Act 451
Operating License Renewal Application for Existing Facility

Michigan State University
Waste Storage Facility
Environmental Health & Safety

T.3N, R.2W, Section 1
Delhi Township
Ingham County, Michigan

July 24, 2023

EGLE

Michigan Department of Environment, Great Lakes, and Energy
Materials Management Division

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 EGLE 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	MID 053 343 976										
II. FACILITY'S LEGAL OWNER											
A. Name	Michigan State University										
B. Street or P.O. Box	412 Administration Building										
C. City/State/ZIP	East Lansing, MI 48824										
D. Telephone Number (area code included)	(517) 355-0153										
E. Owner Type	S	F. Ownership Change?	Y		N	X	N/A		Date		
III. FACILITY OPERATOR											
A. Name	Michigan State University										
B. Street or P.O. Box	4000 Collins Road, B20										
C. City/State/ZIP	Lansing, MI 48910										
D. Telephone Number (area code included)	(517) 355-0153										
E. Operator Type	S	F. Operator Change?	Y		N	X	N/A		Date		
IV. TITLEHOLDER OF LAND											
A. Name	Michigan State University										
B. Street or P.O. Box	412 Administration Building										
C. City/State/ZIP	East Lansing, MI 48824										
D. Telephone Number (area coded included)	(517) 355-0153										

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	1980
For RDD activities, provide the date RDD began or expected to begin.	Date	
For new, altered, enlarged, or expanded facilities, provide date expected construction to begin.	Date	

***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		$	500

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 EGLE, Cashier's Office, P.O. Box 30657, Lansing, Michigan 48909-8157, with a copy of payment included with application that is mailed to the EGLE, MMD, 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	MID 053 343 976
☐	D. PSD (Air Emissions From Proposed Sources) Permit Number	
☒	E. Other (Specify below) Permit Number	ROP K3249-2009
	Renewable Operating Permit - EGLE AQD	

VIII. NATURE OF BUSINESS (Provide a brief description)

Michigan State University is a non-profit research and teaching institution.

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 B.1. Quantity	B.2. Unit of Measure	For Official Use Only	Line Number	A. Process Code (from list)	B. Process Design Capacity B.1. Quantity	B.2. Unit of Measure	For Official Use Only
1.	S01	7,900	G		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)
	See Attached List							

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.		
DAN BOLLMAN, VP IPF		7-26-23
OWNER NAME (type or print)	SIGNATURE	DATE SIGNED
BRIAN SMITH		7/26/23
OPERATOR NAME (type or print)	SIGNATURE	DATE SIGNED
MICHIGAN STATE UNIVERSITY		7-26-23
TITLEHOLDEROF LAND NAME (type or print)	SIGNATURE	DATE SIGNED

XIII. Description of Hazardous Wastes				
Line	A. Hazardous Waste Code Number	B. Estimated Annual Quantity of Waste*	C. Unit of Measure	D.1. Process Code
1	D001	120000	P	S01
2	D002	45000	P	S01
3	D003	600	P	S01
4	D004	800	P	S01
5	D005	2500	P	S01
6	D006	1100	P	S01
7	D007	1100	P	S01
8	D008	8000	P	S01
9	D009	500	P	S01
10	D010	500	P	S01
11	D011	2800	P	S01
12	D012	<100	P	S01
13	D013	<100	P	S01
14	D014	<100	P	S01
15	D015	<100	P	S01
16	D016	800	P	S01
17	D017	<100	P	S01
18	D018	1000	P	S01
19	D019	250	P	S01
20	D020	<100	P	S01
21	D021	<100	P	S01
22	D022	5800	P	S01
23	D023	<100	P	S01
24	D024	<100	P	S01
25	D025	<100	P	S01
26	D026	<100	P	S01
27	D027	<100	P	S01
28	D028	<100	P	S01
29	D029	<100	P	S01
30	D030	<100	P	S01
31	D031	<100	P	S01
32	D032	<100	P	S01
33	D033	<100	P	S01
34	D034	<100	P	S01
35	D035	250	P	S01
36	D036	<100	P	S01
37	D037	<100	P	S01
38	D038	1000	P	S01
39	D039	500	P	S01
40	D040	500	P	S01
41	D041	<100	P	S01
42	D042	<100	P	S01
43	D043	<100	P	S01
44	001S	<100	P	S01

XIII. Description of Hazardous Wastes				
Line	A. Hazardous Waste Code Number	B. Estimated Annual Quantity of Waste*	C. Unit of Measure	D.1. Process Code
45	002S	400	P	S01
46	003S	<100	P	S01
47	004S	<100	P	S01
48	005S	<100	P	S01
49	006S	<100	P	S01
50	007S	<100	P	S01
51	F001	10000	P	S01
52	F002	30000	P	S01
53	F003	50000	P	S01
54	F004	<100	P	S01
55	F005	12000	P	S01
56	F025	<100	P	S01
57	F027	<100	P	S01
58	F032	<100	P	S01
59	F035	<100	P	S01
60	F039	<100	P	S01
61	P001	<100	P	S01
62	P002	<100	P	S01
63	P003	<100	P	S01
64	P004	<100	P	S01
65	P005	<100	P	S01
66	P006	<100	P	S01
67	P007	<100	P	S01
68	P008	<100	P	S01
69	P009	<100	P	S01
70	P010	<100	P	S01
71	P011	<100	P	S01
72	P012	<100	P	S01
73	P013	<100	P	S01
74	P014	<100	P	S01
75	P015	<100	P	S01
76	P016	<100	P	S01
77	P017	<100	P	S01
78	P018	<100	P	S01
79	P020	<100	P	S01
80	P021	<100	P	S01
81	P022	<100	P	S01
82	P023	<100	P	S01
83	P024	<100	P	S01
84	P026	<100	P	S01
85	P027	<100	P	S01
86	P028	<100	P	S01
87	P029	<100	P	S01
88	P030	250	P	S01

XIII. Description of Hazardous Wastes				
Line	A. Hazardous Waste Code Number	B. Estimated Annual Quantity of Waste*	C. Unit of Measure	D.1. Process Code
89	P031	<100	P	S01
90	P033	<100	P	S01
91	P034	<100	P	S01
92	P036	<100	P	S01
93	P037	<100	P	S01
94	P039	<100	P	S01
95	P040	<100	P	S01
96	P041	<100	P	S01
97	P042	<100	P	S01
98	P043	<100	P	S01
99	P044	<100	P	S01
100	P045	<100	P	S01
101	P046	<100	P	S01
102	P047	<100	P	S01
103	P048	<100	P	S01
104	P049	<100	P	S01
105	P050	<100	P	S01
106	P051	<100	P	S01
107	P054	<100	P	S01
108	P056	<100	P	S01
109	P057	<100	P	S01
110	P058	<100	P	S01
111	P059	<100	P	S01
112	P060	<100	P	S01
113	P062	<100	P	S01
114	P063	<100	P	S01
115	P064	<100	P	S01
116	P066	<100	P	S01
117	P067	<100	P	S01
118	P068	<100	P	S01
119	P069	<100	P	S01
120	P070	<100	P	S01
121	P071	<100	P	S01
122	P072	<100	P	S01
123	P073	<100	P	S01
124	P074	<100	P	S01
125	P075	<100	P	S01
126	P076	<100	P	S01
127	P077	<100	P	S01
128	P078	<100	P	S01
129	P081	<100	P	S01
130	P082	<100	P	S01
131	P084	<100	P	S01
132	P085	<100	P	S01

XIII. Description of Hazardous Wastes				
Line	A. Hazardous Waste Code Number	B. Estimated Annual Quantity of Waste*	C. Unit of Measure	D.1. Process Code
133	P087	<100	P	S01
134	P088	<100	P	S01
135	P089	<100	P	S01
136	P092	<100	P	S01
137	P093	<100	P	S01
138	P094	<100	P	S01
139	P097	<100	P	S01
140	P098	<100	P	S01
141	P099	<100	P	S01
142	P101	<100	P	S01
143	P102	<100	P	S01
144	P103	<100	P	S01
145	P104	<100	P	S01
146	P105	<100	P	S01
147	P106	<100	P	S01
148	P108	<100	P	S01
149	P109	<100	P	S01
150	P110	<100	P	S01
151	P111	<100	P	S01
152	P112	<100	P	S01
153	P113	<100	P	S01
154	P114	<100	P	S01
155	P115	<100	P	S01
156	P116	<100	P	S01
157	P118	<100	P	S01
158	P119	<100	P	S01
159	P120	<100	P	S01
160	P121	<100	P	S01
161	P122	<100	P	S01
162	P123	<100	P	S01
163	P127	<100	P	S01
164	P128	<100	P	S01
165	P185	<100	P	S01
166	P188	<100	P	S01
167	P189	<100	P	S01
168	P190	<100	P	S01
169	P191	<100	P	S01
170	P192	<100	P	S01
171	P194	<100	P	S01
172	P196	<100	P	S01
173	P197	<100	P	S01
174	P198	<100	P	S01
175	P199	<100	P	S01
176	P201	<100	P	S01

XIII. Description of Hazardous Wastes				
Line	A. Hazardous Waste Code Number	B. Estimated Annual Quantity of Waste*	C. Unit of Measure	D.1. Process Code
177	P202	<100	P	S01
178	P203	<100	P	S01
179	P204	<100	P	S01
180	P205	<100	P	S01
181	U001	<100	P	S01
182	U002	600	P	S01
183	U003	500	P	S01
184	U004	<100	P	S01
185	U005	<100	P	S01
186	U006	<100	P	S01
187	U007	200	P	S01
188	U008	<100	P	S01
189	U009	<100	P	S01
190	U010	<100	P	S01
191	U011	<100	P	S01
192	U012	<100	P	S01
193	U014	<100	P	S01
194	U015	<100	P	S01
195	U016	<100	P	S01
196	U017	<100	P	S01
197	U018	<100	P	S01
198	U019	200	P	S01
199	U020	<100	P	S01
200	U021	<100	P	S01
201	U022	<100	P	S01
202	U023	<100	P	S01
203	U024	<100	P	S01
204	U025	<100	P	S01
205	U026	<100	P	S01
206	U027	<100	P	S01
207	U028	<100	P	S01
208	U029	<100	P	S01
209	U030	<100	P	S01
210	U031	200	P	S01
211	U032	<100	P	S01
212	U033	<100	P	S01
213	U034	<100	P	S01
214	U035	<100	P	S01
215	U036	<100	P	S01
216	U037	<100	P	S01
217	U038	<100	P	S01
218	U039	<100	P	S01
219	U041	<100	P	S01
220	U042	<100	P	S01

XIII. Description of Hazardous Wastes				
Line	A. Hazardous Waste Code Number	B. Estimated Annual Quantity of Waste*	C. Unit of Measure	D.1. Process Code
221	U043	<100	P	S01
222	U044	300	P	S01
223	U045	<100	P	S01
224	U046	<100	P	S01
225	U047	<100	P	S01
226	U048	<100	P	S01
227	U049	<100	P	S01
228	U050	<100	P	S01
229	U051	<100	P	S01
230	U052	<100	P	S01
231	U053	<100	P	S01
232	U055	<100	P	S01
233	U056	150	P	S01
234	U057	<100	P	S01
235	U058	<100	P	S01
236	U059	<100	P	S01
237	U060	<100	P	S01
238	U061	<100	P	S01
239	U062	<100	P	S01
240	U063	<100	P	S01
241	U064	<100	P	S01
242	U066	<100	P	S01
243	U067	<100	P	S01
244	U068	<100	P	S01
245	U069	<100	P	S01
246	U070	<100	P	S01
247	U071	<100	P	S01
248	U072	<100	P	S01
249	U073	<100	P	S01
250	U074	<100	P	S01
251	U075	<100	P	S01
252	U076	<100	P	S01
253	U077	<100	P	S01
254	U078	<100	P	S01
255	U079	<100	P	S01
256	U080	200	P	S01
257	U081	<100	P	S01
258	U082	<100	P	S01
259	U083	<100	P	S01
260	U084	<100	P	S01
261	U085	<100	P	S01
262	U086	<100	P	S01
263	U087	<100	P	S01
264	U088	3960	P	S01

XIII. Description of Hazardous Wastes				
Line	A. Hazardous Waste Code Number	B. Estimated Annual Quantity of Waste*	C. Unit of Measure	D.1. Process Code
265	U089	<100	P	S01
266	U090	<100	P	S01
267	U091	<100	P	S01
268	U092	<100	P	S01
269	U093	<100	P	S01
270	U094	<100	P	S01
271	U095	<100	P	S01
272	U096	<100	P	S01
273	U097	<100	P	S01
274	U098	<100	P	S01
275	U099	<100	P	S01
276	U101	<100	P	S01
277	U102	<100	P	S01
278	U103	<100	P	S01
279	U105	<100	P	S01
280	U106	<100	P	S01
281	U107	<100	P	S01
282	U108	<100	P	S01
283	U109	<100	P	S01
284	U110	<100	P	S01
285	U111	<100	P	S01
286	U112	200	P	S01
287	U113	<100	P	S01
288	U114	<100	P	S01
289	U115	<100	P	S01
290	U116	<100	P	S01
291	U117	250	P	S01
292	U118	<100	P	S01
293	U119	<100	P	S01
294	U120	<100	P	S01
295	U121	<100	P	S01
296	U122	200	P	S01
297	U123	<100	P	S01
298	U124	<100	P	S01
299	U125	<100	P	S01
300	U126	<100	P	S01
301	U127	<100	P	S01
302	U128	<100	P	S01
303	U129	<100	P	S01
304	U130	<100	P	S01
305	U131	<100	P	S01
306	U132	<100	P	S01
307	U133	<100	P	S01
308	U134	175	P	S01

XIII. Description of Hazardous Wastes				
Line	A. Hazardous Waste Code Number	B. Estimated Annual Quantity of Waste*	C. Unit of Measure	D.1. Process Code
309	U135	<100	P	S01
310	U136	<100	P	S01
311	U137	<100	P	S01
312	U138	<100	P	S01
313	U140	<100	P	S01
314	U141	<100	P	S01
315	U142	<100	P	S01
316	U143	<100	P	S01
317	U144	<100	P	S01
318	U145	<100	P	S01
319	U146	<100	P	S01
320	U147	<100	P	S01
321	U148	<100	P	S01
322	U149	<100	P	S01
323	U150	<100	P	S01
324	U151	<100	P	S01
325	U152	<100	P	S01
326	U153	<100	P	S01
327	U154	650	P	S01
328	U155	<100	P	S01
329	U156	<100	P	S01
330	U157	<100	P	S01
331	U158	<100	P	S01
332	U159	<100	P	S01
333	U160	<100	P	S01
334	U161	<100	P	S01
335	U162	<100	P	S01
336	U163	<100	P	S01
337	U164	<100	P	S01
338	U165	<100	P	S01
339	U166	<100	P	S01
340	U167	<100	P	S01
341	U168	<100	P	S01
342	U169	<100	P	S01
343	U170	<100	P	S01
344	U171	<100	P	S01
345	U172	<100	P	S01
346	U173	<100	P	S01
347	U174	<100	P	S01
348	U176	<100	P	S01
349	U177	<100	P	S01
350	U178	<100	P	S01
351	U179	<100	P	S01
352	U180	<100	P	S01

XIII. Description of Hazardous Wastes				
Line	A. Hazardous Waste Code Number	B. Estimated Annual Quantity of Waste*	C. Unit of Measure	D.1. Process Code
353	U181	<100	P	S01
354	U182	<100	P	S01
355	U183	<100	P	S01
356	U184	<100	P	S01
357	U185	<100	P	S01
358	U186	<100	P	S01
359	U187	<100	P	S01
360	U188	200	P	S01
361	U189	<100	P	S01
362	U190	<100	P	S01
363	U191	<100	P	S01
364	U192	<100	P	S01
365	U193	<100	P	S01
366	U194	<100	P	S01
367	U196	<100	P	S01
368	U197	<100	P	S01
369	U200	<100	P	S01
370	U201	<100	P	S01
371	U203	<100	P	S01
372	U204	<100	P	S01
373	U205	<100	P	S01
374	U206	<100	P	S01
375	U207	<100	P	S01
376	U208	<100	P	S01
377	U209	<100	P	S01
378	U210	<100	P	S01
379	U211	<100	P	S01
380	U213	250	P	S01
381	U214	<100	P	S01
382	U215	<100	P	S01
383	U216	<100	P	S01
384	U217	<100	P	S01
385	U218	<100	P	S01
386	U219	<100	P	S01
387	U220	250	P	S01
388	U221	<100	P	S01
389	U222	<100	P	S01
390	U223	<100	P	S01
391	U225	<100	P	S01
392	U226	<100	P	S01
393	U227	<100	P	S01
394	U228	<100	P	S01
395	U234	<100	P	S01
396	U235	<100	P	S01

XIII. Description of Hazardous Wastes				
Line	A. Hazardous Waste Code Number	B. Estimated Annual Quantity of Waste*	C. Unit of Measure	D.1. Process Code
397	U236	<100	P	S01
398	U237	<100	P	S01
399	U238	<100	P	S01
400	U239	250	P	S01
401	U240	<100	P	S01
402	U243	<100	P	S01
403	U244	<100	P	S01
404	U246	<100	P	S01
405	U247	<100	P	S01
406	U248	<100	P	S01
407	U249	<100	P	S01
408	U271	<100	P	S01
409	U278	<100	P	S01
410	U279	<100	P	S01
411	U280	<100	P	S01
412	U328	<100	P	S01
413	U353	<100	P	S01
414	U359	<100	P	S01
415	U364	<100	P	S01
416	U367	<100	P	S01
417	U372	<100	P	S01
418	U373	<100	P	S01
419	U387	<100	P	S01
420	U389	<100	P	S01
421	U394	<100	P	S01
422	U395	<100	P	S01
423	U404	<100	P	S01
424	U409	<100	P	S01
425	U410	<100	P	S01
426	U411	<100	P	S01
427	001U	<100	P	S01
428	002U	<100	P	S01
429	003U	<100	P	S01
430	004U	<100	P	S01
431	005U	<100	P	S01
432	007U	<100	P	S01
433	011U	<100	P	S01
434	012U	<100	P	S01
435	014U	<100	P	S01
436	020U	<100	P	S01
437	023U	<100	P	S01
438	027U	<100	P	S01
439	029U	<100	P	S01
440	032U	<100	P	S01

XIII. Description of Hazardous Wastes				
Line	A. Hazardous Waste Code Number	B. Estimated Annual Quantity of Waste*	C. Unit of Measure	D.1. Process Code
441	033U	<100	P	S01
442	036U	<100	P	S01
443	038U	<100	P	S01
444	040U	<100	P	S01
445	042U	<100	P	S01
446	046U	<100	P	S01
447	048U	<100	P	S01
448	051U	<100	P	S01
449	052U	<100	P	S01
450	054U	<100	P	S01
451	056U	<100	P	S01
452	057U	<100	P	S01
453	061U	<100	P	S01
454	068U	<100	P	S01
455	070U	<100	P	S01
456	073U	<100	P	S01
457	075U	<100	P	S01
458	076U	<100	P	S01
459	078U	<100	P	S01
460	079U	<100	P	S01
461	086U	<100	P	S01
462	089U	<100	P	S01
463	090U	<100	P	S01
464	094U	<100	P	S01
465	097U	<100	P	S01
466	098U	<100	P	S01
467	100U	<100	P	S01
468	104U	<100	P	S01
469	106U	<100	P	S01
470	108U	<100	P	S01
471	169U	<100	P	S01
472	110U	<100	P	S01
473	111U	<100	P	S01
474	112U	<100	P	S01
475	113U	<100	P	S01
476	115U	<100	P	S01
477	116U	<100	P	S01
478	117U	<100	P	S01
479	118U	<100	P	S01
480	119U	<100	P	S01
481	124U	<100	P	S01
482	127U	<100	P	S01
483	128U	<100	P	S01
484	129U	<100	P	S01

XIII. Description of Hazardous Wastes				
Line	A. Hazardous Waste Code Number	B. Estimated Annual Quantity of Waste*	C. Unit of Measure	D.1. Process Code
485	131U	<100	P	S01
486	134U	<100	P	S01
487	136U	<100	P	S01
488	138U	<100	P	S01
489	139U	<100	P	S01
490	142U	<100	P	S01
491	143U	<100	P	S01
492	150U	<100	P	S01
493	151U	<100	P	S01
494	153U	<100	P	S01
495	154U	<100	P	S01
496	160U	<100	P	S01
497	165U	<100	P	S01
498	170U	<100	P	S01
499	171U	<100	P	S01
500	174U	<100	P	S01
501	175U	<100	P	S01

***Estimated Annual Quantities of Waste are variable based on quantity and type of research being conducted at MSU. Refer to most recent Biennial Report for more precise quantities of waste received and stored at the Waste Storage Facility.**

EGLE

MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
MATERIALS MANAGEMENT DIVISION

SITE IDENTIFICATION FORM

You must save this file to your computer before completing the form
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

1. Reason for Submittal (Select only one)

☐	Obtaining an initial United States Environmental Protection Agency (EPA) Identification (ID) number, **as a new site or new owner,** for an on-going regulated activity that will continue for a period of time. **FEES DO NOT APPLY TO LIB ONLY SITES. 1. Pay the $50 fee** on-line using MasterCard, VISA, or Discover Card at https://www.thepayplace.com/mi/deq/siteid. **2. Enter Payment Verification Code: Site!5150. 3. E-mail the form**, with a copy of the fee receipt, to EGLE-MMD-Site-ID-Reporting@Michigan.gov; or, Mail the form with check payable to the State of Michigan to: Michigan Department of Environment, Great Lakes and Energy (EGLE), Cashier's Office–HWUC, P.O. Box 30657, Lansing, Michigan 48909-7741.
☑	Submitting a subsequent notification to change, update, or verify site information for an existing owner of a site with a previously issued Site ID number. E-mail to EGLE-MMD-Site-ID-Reporting@Michigan.gov
☐	* NOTIFYING that **SITE IS STILL IN BUSINESS AND NO LONGER GENERATING WASTE (end date required)** _____ Authorized Signature_____ Date_____ * *E-mail completed pages 1-2 to* EGLE-MMD-Site-ID-Reporting@Michigan.gov
☐	*NOTIFYING that **SITE IS OUT OF BUSINESS AND NO LONGER GENERATING WASTE (end date required)** _____ Authorized Signature_____ Date_____ **E-mail completed pages 1-2 to* EGLE-MMD-Site-ID-Reporting@Michigan.gov
☐	Obtaining or updating an EPA ID number for conducting Electronic Manifest Broker activities.
☐	Submitting a new or revised Part A Form.
☐	Submitting as component of the Hazardous Waste Biennial Report for _____(Reporting Year)
☐	Former TSD facility, reverse distributor, and/or generator of less than 1,000 kilograms(kg) hazardous waste, less than 1 kg acute hazardous waste, or 100 kg acute hazardous waste spill cleanup in one or more months of the reporting year.

2. Site EPA ID Number

M	I	D	0	5	3	3	4	3	9	7	6

3. Site Legal Name

Michigan State University

4. Site Specific Name

MSU Waste Storage Facility

Site ID M I D 0 5 3 3 4 3 9 7 6

5. Site Location Address

Street Address 3634 E. Jolly Road		
Street Address (room/suite/mail code)		
City, Town, or Village Lansing		County Ingham
State Michigan	Country United States	Zip Code 48910

6. Site Mailing Address ☐ **Same as Location Address**

Street Address 4000 Collins Road		
Street Address (room/suite/mail code) B20		
City, Town, or Village Lansing		County Ingham
State Michigan	Country United States	Zip Code 48910

7. Federal Tax ID # (required)

38-6005984

8. Site Land Type (check one)

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

9. North American Industry Classification System (NAICS) at least one 6-digit code REQUIRED

A	B	C	D
611310			

10. Site Contact Information ☐ **Same as Location Address**

First Name Brian	MI	Last Name Smith
Street Address 4000 Collins Road, B20		
City, Town, or Village Lansing		
State Michigan	Country United State	Zip Code 48910
Email smithb97@msu.edu		
Phone (517) 355-0153	Ext	Fax

11. Name of Site's Legal Owner (Company or Individual) ☐ **Change in Ownership**

Approximate date became owner_____ ☑ **Same as Site Mailing Address**

Full Name		
Street Address		
City, Town, or Village		
State	Country	Zip Code
Email		
Phone	Ext	Fax

Site ID M I D 0 5 3 3 4 3 9 7 6

11(b) Name of Site's Legal Operator (Company or Individual) ☐ **Change in Operator**

Approximate date became operator_____ ☑ **Same as Site Specific Name/Address**

Full Name		
Street Address		
City, Town, or Village		
State	Country	Zip Code
Email		
Phone	Ext	Fax

Hazardous Waste Activities (Please complete all questions)

12. Type of Regulated Waste Activity Date Activity Began ☐

☑ Y ☐ N	1. Generator of Hazardous Waste – If "Yes", mark only one of the following:	
☑	**Large Quantity Generator (LQG)**	-Generates, in any calendar month (includes quantities imported by importer site), 1,000 kg per month (mo) (2,200 pounds (lb)/mo) or more of non-acute hazardous waste; or -Generates, in any calendar month or accumulates at any time, more than 1 kg/mo (2.2 lb/mo) of acute hazardous waste; or -Generates, in any calendar month or accumulates at any time, more than 100 kg/mo (220 lb/mo) of acute hazardous spill cleanup material
☐	**Small Quantity Generator (SQG)**	100 to 1,000 kg/mo (220 to 2,200 lb/mo) of non-acute hazardous waste, and no more than 1 kg (2.2 lb) of acute hazardous waste, and no more than 100 kg (220 lb) of any acute hazardous spill cleanup material
☐	**Very Small Quantity Generator (VSQG)**	Less than, or equal to, 100 kg/mo (220 lb/mo) of non-acute hazardous waste
Please answer all questions		
☐ Y ☑ N	2. Short Term Generator (generates 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. Treater, Stores or Disposer of Hazardous Waste – Hazardous waste Part B permit is required for these activities	
☑ Y ☐ N	4. Receives Hazardous Waste from Off-site	
☐ Y ☑ N	5. Recycler of Hazardous Waste	
	☐ who stores prior to recycling ☐ who does not store prior to recycling	
☐ Y ☑ N	6. Exempt Boiler and/or Industrial Furnace – If "Yes", mark all that apply.	
	☐ Small Quantity On-site Burner Exemption	
	☐ Smelting, Melting, and Refining Furnace Exemption	

Waste Codes for Federally Regulated Hazardous Waste. 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, D002, F007, U112). Use an additional page if more spaces are needed.

See Comments						

Waste Codes for State Regulated (non-Federal) Hazardous Waste. Please list the waste codes of the State 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.

13. Additional Regulated Waste Activities

Other Waste Activities

☑ Y ☐ N	**Transporter of Hazardous Waste** – If "Yes", mark all that apply. **(May require permits or registration)**
	☐ Transporter
	☐ Transfer Facility (at your site)
☐ Y ☑ N	Commingle Waste
☐ Y ☑ N	Off Loads During Transportation
☐ Y ☑ N	Underground Injection Control
☐ Y ☑ N	United States Importer of Hazardous Waste
☐ Y ☑ N	Recognized Trader – If "Yes", mark all that apply
	☐ Importer
	☐ Exporter
☐ Y ☑ N	Importer/Exporter of Spent Lead-Acid Batteries (SLABs under R 299.9804) – If "Yes", mark all that apply.
	☐ Importer
	☐ Exporter

Universal Waste Activities

☑ Y ☐ N	Large Quantity Handler of Universal Waste (accumulate 5,000 kg or more) – If "Yes", mark all that apply. Note: Refer to state regulations to determine what is regulated.
	☐ Batteries
	☑ Pesticides
	☐ Thermostats
	☐ Mercury Switches
	☐ Mercury Thermometers
	☐ Devices containing elemental mercury
	☐ Electric Lamps
	☑ Pharmaceuticals
	☐ Consumer Electronics
	☐ Antifreeze as defined in R 299.9101
☐ Y ☑ N	Destination Facility of Universal Waste **(a hazardous waste permit may be required for this activity)**

Used Oil Activities

☑ Y ☐ N	Used Oil Transporter – If "Yes", mark all that apply.
	☑ Transporter
	☐ Transfer Facility (at your site)
☐ Y ☑ N	Used Oil Processor and/or Re-refiner – If "Yes," mark all that apply.
	☐ Processor Date Activity Began:
	☐ Re-refiner Date Activity Began:
☐ Y ☑ N	Off-Specification Used Oil Burner Date Activity Began:
☐ Y ☑ N	Used Oil Fuel Marketer – If "Yes", mark all that apply.
	☐ Marketer Who Directs Shipment of Off-Specification Used Oil to Off-Specification Used Oil Burner Date Activity Began:
	☐ Marketer Who First Claims the Used Oil Meets the Specifications Date Activity Began:
☐ Y ☑ N	Used Oil Collection or Aggregation Point
☐ Y ☑ N	Collection Center or Aggregation Point that accepts DIY Used Oil

Liquid Industrial By-Product Activities

☑ Y ☐ N	Liquid Industrial By-Product Transporter – If "Yes", mark all that apply. **(requires Permit & Registration)**
	☑ Transporter Date Activity Began:
	☐ Transfer Facility (at your site) Date Activity Began:
☑ Y ☐ N	Transports Own Waste. Date Activity Began:
☑ Y ☐ N	Liquid Industrial Waste By-Product Generator. Date Activity Began:
☐ Y ☑ N	Liquid Industrial By-Product Designated Facility. Date Activity Began:

14. Eligible Academic Entities with Laboratories - Notification for opting into or withdrawing from managing laboratory hazardous wastes pursuant to R 299.9315.

☐ Y ☑ N	Opting into, or currently operating under, R 299.9315, for the management of hazardous wastes in laboratories. If "Yes", mark all that apply. NOTE: See the item-by-item instructions for definitions of types of eligible academic entities.
	☐ College or University
	☐ Teaching Hospital that is owned by, or has a formal written affiliation with, a college or university
	☐ Non-profit Institute that is owned by, or has a formal written affiliation with, a college or university
☑ Y ☐ N	Withdrawing from R 299.9315, for the management of hazardous wastes in laboratories.

15. Episodic Generation

☐ Y ☑ N	Are you an SQG or VSQG generating hazardous waste from a planned or unplanned episodic event, lasting no more than 60 days, that moves you to a higher generator category? If "Yes", you must fill out the Addendum for Episodic Generator.

16. LQG Consolidation of VSQG Hazardous Waste

☐ Y ☑ N	Are you an LQG notifying of consolidating VSQG hazardous waste under the control of the same person pursuant to R 299.9307(6)? If "Yes", you must fill out the Addendum for LQG Consolidation of VSQGs hazardous waste.

17. Notification of LQG Site Closure for a Central Accumulation Area (CAA) (optional) OR Entire Facility (Required)

☐ Y ☑ N	LQG Site Closure of a Central Accumulation Area (CAA) or Entire Facility
	☐ Central Accumulation Area (CAA)
	☐ Entire Facility
	Expected Closure date:
	Requesting new closure date:
	Date Closed:
☐ Y ☐ N	In compliance with the closure performance standards R 299.9307(1)(k)
☐ Y ☐ N	Not in compliance with the closure performance standards R 299.9307(1)(k)

18. Notification of Hazardous Secondary Material (HSM) Activity

☐ Y ☑ N	Are you notifying under R 299.9204(1) that you will begin managing, are managing, or will stop managing HSM under R 299.9204(1), R 299.9204(1)(aa – dd)? If "Yes", you must fill out the Addendum to the Site Identification Form for Managing Hazardous Secondary Material.

19. Electronic Manifest Broker

☐ Y ☑ N	Are you notifying as a person, as defined in 40 CFR 260.10, electing to use the EPA electronic manifest system to obtain, complete, and transmit an electronic manifest under a contractual relationship with a hazardous waste generator?

20. Comments (include item number for each comment)

#12 - See Attachment XIII for EQP5111 for a lsit of wastes accepted at the MSU WSF.

21. 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.
Note: For the RCRA Hazardous Waste Part A Permit Application, all owners and operators must sign (see 40 CFR 270.10(b) and 270.11).

Signature of legal owner, operator, or authorized representative: Brian D. Smith	Date (mm/dd/yyyy): 07/26/2023
Printed Name (First, Middle Initial, Last): Brian D. Smith	Title: Hazardous Waste Coordinator
Email: Smithb97@msu.edu	

Signature of legal owner, operator, or authorized representative	Date (mm/dd/yyyy)
Printed Name (First, Middle Initial, Last)	Title
Email	

Site ID M I D 0 5 3 3 4 3 9 7 6

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 rule R 299.9204 (1)(aa - dd) of Part 111;

AND

a. You are or will be managing excluded HSM in compliance with rules R 299.9202 (6)(a – f), or R 299.9204 (1)(aa – dd) (or federal equivalent) or 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. Note: if your facility was granted a solid waste variance under rules R 299.9202 (6)(a – f) prior to July 13, 2015, your management of HSM under rules R 299.9202 (6)(a – f) is grandfathered under the previous regulations and you are not required to notify for the HWM management activity excluded under rules R 299.9202 (6)(a – f).

Reason for Notification (include dates where requested)

Facility will begin managing excluded HSM as of_____

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_____ and is notifying as required.

Description of Excluded HSM Activity: Please list the appropriate codes (see Code List section of the instructions) 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.

Facility Code	HSM Waste Codes	Est. Short Tons of Excluded HSM Managed Annually	Actual Short Tons of Excluded HSM Managed During the Most Recent Odd-numbered Year	Land-based Unit Code

Site ID M I D 0 5 3 3 4 3 9 7 6

ADDENDUM TO THE SITE IDENTIFICATION FORM
EPISODIC GENERATOR

ONLY fill out this form if:

You are an SQG or VSQG generating hazardous waste from a planned or unplanned episodic event, lasting no more than 60 days, that moves the generator to a higher generator category pursuant to R 299.9316. Note: Only one planned and one unplanned episodic event are allowed within one year. Otherwise, you must follow the requirements of the higher generator category. Use additional pages if more space is needed.

Type of Episodic Event

Planned (requires **30 day** prior notification)	**Unplanned** (requires notification within **72 hours**)
☐ Excess chemical inventory removal ☐ Tank Cleanouts ☐ Short-term construction or demolition ☐ Equipment maintenance during plant shutdowns ☐ Other_____	☐ Accidental Spills ☐ Production process upsets ☐ Product recalls ☐ "Acts of nature" (Tornado, hurricane, flood, etc.) ☐ Other_____
Emergency Contact Phone	Emergency Contact Name
Beginning Date	End Date

Waste 1

Waste Description				Estimated Quantity (in pounds)	
Federal and/or State Hazardous Waste Codes					

Waste 2

Waste Description				Estimated Quantity (in pounds)	
Federal and/or State Hazardous Waste Codes					

Waste 3

Waste Description				Estimated Quantity (in pounds)	
Federal and/or State Hazardous Waste Codes					

Site ID M I D 0 5 3 3 4 3 9 7 6

ADDENDUM TO THE SITE IDENTIFICATION FORM

LQG CONSOLIDATION OF VSQG HAZARDOUS WASTE

ONLY fill out this form if:

You are an LQG receiving hazardous waste from VSQGs under the control of the same person. Use additional pages if more space is needed.

VSQG 1

Site ID Number (if assigned)	Name	
Street Address		
City, Town, or Village	State	Zip Code
Contact Phone Number	Contact Name	
Email		

VSQG 2

Site ID Number (if assigned)	Name	
Street Address		
City, Town, or Village	State	Zip Code
Contact Phone Number	Contact Name	
Email		

VSQG 3

Site ID Number (if assigned)	Name	
Street Address		
City, Town, or Village	State	Zip Code
Contact Phone Number	Contact Name	
Email		

A1: General Facility Description:
PA 451 Part 111 R299.9504, R 299.9508, 40 CFR 270.13, 40 CFR 270.14

The Michigan State University (MSU) Waste Storage Facility (WSF) was constructed as a central storage location for all chemical (i.e. hazardous and liquid industrial by-product) waste generated by MSU owned and operated properties. The MSU WSF is owned by MSU and is operated by the Environmental Health & Safety (EHS) Department. Due to MSU being a public land-grant University and research institution, a wide range of chemical waste is generated and transported to the WSF. EHS provides safe, effective storage of these wastes at the WSF prior to being transported to a licensed hazardous waste disposal facility. No active treatment of waste occurs at the MSU WSF.

The MSU WSF is comprised of three interconnected buildings on less than 5 acres of land located at the southwest intersection of East Jolly and Collins Roads. See Figure A1-1 for a site area map. Specific building information is as follows:

Building*	Room #	Room Type	Containment Capacity (gal)	Containment Type	HVAC	Fire Suppression	Security
ESB	100	Consolidation	3,200	Recessed 6" concrete floor sealed with polyurea	Heat	Inergen	Keycard Entry
	110	Mechanical	N/A				
	120	Lab Pack	1,234				
	130	Storage/Drying	389				
MSB	N/A	Storage	N/A	Concrete slab sealed with polyurea	None	None	Keycard Entry
WSB	100	Storage	N/A	N/A	Heat, A/C	Halon	Keycard Entry
	101	Mechanical	N/A	N/A	None	None	Key Entry
	102	Bathroom	N/A	N/A	Heat, A/C	Halon	Keycard Entry
	105	Utility Room	N/A	Recessed 6" concrete floor sealed with polyurea	None		
	110	Office	N/A		Heat, A/C		
	120	Waste Storage	5797		Heat		

*ESB – East Storage Building
MSB – Middle Storage Building
WSB – West Storage Building

The waste process for the MSU WSF is as follows. Chemical waste is generated by MSU owned and operated properties, which is then characterized by trained EHS waste personnel based on generator knowledge of chemical constituents identified on the MSU Hazardous Waste Pick Up Tag. This process is discussed further in Sections A2 and A3. Wastes are segregated, packed, and transported out to the

WSF in State licensed waste hauling vehicles. The WSF accepts all waste generated by MSU owned and operated properties except those identified in Appendix A1-1 of this section.

Once waste is transported out to the WSF, trucks are unloaded, and waste is segregated according to compatibility. Waste containers that are less than 5-gallons in size are placed in Room 120 and sorted in one of two ways: (1) wastes that are compatible with bulk profiled waste streams are poured into 5-gallon containers with other compatible wastes to be eventually poured into 55-gallon profiled waste streams; and (2) materials that cannot be poured up are segregated by hazard class and compatibility for eventual lab pack by licensed third party waste vendor.

Trained EHS personnel consolidate containers of compatible waste into pre-determined waste streams that are profiled through a licensed third-party waste disposal vendor. Drums are stored in Room 100 of the ESB with overflow capacity available in Room 100 of the WSB. In addition to drum waste, Room 100 of the WSB is utilized for storage of flammable paints and aerosols (contained in flammable cabinets), Universal Waste, Liquid Industrial By-Product, Used Oil, and RCRA empty containers for disposal/recycling.

Room 130 in the ESB is utilized as a drying room for the small RCRA-empty bottles of waste prior to disposal. The RCRA empty 5-gallon containers are stored in cages in the MSB prior to being disposed of by a licensed third-party waste vendor. The remainder of the MSB is utilized for storage of supplies and new drums and containers. No hazardous or liquid industrial by-product is stored in the MSB.

Designated process areas are identified in Figure A1-2, while building specifications are found in the Engineering Plans included in Section B6. Section C-1 provides detailed information regarding container management.

MICHIGAN STATE UNIVERSITY
WASTE STORAGE FACILITY
Ingham County, Michigan

Adapted From Google Earth

876-1239

N
W E
S

No Scale

STRATA ENVIRONMENTAL SERVICES, INC.

FIGURE A1-1

Michigan State University Waste Storage Facility Location & Surrounding Area

Traffic Light

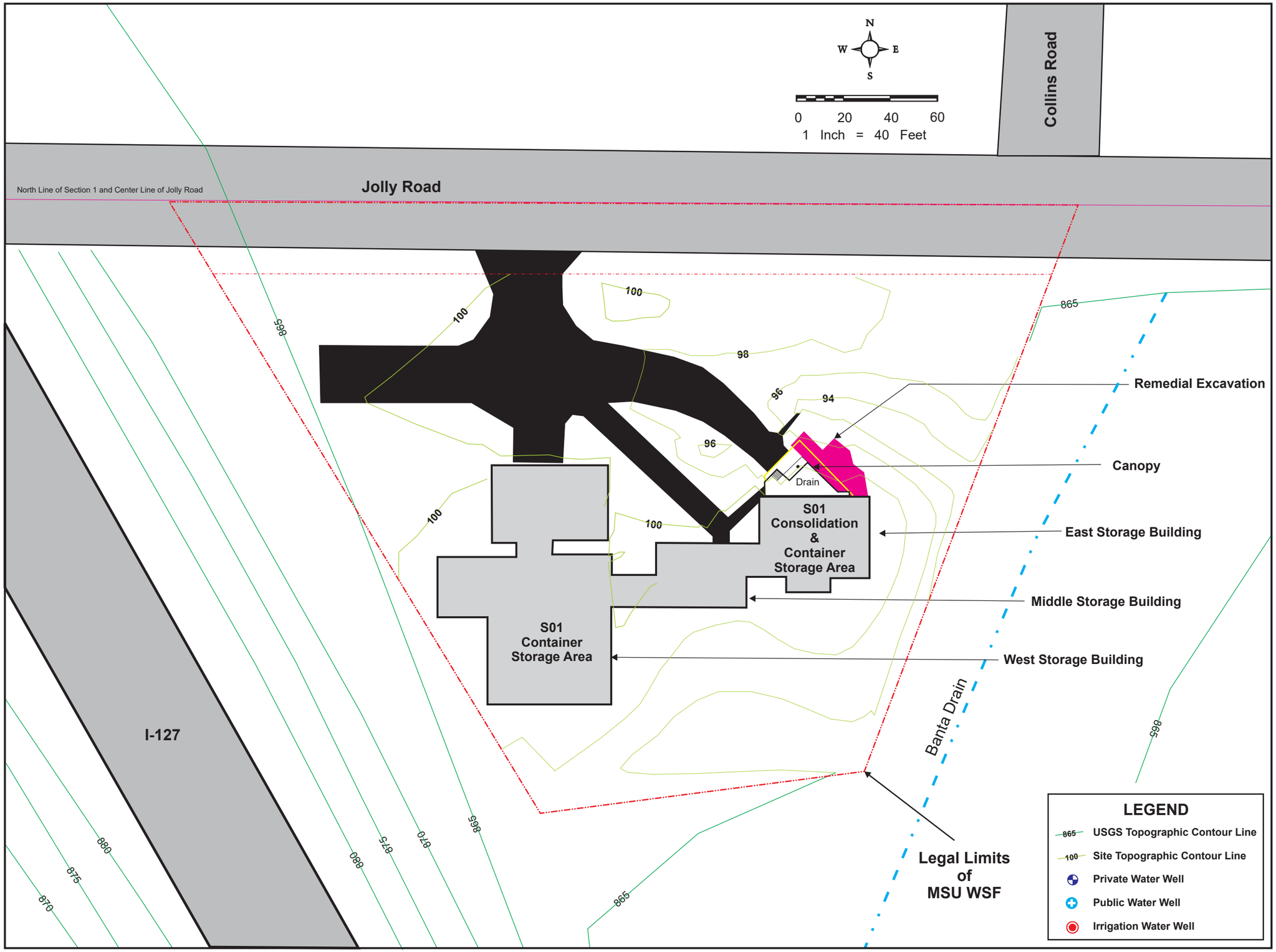


FIGURE A1-2

Michigan State University
Waste Storage Facility

Facility Drawing

STRATA ENVIRONMENTAL SERVICES, INC.

HYDROGEOLOGIC INVESTIGATION
MICHIGAN STATE UNIVERSITY
WASTE STORAGE FACILITY

876-1239

APPENDIX A1-1

WASTES NOT ACCEPTED AT MSU WSF

Appendix A1-1

Wastes Not Accepted at Waste Storage Facility

PA 451 Part 111 R299.9224 Table 205a.

P038 Diethylarsine
P065 Fulminic acid, mercury (II) salt
P095 Phosgene
P096 Phosphine

PA 451 Part 111. R299 9226 Table 205c.

074U Ketene

PA 451 Part 111. R299.9220 Table 203a.

F006 Wastewater treatment sludges from electroplating operations except from the following processes: (1) sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating used on a segregated basis on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning or stripping associated with tin, zinc and aluminum plating on carbon steel: and (6) chemical etching and milling of aluminum.

F007 Spent cyanide plating bath solutions from electroplating operations.

F008 Plating sludges from the bottom of plating baths from electroplating operations where cyanides are used in the process.

F009 Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.

F010 Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.

F011 Spent cyanide solutions from salt bath pot cleaning from metal heat-treating operations.

F012 Quenching wastewater treatment sludges from metal heat-treating operations where cyanides are used in the process.

F019 Wastewater treatment sludges from the chemical conversion coating of aluminum.

F020 Wastes, except wastewater and spent carbon from hydrogen chloride purification, from the production or manufacturing use as a reactant, chemical intermediate, or component in a formulating process, of tri- or tetrachlorophenol or of intermediates used to produce their pesticide derivatives. This listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5-trichlorophenol.

F021 Wastes, except wastewater and spent carbon from hydrogen chloride purification, from the production or manufacturing use as a reactant, chemical intermediate, or component in a formulation process of pentachlorophenol or of intermediates used to produce its derivatives.

F022 Wastes, except wastewater and spent carbon from hydrogen chloride purification, from the manufacturing use as a reactant, chemical intermediate, or component in a formulation" process of tetra-, penta, or hexachlorobenzenes under alkaline conditions.

F023 Wastes, except wastewater and spent carbon from hydrogen chloride purification, from the production of materials on equipment previously used for the production or manufacturing use as a reactant, chemical intermediate, or component in a formulating process of tri- and tetrachlorophenols. This listing does not include wastes from equipment used only for the production or use of hexachlorophene from highly purified 2,4,5-trichlorophenol.

F024 Wastes, including, but not limited to, distillation residues, heavy ends, tars, and reactor cleanout wastes from the production of chlorinated aliphatic hydrocarbons, having a carbon content from 1 to 5, utilizing free radical catalyzed processes. This listing does not include light ends, spent filters and filter aids, spent dessicants, wastewater, wastewater treatment sludges, spent catalysts, and wastes listed in 40 C.F.R. §261.32.

F026 Wastes, except wastewater and spent carbon from hydrogen chloride purification, from the production of materials on equipment previously used for the manufacturing use as a reactant, chemical intermediate, or component in a formulating process of tetra-, penta-, or hexachlorobenzene under alkaline conditions.

F028 Residues resulting from the incineration or thermal treatment of soil contaminated with EPA hazardous waste numbers F020, F021, F022, F023, F026 and F027

F034 Wastewaters, except for those that have not come into contact with process contaminants; process residuals; preservative drippage; and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include KOO1 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote or pentachlorophenol, or both.

F037 Petroleum refinery primary oil/water/solids (oil and/or water and/or solids) separation sludge- any sludge generated from the gravitational separation of oil water/solids during the storage or treatment of process wastewaters and oily cooling wastewaters from petroleum refineries. Such sludges include, but are not limited to, those generated in oil/water/solids separators, tanks and impoundments, ditches and other conveyances, sumps, and stormwater units receiving dry weather flow. Sludges generated in stormwater units that do not receive dry weather flow; sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters; sludges generated in aggressive biological treatment units as defined in R 299.9213(4), including sludges generated in 1 or more additional units after wastewaters have been treated in aggressive biological treatment units; and KOS I wastes are not included in this listing.

F038 Petroleum refinery secondary (emulsified) oil/water/solids (oil and/or water and/or solids) separation sludge- any sludge or float generated from the physical or chemical separation of oil/water/solids in process wastewaters and oily cooling wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in induced air flotation (IAF) units and tanks and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow; sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters; sludges and floats generated in aggressive biological treatment units as defined in R 299.9213(4), including sludges and floats generated in 1 or more additional units after wastewaters have been treated in aggressive biological treatment units; and F037, K048, and K051 wastes are not included in this listing.

PA 451 Part 111. R299.9222 Table 204a.

K001 Bottom sediment sludge from the treatment of wastewaters from wood-preserving processes that use creosote or pentachlorophenol, or both of these compounds

K002 Wastewater treatment sludge from the production of chrome yellow and orange pigments

K003 Wastewater treatment sludge from the production of molybdate orange pigments

K004 Wastewater treatment sludge from the production of zinc yellow pigments.

K005 Wastewater treatment sludge from the production of chrome green pigments

K006 Wastewater treatment sludge from the production of chrome oxide green pigments, anhydrous and hydrated forms

K007 Wastewater treatment sludge from the production of iron blue pigments

K008 Oven residue from the production of chrome oxide green pigments

K009 Distillation bottoms from the production of acetaldehyde from ethylene

K010 Distillation side cuts from the production of acetaldehyde from ethylene

K011 Bottom stream from the wastewater stripper in the production of acrylonitrile

K013 Bottom stream from the acetonitrile column in the Production of acrylonitrile

K014 Bottoms from the acetonitrile purification column in the production of acrylonitrile

K015 Still bottoms from the distillation of benzyl chloride

K016 Heavy ends or distillation residues from the production of carbon tetrachloride

K017 Heavy ends or still bottoms from the purification column in the production of epichlorohydrin

K018 Heavy ends from the fractionation column in ethyl chloride production

K019 Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production

K020 Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production

K021 Aqueous spent antimony catalyst waste from fluoromethanes production

K022 Distillation bottom tars from the production of phenol or acetone from cumene

K023 Distillation light ends from the production of phthalic anhydride from naphthalene

K024 Distillation bottoms from the production of phthalic anhydride from naphthalene

K093 Distillation light ends from the production of phthalic anhydride from ortho-xylene

K094 Distillation bottoms from the production of phthalic anhydride from ortho-xylene

K025 Distillation bottoms from the production of nitrobenzene by the nitration of benzene

K026 Stripping still tails from the production of methyl ethyl pyridines

K027 Centrifuge and distillation residues from toluene diisocyanate production

K028 Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane

K029 Waste from the product steam stripper in the production of 1,1,1-trichloroethane

K095 Distillation bottoms from the production of 1,1,1-trichloroethane

K096 Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane

K039 Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene

K083 Distillation bottoms from aniline production

K103 Process residues from aniline extraction from the production of aniline

K104 Combined wastewater streams generated from nitrobenzene or aniline production

K085 Distillation or fractionation column bottoms from the production of chlorobenzenes

K105 Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes

K107 Column bottoms from product separation from the production of 1,1dimethylhydrazine (UDMH) from carboxylic acid hydrazides

K108 Condensed column overheads from product separation and condensed reactor vent gases from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides

K109 Spent filter cartridges from product purification from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides

K110 Condensed column overheads from intermediate separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides

K111 Product washwaters from the production of dinitrotoluene via nitration of toluene

K112 Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene

K113 Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene

K114 Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene

K115 Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene

K116 Organic condensate from the solvent recovery column in the production of toluene diisocyanate via phosgenation of toluenediamine

K117 Wastewater from the reactor vent gas scrubber in the production of ethylene dibromide via bromination of ethene

K118 Spent adsorbent solids from purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene

K136 Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene

K149 Distillation bottoms from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups. This waste does not include still bottoms from the distillation of benzyl chloride.

K150 Organic residuals, excluding spent carbon adsorbent, from the spent chlorine gas and hydrochloric acid recovery processes associated with the production of alpha- (or methyl-) chlorinated toluenes, ring- chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups

K151 Wastewater treatment sludges, excluding neutralization and biological sludges, generated during the treatment of wastewaters from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups

K156 Organic waste, including heavy ends, still bottoms, light ends, spent solvents, filtrates, and decantates, from the production of carbamates and carbamoyl oximes

K157 Wastewaters, including scrubber waters, condenser waters, washwaters, and separation waters, from the production of carbamates and carbamoyl oximes

K158 Baghouse dusts and filter/separation solids from the production of carbamates and carbamoyl oximes

K159 Organics from the treatment of thiocarbamate wastes

K160 Solids, including filter wastes, separation solids, and spent catalysts, from the production of thiocarbamates and solids from the treatment of thiocarbamates wastes

K161 Purification solids, including filtration, evaporation, and centrifugation solids, bag house dust, and floor sweepings from the production of dithiocarbamates acids and their salts. This listing does not include K125 or K126.

K071 Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used.

K073 Chlorinated hydrocarbon wastes from the purification step of the diaphragm cell process using graphite anodes in chlorine production

K106 Wastewater treatment sludge from the mercury cell process in chlorine production

K031 By-product salts generated in the production of MSMA and cacodylic acid

K032 Wastewater treatment sludge from the production of chlordane

K033 Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane

K034 Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane

K097 Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane

K035 Wastewater treatment sludges generated in the production of creosote

K036 Still bottoms from toluene reclamation distillation in the production of disulfoton

K037 Wastewater treatment sludges from the production of disulfoton

K038 Wastewater production from the washing and stripping of phorate

K039 Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate

K040 Wastewater treatment sludge from the production of phorate

K041 Wastewater treatment sludge from the production of toxaphene

K098 Untreated process wastewater from the production of toxaphene

K042 Heavy ends of distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T

K043 2,6-Dichlorophenol waste from the production of 2,4-D

K099 Untreated wastewater from the production of 2,4-D

K123 Process wastewater, including supernates, filtrates, and washwaters, from the production of ethylenebisdithiocarbamic acid and its salt

K124 Reactor vent scrubber water from the production of ethylenebisdithiocarbamic acid and its salt

K125 Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salt

K126 Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylenebisdithiocarbamic acid and its salts

K131 Wastewater from the reactor and spent sulfuric acid from the acid dryer from the production of methyl bromide

K132 Spent absorbent and wastewater separator solids from the production of methyl bromide

K044 Wastewater treatment sludges from the manufacturing and processing of explosives

K045 Spent carbon from the treatment of wastewater containing explosives

K046 Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds

K047 Pink or red water from TNT operations

K048 Dissolved air floatation, DAF, float from the petroleum refining industry

K049 Slop oil emulsion solids from the petroleum refining industry

K050 Heat exchanger bundle cleaning sludge from the petroleum refining industry

K051 API separator sludge from the petroleum refining industry

K052 Tank bottoms, leaded, from the petroleum refining industry

K061 Emission control dust or sludge from the primary production of steel in electric furnaces

K062 Spent pickle liquor generated by steel finishing (C,T) operations of facilities within the iron and steel industry.

K064 Acid plant blowdown slurry/sludge resulting from the thickening of blowdown slurry from primary copper production

K065 Surface impoundment solids contained in and dredged from surface impoundments at primary lead smelting facilities

K066 Sludge from treatment of process wastewater or acid plant blowdown from primary zinc production, or both

K088 Spent potliners from primary aluminum reduction

K090 Emission control dust or sludge from ferrochromiumsilicon production

K091 Emission control dust or sludge from ferrochromium production

K069 Emission control dust or sludge from secondary lead smelting

K100 Waste leaching solution from acid leaching of emission control dust sludge from secondary lead smelting

K084 Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds

K101 Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds

K102 Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds

K086 Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead

K060 Ammonia still lime sludge from coking operations

K087 Decanter tank tar sludge from coking operations

K141 Process residues from the recovery of coal tar, including, but not limited to, collecting sump residues from the production of coke from coal or the recovery of coke by-products produced from coal. This listing does not include K087.

K142 Tar storage tank residues from the production of coke from coal or from the recovery of coke by-products produced from coal

K143 Process residues from the recovery of light oil, including, but not limited to, those generated in stills, decanters, and wash oil recovery units from the recovery of coke by-products produced from coal

K144 Wastewater sump residues from light oil refining, including, but not limited to, intercepting or contamination sump sludges from the recovery of coke by-products produced from coal

K145 Residues from naphthalene collection and recovery operations from the recovery of coke by-products produced from coal

K147 Tar storage tank residues from coal tar refining.

K148 Residues from coal tar distillation, including, but not limited to, still bottoms

K140 Floor sweepings, off-specification product and spent filter media from the production of 2,4,6-tribromophenol

K169 Crude oil storage tank sediment from petroleum refining operations.

K170 Clarified slurry oil tank sediment and/or in-line filter/separation solids from petroleum refining operations.

K171 Spent Hydrotreating catalyst from petroleum refining operations, including guard beds used to desulfurize feeds to other catalytic reactors (this listing does not include inert support media).

K172 Spent Hydrorefining catalyst from petroleum refining operations, including guard beds used to desulfurize feeds to other catalytic reactors (this listing does not include inert support media).

APPENDIX A1-2

FACILITY PHOTOGRAPHS

View of MSU WSF Entrance on East Jolly Road – Facing Southeast

View of East Storage Building Exterior – Facing South

Photos Taken: May 31, 2023

View of Middle Storage Building Exterior – Facing South

View of West Storage Building Exterior (Office/Mechanical Space) – Facing South

Photos Taken: May 31, 2023

View of West Storage Building– Facing South

View of East Building Loading Dock/Enclosed Canopy

Photos Taken: May 31, 2023

View of West Storage Building Loading Dock/Canopy

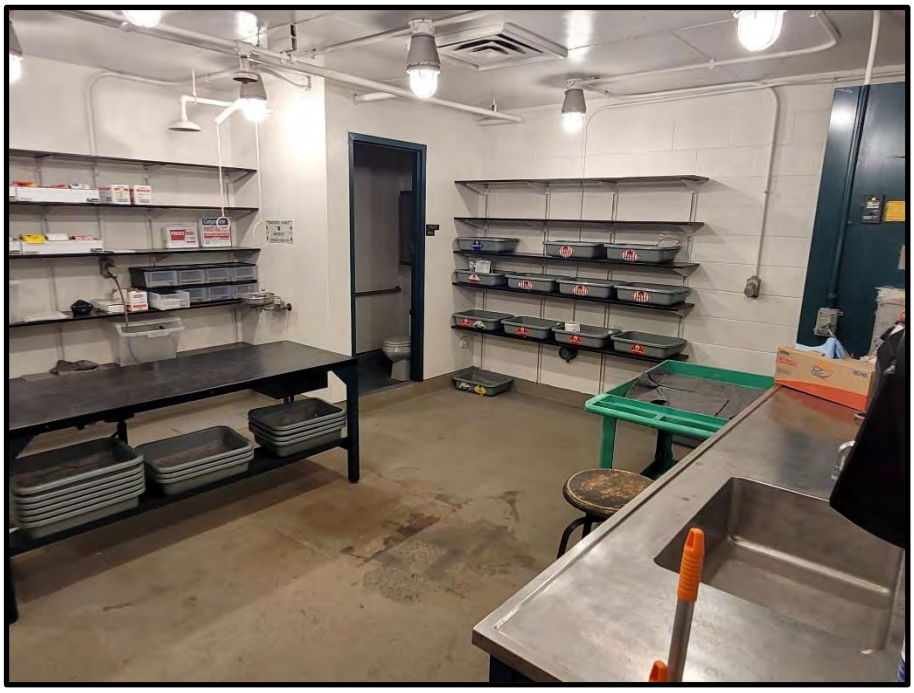
View of Southern Portion of Property – Facing East
From Point of Photo: East Building → Middle Building → West Building

Photos Taken: May 31, 2023

View of East Building Room 100 (Facing Southeast) – Process Code S01

View of East Building Room 100 (Facing Northwest) – Process Code S01

Photos Taken: May 31, 2023

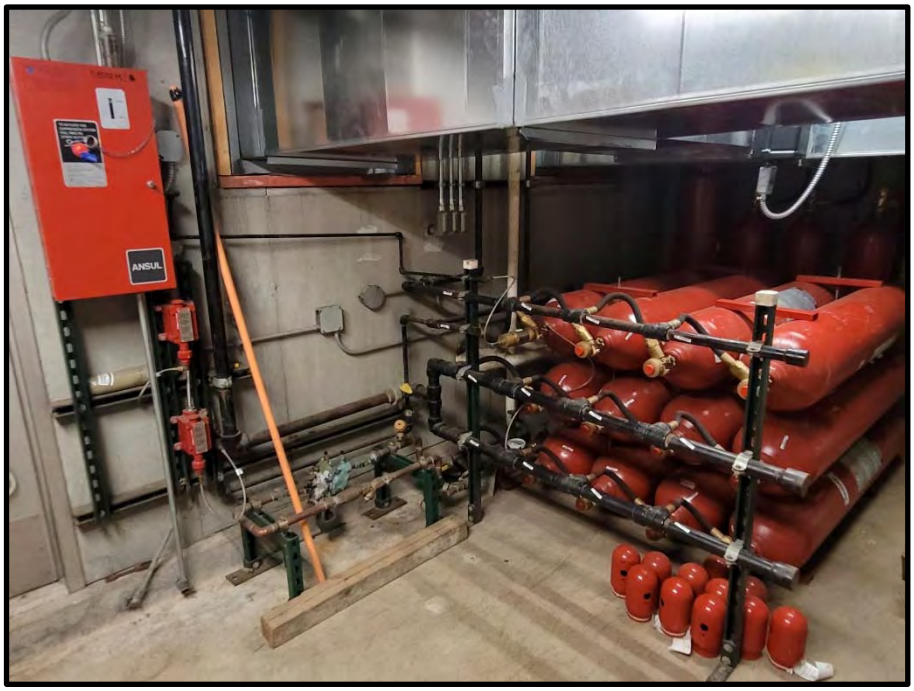


View of East Building Room 120 (Facing Southeast) – Process Code S01

View of East Building Room 120 (Facing North) – Process Code S01

Photos Taken: May 31, 2023

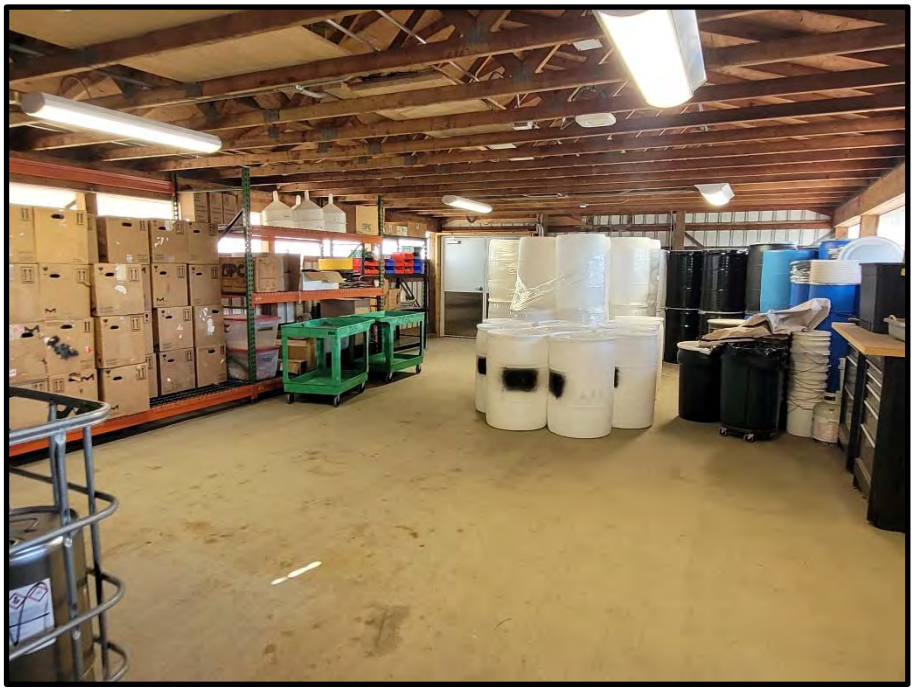
View of East Building Room 130 (Facing East) – Process Code S01



View of East Building Room 110 – Fire Suppression System

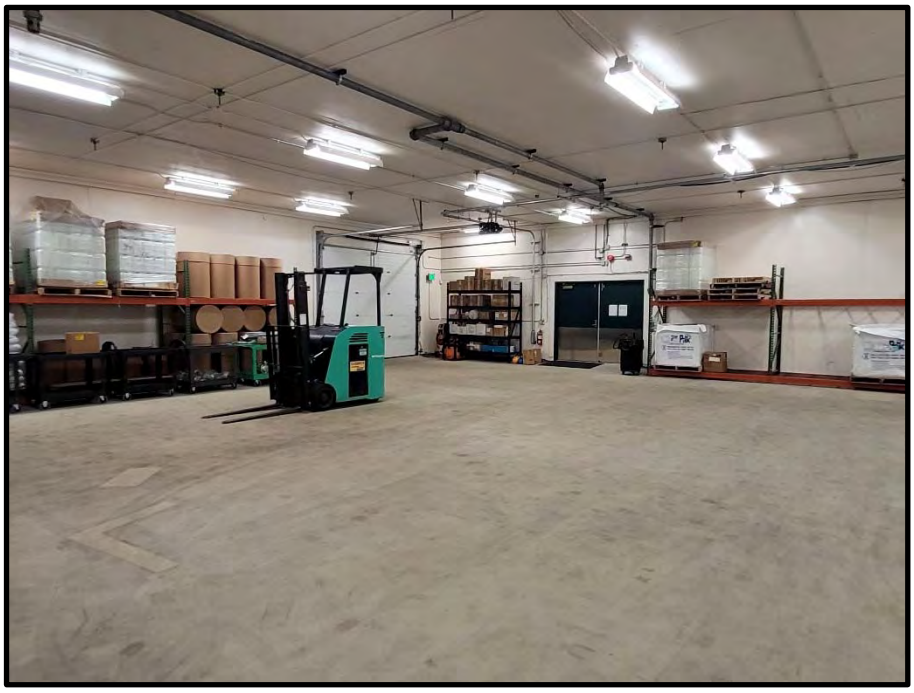
Photos Taken: May 31, 2023

View of East Building Room 110 Fire Suppression/Vapor Alarm Control Panels



View of Middle Storage Building (No Process Codes)

Photos Taken: May 31, 2023



View of West Building Facing Northwest – Process Code S01

View of West Building Facing Southeast – Process Code S01

Photos Taken: May 31, 2023

View of West Building Fire Suppression System (All other Rooms)

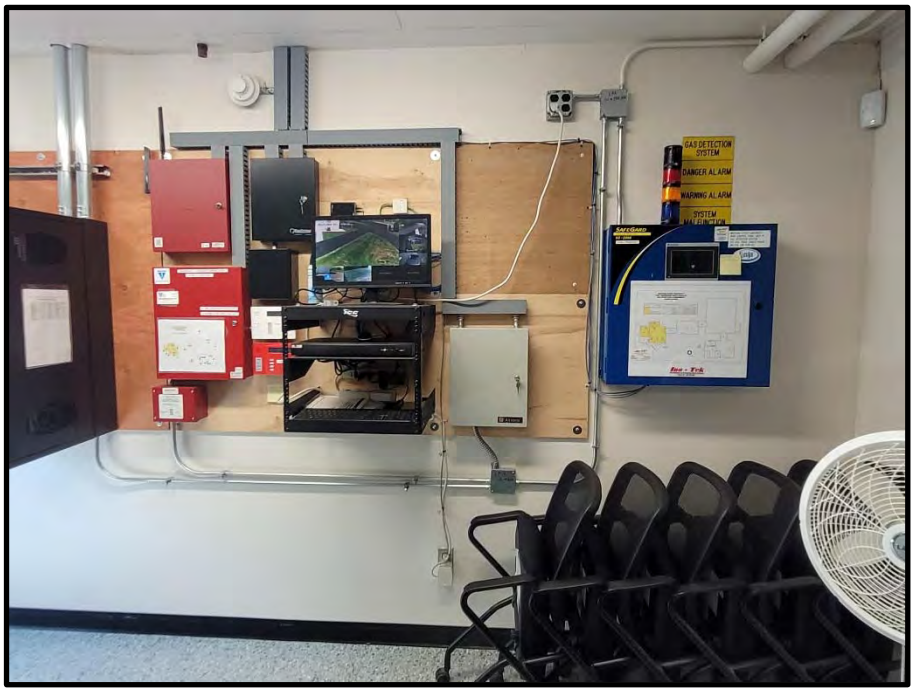
View of West Building Fire Suppression System (Room 120 Only)

Photos Taken: May 31, 2023

View of Recessed Floors for Secondary Containment

View of Recessed Floors for Secondary Containment in Connecting Corridors

Photos Taken: May 31, 2023



View of Security Cameras and Redundant Fire/Vapor Intrusion Panels in West Building Office

View of Facility-Wide Back Up Generator

Photos Taken: May 31, 2023

FORM EQP 5111 ATTACHMENT TEMPLATE A2
CHEMICAL AND PHYSICAL ANALYSES

This document is an attachment to the Michigan Department of Environment, Great Lakes, and Energy'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 Michigan State University (MSU) in Lansing, 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

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)]

The MSU Waste Storage Facility (WSF) is a unique site in that it is an on-site generating facility as it is contiguous with the MSU main campus; however, the MSU WSF also accepts waste from off-site MSU owned and operated locations only. The MSU WSF does not accept non-MSU generated waste.

MSU is a leading research institution that generates a wide variety of chemical wastes for disposal. Therefore, the WSF relies on generator knowledge from the point of generation of each waste. This knowledge is achieved by either of the following methods: (1) review of the manufacturer's Safety Data Sheets (SDS) for Discarded Commercial Chemical Product (DCCP), (2) completion of a MSU Waste Materials Pick Up Tag (Waste Tag), a copy of which is attached as Attachment A2.A1, or 3) a sample is collected and analyzed by a third-party analytical laboratory.

The information on the Waste Tag includes all chemical constituents and their respective amounts (i.e. volume) of each that are in the waste container, a physical (consistency) and visual (color) description of the waste, as well as what hazards are present in the waste container utilizing the Global Harmonization Symbol (GHS) system. Trained WSF personnel review each Waste Tag or SDS prior to transporting the waste and then make a final waste characterization based on the identification of any listed waste, or determining if the waste meets the EPA characteristic waste criteria.

At the start of each contract with their hazardous waste disposal vendor, the MSU WSF establishes waste profiles for the following pre-determined profiled waste streams that are consolidated at the MSU WSF:

(1) **Flammable, toxic liquids** – this waste stream represents the majority of the waste collected at the MSU WSF, and may contain all EPA characteristic "D" codes, respective "F" listed wastes, and most "U" listed wastes, as well as any State of Michigan hazardous waste codes that are applicable. Any waste codes not acceptable for consolidation on this profile by the hazardous waste vendor are stored for labpack disposal.
(2) **Flammable, corrosive acidic liquids** – This waste stream may contain all EPA characteristic "D" codes, respective "F" listed wastes, and most "U" listed wastes, as well as any State of Michigan hazardous waste codes that are applicable. Any waste codes not acceptable for consolidation on this profile by the hazardous waste vendor are stored for labpack disposal.
(3) Flammable, corrosive, basic liquids - This waste stream may contain all EPA characteristic "D" codes, respective "F" listed wastes, and most "U" listed wastes, as well as any State of Michigan hazardous waste codes that are applicable. Any waste codes not acceptable for consolidation on this profile by the hazardous waste vendor are stored for labpack disposal.
(4) **Corrosive liquids** including Nitric/Hydrofluoric Acids, Chromic Acid, and other mixed inorganic acids – these waste streams consist of aqueous solutions of inorganic acids and may include EPA characteristic "D" codes as applicable. All DCCP inorganic acids, as well as some acidic solutions that are not acceptable for consolidation on the profile by the hazardous waste vendor are stored for labpack disposal.

(5) Liquid Industrial By-Product liquids, as defined by the State of Michigan – this waste stream represents all liquid chemical waste that is not a regulated hazardous waste and includes, but is not limited to, buffers, formalin, glycols, pesticide rinseates, cleaning solutions, and other chemical by-products regulated by the State of Michigan.

Samples of the profiled waste that is consolidated by WSF personnel are collected prior to shipment to the hazardous waste vendor and tested for pH and Flashpoint to ensure they are within the waste profile requirements. Refer to Attachment A2.A1 for pH/Flashpoint results from the most recent WSF shipouts. A composite of these drum samples is collected annually and submitted to a 3rd party laboratory for analyses as specified by the hazardous waste disposal vendor. Refer to Attachment A2.A1 for a copy of the most recent annual waste analysis for the MSU WSF.

In addition to the liquid wastes that are consolidated at the MSU WSF, personnel also pack elemental mercury materials and contaminated debris into a drum for disposal with the hazardous waste vendor. A waste profile for a contaminated laboratory debris drum containing materials with "D" and "F"-listed EPA hazardous waste codes has also been established.

As mentioned above, the individual containers of wastes that are unable to be consolidated into the profiled waste streams are stored in the Lab Pack Room (120) and are packed in accordance with 49 CFR 172-173 before transport off site. No consolidation or treatment of these wastes occurs. The substances are separated into the appropriate compatible Department of Transportation (DOT) shipping categories. The lab packs are created by adding absorbent to a drum and loosely packing the chemicals into the drum. Absorbent is added to cushion the chemicals in a manner that will prevent their breakage during normal handling associated with transport. Lists of lab packed chemicals will be retained at the EHS office for at least three years. A hazardous waste vendor will be employed to package and remove the lab pack chemicals.

Any materials that do not meet the profiles for consolidation, and are too large to be labpacked are characterized with a SDS sheet if it is a DCCP material, or samples are collected and sent to a third party lab for analyses as required by the hazardous waste disposal facility to complete a waste profile.

A2.A.2 Waste Description (receive wastes from off-site generators)

[R 299.9504(1)(c) and 40 CFR §270.14(b)(2)]

As previously mentioned, the MSU WSF is a unique site in that it is an on-site generating facility as it is contiguous with the MSU main campus; however, the MSU WSF also accepts waste from off-site MSU owned and operated locations only. The MSU WSF does not accept non-MSU generated waste. Therefore, all MSU waste generated at off-site locations and received by the MSU WSF follows the same procedures identified in Section A2.A1. In addition, all wastes identified in Table A2.A1 are also accepted at the WSF from off-site MSU locations.

A2.B CONTAINERIZED WASTE

[R 299.9504(1)(c) and 40 CFR §264.172]

A2.B.1 Wastes Compatible with Container

Containers for solid and liquid hazardous waste are provided to the MSU WSF by contracted waste vendors. All containers provided meet DOT shipping requirements, and are currently provided by

Clean Earth, Greif Containers, and BASCO USA. MSU WSF personnel provide these containers as requested to MSU waste generators and then collect the containers for disposal. Due to the wide variety of research at MSU, the resulting volumes of waste are also variable. Researchers who generate smaller quantities of waste may reuse chemical reagent bottles that are compatible with their wastes (i.e. no glass containers for hydrofluoric acid or piranha solution).

A listing of containers that are compatible with each of the waste streams is provided in Attachment C-1. Refer to Attachment A2.B1 for specifications on containers utilized at the MSU WSF.

A2.B.2 Containers without Secondary Containment System

All containers stored at the MSU WSF are within secondary containment due to the design of the facility with recessed, lined flooring throughout the designated storage areas (Process Code S01). Refer to Section A1 for photographs depicting the flooring and containment at the MSU WSF.

A2.C WASTE IN TANK SYSTEMS

A2.C.1 Wastes Compatible with Tanks

The MSU WSF does not utilize tank systems for storage of hazardous waste.

A2.D WASTE IN PILES

The MSU WSF does not utilize waste piles for storage of hazardous waste.

A2.E LANDFILLED WASTES

The MSU WSF does not utilize landfills for storage of hazardous waste.

A2.F WASTES INCINERATED AND WASTES USED IN PERFORMANCE TESTS

The MSU WSF does not incinerate hazardous waste on-site.

A2.G WASTES TO BE LAND TREATED

The MSU WSF does not land treat hazardous waste on-site.

A2.H WASTE IN MISCELLANEOUS UNITS

The MSU WSF does not utilize any other miscellaneous units for storage of hazardous waste.

A2.I WASTE IN BOILERS AND INDUSTRIAL FURNACES

The MSU WSF does not utilize boilers or industrial furnaces for hazardous waste.

TABLE A2.A.1 HAZARDOUS WASTE GENERATED/ACCEPTED AT THE FACILITY

Hazardous Waste Code*	Waste Description	Hazardous Waste Characteristics	Basis for Hazardous Designation	Hazardous Waste Management Unit
D001	Liquid or Solid	Flammable	Generator knowledge/analysis	S01
D002	Liquid	Corrosive	Generator knowledge/analysis	S01
D003	Liquid or Solid	Reactive	Generator Knowledge	S01
D004-D011	Liquid or Solid	Heavy Metals	Generator knowledge/analysis	S01
D012-D017	Liquid or Solid	Toxic	Generator knowledge	S01
D018-D043	Liquid or Solid	Toxic	Generator knowledge/analysis	S01
F001-F005	Liquid or Solid	Listed Source	Generator knowledge	S01
F025-F039	Liquid	Listed Source	Generator knowledge	S01
P001-P205	Liquid or Solid	Flammable/toxic/ reactive/corrosive	Generator knowledge	S01
U001-U411	Liquid or Solid	Flammable/toxic/ reactive/corrosive	Generator knowledge	S01
001S-007S	Liquid or Solid	Toxic	Generator knowledge	S01
001U-175U	Liquid or Solid	Flammable/toxic/ reactive/corrosive	Generator knowledge	S01

*Except for those waste codes identified in Appendix A1-1, Waste Not Accepted at Waste Storage Facility

ATTACHMENT A2.A1 – MSU WASTE MATERIALS PICK UP TAG

MSU WASTE MATERIALS PICK UP TAG

Project Leader_____ Dept._____

Bldg & Room No._____ Phone _____

Filled Out By_____ Accumulation Start Date_____

Container Size _____ ☐ Solid ☐ Liquid ☐ Contaminated Items

CONTENTS:

UNABBREVIATED Chemical Names(s)	Amount Volume, Percentage, or Concentration (ppm)
☐ Water	Balance

COLOR ☐ Colorless ☐ Light Brown ☐ Other _____

CONSISTENCY ☐ Waterlike ☐ Viscous/Oily ☐ Other _____

BIOLOGICAL & ANIMAL ITEMS:

☐ Biohazardous Agents_____

FOR EHS USE ONLY

TO BE COMPLETED AS WASTE IS ACCUMULATED AT POINT OF GENERATION
If material is hazardous, please check all hazards that apply:

IGNITABLE

- ☐ Flammable Liquid
- ☐ Flammable Gas
- ☐ Flammable Solid
- ☐ Oxidizer
- ☐ Organic Peroxide

CORROSIVE

- ☐ Acid
- ☐ Base

TOXIC

- ☐ Heavy Metal
- ☐ Poison/Toxic

REACTIVE

- ☐ Peroxide
- ☐ Sulfide
- ☐ Cyanide
- ☐ Pyrophoric
- ☐ Water Reactive
- ☐ Organic Peroxide

WASTE DISPOSAL INSTRUCTIONS

1) Enter information as waste is added to container.
2) Keep waste containers closed.
3) Keep solid waste separate from liquid wastes.
4) Do not place incompatible wastes in same container, including mixtures of: organics, oxidizers, or inorganic acids in any amounts.
5) Do not move waste from the point of generation.
6) All waste containers are limited to 90-days of accumulation once started. Submit an online pickup request prior to deadline.
7) When using your own container for waste, label the waste container or tag with the words “Hazardous Waste”.
8) Place leaking containers in secondary container and call EHS immediately for disposal.
9) Store animal carcasses in an appropriate freezer, walk-in cooler, or refrigerator.
10) Autoclave, chemically disinfect, or incinerate infectious wastes.
11) Place autoclaved biohazard waste bags in an opaque bag prior to disposal.
12) Refer to EHS website for more detailed instructions about waste disposal.

The chemicals below are a hazardous waste at or above these concentrations, so please be specific on the front of this tag when filling it out.

D001	Ignitable	D026	Cresol (> 200ppm)
D002	Corrosive (pH<2 or > 12.5)	D027	1,4-Dichlorobenzene (> 7.5ppm)
D003	Reactive (w/ water or air)	D028	1,2-Dichloroethane (> 0.5ppm)
D004	Arsenic (> 5ppm)	D029	1,1-Dichloroethylene (> 0.7ppm)
D005	Barium (> 100ppm)	D030	2,4-Dinitrotoluene (> 013ppm)
D006	Cadmium (> 1ppm)	D031	Heptachlor (> 0.008ppm)
D007	Chromium (> 5ppm)	D032	Hexachlorobenzene (> 0.13ppm)
D008	Lead (> 5ppm)	D033	Hexachloro-1,3-benzene (> 0.5ppm)
D009	Mercury (> 0.2ppm)	D034	Hexachloroethane (> 3.0ppm)
D010	Selenium (> 1ppm)	D035	Methyl ethyl ketone (> 200ppm)
D011	Silver (> 5ppm)	D036	Nitrobenzene (> 2ppm)
D012	Endrin (> 0.02ppm)	D037	Pentachlorophenol (> 100ppm)
D013	Lindane (> 0.4ppm)	D038	Pyridine (> 5ppm)
D014	Methoxychlor (> 10ppm)	D039	Tetrachloroethylene (> 0.7ppm)
D015	Toxaphene (> 0.5ppm)	D040	Trichloroethylene (> 0.5ppm)
D016	2,4-D (> 10ppm)	D041	2,4,5-Trichlorophenol (> 400ppm)
D017	2,4,5-TP (> 1ppm)	D042	2,4,6-Trichlorophenol (> 2ppm)
D018	Benzene (> 0.5ppm)	D043	Vinyl Chloride (> 0.2ppm)
D019	Carbon Tetrachloride (> 0.5ppm)	001S	Aflatoxin (>1ppm)
D020	Chlordane (> 0.03ppm)	002S	2,3,7,8-Tetrachlorodibenzo-p-dioxin (>1ppm)
D021	Chlorobenzene (> 100ppm)	003S	1,2,3,7,8-Pentachlorodibenzo-p-dioxin (>1ppm)
D022	Chloroform (> 6ppm)	004S	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (>1ppm)
D023	o-Cresol (> 200ppm)	005S	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (>1ppm)
D024	m-Cresol (> 200ppm)	006S	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (>1ppm)
D025	p-Cresol (> 200ppm)	007S	2,3,7,8-Tetrachloridibenzo furan (>1ppm)

ATTACHMENT A2.A1 – ANALYTICAL RESULTS

Experiment #555

Feb. 28, 2023

pH/Flashpoint determination of liquid Hazardous waste samples from the MSU Chemical waste storage facility located at 3634 E. Jolly Rd. Lansing, MI 48910

EPA ID # 0S3343476

Sample #	Sample Type	Sample Date	Test Date	PH	EP	Remarks
230251	FLT SSDF	2-28-23	2-28-23	3	STP	
230252				10		
230253				5		
230254		2-20-23		5		
230255				5		
230256				10		
230257		2-28-23		6		
230258				7		
230259	NRL, SSDF			7	STN	
230260				6		
230261		2-28-23		6		
230262				6		
230263				7		

FLT: Flammable Liquid, Toxic
NRL: Non-regulated
STP: swab test positive
STN: swab test negative

Travis VanWyck
Travis VanWyck

Fibertec environmental services

Analytical Laboratory

1914 Holloway Drive
Holt, MI 48842
Phone: 517 699 0345
Fax: 517 699 0388
email: lab@fibertec.us

8660 S. Mackinaw Trail
Cadillac, MI 49601
Phone: 231 775 8368
Fax: 231 775 8584

Geoprobe

11766 E. Grand River Rd.
Brighton, MI 48116
Phone: 810 220 3300
Fax: 810 220 3311

Chain of Custody # 212676
PAGE 1 of 1

Client Name: Michigan State University
Contact Person: Kyle Corder
Project Name/ Number: CWB Annual Analysis 2021-2022
Email distribution list: corderky@msu.edu
Quote#
Purchase Order#

Matrix Code: S Soil; A Air; O Oil; P Wipe; GW Ground Water; SW Surface Water; WW Waste Water; X Other: Specify

Deliverables: Level 2; Level 3; Level 4; EDD

X: Chemical Waste

Date	Time	Sample #	Client Sample Descriptor	MATRIX (SEE RIGHT CORNER FOR CODE)	# OF CONTAINERS	Specific Gravity	pH	RCRA	Total Halogens	% water	BTU	Ash Content	HOLD SAMPLE	Remarks
8/22/22	9:40		MSU-017	X	5	X	X	X	X	X	X	X		Flammable Liquid, Toxic
	10:00		MSU-013	X	5	X	X	X	X	X	X	X		Flammable Liquid, Corrosive
	10:10		MSU-039	X	5	X	X	X	X	X	X	X		Non-Regulated Liquid
	12:35		MSU-005	X	5	X	X	X	X	X	X	X		Paint Sludge
	12:20		MSU-004	X	5	X	X	X	X					Chromic Acid Stream
	10:25		MSU-009	X	5	X	X	X	X					Mixed Acid Stream
	10:35		MSU-018	X	5	X	X	X	X					Nitric/HF acid Stream
	10:45		MSU-Experiment 5,6,7	X	5	X	X	X	X					
↓	11:00		MSU-078	X	5	X	X	X	X	X	X	X		Flammable Liquid, Corrosive (High pH)

Comments:

Received By Lab

Sampled/Relinquished By:	Date/ Time 8.22.22 13:23	Received By: AUG 22 2022
Relinquished By:	Date/ Time	Received By: Initials: JS
Relinquished By:	Date/ Time	Received By Laboratory:

Turnaround Time ALL RESULTS WILL BE SENT BY THE END OF THE BUSINESS DAY

_____1 bus. day _____2 bus. days _____3 bus. days _____4 bus. days

X 5-7 bus. days (standard) Other (specify time/date requirement): _____

LAB USE ONLY

Fibertec project number: A10458

Temperature upon receipt at Lab: 27°C

Please see back for terms and conditions

Fibertec environmental services

Tuesday, October 11, 2022

Fibertec Project Number:	A10458 Supplemental
Project Identification:	CWB Annual Analysis /
Submittal Date:	08/22/2022

Mr. Kyle Corder
Michigan State University - EHS
Environmental Health & Safety
4000 Collins Road, B20
Lansing, MI 48910

Dear Mr. Corder,

Thank you for selecting Fibertec Environmental Services as your analytical laboratory. The samples you submitted have been analyzed in accordance with NELAC standards and the results compiled in the attached report. Any exceptions to NELAC compliance are noted in the report. These results apply only to those samples submitted. Please note TO-15 samples will be disposed of 7 calendar days after the reporting date. All other samples will be disposed of 30 days after the reporting date.

If you have any questions regarding these results or if we may be of further assistance to you, please contact me at (517) 699-0345.

Sincerely,

By Jacob Sutherlund at 3:37 PM, Oct 11, 2022

For Daryl P. Strandbergh
Laboratory Director

Enclosures

Analytical Laboratory Report

Report ID: S39556.01(01)
Generated on 09/07/2022

Report to

Attention: Fibertec Lab
Fibertec Environmental Service
1914 Holloway Drive
Holt, MI 48842

Phone: 517-699-0345 FAX:
Email: lab@fibertec.us

Report produced by

Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Laverty (johnlaverty@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S39556.01-S39556.09
Project: A10458
Collected Date(s): 08/22/2022
Submitted Date/Time: 08/24/2022 09:15
Sampled by: Unknown
P.O. #:

Table of Contents

Maya Murshak
Technical Director

Analytical Laboratory Report

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.
Methods may be modified for improved performance.
Results reported on a dry weight basis where applicable.
'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).
When MDL results are provided, then 'Not detected' indicates that parameter was not found at a level equal to or greater than the MDL.
40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile, and 2-chloroethylvinyl ether need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.
QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.
Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.
Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.
Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.
Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)
PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."
Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.
Wisconsin PFAs analysis: MDL = LOD; RL = LOQ. LOD and LOQ are adjusted for dilution.

Report Narrative

There is no additional narrative for this analytical report

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884
Wisconsin DNR	FID# 399147320

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched

Method Summary

Method	Version
ASTMD96 - 88	ASTM Method D96-88(1998)
E300.0	EPA Method 300.0 Revision 2.1 (1993)
SW5050	SW 846 Method 5050 Revision 0 September 1994

Sample Summary (9 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S39556.01	MSU-017	Chemical Waste	08/22/22 09:40
S39556.02	MSU-013	Chemical Waste	08/22/22 10:00
S39556.03	MSU-039	Chemical Waste	08/22/22 10:10
S39556.04	MSU-005	Chemical Waste	08/22/22 12:35
S39556.05	MSU-004	Chemical Waste	08/22/22 12:20
S39556.06	MSU-009	Chemical Waste	08/22/22 10:25
S39556.07	MSU-018	Chemical Waste	08/22/22 10:35
S39556.08	MSU-Experiment 5,6,7	Chemical Waste	08/22/22 10:45
S39556.09	MSU-078	Chemical Waste	08/22/22 11:00

Lab Sample ID: S39556.01
Sample Tag: MSU-017
Collected Date/Time: 08/22/2022 09:40
Matrix: Chemical Waste
COC Reference: 212676

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	40ml Glass	None	Yes	10.3	IR

Other / Misc.

Method: ASTMD96 - 88, Run Date: 09/02/22 14:15, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Water*	72	2		%	1		

Method: SW5050, Run Date: 09/01/22 15:00, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Halogens*	15,050	200		mg/kg	1		

Analytical Laboratory Report

Lab Sample ID: S39556.02
Sample Tag: MSU-013
Collected Date/Time: 08/22/2022 10:00
Matrix: Chemical Waste
COC Reference: 212676

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	40ml Glass	None	Yes	10.3	IR

Other / Misc.

Method: ASTMD96 - 88, Run Date: 09/02/22 14:15, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Water*	100	2		%	1		

Method: SW5050, Run Date: 09/01/22 15:00, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Halogens*	7,330	200		mg/kg	1		

Analytical Laboratory Report

Lab Sample ID: S39556.03
Sample Tag: MSU-039
Collected Date/Time: 08/22/2022 10:10
Matrix: Chemical Waste
COC Reference: 212676

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	40ml Glass	None	Yes	10.3	IR

Other / Misc.

Method: ASTMD96 - 88, Run Date: 09/02/22 14:15, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Water*	96	2		%	1		

Method: SW5050, Run Date: 09/01/22 15:00, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Halogens*	4,120	200		mg/kg	1		

Analytical Laboratory Report

Lab Sample ID: S39556.04
Sample Tag: MSU-005
Collected Date/Time: 08/22/2022 12:35
Matrix: Chemical Waste
COC Reference: 212676

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	40ml Glass	None	Yes	10.3	IR

Other / Misc.

Method: ASTMD96 - 88, Run Date: 09/07/22 14:00, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Water*	Not detected	2		%	1		

Method: SW5050, Run Date: 09/01/22 15:00, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Halogens*	1,140	200		mg/kg	1		

Analytical Laboratory Report

Lab Sample ID: S39556.05
Sample Tag: MSU-004
Collected Date/Time: 08/22/2022 12:20
Matrix: Chemical Waste
COC Reference: 212676

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	40ml Glass	None	Yes	10.3	IR

Other / Misc.

Method: E300.0, Run Date: 08/31/22 14:47, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Halogens*	1,840	1,000		mg/kg	1,000		1

1-* Run by IC (300.0)

Analytical Laboratory Report

Lab Sample ID: S39556.06
Sample Tag: MSU-009
Collected Date/Time: 08/22/2022 10:25
Matrix: Chemical Waste
COC Reference: 212676

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	40ml Glass	None	Yes	10.3	IR

Other / Misc.

Method: E300.0, Run Date: 08/31/22 16:30, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Halogens*	22,600	2,000		mg/kg	2,000		1

1-* Run by IC (300.0)

Analytical Laboratory Report

Lab Sample ID: S39556.07
Sample Tag: MSU-018
Collected Date/Time: 08/22/2022 10:35
Matrix: Chemical Waste
COC Reference: 212676

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	40ml Glass	None	Yes	10.3	IR

Other / Misc.

Method: E300.0, Run Date: 08/31/22 16:42, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Halogens*	10,150	2,000		mg/kg	2,000		1

1-* Run by IC (300.0)

Analytical Laboratory Report

Lab Sample ID: S39556.08
Sample Tag: MSU-Experiment 5,6,7
Collected Date/Time: 08/22/2022 10:45
Matrix: Chemical Waste
COC Reference: 212676

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	40ml Glass	None	Yes	10.3	IR

Other / Misc.

Method: E300.0, Run Date: 08/31/22 15:25, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Halogens*	1,715	1,000		mg/kg	1,000		1

1-* Run by IC (300.0)

Analytical Laboratory Report

Lab Sample ID: S39556.09
Sample Tag: MSU-078
Collected Date/Time: 08/22/2022 11:00
Matrix: Chemical Waste
COC Reference: 212676

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	40ml Glass	None	Yes	10.3	IR

Other / Misc.

Method: ASTMD96 - 88, Run Date: 09/02/22 14:15, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Water*	96	2		%	1		

Method: SW5050, Run Date: 09/01/22 15:00, Analyst: PL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Halogens*	3,600	200		mg/kg	1		

Merit Laboratories Login Checklist

Lab Set ID: S39556
Client: FIBERTEC (Fibertec Environmental Service)
Project: A10458
Submitted: 08/24/2022 09:15 Login User: MMC

Attention: Fibertec Lab
Address: Fibertec Environmental Service
1914 Holloway Drive
Holt, MI 48842

Phone: 517-699-0345 FAX:
Email: lab@fibertec.us

Selection				Description	Note
Sample Receiving					
01.	☐ Yes	☒ No	☐ N/A	Samples are received at 4C +/- 2C Thermometer #	IR 10.3
02.	☒ Yes	☐ No	☐ N/A	Received on ice/ cooling process begun	
03.	☐ Yes	☒ No	☐ N/A	Samples shipped	
04.	☐ Yes	☒ No	☐ N/A	Samples left in 24 hr. drop box	
05.	☐ Yes	☐ No	☒ N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody					
06.	☒ Yes	☐ No	☐ N/A	COC adequately filled out	
07.	☐ Yes	☒ No	☐ N/A	COC signed and relinquished to the lab	
08.	☒ Yes	☐ No	☐ N/A	Sample tag on bottles match COC	
09.	☐ Yes	☒ No	☐ N/A	Subcontracting needed? Subcontacted to:	
Preservation					
10.	☒ Yes	☐ No	☐ N/A	Do sample have correct chemical preservation	
11.	☐ Yes	☐ No	☒ N/A	Completed pH checks on preserved samples? (no VOAs)	
12.	☐ Yes	☒ No	☐ N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions					
13.	☒ Yes	☐ No	☐ N/A	All bottles intact	
14.	☒ Yes	☐ No	☐ N/A	Appropriate analytical bottles are used	
15.	☐ Yes	☒ No	☐ N/A	Merit bottles used	
16.	☒ Yes	☐ No	☐ N/A	Sufficient sample volume received	
17.	☐ Yes	☒ No	☐ N/A	Samples require laboratory filtration	
18.	☒ Yes	☐ No	☐ N/A	Samples submitted within holding time	
19.	☐ Yes	☐ No	☒ N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Fibertec environmental services

Analytical Laboratory
1914 Holloway Drive
Holt, MI 48842
Phone: 517 699 0345
Fax: 517 699 0388
email: lab@fibertec.us

8660 S. Mackinaw Trail
Cadillac, MI 49601
Phone: 231 775 8368
Fax: 231 775 8584

Industrial Hygiene Services, Inc.
1914 Holloway Drive
Holt, MI 48842
Phone: 517 699 0345
Fax: 517 699 0382
email: asbestos@fibertechs.com

Geoprobe
11766 E. Grand River Rd.
Brighton, MI 48116
Phone: 810 220 3300
Fax: 810 220 3311

Chain of Custody # 212676

PAGE 1 of 1

Client Name: Fibertec

Contact Person: Jacob Sutherlund

Project Name/ Number: A10458

Email distribution list: lab@fibertec.us

Quote#

Purchase Order# 39556

Date	Time	Sample #	Client Sample Descriptor	MATRIX (SEE RIGHT CORNER FOR CODE)	# OF CONTAINERS	Total Halogens	% Water									HOLD SAMPLE	Remarks:
.01 8/22/22	0940		MSU-017	X	1	✓	✓										Bulk Flammable, Toxic Waste Stream
.02 8/22/22	1000		MSU-013	X	1	✓	✓										Bulk Flammable, Corrosive Wate Stream
.03 8/22/22	1010		MSU-039	X	1	✓	✓										Bulk Non-Regulated Liquid Waste Stre...
.04 8/22/22	1235		MSU-005	X	1	✓	✓										Paint Drum Waste,Flammable
.05 8/22/22	1220		MSU-004	X	1	✓											Bulk Chromic Acid Waste Stream
.06 8/22/22	1025		MSU-009	X	1	✓											Bulk Mixed Acids (HCL,S2SO4, etc.)
.07 8/22/22	1035		MSU-018	X	1	✓											Bulk Nitric Acid/Hydrofluoric Acid Waste
.08 8/22/22	1045		MSU-Experiment 5,6,7	X	1	✓											Bulk Oxidzing,Acidic W.S.(MnO4+Iodine)
.09 8/22/22	1100		MSU-078	X	1	✓	✓										Bulkd Flammable, Corrisive Waste Stre..

PARAMETERS

Matrix Code

S	Soil	GW	Ground Water
A	Air	SW	Surface Water
O	Oil	WW	Waste Water
P	Wipe	X	Other: Specify

Deliverables

- Level 2
- Level 3
- Level 4
- EDD

X=Chemical Waste

Comments: Sample MSU-018, CAUTION MUST wear gloves & be very careful. Mostly Nitric Acid. HFL Acid <10% (closer to 2-5%)-Per Client

Sampled/Relinquished By:	Date/ Time	Received By:
Relinquished By:	Date/ Time	Received By:
Relinquished By:	Date/ Time 8/24/22 0915	Received By Laboratory: M Clifford

Turnaround Time ALL RESULTS WILL BE SENT BY THE END OF THE BUSINESS DAY

_____1 bus. day _____2 bus. days _____3 bus. days _____4 bus. days

X 5-7 bus. days (standard) Other (specify time/date requirement): _____

LAB USE ONLY

Fibertec project number:

Temperature upon receipt at Lab: 10.3

Please see back for terms and conditions

Mineral Labs, Inc.

Box 549
Salyersville, Kentucky 41465
Phone (606) 349-6145

Certificate of Analysis

Company
FIBERTEC ENVIRONMENTAL SERV
1914 HOLLOWAY DRIVE
ATTN: KYLEEN CRANDALL
HOLT, MI 48842

Lab No. **12023346** **4968**
Date Recd. **8/26/2022**
Date Analyzed **8/26/2022**

SAMPLE IDENTIFICATION AS SUPPLIED BY SAMPLER — SAMPLED BY **CUSTOMER** SAMPLED TYPE:

MAIL IN
PROJECT #A10458 ID = MSU-005
DATE 8-22-22 TIME = 12:35
PAINT DRUM WASTE FLAMMABLE

	% Moisture * D3302	% Ash D3174	% Volatile D3175	% Fixed Carbon (Calculated)	BTU/lb D5865	% Sulfur D4239
As Recd	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**
Dry Basis		**42.72**	**XXX**	**XXX**	**13,092**	**XXX**
M.A.F.B.T.U (Calculated)					**22,856**	

Free Swelling Index No. D720 **XXX**

Grindability Index No. D409 **XXX**

-FUSION TEMPERATURE OF- D1857	Reducing		Oxidizing	
Initial	**XXX**	**°F**	**XXX**	**°F**
Softening	**XXX**	**°F**	**XXX**	**°F**
Hemispherical	**XXX**	**°F**	**XXX**	**°F**
Fluid	**XXX**	**°F**	**XXX**	**°F**

SCREEN/WET SIEVE ANALYSIS

SIZE **% WT. RETAINED**

WEIGHT DETERMINATION

Average Light Draft	**X X X**	
Average Loaded Draft	**X X X**	
Weight of Coal Loaded	**X X X**	**Tons**

DRAFT READINGS TAKEN AND
CALCULATED BY LAB PERSONNEL

* Moisture maybe performed by D3302-mod or D2961 by customer preference

Submitted By

Paul Lyon

Mineral Labs, Inc.

Box 549
Salyersville, Kentucky 41465
Phone (606) 349-6145

Certificate of Analysis

Company
FIBERTEC ENVIRONMENTAL SERV
1914 HOLLOWAY DRIVE
ATTN: KYLEEN CRANDALL
HOLT, MI 48842

Lab No. **12023347** **4968**
Date Recd. **8/26/2022**
Date Analyzed **8/26/2022**

SAMPLE IDENTIFICATION AS SUPPLIED BY SAMPLER — SAMPLED BY **CUSTOMER** SAMPLED TYPE:

MAIL IN
PROJECT #A10458 ID = MSU-013
DATE 8-22-22 TIME = 10:00
BULK FLAMMABLE CORROSIVE WASTE

	% Moisture * D3302	% Ash D3174	% Volatile D3175	% Fixed Carbon (Calculated)	BTU/lb D5865	% Sulfur D4239
As Recd	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**
Dry Basis		**72.05**	**XXX**	**XXX**	**0**	**XXX**
M.A.F.B.T.U (Calculated)					**XXX**	

		-FUSION TEMPERATURE OF- D1857	Reducing		Oxidizing	
Free Swelling Index No. D720	**XXX**	**Initial**	**XXX**	**°F**	**XXX**	**°F**
Grindability Index No. D409	**XXX**	**Softening**	**XXX**	**°F**	**XXX**	**°F**
		Hemispherical	**XXX**	**°F**	**XXX**	**°F**
		Fluid	**XXX**	**°F**	**XXX**	**°F**

SCREEN/WET SIEVE ANALYSIS

SIZE	% WT. RETAINED

WEIGHT DETERMINATION

Average Light Draft	**X X X**	
Average Loaded Draft	**X X X**	
Weight of Coal Loaded	**X X X**	**Tons**

DRAFT READINGS TAKEN AND
CALCULATED BY LAB PERSONNEL

* Moisture maybe performed by D3302-mod or D2961 by customer preference

Submitted By

Paul Lyon

Mineral Labs, Inc.

Box 549
Salyersville, Kentucky 41465
Phone (606) 349-6145

Certificate of Analysis

Company
FIBERTEC ENVIRONMENTAL SERV
1914 HOLLOWAY DRIVE
ATTN: KYLEEN CRANDALL
HOLT, MI 48842

Lab No. **12023348** **4968**
Date Recd. **8/26/2022**
Date Analyzed **8/26/2022**

SAMPLE IDENTIFICATION AS SUPPLIED BY SAMPLER — SAMPLED BY **CUSTOMER** SAMPLED TYPE:

MAIL IN
PROJECT #A10458 ID = MSU-017
DATE 8-22-22 TIME = 9:40
BULK FLAMMABLE TOXIC WASTE STREAM

	% Moisture * D3302	% Ash D3174	% Volatile D3175	% Fixed Carbon (Calculated)	BTU/lb D5865	% Sulfur D4239
As Recd	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**
Dry Basis		**23.01**	**XXX**	**XXX**	**0**	**XXX**
M.A.F.B.T.U (Calculated)					**XXX**	

Free Swelling Index No. D720 **XXX**

Grindability Index No. D409 **XXX**

-FUSION TEMPERATURE OF- D1857	Reducing		Oxidizing	
Initial	**XXX**	**°F**	**XXX**	**°F**
Softening	**XXX**	**°F**	**XXX**	**°F**
Hemispherical	**XXX**	**°F**	**XXX**	**°F**
Fluid	**XXX**	**°F**	**XXX**	**°F**

SCREEN/WET SIEVE ANALYSIS

SIZE **% WT. RETAINED**

WEIGHT DETERMINATION

Average Light Draft	**X X X**	
Average Loaded Draft	**X X X**	
Weight of Coal Loaded	**X X X**	**Tons**

DRAFT READINGS TAKEN AND
CALCULATED BY LAB PERSONNEL

* Moisture maybe performed by D3302-mod or D2961 by customer preference

Submitted By

Paul Lyon

Mineral Labs, Inc.

Box 549
Salyersville, Kentucky 41465
Phone (606) 349-6145

Certificate of Analysis

Company
FIBERTEC ENVIRONMENTAL SERV
1914 HOLLOWAY DRIVE
ATTN: KYLEEN CRANDALL
HOLT, MI 48842

Lab No. **12023349** **4968**
Date Recd. **8/26/2022**
Date Analyzed **8/26/2022**

SAMPLE IDENTIFICATION AS SUPPLIED BY SAMPLER — SAMPLED BY **CUSTOMER** SAMPLED TYPE:

MAIL IN
PROJECT #A10458 ID = MSU-039
DATE 8-22-22 TIME = 10:10
BULK NON REGULATED LIQUID WASTE

	% Moisture * D3302	% Ash D3174	% Volatile D3175	% Fixed Carbon (Calculated)	BTU/lb D5865	% Sulfur D4239
As Recd	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**
Dry Basis		**13.62**	**XXX**	**XXX**	**0**	**XXX**
M.A.F.B.T.U (Calculated)					**XXX**	

Free Swelling Index No. D720 **XXX**

Grindability Index No. D409 **XXX**

-FUSION TEMPERATURE OF- D1857	Reducing		Oxidizing	
Initial	**XXX**	**°F**	**XXX**	**°F**
Softening	**XXX**	**°F**	**XXX**	**°F**
Hemispherical	**XXX**	**°F**	**XXX**	**°F**
Fluid	**XXX**	**°F**	**XXX**	**°F**

SCREEN/WET SIEVE ANALYSIS

SIZE **% WT. RETAINED**

WEIGHT DETERMINATION

Average Light Draft	**X X X**	
Average Loaded Draft	**X X X**	
Weight of Coal Loaded	**X X X**	**Tons**

DRAFT READINGS TAKEN AND
CALCULATED BY LAB PERSONNEL

* Moisture maybe performed by D3302-mod or D2961 by customer preference

Submitted By

Paul Lyon

Mineral Labs, Inc.

Box 549
Salyersville, Kentucky 41465
Phone (606) 349-6145

Certificate of Analysis

Company
FIBERTEC ENVIRONMENTAL SERV
1914 HOLLOWAY DRIVE
ATTN: KYLEEN CRANDALL
HOLT, MI 48842

Lab No. **12023350** **4968**
Date Recd. **8/26/2022**
Date Analyzed **8/26/2022**

SAMPLE IDENTIFICATION AS SUPPLIED BY SAMPLER — SAMPLED BY **CUSTOMER** SAMPLED TYPE:

MAIL IN
PROJECT #A10458 ID = MSU-078
DATE 8-22-22 TIME = 11:00
BULK FLAMMABLE CORRSIVE WASTE

	% Moisture * D3302	% Ash D3174	% Volatile D3175	% Fixed Carbon (Calculated)	BTU/lb D5865	% Sulfur D4239
As Recd	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**	**XXX**
Dry Basis		**48.42**	**XXX**	**XXX**	**0**	**XXX**
M.A.F.B.T.U (Calculated)					**XXX**	

Free Swelling Index No. D720 **XXX**

Grindability Index No. D409 **XXX**

-FUSION TEMPERATURE OF- D1857	Reducing		Oxidizing	
Initial	**XXX**	**°F**	**XXX**	**°F**
Softening	**XXX**	**°F**	**XXX**	**°F**
Hemispherical	**XXX**	**°F**	**XXX**	**°F**
Fluid	**XXX**	**°F**	**XXX**	**°F**

SCREEN/WET SIEVE ANALYSIS

SIZE **% WT. RETAINED**

WEIGHT DETERMINATION

Average Light Draft	**X X X**	
Average Loaded Draft	**X X X**	
Weight of Coal Loaded	**X X X**	**Tons**

DRAFT READINGS TAKEN AND
CALCULATED BY LAB PERSONNEL

* Moisture maybe performed by D3302-mod or D2961 by customer preference

Submitted By

Paul Lyon

Fibertec environmental services

Analytical Laboratory

1914 Holloway Drive
Holt, MI 48842
Phone: 517 699 0345
Fax: 517 699 0388
email: lab@fibertec.us

8660 S. Mackinaw Trail
Cadillac, MI 49601
Phone: 231 775 8368
Fax: 231 775 8584

Geoprobe

11766 E. Grand River Rd.
Brighton, MI 48116
Phone: 810 220 3300
Fax: 810 220 3311

Chain of Custody # 212676
PAGE 1 of 1

Client Name: Michigan State University
Contact Person: Kyle Corder
Project Name/ Number: CWB Annual Analysis 2021-2022
Email distribution list: corderky@msu.edu
Quote#
Purchase Order#

Matrix Code: S Soil; A Air; O Oil; P Wipe; GW Ground Water; SW Surface Water; WW Waste Water; X Other: Specify

Deliverables: Level 2; Level 3; Level 4; EDD

X: Chemical Waste

Date	Time	Sample #	Client Sample Descriptor	MATRIX (SEE RIGHT CORNER FOR CODE)	# OF CONTAINERS	Specific Gravity	pH	RCRA	Total Halogens	% water	BTU	Ash Content	HOLD SAMPLE	Remarks
8/22/22	9:40		MSU-017	X	5	X	X	X	X	X	X	X		Flammable Liquid, Toxic
	10:00		MSU-013	X	5	X	X	X	X	X	X	X		Flammable Liquid, Corrosive
	10:10		MSU-039	X	5	X	X	X	X	X	X	X		Non-Regulated Liquid
	12:35		MSU-005	X	5	X	X	X	X	X	X	X		Paint Sludge
	12:20		MSU-004	X	5	X	X	X	X					Chromic Acid Stream
	10:25		MSU-009	X	5	X	X	X	X					Mixed Acid Stream
	10:35		MSU-018	X	5	X	X	X	X					Nitric/HF acid Stream
	10:45		MSU-Experiment 5,6,7	X	5	X	X	X	X					
↓	11:00		MSU-078	X	5	X	X	X	X	X	X	X		Flammable Liquid, Corrosive (High pH)

Comments:

Received By Lab

Sampled/Relinquished By:	Date/ Time 8.22.22 13:23	Received By: AUG 22 2022
Relinquished By:	Date/ Time	Received By: Initials: JS
Relinquished By:	Date/ Time	Received By Laboratory:

Turnaround Time ALL RESULTS WILL BE SENT BY THE END OF THE BUSINESS DAY

_____1 bus. day _____2 bus. days _____3 bus. days _____4 bus. days

X 5-7 bus. days (standard) Other (specify time/date requirement): _____

LAB USE ONLY

Fibertec project number: A10458

Temperature upon receipt at Lab: 27°C

Please see back for terms and conditions

Fibertec environmental services

Wednesday, September 28, 2022

Fibertec Project Number:	A10458
Project Identification:	CWB Annual Analysis /
Submittal Date:	08/22/2022

Mr. Kyle Corder
Michigan State University - EHS
Environmental Health & Safety
4000 Collins Road, B20
Lansing, MI 48910

Dear Mr. Corder,

Thank you for selecting Fibertec Environmental Services as your analytical laboratory. The samples you submitted have been analyzed in accordance with NELAC standards and the results compiled in the attached report. Any exceptions to NELAC compliance are noted in the report. These results apply only to those samples submitted. Please note TO-15 samples will be disposed of 7 calendar days after the reporting date. All other samples will be disposed of 30 days after the reporting date.

If you have any questions regarding these results or if we may be of further assistance to you, please contact me at (517) 699-0345.

Sincerely,

Kaitlyn Miracle

By Kaitlyn Miracle at 2:17 PM, Sep 28, 2022

For Daryl P. Strandbergh
Laboratory Director

Enclosures

Fibertec environmental services

Analytical Laboratory Report
Laboratory Project Number: A10458
Laboratory Sample Number: A10458-001

Order: A10458
Date: 09/28/22

Client Identification:	**Michigan State University - EHS**	Sample Description:	**MSU-017**	Chain of Custody:	**212676**
Client Project Name:	**CWB Annual Analysis**	Sample No:		Collect Date:	**08/22/22**
Client Project No:	**NA**	Sample Matrix:	**Chemical Waste (Liquid)**	Collect Time:	**09:40**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

Specific Gravity at 60°F (Analysis Performed in Cadillac) **Aliquot ID: A10458-001A** **Matrix: Chemical Waste (Liquid)**
Method: ASTM D1429-08D **Description: MSU-017**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Specific Gravity	**0.950**		NA	0.000	1.0	NA	NA	08/30/22	NA	EAS

RCRA Elements by ICP/MS, Total Recoverable **Aliquot ID: A10458-001** **Matrix: Chemical Waste (Liquid)**
Method: EPA 3005A (Total Recoverable)/EPA 6020A **Description: MSU-017**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
1. Arsenic	**1900**		µg/L	10	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
2. Barium	**11000**		µg/L	100	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
3. Cadmium	**96**		µg/L	1.0	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
4. Chromium	**2600**		µg/L	20	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
5. Lead	**440**		µg/L	20	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
6. Selenium	**1100**		µg/L	20	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
7. Silver	**4400**		µg/L	1.0	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA

Mercury (Total) **Aliquot ID: A10458-001** **Matrix: Chemical Waste (Liquid)**
Method: EPA 7470A **Description: MSU-017**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
1. Mercury	**23**		µg/L	1.0	1.0	09/07/22	PM22I07D	09/08/22	M722I08A	JLH

Corrosivity (Waste Characterization) **Aliquot ID: A10458-001** **Matrix: Chemical Waste (Liquid)**
Method: EPA 9040C **Description: MSU-017**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Corrosivity (pH)	**5.21**	H	pH Units	-1.00	1.0	NA	NA	08/25/22 11:58	WD22H25A	RJM
‡ 2. Temperature	**18.8**		°C	0.0	1.0	NA	NA	08/25/22 11:58	WD22H25A	RJM

Fibertec environmental services

Analytical Laboratory Report
Laboratory Project Number: A10458
Laboratory Sample Number: A10458-002

Order: A10458
Date: 09/28/22

Client Identification:	**Michigan State University - EHS**	Sample Description:	**MSU-013**	Chain of Custody:	**212676**
Client Project Name:	**CWB Annual Analysis**	Sample No:		Collect Date:	**08/22/22**
Client Project No:	**NA**	Sample Matrix:	**Chemical Waste (Liquid)**	Collect Time:	**10:00**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

Specific Gravity at 60°F (Analysis Performed in Cadillac) **Aliquot ID: A10458-002A** **Matrix: Chemical Waste (Liquid)**
Method: ASTM D1429-08D **Description: MSU-013**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Specific Gravity	**1.000**		NA	0.000	1.0	NA	NA	08/30/22	NA	EAS

RCRA Elements by ICP/MS, Total Recoverable **Aliquot ID: A10458-002** **Matrix: Chemical Waste (Liquid)**
Method: EPA 3005A (Total Recoverable)/EPA 6020A **Description: MSU-013**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
1. Arsenic	**9600**		µg/L	20	20	09/14/22	PT22I13C	09/14/22	T422I14A	CJA
2. Barium	**1000**		µg/L	100	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
3. Cadmium	**520**		µg/L	1.0	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
4. Chromium	**3600**		µg/L	20	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
5. Lead	**410**		µg/L	20	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
6. Selenium	U		µg/L	20	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
7. Silver	**350**		µg/L	1.0	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA

Mercury (Total) **Aliquot ID: A10458-002** **Matrix: Chemical Waste (Liquid)**
Method: EPA 7470A **Description: MSU-013**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
1. Mercury	U		µg/L	1.0	1.0	09/07/22	PM22I07D	09/08/22	M722I08A	JLH

Corrosivity (Waste Characterization) **Aliquot ID: A10458-002** **Matrix: Chemical Waste (Liquid)**
Method: EPA 9040C **Description: MSU-013**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Corrosivity (pH)	**1.32**	H E	pH Units	-1.00	1.0	NA	NA	08/25/22 12:02	WD22H25A	RJM
‡ 2. Temperature	**17.0**		°C	0.0	1.0	NA	NA	08/25/22 12:02	WD22H25A	RJM

Fibertec environmental services

Analytical Laboratory Report
Laboratory Project Number: A10458
Laboratory Sample Number: A10458-003

Order: A10458
Date: 09/28/22

Client Identification:	**Michigan State University - EHS**	Sample Description:	**MSU-039**	Chain of Custody:	**212676**
Client Project Name:	**CWB Annual Analysis**	Sample No:		Collect Date:	**08/22/22**
Client Project No:	**NA**	Sample Matrix:	**Chemical Waste (Liquid)**	Collect Time:	**10:10**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

Specific Gravity at 60°F (Analysis Performed in Cadillac) **Aliquot ID: A10458-003A** **Matrix: Chemical Waste (Liquid)**
Method: ASTM D1429-08D **Description: MSU-039**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Specific Gravity	**1.025**		NA	0.000	1.0	NA	NA	08/30/22	NA	EAS

RCRA Elements by ICP/MS, Total Recoverable **Aliquot ID: A10458-003** **Matrix: Chemical Waste (Liquid)**
Method: EPA 3005A (Total Recoverable)/EPA 6020A **Description: MSU-039**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
1. Arsenic	**120**		µg/L	10	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
2. Barium	**230**		µg/L	100	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
3. Cadmium	**13**		µg/L	1.0	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
4. Chromium	**410**		µg/L	20	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
5. Lead	**100**		µg/L	20	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
6. Selenium	**46**		µg/L	20	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
7. Silver	**1300**		µg/L	1.0	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA

Mercury (Total) **Aliquot ID: A10458-003** **Matrix: Chemical Waste (Liquid)**
Method: EPA 7470A **Description: MSU-039**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
1. Mercury	**1.1**		µg/L	1.0	1.0	09/07/22	PM22I07D	09/08/22	M722I08A	JLH

Corrosivity (Waste Characterization) **Aliquot ID: A10458-003** **Matrix: Chemical Waste (Liquid)**
Method: EPA 9040C **Description: MSU-039**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Corrosivity (pH)	**5.36**	H	pH Units	-1.00	1.0	NA	NA	08/25/22 12:05	WD22H25A	RJM
‡ 2. Temperature	**17.5**		°C	0.0	1.0	NA	NA	08/25/22 12:05	WD22H25A	RJM

Fibertec environmental services

Analytical Laboratory Report
Laboratory Project Number: A10458
Laboratory Sample Number: A10458-004

Order: A10458
Date: 09/28/22

Client Identification:	**Michigan State University - EHS**	Sample Description:	**MSU-005**	Chain of Custody:	**212676**
Client Project Name:	**CWB Annual Analysis**	Sample No:		Collect Date:	**08/22/22**
Client Project No:	**NA**	Sample Matrix:	**Chemical Waste**	Collect Time:	**12:35**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

RCRA Elements by ICP/MS **Aliquot ID: A10458-004** **Matrix: Chemical Waste**
Method: EPA 0200.2 (Modified)/EPA 6020B **Description: MSU-005**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Arsenic	**560**		µg/kg	100	20	09/12/22	PT22I12C	09/12/22	T422I12C	RJM
‡ 2. Barium	**790000**		µg/kg	1000	40	09/28/22	PT22I12C	09/28/22	T422I28B	CJA
‡ 3. Cadmium	U		µg/kg	50	20	09/12/22	PT22I12C	09/12/22	T422I12C	RJM
‡ 4. Chromium	**1400**		µg/kg	500	20	09/12/22	PT22I12C	09/12/22	T422I12C	RJM
‡ 5. Lead	U		µg/kg	1000	20	09/12/22	PT22I12C	09/12/22	T422I12C	RJM
‡ 6. Selenium	U		µg/kg	200	20	09/12/22	PT22I12C	09/12/22	T422I12C	RJM
‡ 7. Silver	U		µg/kg	100	20	09/12/22	PT22I12C	09/12/22	T422I12C	RJM

Mercury by CVAAS **Aliquot ID: A10458-004** **Matrix: Chemical Waste**
Method: EPA 7471B **Description: MSU-005**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
1. Mercury	U		µg/kg	50	10	08/26/22	PM22H26D	08/29/22	M722H29A	JLH

Corrosivity (Waste Characterization); Soil/waste pH measured in water at the reported temperature **Aliquot ID: A10458-004** **Matrix: Chemical Waste**
Method: EPA 9045D **Description: MSU-005**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Corrosivity (pH)	**8.14**	H	pH Units	-1.00	1.0	NA	NA	08/25/22 12:48	WD22H25C	RJM
‡ 2. Temperature	**20.2**		°C	0.0	1.0	NA	NA	08/25/22 12:48	WD22H25C	RJM

Specific Gravity (Analysis Performed in Cadillac) **Aliquot ID: A10458-004A** **Matrix: Chemical Waste**
Method: SM 2710 F-1997 **Description: MSU-005**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Specific Gravity	**1.051**		NA	0.000	1.0	NA	NA	08/30/22	NA	EAS

1914 Holloway Drive *Holt, MI 48842* *T: (517) 699-0345* *F: (517) 699-0388*
11766 E. Grand River *Brighton, MI 48116* *T: (810) 220-3300* *F: (810) 220-3311*
8660 S. Mackinaw Trail *Cadillac, MI 49601* *T: (231) 775-8368* *F: (231) 775-8584*
lab@fibertec.us

Fibertec environmental services

Analytical Laboratory Report
Laboratory Project Number: A10458
Laboratory Sample Number: A10458-005

Order: A10458
Date: 09/28/22

Client Identification:	**Michigan State University - EHS**	Sample Description:	**MSU-004**	Chain of Custody:	**212676**
Client Project Name:	**CWB Annual Analysis**	Sample No:		Collect Date:	**08/22/22**
Client Project No:	**NA**	Sample Matrix:	**Chemical Waste (Liquid)**	Collect Time:	**12:20**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

Specific Gravity at 60°F (Analysis Performed in Cadillac) **Aliquot ID: A10458-005A** **Matrix: Chemical Waste (Liquid)**
Method: ASTM D1429-08D **Description: MSU-004**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Specific Gravity	**1.100**		NA	0.000	1.0	NA	NA	08/30/22	NA	EAS

RCRA Elements by ICP/MS, Total Recoverable **Aliquot ID: A10458-005** **Matrix: Chemical Waste (Liquid)**
Method: EPA 3005A (Total Recoverable)/EPA 6020A **Description: MSU-004**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
1. Arsenic	U		µg/L	10	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
2. Barium	**210**		µg/L	100	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
3. Cadmium	**3.0**		µg/L	1.0	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
4. Chromium	**230000**		µg/L	400	200	09/14/22	PT22I13C	09/14/22	T422I14A	CJA
5. Lead	**60**		µg/L	20	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
6. Selenium	**120**		µg/L	20	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
7. Silver	**21**		µg/L	1.0	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA

Mercury (Total) **Aliquot ID: A10458-005** **Matrix: Chemical Waste (Liquid)**
Method: EPA 7470A **Description: MSU-004**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
1. Mercury	U		µg/L	1.0	1.0	09/07/22	PM22I07D	09/08/22	M722I08A	JLH

Corrosivity (Waste Characterization) **Aliquot ID: A10458-005** **Matrix: Chemical Waste (Liquid)**
Method: EPA 9040C **Description: MSU-004**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Corrosivity (pH)	**0.34**	H E	pH Units	-1.00	1.0	NA	NA	08/25/22 12:08	WD22H25A	RJM
‡ 2. Temperature	**17.9**		°C	0.0	1.0	NA	NA	08/25/22 12:08	WD22H25A	RJM

Fibertec environmental services

Analytical Laboratory Report
Laboratory Project Number: A10458
Laboratory Sample Number: A10458-006

Order: A10458
Date: 09/28/22

Client Identification:	**Michigan State University - EHS**	Sample Description:	**MSU-009**	Chain of Custody:	**212676**
Client Project Name:	**CWB Annual Analysis**	Sample No:		Collect Date:	**08/22/22**
Client Project No:	**NA**	Sample Matrix:	**Chemical Waste (Liquid)**	Collect Time:	**10:25**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

Specific Gravity at 60°F (Analysis Performed in Cadillac) **Aliquot ID: A10458-006A** **Matrix: Chemical Waste (Liquid)**
Method: ASTM D1429-08D **Description: MSU-009**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Specific Gravity	**1.025**		NA	0.000	1.0	NA	NA	08/30/22	NA	EAS

RCRA Elements by ICP/MS, Total Recoverable **Aliquot ID: A10458-006** **Matrix: Chemical Waste (Liquid)**
Method: EPA 3005A (Total Recoverable)/EPA 6020A **Description: MSU-009**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
1. Arsenic	**12**		µg/L	10	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
2. Barium	**400**		µg/L	100	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
3. Cadmium	**3.6**		µg/L	1.0	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
4. Chromium	**1900**		µg/L	20	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
5. Lead	**110**		µg/L	20	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
6. Selenium	**190**		µg/L	20	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
7. Silver	**43**		µg/L	1.0	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA

Mercury (Total) **Aliquot ID: A10458-006** **Matrix: Chemical Waste (Liquid)**
Method: EPA 7470A **Description: MSU-009**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
1. Mercury	**2.2**		µg/L	1.0	1.0	09/07/22	PM22I07D	09/08/22	M722I08A	JLH

Corrosivity (Waste Characterization) **Aliquot ID: A10458-006** **Matrix: Chemical Waste (Liquid)**
Method: EPA 9040C **Description: MSU-009**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Corrosivity (pH)	**0.39**	H E	pH Units	-1.00	1.0	NA	NA	08/25/22 12:10	WD22H25A	RJM
‡ 2. Temperature	**17.2**		°C	0.0	1.0	NA	NA	08/25/22 12:10	WD22H25A	RJM

Fibertec environmental services

Analytical Laboratory Report
Laboratory Project Number: A10458
Laboratory Sample Number: A10458-007

Order: A10458
Date: 09/28/22

Client Identification:	**Michigan State University - EHS**	Sample Description:	**MSU-018**	Chain of Custody:	**212676**
Client Project Name:	**CWB Annual Analysis**	Sample No:		Collect Date:	**08/22/22**
Client Project No:	**NA**	Sample Matrix:	**Chemical Waste (Liquid)**	Collect Time:	**10:35**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

Specific Gravity at 60°F (Analysis Performed in Cadillac) **Aliquot ID: A10458-007A** **Matrix: Chemical Waste (Liquid)**
Method: ASTM D1429-08D **Description: MSU-018**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Specific Gravity	**1.050**		NA	0.000	1.0	NA	NA	08/30/22	NA	EAS

RCRA Elements by ICP/MS, Total Recoverable **Aliquot ID: A10458-007** **Matrix: Chemical Waste (Liquid)**
Method: EPA 3005A (Total Recoverable)/EPA 6020A **Description: MSU-018**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
1. Arsenic	**160**		µg/L	10	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
2. Barium	**780**		µg/L	100	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
3. Cadmium	**12**		µg/L	1.0	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
4. Chromium	**110000**		µg/L	200	100	09/14/22	PT22I13C	09/14/22	T422I14A	CJA
5. Lead	**3300**		µg/L	20	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
6. Selenium	**48**		µg/L	20	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
7. Silver	**1500**		µg/L	1.0	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA

Mercury (Total) **Aliquot ID: A10458-007** **Matrix: Chemical Waste (Liquid)**
Method: EPA 7470A **Description: MSU-018**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
1. Mercury	**130**		µg/L	10	10	09/08/22	PM22I07D	09/08/22	M722I08A	JLH

Corrosivity (Waste Characterization) **Aliquot ID: A10458-007** **Matrix: Chemical Waste (Liquid)**
Method: EPA 9040C **Description: MSU-018**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Corrosivity (pH)	**0.69**	H E	pH Units	-1.00	1.0	NA	NA	08/25/22 12:12	WD22H25A	RJM
‡ 2. Temperature	**17.0**		°C	0.0	1.0	NA	NA	08/25/22 12:12	WD22H25A	RJM

Fibertec environmental services

Analytical Laboratory Report
Laboratory Project Number: A10458
Laboratory Sample Number: A10458-008

Order: A10458
Date: 09/28/22

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Experiments #5,6,7**	Chain of Custody:	**212676**
Client Project Name:	**CWB Annual Analysis**	Sample No:		Collect Date:	**08/22/22**
Client Project No:	**NA**	Sample Matrix:	**Chemical Waste (Liquid)**	Collect Time:	**10:45**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

Specific Gravity at 60°F (Analysis Performed in Cadillac) **Aliquot ID: A10458-008A** **Matrix: Chemical Waste (Liquid)**
Method: ASTM D1429-08D **Description: Experiments #5,6,7**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Specific Gravity	**1.075**		NA	0.000	1.0	NA	NA	08/30/22	NA	EAS

RCRA Elements by ICP/MS, Total Recoverable **Aliquot ID: A10458-008** **Matrix: Chemical Waste (Liquid)**
Method: EPA 3005A (Total Recoverable)/EPA 6020A **Description: Experiments #5,6,7**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
1. Arsenic	**2500**		µg/L	10	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
2. Barium	**260**		µg/L	100	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
3. Cadmium	**5.9**		µg/L	1.0	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
4. Chromium	**1900**		µg/L	20	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
5. Lead	U		µg/L	20	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
6. Selenium	U		µg/L	20	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA
7. Silver	**25**		µg/L	1.0	10	09/13/22	PT22I13C	09/14/22	T422I14A	CJA

Mercury (Total) **Aliquot ID: A10458-008** **Matrix: Chemical Waste (Liquid)**
Method: EPA 7470A **Description: Experiments #5,6,7**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
1. Mercury	U		µg/L	1.0	1.0	09/07/22	PM22I07D	09/08/22	M722I08A	JLH

Corrosivity (Waste Characterization) **Aliquot ID: A10458-008** **Matrix: Chemical Waste (Liquid)**
Method: EPA 9040C **Description: Experiments #5,6,7**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Corrosivity (pH)	**0.62**	H E	pH Units	-1.00	1.0	NA	NA	08/25/22 12:14	WD22H25A	RJM
‡ 2. Temperature	**17.2**		°C	0.0	1.0	NA	NA	08/25/22 12:14	WD22H25A	RJM

Fibertec environmental services

Analytical Laboratory Report
Laboratory Project Number: A10458
Laboratory Sample Number: A10458-009

Order: A10458
Date: 09/28/22

Client Identification:	**Michigan State University - EHS**	Sample Description:	**MSU-078**	Chain of Custody:	**212676**
Client Project Name:	**CWB Annual Analysis**	Sample No:		Collect Date:	**08/22/22**
Client Project No:	**NA**	Sample Matrix:	**Chemical Waste (Liquid)**	Collect Time:	**11:00**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

Specific Gravity at 60°F (Analysis Performed in Cadillac) **Aliquot ID: A10458-009A** **Matrix: Chemical Waste (Liquid)**
Method: ASTM D1429-08D **Description: MSU-078**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Specific Gravity	**1.025**		NA	0.000	1.0	NA	NA	08/30/22	NA	EAS

RCRA Elements by ICP/MS, Total Recoverable **Aliquot ID: A10458-009** **Matrix: Chemical Waste (Liquid)**
Method: EPA 3005A (Total Recoverable)/EPA 6020A **Description: MSU-078**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
1. Arsenic	**61**		µg/L	20	20	09/14/22	PT22I13C	09/14/22	T422I14A	CJA
2. Barium	**24000**		µg/L	100	20	09/14/22	PT22I13C	09/14/22	T422I14A	CJA
3. Cadmium	**2.2**		µg/L	2.0	20	09/14/22	PT22I13C	09/14/22	T422I14A	CJA
4. Chromium	**410**		µg/L	40	20	09/14/22	PT22I13C	09/14/22	T422I14A	CJA
5. Lead	U		µg/L	40	20	09/14/22	PT22I13C	09/14/22	T422I14A	CJA
6. Selenium	U		µg/L	40	20	09/14/22	PT22I13C	09/14/22	T422I14A	CJA
7. Silver	**1000**		µg/L	2.0	20	09/14/22	PT22I13C	09/14/22	T422I14A	CJA

Mercury (Total) **Aliquot ID: A10458-009** **Matrix: Chemical Waste (Liquid)**
Method: EPA 7470A **Description: MSU-078**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
1. Mercury	**4.4**		µg/L	1.0	1.0	09/07/22	PM22I07D	09/08/22	M722I08A	JLH

Corrosivity (Waste Characterization) **Aliquot ID: A10458-009** **Matrix: Chemical Waste (Liquid)**
Method: EPA 9040C **Description: MSU-078**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Corrosivity (pH)	**12.9**	H E	pH Units	-1.00	1.0	NA	NA	08/25/22 12:42	WD22H25B	RJM
‡ 2. Temperature	**18.7**		°C	0.0	1.0	NA	NA	08/25/22 12:42	WD22H25B	RJM

Definitions/ Qualifiers:

A: Spike recovery or precision unusable due to dilution.
B: The analyte was detected in the associated method blank.
E: The analyte was detected at a concentration greater than the calibration range, therefore the result is estimated.
J: The concentration is an estimated value.
M: Modified Method
U: The analyte was not detected at or above the reporting limit.
X: Matrix Interference has resulted in a raised reporting limit or distorted result.
W: Results reported on a wet-weight basis.
***:** Value reported is outside QC limits

Exception Summary:

E : This flag identifies compounds whose response exceed the response of the highest standard in the initial calibration range of the instrument for that specific analysis.
H : Hold time exceeded.

Analysis Locations:

Most analyses performed in Holt, with the following performed in Cadillac:

Sample Number:	A10458-001A	**Method:**	ASTM D1429-08D
Sample Number:	A10458-002A	**Method:**	ASTM D1429-08D
Sample Number:	A10458-003A	**Method:**	ASTM D1429-08D
Sample Number:	A10458-004A	**Method:**	SM 2710 F-1997
Sample Number:	A10458-005A	**Method:**	ASTM D1429-08D
Sample Number:	A10458-006A	**Method:**	ASTM D1429-08D
Sample Number:	A10458-007A	**Method:**	ASTM D1429-08D
Sample Number:	A10458-008A	**Method:**	ASTM D1429-08D
Sample Number:	A10458-009A	**Method:**	ASTM D1429-08D

NELAP ACCREDITED TNI LABORATORY

Accreditation Number(s):

T104704518-22-14 (TX)

ATTACHMENT A2.B1 – CONTAINER SPECIFICATIONS

SECTION I: CERTIFICATION

Periodic Retest of the BWAY Corporation
6 Gallon Round Tight Head HDPE Drum with Rieke SC-76 TE Closure

TEN-E Packaging Services, Inc. is a current DOT UN Third-Party Certification Agency under §107.403 and certifies that the **BWAY Corporation** packaging referenced above has passed the standards of the DEPARTMENT OF TRANSPORTATION'S TITLE 49 CFR; Performance Oriented Packaging Standards, Section 178. This package is also certified under IMDG, ICAO/IATA Regulations and the UN Recommendations on the Transport of Dangerous Goods. It is the responsibility of the end user to determine authorization for use under these regulations. The use of other packaging methods or components other than those documented in this report may render this certification invalid.

SUMMARY OF PERFORMANCE TESTS

UN / DOT TEST	CFR REFERENCE	TEST LEVEL	TEST CONTENTS	TEST COMPLETED	TEST RESULTS
Drop	178.603	1.8 m	Methanol/Water Solution	April 6, 2022	PASS
Leakproofness	178.604	20 kPa – 5 Minutes	Empty	April 5, 2022	PASS
Hydrostatic	178.605	100 kPa - 30 Minutes	Water	April 5, 2022	PASS
Dynamic Compression	178.606	393.7 Kg	Empty & without Closure	April 5, 2022	PASS
Vibration	178.608	4.0 Hz – 1 Hour	Water	April 4, 2022	PASS

TEST REPORT NUMBERS:	22-MN30084 (NA-0442-BA02), 07-3170 (NA-0442-BA00)
UN MARKING: (CFR 49 – 178.503)	(un) 1H1 / Y1.8 / 100 / ** USA / +AA0544
PACKAGING IDENTIFICATION CODE:	1H1 - Non-Removable Head Plastic Drum (178.509)
PERFORMANCE STANDARD:	Y (Packaging meets Packing Group II and III tests)
MAXIMUM PRODUCT SPECIFIC GRAVITY:	1.8
HYDROSTATIC TEST PRESSURE:	100 kPa
YEAR OF MANUFACTURE:	** Insert year the packaging is manufactured
STATE AUTHORIZING THE MARK:	USA
PACKAGING CERTIFICATION AGENCY:	(+AA) TEN-E Packaging Services, Inc. (Newport, MN CAA #2006030022)
THIRD PARTY PACKAGING IDENTIFICATION:	+AA0544
PERIODIC RETEST DATE:	April 5, 2023

ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY THAT THE PACKAGING TESTED IS MERCHANTABLE OR FIT FOR A PARTICULAR PURPOSE, ARE DISCLAIMED. In no event shall TEN-E Packaging Services, Inc. liability exceed the total amount paid by **BWAY Corporation** for services rendered. In the event of future changes to the above referenced test standards, it is the responsibility of **BWAY Corporation** to determine whether additional testing or updating of past testing is necessary to verify that the packaging we have tested remains in compliance with those standards.

MANUFACTURER:

BWAY Corporation
1603 Orchard Hill Road
LaGrange, GA 30240

Peter Stampfle
Packaging Engineer
TEN-E Packaging Services, Inc.
1666 County Road 74
Newport, MN 55055

Project NA-0442_6 Gallon 1H1
Variation 5 Certification
Through April 5, 2023

DOT / UN PACKAGING CERTIFICATION
SELECTIVE TESTING VARIATION 5

BWAY CORPORATION, in association with **TEN-E PACKAGING SERVICES, INC.**, certifies that the **Mauser Packaging 6 Gallon HDPE Tight Head Drum with optional 18/400 Vent Access and closures listed below** have passed the standards of the DEPARTMENT OF TRANSPORTATION'S TITLE 49 CFR; Performance Oriented Packaging Standards, Section 178. This package is also certified in accordance with the requirements set forth by IMDG, ICAO, IATA and the UN Recommendations on the Transport of Dangerous Goods. It is the responsibility of the end user to determine package authorization for use under these regulations. The use of other packaging methods or components other than those documented in this report may render this certification invalid.

PACKAGE DESCRIPTIONS: 6 Gallon Round Tight Head (1H1)

DESIGN QUALIFICATION TEST REPORTS

DQ REPORT	CLOSURE	DQ DATE
NA-0442-AA00	Rieke FS-60	02/04/1993
NA-0442-AB00	Rieke FS-70+80	02/04/1993
NA-0442-AC00	Rieke FS-70 DBO+Plug	02/04/1993
NA-0442-AE00	Comack 70mm TE	02/04/1993
NA-0442-AF00	AmFlange Tab-Seal	02/04/1993
NA-0442-AG00	Rieke FS-300 Crimp On	01/31/1994
NA-0442-AK00	Republic 70mm Am.	10/01/1993
NA-0442-AL00	Flange UNIGRIP Rieke	08/08/1994
NA-0442-AM00	FS-70 Vented Rieke SC76	08/08/1994
NA-0442-AQ00	Rieke SC78	08/13/2004
NA-0442-AN00	Rieke FS-80 Vented	08/08/1994
NA-0442-AR00	Rieke SC76T	12/19/2006
NA-0442-AS00	Rieke FS-70 8tpi	06/08/2007
NA-0442-AT00	Brandt 70mm 8tpi FS-	05/18/2007
NA-0487-AB00	60 w/ 18-400 Vent	01/08/1993
NA-0487-AG00	AmFlange Tab Seal	08/10/1993
NA-0487-AH00	Rieke Flexspout w/18-400	07/04/1996
NA-0548-AB00	W/ 18/400 Vent Access	03/19/1998
NA-0851-AA00	Rieke FS-70 TE	11/16/2004
NA-0442-AU00	Rieke FS-300 Crimp	02/13/2007
NA-0442-AV00	Brandt 70mm 6tpi TE	01/17/2007
NA-0442-AW00	AmFlange Tab Seal	12/19/2006
NA-0442-AX00	Bomag Crimp	04/17/2007
NA-0442-BA00	Rieke SC76T (6 Gal)	04/18/2008
NA-0442-BB00	AmFlange Tab Seal (6Gal)	01/10/2008
NA-0442-BC00	Nampac 70mm (6 Gal)	05/21/2009
NA-0442-BD00	20L Rieke FS-II	12/11/2009
NA-0442-BE00	6 Gallon Am Flange Uni Grip	06/10/2013
NA-0442-BF00	Brandt 70mm 6tpi TE	06/12/2013
NA-0442-BH00	Brandt 70mm 6tpi TE	11/20/2013
NA-0442-BG00	Brandt 70 mm ¾" Closure	11/20/2013
NA-0442-NO00	Nova Material	11/28/2017
NA-0442-BK00	Rieke SC 66	01/21/2019
NA -0442-CA00	Rieke FS II (6 Gal)	12/23/2020
NA-0442-BN00	Bericap 60 DIN	04/5/2021

UN MARKING: (CFR 49 – 178.503)	u 1H1/Y1.5/100/** USA/+AA0729 n 1H1/Y1.8/100/**USA/+AA0544
PACKAGING IDENTIFICATION CODE:	1H1 – Non-Removable Head Plastic Drum (178.509)
AUTHORIZED PACKING GROUP(S):	II (Y) and III (Z)
MAXIMUM PRODUCT SPECIFIC GRAVITY:	1.8
INTERNAL TEST PRESSURE:	100 kPa
YEAR OF MANUFACTURE:	** Insert year packaging is manufactured
STATE AUTHORIZING THE MARK:	USA
CERTIFICATION AGENCY:	(+AA) Ten-E Packaging Services, Inc.
THIRD PARTY PKG. IDENTIFICATION:	+AA0544 +AA0729
PERIODIC RETEST DATE:	**Active Package Design Reports:** • **NA-0442-BA02 April 5, 2022**

Robert Burek
E&TS and UN Compliance
Mauser Packaging

ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY THAT THE PACKAGING TESTED IS MERCHANTABLE OR FIT FOR A PARTICULAR PURPOSE, ARE DISCLAIMED. In no event shall Ten-E Packaging Services, Inc. liability exceed the total amount paid by **BWAY CORPORATION** for services rendered. In the event of future changes to the above referenced test standard, it is the responsibility of **BWAY** to determine whether additional testing or updating of past testing is necessary to verify that the packaging tested remains in compliance with those standards.

MAUSER Packaging Solutions

Project NA-0442_6 Gallon 1H1
Variation 5 Certification
Through April 5, 2023

DOT / UN PACKAGING CERTIFICATION SELECTIVE TESTING VARIATION 5

Title 49 CFR 178.601
General requirements

(g) Selective testing. The selective testing of packagings that differ only in minor respects from a tested type is permitted as described in this section. For air transport, packagings must comply with §173.27(c)(1) and (c)(2) of this subchapter.

(5) Variation 5. Single packagings (i.e., non-bulk packagings other than combination packagings), that differ from a tested design type only to the extent that the closure device or gasketing differs from that used in the originally tested design type, may be used without further testing, provided an equivalent level of performance is maintained, subject to the following conditions (the qualifying tests):

(i) A packaging with the replacement closure devices or gasketing must successfully pass the drop test specified in §178.603 in the orientation which most severely tests the integrity of the closure or gasket;

(ii) When intended to contain liquids, a packaging with the replacement closure devices or gasketing must successfully pass the leakproofness test specified in §178.604, the hydrostatic pressure test specified in §178.605, and the stacking test specified in §178.606.

Replacement closures and gasketings qualified under the above test requirements are authorized without additional testing for packagings described in paragraph (g)(3) of this section. Replacement closures and gasketings qualified under the above test requirements also are authorized without additional testing for different tested design types packagings of the same type as the originally tested packaging, provided the original design type tests are more severe or comparable to tests which would otherwise be conducted on the packaging with the replacement closures or gasketings. (For example: The packaging used in the qualifying tests has a lesser packaging wall thickness than the packaging with replacement closure devices or gasketing; the gross mass of the packaging used in the qualifying drop test equals or exceeds the mass for which the packaging with replacement closure devices or gasketing was tested; the packaging used in the qualifying drop test was dropped from the same or greater height than the height from which the packaging with replacement closure devices or gasketing was dropped in design type tests; and the specific gravity of the substance used in the qualifying drop test was the same or greater than the specific gravity of the liquid used in the design type tests of the packaging with replacement closure devices or gasketing.)

FORM EQP 5111 ATTACHMENT TEMPLATE A3
WASTE ANALYSIS PLAN (WAP)

This document is an attachment to the Michigan Department of Environment, Great Lakes, and Energy'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) §§270.14(b)(3) and 264.13(b) and (c), establish requirements for WAPs for 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 WAP for the hazardous waste management units and the hazardous waste management facility for the Michigan State University (MSU) Waste Storage Facility (WSF). All activities associated with the WAP will be conducted at the MSU WSF, 3634 E. Jolly Road, Lansing, MI 48910.

Ensure that all samples collected for the purposes of waste characterization are collected, transported, analyzed, stored, and disposed by trained and qualified individuals in accordance with the Quality Assurance/Quality Control (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," U.S. Environmental Protection Agency (EPA) Publication No. SW-846, Third Edition, Chapter 1 (November 1986), and its updates.

This template is organized as follows:

A3.A COMMERCIAL FACILITY

The MSU WSF accepts waste from off-site MSU owned and operated locations only. The MSU WSF does not accept non-MSU generated waste. A list of MSU off-site locations is provided in Appendix A3-1 of this section.

The MSU WSF is a commercial facility that receives wastes generated off site. The MSU WSF has developed a WAP to ensure that its facility at 3634 E. Jolly Road, Lansing, MI 48910 will accept only wastes that it is authorized to accept. The hazardous wastes stored at the MSU WSF will be properly characterized prior to waste acceptance. All generators will be required to provide a complete waste characterization, including chemical analysis when appropriate. Waste screening will be conducted on every shipment of waste to ensure that the waste conforms to the waste profile for the generator and information on incoming manifests and to ensure that the waste is properly managed within the facility.

All analysis performed pursuant to this application will be consistent with *the written procedures outlined in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," U.S. Environmental Protection Agency (EPA) Publication SW-846, Third Edition, Chapter 1 (November 1986), and its updates.* All samples for the purpose of waste characterization will be collected, transported, stored, and disposed of by trained and qualified individuals in accordance with the QA/QC Plan.

In accordance with R 299.9609 and 40 CFR §264.73 and Part 264, Appendix I, the MSU WSF will retain all records and results of waste determinations performed as specified in 40 CFR §§264.13, 264.17, 264.314, 264.1034, 264.1063, 264.1083, 268.4(a), and 268.7 in the facility operating record until closure of the facility.

A3.A.1 Initial Waste Characterization Requirements for Generators
[R 299.9605(1) and R 299.9504(1)(c) and 40 CFR §264.13(b)(5)]

The MSU WSF will require the following waste profile information for initial waste shipments from all off-site generators prior to shipment.

MSU is a research, health care, and agricultural based educational University, and as such, hazardous wastes are generated by laboratory and farm research, general maintenance, and in clinical settings. The Facility relies on generator knowledge from the point of generation of each waste, which is achieved by either utilizing a Manufacturer’s Safety Data Sheet (SDS) for Discarded Commercial Chemical Product (DCCP) waste, or completion of a pickup tag attached to each container of waste, which is completed by the generator during hazardous waste generation. The generator completes the following information on the pickup tag: (1) generator contact information, including satellite accumulation area location and direct contact information, (2) accumulation start date, (3) container size and state of matter, (4) container contents, including unabbreviated chemical names and their respective amounts (volume, percentage, or concentration), (5) color and consistency, and (6) hazards

associated with the waste as identified by Global Harmonization Symbols (GHS) and characteristics. The MSU WSF provides MSU Waste Materials Pick Up Tags to all MSU waste generators to establish the waste stream profiles. A copy of MSU's pick up tag is provided as Figure A.3.A.1.

Facility personnel review each waste tag or SDS prior to transporting the waste and make a final waste characterization based on the identification of any listed hazardous waste, or determining if the waste meets EPA characteristic waste criteria. From the characteristics of the initial products and the waste generated from the process, the ignitable, corrosive, reactive or toxic characteristics are identified. As such, conducting waste analyses for these characteristic parameters is usually unnecessary. A pH test may be conducted to verify whether a waste is corrosive. The waste generation and profiling processes also provide known RCRA listed hazardous waste constituents. A waste analysis for the RCRA listed constituents is usually unnecessary.

Waste determination effective dates correspond to the date facility personnel characterize and pick up the waste from MSU locations. Hazardous waste is picked up from the generator as requested through the MSU WSF internal request system that automatically populates all required hazardous waste information into a document formatted similarly to a Uniform Hazardous Waste Manifest. Each satellite accumulation area has a chemical disposal reference document that includes the instructions for proper labeling of the pickup tag, proper storage, proper disposal procedures for hazardous waste, and a direct link to MSU WSF disposal guidance on the EHS website.

The characteristics of the initial hazardous waste constituents used are identified through MSU generator knowledge or as necessary by analysis of the waste streams and are recorded on the pickup tag. Additional testing, if required, is conducted by an outside contract laboratory. Table A3.A.1 lists the hazardous waste codes of the hazardous waste stored at the MSU WSF.

Figure A3.A.1 Information to be on Each Generator Waste Profile Form.

In addition to the waste profile information submitted by the generator, the MSU WSF will:

☐ Require submittal of a representative waste sample

☐ Conduct an audit of the generator facility

☐ Review industry literature to identify typical waste streams

☒ Other: MSU WSF personnel verify all container contents and hazardous waste codes after review of the MSU Pickup Tag or SDS documentation prior to transport and arrival at the MSU WSF.

A3.A.1(a) Generator Waste Characterization Discrepancies
[R 299.9605(1) and R 299.9504(1)(c) and 40 CFR §§264.13(a)(3) and (4), 264.13(b)(c), and 264.72]

If Facility personnel cannot make a direct hazardous waste determination of a waste, samples are collected and submitted to a third-party lab for appropriate analyses per the waste stream. Facility personnel also submit annual waste stream samples to a third-party lab for waste characterization of bulk waste streams consolidated at the Facility to ensure they are compliant with existing waste profiles. The effective dates of these characterizations are the dates the lab analyzes each waste stream.

Hazardous waste is not transported or accepted into the MSU WSF until a waste characterization has been made.

A3.A.1(b) Subsequent Waste Shipment Procedures
[R 299.9605(1) and R 299.9504(1)(c) and 40 CFR §§264.13(a)(3) and 264.13(b)(4)]

The initial analysis of waste from each generator will be reviewed or repeated for each container of waste requested for pick up to ensure that the analysis is accurate and up-to-date.

A3.A.1(c) Additional Waste Analysis Requirements
[R 299.9605(1) and R 299.9504(1)(c) and 40 CFR §§264.13(b)(6) and 264.13(c)(3)]

The MSU WSF will review the waste profile information to ensure that the facility is authorized to receive the waste, and can manage the waste in compliance with the following:

☒ R 299.9605 and 40 CFR §264.17	General requirements for ignitable, reactive, or incompatible wastes [Template C1, Section C1G and C1H]
☐ R 299.9605 and 40 CFR §264.314	Special requirements for bulk and containerized liquids [Template , Section]
☐ R 299.9630 and 40 CFR §264.1034(d)	Test methods and procedures (Subpart AA) [Template A3, Section A3.A.2(c)]
☐ R 299.9631 and 40 CFR §264.1063(d)	Test methods and procedures (Subpart BB) [Template A3, Section A3.A.2(c)]
☐ 40 CFR §264.1083	Waste determination procedures (Subpart CC) [Template A3, Section A3.A.2(c)]
☒ R 299.9627 and 40 CFR §268.7	Waste analysis and record keeping LDR requirements [Template A3, Sections A3.A.3, A3.B.3 and A3.C]
☐ R 299.9228	Universal waste requirements [Template , Section]

FIGURE A3.A.1
INFORMATION THAT MUST BE SHOWN ON A GENERATOR'S WASTE PROFILE FORM

See attached MSU Waste Materials Pick Up Tag.

A3.A.2 Waste Acceptance Procedures
[R 299.9605(1) and R 299.9504(1)(c), and 40 CFR §§264.13(c), 264.72(a) and (b), and 264.73(b)]

Waste shipments arrive at the facility in the following containers:

☒ Drums	☒ Totes	☐ Tanker trucks
☒ Carboys	☒ Wrangler box	☐ Filter bags
☐ Roll-off boxes	☐ Vacuum trucks	☒ Other: Labpacks

Upon receipt of wastes from an off-site generator, the MSU WSF will perform all of the following tasks:

- Review paperwork
- Visually inspect the waste
- Perform waste screening/fingerprint analysis of waste, if required

These tasks are discussed below.

A3.A.2(a) Review Paperwork
[R 299.9605(1) and R 299.9504(1)(c), and 40 CFR §§264.13(c), 264.72(a) and (b), and 264.73(b)]

The MSU WSF will review all paperwork, including manifests and LDR notifications, before any wastes are accepted by the facility. The MSU WSF will review all paperwork for completeness. In addition, the manifest and LDR notification will be compared for consistency. The manifest will also be compared to the waste profile and analytical information provided by the generator and to the waste shipment to ensure the accuracy of information provided on shipment paperwork. The manifest will also be compared to the number of containers, the volume, and/or the weight of the waste in the shipment. All discrepancies will be resolved before processing the waste.

As the MSU WSF accepts waste from only MSU owned and operated properties, the MSU WSF utilizes an internal MSU EHS database request system for submittal of hazardous waste requests. Trained MSU WSF personnel review the incoming requests for accuracy and completeness prior to picking up the material and will contact the generator directly if any additional information is necessary.

Once on-site to pick up the waste, MSU WSF staff will review the MSU Hazardous Materials Pickup Tag and conduct a visual inspection of the waste as described in A.3.A.2(b), and revise the internal shipping paperwork as necessary. All necessary paperwork will be maintained in the facility operating record until closure of the facility.

In January 2015, the MSU WSF submitted a document to EGLE requesting the approval of a one-time LDR for all hazardous waste shipments from MSU campus to the MSU WSF. In October 2020, the MSU WSF submitted a document to EGLE requesting the approval of a one-time LDR for all hazardous waste shipments from MSU off-site locations (listed in Appendix 1 of this Template). Each LDR was completed in accordance with R 299.9627 and 40 CFR §268.7 and includes all hazardous wastes in Table XIII of the License Application.

A3.A.2(b) Visual Inspection of Waste
[R 299.9605(1) and R 299.9504(1)(c) and 40 CFR §264.13(c)]

The MSU WSF will visually inspect a minimum of one container and up to a maximum of 100 percent of the containers from each generator. The contents of the container will be visually inspected for the following:

☒ Color ☒ pH ☒ Physical State ☒ Consistency ☒ Other: Completed MSU Waste Materials Pick Up Tag

Visual observations will be recorded and compared to the waste profile information. All discrepancies will be resolved before accepting the waste. Any discrepancies identified by MSU WSF staff during a waste pick up will be rectified at the generator site location through direct communication with the

generator contact. If the generator cannot rectify the discrepancy, the waste will be left at the generator location until a waste determination can be made, which may include collection of a sample to submit to a third party lab for appropriate analyses per the waste stream.

Hazardous waste is not transported or accepted into the MSU WSF with any identified discrepancies or until a waste determination can be made.

A3.A.2(c) Waste Screening/Fingerprinting
[R 299.9605(1) and R 299.9504(1)(c) and 40 CFR §§264.13(b)(14) and 264.13(c)(2)]

Table A3.A.1 lists the waste analysis procedures, including screening parameters for each hazardous waste, the rationale for the selection of these parameters, test methods that will be used to test for these parameters, the appropriate reference, whether the waste is specified in R 299.9216, the frequency of waste screening, and the rationale for the frequency. The sampling methods that will be used to obtain a representative sample of the waste to be analyzed and the sampling equipment and rationale are summarized in Table A3.A.2. The results of the waste screening/fingerprint analysis will be compared to the waste profile information and analytical results provided by the generator during the initial waste characterization process. The outside container of inner laboratory pack containers will be 100 percent visually inspected. Containers of personal protective equipment (PPE) or debris will undergo visual inspection. All discrepancies will be resolved before processing the waste.

Table A3.A.1 Waste Analysis Procedures

Screening Parameters (*Check as appropriate)*	Rationale for Parameter	Test Method	Reference	Frequency	Rationale for Frequency
D004, D007, D008, D011	Characteristic	SW-846 6020	Regulated Level 5.0 mg/l	Confirmed at time of pick-up	Generator Knowledge
D005	Characteristic	SW-846 6020	100 mg/l	Confirmed at pick-up	Generator Knowledge
D006	Characteristic	SW-846 6020	1.0 mg/l	Confirmed at pick-up	Generator Knowledge
D009	Characteristic	SW-846 7471	0.2mg/l	Confirmed at pick-up	Generator knowledge
D010	Characteristic	SW-846 6020	1.0mg/l	Confirmed at pick	Generator knowledge
D012	Characteristic	SW-846	0.02mg/l	Confirmed at pick	Generator knowledge
D013	Characteristic	SW-846	0.4mg/l	Confirmed at pick	Generator knowledge
D014	Characteristic	SW-846	10.0mg/l	Confirmed at pick	Generator knowledge
D015	Characteristic	SW-846	0.5mg/l	Confirmed at pick	Generator knowledge
D016	Characteristic	SW-846	10.0mg/l	Confirmed at pick	Generator knowledge
D017	Characteristic	SW-846	1.0mg/l	Confirmed at pick	Generator knowledge
D018	Characteristic	SW-846 8260C	0.5mg/l	Confirmed at pick	Generator knowledge
D019	Characteristic	SW-846 8260C	0.5mg/l	Confirmed at pick	Generator knowledge
D020	Characteristic	SW-846	0.03mg/l	Confirmed at pick	Generator knowledge
D021	Characteristic	SW-846 8260C	100mg/l	Confirmed at pick	Generator knowledge

Screening Parameters (*Check as appropriate)*	Rationale for Parameter	Test Method	Reference	Frequency	Rationale for Frequency
D022	Characteristic	SW-846 8260C	6.0mg/l	Confirmed at pick	Generator knowledge
D023, D024, D025, D026	Characteristic	SW-846 8270D	200mg/l	Confirmed at pick	Generator knowledge
D027	Characteristic	SW-846 8270C	7.5mg/l	Confirmed at pick	Generator knowledge
D028	Characteristic	SW-846 8260C	0.5mg/l	Confirmed at pick	Generator knowledge
D029	Characteristic	SW-846 8260C	0.7mg/l	Confirmed at pick	Generator knowledge
D030	Characteristic	SW-846 8270D	0.13mg/l	Confirmed at pick	Generator knowledge
D031	Characteristic	SW-846 8270D	0.008mg/l	Confirmed at pick	Generator knowledge
D032	Characteristic	SW-846 8270D	0.13mg/l	Confirmed at pick	Generator knowledge
D033	Characteristic	SW-846 8270D	0.5mg/l	Confirmed at pick	Generator knowledge
D034	Characteristic	SW-846 8270D	3.0mg/l	Confirmed at pick	Generator knowledge
D035	Characteristic	SW-846 8260C	200mg/l	Confirmed at pick	Generator knowledge
D036	Characteristic	SW-846 8270D	2.0mg/l	Confirmed at pick	Generator knowledge
D037	Characteristic	SW-846	100mg/l	Confirmed at pick	Generator knowledge
D038	Characteristic	SW-846 8270D	5.0mg/l	Confirmed at pick	Generator knowledge
D039	Characteristic	SW-846 8260C	0.7mg/l	Confirmed at pick	Generator knowledge
D040	Characteristic	SW-846 8260C	0.5mg/l	Confirmed at pick	Generator knowledge

Screening Parameters (*Check as appropriate)*	Rationale for Parameter	Test Method	Reference	Frequency	Rationale for Frequency
D041	Characteristic	SW-846 8270D	400mg/l	Confirmed at pick-up	Generator knowledge
D042	Characteristic	SW-846 8270D	2.0mg/l	Confirmed at pick-up	Generator knowledge
D043	Characteristic	SW-846 8260C	0.2mg/l	Confirmed at pick-up	Generator knowledge
D001	Characteristic	SW-846 1010&1020	Part 261.21	Confirmed at pick-up	Generator knowledge
D002	Characteristic	SW-846 1110	Part 261.22	Confirmed at pick-up	Generator knowledge
D003	Characteristic	SW-846 7.3.3.2	Part 261.23	Confirmed at pick-up	Generator knowledge
001S-007S	Characteristic	SW-846 8280A	R299.9219 Table 202	Confirmed at pick-up	Generator knowledge
F001	Listed Waste	SW-846 8260A	Part 261.31(a)	Confirmed at pick-up	Generator knowledge
F002	Listed Waste	SW-846 8260A	Part 261.31(a)	Confirmed at pick-up	Generator knowledge
F003	Listed Waste	SW-846 8260C	Part 261.31(a)	Confirmed at pick-up	Generator knowledge
F004	Listed Waste	SW-846 8270D	Part 261.31(a)	Confirmed at pick-up	Generator knowledge
F005	Listed Waste	SW-846 8260C	Part 261.31(a)	Confirmed at pick-up	Generator knowledge
F025	Listed Waste	SW-846 8260A	Part 261.31(a)	Confirmed at pick-up	Generator knowledge
F027	Listed Waste	SW-846 8260A	Part 261.31(a)	Confirmed at pick-up	Generator knowledge
F032	Listed Waste	SW-846 8260A	Part 261.31(a)	Confirmed at pick-up	Generator knowledge

Screening Parameter (*Check as appropriate)*	Rationale for Parameter	Test Method	Reference	Frequency	Rationale for Frequency
X Free Liquids	Waste Contains free liquids	Generator knowledge, SW846, 9095B	Liquid/Solid	Confirmed at Pick-up	Generator knowledge
☐ Ignitability					
☐ Reactivity					
X Compatibility	Waste – Container compatibility	EPA compatibility chart	40CFR 264.17	N/A	Generator knowledge
X Land Disposal Restrictions	40CFR 268	40CFR 268	40CFR 268	Confirmed at pickup	Required by rules
☐ Volatile Organic Compound Content					
☐ Radioactivity					
☐ Other: [d*escribe]*					

Table A3.A.2 Representative Sampling Procedures

Container Type or Material	Sampling Method[1]	Sampling Equipment	Rationale
Solids	Grab	Scoop, Auger or Trowel	Representative Sample
Organic Liquids	Grab	Coliwasa	Representative Sample
Aqueous	Grab	Coliwasa	Representative Sample
Oils	Grab	Coliwasa	Representative Sample
Sludge	Grab	Trier	Representative Sample

[1] The sampling method should demonstrate equivalence with the sampling methods described in 40 CFR, Part 261, Appendix I.

A3.A.3 Procedures to Ensure Compliance with Land Disposal Restrictions (LDR) Requirements [R 299.9627 and 40 CFR, Part 268]

All shipments of wastes subject to LDR received at the facility will be accompanied by appropriate generator notification and LDR notification in accordance with R 299.9627 and 40 CFR §268.7. The LDR notification accompanying generator wastes will be reviewed, and any discrepancies in the LDR notification and the associated manifest, analytical records, or Waste Profile Form will require shipment rejection unless additional, satisfactory, clarifying information is provided by the generator. All information obtained to document LDR compliance will be maintained in the facility operating record until closure of the facility.

If the facility receives a shipment of waste without LDR notification, or a notification with incorrect or incomplete information, the following actions will be conducted:

- If the LDR discrepancy can be resolved, corrections will be made to the LDR notification, and the waste procedure process will continue.

- If the LDR discrepancy cannot be resolved, the waste stream in questions will be returned to the generator along with a completed discrepancy section of the hazardous waste manifest. Documentation will be maintained at the facility.

In accordance with the LDR regulations, all wastes shipped off site will be analyzed, or generator knowledge will be used when appropriate, to determine whether the waste meets the applicable LDR treatment standards specified in R 299.9627 and 40 CFR §§268.41-43. All analytical results will be maintained in the facility operating record until closure of the facility. Wastes that are determined through analysis to meet treatment standards as specified in R 299.9627 and 40 CFR §268.41-43 will be shipped off-site.

The MSU WSF will supply LDR notifications and certification, including appropriate analytical records to support the certification, to the receiving facility with each shipment of waste. The notifications and certifications will contain the information required under R 299.9627 and 40 CFR §268.7. Any additional data obtained from the generators (e.g., Waste Profile Forms, original LDR notifications, analysis provided by generators) will be provided to the licensed TSDF where the waste will be sent.

In January 2015, the MSU WSF submitted a document to EGLE requesting the approval of a one-time LDR for all hazardous waste shipments from MSU campus to the MSU WSF. In October 2020, the MSU WSF submitted a document to EGLE requesting the approval of a one-time LDR for all hazardous waste shipments from MSU off-site locations (listed in Appendix 1 of this Template). Each LDR was completed in accordance with R 299.9627 and 40 CFR §268.7 and includes all hazardous wastes in Table XIII of the License Application.

A3.A.3(a) Spent Solvent and Dioxin Wastes [R 299.9627 and 40 CFR §§264.13(a)(1), 268.7, 268.30, 268.31, 268.40, 268.41, 268.42, and 268.43]

Spent solvent wastes (F001-F005) are accepted at the facility. Generator process knowledge will be used to determine the presence of spent solvent wastes (F001-F005). Generator process knowledge will be documented on the waste material profile report and LDR notification. The LDR notification will provide additional information regarding the appropriate treatment standards for the waste and whether it has already been treated to the appropriate standards.

A3.A.3(b) Listed Wastes
[R 299.9627, R 299.9213, and R 299.9214 and 40 CFR §§264.13(a)(1), 268.7, 268.33, 268.34, 268.35, 268.36, 268.39, 268.40, 268.41, 268.42, and 268.43]

Generator process knowledge will be used to determine whether listed waste meets the applicable treatment standards or to demonstrate that the waste has been treated by the appropriate specified treatment technology. In accordance with R 299.9627 and 40 CFR §268.41, where treatment standards are based on concentrations in the waste extract, the facility will use toxicity characteristic leaching procedures (TCLP) to determine if wastes meet treatment standards. *Generator process knowledge* will be documented on the waste material profile report and LDR notification.

A3.A.3(c) Characteristic Wastes
[R 299.9627, R 299.9208, and R 299.9212 and 40 CFR §§261.3(d)(1), 264.13(a)(1), 268.7, 268.9, 268.37, 268.40, 268.41, 268.42, 268.43 and Part 268, Appendix I and Appendix IX]

Generator process knowledge will be used to determine whether characteristic waste meets the applicable treatment standards or to demonstrate that the waste has been treated by the appropriate specified treatment technology. In accordance with R 299.9627 and 40 CFR §268.41, where treatment standards are based on concentrations in the waste extract, generators shipping waste to the facility will determine if their wastes meet treatment standards.

Characteristic D008 lead nonwastewaters and D004 arsenic nonwastewaters will be analyzed using TCLP to determine compliance with treatment standards of 40 CFR §§268.40 and 268.48. If after treatment a hazardous waste displays a characteristic for the first time, the characteristic waste code will be added to the LDR notification and facility records. Wastes will be retreated, as appropriate, to meet the characteristic treatment standards of 40 CFR §§268.40 and 268.48 prior to land disposal. In addition, the Generator process knowledge will be used to identify the underlying hazardous constituents that are expected to be present in the waste. Generator process knowledge will be documented on the waste material profile report and LDR notification.

A3.A.3(d) Radioactive Mixed Waste
[R 299.9627 and 40 CFR §§268.7, 268.35(c), 268.35(d), 268.36, and 268.42(d)]

☒ The facility does not accept radioactive mixed waste.

A3.A.3(e) Leachates
[R 299.9627 and 40 CFR §260.10 and 40 CFR §§268.35(a) and 268.40]

☒ The facility does not accept single-source or multi-source F039 leachates.

A3.A.3(f) Laboratory Packs
[R 299.9627 and 40 CFR §§268.7and 268.42(c) and Part 268, Appendix IV and Appendix V]

☒ The laboratory packs accepted at the facility are not land disposed.

Generator process knowledge will be used and documented to determine applicable treatment standards on the waste stream, manifest profile and LDR notification.

If a laboratory pack hazardous waste is combined with nonlaboratory pack hazardous waste prior to or during treatment, the entire mixture will be treated to meet the most stringent treatment standards for each waste constituent before being land disposed.

A3.A.3(g) Contaminated Debris
[R 299.9627 and 40 CFR §§268.2(g), 268.7, 268.9, 268.36, 268.45, and 270.13(n)]

☒ The hazardous debris categories and the contaminant categories associated with the types of hazardous debris accepted at the facility are presented in Table A3.A.3.

Hazardous debris accepted at the facility that exhibits the characteristics of ignitability, corrosivity, or reactivity will be treated using one of the extraction, destruction, or immobilization technologies identified in Table 1 of 40 CFR §268.45.

A3.A.3(h) Waste Mixtures and Wastes with Overlapping Requirements
[R 299.9627 and 40 CFR §§264.13(a), 268.7, 268.41(b), 268.43(b), and 268.45(a)]

Generator process information and analytical data will be used to demonstrate that those waste mixtures and wastes with multiple codes are properly characterized. Each waste that has more than one characteristic will be identified with a number for each characteristic. Waste identified as meeting a listing and exhibiting a characteristic will be primarily identified with the listed waste code for the purpose of manifesting, etc.

A3.A.3(i) Dilution and Aggregation of Wastes
[R 299.9627 and 40 CFR §268.3]

Listed wastes, if destined for land disposal, may not be diluted from the point of generation to the point of land disposal. Characteristic wastes may only be diluted if, (1) the waste is managed in a Clean Water Act (CWA)/CWA-equivalent surface unit or a Class I Safe Drinking Water Act injection well, (2) the waste has a concentration-based treatment standard or is treated using the DEACT technology-based treatment standard, and (3) the waste is not a D003 reactive waste.

The facility may not dilute or partially treat a listed waste to change its treatability category (i.e., from nonwastewater to wastewater), in order to comply with different treatment standards. If the wastes are all legitimately amenable to the same type of treatment to be performed, the facility may aggregate wastes for treatment.

Table A3.A.3 Contaminated Debris Categories

Hazardous Debris Category	Contaminant Category
Glass:	
Metal:	
Plastic:	
Rubber:	
Brick:	
Cloth:	
Concrete:	
Paper:	
Asphalt:	
Rock:	
Wood:	
Other: *Laboratory debris – gloves, kim wipes, pipette tips, weigh boats, etc.*	Contaminated laboratory debris will be treated with the applicable standard in 40 CFR 268.45

☞ *Describe how hazardous debris is managed at the facility. Describe procedures to determine whether hazardous debris is treated in accordance with treatment standards specified in R 299.9627 and 40 CFR §268.45, or to meet the existing treatment standards for each waste constituent specified in R 299.9627 and 40 CFR §§268.41 and 268.43 (except wastes with a specified treatment technology listed in R 299.9627 and 40 CFR §268.42, which must be treated as required in R 299.9627 and 40 CFR §268.42).*

A3.B CAPTIVE FACILITY

The MSU WSF accepts waste from off-site MSU owned and operated locations only that is stored until disposal with a licensed third-party hazardous waste vendor. The MSU WSF does not accept non-MSU generated waste.

A3.C NOTIFICATION, CERTIFICATION, AND RECORDKEEPING REQUIREMENTS
[R 299.9627 and R 299.9609 and 40 CFR §§264.73, 268.7, and 268.9(d)]

The MSU WSF will perform the following procedures for preparing and/or maintaining applicable notifications and certifications to comply with LDRs:

All hazardous waste accepted at the MSU WSF will be accompanied by the LDR notification, if applicable. Staff personnel will review the accuracy of all paperwork including manifest, waste profile documents (pick up tag) and LDR notification, before any waste is accepted by the facility.

In January 2015, the MSU WSF submitted a document to EGLE requesting the approval of a one-time LDR for all hazardous waste shipments from MSU campus to the MSU WSF. In October 2020, the MSU WSF submitted a document to EGLE requesting the approval of a one-time LDR for all hazardous waste shipments from MSU off-site locations (listed in Appendix 1 of this Template). Each LDR was completed in accordance with R 299.9627 and 40 CFR §268.7 and includes all hazardous wastes in Table XIII of the License Application.

A3.C.1 Retention of Generator Notices and Certifications
[R 299.9627 and 40 CFR §268.7(a)(7)]

The MSU WSF will retain a copy of all notices, certifications, demonstrations, data, and other documentation associated with compliance to LDRs.

The following notices and certifications submitted by the initial generator of the waste will be reviewed and maintained:

- Notices of restricted wastes not meeting treatment standards or exceeding levels specified in RCRA §3004(d), including the information listed in R 299.9627 and 40 CFR §268.7(a)(1).
- Notices of restricted wastes meeting applicable treatment standards and prohibition levels, including the information in R 299.9627 and 40 CFR §268.7(a)(2).

A3.C.2 Notification and Certification Requirements for Treatment Facilities
[R 299.9627 and 40 CFR §268.7(b)]

The treatment facility will submit a notice and certification to the land disposal facility with each shipment of restricted waste or treatment residue of a restricted waste. The notice will include the information specified in R 299.9627 and 40 CFR §§268.7(b)(4) and 268.7(b)(5).

If the waste or treatment residue will be further managed at a different treatment or storage facility, the facility will comply with the notice and certification requirements applicable to generators as specified in R 299.9627 and 40 CFR §268.7(b)(6).

A3.C.3 Waste Shipped to Subtitle C Facilities
[R 299.9627 and 40 CFR §§268.7(a) and 268.7(b)(6)]

☒ For restricted waste or waste treatment residues that will be further managed at a Subtitle C (hazardous waste management) facility, the facility will submit notifications and certifications in compliance with the notice and certification requirements applicable to generators under R 299.9627 and 40 CFR §268.7(a) and (b)(6).

A3.C.4 Waste Shipped to Subtitle D Facilities
[R 299.9627 and 40 CFR §§268.7(d) and 268.9(d)]

☒ The facility does not ship waste to Subtitle D facilities.

A3.C.5 Recyclable Materials
[R 299.9627 and 40 CFR §268.7(b)(6)]

☒ The facility does **not accept** recyclable materials used in a manner constituting disposal.

A3.C.6 Record Keeping
[R 299.9608(4), R 299.9609, R 299.9610(3), and R 299.9627 and 40 CFR §§264.72, 264.73, 268.7(a)(5), 268.7(a)(6), 268(a)(7), and 268.7(d)]

The MSU WSF maintains a facility operating log in accordance with R 299.9609 and 40 CFR §264.73. The operating log consists of:

- Date Received, Quantity and Type of Materials
- Location of Storage and type of container
- Date and method of disposal
- Copies of manifest and LDR notification
- Any required waste analysis or determination documentation
- Summary reports of any incidents requiring implementation of the Contingency Plan

Copies of all necessary notifications and certifications, as well as relevant inspection forms and monitoring data, are also maintained on file at the facility. Files will be maintained for a minimum of three years (for inspection records and LDR notification), or until facility closure (for inventory records).

If a significant manifest discrepancy is discovered (such as variation in one-piece count or misrepresentation of the type of waste or corrosive rather than flammable) that cannot be resolved with the generator or transporter within 15 days of receipt, facility personnel will submit to the Director and Regional Administrator a letter describing the discrepancy and all attempts to reconcile the discrepancy. The letter will include a copy of the discrepant manifest or shipping document.

A3.C.7 Required Notice
[R 299.9605(1) and 40 CFR §264.12(a) and (b))]

The facility will notify the Division Director in writing at least four weeks before the date the facility expects to receive hazardous waste from a foreign source. Notice of subsequent shipments of the same waste from the same foreign source is not required. When receiving such hazardous waste, the facility will comply with applicable treaties or other agreements

entered into between the country in which the foreign source is located and the United States.

When the facility is to receive hazardous waste from an off-site source, the facility will inform the generator in writing that the facility has the appropriate license for and will accept the waste the generator is shipping. The facility will keep a copy of this written notice in the operating record.

FIGURE A3.A1

MSU WASTE MATERIALS PICK UP TAG

MSU WASTE MATERIALS PICK UP TAG

Project Leader_____ Dept._____

Bldg & Room No._____ Phone _____

Filled Out By_____ Accumulation Start Date_____

Container Size _____ ☐ Solid ☐ Liquid ☐ Contaminated Items

CONTENTS:

UNABBREVIATED Chemical Names(s)	Amount Volume, Percentage, or Concentration (ppm)
☐ Water	Balance

COLOR ☐ Colorless ☐ Light Brown ☐ Other _____

CONSISTENCY ☐ Waterlike ☐ Viscous/Oily ☐ Other _____

BIOLOGICAL & ANIMAL ITEMS:

☐ Biohazardous Agents_____

FOR EHS USE ONLY

TO BE COMPLETED AS WASTE IS ACCUMULATED AT POINT OF GENERATION
If material is hazardous, please check all hazards that apply:

IGNITABLE

- ☐ Flammable Liquid
- ☐ Flammable Gas
- ☐ Flammable Solid
- ☐ Oxidizer
- ☐ Organic Peroxide

CORROSIVE

- ☐ Acid
- ☐ Base

TOXIC

- ☐ Heavy Metal
- ☐ Poison/Toxic

REACTIVE

- ☐ Peroxide
- ☐ Sulfide
- ☐ Cyanide
- ☐ Pyrophoric
- ☐ Water Reactive
- ☐ Organic Peroxide

WASTE DISPOSAL INSTRUCTIONS

1) Enter information as waste is added to container.
2) Keep waste containers closed.
3) Keep solid waste separate from liquid wastes.
4) Do not place incompatible wastes in same container, including mixtures of: organics, oxidizers, or inorganic acids in any amounts.
5) Do not move waste from the point of generation.
6) All waste containers are limited to 90-days of accumulation once started. Submit an online pickup request prior to deadline.
7) When using your own container for waste, label the waste container or tag with the words “Hazardous Waste”.
8) Place leaking containers in secondary container and call EHS immediately for disposal.
9) Store animal carcasses in an appropriate freezer, walk-in cooler, or refrigerator.
10) Autoclave, chemically disinfect, or incinerate infectious wastes.
11) Place autoclaved biohazard waste bags in an opaque bag prior to disposal.
12) Refer to EHS website for more detailed instructions about waste disposal.

The chemicals below are a hazardous waste at or above these concentrations, so please be specific on the front of this tag when filling it out.

D001	Ignitable	D026	Cresol (> 200ppm)
D002	Corrosive (pH<2 or > 12.5)	D027	1,4-Dichlorobenzene (> 7.5ppm)
D003	Reactive (w/ water or air)	D028	1,2-Dichloroethane (> 0.5ppm)
D004	Arsenic (> 5ppm)	D029	1,1-Dichloroethylene (> 0.7ppm)
D005	Barium (> 100ppm)	D030	2,4-Dinitrotoluene (> 013ppm)
D006	Cadmium (> 1ppm)	D031	Heptachlor (> 0.008ppm)
D007	Chromium (> 5ppm)	D032	Hexachlorobenzene (> 0.13ppm)
D008	Lead (> 5ppm)	D033	Hexachloro-1,3-benzene (> 0.5ppm)
D009	Mercury (> 0.2ppm)	D034	Hexachloroethane (> 3.0ppm)
D010	Selenium (> 1ppm)	D035	Methyl ethyl ketone (> 200ppm)
D011	Silver (> 5ppm)	D036	Nitrobenzene (> 2ppm)
D012	Endrin (> 0.02ppm)	D037	Pentachlorophenol (> 100ppm)
D013	Lindane (> 0.4ppm)	D038	Pyridine (> 5ppm)
D014	Methoxychlor (> 10ppm)	D039	Tetrachloroethylene (> 0.7ppm)
D015	Toxaphene (> 0.5ppm)	D040	Trichloroethylene (> 0.5ppm)
D016	2,4-D (> 10ppm)	D041	2,4,5-Trichlorophenol (> 400ppm)
D017	2,4,5-TP (> 1ppm)	D042	2,4,6-Trichlorophenol (> 2ppm)
D018	Benzene (> 0.5ppm)	D043	Vinyl Chloride (> 0.2ppm)
D019	Carbon Tetrachloride (> 0.5ppm)	001S	Aflatoxin (>1ppm)
D020	Chlordane (> 0.03ppm)	002S	2,3,7,8-Tetrachlorodibenzo-p-dioxin (>1ppm)
D021	Chlorobenzene (> 100ppm)	003S	1,2,3,7,8-Pentachlorodibenzo-p-dioxin (>1ppm)
D022	Chloroform (> 6ppm)	004S	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (>1ppm)
D023	o-Cresol (> 200ppm)	005S	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (>1ppm)
D024	m-Cresol (> 200ppm)	006S	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (>1ppm)
D025	p-Cresol (> 200ppm)	007S	2,3,7,8-Tetrachloridibenzo furan (>1ppm)

APPENDIX A3-1

CURRENT MSU OFF-SITE WASTE LOCATIONS

APPENDIX A3-1:

LIST OF MSU OFF-SITE LOCATIONS

ID Number	Name	Generator Site Address
MID985569516	MSU Campus	4000 Collins Road, B20 Lansing, MI 48910
MID053343976	MSU TSD	3634 East Jolly Road Lansing, MI 48910
MIK197091539	Grand Rapids Research Center	400 Monroe Avenue NW Grand Rapids, MI 49503
MID985607258	Kellogg Bio Station	3700 East Gull Lake Drive Hickory Corners, MI 49060
MID985604222	Clarksville Station	9302 Portland Road Clarksville, MI 48815
MIG000056296	Dobie Road Transmitter Site	4101 Dobie Road Okemos, MI 48864
MIG000061916	Eyde Building Site	4660 S. Hagadorn Road East Lansing, MI 48824
MIG 000063259	Engineering - Hulett Road	3361 Hulett Road Okemos, MI 48864
MIG000063314	Jolly Road Research Facility	2857 W. Jolly Road Okemos, MI 48864
MID985607332	Trevor Nichols	6237 124th Avenue Fennville, MI 49408
MIK778623629	Grand River Park Boathouse	2355 W. Main Street Lansing, MI 48917
MID985607456	NW Michigan Horticulture Research Station	6686 S. Center Highway Traverse City, MI 49684

APPENDIX A3-1:

ID Number	Name	Generator Site Address
MID985607431	Montcalm Research Farm	4747 McBrides Road Lakeview, Michigan 48850
MID985607449	Muck Soils Research Farm	9422 E. Herbison Rte.3 Laingsburg, MI 48848
MIK983591280	MSU Bio-Economic Institute	242 Howard Avenue Holland, MI 49424
MID985607472	Hidden Lake Gardens	6214 Monroe Road / M-50 Tipton, MI 49287
MIK722269491	MSU Sailing Center	5910 Shaw Street Haslett, MI 48840
MID074260720	Bioeconomy Institute - Midland	1910 W. St Andrews Rd Midland, MI 48640
MID985607290	Lake City Research Center	5401 W. Jennings Rd. Lake City, MI 49651
MIK174858114	Saginaw Valley Research Center	3775 S. Reese Rd. Frankenmuth, MI 48734
MID985607357	Tollgate Education Center	28115 Meadowbrook Rd. Novi, MI 48377
MID985607241	Kellogg Experimental Forest	7060 N. 42nd Street Augusta, MI 49012
MID985607316	SW Michigan Research Center	1791 Hillandale Rd. Benton Harbor, MI 49022
MID985607282	Upper Peninsula Research Center	E3774 University Drive Chatham, MI 49816
MID985607340	Forest Biomass Innovation Center	6005 J Road Escanaba, MI 49829
MIK184233215	Institute for Advanced Composites Manufacturing Innovation	1400 Rosa Parks Blvd Detroit, MI 48216

APPENDIX A3-1:

ID Number	Name	Generator Site Address
MIK734389862	MSU Medicine Specialty Clinic	4650 S. Hagadorn Rd, 1st Floor East Lansing, MI 48824
MIK993898899	MSU Clinics - Sparrow Professional Building	1200 E. Michigan Avenue Lansing, MI 48912
MIK152788076	MSU Pediatrics Okemos	1600 West Grand River Avenue, Suite 2 Okemos, MI 48864
MIK575681651	MSU Pediatrics Westside	7335 Westshire Drive Lansing, MI 48917
MIK178961870	MSU Pediatrics Dewitt	13750 S. Sedona Parkway Dewitt, MI 48820
MIG000028110	Central School	325 West Grand River Ave East Lansing, MI 48824
MIK188447239	Secchia Center	15 Michigan Street NE Grand Rapids, MI 49503
MIK209444436	Lux Arbor Reserve	11332 S. Norris Road Delton, MI 49046
MIK433060882	Rose-Dell Property	8500 29 Mile Road Albion, MI 49224
MID985607274	Dunbar Forest Experimental Station	12839 S. Scenic Drive Sault Sainte Marie, MI 49783
MIK212556397	Dave Morris Property	16940 S. Wright Road Grand Ledge, MI 48837
MID985607324	Camp Wa Wa Sum	Rte 2 Grayling, MI 49738
MIK165083341	Rogers Reserve	8072 S. Jackson Road Jackson, MI 49201

APPENDIX A3-1:

ID Number	Name	Generator Site Address
MIK133577136	MacCready Forest and Wildlife Reserve	9243 Skiff Lake Road Clarklake, MI 49234
MIK204078955	Management Education Center	811 W. Square Lake Road Troy, MI 48098
MID985607480	Fred Russ Research Forest	20673 Marcellus Hwy Decatur, MI 49045
MIK136587688	Mason Research Farm	1614 Okemos Road Mason, MI 48854
MIK149175190	West Central Michigan Horticultural Research Center	5185 N. Oceana Drive Hart, MI 49420

A4: Security Procedures and Equipment
PA 451 Part 111 R299.9605, 40 CFR 264.14

A4.1 Introduction

The MSU WSF is a secure facility that prevents the unknowing entry of unauthorized people, and also livestock, into the active portion of the site. The only entrance to the MSU WSF is from East Jolly Road along the northern side of the property. A fence runs the north side of the property which includes the use of an automated gate and locked pass-through door that can only be opened with remotes or a key by authorized individuals. The property is adjoined by the Banta Drain to the east and utilizes a fence along the southern and western property lines.

The MSU WSF utilizes a third-party security and fire company which is monitored 24 hours a day, 7 days a week by an outside company. The alarm system relays signals to the monitoring company's security desk. The alarm company then relays the appropriate information to the Ingham County Dispatch or MSU police desk which are staffed 24 hours a day, 7 days a week, or to the MSU EHS Department for non-fire alarms during normal business hours. The function of each of the alarm systems will be described in the following paragraphs.

The MSU WSF also maintains a facility-wide, natural gas backup generator so that fire and security equipment is still active in the event of a power outage.

A4.2 Intruder Alarm System

The main equipment for the security alarm system is located in Room 105 in the West Storage Building (WSB), including the alarm panel where authorized personnel must enter their individual code to arm and disarm the building security. The security panel also identifies which zone of the building was tripped during an alarm event.

The security system consists of several exterior cameras covering the doors into the facility, which are connected to a security monitor and computer and retain data for a predetermined period of time. All exterior entrance doors to the facility are key card only, with MSU EHS personnel maintaining a list of individuals with site access. Key card entry logs are maintained for the facility. Any other entry into the building (i.e., key, or breaking of a door contact) will result in the alarm activating if the system is armed.

The security system also utilizes magnetic door contacts on all exterior doors, as well as interior fire doors. If doors are not properly closed, the security system cannot be armed, and the panel will alert the User to which zone is not closed. If door contacts are broken when the system is armed, the alarm will be activated.

Once the intruder alarm has been activated, it will emit a loud sound and flashing lights until it is manually cleared by MSU WSF authorized personnel at the alarm panel in the office. If the intruder alarm is activated, the alert goes to an outside alarm monitoring company, which is staffed 24 hours a day, 7 days a week. The alarm company will then contact the MSU police desk to report the alarm condition, and additional responding agencies as necessary for the nature of the alarm.

The intruder alarm system and equipment are maintained and tested on a set schedule with an outside fire and security company.

A4.3 Fire Suppression System

The MSU Waste Facility utilizes two separate fire suppression systems. The Inergen Fire Suppression System in the East Storage Building (ESB) and the Halon Fire Suppression System in the WSB are both total flooding systems. These systems comply with NFPA Standard 2001, and both types of gases extinguish fire by lowering the oxygen content below the level that supports combustion.

The Inergen fire suppression system utilizes both ultraviolet/infrared sensors and smoke detectors to sense a fire event. Sensors are located throughout the interior of the East Storage Building, including mechanical spaces. Inergen cylinders are located in the mechanical room of the ESB along with the main fire panel. A redundant fire panel associated with this system is located in the main office of the WSB.

The Halon fire suppression system utilizes smoke and heat sensing detectors throughout the interior of the WSB. Halon cylinders are located in the office and mechanical areas of the building.

Both systems can also be manually activated in case of a fire event. If the fire suppression system is activated, an alert is sent to the third-party alarm monitoring and security company which monitors 24 hours a day, 7 days a week. The alarm company will then contact Ingham County Dispatch or the MSU police desk to report the alarm, who will contact EHS and other responding agencies, as necessary.

The fire suppression system including panels, sensors, cylinders, and all other associated equipment are maintained and tested on a set schedule by a third-party fire and security company.

Once activated, the fire suppression alarm will emit loud sound and flashing strobe lights until the hazard is gone and the system is manually shut off and reset at the control panel.

The Middle Storage Building (MSB) is for cold storage and is not connected to either fire suppression system.

A4.4 Organic Vapor Alarm System

The MSU WSF utilizes an organic vapor alarm system in the ESB only. The current detection system is calibrated to 10% of the lower explosive limit (LEL) for propane. The system utilizes 5 sensors located approximately 12” above the floor. Three sensors are located in Room 100, one sensor is located in Room 120, and one sensor is in Room 130.

The vapor alarm panel is located in Room 110 of the ESB, however a redundant panel is also located in the office area of the WSB. The vapor alarm system utilizes a color coded light stack warning system with conditions as follows: (1) Green = Safe to Enter, (2) Amber = Warning Alarm, (3) Red = Danger Alarm, and (4) Blue = System Malfunction.

Light stacks are located on the vapor alarm panels as well as outside the two entrances to the ESB. If the sensors detect organic vapor, the alarm will go off and give an audible alarm as well as the visual alarm on the light stacks. The vapor panel will identify which sensor went off and the levels of material. Although the audible alarm can be silenced during an event, the panel cannot be cleared and reset until

the concentration of the chemical has lowered to safe levels and the light stack turns to green. When the vapor alarm goes off, the alarm goes to an outside alarm monitoring company, which is staffed 24 hours a day, 7 days a week. The alarm company will then contact the MSU police desk to report the alarm condition, and additional responding agencies as necessary for the nature of the alarm.

The vapor alarm system is maintained and calibrated by a third-party vendor on a pre-determined schedule.

A4.5 Signs

In addition to the described security measures, the MSU WSF has placed "Danger Unauthorized Personnel Keep Out" signs on the exterior fence gate, as well as all entrance doors to the ESB and WSB. Per 40 CFR 264.14, the signs are in English, the predominant language in the area, and are large enough to be seen from any approach to the facility.

The MSU WSF also has warning signs on all exterior doors to the facility indicating personnel should not enter the facility when the fire suppression system is in alarm as that indicates the fire suppression system has discharged.

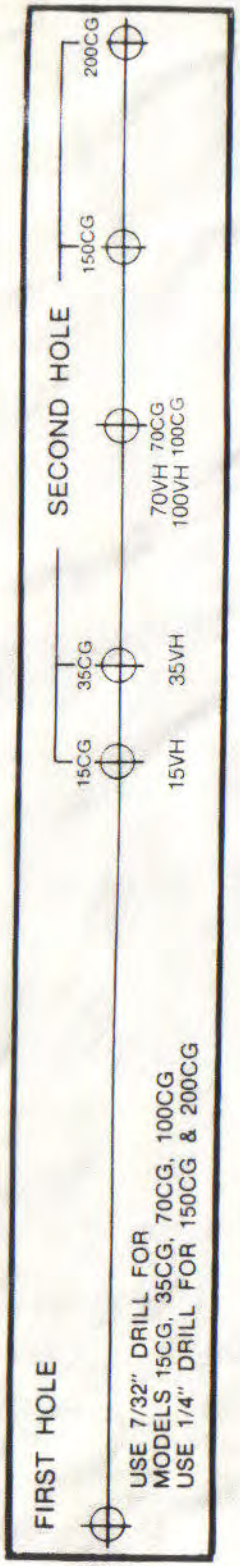


FIGURE 4

6.5 LIMITATIONS

Only one FIREBOY System shall be used per enclosure. For example, never use two Model 100CG units when the Specification Table calls for a Model 200CG (which contains double the quantity of Halon 1301 as does the Model 100CG). If multiple units were used to achieve the necessary concentration, there is no guarantee that both units would discharge simultaneously since each unit is independent of the other. Multiple units may be used only if each unit is sufficient for the compartment being protected. This may be desirable if the nature of the hazard requires backup or redundant protection.

6.6 OPTIONAL EQUIPMENT

SPECIAL NOTE: Where required in commercial or industrial application, Relay Terminal Box for controlling external loads with different operation voltages (for use with CG models only) are available under special order. Contact our Applications Engineering Department.

3 YEAR AUTOMATIC FIREBOY LIMITED WARRANTY

We warrant, to the original retail purchaser, all FIREBOY units for a period of three (3) years after retail purchase against defective materials and/or faulty workmanship. Any unit found to be defective within the warranty period will be replaced free of charge upon the prepaid return of the defective unit. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

CUSTOMER EXCHANGE PROGRAM*
For Discharged Units

For the original purchaser only, we will replace any discharged FIREBOY unit with a comparable unit upon the prepaid return of the discharged unit to Convenience Marine Products, Inc., Grand Rapids, Michigan, for one-half (½) of the suggested list price of a comparable unit at the time of return, plus shipping costs, provided: (1) Upon request of Convenience Marine Products, Inc., advance payment is received. (2) Convenience Marine Products, Inc. reserves the right to discontinue this exchange program without notice in the event it shall for any reason discontinue the marketing of comparable units.

*APPLIES IN U.S.A. ONLY

FIREBOY
THE AUTOMATIC
HALON 1301 SYSTEM

Mfg. by Convenience Marine Products, Inc.
P.O. Box 152 • Grand Rapids, MI 49501-0152
Shipping Address
100 Commerce Ave., S.W., Grand Rapids, MI 49503
616/454-8337

R118820M

FIREBOY®
THE AUTOMATIC HALON 1301 SYSTEM

OWNERS MANUAL

FORM FBVH AND FBCG

INSTALLATION INSTRUCTIONS FOR ALL MODELS

FM APPROVED

MARINE TESTING MTI INSTITUTE TESTED & CERTIFIED

U. S. COAST GUARD APPROVED

MODEL	MODEL
15CG - 162.029/20/1	100CG - 162.029/23/1
35CG - 162.029/21/1	150CG - 162.029/24/1
70CG - 162.029/22/1	200CG - 162.029/25/1

READ AND COMPLY WITH THESE INSTRUCTIONS, WARNINGS AND LIMITATIONS BEFORE INSTALLING

WARNING

The concentrated agent or by-products, when applied to fire are toxic. Before attempting to install this device read and comply with instructions, warnings and limitations contained in this manual. Additional copies of this Manual are available from the manufacturer.
Accidental discharge during handling or installation may cause serious injury. Do not lift, carry or handle by actuator. The actuator is visually described in figure 3 of this manual. Do not drop. Keep FIREBOY away from extreme heat. Keep away from children. Do not use in aircraft.

RETAIN THIS MANUAL FOR REFERENCE

GENERAL INFORMATION

FIREBOY Automatic Halon 1301 Systems are manufactured for a broad range of applications, including marine, industrial, commercial or domestic use. This booklet is intended to outline the proper installation of the systems for most applications. If, however, further advice or technical data is required, this information is available by calling or writing Fireboy Systems. Referenced materials which may apply in your application include: NFPA booklet 12A available from the National Fire Protection Association, Inc., 470 Atlantic Ave., Boston, MA 02210; ABYC Standard E 9-9, available from American Boat & Yacht Council, Box 806, Amityville, NY 11701.

All FIREBOY Systems carry FM approval resulting from tests conducted by Factory Mutual Systems, Inc., 1151 Boston-Providence Turnpike, Norwood, MA 02062, and for marine application, VH and CG FIREBOY Systems are MTI certified resulting from stringent tests conducted by Marine Testing Institute Division American Marine Laboratories, Inc., Stamford, CT. In addition, FIREBOY "CG" models are U.S. Coast Guard approved.

NOTE: FIREBOY Systems are ***not,*** *nor are they intended to be, explosion suppression devices. They do not lessen the need to take all usual precautions before starting engines. Example: inspect, sniff, run blowers* ***before*** *starting engines, or operating generators or other equipment in protected spaces.*

Before installing, be sure to follow the table listed below for determining the proper size system.

SPECIFICATION TABLE *

MODEL NUMBERS	MAXIMUM PROTECTED AREA	QUANTITY OF HALON 1301	ACTUATION TEMPERATURE	OVERALL DIMENSIONS
15 VH **15 CG**	75 cu. feet 2.1 cu. meters	1.5 pounds .68 kg.	212° F. 100° C.	11¼" High 3" dia.
35 VH **35 CG**	200 cu. feet 5.7 cu. meters	4 pounds 1.6 kg.	165° F. 74° C.	14¾" high 3½" dia.
70 VH **70 CG**	350 cu. feet 9.9 cu. meters	7 pounds 3.2 kg.	165° F. 74° C.	15¾" high 5" dia.
100 VH **100 CG**	500 cu. feet 14 cu. meters	10 pounds 4.5 kg.	165° F. 74° C.	21" high 5" dia.
150 CG	750 cu. feet 21 cu. meters	15 pounds 6.75 kg.	165° F. 74° C.	23¾" high 5-13/16" dia.
200 CG	1000 cu. feet 28 cu. meters	20 pounds 9 kg.	165° F. 74° C.	23⅞" high 6⅞" dia.

* When specifications differ from above, they are clearly defined on the Nameplate (label) which is applied to each unit.

MARINE INSTALLATION INSTRUCTIONS (VH AND CG MODELS)

1.0 Always check the system for damage in shipment and always weigh the unit on an accurate scale prior to installation. The correct weight is shown on the right side of the nameplate. Do not use a "tackle box" type of scale. Instead, use an accurate scale, frequently certified by an independent agency. FIREBOY Systems are designed and intended only for installation in interior compartments where they are not subject to direct weather or sea water.

We highly recommend the use of the optional engine shutdown system for Fireboy Systems installed in compartments containing diesel engines and/or generators. A 5% concentration of Halon 1301 will not stall a diesel engine, and it will continue to run after the extinguishing system has discharged, thereby evacuating the Halon 1301 from the compartment and possibly allowing a re-flash or a re-kindling of a fire.

Before installation, reconfirm the volume of the compartment to be protected in cubic feet. Multiply the width times the length, times the depth at the keel. It is all right to discharge more Halon 1301 than required, but *never* install a FIREBOY System that is rated for less volume than the compartment that is to be protected. (See specification table for ratings).

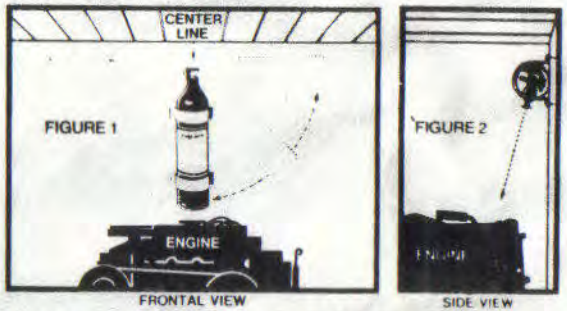
WARNING: NEVER INSTALL A FIREBOY SYSTEM ON THE UNDERSIDE OF A HATCH OR COVER THAT COULD BE THROWN CLEAR BY AN EXPLOSION. NEVER INSTALL IN A MANNER THAT RESULTS IN THE ACTUATOR BEING IN CLOSE PROXIMITY TO ENGINE EXHAUST MANIFOLDS OR TURBO CHARGERS WHERE RADIATED HEAT COULD CAUSE PREMATURE ACTUATION. NEVER INSTALL UPSIDE DOWN. NEVER INSTALL IN NORMALLY OCCUPIED COMPARTMENTS. NEVER INSTALL CYLINDER IN A LOCATION THAT CAN TRAP WATER IN CONTACT WITH CYLINDER SURFACE.

1.1 STEP 1. SELECTING THE LOCATION

NOTE: If mounting the system in a compartment that has an overhead hatch or deck that could open or be lost in the event of an explosion, the actuator shall be aimed so that the cylinder contents would be discharged into the compartment to suppress the fire resulting from an explosion.

A. VERTICAL BULKHEAD

All FIREBOY models may be installed in a vertical or horizontal position. However, certain guidelines must be strictly followed. Vertical installation should be on a forward or aft vertical bulkhead of the engine compartment, as near the centerline of the vessel (keel) and as high as possible. Direct the actuator toward the opposite bulkhead. For convenience of installation, if space is limited, the FIREBOY unit may be installed on a vertical bulkhead in any position between vertical and horizontal. (Fig. 1 & 2) In all installations, the actuator must be as high as possible and directed toward the opposite bulkhead. WARNING: WHEN INSTALLING HORIZONTALLY THE ACTUATOR PORTION (TOP OF CYLINDER) MUST NEVER BE LOWER THAN THE CYLINDER BOTTOM OR PROPER OPERATION WILL NOT OCCUR.



B. OVERHEAD LOCATION

When installing on an overhead (compartment ceiling), locate the FIREBOY as near the center of the compartment as possible. Install with cylinder wall parallel to the keel with the top of the cylinder toward the bow of the boat. The actuator itself must be pointed directly downward. If the FIREBOY must be installed near the forward or aft portion of the overhead, secure it athwartship (crosswise to the keel), and direct the actuator toward the underside of engine(s). In sailboats, avoid installing athwartship. WARNING: NEVER INSTALL A FIREBOY ON THE UNDERSIDE OF A HATCH OR COVER THAT COULD BE THROWN CLEAR BY AN EXPLOSION, NEVER INSTALL IN A MANNER THAT RESULTS IN THE ACTUATOR BEING IN CLOSE PROXIMITY TO ENGINE EXHAUST MANIFOLDS OR TURBO CHARGERS WHERE RADIATED HEAT COULD CAUSE PREMATURE ACTUATION.

1.2 STEP 2. INSTALLING CYLINDER (VH OR CG MODELS)

Following selection of a location, use template (Fig. 4, inside back page) to drill holes for bracket(s). For Models 35, 70, 100, 150 and 200 locate the lower bracket one and one-half inches above the bottom of the cylinder and the upper bracket one-half inch above FIREBOY's nameplate. When installing Model 15, which uses only one bracket, locate bracket immediately above nameplate. After holes are drilled, use appropriate length 10/24 size stainless steel bolts and lock washers, for all Models 15 through 100 and "through" bolt to bulkhead. For Models 150 and 200 use 1/4 inch size stainless steel bolts and lock washers. Slide FIREBOY into bracket(s). Rotate actuator according to Step 1, A and B, and secure nuts. Your FIREBOY cylinder installation is now complete.

INSTRUCTION LABEL: Apply the enclosed "Protected by FIREBOY Halon 1301 System" label on or near the instrument panel at the helm in full view of the operator. Remove paper backing and press firmly to a clean, dry surface. Temperatures must be above +50°F. for proper adhesion. Additional labels available at no cost. Always maintain this Owners Manual nearby for operator reference.

1.3 STEP 3. INSTALLING INDICATOR LAMP AND ESCUTCHEON PLATE (CG MODELS ONLY)

Select an appropriate location for indicator lamp escutcheon plate on or near the instrument panel at the helm in full view of the operator. Remove backing paper and press the escutcheon panel firmly to a clean, dry surface. Temperatures must be above + 50°F. for proper adhesion. With a 5/16th inch drill, carefully drill through the diecut center hole in the escutcheon plate. Use care to avoid tearing up the edges of the escutcheon plate. Insert lamp wires first and snap into position. Your indicator lamp may now be wired according to the following instructions. (A second escutcheon plate, without lamp hole, is also included for use at a second helm station). If a second indicator lamp is desired for a second helm station see Optional Equipment (Sec. 5.0).

1.4 WIRING INDICATOR LAMP

WARNING: BEFORE ATTEMPTING TO WIRE THE INDICATOR LAMP, YOU MUST TURN OFF ALL ELECTRICAL CURRENT TO THE IGNITION SWITCH BY EITHER TURNING OFF THE IGNITION CIRCUIT BREAKER, REMOVING THE IGNITION FUSE, OR DISCONNECTING THE POSITIVE BATTERY TERMINAL. AN ELECTRICAL SHORT WHILE CONNECTING THE INDICATOR LAMP COULD RESULT IN ELECTRICAL BURN, INJURY, OR FIRE.

Indicator lamp supplied is for 12 Volt use only. All FIREBOY wiring must comply with the American Boat & Yacht Council Standard E 9-9, titled, Direct Current Electrical Systems for Boats, available from ABYC, Box 806, Amityville, NY 11701.

NOTE: In order to fully comply with U.S. Coast Guard Rule 162.029 when this system is installed in boats having powered ventilation, (i.e., a blower that is on anytime the engines are running) the ground connection of the ventilation blower must be connected to the pressure switch at the same point as the indicator lamp (See Fig. 5) or to terminal Number 1 of Fireboy System's Engine Shutdown/Override Model Series I & II. This connection method will interrupt the blower in the event of a discharge. (See Sec. 6.2 for current limits)

If, after reviewing the wiring instructions below, you have any doubts about your ability to safely install this device, don't take chances. . .consult a qualified marine electrician. In addition, ignition systems and electrical systems vary from boat to boat, and the directions which follow may not apply to your boat. Simply put, the FIREBOY indicator lamp is wired in "series" with the ignition switch, fuse, FIREBOY electrical pressure switch and common ground. See Fig. 5. Assemble the supplies you will need that are not included with your FIREBOY System. 1. The necessary length of insulated 16 gauge (min.) stranded wire; 2. A five (5) ampere "in-line" fuse and fuse holder; 3. Properly sized insulated crimp-on wire connectors. Connect one lead of the fuse to the "ignition" screw of the ignition switch. Connect the other wire of the in-line fuse to one lead of the indicator lamp. Connect the other indicator lamp wire lead to one of the wires on the connector pigtail. Connect the remaining pigtail wire of the connector to a common ground such as the negative terminal block at the instrument panel or secure it directly to the engine block. Press the electrical connector onto the pressure switch. Your lamp installation is now complete.

1.5 TESTING INDICATOR LAMP

Re-connect power to the ignition switch with the key off, lamp should be OFF. Turn key on and the indicator lamp should be ON.

1.6 USING INDICATOR LAMP

The FIREBOY System indicator lamp is designed to announce to the helmsman when the unit has discharged. Under normal circumstances, whenever the ignition key is turned ON, the indicator lamp will glow. Should the FIREBOY unit discharge during operation of the vessel, the lamp will go OFF. Should you wish to check the system while dockside, simply turn ON the ignition key. This design provides a constant "continuity" check of the system's electrical circuit without the need for a test mechanism. It also permits using the FIREBOY electrical switch to directly interrupt other electrical systems. (See Sec 5.0)

2.0 OPERATION OF YOUR FIREBOY SYSTEM (VH AND CG MODELS)

Your FIREBOY System is automatically actuated when temperatures reach or exceed those given on the nameplate or the Specification Table in this manual. When actuation occurs, a loud sound may be heard similar to that of small arms fire, followed by a "rushing" air sound. Your CG FIREBOY models will also indicate actuation whenever the ignition key is ON and the indicator lamp goes OFF. Actual actuation time, when fire occurs, is entirely dependent upon the severity or intensity of the fire.

When actuation occurs, IMMEDIATELY SHUT DOWN ALL ENGINES, POWERED VENTILATION, ELECTRICAL SYSTEMS AND EXTINGUISH ALL SMOKING MATERIALS. **DO NOT OPEN THE ENGINE COMPARTMENT IMMEDIATELY!!!** THIS FEEDS OXYGEN TO THE FIRE AND FLASHBACK COULD OCCUR. Allow the Halon 1301 to "soak" the compartment for at least fifteen (15) minutes and wait for hot metals or fuels to cool before cautiously inspecting for cause or damage. Have approved portable extinguishers at hand and ready for use. DO NOT BREATHE FUMES OR VAPORS CAUSED BY THE FIRE.

3.0 MAINTENANCE OF FIREBOY SYSTEMS (VH AND CG MODELS)

WARNING: NEVER ATTEMPT TO DISASSEMBLE ANY PART OR PORTION OF YOUR FIREBOY SYSTEM. FIREBOY SYSTEMS CONTAIN LIQUIFIED GAS AT HIGH PRESSURE AND SERIOUS INJURY COULD RESULT.

Inspect daily. Figure 3 illustrates the "ready" and "discharged" condition of the actuator. Remove and weigh complete unit (less brackets) every 6 months on an accurate scale and record on tag provided. (Do not use any type of hand-held scale. Instead use an accurate scale which is frequently certified by an independent agency.) If weight is below that shown on each unit's nameplate, it must be removed from service immediately. If leakage is suspected, brush liquid soap at all points of possible leaks, or submerge entire unit in clean water and watch carefully for five to ten minutes. Leaks will appear as tiny bubbles. If leakage is found return unit to dealer or manufacturer immediately for replacement. See Limited Warranty and Customer Exchange Program elsewhere in this manual. Remember the two most important requirements to assure full charge and reliability of your FIREBOY System are: 1. Visual inspection of the actuator to determine if it has been actuated. 2. Weighing, the *only* sure method of determining the contents of all Halon 1301 fire systems. NOTE: FIREBOY systems are not required to be emptied and hydrotested at regular intervals as with some other types of systems. With frequent and proper visual and weighing inspections, your FIREBOY System will provide many years of reliable protection.

NOTE: All extinguishing systems are required to be periodically weighed to insure a fully charged unit. A gauge is *not* a means of measuring the quantity of agent in the cylinder. Because of the large change in vapor pressure versus temperature for liquified gases, a pressure gauge will be accurate *only* at a single specified temperature. At any other temperature a gauge will be inaccurate and misleading. Weighing is the only safe method of determining that the system cylinder is fully charged with agent.

3.1 MAINTAINING THE INDICATOR LAMP CIRCUIT (CG MODELS ONLY)

Should the indicator lamp fail to come ON when the ignition key is ON, first check to see if the system has discharged (Figure 3). Check fuse. Weigh unit as indicated above. With continuity tester, check indicator lamp. Check FIREBOY's electrical pressure switch circuit (circuit should be closed) Check continuity of entire wiring circuit. Should the indicator lamp be faulty, replacement lamps are available direct from FIREBOY Systems Division.

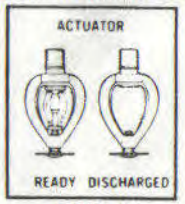


FIGURE 3

4.0 LIMITATIONS

Only one FIREBOY System shall be used per compartment. For example, never use two Model 100CG units when the Specification Table calls for a Model 200CG (which contains double the quantity of Halon 1301 as does the Model 100CG). If multiple units were used to achieve the necessary concentration, there is no guarantee that *both* units would discharge simultaneously since each unit is independent of the other. Multiple units may be used only if each unit is sufficient for the compartment being protected. This is called "overkill" and is often desired by skippers who believe in dual systems.

5.0 OPTIONAL EQUIPMENT (FOR CG MODELS ONLY)

For additional indicator lamps for other helm stations, kits including escutcheon plates and indicator lamps are available factory direct. Send $5.95 for each kit desired to cover postage and handling to the address shown on this manual. Outside the U.S.A. and Canada, see your dealer.

Deluxe Halon Discharge Alarm - See enclosed brochure

Engine Shutdown/Override System - See enclosed brochure

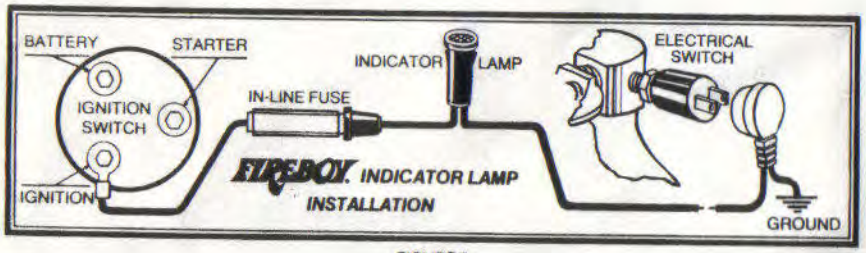


FIGURE 5

COMMERCIAL & INDUSTRIAL

6.0 APPLICATIONS FOR FIREBOY SYSTEMS;

Computer rooms, and data processing equipment, electrical and electronic equipment and enclosures, film, micro-film, and magnetic tape storage. Archives, museums, libraries, and book deposits, bank vaults, night depositories, automatic tellers, and armored cars. Flammable liquid and gas storage, hoods and gloveboxes in chemical and physical laboratories, furnace rooms, workshops, and laundry equipment, standby generator enclosures.

This is only a partial listing. FIREBOY Systems may be used in any normally unoccupied *enclosed* area requiring automatic fire protection that falls within the capacities listed in the specification table. For applications requiring capacities beyond those listed, contact FIREBOY Systems Division. Automatic FIREBOY Halon 1301 Systems have been tested and certified by Factory Mutual Systems. (FM). (NFPA 12A may apply, see general information).

6.1 INSTALLATION (VH AND CG MODELS)

To determine the volume (in cubic feet) of the enclosure to be protected, multiply the width times the length, times the height. The FIREBOY System of appropriate size (from specification table) shall be mounted securely to the ceiling or wall of the enclosure in such a way that the actuator is protected from mechanical damage. If mounted to the wall, the actuator (Figure 3) shall be within 12 inches of the ceiling of the enclosure. The cylinder may be mounted in any position between vertical (actuator up) and horizontal (see Figure 1). WARNING: The system must *never* be mounted with the actuator lower than the bottom of the cylinder. After installing the cylinder in the brackets, rotate until the actuator points toward the center of the enclosure, and tighten down.

NOTE: In enclosures having air exchange devices, (i.e. blowers, air conditioning, forced air furnaces, etc.) a FIREBOY CG System having the electrical interrupt switch should be used to shutdown these devices in the event of a fire and subsequent discharge (See Section 6.2)

6.2 ELECTRICAL HOOK-UP (CG MODELS ONLY)

The pressure switch supplied as part of FIREBOY CG Models may be used to control or interrupt electrical circuits up to its rated capacity in accordance with the following limits:

4.0 amps at 12 volts DC	5.8 amps at 120 volts AC
2.0 amps at 28 volts DC	2.9 amps at 240 volts AC

With the FIREBOY System in the *charged* condition, the switch is in the "normally closed" mode, and current will flow. With the FIREBOY System in the *actuated* or *discharged* condition, the switch is "open" and current will not flow. NOTE: FIREBOY Systems are available having switches that are "normally open" when the cylinder is charged.

6.3 OPERATION (VH AND CG MODELS)

Your FIREBOY System is automatically actuated when temperatures reach or exceed those given on the name plate or the Specification Table in this manual. When actuation occurs, a loud sound may be heard similar to that of small arms fire followed by a "rushing" air sound. The electrical switch of a CG model system will "open" at this time. Actual actuation time, when fire occurs, is entirely dependent upon the severity or intensity of the fire. Occupied enclosures should be exited immediately upon discharge of the FIREBOY System. When a discharge occurs, immediately shut down all electrical and mechanical systems, and powered ventilation if not already done automatically by means of the pressure switch (CG models). Do not open the enclosure at this time! This feeds oxygen to the fire and flashback can occur. Allow the Halon 1301 to "soak" the compartment for at least fifteen (15) minutes, and wait for hot metals and fuels to cool before inspecting for cause or damage. Have approved portable extinguishers at hand and ready for use. Do not breathe fumes or vapors caused by the fire.

NOTE: FIRE ALARM SYSTEMS MAY USE "NORMALLY OPEN" SENSING INPUTS AND IT WILL BE NECESSARY TO USE A RELAY TO INTERFACE A FIREBOY CG MODEL TO THESE SYSTEMS.

6.4 MAINTENANCE OF FIREBOY SYSTEMS: (VH AND CG MODELS)

WARNING: NEVER ATTEMPT TO DIS-ASSEMBLE ANY PART OR PORTION OF YOUR FIREBOY SYSTEM. FIREBOY SYSTEMS CONTAIN LIQUIFIED GAS AT HIGH PRESSURE AND SERIOUS INJURY COULD RESULT.

Inspect before operating boat. Figure 3 illustrates the "ready" and "discharged" condition of the actuator. Remove and weigh complete unit (less brackets) every 6 months on an accurate scale and record on tag provided. (Do not use any type of hand-held scale. Instead use an accurate scale which is frequently certified by an independent agency). If weight is below that shown on each unit's nameplate, it must be removed from service immediately. If leakage is suspected, brush liquid soap at all points of possible leaks, or submerge entire unit in clean water and watch carefully for five to ten minutes. Leaks will appear as tiny bubbles. If leakage is found, return unit to dealer or manufacturer immediately for replacement. See Limited Warranty and Customer Exchange Program elsewhere in this manual. Remember the two most important requirements to assure full charge and reliability of your FIREBOY System are: 1. Visual inspection of the actuator to determine if it has been actuated. 2. Weighing, the *only* sure method of determining the contents of all Halon 1301 fire systems. NOTE: FIREBOY systems are not required to be emptied and hydrotested at regular intervals as with some other types of systems. With frequent and proper visual and weighing inspections, your FIREBOY System will provide many years of reliable protection.

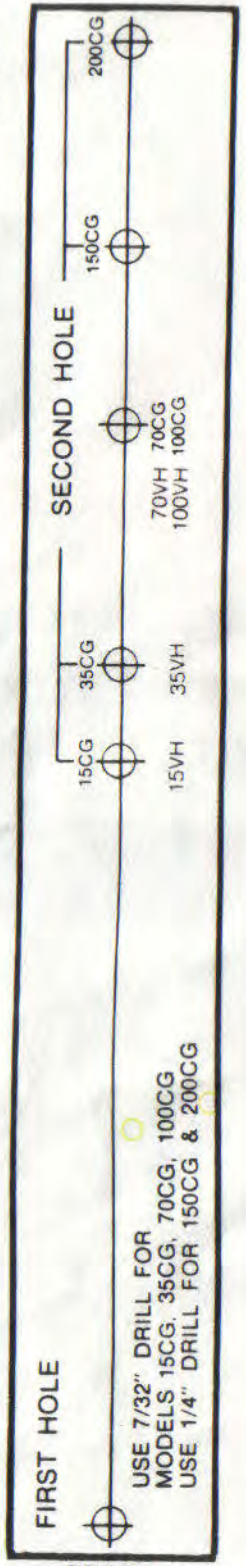


FIGURE 4

INERGEN® Extinguishing Agent

Features

INERGEN® suppressing agent used in ANSUL® engineered systems is particularly useful for hazards where an electrical, non-conductive medium is essential or desirable; where clean-up of other agents presents a problem; where hazard obstructions require the use of a gaseous agent; or where the hazard is normally occupied and requires a non-toxic agent.

The following are typical hazards protected by INERGEN systems:

- Computer rooms
- Subfloors
- Tape storage
- Telecommunications/Switchgear
- Vaults
- Process equipment
- All normally occupied or unoccupied areas where electronic equipment is either very sensitive or irreplaceable

Environmental Impact

INERGEN agent is a mixture of three naturally occurring gases: nitrogen, argon and carbon dioxide. As INERGEN agent is derived from gases present in the earth's atmosphere, it exhibits no ozone depleting potential, does not contribute to global warming, nor does it contribute unique chemical species with extended atmospheric lifetimes. Because INERGEN agent is composed of atmospheric gases, it does not pose the problems of toxicity associated with the chemically derived Halon alternative agents.

Description

INERGEN agent is a plentiful, non-corrosive gas that does not support combustion nor react with most substances. INERGEN agent contains only naturally-occurring gases which have no impact on the ozone or the environment in general. INERGEN agent is a mixture of three inerting (oxygen diluting) gases: 52% nitrogen, 40% argon, and 8% carbon dioxide. INERGEN agent suppresses fire by lowering the oxygen content below the level that supports combustion. When INERGEN agent is discharged into a room, it introduces the proper mixture of gases that still allow a person to breathe in a reduced oxygen atmosphere. It actually enhances the body's ability to assimilate oxygen.

The normal atmosphere in a room contains approximately 21% oxygen and less than 1% carbon dioxide. If the oxygen content is reduced below 15%, most ordinary combustibles will not burn. INERGEN agent will reduce the oxygen content to approximately 12.5% while increasing the carbon dioxide content to about 3%.

010067

The increase in the carbon dioxide content increases a person's respiration rate and the body's ability to absorb oxygen. Simply stated, the human body is stimulated by the carbon dioxide to breathe more deeply and rapidly to compensate for the lower oxygen content of the atmosphere.

Performance

INERGEN agent is an effective fire suppressing agent that can be used on many types of fires. The INERGEN fire suppression system is designed for total flooding protection against Class A surface burning, Class B flammable liquid, and Class C fires occurring within an enclosure by lowering the oxygen content below the level that supports combustion.

INERGEN agent has been tested by FM Approvals for inerting capabilities. Those tests have shown that INERGEN agent, at design concentrations between 40% and 50%, has successfully inerted mixtures of propane/air, and methane/air.

Physical Properties of INERGEN

Specific gravity:	0.085 lb/ft^3 (1.36 kg/m^3)
Vapor density:	1.1 (Air = 1)
Approximate molecular weight:	34

Approval

INERGEN agent complies with the NFPA Standard 2001, Standard for Clean Agent Fire Extinguishing Systems and EPA Program SNAP, Significant New Alternate Policy.

Agent is listed and approved by Underwriters Laboratories, Inc. (UL) and Factory Mutual (FM).

Containers meet the applicable Department of Transportation (DOT) specifications.

Note: The converted values in this document are for dimensional reference only and do not reflect an actual measurement.

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 | Form No. F-200045-05

FORM EQP 5111 ATTACHMENT TEMPLATE A5
INSPECTION REQUIREMENTS

This document is an attachment to the Michigan Department of Environment, Great Lakes, and Energy'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: Michigan State University (MSU) Waste Storage Facility (WSF) in Lansing, 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

The owner or operator of a hazardous waste management facility must inspect the facility for malfunctions and deterioration, operator errors, and discharges that may be causing, or may lead to: (1) release of hazardous waste constituents into the environment or (2) a threat to human health. The owner or operator must conduct these inspections often enough to identify problems in time to correct them before they harm human health or the environment [R 299.9605 and 40 CFR §264.15(a)].

A5.A WRITTEN SCHEDULE

[R 299.9605 and 40 CFR §264.15(b)(1)]

To meet the inspection requirements, develop and follow a written schedule for inspecting monitoring equipment, safety and emergency equipment, security devices, and operating and structural equipment (e.g., as dikes and sump pumps) that are important to preventing, detecting, or responding to environmental or human health hazards. This written inspection schedule must be kept at the facility.

A5.A.1 Types of Problems
[R 299.9605 and 40 CFR §264.15(b)(3)]

When hazardous waste operations occur at the facility (i.e. unloading, consolidating, or shipping waste), a visual inspection of the containers and floors in all storage rooms will be conducted on a daily basis. Containers will be inspected for corrosion, leaks in seals, overflows, tightness of lids, as well as possible signs of degradation, weakness or other factors that could lead to an accidental release. If leakage or the imminent possibility of leakage from any of the containers is observed, an immediate transfer of waste materials from the damaged container to a secure container is performed.

Containers are inspected before and after consolidation occurs at the facility. Caps and lids are checked for tightness to ensure that no harmful vapor release occurs. In addition, the Vapor Detection Alarm System at the site provides for the constant 24-hour detection of leakage of flammable liquids from the containers. There are no floor drains in the facility, and no sumps as the facility utilizes recessed, lined floors for secondary containment in the event of a release. The polyurea floor coating throughout the facility is also checked on days when hazardous waste operations occur at the facility for any signs of corrosion, degradation, or other damage. If damage to the floor coating is identified, the area will be marked off, and repairs will be made as soon as possible by a third-party contractor.

Inspections of the safety equipment, the security devices, and the operational structural equipment are performed on a weekly basis. The complete list of equipment and devices, and possible problems associated with each, is included in the Inspection Schedule provided in **Appendix A5-1**.

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 minimum frequency of inspection is based on the requirements for each unit on the written schedule. Areas subject to spills (e.g., loading and unloading areas) are inspected daily when in use, while other equipment or systems may be inspected weekly or monthly as required. The attached inspection schedule (**Appendix A5-1**) includes the items, types of problems to check for, and frequencies of inspection.

A5.B REMEDY SCHEDULE
[R 299.9605 and 40 CFR §264.15(c)]

If either daily or weekly inspections reveal that non-emergency maintenance is needed, these measures will be completed as soon as possible. This will preclude the possibility of a release of waste materials and reduce the need for emergency repairs. If any leaks have occurred, the spilled material will be collected immediately and disposed of properly. Leaks from containers at the Waste Storage Facility will be remediated by either transferring the leaking container to an oversized container, or by transferring the remaining contents of the leaking container to a different compatible container. Spilled liquids will be controlled using dikes and chemical spill absorbent materials.

After the material has been cleaned up, the area affected by the spill will be examined to verify that no deterioration of the containment system has occurred. If damage to the containment system has occurred, appropriate remedial actions will be taken immediately. Besides addressing the spill or release of the hazardous materials, the Hazardous Waste Coordinator and/or his or her designee may notify authorities if warranted in Section A7 Contingency Plan.

In the event of an emergency involving the release of hazardous constituents to the environment, efforts will be directed toward the containment of the hazard, removal of hazardous materials from the environment, and subsequent decontamination of affected areas. The Environmental Health & Safety Office will file the appropriate written reports. In addition, following the completion of the emergency response the following actions will occur:

1. A safety inspection will be conducted by the Emergency Coordinator. This inspection will certify that the decontamination process has been completed, and that the proper emergency equipment is on-hand at the site.
2. The Environmental Compliance Officer will notify the USEPA Regional Administrator, and the appropriate local authorities that the facility is in compliance.
3. The Emergency Coordinator will record the time, date and details of all emergency responses that require implementation of the Contingency Plan. A written report will be submitted to the USEPA Regional Administrator within 15 days of the incident.

As an initial step, all wastes that have not been impacted will be removed from the affected zone to a secure area which has been approved by a representative of EGLE. The remaining wastes will be characterized to determine their chemical nature and will be treated according to the process described in Section A7 Contingency Plan. Once an emergency situation has been managed, the Emergency Coordinator will provide for the treatment, storage, and disposal of all recovered wastes, contaminated soils, and other contaminated materials. Details of these activities are provided in Section A7 Contingency Plan.

It is essential that all emergency equipment at the Waste Storage Facility is constantly available and operable. To ensure that this is the case, following all emergency situations, all equipment must be either decontaminated or replaced before regular operations are resumed at the site. A list of all emergency equipment is contained in **Appendix A5-2** and included as Attachment A7-3 of the Contingency Plan. The decontamination and inspection processes for emergency equipment is included in Section A7 Contingency Plan

A5.C INSPECTION LOG OR SUMMARY

[R 299.9605 and 40 CFR §264.15(d)]

A current operating inspection log is kept at the facility, and an example is provided as **Table A5.C.1.** Any observations made or repairs made are tracked in the comments section.

Table A.5.C.1

WSF Inspection Checklist

WSF Inspection Checklist Version 1.5

(requirements of 40 CFR 264.15)

	D - Daily W - weekly M - monthly			Time is PM unless otherwise stated																Time is PM unless stated oth	
Freq.	**Specific Item (Building location)**	**7/1/2023**	**7/2/2023**	**7/3/2023**	**7/4/2023**	**7/5/2023**	**7/6/2023**	**7/7/2023**	**7/8/2023**	**7/9/2023**	**7/10/2023**	**7/11/2023**	**7/12/2023**	**7/13/2023**	**7/14/2023**	**7/15/2023**	**7/16/2023**	**7/17/2023**	**7/18/2023**	**7/19/2023**	**7/20/2023**
		Saturday	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**
D	Enmet Vapor Detection Sys. (E)																				
D	Sonitrol Monitoring Sys. (E & W)																				
D	Exhaust Fans/Fume Hood (E)																				
D	Storage Building Locks (All)																				
D	APR Respirator Cartridges (E & W)																				
D	Sealing of Containers (E & W)																				
D	Labeling of Containers (E & W)																				
D	Container Integrity (E & W)																				
D	Container Stacking (E & W)																				
D	Floor Coating - Inside (E & W)																				
D	Floor Coating - Outside (E & W)																				
D	Accidental Releases (E & W)																				
D	Loading containment area (E & W)																				
W	Eyewash & Shower (E)																				
W	First Aid Supplies (All)																				
W	Protective Clothing (All)																				
W	Absorbants (All)																				
W	Spill Control Materials/Kits (All)																				
W	Acid Spill Kits (E)																				
W	Storage Area Foundations (E & W)																				
W	Container Segregation/Stack (E & W)																				
W	Incompatible Segregation (E & W)																				
W	Debris & Refuse (E & W)																				
W	Check Battery/Water Level on Forklift (W)																				
W	Doors(s) - Warning Signs (E & W)																				
W	Canopy Area/Dock (E & W)																				
M	Heating/Ventilation Sys. (E)																				
M	Fire Alarm System (E & W)																				
M	Fire Extinguishers (E & W)																				
M	Start Power Equipment (W)																				
M	Building Exterior (All)																				
	Comments:																				

WSF Inspection Checklist Version 1.5

(requirements of 40 CFR 264.15)

	D - Daily W - weekly M - monthly	erwise.															
Freq.	**Specific Item (Building location)**	7/21/2023	7/22/2023	7/23/2023	7/24/2023	7/25/2023	7/26/2023	7/27/2023	7/28/2023	7/29/2023	7/30/2023	7/31/2023					
		Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Friday
D	Enmet Vapor Detection Sys. (E)																
D	Sonitrol Monitoring Sys. (E & W)																
D	Exhaust Fans/Fume Hood (E)																
D	Storage Building Locks (All)																
D	APR Respirator Cartridges (E & W)																
D	Sealing of Containers (E & W)																
D	Labeling of Containers (E & W)																
D	Container Integrity (E & W)																
D	Container Stacking (E & W)																
D	Floor Coating - Inside (E & W)																
D	Floor Coating - Outside (E & W)																
D	Accidental Releases (E & W)																
D	Loading containment area (E & W)																
W	Eyewash & Shower (E)																
W	First Aid Supplies (All)																
W	Protective Clothing (All)																
W	Absorbants (All)																
W	Spill Control Materials/Kits (All)																
W	Acid Spill Kits (E)																
W	Storage Area Foundations (E & W)																
W	Container Segregation/Stack (E & W)																
W	Incompatible Segregation (E & W)																
W	Debris & Refuse (E & W)																
W	Check Battery/Water Level on Forklift (W																
W	Doors(s) - Warning Signs (E & W)																
W	Canopy Area/Dock (E & W)																
M	Heating/Ventilation Sys. (E)																
M	Fire Alarm System (E & W)																
M	Fire Extinguishers (E & W)																
M	Start Power Equipment (W)																
M	Building Exterior (All)																
	Comments:																

Appendix A5-1

Inspection Schedule

Appendix A5-1 Inspection Schedule

Area/Equipment	Specific Item	Types of Problems	Frequency of Inspection
Monitoring Equipment	Enmet ISA-44-5 gas detection system	Power, electrical circuitry, M.S.O. sensors dirty, line voltage, heater voltage	Daily
Safety and Emergency Equipment	Absorbents (vermiculite or Superfine)	Out of stock	Weekly
	Absorbent pads and pigs (universal)	Out of stock	Weekly
	Solvent/acid spill kits	Out of stock	Weekly
	Emergency eyewash and shower	Stick valve, leaking, low water pressure	Weekly
	Air purifying respirator cartridges	Out of stock	Weekly
	Fire extinguishers	Low charge	Monthly
	Fire Alarm system	Low charge, malfunctioning sensors and horns	Per NFPA
	First aid supplies	Items out of stock	Weekly
	Protective clothing (gloves, impermeable suits)	Out of stock	Weekly
Security Devices	Intruder Alarm	Power failure	Daily
	Storage building locks	Corroding, malfunctioning	Daily
Operating/Structural Equipment	Heating/ventilation system	Power failure, dirty filters	Monthly
	Exhaust fans	Power failure	Daily
	Storage area foundation	Erosion, cracks, settlement	Weekly
	Building Exterior	Cracks, Forced entry, Roof Damage	Monthly
Container Storage Area	Container placement and stacking	Aisle space, height of stacks	Weekly
	Sealing of containers	Open lids	Daily
	Labeling of containers	Date missing, damaged or improper labels	Daily
	Container integrity	Corrosion, leakage, structural damage	Daily
	Segregation compatibilities	Incompatible wastes stored in same area	Weekly
	Debris and refuse	Trip/fall hazards	Weekly
	Warning signs	Damaged or missing	Weekly
	Floor coating	Peeling, exposed concrete, unsealed cracks	Daily
Loading/Unloading Dock	Concrete pads and adjoining surface areas	Accidental releases	Daily
	Floor coating	Peeling, exposed concrete, unsealed cracks	Daily
	Dock	Accumulated liquids, accidental releases	Daily
	Canopy Area	Forced Entry, compromised structure	Weekly

Appendix A5-2

WSF Emergency Equipment List

Appendix A5-2

WASTE STORAGE FACILITY EMERGENCY EQUIPMENT LIST

FIRE EXTINGUISHING SYSTEMS

(The Waste Storage Facility is serviced by two separate fire suppression systems in each building, as noted below)

EAST STORAGE BUILDING (ESB)		
Quantity	**Physical Description and Capability**	**Location - (Rm#)**
13	Inergen Fire Suppression System - 435 CF Tanks	110
3	Inergen Fire Suppression System - 200 CF Tanks	110
7	Infrared detector heads	Throughout Area
1	Fire Extinguisher - 30 lb. Class D	100
1	Fire Extinguisher - 10 lb. Class ABC	100
1	Fire Extinguisher - 6 lb. Class ABC	110
1	Fire Extinguisher - 6 lb. Class ABC	120
6	Magnetic Door Closing Mechanisms	Throughout

MIDDLE STORAGE BUILDING (MSB)		
Quantity	**Physical Description and Capability**	**Location - (Rm#)**
1	Fire Extinguisher - 6 lb. ABC	N/A

WEST STORAGE BUILDING (WSB)		
Quantity	**Physical Description and Capability**	**Location - (Rm#)**
3	1301 Halon Fire Suppression System - 304 lb. Tanks	115
6	1301 Halon Fire Suppression System - 54 lb. Tanks	105
1	Fire Extinguisher - 6 lb. Class ABC	105
1	Fire Extinguisher - 10 lb. Class ABC	100
1	Fire Extinguisher - 10 lb. Class ABC	110
1	Fire Extinguisher - 30 lb. Class D	120
1	Fire Extinguisher - 6 lb. Class ABC	120
1	Fire Extinguisher - 10 lb. Class ABC	120
4	Magnetic Door Closing Mechanisms	115, 120

Appendix A5-2

COMMUNICATION AND ALARM SYSTEMS

(Vanguard Fire & Security Systems In conjunction with EMERgency 24 monitors all the building alarms including intrusion, fire, organic vapors and low temperature)

EAST STORAGE BUILDING (ESB)		
Quantity	**Physical Description and Capability**	**Location - (Rm#)**
1	Vanguard Intrusion Alarm and Motion Detection System, including:	Throughout
	Key Card Readers	Exterior Doors on Dock, 100, and 110
	Infrared/flame detector heads	Throughout Interior
	Magnetic Door Contacts	Throughout Interior
	Motion Detectors	Throughout Interior
	Low Temperature Monitoring System	
1	SafeGuard SG-2000 Gas Leak Monitor - Organic Vapor Monitoring System	Throughout
1	EMERgency 24 Alarm Monitoring - Monitor/Notification Service	Throughout

MIDDLE STORAGE BUILDING (MSB)		
Quantity	**Physical Description and Capability**	**Location - (Rm#)**
1	Vanguard Intrusion Alarm and Motion Detection System, including:	Throughout
	Key Card Reader	Exterior Door
	Magnetic Door Contacts	Throughout
	Motion Detectors	Throughout
1	EMERgency 24 Alarm Monitoring - Monitor/Notification System	Throughout

WEST STORAGE BUILDING (WSB)		
Quantity	**Physical Description and Capability**	**Location - (Rm#)**
1	Vanguard Intrusion Alarm and Motion Detection System, including	Throughout
	Heat/Smoke Detector heads	Throughout Interior
	Magnetic Door Contacts	Throughout Interior
	Motion Detectors	Throughout Interior
1	EMERgency 24 Alarm Monitoring - Monitor/Notification System	Throughout

Appendix A5-2

WASTE STORAGE FACILITY EMERGENCY EQUIPMENT LIST

SPILL CONTROL EQUIPMENT				
Equipment Type	**Minimum Quantity Available**	**Physical Description and Capability**	**Location**	**Additional Product Locations**
Spill Control	4	Plastic Chemical Scoops - manipulation of solids and liquids	ESB, MSB, WSB	SRV, Annex
	2	Dust Pans - collection of solid floor debris	ESB, MSB, WSB	SRV, Annex
	2	Push Brooms - various sweeping	Dock, ESB, MSB, WSB	SRV, Annex
	2 boxes	Plastic Bus Trays - Secondary containment of liquid containers	ESB, MSB	
	5 each	Open Head Poly Drums (5-gal, 16-gal, 30-gal, 55-gal)- Secondary containment of liquid containers	MSB	Annex
	2 each	Large/Small funnels - transferring liquids	ESB, MSB	
	2 boxes	Spill Pads/Wypalls - collection of liquids	ESB, MSB, WSB	SRV, Annex
	1 pair each	Butyl, Kevlar, Viton Gloves	ESB, WSB	SRV, Annex
	5 boxes each size	Nitrile Gloves	ESB, WSB	SRV, Annex
	2 units	Nilfisk Mercury Vacuum and Tools - cleaning mercury spill debris	Annex	
Neutralization	2 boxes	Sodium Bicarbonate - for neutralizing acid spills	ESB, MSB, WSB	SRV
	2 boxes	Citric Acid - for neutralizing caustic spills	WSB	SRV
Absorbents	2 boxes	Haz-Mat Pig Pulp - liquid absorbent	ESB	
	20 bags	Superfine granular sorbent - diking and absorbing liquid	ESB, MSB, WSB	SRV, Annex
	2 boxes	Pig Absorbent Socks - for diking liquid spills	SRV, Annex	
	1 roll	Hydrocarbon Selective Fabric	SRV	
	2 each	Drain Stopper Pad	SRV	

* MSB = Middle Storage Building **SRV = Special Response Vehicle (available but not on site)
***Annex = MSU EHS Building at 3940 Collins Road

Appendix A5-2

WASTE STORAGE FACILITY EMERGENCY EQUIPMENT LIST

SPILL CONTROL EQUIPMENT				
Equipment Type	**Minimum Quantity Available**	**Physical Description and Capability**	**Location**	**Additional Product Locations**
Drum Handling Equipment	2	1000 Pound Drum Hand Trucks - movement of drums	ESB, MSB, WSB	Annex
	1	Drum Lifting Tool - up-ending 30-55-gal drums	ESB	
	5	Collawasa drum samplers - sampling 30-55-gal drums	ESB, MSB	Annex
	5	Collawasa samplers - sampling 5-gal or less containers	ESB, MSB	SRV, Annex
	1	Explosion-Proof Electric Drum Pump	ESB	Annex
	5	Polyethylene hand drum pump	ESB, MSB	SRV, Annex
	2	Bung Wrenches	ESB	SRV
Miscellaneous	3	Explosion-proof extension cords	ESB, MSB	
	2 sets	Explosion-proof tools	ESB	
Personal Protective Equipment	1 box each size	Tyvek Suits	WSB	SRV, Annex
	2 boxes each size	Tychem Suits	WSB	SRV, Annex
	4 pair	Chemical Resistant Boots	WSB	SRV
	20 pair	PVC Boot Covers	WSB	SRV
	10 pair each	Silver Shield Sleeves, Gloves, Aprons	WSB	SRV, Annex
	5 boxes each size	Nitrile Gloves	WSB	SRV, Annex
	2	Face Shields	WSB	SRV
	5	Safety Glasses/Goggles	WSB	SRV
	2	3M Powered Air Purifying Respirators	WSB	

* MSB = Middle Storage Building **SRV = Special Response Vehicle (available but not on site)
***Annex = MSU EHS Building at 3940 Collins Road

FORM EQP 5111 ATTACHMENT TEMPLATE A6
PREPAREDNESS AND PREVENTION

This document is an attachment to the Michigan Department of Environment, Great Lakes, and Energy'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 Michigan State University (MSU) Waste Storage Facility (WSF) in Lansing, 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

The preparedness and prevention standards are intended to minimize and prevent emergency situations at hazardous waste management facilities. This is in contrast to the contingency plan standards that are intended to ensure that facilities have instituted plans and procedures to use in response to an emergency situation (See Template A7).

To meet the preparedness and prevention standards, facilities must be operated and maintained in a manner that minimizes the possibility of a fire, explosion, or any unplanned sudden or nonsudden release of hazardous waste or hazardous waste constituents. The regulations require maintenance of equipment, alarms, minimum aisle space, and provisions for contacting local authorities (R 299.9606 and 40 CFR §264.31).

A6.A REQUIRED EQUIPMENT

[R 299.9606 and 40 CFR §264.32]

A6.A.1 Internal Communication System

[R 299.9606 and 40 CFR §264.32(a)]

An alarm system is installed in the WSF East and West Buildings to detect the hazards associated with fire, hazardous vapors, unauthorized intrusion, and explosion. The detection of these hazards by independently operating systems results in the initiation of the alarm system which notifies personnel of the hazards and allows time for the evacuation of the facility, if necessary, and the initiation of the Contingency Plan.

The security system is a movement activated intrusion alarm system continuously monitored at the security desk of the third-party contracted company. All external doors to the MSU WSF are wired to the alarm system. In addition, interior doors connecting the various buildings are also wired to the alarm system. If any door is left ajar, the system will not allow the user to alarm the system until the door is closed.

When authorized personnel enter or leave the building the intrusion system is switched "off" or "on" as appropriate. Exterior entry doors at the MSU WSF are all key card access, meaning access to the facility is restricted to only those individuals approved by the MSU WSF

personnel. Keycards are unique to all individuals and therefore all keycard swipes and attempts are logged and create a real time list of which personnel are at the facility. Each individual with access to the MSU WSF is provided with a unique personal access code and verbal code. Access codes are used to turn the alarm system on or off. No other personnel has access to the building and are not assigned access codes.

During an alarm from the security system indicating a breach in the building, a loud horn sounds throughout the facility to alert appropriate personnel. The alarm panel will display the “Zone” that the breach has occurred in, so personnel can clearly identify the problem area. The horn and alarm can only be cleared by entering an individual’s unique access code into the alarm panel once the situation has been cleared by Environmental Health & Safety (EHS) and local law enforcement.

Other than a door intrusion, the alarm panel will also send an alarm code/communication for the following conditions:

- Fire suppression system – Audible horn with beeps on control unit and lights flashing in affected areas. See Section A6.A.3 for equipment related to fire suppression system.
- Trouble (power loss) – Beeps on control panel unit (Unit also contains a back up battery). See Section A6.F4 for equipment related to power outages.
- Organic vapor detection system – Audible horn with beeps on control unit, and corresponding light on vapor monitor panel. See Section A6.A.3 for equipment related to vapor alarm detection.
- Low temperature alarm - which means temperatures of less than 55 degrees F have occurred in the East Storage Building (ESB). Will beep on control panel until temperature is above 55 degrees F.
- Septic tank is full – Will beep on the control panel until tank is emptied.

Tests of the system are conducted daily whenever the monitoring company personnel receive signals from MSU WSF personnel entering or leaving the premises. In addition, the system automatically signals if there is a malfunction in the dedicated line and resets automatically after an alarm condition.

A6.A.2 Emergency Response Communication System
[R 299.9606 and 40 CFR §264.32(b)]

Should an emergency situation arise that does not trip the alarm panel to dispatch emergency personnel, all MSU WSF personnel are equipped with personal cell phones. These cell phones provide the capability of summoning assistance from the appropriate local emergency response units.

A6.A.3 Fire, Spill, and Decontamination Equipment
[R 299.9606 and 40 CFR §264.32(c)]

A list of the emergency equipment present at the MSU WSF is provided in **Attachment A7-3**. A discussion of this equipment and its use is also included in the sections of this application entitled "A7 - Contingency Plan" and "A4 - Security."

Fire Suppression:
The Ansul Inergen fire suppression equipment in the East Storage Building is a total flooding system. The clean agent can achieve and maintain the required concentration for ensuring

effective extinguishment of any combustibles. The West Storage Building has an Ansul Halon 1301 system which operates on the same principle of total flooding. An extensive explanation of these systems can be found in Section A4.3 of this application.

Each Ansul fire suppression system also has a manual button to deploy the system if needed. In addition to the Ansul fire suppression systems, the MSU WSF is also equipped with several portable Type A, B, C, and D fire extinguishers. The locations of the portable fire extinguishers are located on the figures in Attachment A7-3.

Organic Vapor Detection System and Testing Procedure:
The organic vapor detection system in the ESB is comprised of five sensors with associated circuits. One unit is located on the south wall of the Lab-pack Room, three units in the Consolidation Room and one in the Storage Room as shown on **Figure B6-1**. A detailed description of the system can be found in Section A4.4 of this application.

Spill Control and Decontamination Equipment
Spill control is provided for in several ways at the WSF. Each container storage area has a containment system consisting of pads of 4-inch concrete, reinforced with 6-inch by 6-inch 10/10 wire mesh. The concrete floor is free of gaps, holes, or cracks to prevent the infiltration of released substances. Each storage room in the ESB is also equipped with a 6-inch containment lip which allows for the containment of released substances and prevents the spread of releases from one room to another. The entire storage area of the WSB consists of a 3-inch lip to prevent spills from migrating outside the building. In addition to the containment lips in each of the storage buildings, the MSU WSF is also protection by a polyurea floor coating that protects the underlying concrete base and allows for quick cleanup of free liquids. Details of the construction of the facility have been provided in Section B6 Engineering Plans.

In addition to the physical containment of released substances by the structure of the WSF, there is equipment available at the site to manage and remediate releases. This includes vermiculite, universal absorbent pads and pigs, a corrosive spill kit, absorbent spill pillows, and oversize and regulation size containers for disposal of the absorbed substances.

The vermiculite super-fine, absorbent spill pads, and corrosive spill kit are located throughout the MSU WSF facility for easy access. The materials in the kits provide for the neutralization of the released substances, facilitating their absorption. Details regarding the use of the equipment and specific decontamination procedures are provided in Section A7 Contingency Plan.

The MSU WSF also contains one emergency eye wash in Room 100 and one emergency shower and eye wash in Room 120 of the ESB.

A6.A.4 Adequate Water Volume
[R 299.9606 and 40 CFR §264.32(d)]

The Inergen and Halon fire suppression systems have been described previously. Details of the construction/installation of this system are provided in the section of this application entitled "B-6 - Engineering Plans." The WSF is also supplied by the Lansing Board of Water and Light water supply system. A hydrant is located at the corner of Jolly Road and Collins Road and another at Oakbrook and Jolly Road. The hydrant at the Jolly-Collins intersection has been flow tested at a delivery pressure of 55 to 60 pounds.

A6.B TESTING AND MAINTENANCE OF EQUIPMENT

[R 299.9606 and 40 CFR §264.33]

All emergency equipment (i.e. security, fire, vapor detection) is tested and maintained on a schedule set by the respective monitoring companies. Any deficiencies noted in equipment at the time of inspection are immediately repaired or scheduled for repair. The procedures for testing and maintenance of the equipment are provided with the description of the equipment. The testing of the alarm systems have all been described in Sections A4.3 and A4.4.
The portable fire extinguishers are inspected on a monthly basis by MSU WSF personnel and maintained by MSU Infrastructure, Planning, and Facilities (IPF), as well as all the safety equipment at the facility as described in Section A5 "Inspection Schedules."

A6.C ACCESS TO COMMUNICATIONS OR ALARM SYSTEM

[R 299.9606 and 40 CFR §264.34]

A6.C(1) Multiple Employees Present

[R 299.9606 and 40 CFR §264.34(a)]

When hazardous waste is being processed at the MSU WSF, the work is always completed with more than one person present at the facility who are always in direct visual or voice contact with the other. Therefore, should an emergency situation arise, each person is equipped with a personal cell phone to immediately contact emergency personnel. In addition, the MSU WSF office is equipped with a landline phone.

In the event of an emergency, employees throughout the facility will also be alerted to any hazards from the audible and visual alarm systems at the facility. When the alarm system is tripped at the MSU WSF for emergency conditions, local first responders are immediately dispatched by a third-party monitoring company.

A6.C(2) Single Employee Present

[R 299.9606 and 40 CFR §264.34(b)]

The MSU WSF is only operated with a single person during the transfer and storage of waste materials. Therefore, access to the communications and alarm system when a single employee is present is the same as the instance in which two or more employees are working at the facility as identified in Section A6.C(1).

A6.D REQUIRED AISLE SPACE

[R 299.9606 and 40 CFR §264.35]

The facility has been constructed to provide adequate storage capacity, adequate containment capability and sufficient aisle space. To allow for the unobstructed movement of all personnel within the facility, the aisle spaces in all the storage areas are maintained at a minimum of 2 feet. This 2-foot spacing has been determined to meet the requirements of 40 CFR 264.35 by allowing for the inspection of individual containers as previously discussed in Section A5, the passage of emergency equipment, if necessary, and for effective spill management in the event of a release.

A6.E STATE AND LOCAL AUTHORITIES

[R 299.9606 and 40 CFR §264.37]

A6.E.1 Arrangements with State and Local Authorities
[R 299.9606 and 40 CFR §264.37(a)(1)]

Arrangements have been made with local authorities for a coordinated response to emergency situations. These arrangements for emergency response have been documented in the section of this application entitled "A7 - Contingency Plan." The Contingency Plan identifies Emergency Coordinators who function to provide a uniform, consistent pattern of response to emergency situations. The Emergency Coordinators are personnel employed by MSU and can function in close association with the MSUPD and responding Fire Department(s). Whenever the alarm system indicates the presence of a hazard at the WSF, the monitoring company informs the MSUPD. The Police Department then notifies the MSU Emergency Coordinator or on call responder. The MSUPD is always informed of any emergency situation which exists at the WSF.

Following notification of an alarm, the Emergency Coordinator, and/or MSUPD personnel, has the authority to notify the appropriate emergency response units. These units include the following:

- Michigan Department of EGLE
- East Lansing Fire Department
- Lansing Fire Department
- Delhi Township Fire Department
- East Lansing Police Department
- Sparrow Hospital

Each of these units has been provided with a copy of the Contingency Plan which identifies the general nature of the wastes present at the facility, the floor plan of the facility and the location of all safety equipment, and evacuation routes. The Contingency Plan contains the information required to contact the emergency response teams. It is expected that, in the event of an emergency, the ranking officer of the MSUPD, or the ranking officer of the East Lansing Fire Department will be the incident commander. The EHS Emergency Coordinator will assist in any way possible as defined in the Contingency Plan.

MSU WSF personnel conduct frequent facility walk throughs with first responders to familiarize them with the facility and its operations.

A6.E.2 Refusal of State or Local Authorities to Enter into Emergency Response Agreements
[R 299.9606 and 40 CFR §264.37(b)]

The emergency coordinator will document if state or local authorities decline to enter into emergency response arrangements in the facility operating record.

A6.F GENERAL HAZARD PRVENTION
[40 CFR 270.14 (b)(8)]

General hazard prevention includes several factors listed in 40 CFR 270.14. These include a description of procedures, structures, or equipment used at the facility to:

- Prevent hazards in unloading.
- Prevent run-on and run-off from the hazardous waste area.
- Prevent contamination of water supplies.
- Mitigate effects of equipment failure and power outages
- Prevent undue exposure of personnel to hazardous waste.
- Releases to atmosphere
- Ignitable, reactive, or incompatible wastes

Each of these descriptions will be provided separately in the following discussion:

A6.F.1 Loading and Unloading

All hazardous wastes are transported to the MSU WSF via licensed waste hauling vehicles. In order to prevent hazards during unloading operations, all wastes are unloaded and loaded inside the MSU WSF. The East Storage Building (ESB) contains an enclosed canopy overtop of a truck height loading dock. MSU and licensed hazardous waste disposal vendor trucks back up to this dock to load and unload wastes. The ESB loading dock area is concrete with the same polyurea floor coating that is present through the interior of the MSU WSF to protect any spills from getting into the concrete. The ESB dock also contains a polyurea coated concrete diked basin with a 4-inch lip directly beneath the edge of the loading dock to catch any spills that may occur during loading/unloading. If a spill occurs in this area, spill pads and absorbent are located immediately adjacent to the dock in Room 100 of the ESB.

MSU WSF personnel typically unload their vehicles weekly and hand carry 5-gallon or less containers into the facility. Larger containers are transported from truck to facility with a dock plate and cart or via the lift gate on the back of the vehicle. This decreases the chance of large loads slipping or falling. Each container is carried into the appropriate room depending on the nature of the waste material. Containers will only be transported between the MSU WSF indoors (through connecting corridors) or from a truck driving from one loading door to the next.

The loading of containers into the vehicle of off-site contractors will be supervised by MSU WSF personnel. Following the removal of all containers the loading dock is inspected for any evidence of leakage from the containers. If any such leakage is detected, it will be immediately remedied with the spill absorbent equipment maintained at the facility.

A6.F.2 Prevention of Run-On and Run-Off

Run-off from the facility is eliminated since both the East and West storage buildings and loading/unloading docks are diked and enclosed to prevent the release of chemicals. No floor drains are present to allow for the release of spilled substances within the facility and 150 percent containment capacity is present in every storage room. In addition, the entire loading/unloading area is diked to ensure that any accidental spills will be contained and not allowed to impact the adjoining soils. Any spill which could occur in this vicinity will be removed by means of an explosion proof electric pump, plastic hand pump, or a sponge or remedied by the absorbent equipment maintained at the facility.

Run-on to the facility is prevented since the buildings and canopies are enclosed - except when unloading, as the garage door would be open. Because this area is not contained in a flood

plain, and because of the elevation difference from the nearby drainage ditch, the facility is not threatened by the possibility of run-on from surface water.

Any incidental release of liquids will be typically removed by means of an explosion proof electric pump, plastic hand pump, or a sponge and placed in a drum. The liquids will be characterized and analyzed and managed as appropriate. The diked area of the east building loading dock is shown in the drawings included in Section B6 Engineering Plans.

A6.F.3 Prevention of Contamination of Water Supplies

Drinking water supplies in this area are represented by the groundwater contained in the Saginaw Formation. Groundwater contamination is prevented by the elimination of all potential discharges from the facility onto the surrounding soils. Details of the construction of the facility which relate to this protection are provided in the Section B6 Engineering Plans.

Prevention of groundwater contamination is aided by the presence of significant amounts of clays in the soils underlying the site.

A6.F.4 Equipment Failure and Power Outages

The loss of electrical power and/or equipment failure at the site could pose significant problems if precautions were not taken and backup equipment in place. An alarm system has been installed to indicate when the temperature at the WSF drops below 55°F. When a temperature drop occurs, the monitoring company notifies EHS personnel who then take remedial action, including contacting MSU Facilities personnel.

The East Building is equipped with a dual, independent gas-fired, forced air heating system. The system has the capacity to provide heat for all areas following the failure of one unit. In addition, service to the furnace unit is available by MSU IPF personnel on a 24-hour call basis.

In the event of an extended power outage, the MSU WSF is equipped with a full-facility back-up generator. The generator is maintained by MSU Facilities personnel and is tested and serviced monthly. The generator automatically kicks on in the event of a power outage and supplies power to the entire facility, including security, fire, and vapor detection equipment. EHS will be notified by the monitoring company either directly through the office during working hours, or through the MSU Police Department after working hours if the backup generator is running. MSU WSF personnel will then conduct a check of the facility to ensure all systems are running appropriately.

In addition to the facility wide back up generator, alarm panels and systems also have 24-hour back up batteries which operate the instruments in the event of a power failure.

A6.F.5 Personnel Exposure

Numerous measures have been incorporated into the design to protect personnel from undue exposure to hazardous wastes. These measures include aspects of the building construction, the training of personnel, the procedures for handling waste, and the availability of safety equipment.

The construction of the WSF includes numerous features which are designed to facilitate the safe unloading and storage of waste substances. The building also contains alarm systems, fire suppression systems, containment features, and safety equipment, all of which are explained in Section B6 Engineering Plans and A4 Security Procedures and Equipment.

The training of EHS personnel is a vital aspect of maintaining a safe working environment. The training program for each individual has been documented in the section of this application entitled A10 Personnel Training Program. All personnel are instructed in the techniques of handling hazardous wastes to protect themselves and others from undue exposure. In addition, the trainings inform employees of the proper personal protective equipment which should be worn when handling hazardous wastes and the availability of safety equipment at the WSF. The training sessions also identify the proper response to emergency situations. This information is presented in Section A7 Contingency Plan, which is reviewed at least annually by MSU WSF personnel.

Proper procedures for the handling of hazardous waste must be utilized at all times. Safety precautions have been incorporated into these procedures and adherence to these protocols is emphasized in the training sessions. These precautions include requirements for protective clothing which must be worn during the handling of waste materials.

Safety equipment has been made available at the WSF and all personnel are instructed during the training sessions concerning its location and usage. Portions of this application relating to the availability and use of safety equipment are contained in several sections of this application including A3 Waste Analysis Plans, A10 Personnel Training, A4 Security Procedures and Equipment, B6 Engineering Plans, and A6 Preparedness and Prevention.

A6.F.6 Unplanned Releases to the Atmosphere

Atmospheric releases are controlled by following specific procedures for waste handling and container management. For example, containers are only opened for consolidation purposes, to relieve pressure, or as required for acceptance by the licensed facility accepting the materials. More details on container management are provided in Section C1 Containers. Additionally, consolidation procedures as described in A6.F.7 below prevent the mixture of incompatible materials and any resultant unplanned reactions.

A6.F.7 Identification of Ignitable, Reactive, and Incompatible Wastes

An involved process has been established to ensure the identification of waste substances received at the WSF. The details of this program are contained in Section A3 Waste Analysis Plan. In summary, this process facilitates tracking the identity and approximate volumes of all compounds that are transported to the site by EHS personnel.

Upon arrival at the WSF, the containers are unloaded according to the protocol described in “Loading and Unloading” description in Section A6.F.1. Each container is then transported to a designated area of the facility (Figure C1-1). Solvents are moved to the Consolidation Room (100), containers with reactive wastes are moved to the Lab Pack Room (120), corrosive wastes are stored inside the diked area in the Consolidation Room (100).

The Consolidation Room generally receives all ignitable solvents and corrosive or poisonous liquids in containers greater than 1 gallon capacity. All materials received in containers of less

than or equal to 1 gallon capacity are moved to the Lab Pack Room for further segregation and placement into secondary containment. Upon placement into secondary containment, materials appropriate for consolidation are stored in the Consolidation Room. The criteria for determining flammability, corrosivity, and toxicity are based on generator knowledge and information contained on the MSU Waste Materials Pick Up Tag. After consolidation, some profiled hazardous waste or Liquid Industrial By-Product may be transported to the West Storage Building for storage until a vendor is scheduled for a pick-up.

All reactive and ignitable wastes are separated and protected from sources of ignition. The WSF is equipped with many fire safety devices as documented in Section A4 Security Procedures and Equipment. This includes an Inergen fire suppression system, organic vapor monitoring and alarm systems, explosion proof electrical outlets, and explosion proof lights. "Danger -- No Smoking" signs are located on the main entrance doors of the WSF. Other "No Smoking" signs are located on external doors as indicated in Figure C1-1 of Section C-1. Smoking is absolutely forbidden in all areas inside and outside of the facility.

Grounding and bonding procedures are also used during the transfer of ignitable materials to prevent static charge buildup. A general exhaust ventilation system serves to minimize vapor and dust buildup while two local exhaust systems are available for vapor removal during consolidation of materials.

Prevention of reactions is achieved by segregation and pre-consolidation testing. Reactive or poisonous chemicals that are not consolidated (Lab Pack chemicals) are segregated into compatible groups before being packed. The Lab Pack Room is separated from the main holding area (Consolidation Room) by means of a fire door, a transfer grill, and a 4 inch floor dike.

The categories of chemicals designated for storage in the Lab Pack Room is extensive and incorporates thousands of compounds. These include reactive, poisonous, irritating, flammable, corrosive, and oxidizing substances as well as any other substances that are not deemed suitable for consolidation. Lab Pack chemicals are sorted and placed, without being opened, onto shelving units for subsequent removal by a third-party licensed hazardous waste vendor.

Specific waste stream categories are described in Section A3 Waste Analysis Plan.

FORM EQP 5111 ATTACHMENT TEMPLATE A7
CONTINGENCY PLAN

This document is an attachment to the Michigan Department of Environment, Great Lakes, and Energy's (EGLE) *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 299.9501, R 299.9508(1)(b), R 299.9504(1)(c), R 299.9521(3)(b), R 299.9607, and Title 40 of the Code of Federal Regulations (CFR) §§264.50 through 264.56, and 270.14(b)(7), establish requirements for contingency plans 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 contingency plan at the hazardous waste management facility for the Michigan State University (MSU) Waste Storage Facility (WSF) in Lansing, Michigan. It is recommended that the MSU WSF perform annual drill exercises with the local fire department and emergency responders using the contingency plan to make sure all staff are familiar with the plan and determine whether the plan needs any updating.

(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:

📖 GUIDANCE/REFERENCES
EGLE, Policy and Procedure OWMRP-111-22: "Hazardous Waste Contingency Plan Implementation and Reporting Obligations," November 5, 2012.

INTRODUCTION

The contingency plan contained in this template serves two functions: (1) presenting required application information and demonstrating that the facility meets the performance standards in 40 CFR, Part 264; and (2) serving as the actual Contingency Plan to be used by the facility. All sections of this template must be completed with these functions in mind.

A7.A BACKGROUND INFORMATION

A7.A.1 Purpose of the Contingency Plan
[R 299.9607 and 40 CFR §§264.51 and 264.53]

This Contingency Plan has been prepared in accordance with the requirements of 40 CFR, Part 264, Subpart D, and R 299.9607. It is designed to establish the necessary planned procedures to be followed in the event of an emergency situation at the MSU Waste Storage Facility in Lansing, Michigan, such as a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to the air, soil, or water.

The provisions of this plan will be carried out immediately whenever there is a fire, explosion, or release of hazardous waste or hazardous waste constituents that could threaten human health or the environment.

Copies of the Contingency Plan have been provided to emergency response agencies in order to familiarize them with the facility layout, the properties of the material handled, locations of the working areas, access routes into and within the facility, possible evacuation routes from the facility, and types of injuries or illness that could result from releases of materials at the facility. This information has been submitted to:

Michigan State University Police Department
East Lansing Police Department
East Lansing Fire Department
Lansing Fire Department
Delhi Township Fire Department
Sparrow Hospital

Attachment A7.1 includes documentation that each of these agencies has received a copy of the Contingency Plan. MSU has and continues to provide state and local agencies with copies and amendments to our contingency plan.

A7.A.2 Description of Facility Operations

The Contingency Plan for the Michigan State University (MSU) Waste Storage Facility (WSF) has been designed to minimize hazards to human health and the environment from fires, explosions, or any unplanned release of wastes to the environment. The provisions of this plan will be immediately implemented whenever there is a fire, explosion, or release of any hazardous substance which may threaten human health or the environment.

Michigan State University is a non-profit research and teaching institution generating diverse hazardous waste streams. The wastes generated by MSU owned and operated properties are transported to the WSF located at the intersection of Jolly and Collins Road. The identity of the individual wastes is provided by the generators prior to their transport to the storage facility and documented on MSU Materials Pick Up Tags on each container. The waste materials are then stored and containerized at this facility until shipment to licensed hazardous waste disposal facilities. A listing of the types of hazardous wastes handled at the facility is listed in Section A7.D7.

The Waste Storage Facility consists of an East Storage Building used for consolidation and storage of waste and a West Storage Building used for storage of containers of waste. The East Storage building was constructed to safely store different types of wastes in containers of 55-gallons or less and reduce the possibility of reactions between incompatible substances. The WSF structure provides the necessary containment of wastes in separate areas in the event of accidental releases. Construction safety features of the facility include the presence of explosion proof wiring and lighting (East Storage Building), the maintenance of extensive safety equipment, specific protocols for the handling of all wastes, fire suppression, vapor alarm, and security alarm systems.

The Contingency Plan has been developed to direct the efficient response of personnel in the event of fire, explosion, or the release of hazardous substances. The Plan describes the actions of EHS personnel and how these individuals would coordinate their efforts with local emergency response teams, police departments, fire departments, and hospitals. The Plan includes the names, addresses and phone numbers of personnel serving as emergency coordinators, as well as the location and availability of emergency equipment at the site. Evacuation plans for the storage facility are also included.

A7.A.3 Identification of Potential Situations

The Contingency Plan will be implemented in the event of any of the following incidents:

- Fire at the storage facility necessitating the use of professional firefighters.

- Explosion at the facility resulting in the:
  loss of the integrity of the containment design of the structure;
  release, or threatened release of waste materials from the facility;
  imminent release of hazardous waste from the facility.
- Release or imminent release from the facility of:
  hazardous waste to the environment;
  any other material which would impact human health or the environment.
- Vandalism resulting in:
  the release, or threatened release of hazardous waste from the facility;
  loss of security at the facility.
- Civil disorder resulting in:
  the release, or threatened release of hazardous waste from the facility;
  loss of security at the facility.
- Uncontrolled reactions or spills resulting in:
  a sustained IDLH condition within the facility necessitating the use of outside resources to intervene and remediate the conditions;
  a release of toxic vapor into the environment at a volume sufficient to cause extreme annoyance or discomfort to off-site personnel.
- Rupture of the pressurized fire suppressant gas system resulting in the release of hazardous waste into the environment.
- Imminent hazard potential (tornado, war, etc.) will result in the establishment of a standby status of the Contingency Plan at the direction of the Emergency Coordinator.

A7.B EMERGENCY COORDINATORS
[R 299.9607 and 40 CFR §§264.52 and 264.55]

A7.B.1 Identification of Primary and Alternate Emergency Coordinators
[R 299.9607 and 40 CFR §§264.52 and 264.55]

At all times there is at least one employee, either on the facility premises or on call and within reasonable travel distance of the facility, with the responsibility for coordinating all emergency response measures. The list of employees designated as emergency coordinators is contained in Table A7.B.1. The coordinators are listed in the order in which they will assume responsibility.

An Emergency Coordinator will, at all times, be either at the EHS Office (517-355-0153) or on call. The individual on call will carry the MSU Hazardous Materials Pager (517-360-6271) and make contact with the Emergency Coordinator(s) identified in Table A7.B1 who can arrive on campus within a short period of time following notification. The EHS Hazardous Waste Coordinator has been designated as the Primary Emergency Coordinator.

A7.B.2 Qualifications of the Emergency Coordinators
[R 299.9607 and 40 CFR §264.55]

An Emergency Coordinator will, at all times, be either at the Waste Storage Facility, or on call. The individual on call is available to reach the facility within a short period of time following notification. Each Emergency Coordinator has been familiarized with all aspects of the Contingency Plan, the operation of the storage facility, the physical layout of the facility, and the location of records pertaining to the facility. Each individual has taken a 40-hour HAZWOPER training program and is familiar with environmental regulations and components regarding emergencies at the WSF. Each individual has been delegated the authority to commit the resources necessary to respond appropriately to any emergency at the facility.

Table A7.B.1 *contains a list of individuals presently serving as Emergency Coordinators. The EHS Hazardous Waste Coordinator has been designated as the Primary Emergency Coordinator. Other Coordinators are listed in the order in which they will assume responsibility. The names, addresses, and phone numbers of the Emergency Coordinators contained in the Contingency Plan have been provided to the local emergency response units, and are posted on multiple locations in the facility.*

Table A7.B.1 Identification of Primary and Alternate Emergency Coordinators

Michigan State University Waste Storage Facility

Priority	Name	Address	Work Phone	Home Phone
Primary Coordinator	Brian Smith	846 Eagles Nest Ct, Mason, MI	517-432-4454 517-881-7410*	517-881-7410*
First Alternate Coordinator	Genevieve Cottrell	131 Horace Perry, MI	517-432-8715 810-624-3326*	810-624-3326*
Second Alternate Coordinator	Stephanie Horn	895 Shawano Dr, Mason, MI	517-432-2084 517-282-4080*	517-282-4080*
Third Alternate Coordinator	Kyle Corder	3944 Jonquil Dr, Okemos, MI	517-432-5097 517-525-4202*	517-525-4202*
Alternate Coordinator	David Hurst	414 N. Iris Lane Laingsburg, MI	517-432-4328 517-719-6254*	517-719-6254*
Alternate Coordinator	Mary Lindsey	4255 Sugar Maple Ln, Okemos, MI	517-432-5542 517-881-5002*	517-881-5002*

*Denotes cell phone number

A7.B.3 Authority to Commit Resources
[R 299.9607 and 40 CFR §264.55]

MSU Administration supports and delegates authority to emergency coordinators to access any necessary resources in the event of an incident at the MSU WSF.

A7.C IMPLEMENTATION OF THE CONTINGENCY PLAN
[R 299.9607 and 40 CFR §§264.51, 264.52, and 264.56]

The emergency coordinator must be contacted immediately in the occurrence of any situation that may result in potential or actual threats to human health or the environment. The emergency coordinator must implement this plan whenever there is a fire, explosion, or release of hazardous waste or hazardous waste constituents that could threaten human health or the environment.

The following situations are provided as guidance to facility personnel as the conditions or circumstances under which the plan must be implemented:

- Fire at the storage facility necessitating the use of professional firefighters.
- Explosion at the facility resulting in the:
  loss of the integrity of the containment design of the structure;

release, or threatened release of waste materials from the facility;
imminent release of hazardous waste from the facility.

- Release or imminent release from the facility of:
  hazardous waste to the environment;
  any other material which would impact human health or the environment.
- Vandalism resulting in:
  the release, or threatened release of hazardous waste from the facility;
  loss of security at the facility.
- Civil disorder resulting in:
  the release, or threatened release of hazardous waste from the facility;
  loss of security at the facility.
- Uncontrolled reactions or spills resulting in:
  a sustained IDLH condition within the facility necessitating the use of outside resources to intervene and remediate the conditions;
  a release of toxic vapor into the environment at a volume sufficient to cause extreme annoyance or discomfort to off-site personnel.
- Rupture of the pressurized fire suppressant gas system resulting in the release of hazardous waste into the environment.
- Imminent hazard potential (tornado, war, etc.) will result in the establishment of a standby status of the Contingency Plan at the direction of the Emergency Coordinator.

An Emergency Coordinator will, at all times, be either at the EHS Office (517-355-0153) or on call. The individual on call will carry the MSU Hazardous Materials Pager (517-360-6271) and make contact with the Emergency Coordinator(s) identified in Table A7.B1 who can arrive on campus within a short period of time following notification.

In the event of an alarm signal being received by the monitoring company's security desk, appropriate alarm information is sent to the Ingham County Dispatch or MSU Police Department desk. These are staffed 24 hours/day, seven days/week. The EHS staff is contacted directly for non-fire alarms during normal business hours. The Emergency Coordinator and the appropriate emergency response unit are notified, depending upon the nature of the alarm.

A7.D EMERGENCY PROCEDURES

[R 299.9607 and 40 CFR §§264.51, 264.52, and 264.56]

The following general procedures have been established for implementation by facility personnel and the emergency coordinator in order to efficiently respond to the release of hazardous waste or hazardous waste constituents that could threaten human health or the environment. The facility's procedure for assessing offsite risk during and after a significant release is provided in Attachment A7.4.

A7.D.1 Immediate Notification Procedures for Facility Personnel and State and Local Agencies with Designated Response Roles

[R 299.9607 and 40 CFR §§264.51, 264.52, and 264.56]

The list of emergency contacts in Table A7.D.1 identifies local emergency response agencies, and state and federal authorities that must be notified in the event of an imminent or actual emergency situation requiring response.

The emergency coordinator will be responsible for ensuring that all appropriate authorities are notified as necessary.

During operational hours, employees at the facility will be made aware of any incident by visual or audible alarms systems. During non-operational hours, the on-call emergency coordinator will make an assessment of the incident and contact necessary resources to minimize any type of release from the facility that may impact the environment. WSF personnel are also accessible via cell phone communication for emergency notification.

A7.D.2 Procedures to Be Used for Identification of Releases

[R 299.9607 and 40 CFR §§264.51, 264.52, and 264.56]

Determination of the type of material released will be based on MSU generator knowledge and documentation accompanying the waste material (manifests, pick-up tags). Visual observations and appropriate instrumentation will be used for source identification as necessary. Whether or not visual observation is possible, the identity and volume of the hazardous wastes present at the storage facility may also be made from records at the EHS office. These records provide the general identity and volume of hazardous wastes presently at the storage facility.

A7.D.3 Procedures to Be Used to Assess Potential Hazards to Human Health and the Environment

[R 299.9607 and 40 CFR §§264.51, 264.52, and 264.56]

The emergency coordinator will use knowledge of chemicals on site as well as manifests and chemical records (including Safety Data Sheets) to assess possible hazards, both direct and indirect, to human health or the environment that may result from the release, fire, or explosion.

This assessment will include the following:

- The possibility of further fire, explosion, or release of additional substances.
- The possible presence of toxic, irritating, or asphyxiating gases which may be generated as a result of the release.
- The effect of the contamination and run-off of the water, or other chemical agents used to control fire or explosions at the facility.
- The possibility of any additional chemical and or physical reactions.
- The effect of current weather conditions in spreading hazards.

A7.D.4 Procedures to Determine if Evacuation Is Necessary and Immediate Notification of Michigan Pollution Emergency Alerting System and the National Response Center

[R 299.9607 and 40 CFR §§264.51, 264.52, and 264.56]

A determination will be made by the emergency coordinator and the local agencies (MSU police and East Lansing Fire), with a consideration of wind direction, if it is necessary to evacuate the local area around the storage facility due to the extent and nature of the release and wind direction. The actual jurisdiction for evacuation of an area will be made by the MSU Police Department or East Lansing Fire Department.

If the emergency coordinator's assessment indicates that evacuation of facility areas may be advisable, he will implement the evacuation plan for the facility. If the emergency coordinator's assessment indicates that evacuation of the surrounding local areas is also advisable, the appropriate local authorities will be immediately notified (see Table A7.D.1). The National

Response Center will also be notified (see Table A7.D.1), and the following information will be provided:

1. Name and telephone number of the reporting individual
2. Name and address of the facility
3. Time and type of incident
4. Type and quantity of materials involved
5. Possible hazards to human health or the environment
6. Extent of injuries, if applicable

The facility's evacuation plan and maps are included in this Contingency Plan as Attachment A7.2.

A7.D.5 Procedures to Be Used to Ensure that Fires, Explosions, and Releases Do Not Occur, Reoccur, or Spread During the Emergency

[R 299.9607 and 40 CFR §§264.51, 264.52, and 264.56(e), 264.227, and 264.200]

Whenever there is an imminent or actual emergency situation where the potential or actual release of hazardous waste or hazardous waste constituents may threaten human health or the environment, the facility will implement the following procedures:

The Emergency Coordinator will assist the MSU Police and East Lansing Fire Department personnel in determining what measures might be appropriate in attempting to stop additional releases of materials both within and from the facility. If materials have been released to the environment, the danger to human health and the environment will be assessed. Resources will be committed initially to contain, and subsequently to decontaminate the affected area.

Once the emergency situation has been managed, the Emergency Coordinator will provide for the treatment, storage, or disposal of recovered wastes, contaminated soil, contaminated water, or other contaminated materials. In addition, non-disposable equipment used in the emergency situation will be decontaminated as well as any structural units which were affected by the release. Typical procedures for these functions are described below.

All of the containers in the storage area will be removed to a non-contaminated portion of the facility. If no portion of the facility remains for appropriate storage, then all containers will be removed to a licensed waste disposal facility. All containers will be moved either by hand or by hand-truck devices. Following the identification of the released substances, materials used for decontamination will be placed into appropriate containers for shipment to a licensed disposal facility.

Table A7.D.1 Federal, State, and Local Response Contacts

Local:	**Phone:**
East Lansing Police Department	517-351-4220
East Lansing Fire Department	517-332-1956
Sparrow Hospital	517-483-2222
MSU Administration Office	517-355-0306
State:	**Phone:**
Michigan State Police	517-332-2521
EGLE – Waste Management Division	517-284-6651
EGLE – Pollution Emergency Alert System	800-292-4706

National Response Center:	**Phone:**
National Response Center	800-424-8802

Attachment A7.3 is a detailed description of the type, amount, and location of all emergency equipment at the MSU Waste Storage Facility.

A7.D.6 Procedures to Be Used to Monitor Equipment Should Facility Operations Cease

[R 299.9607 and 40 CFR §§264.51, 264.52, and 264.56(f)]

The MSU WSF is a storage facility only and does not have any valves, pipes, tanks, or other treatment vessels that require monitoring.

A7.D.7 Procedures to Provide Proper Treatment, Storage, and Disposal for Any Released Materials

[R 299.9607 and 40 CFR §§264.51, 264.52, and 264.56(g)]

MSU has the resources available onsite for the proper containment and management of any released material. The established protocol for the clean-up of any unlikely release will be based on quantity and characteristics of the released material and state and Federal regulations dictating the type of disposal options available.

Description of Wastes Stored:
A broad range of chemical wastes are stored at the MSU WSF. The quantities of most of these chemicals are small since they are used for research and teaching purposes rather than industrial production. Because of the diversity, it is estimated that greater than 2,000 separate chemicals are received for storage at the facility. The waste materials have been organized into the following generic waste streams depending on their chemical nature, although this is not an exhaustive list:

MSU I.D. #, Waste Stream and Substance

001. Flammable Liquid, Toxic
002. Mixed Acid Solutions
003. Flammable Liquid, Corrosive
004. Chromic Acid/Sulfuric Acid Solutions
005. Nitric/Hydrofluoric Acid Solutions
006. Formalin Solution
007. Pesticide/Herbicide Rinsate
008. Mercury Contaminated Debris
009. Paint Related Material
010. Chloroform Debris
011. Aflatoxin Debris
012. PCB Debris
013. PCB Ballasts
014. Reactive Cyanides and Sulfides Lab Pack
015. Organic Peroxides Lab Pack
016. Perchloric Acid Lab Pack
017. Pyrophoric Lab Pack
018. Flammable Solids Lab Pack
019. Flammable Liquids Lab Pack
020. Aerosol Lab Pack
021. Poison Lab Pack
022. Corrosive Solids Lab Pack
023. Oxidizer Lab Pack
024. Water Reactive Lab Pack
025. Not Classified Lab Pack
026. Compressed Gas Cylinders
027. Empty Containers
028. Aerosol Cans

029. Pharmaceutical Waste 030. Inorganic Acid Labpacks

A7.D.8 Procedures for Cleanup and Decontamination
[R 299.9607 and 40 CFR §§264.51, 264.52, and 264.56(h)]

All of the containers in the storage area will be removed to a non-contaminated portion of the facility. If no portion of the facility remains for appropriate storage, then all containers will be removed to a licensed waste disposal facility. All containers will be moved either by hand or by hand-truck devices. Following the identification of the released substances, materials used for decontamination will be placed into appropriate containers for shipment to a licensed disposal facility.

After the removal of the waste materials, if able, the facility will be decontaminated and cleaned by a 3rd party licensed waste vendor. All wastes generated during the decontamination process will be disposed shipped to a licensed disposal facility.

The construction of the storage facility has incorporated several precautions which prevent or greatly limit the possibility of a release to the soil around the facility. In the event that soil around the facility has been impacted during the emergency situation, the contaminated portions will be excavated and transported to a licensed hazardous waste disposal facility. Initially, only the soil which is visually observed to be impacted will be excavated. This will be followed by additional sampling and analyses to confirm that the horizontal and vertical extent of the decontamination has been determined. If these efforts identify the continued presence of contamination, additional excavations will be performed until it has been confirmed that all contamination has been removed to acceptable levels.

Following an emergency situation resulting in the release of hazardous waste, the surface water flowing adjacent to the site will be sampled and analyzed for appropriate parameters. Sampling will be collected both upstream and downstream of the facility for the same parameters. The results of these analyses will determine the necessity of remedial action.

The Emergency Coordinator will ensure that no waste materials incompatible with the released material are introduced, or stored, in the affected area until the decontamination process is complete. All equipment used in the response to the emergency situation will be disposed of, or decontaminated, following the completion of the decontamination process. All spent safety equipment will be replaced before the resumption of normal activities at the storage facility.

A7.E RESUMPTION OF OPERATIONS AND RECORD KEEPING REQUIREMENTS
[R 299.9607 and 40 CFR §§264.51, 264.52, and 264.56(h) and (i)]

The following subsections identify procedures that must be followed to meet the notification and record keeping requirements.

A7.E.1 Procedures to Be Used Prior to Resuming Operations
[R 299.9607 and 40 CFR §§264.51, 264.52, and 264.56(h)]

Prior to resuming operations in the affected area(s), the MSU WSF will inspect all emergency equipment to ensure that the proper cleanup procedures have been implemented and all equipment has been cleaned and is fit for its intended use. The emergency coordinator must notify the EPA, EGLE, and local authorities that post-emergency equipment maintenance has been performed and operations at the facility will be resumed.

Following the completion of the emergency response and decontamination procedures, the following actions will occur:

- A safety inspection will be conducted by the Emergency Coordinator. This inspection will certify that the decontamination process has been completed, and that the proper emergency equipment has been restocked and is on-hand.
- The emergency coordinator will let the agencies listed in Table A7.D.1 know the date that operations will commence at the MSU WSF.

A7.E.2 Record Keeping Requirements
[R 299.9607 and 40 CFR §§264.51, 264.52, and 264.56(i)]

A7.E.2(a) Operating Record

In the event of an emergency situation that requires implementation of the Contingency Plan, the emergency coordinator will record in the operating record the time, date, and description of the event. The operating record is maintained by Michigan State University Environmental Health & Safety and can be found at the following location: EHS Office, 4000 Collins Road, B20, Lansing, MI 48910.

A7.E(2)(b) Written Incident Report

Within 15 days of an incident requiring implementation of the Contingency Plan, the Michigan State University Waste Storage Facility will submit a written incident report to EGLE at the following address:

Chief of the Office of Materials Management Division
Department of Environment, Great Lakes, and Energy
P.O. Box 30241
Lansing, MI 48909

The report will contain the following information:

1. Name, address, telephone number, and site identification number of the facility and the owner/operator.
2. Date, time, and type of incident.
3. Type and quantity of materials involved.
4. Assessment of actual or potential hazards to human health and the environment.
5. Extent of injuries, if applicable.
6. Estimated quantity and disposition of recovered materials that resulted from the incident.

A7.F PROCEDURE FOR ASSESSING OFFSITE RISK DURING AND AFTER A FIRE/EXPLOSION INCIDENT OR SIGNIFICANT RELEASE
[R 299.9521(3)(b) and R 299.9607 and 40 CFR §264.56(d)]

Refer to Attachment A7.4 for the Checklist for Tracking Facility Response Actions During and After a Fire/Explosion Incident or Significant Release.

A7.G PROCEDURES FOR REVIEWING AND AMENDING THE CONTINGENCY PLAN
[R 299.9607 and 40 CFR §264.54]

To ensure that the Contingency Plan remains an effective document, the Plan will be reviewed annually for effectiveness. It will be amended whenever the permit is revised, following the failure of an emergency response, or following any substantial structural or operational changes associated with the WSF. In addition, the Plan will be amended whenever there is a change associated with the position of emergency coordinator, or a substantial change in the list of emergency equipment.

Attachment A7.1: Documentation of Arrangements with Local Authorities

Attachment A7.2: Evacuation Plan and Routes

Attachment A7.3: Emergency Equipment Description

Attachment A7.4: Checklist for Tracking Facility Response Actions During and After a Fire/Explosion Incident

Attachment A7.1

Documentation of Arrangements with Local Authorities

MICHIGAN STATE UNIVERSITY

I hereby acknowledge receipt of Revision 9 (dated 3/28/22) of the contingency plan for the Michigan State University Waste Storage Facility located at 3634 E. Jolly Road, Lansing, MI 48910.

MSU Police Department: I.N.S.P

M. D. JOHNSON	M D Johnson	8/2/2022
Name and Title (printed)	Signature	Date

East Lansing Police Department:

Dep. Chief		8/2/22
Name and Title (printed)	Signature	Date

East Lansing Fire Department:

Kim Petersen	Kim Peter	8/2/22
Name and Title (printed)	Signature	Date

Lansing Fire Department:

CAPT. J. GARLITZ		8-3-22
Name and Title (printed)	Signature	Date

Delhi Township Fire Department:

Leo Allaire Asst Chief		8-2-2022
Name and Title (printed)	Signature	Date

Sparrow Hospital:

	Blaine DeGracia Assistant Legal Counsel	8.3.22
Name and Title (printed)	Signature	Date

Vice President for Research and Innovation

Office of Environmental Health & Safety

4000 Collins Rd, Suite B20
Lansing, MI 48910

517-355-0153
Fax: 517-353-4871
ehs.msu.edu

Attachment A7.2

Evacuation Plan and Routes

Attachment A7.2: Evacuation Plan

There are several factors which combine to determine that an extensive evacuation plan is not required for the WSF. The facility is relatively small and there are no rooms without direct outside access. The Hazardous Waste Coordinator and other EHS waste staff do spend significant time at the site, but no employees have the WSF as their permanent work station.

An evacuation of the facility should be performed in the event of any emergency situation, or when either the Hazardous Materials Professional or the Hazardous Waste Coordinator believes a sufficient threat to safety or the environment exists.

The evacuation route for all areas of the facility is through the closest door providing clear access to the outside. Since each room has a door providing direct outside access the evacuation will usually be directed along the closest route. If the most direct route is blocked then an alternative route through the closest alternative door should be utilized. **Figures A7.2** indicating the evacuation routes, are posted in each storage room at the WSF.

Following evacuation of the WSF, all personnel should assemble north of Jolly Road. If it is determined that this location is down-wind of the facility, then the personnel should move further to the west along Jolly Road.

Figure A7.2

EMERGENCY EXIT LOCATIONS AND MAP

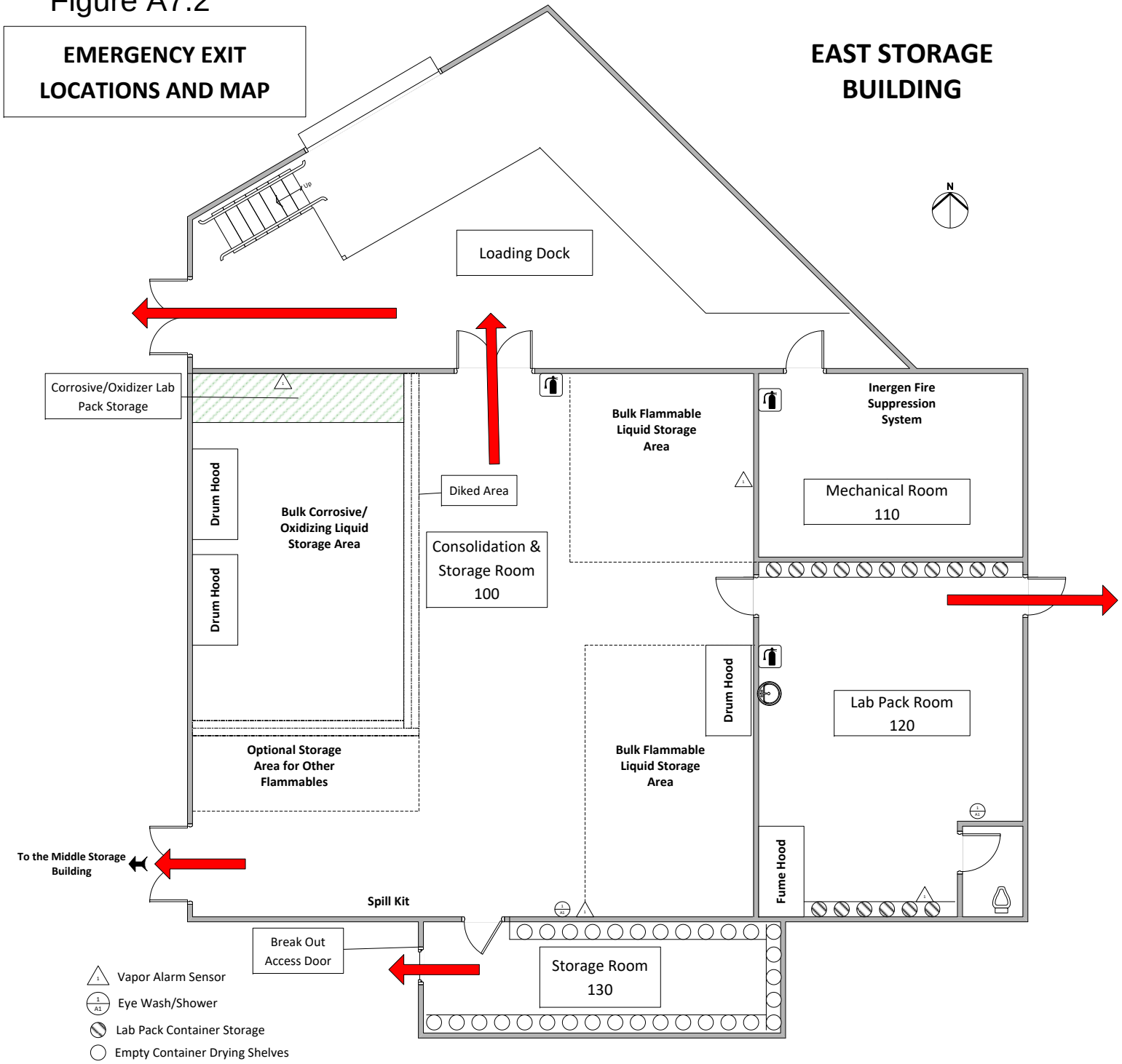
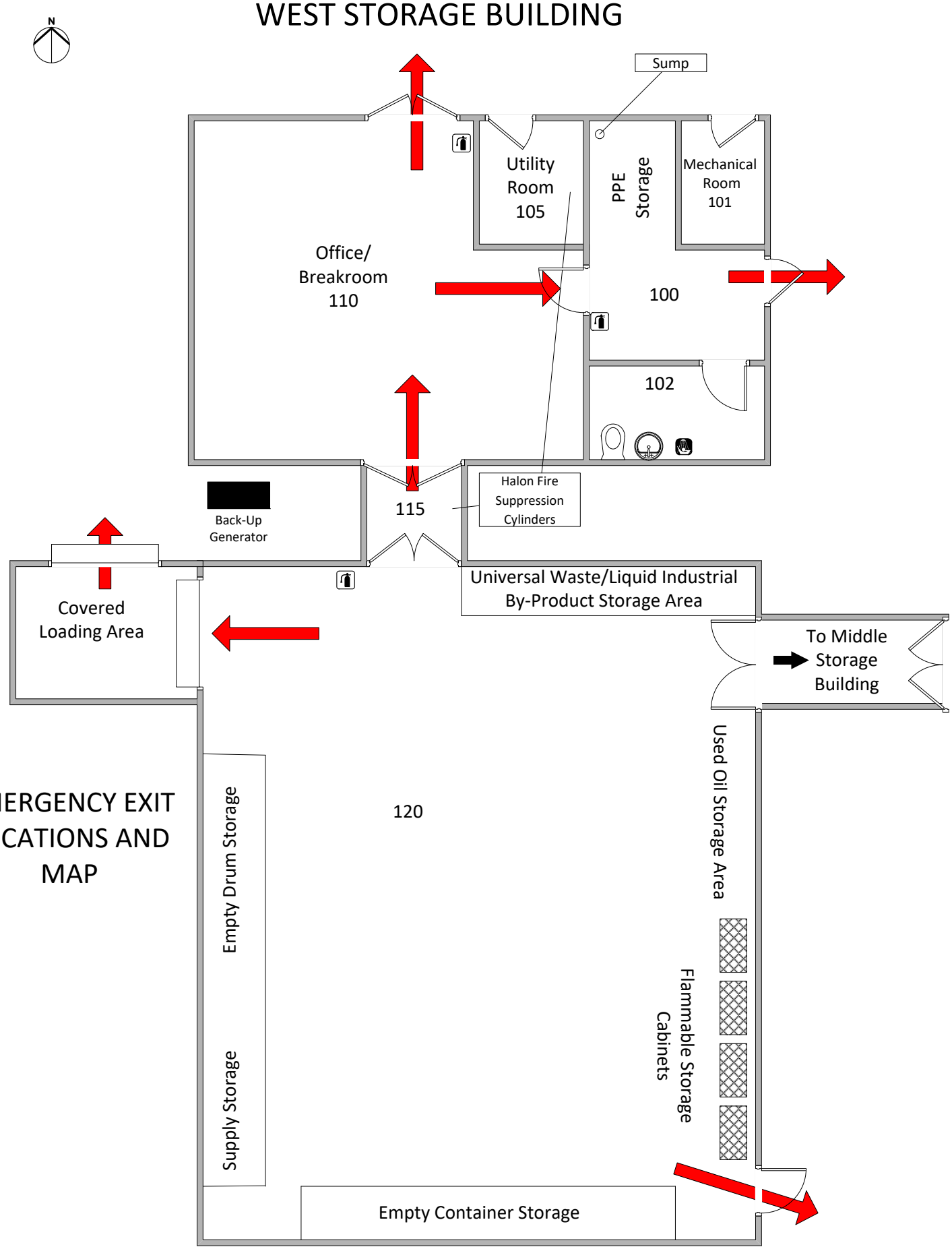


Figure A7.2

WEST STORAGE BUILDING



Attachment A7.3

Emergency Equipment Description

Attachment A7-3

WASTE STORAGE FACILITY EMERGENCY EQUIPMENT LIST

FIRE EXTINGUISHING SYSTEMS

(The Waste Storage Facility is serviced by two separate fire suppression systems in each building, as noted below)

EAST STORAGE BUILDING (ESB)		
Quantity	**Physical Description and Capability**	**Location - (Rm#)**
13	Inergen Fire Suppression System - 435 CF Tanks	110
3	Inergen Fire Suppression System - 200 CF Tanks	110
7	Infrared detector heads	Throughout Area
1	Fire Extinguisher - 30 lb. Class D	100
1	Fire Extinguisher - 10 lb. Class ABC	100
1	Fire Extinguisher - 6 lb. Class ABC	110
1	Fire Extinguisher - 6 lb. Class ABC	120
6	Magnetic Door Closing Mechanisms	Throughout

MIDDLE STORAGE BUILDING (MSB)		
Quantity	**Physical Description and Capability**	**Location - (Rm#)**
1	Fire Extinguisher - 6 lb. ABC	N/A

WEST STORAGE BUILDING (WSB)		
Quantity	**Physical Description and Capability**	**Location - (Rm#)**
3	1301 Halon Fire Suppression System - 304 lb. Tanks	115
6	1301 Halon Fire Suppression System - 54 lb. Tanks	105
1	Fire Extinguisher - 6 lb. Class ABC	105
1	Fire Extinguisher - 10 lb. Class ABC	100
1	Fire Extinguisher - 10 lb. Class ABC	110
1	Fire Extinguisher - 30 lb. Class D	120
1	Fire Extinguisher - 6 lb. Class ABC	120
1	Fire Extinguisher - 10 lb. Class ABC	120
4	Magnetic Door Closing Mechanisms	115, 120

Attachment A7-3

COMMUNICATION AND ALARM SYSTEMS

(Vanguard Fire & Security Systems In conjunction with EMERgency 24 monitors all the building alarms including intrusion, fire, organic vapors and low temperature)

EAST STORAGE BUILDING (ESB)		
Quantity	**Physical Description and Capability**	**Location - (Rm#)**
1	Vanguard Intrusion Alarm and Motion Detection System, including:	Throughout
	Key Card Readers	Exterior Doors on Dock, 100, and 110
	Infrared/flame detector heads	Throughout Interior
	Magnetic Door Contacts	Throughout Interior
	Motion Detectors	Throughout Interior
	Low Temperature Monitoring System	
1	SafeGuard SG-2000 Gas Leak Monitor - Organic Vapor Monitoring System	Throughout
1	EMERgency 24 Alarm Monitoring - Monitor/Notification Service	Throughout

MIDDLE STORAGE BUILDING (MSB)		
Quantity	**Physical Description and Capability**	**Location - (Rm#)**
1	Vanguard Intrusion Alarm and Motion Detection System, including:	Throughout
	Key Card Reader	Exterior Door
	Magnetic Door Contacts	Throughout
	Motion Detectors	Throughout
1	EMERgency 24 Alarm Monitoring - Monitor/Notification System	Throughout

WEST STORAGE BUILDING (WSB)		
Quantity	**Physical Description and Capability**	**Location - (Rm#)**
1	Vanguard Intrusion Alarm and Motion Detection System, including	Throughout
	Heat/Smoke Detector heads	Throughout Interior
	Magnetic Door Contacts	Throughout Interior
	Motion Detectors	Throughout Interior
1	EMERgency 24 Alarm Monitoring - Monitor/Notification System	Throughout

Attachment A7-3

WASTE STORAGE FACILITY EMERGENCY EQUIPMENT LIST

SPILL CONTROL EQUIPMENT				
Equipment Type	**Minimum Quantity Available**	**Physical Description and Capability**	**Location**	**Additional Product Locations**
Spill Control	4	Plastic Chemical Scoops - manipulation of solids and liquids	ESB, MSB, WSB	SRV, Annex
	2	Dust Pans - collection of solid floor debris	ESB, MSB, WSB	SRV, Annex
	2	Push Brooms - various sweeping	Dock, ESB, MSB, WSB	SRV, Annex
	2 boxes	Plastic Bus Trays - Secondary containment of liquid containers	ESB, MSB	
	5 each	Open Head Poly Drums (5-gal, 16-gal, 30-gal, 55-gal)- Secondary containment of liquid containers	MSB	Annex
	2 each	Large/Small funnels - transferring liquids	ESB, MSB	
	2 boxes	Spill Pads/Wypalls - collection of liquids	ESB, MSB, WSB	SRV, Annex
	1 pair each	Butyl, Kevlar, Viton Gloves	ESB, WSB	SRV, Annex
	5 boxes each size	Nitrile Gloves	ESB, WSB	SRV, Annex
	2 units	Nilfisk Mercury Vacuum and Tools - cleaning mercury spill debris	Annex	
Neutralization	2 boxes	Sodium Bicarbonate - for neutralizing acid spills	ESB, MSB, WSB	SRV
	2 boxes	Citric Acid - for neutralizing caustic spills	WSB	SRV
Absorbents	2 boxes	Haz-Mat Pig Pulp - liquid absorbent	ESB	
	20 bags	Superfine granular sorbent - diking and absorbing liquid	ESB, MSB, WSB	SRV, Annex
	2 boxes	Pig Absorbent Socks - for diking liquid spills	SRV, Annex	
	1 roll	Hydrocarbon Selective Fabric	SRV	
	2 each	Drain Stopper Pad	SRV	

* MSB = Middle Storage Building **SRV = Special Response Vehicle (available but not on site)
***Annex = MSU EHS Building at 3940 Collins Road

Attachment A7-3

WASTE STORAGE FACILITY EMERGENCY EQUIPMENT LIST

SPILL CONTROL EQUIPMENT				
Equipment Type	**Minimum Quantity Available**	**Physical Description and Capability**	**Location**	**Additional Product Locations**
Drum Handling Equipment	2	1000 Pound Drum Hand Trucks - movement of drums	ESB, MSB, WSB	Annex
	1	Drum Lifting Tool - up-ending 30-55-gal drums	ESB	
	5	Collawasa drum samplers - sampling 30-55-gal drums	ESB, MSB	Annex
	5	Collawasa samplers - sampling 5-gal or less containers	ESB, MSB	SRV, Annex
	1	Explosion-Proof Electric Drum Pump	ESB	Annex
	5	Polyethylene hand drum pump	ESB, MSB	SRV, Annex
	2	Bung Wrenches	ESB	SRV
Miscellaneous	3	Explosion-proof extension cords	ESB, MSB	
	2 sets	Explosion-proof tools	ESB	
Personal Protective Equipment	1 box each size	Tyvek Suits	WSB	SRV, Annex
	2 boxes each size	Tychem Suits	WSB	SRV, Annex
	4 pair	Chemical Resistant Boots	WSB	SRV
	20 pair	PVC Boot Covers	WSB	SRV
	10 pair each	Silver Shield Sleeves, Gloves, Aprons	WSB	SRV, Annex
	5 boxes each size	Nitrile Gloves	WSB	SRV, Annex
	2	Face Shields	WSB	SRV
	5	Safety Glasses/Goggles	WSB	SRV
	2	3M Powered Air Purifying Respirators	WSB	

* MSB = Middle Storage Building **SRV = Special Response Vehicle (available but not on site)
***Annex = MSU EHS Building at 3940 Collins Road

Attachment A7.4

Checklist for Tracking Facility Response Actions During and After a Fire/Explosion Incident

Checklist- Tracking Facility Response Actions During and After a Fire/Explosion Incident

Date Incident Started: _____ **Staff Name and Office:** _____

Facility Name and Location: _____

Comments: _____

1. Air Monitoring During Incident **Owner/operator (if the facility is equipped with monitoring instruments), in combination with federal (EPA, NOAA) and local hazmat response teams- As soon as can be mobilized**		
Status e.g. Pending or Complete	**Date Completed**	**ACTION**
		a. If possible, model dispersion and deposition of the release with real time parameters to determine likely extent of plume and to assist local authorities making shelter-in-place or evacuation recommendations
		b. Establish air monitoring equipment in locations upwind and downwind of the incident (assign locations as soon as possible, using visual/meteorological data and update, as needed, with modeling results). Monitoring should continue until downwind data is consistent with upwind values.
		c. Air monitoring should be conducted utilizing approved methods and should include as many of the identified substances as possible. In the event of a fire/explosion, continuous particulate matter less than 2.5 microns in diameter (PM2.5) should be monitored as well. The Contingency Plan should indicate what kind of monitoring equipment may be necessary (e.g., PM2.s meters for fire events, SUMMA canisters/Tedlar bags for volatile organic compounds released from ruptured tanks), and which ones will be readily available.
Comments:		

2. Record Incident Parameters **Owner/Operator – As soon as access is available to employees/witnesses**		
Status e.g. Pending or Complete	**Date Completed**	**ACTION**

		a. Document the time the incident began and the duration of the overall event. Identify the specific location(s) where the incident began
		b. Identify employees/witnesses having direct involvement or direct knowledge of the incident.
		c. Identify employees/witnesses having direct involvement or direct knowledge of the incident.
		d. Gather local meteorological data from the National Weather Service {point-specific data are available at the NOAA Web site) and any characteristics noted by personnel directly involved with the incident or recorded elsewhere
Comments:		

3. Develop Event Narrative **Owner/Operator – As soon as access is available to employees/witness**		
Status e.g. Pending or Complete	**Date Completed**	**ACTION**
		a. Determine the sequence of events and time line leading up to and throughout the incident by reviewing with employees directly involved and other on-site peripheral witnesses (office staff, truck drivers, maintenance staff, etc.), along with accessing other tools and resources, as available (automated data records, surveillance cameras, etc.).
		b. Identify specific event locations, materials, and equipment involved in the incident.
		c. Identify and characterize, to the extent possible, the size and scope of the event.
Comments:		

4. Develop a Comprehensive List of Materials or Substances Involved **Owner/operator in combination with regulatory and health agencies and hazardous materials (hazmat) response teams - As soon as possible**		
Status e.g. Pending or Complete	**Date Completed**	**ACTION**
		a. Identify all of the materials/substances that may have been involved in the event, using the information obtained in the previous steps, inventory records and/or container/tank logs, laboratory data, approval records, material safety data sheets, or any other means available. Use a generic list initially, and then develop a final list from off-site records. Verify that the most up-to-date records are used

		b. Determine the volume, concentration, and weight of substances identified above, and determine how they may have been altered by the event (e.g., pyrolysis products, decomposition, degradation, and both known and potential mixture reactions). Based on this information, begin developing a list of compounds of potential concern.
		c. The OWMRP shall identify the primary location where information and documents used to in previous steps 3.a. and 3.b. will be housed and ensure that information critical to response an activity is kept in that location.
Comments:		

5. Post-Incident Sample Collection
Owner/Operator, in combination with EPA, DEQ, and DCH – During and/or immediately following the incident

Status e.g. Pending or Complete	**Date Completed**	**ACTION**
		a. Develop a sampling plan for the collection of waste, groundwater, soil, ash, airborne dust, debris, surface water, and/or wipe samples, as appropriate. The plan, or the need for one, may take into account fallout density, air monitoring data, visual observation, or air modeling. A statistical sampling design may not be necessary for the screening evaluation. Post-incident, off-site sampling may not be necessary based on air monitoring data and lack of off-site migration or deposition.
		b. Collect a sufficient number of samples to identify and characterize concentrations of substances involved in the incident. Include sampling for background concentrations.
		c. Complete the analysis of collected samples and review by comparison to relevant screening levels. Screening levels may have to be developed for some chemicals or environmental media.
		d. Identify and document any substances found to be present in levels that exceed screening levels
Comments:		

6. Evaluate Data for Screening Potential Risk Yes/No (determines next step)
Owner/Operator – As soon as possible

Status e.g. Pending or Complete	**Date Completed**	**ACTION**

		a. Screen existing data against relevant screening levels
		b. Prepare RA Screening Report and submit it to the DEQ, OWMRP, for review as soon as possible but no more than 90 days after the incident.
		c. If less than screening levels, no further action is needed for off-site potential releases upon approval of the OWMRP.
		d. If the data is greater than screening levels, proceed immediately to Step 7.0, after notification from the DEQ.
Comments:		

7. If Needed, Conduct Off-Site RCRA RFI and Prepare Full RA Report – Owner/Operator (Steps 7.b. through 7.c. to be completed within 180 days, if at all possible)		
Status e.g. Pending or Complete	**Date Completed**	**ACTION**
		a. Prepare off-site RFI Work Plan and submit for review to the OWMRP. Submit within 30 days from step 6.d. notification from the DEQ.
		b. Prepare off-site RFI Work Plan and submit for review to the OWMRP. Submit within 30 days from step 6.d. notification from the DEQ.
		c. Conduct a RA on RFI data.
		d. Prepare and submit RFI Report to the OWMRP
		e. Upon DEQ approval of the RFI , prepare a combined CMS and CMI Plan, and submit for review to the OWMRP, if directed.
		f. Upon DEQ approval of the CMS/CMI, implement the CMI Plan as directed.
		g. Provide a report to the DEQ upon completion of the CMI Plan.
Comments:		

A8 Traffic Information

CFR 270.14(b)(10)

Waste streams are collected from numerous generation sites throughout the Michigan State University (MSU) campus and off-site locations identified in Attachment A3-1 and transported to the Waste Storage Facility (WSF) in vehicles which are approved and licensed by the Michigan Department of Energy, Great Lakes, and Environment (EGLE). Therefore, traffic considerations are limited to the transport of waste chemicals to the site and minimal transport within the facility.

The transport of waste chemicals from MSU owned and operated properties to the WSF involves the usage of public roads which are all paved, two-lane roads with a speed limit ranging from 45 miles per hour (MPH) on Farm Lane to 55 MPH on College Road. All of the roads governed by the Ingham County Road Commission are classified as "All Season" routes. This designation indicates that the roads are not under frost restrictions and that for vehicles with 3.5 - 9.0 feet between axles, the load capacity is 13,000 pounds/axle. The vehicles used for transporting materials are well within these limits.

Forest Road is governed by East Lansing and is a Class A road. Vehicles using Forest Road are subject to seasonal road restrictions which limit their weight and speed. The vehicles used by MSU do not exceed the restricted weight. The normal route of transport from MSU Campus is shown in Figure A8-1 and covers approximately 3.2 miles. College Road is often used as an alternative to Collins Road.

Farm Lane serves as an important southern access to MSU and therefore carries significant passenger car traffic during the morning and evening rush hours. According to traffic counts by the Michigan Department of Transportation (MDOT), the following Annual Average Daily Traffic (AADT) counts were documented in 2021 along the route to the MSU WSF:

Location	AADT Count
Farm Lane/Mt. Hope	14,198
Forest Road	5,860
Collins Road	11,549
East Jolly Road	12,473
College Road	6,574
US-127	40,252

Traffic along Collins Road and East Jolly Road has increased due to the construction of multi-family apartment complexes on East Jolly and Collins Road, in addition to the construction of McLaren Hospital on Collins Road.

All of the public roads leading to the facility from the campus are designed and maintained to handle public commercial traffic. Because of the light to moderate traffic patterns on these public roads, and because they are well maintained, it is not expected that transport of waste materials to the WSF will be interrupted. Table A8-1 indicates the traffic controls and signals for the various intersections encountered during the transport.

Only one entrance to the facility is present and can be reached by a left-hand turn from Jolly Road. No stacking lanes are present. All traffic routes within the facility are paved with asphalt

and are adequate to handle both the Waste Transport Vehicles and commercial service trucks. The traffic pattern and flow within the facility are minimal since the only vehicles to use the paved surface leading to the facility off Jolly Road are the MSU Waste Transport Vehicles or service vehicles as required. On an average day, one to two vehicles enter the facility to transport waste chemicals from campus. There are no additional facilities located on these premises and no additional facilities located further along this access road. There are no sidewalks in the vicinity of the facility and therefore, limited pedestrian traffic near the facility.

Following entrance to the facility, the Waste Transport Vehicles back to the loading dock as identified in Figure B6-5. The loading dock is positioned approximately 100 feet, by road, from the last public road used for transport. Maintenance of these paved surfaces is provided by the MSU Landscape Services Department and third-party vendors as necessary.

Table A8-1

Traffic Controls and Signals and Turns Across Lanes of Traffic

Intersection	Controls and Signals	Turns
MAIN ROUTE:		
Farm Lane and Mt. Hope Road	Traffic Light	None
Farm Lane and Forest Road	Stop Sign on Farm Lane	Right
Forest Road and Collins Road	Traffic Circle into Collins	None
Collins Road and Dunckel Drive	Traffic Light	None
Collins Road and Jolly Road	Traffic light	Right
Jolly Road and Facility Entrance	None	Left
ALTERNATE ROUTE:		
Farm Lane and Mt. Hope Road	Traffic Light	None
Farm Lane and Forest Road	Stop Sign on Farm Lane	Right
Forest Road and College Road	None	Left
College Road Jolly Road	Traffic Light	Right

MICHIGAN STATE UNIVERSITY
WASTE STORAGE FACILITY
Ingham County, Michigan

Adapted From Google Earth

876-1239

N
W E
S

No Scale

STRATA ENVIRONMENTAL SERVICES, INC.

FIGURE A8-1

Michigan State University
Waste Storage Facility Location

Traffic Map

Traffic Light

A9 Location Information

40CFR Subpart B - Location Standards 264.18; 270.14 (11), PA 451 Part 111 R 299.9603
PA 451 Part 111 R 299.9506(1e)(1f)

The Waste Storage Facility (WSF) is located on the Michigan State University (MSU) campus at 3634 E. Jolly Road near the intersection with Collins Road. The campus is located in Ingham County, Michigan and the exact situation of the facility is shown in **Figure A9-1**. The mailing address of the facility is as follows:

Michigan State University
Environmental Health & Safety
4000 Collins Road, B20
Lansing, MI 48910

R299.9603(a)

Seismic Considerations

The site is not located within 61 meters of a fault which has had displacement in Holocene time. In 1977, D. M. Bricker of the Michigan Department of Natural Resources compiled a publication entitled "Seismic Disturbance in Michigan". This reference indicated that the greater Lansing area is in a minor damage zone as far as seismic risk is concerned.

(b)

Flood Plain

Figures A9-2a and A9-2b provide an outline of the 100-year flood plain provided by the Federal Insurance Administration, and the location of the MSU WSF. It is obvious from the figure that the facility is situated well away from the 100-year flood plain boundary. Therefore, the regulations in RCRA and Michigan Act 451 which place restrictions and additional requirements for those facilities which fall within the flood plain do not apply to this site.

(c)

Coastal High-Risk Areas

The Waste Storage Facility is not in a coastal high-risk area due to the inland location far from any major surface water bodies.

299.9603(1)(d)

Sole Source Aquifer Limitations

The MSU WSF is located in a region of gentle to rolling topography resulting from the impact of continental glaciation. The drift deposits in this general vicinity range from 25 to 75 feet in thickness and are characterized by sands and silty clays. Historical soil borings placed at the facility indicate that the site-specific area underneath the facility is characterized by clays and silty clays with thin layers of saturated sandy clays. The glacial tills at the site are such that, in the event that releases did occur, the low permeability clays underlying the facility would function to limit the migration of the released materials and thus serve as a barrier protecting the lower aquifer.

Beneath these glacial deposits lies the sandstone bedrock of the lower Saginaw Formation which represents the Lansing region's primary aquifer. In order to prevent the degradation of that aquifer, the storage facility has been located, designed, built, and operated in such a way that degradation of the aquifer is prevented.

The specific location features of the facility which prevent release of degradation to the aquifer are discussed throughout this section. The design and structural elements of the facility which also prevent releases to the soils and groundwater are described in Section B6 entitled "Engineering Plans." The operation of the facility has been carefully developed to ensure personnel protection and the prevention of accidental releases to the environment. These measures are documented in sections entitled "A3-Waste Analysis Plan," "A5-Inspection Schedules," "A4-Security Procedures and Equipment," "B6-Engineering Plans," "A6-Preparedness and Prevention," "A7-Contingency Plan," and "A10-Personnel Training Program."

(e)

Isolation from Public Water Supplies

Currently, the closest public water supply well operated by the Lansing Board of Water and Light is situated approximately 900 to 1000 feet upgradient of the storage facility. The locations of the Lansing wells within ¼-mile of the facility are shown in **Figure A13**, the topographic map. Michigan State University operates public wells on the campus, the closest being at least ½-mile from the facility. **Figure B3.A-4** shows the locations of the MSU wells relative to the facility. The isolation distances for all drinking water supply wells are specified in the Michigan Safe Drinking Water Act 399 of 1976 (Act 399 R.325.10812), with the exception of the Board of Water and Light well #70-8.

Although there is some confusion regarding which unit pre-existed the other, the key element remains whether the operation of the storage facility represents a threat to the integrity of the Board of Water and Light well #70-8. Numerous precautions have been incorporated into the standard operating procedures of the facility both to prevent any release and to provide for the detection and remediation of any release which might occur. These precautions include security measures (Section A4), a regular inspection program (Section A5), training of all personnel (Section A10), special construction features (Section B6), standard procedures to prevent hazards (Section A6), and a contingency plan for handling emergencies (Section A7).

(f)

Wetlands

The Waste Storage Facility is not located in, or near, an area which may be described as a wetland. The facility is surrounded by either cultivated farmland or lawns which are regularly maintained. The small drain located to the east of the facility does not result in the presence of any standing water or ponds.

Isolation Distances

At least 60 meters are present between the Waste Storage Facility and the nearest adjacent commercial, residential, or recreational property.

Isolation Distances

This regulation pertains to the required isolation of the facility from public roads, railroads, or right-of-ways. The distance of the facility from both railroads and right-of-ways are greater than 60 meters. The set back of the facility from Jolly Road is approximately 34 meters.

Floodplain

299.9603(1)(b) The facility does not lie in the 100-year floodplain. This regulation does not pertain to storage facilities.

MICHIGAN STATE UNIVERSITY
WASTE STORAGE FACILITY
Ingham County, Michigan

Adapted From Google Earth

876-1239

N
W E
S

No Scale

STRATA ENVIRONMENTAL SERVICES, INC.

FIGURE A9-1

Michigan State University Waste Storage Facility Location & Surrounding Area

Traffic Light

STRATA ENVIRONMENTAL SERVICES, INC.

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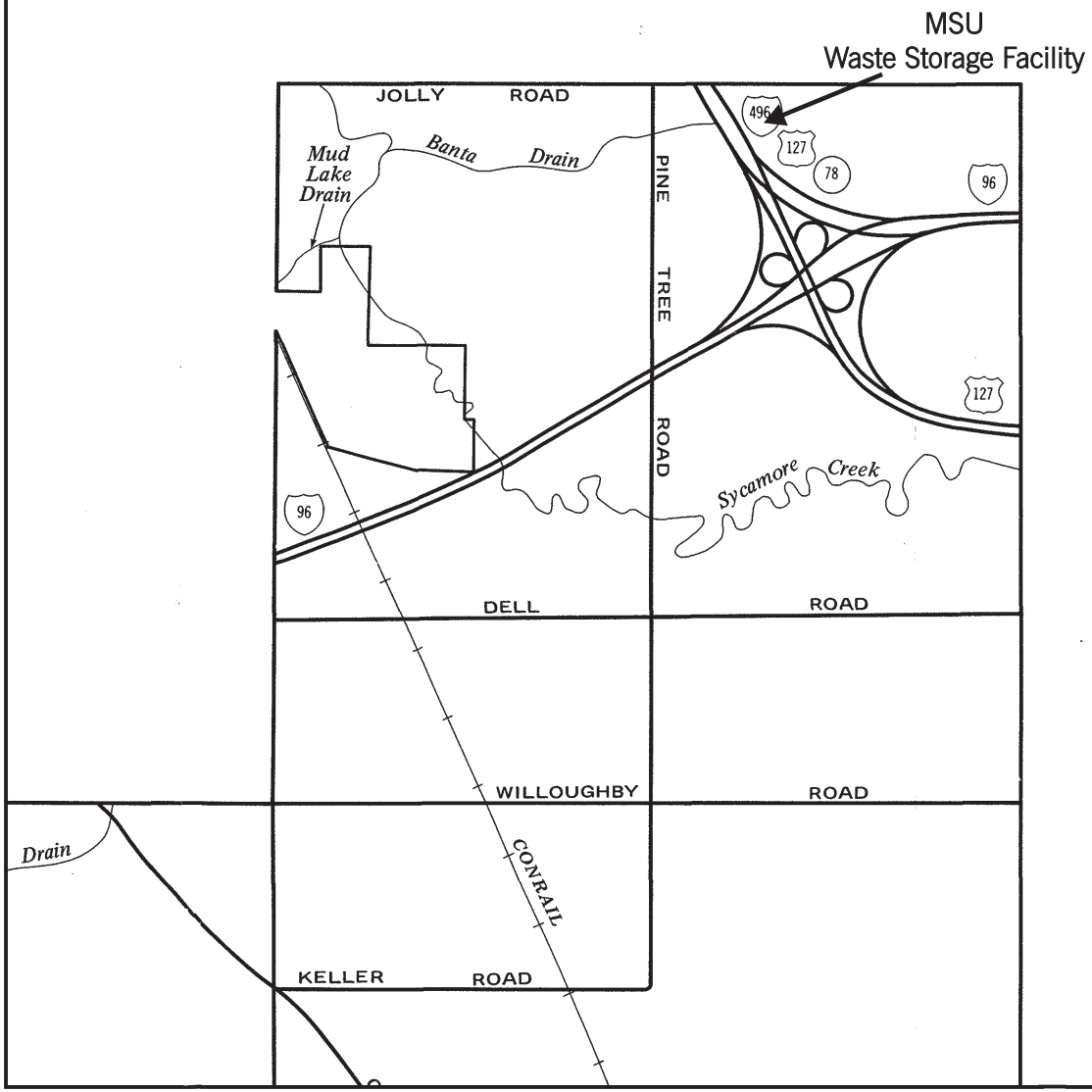
Figure A9-2a

Updated May 2023



NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

CHARTER TOWNSHIP OF
DELHI,
MICHIGAN
INGHAM COUNTY

MAP INDEX

PANELS PRINTED: 5, 10

COMMUNITY-PANEL NUMBERS
260088 0005-0010

MAP REVISED:
NOVEMBER 16, 1990

Federal Emergency Management Agency

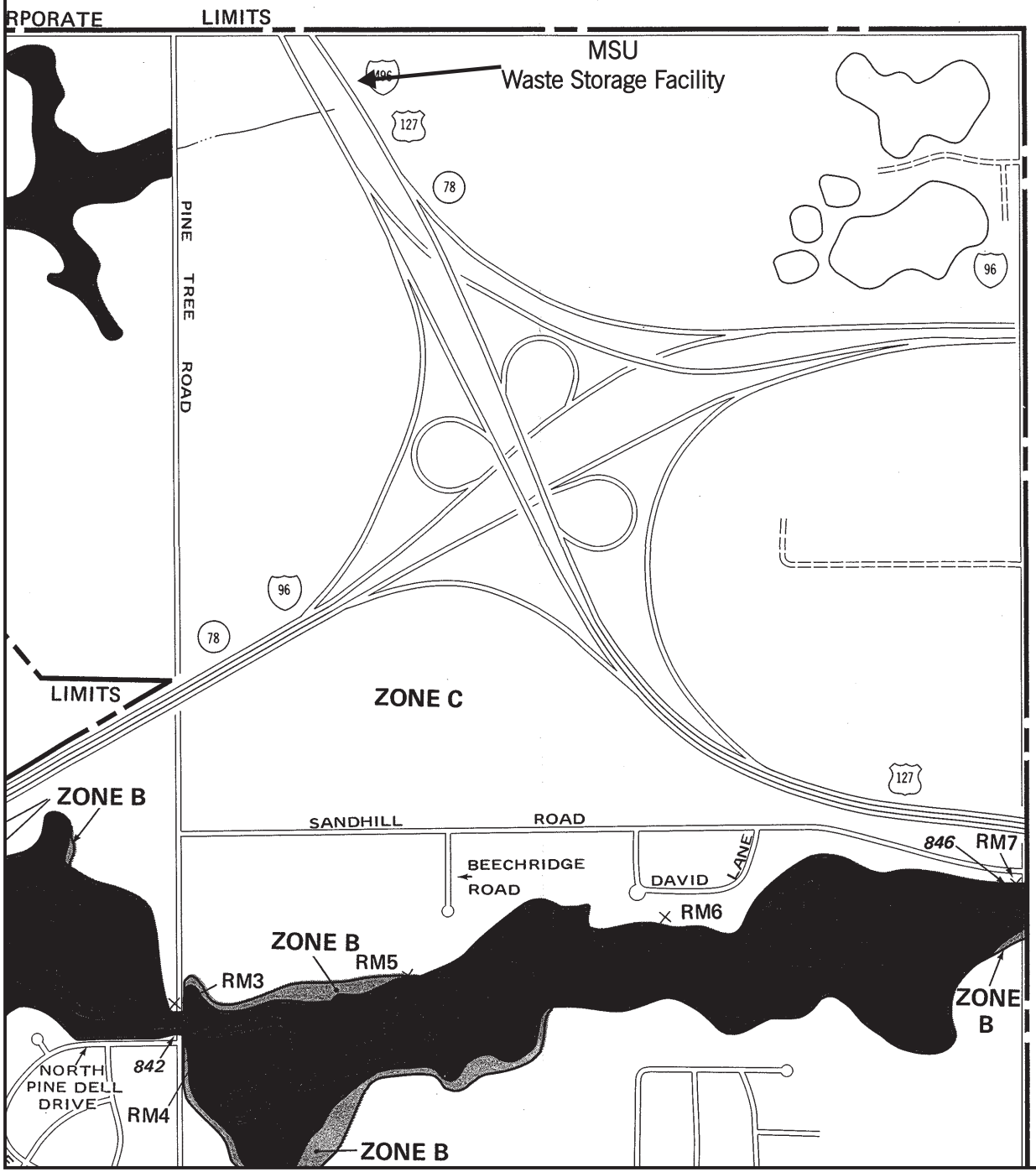


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Figure A9-2b

Updated May 2023

STRATA ENVIRONMENTAL SERVICES, INC.

KEY TO MAP

- 500-Year Flood Boundary
- 100-Year Flood Boundary
- Zone Designations*
- 100-Year Flood Boundary
- 500-Year Flood Boundary
- Base Flood Elevation Line With Elevation In Feet** — 513
- Base Flood Elevation in Feet Where Uniform Within Zone** — (EL 987)
- Elevation Reference Mark — RM7×
- Zone D Boundary
- River Mile — •M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

FORM EQP 5111 ATTACHMENT TEMPLATE A10
PERSONNEL TRAINING

This document is an attachment to the Michigan Department of Environment, Great Lakes, and Energy'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 Michigan State University (MSU) Waste Storage Facility (WSF) in Lansing, 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)]

The purpose of the MSU training program is to prepare designated EHS waste staff employees to safely operate and maintain the MSU WSF. Trainings are designed to familiarize EHS waste staff with waste handling procedures, waste transport, and characterization, as well as emergency response to an incident at the MSU WSF. Specific training program information is included in Sections A10.A.1 and A10.B.1.

A10.A.1 Outline for Introductory Training Program
[R 299.9605 and 40 CFR §§264.16(a)(1) and 264.16(d)(3)]

MSU WSF personnel, as identified in Section A10.B.1 complete several in person, site specific, and online trainings to enable staff to perform job duties related to hazardous waste operations and emergency response procedures. All initial training is completed within 6 months of the date of hire of the individual. Refer to attached Table A10.A1 – Facility Training Requirements for a full list and description of all initial training and descriptions.

A10.A.2 Outline for Continuing Education
[R 299.9605 and 40 CFR §§264.16(a)(1) and 264.16(d)(3)]

Refer to attached Table A10.A1 – Facility Training Requirements for a full list and description of all initial training, descriptions, and refresher trainings as necessary. In addition to the training requirements identified in Table A10.A1, MSU WSF personnel regularly participate in both EPA and EGLE continuing education webinars and other learning opportunities.

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)]

The following is a list of job descriptions for individuals who are in the personnel training program identified in Section A10.A.1.

Hazardous Waste Coordinator: The Hazardous Waste Coordinator (HWC) supervises and helps conduct and coordinate the campus-wide hazardous waste program. The HWC ensures that hazardous wastes are properly handled, transported, and stored. Work which takes place at the Waste Storage Facility is directly supervised by the HWC. The HWC provides guidance, instruction, and supervision of specific techniques and procedures to maintain operational safety and compliance with regulatory requirements. The HWC is responsible for the preparation and maintenance of records and reports dealing with hazardous waste transportation and storage. In addition, the HWC must be an individual trained in the management of hazardous waste and capable of directing the training sessions.

Senior Hazardous Materials Professional: The Senior Hazardous Materials Professional (HMP II) coordinates in the development, implementation and monitoring of University programs designed to the safe handling, storage, transport, and disposal of regulated and non-regulated hazardous chemical, biohazardous materials; coordinates in preparing for, participates in, and reviews responses to spills and releases of hazardous materials; and coordinates in the management and review of University programs and policies which maintain licensure by and ensure compliance with state and federal hazardous materials regulations.

Hazardous Materials Professional: The Hazardous Materials Professional (HMP) assists in the development, implementation and monitoring of University programs designed to the safe handling, storage, transport, and disposal of regulated and non-regulated hazardous chemical and biohazardous materials. The HMP assists in preparing for, participates in, and reviews responses to spills and releases of hazardous materials and assists in the management and review of University progams and policies which maintain licensure by and ensure compliance with state and federal hazardous materials regulations.

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)]

New designated MSU WSF employees are given an overview of the policies of the EHS department and the responsibilities of EHS personnel. They are provided with basic information relating to the responsibilities of the position being filled. Also included is information pertaining to the responsibilities of safety personnel involved with the handling of hazardous materials. In addition, new employees are oriented with the WSF Environmental Management System and the QA/QC protocols in place.

The actual moving of hazardous waste from University locations to the WSF involves knowledge of EPA, Department of Transportation (DOT), and State of Michigan laws, the University policy, and the WSF Operating license. As an introduction to this vast array of governing laws, a new employee is required to read through appropriate federal and state regulations. In addition, each is required to take MSU EHS Chemical Safety, Radiation Safety, Hazardous Waste, and Bloodborne Pathogen Initial training. These courses serve as general instruction on the hazards which will or may be encountered by the person in the course of their duties as research conducted at MSU is diverse, and can include a wide variety of chemical and biological compounds.

Right-to-Know training is given to inform employees of their rights and access to information on hazardous materials. A regulatory overview is provided by guiding new HMPs and HWCs through PA 451 parts 111 and 121, enabling them to gain an understanding of the requirements for the transportation and storage of hazardous waste. A majority of the tasks done by the HMPs involves the transportation or storage of hazardous waste. Since many portions of 40 CFR 264 Rules are referenced in PA 451, employees are presented selected portions of this section for study.

All HMPs and HWCs receive DOT HazMat Ground Shipper Training that involves more of the regulations regarding the packaging, labeling, marking, classification, and shipping hazards of materials. They are also instructed on placarding vehicles, as necessary, and required to have a valid driver's license. Also involved in the transportation process is instruction on how materials are recorded and tracked by EHS. By nature this process involves a good foundation in the knowledge of identifying and classifying hazardous wastes and assigning of waste codes. The EHS department is the body responsible for ensuring that waste codes are placed on hazardous waste containers before they are shipped to the WSF. Employees are given hands on training using the database set up and maintained by EHS.

HMPs and HWCs are given a thorough introduction to the MSU WSF. A large portion of their time is spent consolidating, storing, and preparing hazardous waste for shipment from the WSF. The introductory training addresses the following:

- Procedures for using and inspecting the emergency and monitoring equipment.
- The function of the fire and alarm systems at the facility
- Responses to fires, explosions, and spills
- Shutdown of the facility
- Response to a release of contaminants to the environment

In addition, they are required to read through the Operating License and Contingency Plan and are given the opportunity to ask questions at any time. They are physically shown all the

operating systems and locations of all equipment addressed in the License. They are also shown the location of all records stored at the WSF. Supervised work takes place within the facility soon after new employment. It is during this supervised time that new employees working in the WSF are shown how it functions, how materials are stored and consolidated, and other operating standards.

The use of personal protective clothing and equipment (PPE) while at the WSF or while picking up waste materials from MSU generators is incorporated into a number of the training sessions. The Initial Chemical Safety training presents some of the more rudimentary aspects of PPE. As the new employees progress in their supervised work, they are shown the proper protective equipment for the work they are expected to do. They are also given knowledge of how to access information on PPE for applications outside of the compounds they would normally encounter. All persons expected to work in hazardous environments are fit tested for full or half mask air purifying respirators or a self-contained breathing apparatus (SCBA) as necessary.

All persons working directly with the WSF are required to participate in the annual refresher training. This review is intended to keep all personnel apprised of any recent modifications of the Contingency Plan, and to keep them informed of recent innovations in the handling and storage of hazardous waste. In addition to MSU WSF staff, annual Contingency Plan reviews are conducted with all other primary and alternate emergency coordinators as identified in Template A7, Table A7.B1. Table A10.A-1 lists examples of the types of topics to be reviewed annually.

Training records for each employee, including documentation of their successful completion of the training, will be maintained at the EHS office and the WSF. At the time of hire, each person receives a written description of the responsibilities of their position, WSF security information, and a listing of the introductory and continuing training required for the position.

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)]

All MSU WSF personnel must complete introductory training within six months of their employment or assignment to a new position. Employees do not work in unsupervised positions until they have completed the training.

A10.C.2 Continuing Education

[R 299.9605 and 40 CFR §264.16(c)]

All MSU WSF personnel take part in continuing education training annually.

A10.D TRAINING DIRECTOR

[R 299.9605 and 40 CFR §264.16(a)(2)]

The Hazardous Waste Coordinator will conduct the training programs. The HWC is qualified based on years of experience in the field of hazardous waste, in addition to off-site training provided by qualified consultants and contractors.

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)]

The job titles of Hazardous Waste Coordinator and Hazardous Materials Professional incorporate all EHS personnel who are directly involved with the storage and transportation of hazardous waste. Individual records are maintained in separate folders at the EHS office for each person employed in this capacity. The records of each employee include their names, job title, and description of responsibilities. Future employees are included by the addition of folders with the information specific to their conditions of employment. The EHS Environmental Compliance Officer and the Chemical Safety Officer are responsible for the development and currency of the training programs.

All training records of current personnel will be maintained at least three (3) years following the close of the facility. The training records of former employees will be maintained for at least three years from their last date of employment. If an individual is transferred within the department, his/her records will be maintained as a current employee.

A10.E.1(b) Written Job Descriptions
[R 299.9605 and 40 CFR §264.16(d)(2)]

The records described in A10.E.1(a) of each employee include his/her name, job title, and description of responsibilities.

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)]

The Hazardous Waste Coordinator maintains a record with a written description of the type and amount of training given to each position

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)]

The records described in A10.E.1(a) of each employee contain documentation of all training completed.

A10.E.2 Record Keeping
[R 299.9605 and 40 CFR §264.16(e)]

Extensive records relating to the facility and the EHS personnel will be maintained at the EHS office and WSF. These records will include the following: names and job titles of personnel presently employed, job descriptions, training records for each employee. Records for current personnel will be retained until the closure of the facility.

Records for former employees are kept for a minimum of three years at the EHS department office.

Table A10.A1 - Facility Training General Requirements

Training Type	Training Description	Training Institution	Renewal Required
Site Specific Initial, On-Site Training	Review EHS documents including: MSU TSDF Operating License, Past EPA/EGLE inspection reports, waste profiles, SDS sheets, fire and security equipment and procedures, MSU TSDF Contingency Plan, and MSU TSDF Emergency Management System including all SOGs. Working directly with Supervisor at Facility, and take additional trainings as noted below.	MSU EHS	No - One Time Training
29 CFR	40-Hour Initial HAZWOPER training in accordance with 29 CFR 1910.120 and 8-hour annual refresher trainings	3rd Party - Lion Technology	Annual
40 CFR	RCRA Hazardous Waste Training in accordance with 40 CFR 262.16(b)(9)(iii) and 262.17(a)(7) and annual refresher trainings	3rd Party - Lion Technology	Annual
49 CFR	DOT HazMat Ground Shipper Training in accordance with 49 CFR 172.704(a) and annual refresher trainings	3rd Party - Lion Technology	Every 3 years
Site Specific Refresher (EMS Review)	Annual review of current MSU Facility Emergency Management System plan and SOGs.	MSU EHS	Annual
Contingency Plan Review	Annual review of current MSU Facility Contingency Plan pursuant to Part 111, Hazardous Waste Management, of Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451.	MSU EHS	Annual
Respirator Training	Required annually for employees using a cartridge respirator, includes medical evaluation with University Physician's Office and annual fit tests.	MSU EHS	Annual
Powered Air-Purifying Respirator	Required anually for employees using a powered air-purifing respirator, includes medical evaluation with University Physician's Office and annual fit tests.	MSU EHS	Annual
Chemical Hygiene, Laboratory Safety, and Hazardous Waste	Required for MSU employees in a laboratory containing hazardous chemicals. Employees must complete before receiving work assignments. Fulfulls requirements under the MIOSHA Rules for Hazardous Work in Laboratories and the Michigan Hazardous Waste Management Act.	MSU EHS	Annual
Biosafety Principles	Required for personnel working in environments at Biosafety Level 1 or higher. Pre-requisite for the Biosafety Refresher course.	MSU EHS	One time training, refreshers included with Bloodborne Pathogen training.
Bloodborne Pathogen Site-Specific	Required for employees with a reasonable anticipated risk of exposure to bloodborne pathogens or human blood/bodily fluids, including human cell lines. Fulfills the general requirements under the MIOSHA Bloodborne Pathogens Standard.	MSU EHS	Annual
Fork Truck Operator Tutorial	Required for anyone operating warehouse, rough terrain, but not walkie type fork trucks. Not for golf carts, utility vehicles/gators, or tractors.	MSU EHS	Every 3 years
Radiation Safety	Required for any individual using radioactive material at MSU. Fulfills the currently existing requirements of the Nuclear Regulatory Commission and the State of Michigan licenses and permits.	MSU EHS	Annual

FORM EQP 5111 ATTACHMENT TEMPLATE A11
CLOSURE AND POSTCLOSURE CARE PLANS

This document is an attachment to the Michigan Department of Environment, Great Lakes, and Energy's (EGLE) *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 Michigan State University (MSU) Waste Storage Facility (WSF) in Lansing, 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.

This template is organized as follows:

A11.A CLOSURE PLAN

A11.A.1 Closure Performance Standard
[R 299.9613 and 40 CFR §264.111]

This Closure Plan is designed to ensure that the facility will be closed in a manner that achieves the following:

a. Minimizes the need for further maintenance; and

b. Controls, minimizes, or eliminates, to the extent necessary to protect human health and the environment, postclosure escape of hazardous wastes, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition byproducts to the groundwater, surface water, or atmosphere; and, as applicable

c. Complies with the unit-specific closure requirements for each of the following units:

(Check as appropriate)

☒ Use and management of containers	R 299.9614 and 40 CFR §264.178
☐ Tank systems	R 299.9615 and 40 CFR §264.197
☐ Surface impoundments	R 299.9616 and 40 CFR §264.228
☐ Waste piles	R 299.9617 and 40 CFR §264.258
☐ Land treatment[a]	R 299.9618 and 40 CFR §264.280
☐ Landfill	R 299.9619 and 40 CFR §264.310
☐ Incinerators	R 299.9620 and 40 CFR §264.351
☐ Drip pads[b]	R 299.9621 and 40 CFR §264.575
☐ Miscellaneous units	R 299.9623 and 40 CFR §§264.601-603
☐ Hazardous waste munitions and explosive storage[b]	R 299.9637 and 40 CFR §264.1202
☐ Boilers and industrial furnaces	R 299.9808 and 40 CFR §266.102(e)(11)

[a] Not included in the template
[b] *Not yet included in 40 CFR §264.111; therefore not considered*

Unit-specific closure procedures are discussed in Section A11.A.5 of this template for each unit type indicated above.

A11.A.2 Unit-Specific Information
[R 299.9613 and 40 CFR §§264.112(b)(3) and (6)]

Table A11.A.1 Hazardous Waste Management Units Information

The following table identifies each hazardous waste management unit at the MSU WSF subject to the closure requirements of this hazardous waste management facility operating license. The table also includes: each unit's maximum licensed hazardous waste inventory, a list of the waste codes managed in the unit, the anticipated date of closure (if known), and the estimated duration of closure activities once closure begins. Unit-specific methods for closure and detailed schedules are discussed in Section 11A.5 of this template.

Unit Designation	Maximum Inventory (Include Units)	Waste Codes of Hazardous Wastes Managed	Scheduled Closure Date	Estimated Duration of Closure
S01	7900 gallons total (see Table C1-2)	See Table A2.A1	N/A	180 Days

A11.A.3 Schedule of Final Facility Closure
[R 299.9613 and 40 CFR §264.112(b)(6)]

The Michigan State University WSF:

(Check as appropriate)

☐ Anticipates completing final closure of the entire facility by *[insert estimated date]*

☒ Has not determined when the facility will close and does not anticipate completing final closure of the entire facility prior to expiration of the facility's hazardous waste operating license.

Detailed Closure Schedule for Facility Closure: Provide a detailed breakdown showing the closure schedule with the anticipated time of completion for each activity below.

Closure Activity	Time Completed
Receipt of final load of wastes	Day 1
Disposal of final inventory	Day 1-90
Decontamination of facility	Day 60-150
Salvage of alarm system, HVAC, equip, etc.	Day 120-150
Laboratory analyses of samples	Day 120-150
Completion of closure	Day 150-180
Certification submittal to EPA and EGLE	Day 150-180

A11.A.4 Notification and Time Allowed for Closure
[R 299.9613 and 40 CFR §§264.112(d)(2) and 264.113(a) and (b)]

Final closure activities will be initiated within 90 days of receipt of the final volume of hazardous wastes and completed within 180 days of receipt of the final volume of waste. The tasks and estimated time required for closure shall follow the schedule specified in Section 11A.3. The Director will be notified by the MSU WSF 60 days before final closure begins. Final closure will be certified by both the MSU facility and an independent, qualified, registered professional engineer of the state of Michigan.

A11.A.4(a) Extensions for Closure Time
[R 299.9613 and 40 CFR §264.113(a) and (b)]

In the event that an extension for closure for the facility or any unit is necessary, the MSU WSF will request an extension in accordance with the requirements of 40 CFR §264.113(a).

A11.A.5 Unit-Specific Closure Procedures

Unit-specific closure procedures are provided for each unit identified in Section A11.A.2 of this template.

🕮 GUIDANCE/REFERENCES

- Part 201, Environmental Remediation, of Act 451. September 1996.
- Test Methods for Evaluating Solid Waste: Physical/Chemical Methods SW 846, Update III plus Variations. December 1996. EPA

A11.A.5(a) Closure of Container Storage Areas
[R 299.9614 and 40 CFR §264.178]

This section describes the procedures for closure of MSU WSF. The general closure requirement and specific closure procedures are discussed below.

A. General Closure Requirement

At closure, all hazardous waste and hazardous waste residues will be removed from the containment system. Remaining containers, liners, bases, and soil containing or contaminated with hazardous waste or hazardous waste residues will be decontaminated or removed.

B. Specific Closure Procedures

Specific procedures for inventory management, unit inspection, decontamination, sampling and analysis, and additional waste management are discussed below.

1. Inventory and Remedial Waste Management Procedures

All the containers at the WSF at the time of closure will be transported to a licensed disposal facility. Any containers with any portion of hazardous material will be transported as a hazardous waste.

2. Unit Inspection Procedures

A visual inspection of all areas of the WSF will be conducted to verify that all hazardous materials have been removed and any spills have been cleaned up.

3. Decontamination Procedures

Prior to decontamination procedures, all minor cracks, joints, etc. will be sealed so as to prevent loss of contaminants through structural surfaces. Following the removal of all waste containers from the facility, all inside surfaces (walls, ceilings and floors) will be washed with a dilute solution of trisodium phosphate. The surfaces will then be rinsed using high-pressure steam and water sprays as indicated in 40 CFR 268.45 Table 1.A.1.e. This work will be supervised and/or performed by EHS personnel and a licensed outside contractor. Personnel will be equipped with proper personal protective equipment. Full-face respirators with organic vapor and acid filter cartridges will be available during the entire decontamination process. Chemical neutralizers and spill control pillows will also be available.

The rinse water will be collected and analyzed for the parameters identified below in Sampling and Analysis Procedures. If the total volatile organic (USEPA Method 8260) content of the wash water is greater than 100 µg/l, or any of the parameters are detected above regulatory limits, it will be transported to a licensed disposal facility as hazardous waste. If the total volatile organic content of the wash water is less than 100 µg/l, and all parameters are below regulatory limits, the water will be disposed of as liquid industrial by-product. The results of all analyses will be included as part of the final closure report. The results of the rinse water sampling and a visual inspection will be used to determine when the decontamination is complete.

Any spill saturated control pillows or other absorbent materials used in the decontamination process will be placed in containers and transported to a licensed disposal facility. The same process will be followed for any disposable protective clothing used during the decontamination process. Non-disposable protective clothing will be cleaned with the trisodium phosphate solution. Manifests of all containers shipped as part of these closure activities will be obtained.

4. Sampling and Analysis Procedures

At the time of closure, soil sampling will be conducted at the facility. Samples will be collected at the ten locations presented on Figure B5-2. A Sampling and Analysis Plan will be submitted prior to implementing the soil sampling portion of closure. This plan will include sample collection procedures, QA/QC procedures (duplicates, blanks, etc.), analytical methods and detection limits, and soil results evaluation procedures. Specifically, the samples will be analyzed for metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and zinc), halogenated and aromatic volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), and semi volatile organic compounds (SVOCs). Laboratory analyses of the soil samples (from all sample locations and any duplicate) will be performed as described below by a qualified laboratory. Sampling parameters will be reviewed and will be reflective of past and current waste streams handled at MSU WSF.

Analytical Parameter	Reference Method
Volatile Organic Compounds	US EPA Method 8260
Semi-Volatile Organic Compounds	US EPA Method 8270E
Polychlorinated Biphenyls	US EPA Method 8082A
Metals (excluding Mercury)	US EPA Method 6020A
Mercury	US EPA Method 7471B
Total Cyanide	ASTM D7511-09

The MSU WSF anticipates that sampling, analysis and review of the results will take between 60 and 120 days for completion once closure procedures begin.

5. Additional Waste Management Procedures

Analytical data from the final soil sampling event will be evaluated for evidence of impact in accordance with the criteria presented in the Sampling and Analysis Plan submitted at that time. Metals will be compared to the applicable criteria. The detection of VOCs, metals, and/or SVOCs above the current reporting limits will be evidence of impact, being that these reporting limits represent background concentrations at the site.

If the results of these analyses indicate the presence of impacted soils, then additional sampling will be performed to identify the extent of soil degradation at the site. Specific sampling locations are not identified at this time. However, the additional samples will be located in accordance with the 2002 Michigan Department of Natural resources and Environment (MDNRE), Remediation and Redevelopment Division (RRD) guidance document entitled *Sampling Strategies and Statistics Training Materials for Part 201 Cleanup Criteria (S^3TM)*. Excavations will also be performed according to the criteria described in the RRD document.

If, at the time of closure, the concrete floor of any building in the waste storage facility has developed cracks or separations in the construction joints, then sampling will also be performed through the concrete in these areas to determine the possible presence of degradation. Analyses will be performed for the same parameters listed for the soil samples and the same criteria for the determination of impact will be utilized. If impact is detected, then additional sampling will be performed to identify the extent of degradation under the facility. Excavations will be performed as described previously. If any excavation is required, the area will be graded by clean soils which have not been impacted by site activities.

A11.A.5(b) Closure of Tank Systems
[R 299.9615 and 40 CFR §264.197]

The MSU WSF does not use any tank systems for hazardous waste disposal.

A11.A.5(c) Closure of Surface Impoundments
[R 299.9616 and 40 CFR §264.228(a)(1) and (2)]

The MSU WSF does not use any surface impoundments for hazardous waste disposal.

A11.A.5(d) Closure of Waste Piles
[R 299.9617 and 40 CFR §264.258]

The MSU WSF does not use any waste piles for hazardous waste disposal.

A11.A.5(e) Closure of Landfills
[R 299.9619 and 40 CFR §264.310(a)]

The MSU WSF does not use any landfills for hazardous waste disposal.

A11.A.5(f) Closure of Incinerators
[R 299.9620 and 40 CFR §264.351]

The MSU WSF does not use any incinerators for hazardous waste disposal.

A11.A.5(g) Closure of Miscellaneous Units
[R 299.9623 and 40 CFR §§264.601 through 264. 603]

The MSU WSF does not use any other miscellaneous units for hazardous waste disposal.

A11.A.5(h) Closure of Boilers and Industrial Furnaces (BIF)
[R 299.9808 and 40 CFR §266.102(e)(11)]

The MSU WSF does not use any boilers or industrial furnaces for hazardous waste disposal.

A11.A.5(i) Other Closure Activities
[R 299.9504(1)(c), R 299.9508(1)(b), and R 299.9613(1) and 40 CFR §§270.14(b)(13) and 264.112(b)(5)}

No other closure activities other than those described in Section A11.A5(b) are applicable for the MSU WSF.

A11.A.6 Certification of Closure
[R 299.9613]

Within 60 days of completion of closure the MSU WSF will submit to the Director, by registered mail, a certification that the hazardous waste management unit or facility, as applicable, has been closed in accordance with the specifications in the approved closure plan. The certification will be signed by the MSU WSF representative 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(3), including:

1. The results of all sampling and analysis;

2. Sampling and analysis procedures;
3. A map showing the location where samples were obtained;
4. Any statistical evaluations of sampling data;
5. A summary of waste types and quantities removed from the site and the destination of these wastes; and
6. If soil has been excavated, the final depth and elevation of the excavation and a description of the fill material used.

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.

A11.A.7 Postclosure Notices Filed

[R 299.9504(1)(c) and R 299.9508(1)(b) and 40 CFR §270.14(b)(14)]

The applicant must provide documentation that the postclosure notices required under 40 CFR §264.119 have been filed for hazardous waste disposal units that have been closed at the facility.

A11.B POSTCLOSURE PLAN

[R 299.9613 and 40 CFR §264.118]

A11.B.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.B.2 Postclosure Care Objectives

This section is not applicable for closure of the MSU WSF.

FORM EQP 5111 ATTACHMENT TEMPLATE A12
CLOSURE AND POSTCLOSURE CARE COST ESTIMATES

This document is an attachment to the Michigan Department of Environment, Great Lakes, and Energy'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 299.9702 and Title 40 of the Code of Federal Regulations (CFR), Part 264, Subpart H, establishes requirements for providing financial assurance for closure and, if necessary, postclosure care. Specifically, R 299.9702(1) requires the preparation of associated cost estimates. This license application template addresses the requirement for preparing a closure cost estimate and, if necessary, a postclosure care cost estimate. The cost estimates provided in this attachment are based on the closure and postclosure care activities detailed in Template A11. All references to 40 CFR citations specified herein are adopted by reference in R 299.11003.

This template is organized as follows:

A12.A CLOSURE COST ESTIMATE

[R 299.9702(1) and 40 CFR §264.142]

The closure cost estimate covers the corresponding closure activities in the approved closure plan. These activities may include, but are not limited to, removal of waste inventory, decontamination, sampling and analysis, and closure certification. Unless otherwise specified in Section A11.A.3 of Template A11, the date of closure of the hazardous waste management units has not been determined. As such, it is not possible to predict, with any high degree of certainty, actual facility conditions or regulatory requirements at time of closure. Therefore, this closure cost estimate is based on closure of the unit within the next six months and includes a contingency estimate to account for media sampling and analysis, and removal based on current conditions.

The estimate assumes closure procedures are completed by a third party at the time facility closure would be most expensive (e.g., with a maximum inventory). The cost estimate for disposal assumes wastes will be treated and contaminated equipment disposed rather than recovered or salvaged. The total closure cost for the closure of the Michigan State University (MSU) Waste Storage Facility (WSF) is estimated at $195,720. The closure cost estimate breakdown by unit is provided in Section A12.A.1. A unit-specific work sheet is provided in Table A12.A.2.

Additional cost estimate assumptions are listed below.

1. All hazardous waste will be transported off site to a licensed facility in accordance with all applicable state and federal regulations.

2. Costs are based on current year costs. All labor rates reflect commercial rates and include fringe benefits, payroll burden, and taxes.

3. Total costs include a 10 percent contingency for administrative and a 5 percent contingency for miscellaneous operating costs.

This closure cost estimate will be maintained at the facility. It will be revised whenever a change in the closure plan affects the cost of closure. It will be adjusted annually as required by pertinent regulations or when the types and quantity of wastes received at the facility change.

A12.A.1 Closure Cost Estimate Breakdown

Table A12.A.1 Facility Closure Cost Estimate Breakdown by Unit*

1.	Container Storage Areas	$ 195,720
2.	Tank Systems	$ N/A
3.	Surface Impoundments	$ N/A
4.	Waste Piles	$ N/A
5.	Landfills	$ N/A
6.	Incinerators	$ N/A
7.	Miscellaneous Units	$ N/A
8.	Boilers and Industrial Furnaces	$ N/A
Total Facility Closure and Postclosure Care Estimate (add lines 1 through 11)		$ 195,720

* Tables not included at this time for Land Treatment Units, Drip Pads, and Hazardous Waste Munitions and Explosives Storage Units

☞ Please delete references to types of units that are not present at the facility.

Table A12.A.2 Container Storage Areas Closure Cost Estimate

Michigan State University Waste Storage Facility

	Activity If certain activities are not expected to be performed, enter "NA" as the Estimated Cost.	**Estimated Cost**
1.	Demolition and Removal of Containment	$ N/A
2.	Removal of Soil	$ N/A
3.	Backfill	$ N/A
4.	Decontamination	$ 23,000
5.	Sampling and Analysis	$ 48,000
6.	Monitoring Well Installation	$ N/A
7.	Transportation	$ 18,000
8.	Treatment and Disposal of Waste Inventory and Other Cleanup Wastes	$ 52,000
9.	**Subtotal of Closure Costs** (Add lines 1 through 8)	$ 141,000
10.	Engineering Expenses (typically 10% of closure costs, excluding certification of closure.)	$ 14,100
11.	Certification of Closure	$ 8,000
12.	**Subtotal** (Add Lines 9, 10, and 11])	$ 163,100
13.	Contingency Allowance (typically 20% of closure costs, engineering expenses, and cost of certification of closure.)	$ 32,620
14.	Landfill Closure	$ N/A
	Total Closure Cost (Add Lines 12, 13, and 14)	$ 195,720

A12.B POSTCLOSURE COST ESTIMATE

[R 299.9702(1) and 40 CFR §264.144]

There will be no waste units with waste left in place during the closure of the MSU WSF.

A13 Topographic Maps

Two topographic maps can be found in this section, in addition to the maps provided in Section B3 in compliance with regulations R.299.9506(1)(e) and (1)(f). The first map, **Figure A13-1**, is a topographic map with a scale of 1 inch equal to 1,150 feet. **Figure B3.A-4** corresponds to the information required in 299.9506(1)(f). This map identifies the location of all domestic, municipal, and gas wells for which copies of logs are available within a mile radius of the site. In addition, this map identifies the surface water bodies in the vicinity.

The second map is constructed with a scale of 1 inch equal to 200 feet and corresponds to the requirements of 270.14(b)(19). Along with the additional topographic maps in Section B3, it provides the following information:

- Map scale
- 100-year floodplain area
- Surface water in the vicinity
- Surrounding land uses
- A wind rose
- Legal Boundaries of the site.
- Buildings at the site, including the MSU Waste Storage Facility
- Facility, entrance road, and loading dock
- Orientation.

Withdrawal and injection wells are not present at the site.

Enlarged View of Waste Storage Facility

N
W E
S

575 0 575 1,150
1 Inch ~ 1,150 Feet

1-Mile Radius

Legal Limits
of
Waste Storage Facility

Type I
Water Supply Well

FIGURE A13

Michigan State University
Waste Storage Facility

Topographic Map

STRATA ENVIRONMENTAL SERVICES, INC.

HYDROGEOLOGIC INVESTIGATION
MICHIGAN STATE UNIVERSITY
WASTE STORAGE FACILITY

876-1239

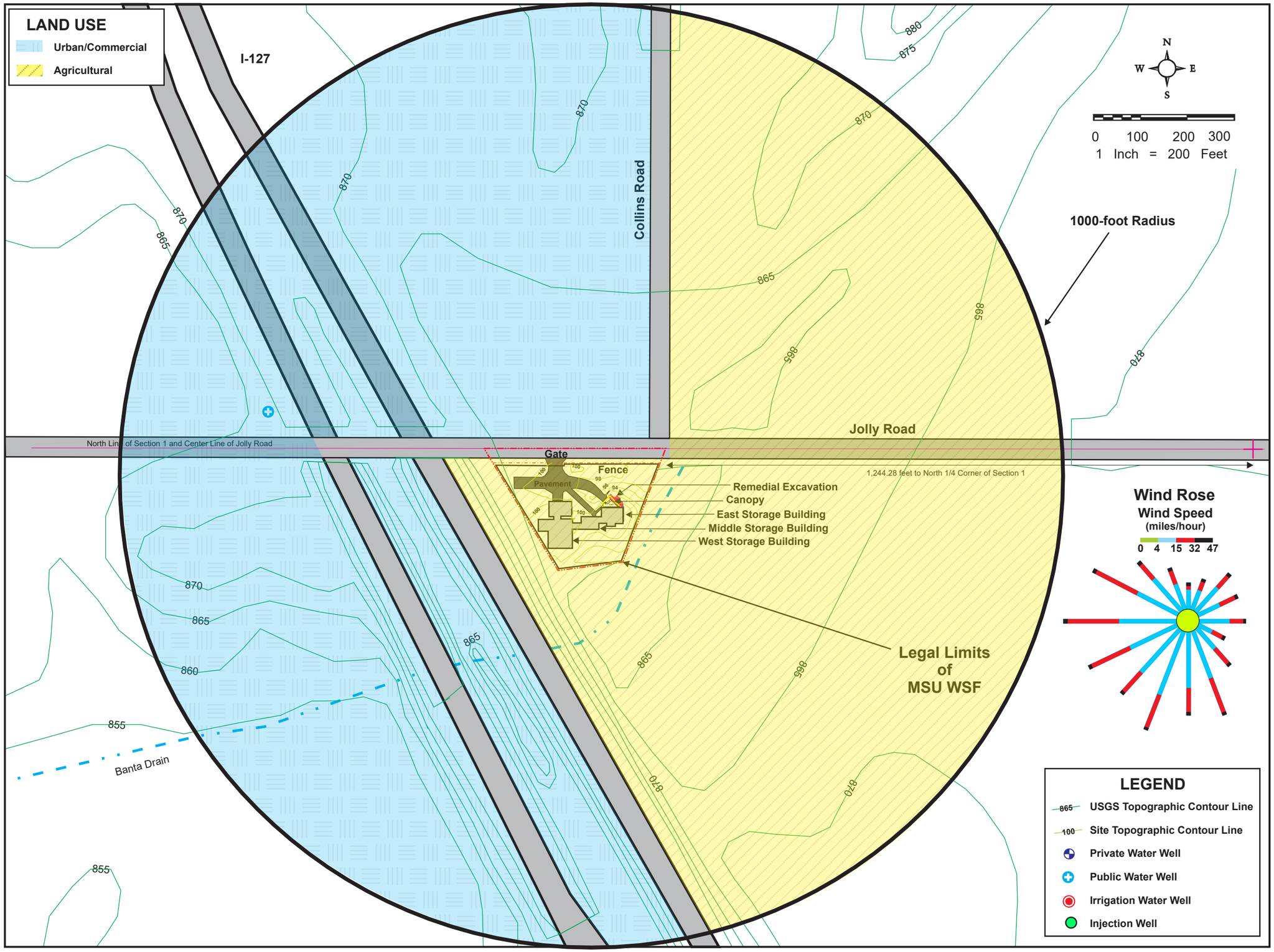


FIGURE A13

Michigan State University
Waste Storage Facility

Topographic Map

STRATA
ENVIRONMENTAL SERVICES, INC.

HYDROGEOLOGIC INVESTIGATION
MICHIGAN STATE UNIVERSITY
WASTE STORAGE FACILITY

876-1239

A14 Liability Mechanism

According to R 299.97021 (3), states and the federal government are exempt from the requirements of this part (Part 7. Financial Capability).

According to the Office of the General Counsel of Michigan State University, the University is a State Agency created by the Michigan Constitution. As a State Agency, the University is exempt from this legislative requirement.

Because Michigan State University is a State Agency, and as such is exempt from the requirement, no liability mechanism statement is required.

A15 Financial Assurance Instrument

According to R 299.97021 (3), states and the federal government are exempt from the requirements of this part (Part 7. Financial Capability).

According to the Office of the General Counsel of Michigan State University, the University is a State Agency created by the Michigan Constitution. As a State Agency, the University is exempt from this legislative requirement.

Because Michigan State University is a State Agency, and as such is exempt from the requirement, no financial assurance statement is required.

B1. Status of compliance with other federal laws

There are no other applicable federal laws that regulate the MSU WSF; therefore no status of compliance is required.

FORM EQP 5111 ATTACHMENT TEMPLATE B2
CORRECTIVE ACTION INFORMATION

This document is an attachment to the Michigan Department of Environment, Great Lakes, and Energy's (EGLE) *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(1)(c), R 299.9508(1)(b), R 299.9525, R 299.9629, R 299.9635, and R 299.9636; §§324.11115a and 324.11115b of Act 451; and Title 40 of the Code of Federal Regulations (CFR) §270.14(d) and Part 264, Subpart F, establish requirements for submitting corrective action information and implementing a corrective action program for 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 corrective action information for the waste management units (WMU) at the MSU Waste Storage Facility in Lansing, Michigan. This template includes facility background information, current conditions, and release assessment requirements for operating license applications. This template supplies information to support the corrective action program specified in R 299.9629. In this template, applicants must include appropriate justification for the proposed elimination of any WMU from the corrective action program under Part 111 of Act 451.

Ensure that all samples collected for waste characterization and environmental monitoring during corrective action are collected, transported, analyzed, stored, and disposed by trained and qualified individuals in accordance with a 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.

(Check as appropriate)

Applicant for Operating License for Existing Facility:

☒ R 299.9629 Corrective Action

☐ Elimination from corrective action requirements proposed for one or more units

☞ *More than one box may be checked, if one or more WMUs are proposed for elimination from corrective action requirements*

Applicant for Operating License for New, Altered, Enlarged, or Expanded Operating License:

☐ R 299.9629 Corrective Action

☐ Elimination from corrective action requirements proposed for one or more units

☞ *More than one box may be checked, if one or more units are proposed for elimination from corrective action requirements.*
Instructions:

This template requires submittal of information for establishing the basis for specific corrective action license requirements for your facility. The information submitted under this template should represent a summary of current conditions at your facility, supported by specific references to technical reports and studies, as appropriate. Some parts of this template require information only to the extent that this information is already available to you through existing facility-specific documents and records. The instructions for these parts will clearly indicate where the criteria apply. In those parts where criteria are not indicated, you must gather and submit all required information.

This template requires you to provide information that may be detailed in other documents or that may be submitted in another license *template, e.g., as Template B3, Hydrogeological Report or Template B4, Environmental Assessment. If you reference facility-specific documents that have not been submitted to the EGLE, Materials Management Division, or the EPA, Region 5, you must attach these documents to this completed template.*

For those units for which you propose elimination from corrective action requirements, you must provide all information required in this template, including Section B2.M at the end of this template.

This template is organized as follows:

B2.A FACILITY BACKGROUND
- B2.A.1 History and Description of Ownership and Operation
- B2.A.2 Environmental Setting
  - B2.A.2(a) Climate
  - B2.A.2(b) Topography
  - B2.A.2(c) Hydrogeology
  - B2.A.2(d) Soil
  - B2.A.2(e) Surface Water
  - B2.A.2(f) Surrounding Land Uses
  - B2.A.2(g) Critical Habitats and Endangered Species
- B2.A.3 Characterization of Potential or Actual Sources of Contamination
  - B2.A.3(a) [Name of Unit or Unit Group]
    - B2.A.2(a)(1) Unit Characteristics
    - B2.A.2(a)(2) Waste Characteristics and Management
    - B2.A.2(a)(3) History of Releases or Potential to Release

B2.B FACILITY'S ASSESSMENT OF KNOWN NATURE AND EXTENT OF CONTAMINATION
- B2.B.1 Groundwater
- B2.B.2 Soil
- B2.B.3 Surface Water and Sediment
- B2.B.4 Air
- B2.B.5 Subsurface Gas Contamination

B2.C FACILITY'S EXPOSURE ASSESSMENT

B2.D INTERIM MEASURES

B2.A FACILITY BACKGROUND

B2.A.1 History and Description of Ownership and Operation

The MSU WSF originally began operating in 1982. Its first Section 64 permit was issued in October of 1989. The MSU WSF has been operating under its current EGLE (formerly MDNRE) operating license issued January 31, 2014, and is inspected regularly by EGLE and the EPA. Results of these inspections have shown no major violations during operation of the WSF. The only previous investigation that occurred was the result of an accidental release of mercury on August 23, 2001. An investigation and remediation work plan was submitted to the MDNRE (formerly MDEQ) on November 5, 2001 and was approved.

B2.A.2 Environmental Setting

B2.A.2(a) Climate

The *"Michigan Climate and Health Profile Report"* by the Michigan Department of Health and Human Services (MDHHS) in 2015 compiled climate data from twenty-two weather observation stations throughout the State. The key drivers for weather in Michigan are the Great Lakes surface water temperatures, evaporation from the lakes, and the seasonality of lake freezing and thawing. In general, the Lower Peninsula experiences milder winters with hot, humid summers with temperatures varying between below 0 degrees Fahrenheit to above 90 degrees Fahrenheit. Average annual precipitation in the Lower Peninsula is 38 inches per year, whereas average snowfall is a little over 30 inches per year.

According to Weather Spark, the average daily high temperature is above 72 degrees Fahrenheit between May 25 and September 17, with the hottest month of the year being July with an average high temperature of 82 degrees Fahrenheit. From December 1 to March 9, the average daily high temperature is below 40 degrees Fahrenheit with the coldest month being January at an average low of 18 degrees Fahrenheit.

B2.A.2(b) Topography

Refer to maps A13, and B3.A1 through B3.A3 for topographic map information.

B2.A.2(c) Hydrogeology

Prior to 2004, ground-water monitoring was performed semi-annually at the WSF site, provided that sufficient groundwater was present. Review of historical reports prepared for the WSF site by Strata, and others, indicates that sufficient groundwater was rarely present to allow for the collection of ground-water samples from all of the monitoring wells that had been installed at the site. In turn, following approval by Mr. Joe Rogers of the Materials Management Division of EGLE, the monitoring well network was removed from the site during June of 2004.

Ground water was not consistently present in the former site monitoring wells, because, the wells were completed in soils that are predominantly comprised of clay-rich glacial till deposits with interspersed, discontinuous sand lenses. DLZ Michigan Inc. and Braun Intertec, the consulting firms that completed the original hydrogeological investigations of the WSF site, indicated that these discontinuous "*sand deposits are only sporadically saturated during the wettest periods of the year*".

Given the characteristics of the underlying soil types, groundwater sampling with statistical analyses of the chemical data is not considered an appropriate monitoring technique for the WSF. In addition, the surface soil types that underlie the WSF site are not conducive for rapid infiltration of precipitation that falls over the site. The precipitation that falls over the site would tend to flow overland following the site topography that generally slopes eastward toward the Banta Drain. On the north side of the WSF building, this precipitation would tend to be captured by the two surface drains located on each side of the paved driveway, and eventually discharged to Banta Drain.

B2.A.2(d) Soil

During the spring of 2005, the soil type(s) and background metal concentrations in the immediate vicinity of the WSF were determined. Nine soil samples (assigned BM-series names) were collected from the areas on the east and west sides of the paved driveway that accesses the WSF from the north. Each of the nine background soil samples were comprised of brown sandy loam that were categorized as part of the "B" phase of the Marlette Series (MaB) soil that is associated with the Marletter-Capac-Owosso soil association. This soil type extends around the WSF and grades into Colwood-Brookston soils east of the WSF. Both of these soil types (MaB and Co) have high percentages of clay and considered to be poorly drained.

B2.A.2(e) Surface Water

The WSF is an indoor storage facility constructed with concrete footings and a concrete floor with steel walls and a concrete curb along the base of the walls. Precipitation that falls onto the site is directed northward and eastward by the surface grade of the site toward catch basins located north and east of the indoor storage facility.

No water bodies are located at the WSF site; however the Banta Drain makes up the southeastern boundary of the triangular-shaped site. The drain emerges from culverts near the northeast corner of the WSF and flows toward the southwest. These culverts extend beneath Jolly Road and the agricultural field north of Jolly Road and east of Collins Road.

According to the Ground-Water Mapping Project jointly complied by United States Geological Survey (USGS), EGLE, and MSU Institute of Water Research, the Banta Drain has an average

base flow of 1 to 5 cubic feet per second. During semi-annual monitoring of the surface-water quality flow ranges from a trickle during the summer months to a steady flow of water that is generally less than 2 feet wide and 1 foot deep during the wet months of the year (i.e. spring). Visual observations during the monitoring events indicate that base sediments of the drain are sand and gravel, with silts accumulating along the edges of the drain.

B2.A.2(f) Surrounding Land Uses

See Section B4.A.2(f) for surrounding land use description.

B2.A.2(g) Critical Habitats and Endangered Species

See Section B4.A.2 for descriptions of critical habitats and endangered species.

B2.A.3 Characterization of Potential or Actual Sources of Contamination [R 299.9504(c) and 40 CFR §270.14(d)]

This section describes actual or potential sources of contamination at the MSU WSF that are subject to the corrective action requirements of Part 111 of Act 451. These sources include Waste Management Units (WMUs) that are discernible units at which contaminants have been placed at any time, or at which contaminants have been released, or at which there is a threat of release regardless of the intended use of such unit. These sources also include areas of concern that are those units which do not meet the definition of WMU, but which may have released contaminants to the environment on a non-routine basis, or which may present an unacceptable risk to public health, safety, welfare, or the environment.

B2.A.3(a) MSU WSF

B2.A.3(a)(1) Unit Characteristics

The MSU WSF is an indoor storage facility constructed with concrete footings and a concrete floor with steel walls and a concrete curb along the base of the walls. The WSF was designed to enable the separation of different types of wastes into distinct storage areas of the facility and to provide the necessary containment in each storage area. See Section B3 for a map with the WSF location marked. Complete engineering plans of the facility are presented in Section B6 (Engineering Plans).

B2.A.3(a)(2) Waste Characteristics and Management

Table A2.A.1 lists all hazardous wastes generated and managed at the facility.

B2.A.3(a)(3) History of Releases or Potential to Release

2001: The MSU WSF had an accidental release of mercury on August 23, 2001, during the dismantling of a mercury-containing flow meter, which impacted a small amount of surface soil. Corrective measures to eliminate track-out of the mercury were conducted on August 24-28, 2001. This initial corrective action entailed some limited hand shoveling of impacted soil with the placement of this material in an appropriate sealed container(s).

A follow-up investigation and November 5, 2001 *Mercury Delineation Report and Remediation Work Plan* was submitted to the MDNRE (formerly MDEQ) and was approved. On November 13, 2001, the impacted area was excavated. A total of 26 cubic yards of soil were removed and properly disposed in a Type II Sanitary Landfill. A total of six soil samples were collected from the base and sidewalls of the excavation in accordance with MDEQ's *Verification of Soil Remediation* (VSR) guidance document. The samples were analyzed for total mercury. Results of the analyses showed that mercury was not detected at or above site-specific background concentrations. This information was documented in the December 3, 2001, *Corrective Action Report – Removal of Mercury Impacted Soil* which is included as Attachment B2-1. No other corrective measures were required.

1991: In May of 1991, approximately 20 cubic yards of soil was excavated and removed from the MSU WSF. Analytical testing during the 1990 monitoring period had shown that soil near the facility's dock had elevated mercury levels. The mercury impact was thought to have resulted from an accidental release of metallic mercury from a broken barometer in the summer of 1986. The excavation was backfilled with clean sand on May 15, 1991. Clean excavation closure was acknowledged by the Department of Natural Resources on August 8, 1991. Attachment B2-2 contains the work plan and acknowledgement letter from the MDNR.

B2.B FACILITY'S ASSESSMENT OF KNOWN NATURE AND EXTENT OF CONTAMINATION

No known contamination is present at the MSU WSF. Historical releases that were granted clean closure are described in Section B2.A3(a)(3).

B2.B.1 Groundwater

No known groundwater contamination is present at the MSU WSF.

B2.B.2 Soil

No known soil contamination is present at the MSU WSF.

B2.B.3 Surface Water and Sediment

No known surface water contamination is present at the MSU WSF.

B2.B.4 Air

No known air contamination is present at the MSU WSF.

B2.B.5 Subsurface Gas Contamination

No known subsurface gas contamination is present at the MSU WSF.

B2.C FACILITY'S EXPOSURE ASSESSMENT

There are no known exposures or threats related to contamination at the MSU WSF.

B2.D INTERIM MEASURES

There are no Interim Measures in place at the MSU WSF related to known contamination.

B2.E ENVIRONMENTAL INDICATORS

As previously stated in Section B2.B, there are no known contaminants at the MSU WSF. Completed EI forms are provided as Attachment B2.E.1.

B2.F FACILITY'S ASSESSMENT OF KNOWN OR PROPOSED CONSTITUENTS OF CONCERN

[R 299.9629(3)(a)(i) and (3)(b)(i)]

There are no known or proposed constituents of concern at the MSU WSF.

B2.G ESTABLISHED OR PROPOSED CLEANUP CRITERIA

[R 299.9629(3)(a)(ii) and (iii) and R 299.9629(3)(b)(ii) and (iii)]

There are no known contaminants at the MSU WSF.

B2.H ESTABLISHED OR PROPOSED COMPLIANCE POINTS AND PERIODS

[R 299.9629(3)(a)(iv) and (v) and R 299.9629(3)(b)(iv) and (v)]

There are no known contaminants at the MSU WSF.

B2.I OFF-SITE ACCESS

There are no known contaminants at the MSU WSF.

B2.J PUBLIC INVOLVEMENT PLAN

There are no known contaminants at the MSU WSF.

B2.K HEALTH AND SAFETY PLAN

There are no known contaminants at the MSU WSF.

B2.L NOTICE REQUIREMENTS

[R 299.9525]

There are no known contaminants at the MSU WSF.

B2.M JUSTIFICATION FOR PROPOSED ELIMINATION OF ANY WASTE MANAGEMENT UNIT FROM THE CORRECTIVE ACTION PROGRAM OR INTENT TO PROCEED WITH CORRECTIVE ACTIONS

There are no known contaminants at the MSU WSF.

ATTACHMENT B2.E.1

ENVIRONMENTAL INDICATOR FORMS

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

EGLE adapted to Word 8/07

RCRA Corrective Action Environmental Indicator (EI) RCRAInfo Code (CA725)
Current Human Exposures Under Control

Facility Name: **MSU WSF**
Facility Address: **3634 E. Jolly Road, Lansing, MI 48910**
Facility EPA ID #: **MID 053 343 976**

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to Resource Conservation Recovery Act of 1976 (RCRA) Corrective Action (e.g., waste management unit [WMU], regulated unit [RU], and area of concern [AOC]), been **considered** in this EI determination?

   ☒ If yes – check here and continue with #2 below.

   ☐ If no – reevaluate existing data, or

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

BACKGROUND

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

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

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

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

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

	Yes	No	?	Rationale/Key Contaminants
Groundwater	☐	☒	☐	
Air (indoors)2	☐	☒	☐	
Surface Soil (e.g., <2ft)	☐	☒	☐	
Surface Water	☐	☒	☐	
Sediment	☐	☒	☐	
Subsurf. Soil (e.g., >2ft)	☐	☒	☐	
Air (outdoors)	☐	☒	☐	

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

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

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

Rationale and Reference(s):

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

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

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

Summary Exposure Pathway Evaluation Table

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

Contaminated Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food3
Groundwater							
Air (indoors)							
Soil (surface, e.g., <2 ft)							
Surface Water							
Sediment							
Soil (subsurface e.g., >2 ft)							
Air (outdoors)							

Instructions for Summary Exposure Pathway Evaluation Table:

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

B. Enter "yes" or "no" for potential "completeness" under each "Contaminated" Media – Human Receptor Combination (Pathway).

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

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

☐ If yes (Pathways are complete for any "Contaminated" Media – Human Receptor combination) – continue after providing supporting explanation.

☐ If unknown (for any "Contaminated" Media – Human Receptor combination) – skip to #6

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

and enter “IN” status code.

Rationale and Reference(s)

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

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

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

   ☐ If unknown (for any complete pathway) - skip to #6 and enter “IN” status code.

Rationale and Reference(s):

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

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

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

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

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

Rationale and Reference(s):

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

   ☒ YE – Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the MSU WSF facility, EPA ID # MID 053 343 976, located at 3634 East Jolly Road, Lansing, MI 48910 under current and reasonably expected conditions. This determination will be reevaluated when the agency/state becomes aware of significant changes at the facility.

   ☐ NO – "Current Human Exposures" are NOT "Under Control."

   ☐ IN – More information is needed to make a determination.

Completed by: _____ Date: (type date)
(type name)
(type title)
Materials Management Division
Michigan Department of Environment, Great Lakes, and Energy
517- -

Supervisor: _____ Date: (type date)
(type name)
(type title)
Materials Management Division
Michigan Department of Environment, Great Lakes, and Energy
517- -

Locations where references may be found:
Hazardous Waste Section facility files at:
Materials Management Division
Michigan Department of Environment, Great Lakes, and Energy
525 West Allegan Street
Lansing, Michigan 48933

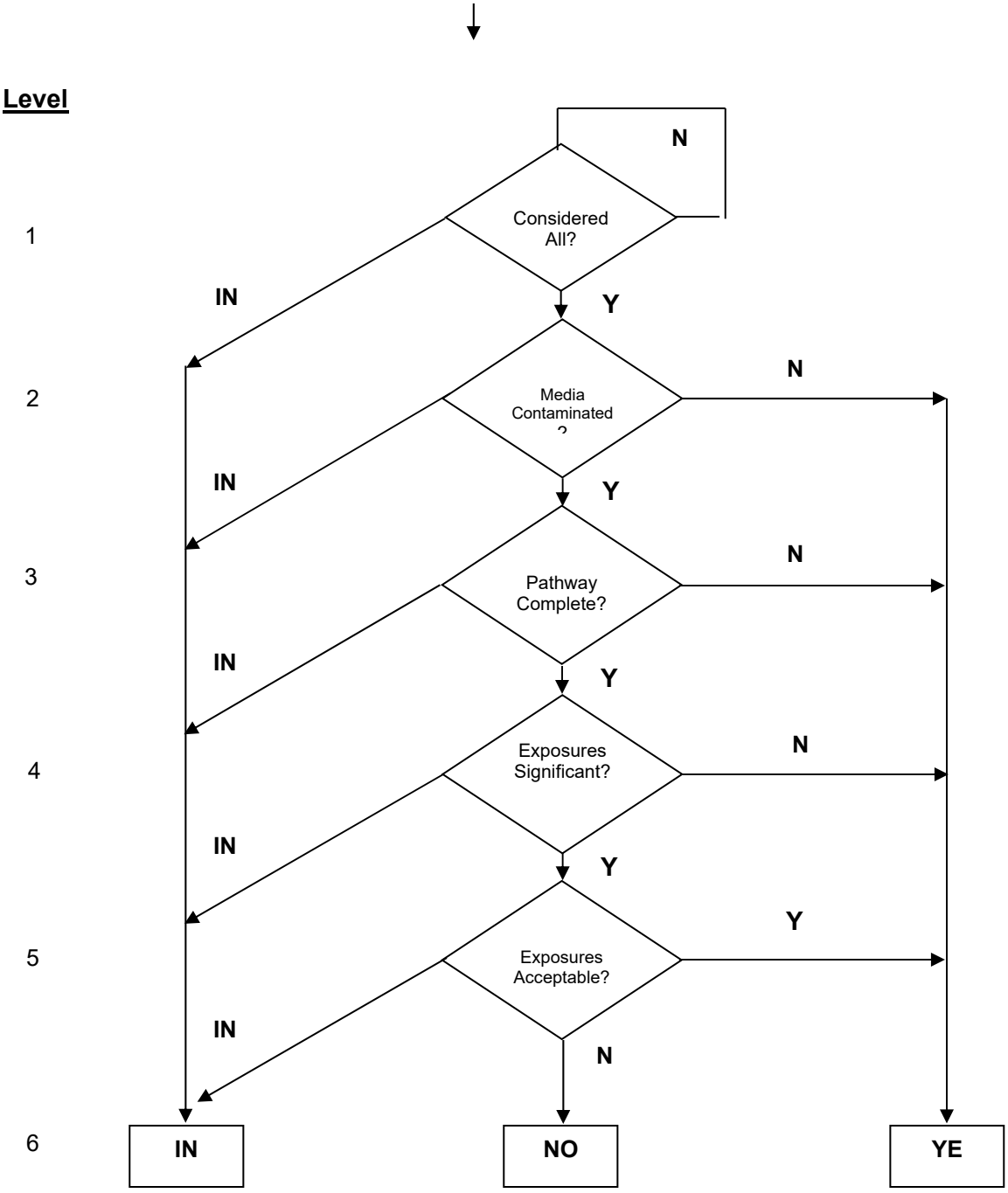
Contact e-mail addresses:

(type name) - (type e-mail)

(type name) - (type e-mail)

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

Facility Name: MSU WSF
EPA ID#: MID 053 343 976
City/State: Lansing/Michigan



DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

EGLE adapted to Word 8/07

RCRA Corrective Action Environmental Indicator (EI) RCRAInfo Code (CA750)
Migration of Contaminated Groundwater Under Control

Facility Name: **MSU WSF**
Facility Address: **3634 East Jolly Road, Lansing, MI 48910**
Facility EPA ID #: **MID 053 343 976**

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from waste management units (WMU), regulated units (RU), and areas of concern (AOC)), been **considered** in this EI determination?

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

   ☐ If no - reevaluate existing data, or

   ☐ **I**f data are not available, skip to #8 and enter "IN" (more information needed) status code.

BACKGROUND

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

Definition of "Migration of Contaminated Groundwater Under Control" EI
A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA Corrective Action at or from the identified facility [i.e., site-wide]).

Relationship of EI to Final Remedies
While final remedies remain the long-term objective of the RCRA Corrective Action Program the EIs are near-term objectives that are currently being used as program measures for the Government Performance and Results Act of 1993, (GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated groundwater and contaminants within groundwater (e.g., nonaqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

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

2. Is **groundwater** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

   ☐ If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

   ☒ If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

   ☐ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination)?

   ☐ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[2].

   ☐ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[2]) – skip to #8 and enter "NO" status code, after providing an explanation.

   ☐ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

   ☐ If yes - continue after identifying potentially affected surface water bodies.

   ☐ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

   ☐ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions [e.g., the nature, and number, of discharging contaminants, or environmental setting], that significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

   ☐ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: (1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and (2) provide a statement of professional judgment/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

   ☐ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: (1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and (2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

   ☐ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

   ☐ If yes - continue after either: (1) identifying the final remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR (2) providing or referencing an interim-assessment,[5] appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors that should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk

Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

☐ If no - (the discharge of “contaminated” groundwater can not be shown to be “**currently acceptable**”) - skip to #8 and enter “NO” status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

☐ If unknown - skip to 8 and enter “IN” status code.

Rationale and Reference(s):

7. Will groundwater **monitoring**/measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the “existing area of contaminated groundwater?”

   ☐ If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the “existing area of groundwater contamination.”

   ☐ If no - enter “NO” status code in #8.

   ☐ If unknown - enter “IN” status code in #8.

Rationale and Reference(s):

8. Check the appropriate RCRAInfo status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), obtain supervisor signature and date on the EI determination below, and (attach appropriate supporting documentation as well as a map of the facility.

   ☒ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the MSU WSF facility, EPA ID # **MID 053 343 976**, located at 3634 East Jolly Road, Lansing, MI 48910. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater." This determination will be reevaluated when the agency/state becomes aware of significant changes at the facility.

   ☐ NO - Unacceptable migration of contaminated groundwater is observed or expected.

   ☐ IN - More information is needed to make a determination.

Completed by: _____ Date (type date)
(type name)
(type title)
Materials Management Division
Michigan Department of Environment, Great Lakes, and Energy
517- -

Supervisor: _____ Date (type date)
(type name)
(type title)
Materials Management Division
Michigan Department of Environment, Great Lakes, and Energy

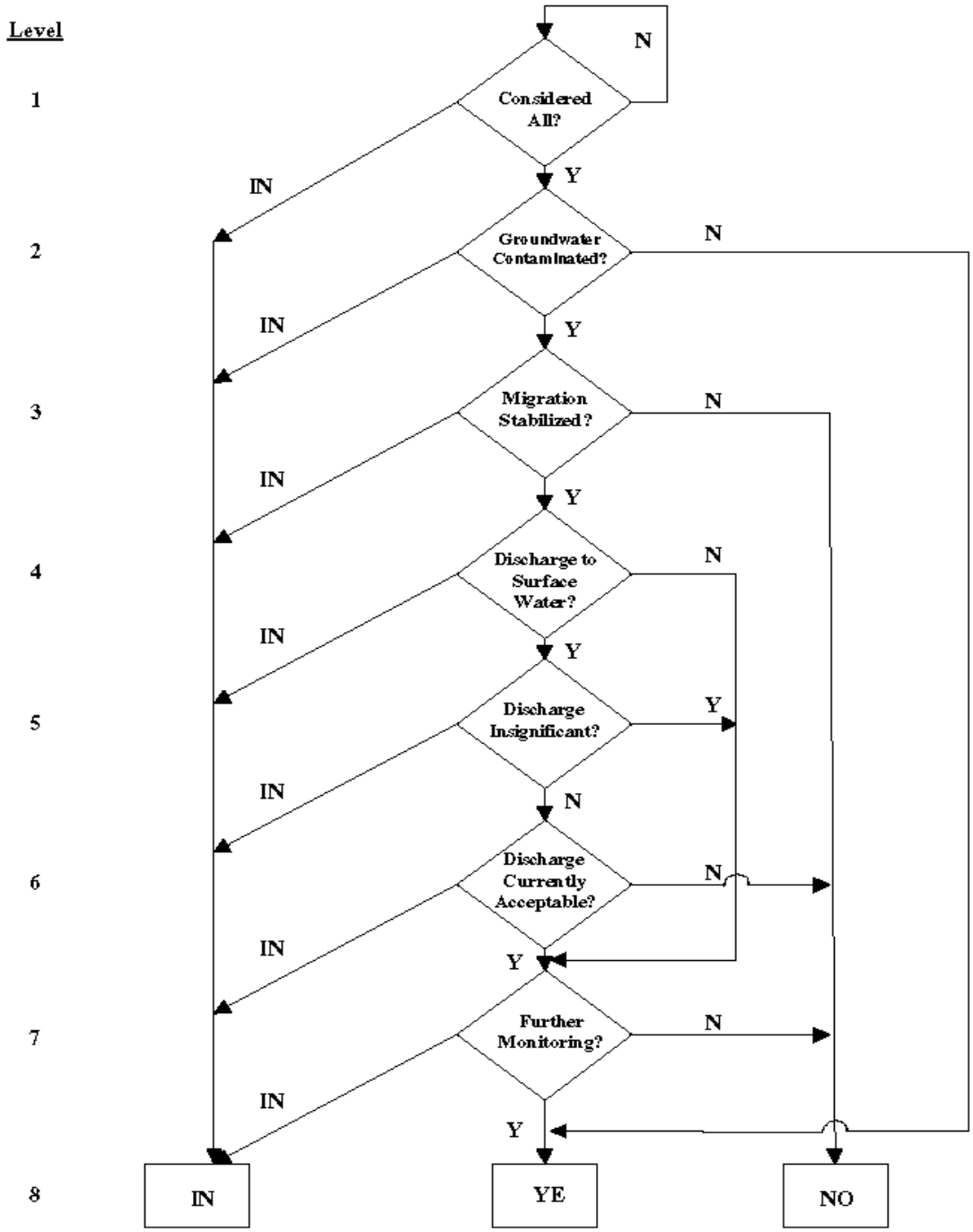
Locations where references may be found:
Hazardous Waste Section facility files at:
Materials Management Division
Michigan Department of Environment, Great Lakes, and Energy
525 West Allegan Street
Lansing, Michigan 48933

Contact e-mail addresses:

(type name) - (type e-mail)
(type name) - (type e-mail)

Facility Name: MSU WSF
EPA ID#: MID 053 343 976
City/State:
Lansing/Michigan

MIGRATION OF CONTAMINATED GROUNDWATER UNDER CONTROL (CA 750)



Appendix B2-1

2001 MSU WSF Corrective Action

MICHIGAN STATE
UNIVERSITY

December 3, 2001

Mr. Joseph T. Rogers
Michigan Department of Environmental Quality
Hazardous Waste Program Section
Waste Management Division
P.O. Box 30241
Lansing, Michigan 48909

Re: Corrective Action Report – Removal of Mercury Impacted Soil
Michigan State University - Waste Storage Facility
U.S. EPA I.D. # MID053343976

Dear Mr. Rogers:

Michigan State University (MSU) is providing you with this corrective action report associated with the discovery and removal of mercury-impacted soil at the Waste Storage Facility (WSF) located at 3885 Jolly Road in East Lansing, Michigan. The purpose of this report is to comply with the Michigan Department of Environmental Quality (MDEQ) Facility Operating License issued to MSU on September 29, 2000. This plan describes the proposed scope of work for the delineation of mercury discovered in site soil in July 2001.

ORCBS

OFFICE OF RADIATION, CHEMICAL & BIOLOGICAL SAFETY

Michigan State University
C124 Research Complex-Engineering
East Lansing, MI
48824-1326
517/355-0153
FAX: 517/353-4871

OBJECTIVES

On November 5, 2001, MSU submitted the "Mercury Delineation Report and Removal Work Plan" to the MDEQ. The work plan indicated the appropriate course of action to be taken in order to comply with the Operating License. The following were actions deemed necessary to achieve the objectives outlined in the Operating License:

- Remove mercury impacted soil from the edge of the dock to the perimeter of the soil sample locations with results below site- specific background values.
- Stage soil in a lined and covered roll-off.
- Collect *Verification of Soil Remediation* (VSR) samples of the excavation.
- Collect a composite sample from the staged soil and analyze via Toxicity Characteristic Leaching Procedure (TCLP) for mercury.
- Properly dispose of staged soil.

SOIL REMOVAL ACTIVITIES

On November 13, 2001, MSU personnel, and their consultant DLZ, performed excavation activities at the WSF. Twenty-Six cubic yards of soil were removed from an area east of the loading dock as depicted in Figure 1. The soil was staged in two lined and covered roll-offs. The roll-offs were initially kept on site for subsequent disposal following evaluation of VSR and waste characterization. After excavation activities, VSR samples were collected from four sidewalls and two bottom locations (Figure 1). Four soil samples were collected from the staged soil, mixed in a clean, stainless steel bowl and submitted as a composite soil sample. All samples were submitted to Brighton Analytical Inc. (BA) in Brighton, Michigan for analysis. The VSR samples were analyzed for mercury, and the composite sample was analyzed for TCLP mercury.

The backhoe buckets were decontaminated using a TSP-PF (sodium sesquicarbonate based trisodium phosphate subsititute) solution. The buckets were scrubbed with the TSP-PF solution and rinsed three times. The buckets were cleaned over the lower diked area under the dock. The diked area was lined with plastic. The recovered rinse solution and mud were placed in a 55-gallon hazardous waste container and will be properly disposed.

RESULTS

Soil sample analytical results from the four sidewall and two bottom samples are summarized in Table 1. Results have been compared to the Operating License specified background criteria. As indicated in Table 1 none of the analytical results exceeded the site background values. The result of the composite soil sample from the roll-offs was non-detect for mercury. The roll-off containers were transported by MSU and the soil disposed at Granger Landfill in Lansing, Michigan.

CONCLUSION

The mercury-impacted soil has been delineated and remedied as per the Operating License specifications. Four background samples will also be collected from the clean topsoil to re-establish background levels.

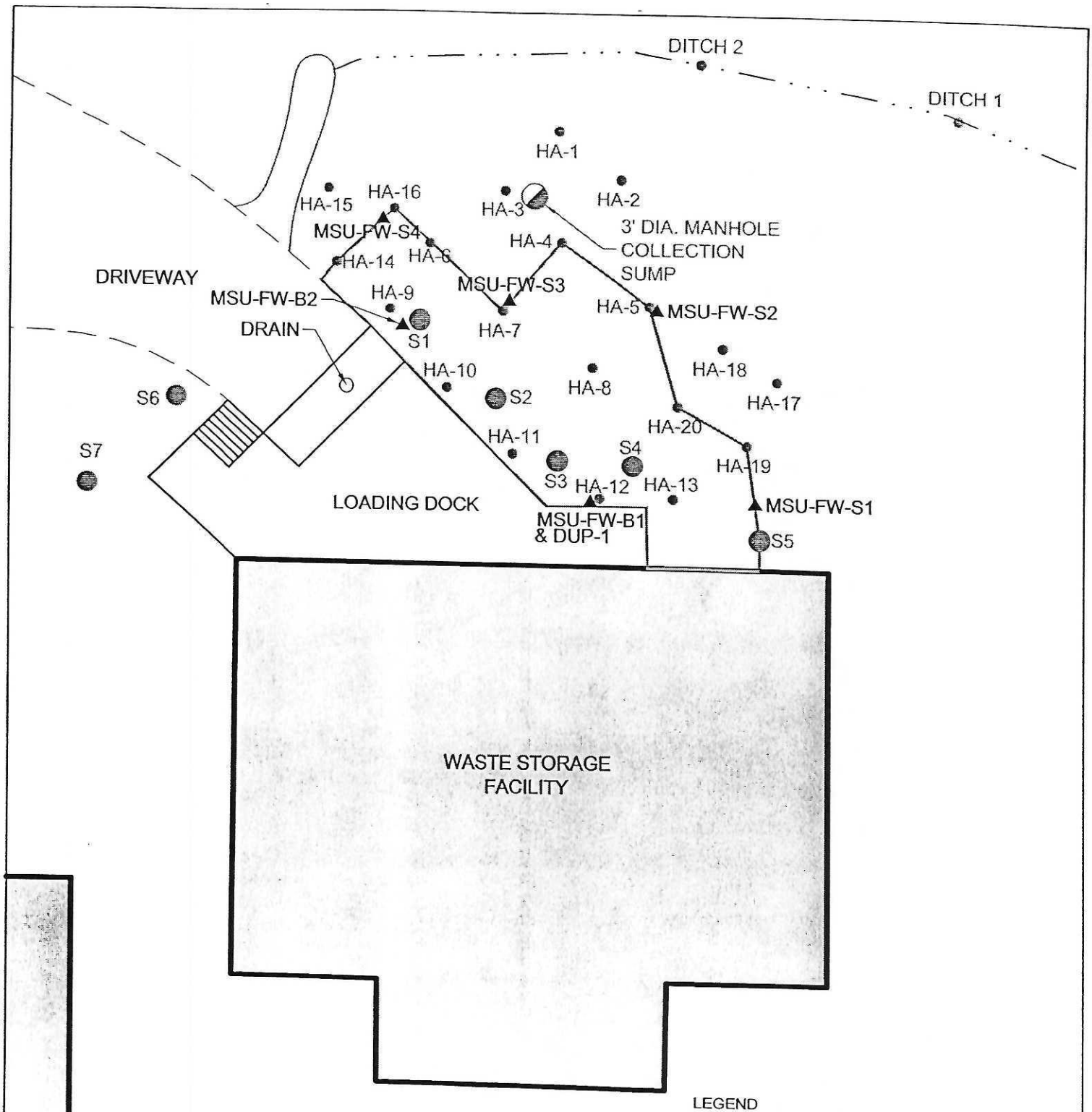
Should you have any questions or comments, please feel free to contact me at 355-6651.

Sincerely,

Thomas F. Grover, CHMM
Environmental Compliance Officer

c: John Parmer, ORCBS
Nathan Schuck, ORCBS
Bob Ceru, ORCBS
Theresa Kelley, Assistant General Counsel
Dr. Robert Hugget, VP Research and Grants
. Bill Yocum , MDEQ

Figure 1`



DLZ
ENGINEERS - ARCHITECTS - SCIENTISTS
PLANNERS - SURVEYORS

MSU WASTE STORAGE FACILITY
INGHAM COUNTY, MICHIGAN

AREA OF SOIL EXCAVATION

SCALE: SHOWN

FIGURE 1

Table 1`

Brighton Analytical L.L.C.

TM

Brighton Analytical, L.L.C.
2105 Pless Drive
Brighton, Michigan 48116
Phone: (810) 229-7575 FAX: (810) 229-8650

Sample Date: 11/13/01
Submit Date: 11/14/01
Report Date: 11/15/01

To: DLZ Michigan Inc.
1425 Keystone Ave.
Lansing, MI 48911

BA Report Number: **54150**
BA Sample ID: **AX09230**

Project Name: **MSU Waste Storage**
Project Number: **9841548500**
Sample ID: **MSU-FW-B1**

Parameters	Results	Units	DL	Method Reference	Analyst	Analysis Date
Total Metal Analysis						
Total Mercury	**0.25**	mg/Kg	0.10	SW846 7471	DL	11/14/01
Mercury (digestion)	**Digested**			7470/7471	DL	11/14/01
%Solid	**84.2**	%		EPA 160.3	GW	11/14/01

All soil results based on dry weight.

DL=Detection Limit as recommended by MDEQ

Released by: [signature]

Date: 11/15/01

Brighton Analytical L.L.C.
TM

Brighton Analytical, L.L.C.
2105 Pless Drive
Brighton, Michigan 48116
Phone: (810) 229-7575 FAX: (810) 229-8650

Sample Date: 11/13/01
Submit Date: 11/14/01
Report Date: 11/15/01

To: DLZ Michigan Inc.
1425 Keystone Ave.
Lansing, MI 48911

BA Report Number: **54150**
BA Sample ID: **AX09231**

Project Name: **MSU Waste Storage**
Project Number: **9841548500**
Sample ID: **MSU-FW-Dup-1**

Parameters	Results	Units	DL	Method Reference	Analyst	Analysis Date
Total Metal Analysis						
Total Mercury	**0.21**	mg/Kg	0.10	SW846 7471	DL	11/14/01
Mercury (digestion)	**Digested**			7470/7471	DL	11/14/01
%Solid	**85.7**	%		EPA 160.3	GW	11/14/01

All soil results based on dry weight.

DL=Detection Limit as recommended by MDEQ

Released by: J. Hunyon

Date: 11/15/01

Brighton Analytical L.L.C.™

Brighton Analytical, L.L.C.
2105 Pless Drive
Brighton, Michigan 48116
Phone: (810) 229-7575 FAX: (810) 229-8650

To: DLZ Michigan Inc.
1425 Keystone Ave.
Lansing, MI 48911

Sample Date: 11/13/01
Submit Date: 11/14/01
Report Date: 11/15/01

BA Report Number: **54150**
BA Sample ID: **AX09232**

Project Name: **MSU Waste Storage**
Project Number: **9841548500**
Sample ID: **MSU-FW-B2**

Parameters	Results	Units	DL	Method Reference	Analyst	Analysis Date
Total Metal Analysis						
Total Mercury	**0.39**	mg/Kg	0.10	SW846 7471	DL	11/14/01
Mercury (digestion)	**Digested**			7470/7471	DL	11/14/01
%Solid	**89.9**	%		EPA 160.3	GW	11/14/01

All soil results based on dry weight.

DL=Detection Limit as recommended by MDEQ

Released by: _____

Date: 11/15/01

Brighton Analytical L.L.C.™

Brighton Analytical, L.L.C.
2105 Pless Drive
Brighton, Michigan 48116
Phone: (810) 229-7575 FAX: (810) 229-8650

To: DLZ Michigan Inc.
1425 Keystone Ave.
Lansing, MI 48911

Sample Date: 11/13/01
Submit Date: 11/14/01
Report Date: 11/15/01

BA Report Number: **54150**
BA Sample ID: **AX09233**

Project Name: **MSU Waste Storage**
Project Number: **9841548500**
Sample ID: **MSU-FW-S1**

Parameters	Results	Units	DL	Method Reference	Analyst	Analysis Date
Total Metal Analysis						
Total Mercury	**0.23**	mg/Kg	0.10	SW846 7471	DL	11/14/01
Mercury (digestion)	**Digested**			7470/7471	DL	11/14/01
%Solid	**87.3**	%		EPA 160.3	GW	11/14/01

All soil results based on dry weight.

DL=Detection Limit as recommended by MDEQ

Released by: _____

Date: 11/15/01

Brighton Analytical L.L.C.
TM

Brighton Analytical, L.L.C.
2105 Pless Drive
Brighton, Michigan 48116
Phone: (810) 229-7575 FAX: (810) 229-8650

To: DLZ Michigan Inc.
1425 Keystone Ave.
Lansing, MI 48911

Sample Date: 11/13/01
Submit Date: 11/14/01
Report Date: 11/15/01

BA Report Number: **54150**
BA Sample ID: **AX09234**

Project Name: **MSU Waste Storage**
Project Number: **9841548500**
Sample ID: **MSU-FW-S2**

Parameters	Results	Units	DL	Method Reference	Analyst	Analysis Date
Total Metal Analysis						
Total Mercury	**0.22**	mg/Kg	0.10	SW846 7471	DL	11/14/01
Mercury (digestion)	**Digested**			7470/7471	DL	11/14/01
%Solid	**87.9**	%		EPA 160.3	GW	11/14/01

All soil results based on dry weight.

DL=Detection Limit as recommended by MDEQ

Released by: J Kenyon
Date: 11/15/01

Brighton Analytical L.L.C.™

Brighton Analytical, L.L.C.
2105 Pless Drive
Brighton, Michigan 48116
Phone: (810) 229-7575 FAX: (810) 229-8650

To: DLZ Michigan Inc.
1425 Keystone Ave.
Lansing, MI 48911

Sample Date: 11/13/01
Submit Date: 11/14/01
Report Date: 11/15/01

BA Report Number: **54150**
BA Sample ID: **AX09235**

Project Name: **MSU Waste Storage**
Project Number: **9841548500**
Sample ID: **MSU-FW-S3**

Parameters	Results	Units	DL	Method Reference	Analyst	Analysis Date
Total Metal Analysis						
Total Mercury	**0.13**	mg/Kg	0.10	SW846 7471	DL	11/14/01
Mercury (digestion)	**Digested**			7470/7471	DL	11/14/01
%Solid	**88.7**	%		EPA 160.3	GW	11/14/01

All soil results based on dry weight.

DL=Detection Limit as recommended by MDEQ

Released by: _____

Date: 11/15/01

Brighton Analytical, L.L.C.
2105 Pless Drive
Brighton, Michigan 48116
Phone: (810) 229-7575 FAX: (810) 229-8650

Sample Date: 11/13/01
Submit Date: 11/14/01
Report Date: 11/15/01

To: DLZ Michigan Inc.
1425 Keystone Ave.
Lansing, MI 48911

BA Report Number: **54150**
BA Sample ID: **AX09236**

Project Name: **MSU Waste Storage**
Project Number: **9841548500**
Sample ID: **MSU-FW-S4**

Parameters	Results	Units	DL	Method Reference	Analyst	Analysis Date
Total Metal Analysis						
Total Mercury	**0.14**	mg/Kg	0.10	SW846 7471	DL	11/14/01
Mercury (digestion)	**Digested**			7470/7471	DL	11/14/01
%Solid	**92.4**	%		EPA 160.3	GW	11/14/01

All soil results based on dry weight.

DL=Detection Limit as recommended by MDEQ

Released by: J. Kenyon

Date: 11/15/01

Brighton Analytical L.L.C.

TM

Brighton Analytical, L.L.C.
2105 Pless Drive
Brighton, Michigan 48116
Phone: (810) 229-7575 FAX: (810) 229-8650

To: DLZ Michigan Inc.
1425 Keystone Ave.
Lansing, MI 48911

Sample Date: 11/13/01
Submit Date: 11/14/01
Report Date: 11/15/01

BA Report Number: **54150**
BA Sample ID: **AX09237**

Project Name: **MSU Waste Storage**
Project Number: **9841548500**
Sample ID: **MSU-FW-roll off**

Parameters	Results	Units	DL	Method Reference	Analyst	Analysis Date
TCLP Metal Analysis						
TCLP Mercury	**Not detected**	mg/L	0.002	SW846 7470	DL	11/15/01
TCLP Mercury (digestion)	**Digested**			7470	DL	11/15/01

DL=Detection Limit as recommended by MDEQ

Released by: _____

Date: 11/15/01

DLZ

54150

ENVIRONMENTAL TESTING • COMPLIANCE ANALYSIS • INDUSTRIAL HYGIENE

1120 May St. • Lansing, Michigan 48906-5599
Telephone: (517) 374-9656 • FAX: (517) 374-6910

6121 Huntley Rd. • Columbus, OH 43229
Telephone (614) 848-4333 • FAX: (614) 841-0818

CUSTODY RECORD

REPORT PAGE	RECORD NUMBER
OF	48519

PROJECT NAME/TYPE: MSU Waste Storage - 9841548500

LOCATION: MSU Waste Storage

NAME	Dave Dryburgh
EMAIL	
COMPANY	DLZ, Michigan, Inc.
ADDRESS	1425 Keystone Avenue
CITY	Lansing
STATE	MI
ZIP	48911
SAMPLED BY	Kenneth McRowe
P.O. #/PROJECT #	
PHONE NO.	(517) 393-6800
FAX NO.	(517) 272-7390

NAME	Same
COMPANY	
ADDRESS	
CITY	
STATE	
ZIP	

ANALYSIS REQUESTED

NUMBER OF CONTAINERS / PRESERVATIVE

CLIENT SAMPLE IDENTIFICATION	MATRIX MEDIA	DATE SAMPLED	TIME SAMPLED	GRAB (G)/COMP (C)	OTHER	METHANOL KIT	ENCORE	NONE	HCL	SULFURIC (H2SO4)	NaOH	NITRIC (HNO3)	FILTERED Y/N	Mercury TCLP Hg	AX 9230	DLZ LAB ID
				ENTER # IN THE BOX										ENTER AN "X" IN THE BOX BELOW TO INDICATE REQUEST		
MSU-FW-B1	Soil	11/13/01	1428	G				X						X		no MeOH Rq
MSU-FW-Dup-1			1428	G				X						X	31	
MSU-FW-B2			1431	G				X						X	32	
MSU-FW-S1			1435	G				X						X	33	
MSU-FW-S2			1437	G				X						X	34	
MSU-FW-S3			1441	G				X						X	35	
MSU-FW-S4			1443	G				X						X	36	
MSU-FW-rolloff			1449	C				X						X	37	

Rush per Dave Dryburgh RR 11/14/01

LAB COPY

TRANSFER NO.	RELINQUISHED BY	DATE	TIME	ACCEPTED BY	DATE	TIME
1	Kenneth McRowe	11/14/01		[illegible]	11/14/01	9:45
2						
3						
4						

QA / QC LEVEL:

REPORTING LIMIT:

ADDITIONAL COMMENTS (PLEASE RECORD SPECIAL HANDLING / HAZARD INFORMATION)

PAID IN FULL ☐ YES ☐ NO

SAMPLES RECEIVED ON ICE ☐ YES ☐ NO COOLER TEMP. _____

SAMPLE INTEGRITY CHECKED ☐ YES ☐ NO

IMPORTANT - TURN AROUND TIME

NOTE: RUSH RESULTS MUST BE APPROVED BY LAB PRIOR TO SUBMITTAL.

DATE RESULTS EXPECTED

☐ 24 HR. ☐ 48 HR. ☐ 5 DAYS ☐ STANDARD

Brighton Analytical L.L.C.

BRIGHTON ANALYTICAL, LLC

QUALITY CONTROL

Brighton Analytical L.L.C.

REPRESENTATIVE BATCH QUALITY CONTROL

Accuracy & Precision

Analyst: DL **Parameter:** MERCURY

Analysis Date: 11/14/01 **Method Reference:** 245.1/7470/7471

SPIKE - ACCURACY					
Laboratory ID	Spike Concentration	Background	% Recoveries	Acceptable Range (%)	Method Blank Concentration
AX09214	0.0020	<0.0002	96/95	80 - 120	<0.0002
Laboratory ID	Observed A	Observed B	RPD	Acceptable Range	
AX09214	0.00191	0.00189	1	≤20%	
MISCELLANEOUS					
		Standard ID #			
Independent Secondary Reference Material:		SPEX	103%		
Method Standard (Laboratory Control Spike):			101%		

COMMENTS: _____

Brighton Analytical L.L.C.

REPRESENTATIVE BATCH QUALITY CONTROL

Accuracy & Precision

Analyst: DL **Parameter:** MERCURY

Analysis Date: 11/15/01 **Method Reference:** 245.1/7470/7471

SPIKE - ACCURACY					
Laboratory ID	**Spike Concentration**	**Background**	**% Recoveries**	**Acceptable Range (%)**	**Method Blank Concentration**
AX09237	0.0020	0.000319	107/107	80 - 120	<0.0002
Laboratory ID	**Observed A**	**Observed B**	**RPD**	**Acceptable Range**	
AX09237	0.00245	0.00245	0.6	≤20%	
MISCELLANEOUS					
		Standard ID #			
Independent Secondary Reference Material:		SPEX	100%		
Method Standard (Laboratory Control Spike):			87%		

COMMENTS: _____

DEQ

WASTE MANAGEMENT DIVISION
MICHIGAN DEPARTMENT OF
ENVIRONMENTAL QUALITY

DO NOT WRITE IN THIS SPACE
ATT. ☐ DIS. ☐ REJ. ☐ PR. ☐

Required under authority of Part 111 and Part 121 of Act 451, 1994, as amended.

Failure to file may subject you to criminal and/or civil penalties under Sections 324.11151 or 324.12116 MCL.

Please print or type.

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: MID 053343976
Manifest Document No.: 21284
2. Page 1 of 1
Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
Michigan State University, C-124 Research Complex-Eng.
(Chemical Storage Facility) E. Lansing, MI 48824

A. State Manifest Document Number: MI 7421284

B. State Generator's ID

4. Generator's Phone (517) 355-0153

5. Transporter 1 Company Name: Michigan State University
6. US EPA ID Number: MID986569616
C. State Transporter's ID
D. Transporter's Phone (517) 355-0153

7. Transporter 2 Company Name
8. US EPA ID Number
E. State Transporter's ID
F. Transporter's Phone

9. Designated Facility Name and Site Address
Granger Land Development Co. (Lansing)
3535 Wood Road
Lansing, MI 48906
10. US EPA ID Number
G. State Facility's ID
H. Facility's Phone (517) 355-1788

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID NUMBER). HM	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. Soil contaminated with mercury at less than 0.2ppm	1	CM	13	Y	N/A
b. Approval #1200120 PO#120215 >>>>> Customer acct# 001163 <<<<<					
c.					
d.					

J. Additional Descriptions for Materials Listed Above
a RCRA non-hazardous non-notification material
b
c
d

K. Handling Co
a
b
c
d

15. Special Handling Instructions and Additional Information
In case of spill, contain and call the O.R.C.B.S. at (517) 355-0153

GENERATOR

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classifi packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulatio If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determin to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes t present and future threat to human health and the environment; OR; if I am a small quantity generator, I have made a good faith effort to minimize my wa generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name | Signature | Date (Month Day Y)

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name | Signature | Date (Month Day Y)

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name | Signature | Date (Month Day Y)

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: H. Smitley | Signature: Heather Smitley | Date (Month Day): 11/27

ALL SPILLS MUST BE REPORTED TO THE MICHIGAN POLLUTION EMERGENCY ALERTING SYSTEM, IN MICHIGAN AT 1-800-292-4706 OR OUT OF STATE AT 517-373-7660 AND THE NATIONAL RESPONSE CENTER AT 1-800-424-8802 24 HOURS PER DAY.

EPA Form 8700-22 (Rev. 9/88)

EQF Rev

DEQ

WASTE MANAGEMENT DIVISION
MICHIGAN DEPARTMENT OF
ENVIRONMENTAL QUALITY

DO NOT WRITE IN THIS SPACE
ATT. ☐ DIS. ☐ REJ. ☐ PR. ☐

Required under authority of Part 111 and Part 121 of Act 451, 1994, as amended.

Failure to file may subject you to criminal and/or civil penalties under Sections 324.11151 or 324.12116 MCL.

Please print or type.

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. MID 053343976
Manifest Document No. 21285
2. Page 1 of 1
Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
Michigan State University, C-124 Research Complex-Eng.
(Chemical Storage Facility) E. Lansing, MI 48824

A. State Manifest Document Number MI 7421285

B. State Generator's ID

4. Generator's Phone (517) 355-0153

5. Transporter 1 Company Name
Michigan State University

6. US EPA ID Number MID985569516

C. State Transporter's ID

D. Transporter's Phone (517) 355-0153

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address
Granger Land Development Co. (Lansing)
3535 Wood Road
Lansing, MI 48906

10. US EPA ID Number

G. State Facility's ID

H. Facility's Phone (517) 355 1780

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID NUMBER). HM	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. Soil contaminated with mercury at less than 0.2ppm	1	CM	13	Y	N/A
b. Approval #1200120 PO#120215 >>>>> Customer acct# 001163 <<<<<					
c.					
d.					

J. Additional Descriptions for Materials Listed Above
a RCRA non-hazardous non-notification material
b
c
d

K. Handling Code
a
b
c
d

15. Special Handling Instructions and Additional Information
In case of spill, contain and call the O.R.C.B.S. at (517) 355-0153

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR; if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

GENERATOR

Printed/Typed Name	Signature	Date (Month Day Yea)

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date (Month Day Yea)

TRANSPORTER

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date (Month Day Yea)

19. Discrepancy Indication Space

FACILITY

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Date (Month Day Yea)
H. Smitley	H. Smitley	11 20 14

ALL SPILLS MUST BE REPORTED TO THE MICHIGAN POLLUTION EMERGENCY ALERTING SYSTEM, IN MICHIGAN AT 1-800-292-4706 OR OUT OF STATE AT 517-373-7660 AND THE NATIONAL RESPONSE CENTER AT 1-800-424-8802 24 HOURS PER DAY.

Appendix B2-2

1991 MSU WSF Corrective Action

STATE OF MICHIGAN

JOHN ENGLER, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING
P.O. BOX 30028
LANSING, MI 48909

DELBERT RECTOR, Director

August 8, 1991

Mr. John D. Parmer, Acting Director
Office of Radiation, Chemical and Biological Safety
Michigan State University
C124 Research Complex - Engineering
East Lansing, Michigan 48824-1326

Dear Mr. Parmer:

SUBJECT: Report of Soil Remediation
MSU Waste Storage Facility
MID 053 343 976

The Waste Management Division has completed review of the July 12, 1991, Report of Soil Remediation. The report is sufficient to document that mercury-contaminated soils at the waste storage facility were remediated as required under condition IV.C of the facility's Act 64 operating license.

If you have questions, please contact me at Waste Management Division, Department of Natural Resources, P.O. Box 30241, Lansing, Michigan 48909, or at the telephone number below.

Sincerely,

Steven R. Sliver
Environmental Engineer
Waste Management Division
517-373-1976

cc: Mr. Rich Traub, U.S. EPA
Mr. Steve Buda, MDNR
Mr. Leroy Vahovick, MDNR - Dimondale
Mr. Dave Slayton, MDNR
HWP/C&E File

AMERICAN HYDROGEOLOGY CORPORATION

Environmental Consulting Services

Main Office
6869 Sprinkle Road
Portage, MI 49002
Phone: (616) 329-1600
Fax: (616) 329-2494

Lansing Area Office
2163 University Park Drive, Suite 165
Okemos, Michigan 48864
Phone: (517) 349-4955
Fax: (517) 349-7022

May 7, 1991

Mr. John Parmer, Acting Director
Mr. David Erickson
Michigan State University
Office of Radiation, Chemical
& Biological Safety
C124 Research Complex-Engineering
East Lansing, Michigan 48824-1326

Re: Michigan State University - Waste Storage Facility

Dear Messrs. Parmer and Erickson:

Please find enclosed the work plan for soils remediation at the Michigan State University (MSU) Waste Storage Facility (WSF). Please read the plan at your earliest convenience so that we may discuss the various details. As you will note, we are prepared to proceed with the work during the second week of May, 1991. Once you have approved the plan, a copy should be forwarded to the Waste Management of the Michigan Department of Natural Resources (MDNR) for their information and to give prior notification of soil remediation.

Thank you for your attention to this matter.

Sincerely,

AMERICAN HYDROGEOLOGY CORPORATION

Stephen H. Manz
Senior Project Manager

SHM/ms/44-1363

Enclosure

AHC

MSU Waste Storage Facility
Soils Remediation Plan
May 3, 1991

The following work plan has been prepared to address remediation of soils exhibiting statistically elevated total mercury concentrations adjacent to the loading dock of the MSU Waste Storage Facility. Specific details regarding the situation are presented in the report entitled "Report of Annual Soil Monitoring, Michigan State University Waste Storage Facility (MIDO53343976) Jolly Road, East Lansing, Michigan, April 10, 1991".

Task 1. Evaluate Vertical Extent of Mercury Contamination.

1. Install soil borings in the vicinities of stations 1a, 2a, and 3a. (Refer to Figure 3 from the above referenced report; a copy is attached). Borings will be installed using a stainless-steel hand auger. Soil samples will be collected at one (1) foot intervals beginning at a depth of two (2) feet below grade. Borings will be extended to a depth of approximately 10 feet or to a depth penetrating 1 foot into an underlying clay unit, whichever is encountered first. A sample of the clay surface interfacing the sand fill will also be collected, if encountered. Standard QA/QC procedures will be observed to prevent cross-contamination between samples. These procedures are specified in Section R of the facility's operating license. Additional sampling may be necessary, to fully define the extent of degradation depending upon the initial results.

2. Soil samples will be submitted to Brighton Analytical, Inc. under chain of custody documentation. Based on soil types encountered, selected samples will be analyzed for total mercury content. Samples will be analyzed on a expedited basis.

3. Results will be utilized to evaluate the vertical extent of degradation and are intended to provide target depths for soils removal. A minimum of 3 samples will be analyzed from each soil boring. Analytical results for target excavation depths are also intended to be used as confirmation of remediation. However, additional samples (minimum of 4) from the excavation walls will be required during the excavation process.

Task 2. Define Horizontal Extent of Mercury Contamination.

1. The extent of soil degradation is not fully defined northwest from station 1a. As a result, shallow soil samples will be collected northwest of station 1a from the 0.5 to 1.0 foot depth interval. Two sampling stations are anticipated and will be located downslope from station 1a at linear distances of approximately 2.5 ft. and 5 ft. A stainless-steel hand auger will be utilized for this task. Standard QA/QC procedures will be observed to prevent cross contamination between samples.

AHC

2. Soil samples will be submitted to Brighton Analytical, Inc. under chain of custody documentation. Samples will be analyzed for total mercury on an expedited basis.

3. Results will be reviewed to evaluate the presence or absence of impact at the respective stations and will provide the basis for additional sampling, if necessary, or will define the northwestern extent of soil remediation.

Task 3. Excavate contaminated soils and place in storage containers, on-site.

1. A back-hoe will be utilized for this task. Excavation work will be performed by an OSHA certified contractor who is subcontracted by American Hydrogeology Corporation (AHC). All excavation work will be performed under the supervision of AHC personnel. The extent of soils removal required will be based on results of Tasks 1 and 2. Based on the currently existing data, stations 1, 2, and 3 are unimpacted. Due to the granular soils in this vicinity, these stations will define the horizontal extent of the excavation in this area. Soils between these stations and the loading dock wall will be removed to the appropriate or feasible depth. However, MSU personnel are responsible for determining the "safe" amount of soil removal with respect to maintaining the physical integrity of the surrounding structures, e.g., loading dock, loading dock catchment. The excavation will not occur at or below the foundation/footing depth of the loading dock. This information along with information regarding site specific utilities and other below ground structures is to be provided by MSU personnel. Reasonable care will be exercised by the excavator during the soils removal process.

2. Excavated soils are to be placed in approved hazardous waste containers to be provided by MSU ORCBS.

3. Disposal and characterization of all contaminated soils is the sole responsibility of MSU ORCBS.

4. Confirmatory samples will be collected from the excavation sidewalls at appropriate locations and depths to confirm soil remediation at these locations. Additional soils removal may be necessary depending upon the analytical results.

5. The resulting excavation will be backfilled with clean sand to be provided by the excavator.

6. Decontamination of the back-hoe bucket and other excavation tools will occur at a location approved by MSU representatives. One logical location would be over the loading dock catchment. Soils and decontamination water will be directed to a 55 gallon drum placed in the catchment area. Materials missing the drum will be captured in the "secondary" catchment basin. Less than fifty-five gallons of decontamination water is anticipated. Disposal of waste water is the responsibility of MSU ORCBS.

7. Although not anticipated, any groundwater encountered during excavation will be containerized.

Task 4. Report Preparation.

1. A report summarizing remedial activities will be prepared at the conclusion of the project. The report will include a map showing the location of the excavation and soil sample locations. Confirmatory analytical results will also be provided to document closure.

Schedule

Tasks 1 and 2 will be executed during the second week of May.

Task 3 is scheduled for the week of May 13th and is to be completed by May 20, 1991.

Task 4 will be completed approximately one month from May 20, 1991.

Cost Estimate

Due to the undefined parameters at the present time, it is impossible to accurately estimate the total cost for this project. However, it is possible to estimate anticipated costs for the various tasks. All tasks are to be performed on a time and materials basis. The following presents only an estimate of the anticipated costs.

Tasks 1 and 2. Evaluate Vertical and Horizontal Extent of Mercury Contamination.

1. <u>Professional Services</u>

General Manager
1 hour @ $ 100.00/hour $ 100.00

Senior Project Manager 8 hours @ $ 85.00/hour		680.00
Field Geologist 10 hours @ $ 65.00/hour		650.00
	Subtotal 1.	**$ 1,430.00**

2. Expenses

Field Supplies/Equipment		$ 100.00
Subcontracted Laboratory Services 13 samples @ $ 88.00/each		1,144.00
Field Vehicle Mileage (includes sample delivery) 100 miles @ $ 0.55		55.00
	Subtotal 2.	**$ 1,299.00**
	Total Estimated Cost for Tasks 1 and 2	**$ 2,729.00**

Task 3. Excavate contaminated soils and place in storage containers on-site.

1. Professional Services

Senior Project Manager 4 hours @ $ 85.00/hour		$ 340.00
Field Geologist 8 to 16 hours @ $ 65.00/hour		$ 520.00 - $ 1,040.00
	Subtotal 1.	**$ 1,380.00**

2. Subcontracted Excavator

Mobilization 180 miles @ $ 1.00/mile	Estimate	$ 100.00
Tractor Loader Backhoe $ 45.00/hour	Estimate	$ 360.00 - $ 720.00

Subtotal 2. $ 900.00 + 10% Surcharge

3. Expenses

Subcontracted Laboratory Services 4 samples @ $ 88.00/each		$ 352.00
Field Supplies (modified level D personal protection)		50.00
Backfill		?
Field Vehicle Mileage 40 miles @ $ 0.55 mile		22.00
	Subtotal 3.	**$ 424.00**

Total Estimated Cost: Unknown-Incomplete Data.

Task 4. Report Preparation.

1. Professional Services

A.	General Manager 4 hours @ $ 100.00/hour		$ 400.00
B.	Senior Project Manager 16 hours @ $ 85.00/hour		1,360.00
C.	Senior Geologist 10 hours @ $ 65.00/hour		650.00
D.	Cartographer 8 hours @ $ 45.00/hour		360.00
E.	Clerical/Word Processing 8 hours @ $ 30.00/hour		240.00
		Subtotal 1.	**$ 3,010.00**

2. Expenses

Postage		$ 30.00
Phone Calls		10.00
	Subtotal 2.	**$ 40.00**

Total Estimated Costs for Task 4 $. 3,050.00

NOTE: DOES NOT INCLUDE MEETINGS

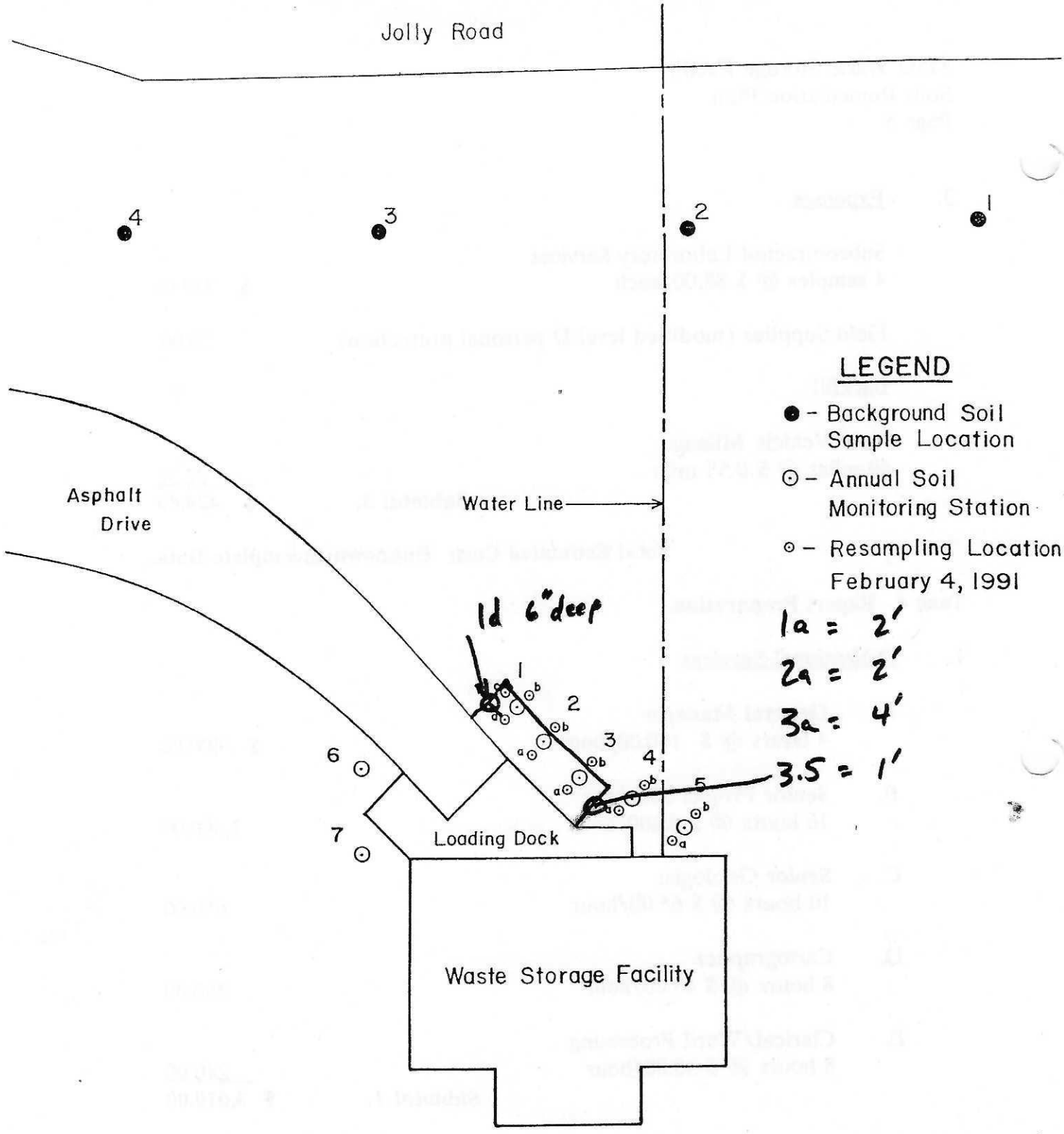


FIGURE 3

SOIL SAMPLE LOCATIONS

MICHIGAN STATE UNIVERSITY WASTE STORAGE FACILITY

Section 1, T. 3 N., R. 2 W.
Delhi Township
Ingham County, Michigan

Adapted From Keck Consulting Services, Inc. Map Supplied By Client

WEC 2/26/91 AHC

A1141

Executive Summary
of
Report of Annual Soil Monitoring
Michigan State University Waste Storage Facility (MIDO5334396)
Jolly Road, East Lansing, Michigan

April 10, 1991

Annual soil monitoring for 1990 was performed at the Michigan State University (MSU) Waste Storage Facility (WSF) in accordance with the Act 64 operating license. It was the first time the sampling process was performed. Statistically significant concentrations of total mercury and total arsenic were confirmed in shallow soils adjacent to the WSF loading dock and building, respectively. MSU Office of Radiation, Chemical, and Biological Safety (ORCBS) personnel report that there has been no known release or spill of waste substances from the WSF during the year.

It is believed that the statistically significant arsenic concentrations are attributable to the application of arsenic acid, a herbicide (weed killer), along the perimeter of the WSF building in 1985. The herbicide application occurred prior to licensing of the facility. Groundwater and surface water data for the site show no evidence of arsenic degradation. Because the arsenic concentrations appear attributable to controlled historical applications of a (then) common weed killer, the observed arsenic levels would not constitute soil impact from site activities in accordance with the license. On this basis and in view of the available data, remediation of soils affected by arsenic does not appear warranted.

The mercury impact to shallow soils is suggested as being related to the accidental release of metallic mercury from a barometer in the summer of 1986, prior to issuance of the operating license. Statistically significant concentrations of total mercury were found in shallow soils sampled immediately adjacent to the loading dock. MSU ORCBS personnel estimate the release of 10 ml of mercury to the soils during the accident. Reportedly, visually affected soils were immediately excavated and disposed as hazardous waste. The release was believed to be corrected at that time. Residual concentrations of mercury in the soils from the release in 1986 appear responsible for the observed concentrations in this investigation. Based on this information, the available data, and the expected chemical behavior of mercury in the subsurface environment, the soil residuals do not appear to constitute a threat to water resources beneath and surrounding the WSF site. Available groundwater and surface water quality data for the site show no evidence of mercury degradation.

In accordance with the Act 64 operating license, Part IV, Subpart C, Soil Monitoring, it is recommended that the MSU ORCBS determine the extent of mercury contamination and excavate the soils within 90 days (presumably from February 19, 1991, the date of re-determination of the statistically significant increase in total mercury). Although it appears that the potential for mercury leachability from the affected soils is low, the governing

regulations affecting the licensee stipulate that the soils be managed as a hazardous waste. The rationale behind this determination is that mercury is a listed metal under RCRA and the release occurred at an Act 64 facility. If feasible, and within practical limits, the cleanup goal will be to remove affected soils until background values for total mercury are reached. Soil remediation and verification will be tailored after the MDNR guidance documents entitled "How Clean is Clean?" and "Verification of Soil Remediation".

This executive summary is inseparable from the text and data presented within the report and should not be taken out of context.

AHC

FORM EQP 5111 ATTACHMENT TEMPLATE B3
HYDROGEOLOGIC REPORT

This document is an attachment to the Michigan Department of Environment, Great Lakes, and Energy'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 299.9506, R 299.9508, and R 299.9612 and Title 40 of the Code of Federal Regulations (CFR) §§264.94, 264.95, 264.97, 264.98, 270.13(10)(l), and 270.14(b)(19) establish requirements for hydrogeologic reports for 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 hydrogeologic report for the hazardous waste management units and the hazardous waste management facility for the Michigan State University (MSU) Waste Storage Facility (WSF) in Lansing, Michigan. This template includes hydrogeologic report requirements, waiver demonstrations, and alternative information requests for operating license applications. This hydrogeologic report supplies information to support the groundwater monitoring program, or groundwater monitoring waiver request, proposed and included in Template B5, Environmental Monitoring Programs.

(Check as appropriate)

Applicant for Operating License for Existing Facility:

☐ R 299.9506 hydrogeologic report

☒ A waiver for the hydrogeologic report is requested for one or more units

☐ Alternative information is proposed for information required in the hydrogeologic report for one or more units

☒ A waiver is requested for groundwater monitoring requirements for one or more units, and is included in Template B5

Applicant for Operating License for New, Altered, Enlarged, or Expanded Facility:

☐ R 299.9506 hydrogeologic report

☐ A waiver is requested for groundwater monitoring requirements for one or more units, and is included in Template B5

This template is organized as follows:

B3.A HYDROGEOLOGIC REPORT WAIVER REQUEST
B3.B SITE HYDROGEOLOGY
- B3.B.1 Summary of Existing Information
- B3.B.2 Identification of Aquifers and Their Uses
- B3.B.3 Topographic Map
  - B3.B.3(a) Waste Management Areas
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- B3.E.3 Additional Geotechnical Characteristics
- B3.E.4 Geologic Cross Sections
- B3.E.5 Water Budget Calculations

📖 EPA 1992. *RCRA Groundwater Monitoring Draft Technical Guidance Document.* Document Number 530-R-93-001. November.

B3.A HYDROGEOLOGIC REPORT WAIVER REQUEST
[R 299.9508(2)]

☒ The MSU WSF is not a landfill, surface impoundment, waste pile, or land treatment unit, all hazardous waste management activities take place inside or under a structure that provides protection from precipitation and runon/runoff, and the unit is in compliance with the facility design and operating standards found in R 299.9604.

B3.B SITE HYDROGEOLOGY

[R 299.9506 (1)(a) through (g) and 40 CFR, Part 265, Subpart F, and §§270.13(l), 270.14(b)(19), and 264.97]

This section presents a summary of the MSU WSF facility's unit-specific preapplication groundwater monitoring data, an identification of all aquifers, hydrogeologic information on topographic maps, and identification of any plumes of contamination.

B3.B.1 Summary of Existing Information

[R 299.9506(1)(a)]

A hydrogeological report was previously conducted at the MSU WSF in February 1988. The hydrogeologic conditions described in this report have not changed and are applicable to the current conditions of the site. The only changes to the facility since this date (1988) has been the addition of a canopy structure over the east loading dock in 2004, and the addition of the west storage building and connecting hallways. These structures are shown in the facility engineering drawings in Section B6. **Figure B3.A-1** depicts the WSF site boundaries, buildings, topography, roads and wells at a scale of 1 inch to 200 feet.

The mercury spill remediation completed in 2001 (described further in Template B2) did not alter the hydrogeologic conditions of the site. During this small remediation project, 26 cubic yards of mercury-impacted soil were excavated from an area adjacent to the loading dock (depicted on **Figure B3.A-2**). The soil excavation extended over a surface area of approximately 367 square feet, had an average depth of 2 feet, and was backfilled with a mixture of clay and sand. Upon backfilling, the area was restored to its original grade and covered with topsoil and sod. Because this small spill remediation did not alter the hydrogeologic conditions of the WSF, only pertinent information contained in the 1988 hydrogeologic report augmented with additional information obtained for this permit renewal are summarized in the following paragraphs of this section.

Soil Types and Quaternary Geology

During the spring of 2005, the soil type(s) in the immediate vicinity of the WSF were evaluated based on visual inspection of nine soil samples collected from areas on the east and west sides of the paved driveway that accesses the WSF from the north. Each of the nine background soil samples were comprised of brown sandy loam. The "Soil Survey of Ingham County, Michigan, compiled jointly by the United States Department of Agriculture and Michigan Agricultural Experiment Station (1992) categorized the soil as part of the "B" phase of the Marlette Series (MaB) associated with the Marletter-Capac-Owosso soil association. This soil type extends around the WSF and grades into Colwood-Brookston (Co) soils east of the WSF. Both of these soil types (MaB and Co) have high percentages of clay and are poorly drained. These soil types formed on top of the uppermost layer of glacial drift sediments that were deposited during the most recent (Wisconsin-age) continental glaciation.

According to the Ground-Water Mapping Project jointly complied by United States Geological Survey (USGS), Michigan Department of EGLE, and MSU Institute of Water Research, 50 to 100 feet of unconsolidated glacial deposits underlie the MSU WSF. The surface expression of the drift sediments is classified as a lodgement till (deposited at the base of the glacier) and is comprised of a mixture of clay, sand, and gravel with a medium texture.

B3.B.2 Identification of Aquifers and Their Uses

[R 299.9506(1)(b), (c), and (d)]

Underlying Aquifers

The unconsolidated glacial sediments in the vicinity of the WSF are not used as aquifers because the yield is typically inadequate for drinking water supplies or for industrial and/or agricultural uses. According to DLZ Michigan Inc. and Braun Intertec, consulting firms that have reported on the hydrogeological investigation of the WSF site, indicate that the sediments underlying the WSF are predominantly clay-rich glacial till deposits with interspersed, discontinuous, sand lenses that "*are only sporadically [water-]saturated during the wettest periods of the year*". Strata agrees with this interpretation, based on a review of historical groundwater monitoring reports that were prepared for the WSF site by Strata and others, that indicate that sufficient ground-water was rarely present in the monitoring wells previously installed at the site to allow for the collection of ground-water samples. Given that the characteristics of the underlying soil and sediment types at the WSF site are not conducive for rapid infiltration of precipitation that falls over the site, most of the precipitation that falls on the WSF site flows overland. The little precipitation that percolates into the subsurface would follow the site topography, and flow southeastward toward Banta Drain. DLZ estimated the rate of ground-water migration in the glacial sediments to be approximately 0.07 feet per day or approximately 25 feet per year.

The unconsolidated glacial deposits in the area surrounding the WSF site rest upon the Pennsylvanian-aged Saginaw Formation according to the "Bedrock Geology of Southern Michigan" map compiled by Randall L. Milstein, (1987) for Michigan's Geological Survey Division. The Saginaw Formation is comprised of alternating horizons of sandstone, shale and limestone and is the primary source of drinking water throughout the Lansing and East Lansing area. Review of water well records located within Sections 1, 2, 11, and 12 of Delhi Township, Sections 6 and 7 of Alaiedon Township, Sections 30 and 31 of Meridian Township, and Sections 25, 26, 35, and 36 of Lansing Township indicates that the majority of these wells were completed in the bedrock aquifer which was typically encountered between 50 and 100 feet below grade. The remaining wells that were completed in the drift sediments were monitoring wells or observation wells owned by MSU. Of the bedrock completed wells, most were privately owned, several were public water supply wells, irrigation wells, and observation wells. These water well records were obtained from EGLE's Water Well Viewer database or Archived Water Well Record Retrieval Database. The blue shading on **Figure B3.A-3** depicts the extent of the Saginaw Formation within 2,000 feet of the WSF site.

Figure B3.A-4 is a topographic map that depicts the boundaries of the WSF and the locations of all wells (public water supply, private, and irrigation) that are located within 1 mile of the WSF and completed in the bedrock aquifer (only aquifer identified), provided that the well record contains sufficient information to properly locate the well.

B3.B.3 Topographic Map
[R 299.9506(1)(e)(i) through (v)]

A topographic map, in accordance with 40 CFR §270.14(b)(19), is included in Template A13. This topographic map is at a scale of one inch equal to no more than 200 feet, showing a distance of 1000 feet around the facility perimeter.

B3.B.3(a) Waste Management Area
[R 299.9506(1)(e)(i)]

Figure B3.A-2 includes the waste management areas (building footprints) at the facility.

B3.B.3(b) Property Boundaries
[R 299.9506(1)(e)(ii)]

Figure B3.A-1 includes the property boundaries for the facility.

B3.B.3(c) Point of Compliance
[R 299.9506(1)(e)(iii)]

The topographic map does not include a point of compliance for proposed groundwater monitoring wells as the MSU WSF is requesting a waiver for groundwater monitoring requirements for one or more units and is included in Template B5.

B3.B.3(d) Groundwater Monitoring Wells
[R 299.9506(1)(e)(iv)]

The topographic map does not include locations for proposed groundwater monitoring wells as the MSU WSF is requesting a waiver for groundwater monitoring requirements for one or more units and is included in Template B5.

B3.B.3(e) Aquifer Information
[R 299.9506(1)(e)(v)]

As previously stated in Section B3.B2, the little precipitation that percolates into the subsurface would follow the site topography, and flow southeastward toward Banta Drain. DLZ estimated the rate of ground-water migration in the glacial sediments to be approximately 0.07 feet per day or approximately 25 feet per year.

B3.B.3(f) Extent of Contaminant Plume
[R 299.9506(1)(g)(i)]

No known groundwater contaminant plumes exist at the MSU WSF.

B3.B.4 Wells and Borings Within One Mile
[R 299.9506(1)(f)]

Figure B3.A-4 includes an area extending at least one mile beyond the property boundaries, contains locations for all domestic, municipal, oil and gas, industrial, and agricultural wells, as well as soil borings for which logs are available.

B3.B.5 Contaminant Plume Description
[R 299.9506(1)(g)]

No known groundwater contaminant plumes exist at the MSU WSF.

B3.C ENGINEERING REPORT FOR PROPOSED GROUNDWATER MONITORING PROGRAM
[R 299.9506(2) and (7)]

The engineering information included in the hydrogeologic report supports the proposed groundwater monitoring programs or waiver requests included in this application as Template B5, Environmental Monitoring Programs, and Template B2, Corrective Action.

B3.C.1 Waiver or Alternate Information Request
[R 299.9506(7)]

☒ Waiver is requested for R 299.9506(2)

☐ Alternate information is substituted for information requirements in R 299.9506(2)

B3.C.2 Soil Borings, Sampling, and Testing
[R 299.9506(2)(a)(i) through (vi)]

This section is not applicable as the MSU WSF is requesting a waiver for groundwater monitoring requirements for one or more units and is included in Template B5.

B3.D GROUNDWATER MONITORING PROGRAM
[R 299.9506(3) through (5), R 299.9611(2)(b) and (3), R 299.9612, R 299.9629, and 40 CFR, Part 264, Subpart F, except 40 CFR §§264.94(a)(2) and (3), 264.94(b) and (c), 264.100, and 264.101}

The summary of preapplication monitoring information and information included in the engineering report establish the basis for determining the appropriate groundwater monitoring program for each unit at the MSU WSF facility. The proposed detection monitoring and compliance monitoring programs for applicable units are included in Template B5, Environmental Monitoring Programs. The proposed corrective action groundwater monitoring program for applicable units is included in Template B5, Environmental Monitoring Programs, and Template B2, Corrective Action. The table below identifies unit-specific determinations for groundwater monitoring programs and is identical to the table included in Section B5.A of Template B5.

Table B3.D.1 Unit-Specific Groundwater Monitoring Program

Unit	Land Disposal Unit (Yes)[1]	Land Disposal Unit (No)[2]	Waiver[3]	Detection Monitoring[4]	Compliance Monitoring[5]	Corrective Action[6]
WSF	☐	☒	☒	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

☞ *Different units can be in different programs. The following instructions should be considered and addressed as appropriate for each unit at the facility.*

[1] *Surface impoundments, waste piles, and land treatment units or landfills (land disposal units) that receive hazardous waste after July 26, 1982, are considered regulated units and must comply with the requirements specified in 40 CFR §§264.91 through 264.99 except 40 CFR §§264.94(a)(2) and (3), and 264.94(b) and (c), and R 299.9629 for purposes of detecting, characterizing, and responding to releases to the uppermost aquifer. If the unit is a land disposal unit, check the "yes" column and indicate in the table whether a waiver for a groundwater monitoring program is being requested or if the facility is proposing a detection monitoring, compliance monitoring, or corrective action program.*

[2] *If the unit is not a land disposal unit, check the "no" column. The applicant should indicate in the table that a waiver is being requested.*

[3] *The unit is a land disposal unit and the applicant is requesting a waiver for a groundwater*

monitoring program.

[4] *If an applicant is not required to implement a compliance monitoring program or a corrective action program, in all other cases, the applicant must institute a detection monitoring program under 40 CFR §264.98.*

[5] *Whenever hazardous constituents under 40 CFR §264.93 are detected at a compliance point, the applicant must institute a compliance monitoring program under 40 CFR §264.99. Detected is defined as statistically significant evidence of contamination as described in 40 CF §264.98(f).*

[6] *If an unit is undergoing corrective action in accordance with R 299.9629 and 40 CFR, Part 264, Subpart F, except 40 CFR §§264.100 and 264.101, the application should refer to Template B2, Corrective Action, which discusses the groundwater monitoring associated with corrective action.*

In summary, if no hazardous constituents have been detected at the time of this application, the unit is subject to detection monitoring program requirements. If hazardous constituents have been detected at the point of compliance at the time of this application, the unit is subject to compliance monitoring requirements. If hazardous constituents have been detected at levels that exceed concentration limits, or if groundwater monitoring conducted at the time of this application indicate the presence of hazardous constituents from the unit above background concentrations, the unit is subject to corrective action.

B3.E ADDITIONAL INFORMATION REQUIREMENTS
[R 299.9506(6)]

Check as appropriate:

☒ The MSU WSF unit is not a landfill, surface impoundment, waste pile, or land treatment unit. The requirements of R 299.9506(6) do not apply.

☐ The *[Hazardous Waste Unit]* unit is a landfill, surface impoundment, waste pile, or land treatment unit. Additional information has been included to address requirements necessary to determine site suitability and facility design.

B3.E.1 Additional Soil Boring Tests
[R 299.9506(6)(a) and (b)]

The MSU WSF unit is not a landfill, surface impoundment, waste pile, or land treatment unit. The requirements of R 299.9506(6) do not apply.

B3.E.2 Soil Borings to Define Bedrock
[R 299.9506(6)(c)]

The MSU WSF unit is not a landfill, surface impoundment, waste pile, or land treatment unit. The requirements of R 299.9506(6) do not apply.

B3.E.3 Additional Geotechnical Characteristics
[R 299.9506(6)(d)]

The MSU WSF unit is not a landfill, surface impoundment, waste pile, or land treatment unit. The requirements of R 299.9506(6) do not apply.

B3.E.4 Geologic Cross Sections
[R 299.9506(6)(e)]

The MSU WSF unit is not a landfill, surface impoundment, waste pile, or land treatment unit. The requirements of R 299.9506(6) do not apply.

B3.E.5 Water Budget Calculations
[R 299.9506(6)(f)]

The MSU WSF unit is not a landfill, surface impoundment, waste pile, or land treatment unit. The requirements of R 299.9506(6) do not apply.

I-127

Collins Road

Jolly Road

North Line of Section 1 and Center Line of Jolly Road

1,244.28 feet to North 1/4 Corner of Section 1

Remedial Excavation
Canopy
East Storage Building
Middle Storage Building
West Storage Building

Legal Limits
of
MSU WSF

Banta Drain

N
W E
S

0 100 200 300
1 Inch = 200 Feet

LEGEND

- 865 USGS Topographic Contour Line
- 100 Site Topographic Contour Line
- Private Water Well
- Public Water Well
- Irrigation Water Well

FIGURE B3.A-1

Michigan State University
Waste Storage Facility

Site Plan and Area

STRATA ENVIRONMENTAL SERVICES, INC.

HYDROGEOLOGIC INVESTIGATION
MICHIGAN STATE UNIVERSITY
WASTE STORAGE FACILITY

876-1239

N
W E
S

0 20 40 60
1 Inch = 40 Feet

Collins Road

Jolly Road

North Line of Section 1 and Center Line of Jolly Road

I-127

Banta Drain

Remedial Excavation

Canopy

Drain

East Storage Building

Middle Storage Building

West Storage Building

Legal Limits
of
MSU WSF

100 98 96 94 865 998 880 875 870 680 675 670

LEGEND

- 865 USGS Topographic Contour Line
- 100 Site Topographic Contour Line
- Private Water Well
- Public Water Well
- Irrigation Water Well

FIGURE B3.A-2

Michigan State University
Waste Storage Facility

Site Plan

STRATA ENVIRONMENTAL SERVICES, INC.

HYDROGEOLOGIC INVESTIGATION
MICHIGAN STATE UNIVERSITY
WASTE STORAGE FACILITY

876-1239

I-127

Collins Road

Jolly Road

Pine Tree Road

Ramp to I-96

N
W E
S

0 200 400 600
1 Inch = 400 Feet

Extent of Saginaw Formation Aquifer within 2000-foot Radius of MSU WSF

1,244.28 feet to North 1/4 Corner of Section 1

North Line of Section 1

Remedial Excavation
Canopy
East Storage Building
Middle Storage Building
West Storage Building

Legal Limits of MSU WSF

Battle Drain

LEGEND

- 865 USGS Topographic Contour Line
- 100 Site Topographic Contour Line
- Public Water Well
- Private Water Well

FIGURE B3.A-3

Michigan State University
Waste Storage Facility
Extent of Aquifers
Within 2000-Foot Radius

STRATA ENVIRONMENTAL SERVICES, INC.

HYDROGEOLOGIC INVESTIGATION
MICHIGAN STATE UNIVERSITY
WASTE STORAGE FACILITY

876-1239

I-127

Collins Road

Bennett Road

College Road

N

W E

S

0 600 1200 1800

1 Inch = 1200 Feet

1-Mile Radius
of
MSU WSF

Cavanaugh
Road

Dunkel Road

Legal Limits
of
MSU WSF

North Line of Section 1

Jolly Road

Banta Drain

Ramp to
I-96

I-96

Pine Tree Road

Sycamore Creek

Sandhill
Road

LEGEND

- 865 USGS Topographic Contour Line
- 100 Site Topographic Contour Line
- Public Water Well
- Private Water Well

FIGURE B3.A-4

Michigan State University
Waste Storage Facility
Locations of Wells
Within 1-Mile Radius

STRATA ENVIRONMENTAL SERVICES, INC.

HYDROGEOLOGIC INVESTIGATION
MICHIGAN STATE UNIVERSITY
WASTE STORAGE FACILITY

876-1239

FORM EQP 5111 ATTACHMENT TEMPLATE B4
ENVIRONMENTAL ASSESSMENT

This document is an attachment to the Michigan Department of Environment, Great Lakes, and Energy's (EGLE) *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) §324.11118(3) and R 299.9504(1)(e) and R 299.9504(1)(b) establish requirements for conducting environmental assessments at hazardous waste management facilities. Before receiving an operating license, owners and operators of hazardous waste treatment, storage, or disposal facilities must evaluate the (proposed) facility's impact on air, water, or other natural resources of the state. The evaluation must also include a failure mode assessment. All references to 40 CFR citations specified herein are adopted by reference in R 299.11003.

This license application template addresses requirements for an environmental assessment for hazardous waste management units at the Michigan State University (MSU) Waste Storage Facility (WSF).

📖 Guidance for this template can be found in EGLE's document titled "Contents of the Environmental Assessment."

This template is organized as follows:

INTRODUCTION
B4.A CURRENT CONDITIONS
- B4.A.1 Facility Description
- B4.A.2 Description of Existing Environmental Conditions
  - B4.A.2(a) Climate
  - B4.A.2(b) Topography
  - B4.A.2(c) Geology
  - B4.A.2(d) Soils
  - B4.A.2(e) Hydrology
  - B4.A.2(f) Land Use and Zoning
  - B4.A.2(g) Historical or Archaeological Resources
  - B4.A.2(h) Social Environment
    - B4.A.2(h)(i) Demographics
    - B4.A.2(h)(ii) Infrastructure
  - B4.A.2(i) Transportation
  - B4.A.2(j) Air Quality
  - B4.A.2(k) Noise
  - B4.A.2(l) Appearance and Aesthetics
  - B4.A.2(m) Terrestrial Ecosystem
    - B4.A.2(m)(i) Flora
    - B4.A.2(m)(ii) Fauna
    - B4.A.2(m)(iii) Rare or Endangered Species
    - B4.A.2(m)(iv) Critical Habitat

INTRODUCTION

This environmental assessment for the MSU WSF describes current conditions, environmental impacts, and applicable exposure information for landfills and surface impoundments. The goals of the environmental assessment are to describe and discuss: (1) the probable impact of the facility on natural resources, human life, and all environmental elements that affect these values; (2) probable unavoidable adverse effects of the facility; (3) alternatives for accomplishing the same objective; and (4) possible modifications that would minimize adverse effects.

MSU continues to manage its waste storage facility located on East Jolly Road for the storage and consolidation of various waste streams generated by MSU owned and operated locations. The purpose and objective of the WSF is for the proper management and characterization of waste streams to be transported to a designated third-party off-site approved TSDF for ultimate disposal in accordance with state and federal regulations.

B4.A CURRENT CONDITIONS

B4.A.1 Facility Description

The MSU WSF is comprised of three interconnected buildings on less than 5 acres of land located at the southwest intersection of East Jolly and Collins Roads, and was constructed as a central storage location for all chemical (i.e. hazardous and liquid industrial by-product) waste generated by MSU owned and operated properties. The MSU WSF is owned by MSU and is operated by the Environmental Health & Safety (EHS) Department. Due to MSU being a public land-grant University and research institution, a wide range of chemical waste is generated and transported to the WSF. EHS provides safe, effective storage of these wastes at the WSF prior to being transported to a licensed third-party hazardous waste disposal facility. No active treatment or disposal of waste occurs at the MSU WSF.

Detailed descriptions of the structures and equipment at the facility are provided in Section B6 entitled "Engineering Plans." This section includes a scale drawing of the facility which shows the location of all storage areas at the site, and the capacities of those areas. No facilities were present at the site before the current structure. Photographs of the facility are also provided in the License Application section of this application.

B4.A.2 Description of Existing Environmental Conditions

A description of existing environmental conditions at the facility and any surrounding areas that may be affected by the facility is included in this section. Detailed information that is provided in other attachment templates is not repeated here; however, references to appropriate attachment templates are provided. Maps, photographs, and other relevant information that are not included in other templates are included in this section. Important ecological relationships, functions, and interdependence of physical environmental elements and social and economic elements are discussed. Factual information from publications, reports, or personal communications is documented, with sources cited.

B4.A.2(a) Climate

According to the National Weather Service Köppen-Geiger climate classification system, the MSU WSF area is identified as a Moist Continental Mid-Latitude climate with mild, continental summers. This area includes mostly continental and mid-latitude climates with warm to cool summers and cold winters. The average temperature of the warmest month is greater than 50° Fahrenheit (F), while the coldest month is less than -22°F. Winters are severe with snowstorms, strong winds, and bitter cold from Continental Polar or Arctic air masses.

According to U.S Climate Data, the temperatures in the Lansing, MI area surrounding the WSF vary significantly with the season. In the winter months, the average high temperatures range from 30-44°F, while the average low temperatures range from 17-26°F. In the summer months, an average high temperature ranges from 78-82°F, and the average low temperature ranges from 57-61°F. In the Spring and Fall months, the average high temperatures can range from 47-73°F, while the average low temperature can range from 32-51°F.

The average precipitation varies by month, with February being the driest month at 1.47 inches of precipitation. June typically experiences the largest amount of precipitation with the average being 3.5 inches. The overall average annual precipitation is 31.77 inches. The average annual snowfall for the area is 51 inches, and this usually comes in the months of November through April.

There are typically no adverse weather conditions that impact the operation at the WSF. Tornadoes occur occasionally, as do thunder and windstorms. Flooding is likely one year out of three; floods caused extensive damage one year out of ten.

B4.A.2(b) Topography

The MSU WSF area lies within a region of gently undulating and hummocky landforms. These landforms are primarily the result of erosional and depositional processes affiliated with continental glaciation during the Pleistocene Epoch. As large ice sheets retreated, significant volumes of erosional sediments, "drift", were left to rest on the bedrock surface. In Ingham County, the drift thickness ranges from 25 to 200 feet. Generally, the local thickness of drift is dependent upon topographic land features; i.e., moraines, eskers and kames. These topographic land features consist of clay rich tills and outwash.

B4.A.2(c) Geology

The glacial drift underlying the proposed storage facility is primarily clay-rich with interbeds of saturated sand, gravel and silt. The glacial drift sequence beneath the site is between 24 and 34 feet thick. In general, the drift appears to increase in thickness towards the north. Underlying the hallow drift deposits is the Saginaw Bedrock Formation. This formation has been characterized as a gray, medium to fine textured sandstone.

The clay-rich drift is a gray to gray-brown, moist, clay till with intermediate lenses of silt, medium to fine, silty sand and/or gravel and occasional cobbles. The shallowest of the clay-rich deposits appear to contain more interbeds with permeable sediments than similar deposits encountered near bedrock.

There is no existing or potential mineral extraction or oil or gas exploration at the site.

B4.A.2(d) Soils

The clay-rich deposits possess low transmissivities and impede both lateral and vertical groundwater migration beneath the study area. The more permeable deposits (natural or fill) provide conduits for groundwater and/or shallow perched water migration beneath the site. The shallow saturated sediments are inconsistent in thickness beneath the site, with the thickest of these deposits being found in historical soil borings SB-3 and SB-5. Underlying these permeable sediments exists a locally continuous layer of clay till. This clay till is similar in texture to those found in the shallower sediments but contains a higher percentage of clay and silt. The clay till averages 7.7 feet in thickness across the site with the thinnest point, of 5 feet, occurring at SB-3.

B4.A.2(e) Hydrology

The shallow drift flow system beneath the study area appears to be perched and governed in part by its underlying clay-rich sediments and the aerial extent of the silty, permeable sand and gravels. Runoff from artificially covered surfaces is directed towards Banta Drain over natural surfaces. No areas of active erosion along the west bank of Banta Drain were observed indicating limited overland flow. However, local shallow groundwater, perched water and surface water discharge will be influenced by historic excavation, porous backfill media, surface and subsurface structures, and underlying clay barriers.

Previous water level data obtained on December 28, 1987, from OW-l(d) through OW-5(d), suggest that multiple shallow zones of saturated drift exist beneath the site. The presence of these multiple perched water zones was supported when additional water level data, collected January 29, 1988, revealed water table elevation differences of approximately 6 and 10 feet for OW-2(d) and OW-5 (d), respectively, in comparison with water levels collected from OW-3(d). Additionally, during this data period water levels within shallow and deep well clusters, OW-2(s & d), and OW-5(s & d) had different hydrostatic heads. OW-l(d) and OW-4(d) were dry during January 1988 while their adjacent shallow wells contained water. The water level data from December 1987 and

January, 1988 document the existence of perched water conditions beneath the site. The continuity and extent of these perched zones beyond the site presently is undefined.

The above water level data also substantiated that the clay-rich sediments beneath the site, provide a vertical barrier to perched water infiltration from the overlying saturated zones. These low permeability clays should attenuate direct groundwater recharge and prevent groundwater communication between the upper shallow glacial drift and the Saginaw aquifer.

B4.A.2(f) Land Use and Zoning

The land at the MSU WSF is zoned A-1 (Agricultural). The area immediately north of the MSU WSF is zoned commercial and contains one commercial office building. The area to the east and southeast is zoned agricultural and consists of agricultural land owned and farmed by MSU. Beyond US-127/I-496, which borders the MSU WSF to the west, the area is zoned commercial and consists of several medical offices and other commercial offices. The nearest residential areas are an apartment complex to the northwest beyond US-127 and Jolly Road. There are no proposed zoning regulations which would change the land use. In the surrounding area, several commercial properties exist, including a Post Office, office buildings, a gas station, multi-family housing, and several restaurants.

B4.A.2(g) Historical or Archaeological Resources

There are no known historical or archeological resources in the area of the MSU WSF.

B4.A.2(h) Social Environment

The social environment, in terms of demographics and infrastructure of the area, is discussed in the following two subsections.

B4.A.2(h)(i) Demographics

According to the U.S. Bureau of Labor Statistics, the majority of employment for the Lansing-East Lansing Michigan area is in Manufacturing, Education and Health Services, and Professional and Business Services. These statistics line up with employers in the area of the MSU WSF, which consists largely of commercial research, medical offices, and teaching facilities. The major employers in the area are Michigan State University, McLaren Hospital, the United States Post Office, and several other medical offices and commercial businesses.

B4.A.2(h)(ii) Infrastructure

The existing MSU WSF is not near any public utilities, law enforcement agencies, sewage disposal or solid waste disposal sites.

Lansing Christian School is located approximately 0.45-miles southwest of the MSU WSF, beyond US-127/I-496 freeway, and several commercial businesses and medical offices. In addition, although the MSU WSF is a part of the MSU campus, the main campus instructional buildings are located approximately 2.75-miles northeast of the MSU WSF.

B4.A.2(i) Transportation

MSU has its own fleet of licensed vehicles to transport waste from the campus to the WSF. The transport of waste chemicals to the MSU WSF involves the usage of public roads which are all paved, two lane roads with a speed limit ranging from 45 miles per hour (mph) on Farm Lane to 55mph on College road. All of the roads governed by the Ingham County Road Commission are classified as "All Season" routes. This designation indicates that the roads are not under frost restrictions and that for vehicles with 3.5 - 9.0 feet between axles, the load capacity is 13,000 pounds/axle. The vehicles used by MSU WSF staff and other licensed hazardous waste disposal vendors are within the limits. In addition, the distance of the facility from both railroads and right-of-ways are greater than 60 meters. The set back of the facility from Jolly Road is approximately 34 meters.

Only one entrance to the facility is present and is gained by a left hand turn from Jolly Road. No stacking lanes are present. All traffic routes within the facility are paved with asphalt and are adequate to handle both the Waste Transport Vehicles and commercial service trucks. The traffic pattern and flow within the facility are minimal since the only vehicles to use the paved surface leading to the facility off Jolly Road are the MSU Waste Transport Vehicles or service vehicles as required. On an average one to two vehicles per day enter the facility to transport waste chemicals from campus. There are no additional facilities located on these premises and no additional facilities located further along this access road. Because there are no sidewalks in the vicinity, there is no pedestrian traffic near the facility. Maintenance of these paved surfaces is provided by the MSU Grounds Department.

Following entrance to the facility, the Waste Transport Vehicles back to the loading dock as identified in **Section B6**. The loading dock is positioned approximately 100 feet from the public road used for transport.

B4.A.2(j) Air Quality

Existing ambient air quality is based on current weather conditions. There are no major potential sources of air pollution in the area. All local businesses are commercial properties such as offices, restaurants, gas stations, medical facilities, and a post office. None of these are considered major sources of air pollution.

B4.A.2(k) Noise

The current ambient noise level in the facility is from the traffic in the area. Specifically, Jolly Road is a major thoroughfare with heavy traffic volumes of 12,473 vehicles per day, and US-127 which adjoins the MSU WSF to the west, is also a major thoroughfare with heavy traffic volumes of 40,252 vehicles per day. No other local businesses significantly contribute to the noise level.

B4.A.2(l) Appearance and Aesthetics

The facility is located behind a six-foot tall privacy fence and scrub vegetation along East Jolly Road. US-127 to the west of the facility is built up on a hill with grass, small trees and other brush. The area to the east and southeast of the MSU WSF consists of small trees and scrub vegetation along the Banta Drain, and beyond that agricultural farmland. There are no unique

features of the facility – when constructed, the facility was built to be as non-descript as possible.

B4.A.2(m) Terrestrial Ecosystem

The characteristics of the terrestrial ecosystem, in terms of flora, fauna, rare or endangered species, and critical habitat are described in the following subsections.

B4.A.2(m)(i) Flora

The ground cover surrounding the MSU WSF consists of grass, and beyond the property boundaries to the west and southeast are vines and bushes, predominately the Bush Honeysuckle and grape vines. To the east of the facility is MSU farmland with rotating crops planted annually. The commercial areas surrounding the facility contain grass cover with trees typical of an urban environment including Pine, Maple, and Ash.

B4.A.2(m)(ii) Fauna

Wildlife species in the surrounding area consists of animals typically found in an urban and/or farm field environment including: deer, coyotes, wild turkeys, opossums, field mice, raccoons, various birds, and skunks. These animals have been observed throughout the years of MSU's management of the land.

B4.A.2(m)(iii) Rare or Endangered Species

For assessment of rare or endangered species, a Michigan Natural Features Inventory (MNFI) Report was obtained for the 4-miles surrounding the facility, with an update of the immediate area for this license renewal. None of the rare or endangered animal species listed on this report was observed during a physical walk-through of the area surrounding the WSF (see Attachment B4.A-1 for MNFI report).

The curator for the MSU Beal Gardens walked the entire area surrounding the MSU WSF and verified that none of the plants in the area were listed on the MNFI endangered or threatened species list for the entire state. Through visual observations, they were able to conclude that there were no rare or endangered plant species in the area surrounding.

In addition, a request submitted to the United States Department of Agriculture (USDA) verified that there are not any known established rare or endangered species in the area of the MSU WSF.

B4.A.2(m)(iv) Critical Habitat

As stated previously, the flora in the area is typical of other urban and farmland areas, and there are no critical habitats in the area.

B4.A.2(n) Aquatic Ecosystem

The characteristics of the aquatic ecosystem, in terms of flora, fauna, rare or endangered species, and critical habitat are described in the following subsections.

B4.A.2(n)(i) Flora

The only surface water in the area is the Banta drain – a small stream running east of the MSU WSF. This stream typically contains less than one foot of water at the area nearest to the WSF. The aquatic vegetation near this drain consists of tall grasses and assorted weeds.

B4.A.2(n)(ii) Fauna

The only surface water in the area is the Banta drain – a small stream running east of the MSU WSF. The aquatic species in this area is expected to include those typically found in shallow streams - tadpoles, frogs, and salamanders – although none have been observed.

B4.A.2(n)(iii) Rare or Endangered Species

For assessment of rare or endangered species, a Michigan Natural Features Inventory (MNFI) Report was obtained for the 4-miles surrounding the facility. None of the rare or endangered animal species listed on this report was observed during a physical walk-through by MSU Pest Management of the drain itself or the area surrounding the WSF (see Attachment B4.A2-1 for MNFI report).

The curator for the MSU Beal Gardens walked the entire area surrounding the MSU WSF and verified that none of the plants in the area were listed on the MNFI endangered or threatened species list for the entire state. Through visual observations, they were able to conclude that there were no rare or endangered plant species in the area surrounding.

In addition, a request submitted to the United States Department of Agriculture (USDA) verified that there are not any known established rare or endangered species in the area of the MSU WSF.

B4.A.2(n)(iv) Critical Habitat

As stated previously, the Banta Drain is a very shallow stream and the flora is typical of surrounding area streams. There is no critical habitat in the area**.**

B4.B ENVIRONMENTAL IMPACTS OF THE FACILITY

It is not expected that any impact or change on the surrounding ecosystem will occur as a result of the continued operation of the MSU WSF. Extensive precautions have been implemented to minimize the potential for any release of waste materials from the site. The sections of this application entitled "Chemical and Physical Analyses", "Waste Analysis Plan", "Security Procedures and Equipment", "Inspection Schedules", "Personnel Training Program", "Engineering Plans", "Preparedness and Prevention", and "Contingency Plan" all contain documentation of precautions and procedures that are designed to prevent the release of any waste materials from the site.

The unlikely releases from the WSF are discussed as follows: an accidental release of waste materials during transfer to the loading dock, leakage from a container in storage in the facility, an explosion of ignitable waste materials on site, a discharge occurring during consolidation of materials, or a potential release during transportation. Each of these scenarios will be discussed in detail below.

For a potential release from the loading dock, it is expected that any such release would be minimized due to the following factors:
1. Limited volumes are transported to the WSF at any one time, as MSU waste hauling vehicles are emptied weekly.
2. Precautions are taken with the packing materials to ensure their safe transport and efficient unloading at the facility.
3. Containers are unloaded and loaded one by one, which limits the overall volume being transferred into or out of the facility for transportation.

Precautions have been established to provide for effective containment and remediation should a release of waste material occur on the loading dock. Remediation would be managed as described in Section A7 Contingency Plan. Superfine, acid and solvent spill kits, and fire extinguishers are available at the WSF. Superfine and fire extinguishers are available on all transport vehicles. In addition, extensive additional safety and personal protective equipment is provided at the WSF. A list of available equipment can be found in **Appendix A7-3**.

It is anticipated that any such release would be contained in the immediate vicinity. The small potential volumes of releases which might occur, the presence of the dike around the loading/unloading area, and the presence of equipment to contain and repackage the material, would serve to minimize the impact on surface water or soil at the site.

The possibility exists that leakage might occur from one of the containers stored within the facility, though limited by the precautions described throughout various sections of this application. In the event of such a leak, the safety system described in Section A4 Security Procedures and Equipment would notify the appropriate personnel. This notification system should effectively limit the extent of any leakage. In addition, an inspection program is in place that would detect such leaks. This program is described in Section A5 Inspection Schedule. It is anticipated that any such leakage from containers would be effectively contained within the facility due to the containment features as described further in Section B6 Engineering Plans.

Another possible source of release from the facility would be an explosion of ignitable waste materials at the site. Precautions for handling these materials are described in sections "Waste Analysis Plan," "Security," "Inspection Schedules" "Engineering Plans," "Contingency Plan," and "Preparedness and Prevention." In the event of such an occurrence, the magnitude of the release will be limited by two practices: the maximum permitted storage capacity of ignitable waste materials and the segregation of waste materials into the different storage areas of the facility.

The possibility of an explosion at the WSF is remote due to the extensive precautions incorporated in the waste handling/storage process. In the event of an explosion at the facility, several precautions are in place to minimize the impact. These precautions are described in the sections entitled "Engineering Plans" and "Security Procedures." Such precautions include the

presence of fire suppression and alarm system, an organic vapor detection system and the automatic shut-down of the high-volume air control fans at the facility. It is expected that such an event could result in the release of some vapors from the facility. It is also possible that an explosion could damage the containment capability of the WSF. In either event the emergency "Contingency Plan" would be activated.

The "Contingency Plan" is thoroughly described in Section A7 and details the effective management of the release, the remediation of the release, the reporting to the proper agencies, and evacuation procedures if necessary. The "Contingency Plan" has been designed to decrease risk of exposure by both EHS personnel and the public to any release from the WSF in an emergency situation. It is also designed to eliminate potential long-term exposure.

It is estimated that the severity of the occurrence of an explosion would be limited to a single storage area of the facility as a one-time event. If such an event were to occur in either the Consolidation Room (Room 100) or the Lab Pack Room (Room 120), it is anticipated that the impact of the event would involve a relatively small volume of material, due to limited storage capacities. Leak detection capabilities, inspections, and the Inergen system would prevent both the spread and reoccurrence of explosions. If the event occurred in the Storage Room (Room 130) it is anticipated that the presence of the blowout walls would limit the impact on the rest of the facility.

Releases and pathways associated with loading/unloading activities at the dock would be limited to the area of the dock itself. The released materials themselves would not be of sufficient volume to migrate off the site or impact any adjoining property, groundwater, or surface water.

Logs of the soil borings from the site indicate the general presence of clay till which would effectively stop the migration of any waste substances released from the facility. Unless a major disruption at the site destroyed the containment capability of the WSF structure, any release of waste would be of low volume. The clay till soils around the facility should result in limiting the migration of this low volume of water to a small area around the point of release until remediation is accomplished.

The potential for a release to surface water is considered extremely unlikely to occur due to the facility’s distance from surface water, the design of the facility, and the current management practices used for handling wastes. All waste operations occur indoors; unloading/loading occurs under an enclosed canopy, and all consolidation occurs inside the building.
The nearest surface water location (the Banta Drain) is 85 feet away from the building. However, should a release occur to the Banta Drain the following corrective measure would be taken:

1. Identify source, amount and extent of the released material to Banta Drain.

2. Notify EHS trained personnel for response measures.

3. Evacuate all non-essential personnel from the immediate area, if required.

4. Stop source of leak, if possible.

5. Take all steps necessary to minimize and mitigate the leak, deploy booms and pads in observed impacted area. Contact outside emergency assistance (see contingency plan).

6. An authorized emergency coordinator will contact (if required) the EGLE Waste Management Division and Pollution Emergency Alert System (see Contingency Plan) regarding the release to the Banta Drain and corrective measures deployed.

7. Initiate remedial measures necessary for clean-up of the Banta Drain

8. Place leaking container into salvage drums.

9. Place collected spilled material and all cleanup materials into drums for disposal.

10. Follow-up investigation to determine how and why release to Banta Drain occurred and measures to prevent future incidents.

Contact of the EHS staff with the waste materials during containment or remediation is reduced or eliminated both by personnel training and the required use of personal safety equipment during such operations. The potential impact of released vapors would be minimal due to the following factors:

1. Limited possible volume of releases.
2. The presence of equipment and trained personnel to cause effective containment of the release.
3. The isolation of the WSF from the nearest residence should allow for tremendous dilution of any vapors which might migrate from the site.

Additional studies have been undertaken relative to the potential for vapor emissions from the site during the consolidation process. The following items apply to that investigation:

The MSU Waste Storage Facility has 4 fume hoods, one bench top hood in room 120, the lab pack room, and 3 floor mounted hoods in room 100. Each hood is set to operate at 100 feet per minute (fpm) with the sash full open. The fume hood exhaust system has audible (horn) and visual (light stack/magnahelic guage) alarms that warn the operators if the air flow rate falls below design set point and become unsafe. The floor mounted hoods are 34.75” deep to accommodate the width of a 55-gallon drum. The hoods operate with an on/off switch at the hood and there is another switch outside the room where the hoods can be turned on remotely. Each fume hood has its own exhaust fan as shown in the mechanical prints. Maximum airflow at the stack for each floor mounted hood is 3246 cubic feet per minute (CFM). Maximum airflow for the smaller bench top hood is 521 CFM. 2 supply fans provide makeup air for the hood exhaust providing 2500 CFM each. The toilet and toilet exhaust fan are out of service in the building. Room 130 has 2 sidewall general exhaust fans, that together, exhaust 1250 CFM. A copy of the most recent ambient air monitoring report is attached as Appendix B4.B-1.

The remaining possibility of release from the facility would be associated with a discharge occurring during the consolidation process. It is expected that releases associated with materials which occur during the consolidation process will be contained within the WSF.

Any release of waste material which might occur within the facility either from container leakage or a reaction during the consolidation process would be contained within the facility. Extensive precautions described elsewhere in this application provide for this containment capability. As a result, it is expected that the pathway of exposure would be limited to contact of EHS personnel with the waste material during the containment/remediation process. Because all EHS personnel at the site have been trained in the management of such releases and because of the availability of personal protective equipment, human exposure should be minimal and the internal release should be effectively managed.

The potential for release during transport to the facility would be greatly minimized due to the training required for any drivers transporting waste and the precautions taken when packing waste in a hauling truck. All drivers are required to possess a valid State of Michigan driver's license, and all trucks used to haul waste are permitted by EGLE and inspected annually by Michigan Department of Transportation (MDOT) trained technicians. Drivers ensure that all waste being transported in an MSU waste vehicle is in a stand-alone container; small containers and containers that do not appear to be durable enough for road travel are placed in a second container. All containers are properly labeled and secured inside the vehicle to prevent movement.

If an accident on the roadway does occur, drivers are trained to immediately notify emergency services and the MSU EHS department. The driver (or other EHS personnel) will verify if the load has shifted, or any waste containers have been compromised, and if there is any actual or immediate potential for a spill. All waste will be transferred out of the damaged vehicle and any spill will immediately cleaned up using the spill kit located on the truck (or other trucks responding to the spill).

B4.C EXPOSURE INFORMATION REPORT FOR LANDFILLS AND SURFACE IMPOUNDMENTS

The MSU WSF does not contain any landfills or surface impoundments.

B4.D EVALUATION OF ALTERNATE HAZARDOUS WASTE MANAGEMENT TECHNOLOGIES

The MSU WSF is an existing facility.

ATTACHMENT B4.A2-1 – MICHIGAN NATURAL FEATURES INVENTORY REPORT (MNFI)

Michigan Natural Features Inventory Information Request

Requestor: Stephanie Horn

Project Name: Federal License Renewal - Chemical Waste Facility

Project Location: Michigan State University, East Lansing, MI

Date Created: 05/22/2023

Use of Data

By acceptance of the information services made available through MNFI the recipient understands that access to the information is provided for primary use only. MNFI requests that the user respect the confidential and sensitive nature of the information. There should be no redistribution of the information. Indiscriminate distribution of information regarding locations of many rare species represents a threat to their protection. Additionally, since the information is constantly being updated MNFI requests that any information service provided by MNFI is destroyed upon completion of the primary use. This information is valid for one year only.

The recipient(s) of the information understand that state endangered and threatened species are protected under state law (Act 451 of 1994, the Natural Resources and Environmental Protection Act, Part 365, Endangered Species Protection). Any questions, observations, new findings, violations or clearance of project activities should be conducted with the Michigan Department of Natural Resources, Wildlife Division. Contact the Endangered Species Coordinator at (517) 284-9453. The recipient(s) of the information understand that federally endangered and threatened species are protected under federal law (Endangered Species Act of 1973). Any questions, observations, new findings, violations or clearance of project activities should be conducted with the U.S. Fish and Wildlife Service in East Lansing at (517) 351-2555. Recipients of the information are responsible for ensuring the protection of protected species and obtaining proper clearance before project activities begin.

Description of Data

The species in this report are listed alphabetically by scientific name. Each record from the database is listed individually. Therefore you may see multiple listings for the same species. The locational and survey date information may be the only differentiating factors when looking at multiple occurrences for a given species. Heritage methodology is followed when entering species occurrences into the MNFI database. Detailed information on heritage methodology can be obtained from NatureServe's website at http://www.natureserve.org. Detailed information on the species listed in this report can be found in abstracts and the rare species explorer on the MNFI website at https://mnfi.anr.msu.edu.

The MNFI database is an ongoing and continuously updated information base. The database is the only comprehensive single source of existing information on Michigan's endangered, threatened, or otherwise significant plant and animal species, natural plant communities, and other natural features. This database cannot provide a definitive statement on the presence, absence, or condition of the natural features in any given locality, since most sites have not been specifically or thoroughly surveyed for their occurrence. Some of the element records are historical. While this historical information may not be important for regulatory purposes, it is important for management and restoration purposes and for scientific use. Furthermore, plant and animal populations and natural communities change with time. Therefore, the information services provided should not be regarded as a complete statement on the occurrence of special natural features of the area in question. In many cases the information may require the interpretation of a trained scientist.

Any comments or questions can be directed to MNFI via our e-mail at mnfi@msu.edu or by calling 517-284-6200.

Plants and Animals

Scientific Name	Common Name	State Status	Federal Status	Count
Acronicta falcula	Corylus dagger moth	SC		1
Alasmidonta marginata	Elktoe	SC		8
Alasmidonta viridis	Slippershell	T		3
Ammodramus savannarum	Grasshopper sparrow	SC	PS	1
Baptisia lactea	White or prairie false indigo	T		2
Betula populifolia	Gray birch	SC		1
Boechera dentata	Rock cress	T		1
Bombus affinis	Rusty-patched bumble bee	E	LE	3
Bombus auricomus	Black and gold bumble bee	SC		2
Bombus borealis	Northern amber bumble bee	SC		1
Bombus pensylvanicus	American bumble bee	E	UR	1
Bombus terricola	Yellow banded bumble bee	SC		2
Cambarunio iris	Rainbow	SC		3
Carex billingsii	Three-seed sedge			1
Carex crus-corvi	Raven's-foot sedge	E		1
Carex davisii	Davis's sedge			2
Carex lupuliformis	False hop sedge	T		2
Carex trichocarpa	Hairy-fruited sedge	SC		2
Carex typhina	Cattail sedge	T		1
Collinsia verna	Blue-eyed Mary	T		2
Conioselinum chinense	Hemlock-parsley	SC		1
Cryptotis parva	Least shrew	T		1
Diarrhena obovata	Beak grass			2
Emydoidea blandingii	Blanding's turtle	SC	UR	3
Falco peregrinus	Peregrine falcon	T	PS:LE	1
Galearis spectabilis	Showy orchis	T		2
Haliaeetus leucocephalus	Bald eagle	SC	DL	1
Hybanthus concolor	Green violet	SC		1
Hydrastis canadensis	Goldenseal	T		2
Lasmigona compressa	Creek heelsplitter	SC		1
Lasmigona costata	Flutedshell	SC		4

Plants and Animals
(continued)

Scientific Name	Common Name	State Status	Federal Status	Count
Lithobates palustris	Pickerel frog	SC		1
Lycopus virginicus	Virginia water-horehound	SC		1
Mertensia virginica	Virginia bluebells	T		2
Microtus pinetorum	Woodland vole	SC		1
Morus rubra	Red mulberry	T		1
Myotis lucifugus	Little brown bat	T	UR	1
Myotis sodalis	Indiana bat	E	LE	1
Necturus maculosus	Mudpuppy	SC		1
Notropis texanus	Weed shiner	X		1
Panax quinquefolius	Ginseng	T		4
Papaipema speciosissima	Regal fern borer	SC		1
Pleurobema sintoxia	Round pigtoe	SC		1
Schoenoplectus torreyi	Torrey's bulrush	SC		1
Silphium perfoliatum	Cup plant	T		1
Sphaerium fabale	River fingernail clam	SC		1
Thamnophis butleri	Butler's garter snake	SC		3
Tradescantia virginiana	Virginia spiderwort	T		1
Venustaconcha ellipsiformis	Ellipse	SC		9

Number of Species: 49 **Number of Occurrences: 91**

Natural Communities

Community Type	Count
Great Blue Heron Rookery	1
Mesic Southern Forest	4

Number of Community Types: 2 **Number of Occurrences: 5**

Acronicta falcula

Corylus dagger moth

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G2G4 **State Rank:** S2S3

Last Observed Date: 1962-08-01

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	18
T04NR02W	13

Alasmidonta marginata

Elktoe

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S3?

Last Observed Date: 2001-07-09

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	13

Alasmidonta marginata

Elktoe **Invertebrate Animal**

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S3?

Last Observed Date: 2001-07-18

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	13

Alasmidonta marginata

Elktoe **Invertebrate Animal**

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S3?

Last Observed Date: 2015-07-22

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	18
T04NR02W	13

Alasmidonta marginata

Elktoe **Invertebrate Animal**

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S3?

Last Observed Date: 2001-07-17

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	13

Alasmidonta marginata

Elktoe **Invertebrate Animal**

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S3?

Last Observed Date: 2001-07-09

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	13

Alasmidonta marginata

Elktoe **Invertebrate Animal**

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S3?

Last Observed Date: 2001-07-10

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	18

Alasmidonta marginata

Elktoe **Invertebrate Animal**

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S3?

Last Observed Date: 2001-07-12

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	13

Alasmidonta marginata

Elktoe **Invertebrate Animal**

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S3?

Last Observed Date: 2013-08-09

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	27

Alasmidonta viridis

Slippershell

Invertebrate Animal

Federal Status: **State Status:** T **Global Rank:** G4G5 **State Rank:** S2S3

Last Observed Date: 2001-07-12

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	21
T04NR02W	13, 22, 23, 27

Alasmidonta viridis

Slippershell

Invertebrate Animal

Federal Status: **State Status:** T **Global Rank:** G4G5 **State Rank:** S2S3

Last Observed Date: 2001-07-18

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	13

Alasmidonta viridis

Slippershell — **Invertebrate Animal**

Federal Status: **State Status:** T **Global Rank:** G4G5 **State Rank:** S2S3

Last Observed Date: 2018-4-30

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	35

Ammodramus savannarum

Grasshopper sparrow — **Vertebrate Animal**

Federal Status: PS **State Status:** SC **Global Rank:** G5 **State Rank:** S4

Last Observed Date: 2005-06-16

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	30

Baptisia lactea

White or prairie false indigo

Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G4Q **State Rank:** S3

Last Observed Date: 1928-07-01

County: Clinton, Ingham, Shiawassee

Watershed: Upper Grand

Town Range	Section
T04NR01E	2, 3, 4, 5, 8, 9, 10, 11, 14, 15, 16, 17, 20, 21, 22, 23, 27, 28, 29, 31, 32, 33
T04NR01W	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 33, 34, 35, 36
T04NR02W	1, 12, 13
T05NR01E	16, 17, 20, 21, 22, 26, 27, 28, 29, 32, 33, 34, 35
T05NR01W	13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
T05NR02W	25, 36

Baptisia lactea

White or prairie false indigo

Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G4Q **State Rank:** S3

Last Observed Date: 2011-06-30

County: Ingham

Watershed: Upper Grand

Town Range	Section
T03NR01W	19

Betula populifolia

Gray birch

Vascular Plant

Federal Status: **State Status:** SC **Global Rank:** G5 **State Rank:** S3

Last Observed Date: 1999-10-17

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	35, 36

Boechera dentata

Rock cress

Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G5 **State Rank:** S1

Last Observed Date: 1886-06-14

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	21

Bombus affinis

Rusty-patched bumble bee

Invertebrate Animal

Federal Status: LE **State Status:** E **Global Rank:** G2 **State Rank:** SH

Last Observed Date: 1966-08-05

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	7, 18, 19
T04NR02W	12, 13, 24

Bombus affinis

Rusty-patched bumble bee

Invertebrate Animal

Federal Status: LE **State Status:** E **Global Rank:** G2 **State Rank:** SH

Last Observed Date: 1967-04-15

County: Ingham

Watershed: Upper Grand

Town Range	Section
T03NR02W	1, 2, 3
T04NR02W	25, 26, 27, 34, 35, 36

Bombus affinis

Rusty-patched bumble bee

Invertebrate Animal

Federal Status: LE **State Status:** E **Global Rank:** G2 **State Rank:** SH

Last Observed Date: 1982-05-24

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	16, 20, 21, 22, 27, 28, 29

Bombus auricomus

Black and gold bumble bee

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G5 **State Rank:** S2

Last Observed Date: 1952-07-15

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	8, 9, 15, 16, 17, 20, 21, 22

Bombus auricomus

Black and gold bumble bee

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G5 **State Rank:** S2

Last Observed Date: 1959-07-24

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	7, 18, 19
T04NR02W	12, 13, 24

Bombus borealis

Northern amber bumble bee

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G4G5 **State Rank:** S3

Last Observed Date: 1937-07-28

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	5, 6, 7, 8, 18, 19
T04NR02W	1, 12, 13, 24

Bombus pensylvanicus

American bumble bee

Invertebrate Animal

Federal Status: UR **State Status:** E **Global Rank:** G3G4 **State Rank:** S1

Last Observed Date: 1970-08-01

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	5, 6, 7, 8, 18, 19
T04NR02W	1, 12, 13, 24

Bombus terricola

Yellow banded bumble bee

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G3G4 **State Rank:** S2S3

Last Observed Date: 1965-06-08

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	7, 18, 19
T04NR02W	12, 13, 24

Bombus terricola

Yellow banded bumble bee

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G3G4 **State Rank:** S2S3

Last Observed Date: 1948-07-17

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	8, 9, 10, 15, 16, 17, 20, 21, 22

Cambarunio iris

Rainbow

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** GNR **State Rank:** S3

Last Observed Date: 2001-07-19

County: Ingham

Watershed: Upper Grand

Town Range	Section
T03NR01W	7

Cambarunio iris

Rainbow

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** GNR **State Rank:** S3

Last Observed Date: 2015-07-22

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	18
T04NR02W	13, 23

Cambarunio iris

Rainbow

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** GNR **State Rank:** S3

Last Observed Date: 2013-08-09

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	27, 35

Carex billingsii

Three-seed sedge

Vascular Plant

Federal Status: **State Status:** **Global Rank:** G5T4T5 **State Rank:** SNR

Last Observed Date: 1947-08-05

County: Ingham

Watershed: Upper Grand

Town Range	Section
T03NR02W	15, 16, 21, 22

Carex crus-corvi

Raven's-foot sedge

Vascular Plant

Federal Status: **State Status:** E **Global Rank:** G5 **State Rank:** S1

Last Observed Date: 1924-09-20

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	22, 23

Carex davisii

Davis's sedge

Vascular Plant

Federal Status: **State Status:** **Global Rank:** G4 **State Rank:** S3

Last Observed Date: 1973-06-16

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	22, 23

Carex davisii

Davis's sedge

Vascular Plant

Federal Status: **State Status:** **Global Rank:** G4 **State Rank:** S3

Last Observed Date: 2013-07-05

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	17, 20

Carex lupuliformis

False hop sedge

Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G4 **State Rank:** S2

Last Observed Date: 1892-07

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	10, 15

Carex lupuliformis

False hop sedge — Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G4 **State Rank:** S2

Last Observed Date: 1891-07

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	7, 18, 19
T04NR02W	12, 13, 14, 23, 24

Carex trichocarpa

Hairy-fruited sedge — Vascular Plant

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S2

Last Observed Date: 1947-07-13

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	22, 23

Carex trichocarpa

Hairy-fruited sedge

Vascular Plant

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S2

Last Observed Date: 1916-06-24

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	13

Carex typhina

Cattail sedge

Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G5 **State Rank:** S1

Last Observed Date: 2021-07-30

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	14, 15, 16, 21, 22, 23, 24, 26, 27, 28, 34

Collinsia verna

Blue-eyed Mary

Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G5 **State Rank:** SNR

Last Observed Date: 1995-05-19

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	8, 9, 10, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25, 26

Collinsia verna

Blue-eyed Mary

Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G5 **State Rank:** SNR

Last Observed Date: 1922-05-19

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	15, 16, 20, 21, 22, 27, 28, 29

Conioselinum chinense

Hemlock-parsley

Vascular Plant

Federal Status: **State Status:** SC **Global Rank:** G5 **State Rank:** SNR

Last Observed Date: 1882-08-00

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	8, 9, 10, 15, 16, 17, 20, 21, 22

Cryptotis parva

Least shrew

Vertebrate Animal

Federal Status: **State Status:** T **Global Rank:** G5 **State Rank:** S1S2

Last Observed Date: 1945-11

County: Clinton, Ingham

Watershed: Upper Grand

Town Range	Section
T03NR01W	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 15, 16, 17, 18
T03NR02W	1, 2, 3, 4, 10, 11, 12, 13, 14
T04NR01W	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
T04NR02W	1, 2, 3, 9, 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24, 25, 26, 27, 28, 33, 34, 35, 36
T05NR01W	29, 30, 31, 32, 33, 34
T05NR02W	35, 36

Diarrhena obovata

Beak grass

Vascular Plant

Federal Status: **State Status:** **Global Rank:** G4G5 **State Rank:** S2

Last Observed Date: 2021-07-01

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	13, 14

Diarrhena obovata

Beak grass

Vascular Plant

Federal Status: **State Status:** **Global Rank:** G4G5 **State Rank:** S2

Last Observed Date: 2013-07-05

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	17, 18, 20

Emydoidea blandingii

Blanding's turtle

Vertebrate Animal

Federal Status: UR **State Status:** SC **Global Rank:** G4 **State Rank:** S2S3

Last Observed Date: 2003-04-??

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	26

Emydoidea blandingii

Blanding's turtle

Vertebrate Animal

Federal Status: UR **State Status:** SC **Global Rank:** G4 **State Rank:** S2S3

Last Observed Date: 2006-05-06

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	35

Emydoidea blandingii

Blanding's turtle

Vertebrate Animal

Federal Status: UR **State Status:** SC **Global Rank:** G4 **State Rank:** S2S3

Last Observed Date: 2019-06-26

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	27

Falco peregrinus

Peregrine falcon

Vertebrate Animal

Federal Status: PS:LE **State Status:** T **Global Rank:** G4 **State Rank:** S3

Last Observed Date: 2020

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	18, 19
T04NR02W	13, 16, 21

Galearis spectabilis

Showy orchis

Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G5 **State Rank:** S2

Last Observed Date: 1877

County: Clinton, Eaton, Ingham

Watershed: Upper Grand

Town Range	Section
T03NR01W	5, 6, 7
T03NR02W	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17
T03NR03W	1, 12
T04NR01W	5, 6, 7, 8, 16, 17, 18, 19, 20, 21, 28, 29, 30, 31, 32
T04NR02W	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
T04NR03W	1, 2, 11, 12, 13, 14, 23, 24, 25, 26, 35, 36
T05NR01W	31
T05NR02W	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
T05NR03W	36

Galearis spectabilis

Showy orchis

Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G5 **State Rank:** S2

Last Observed Date: 1895-05-26

County: Clinton, Ingham

Watershed: Upper Grand

Town Range	Section
T03NR01W	3, 4, 5, 6
T03NR02W	1, 2, 3
T04NR01W	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35
T04NR02W	1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25, 26, 27, 28, 33, 34, 35, 36
T05NR01W	17, 18, 19, 20, 21, 22, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
T05NR02W	22, 23, 24, 25, 26, 27, 28, 33, 34, 35, 36

Great Blue Heron Rookery

Great Blue Heron Rookery

Animal Assemblage

Federal Status: **State Status:** **Global Rank:** G5 **State Rank:** SU

Last Observed Date: 2009-03-17

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	22

Haliaeetus leucocephalus

Bald eagle — Vertebrate Animal

Federal Status: DL **State Status:** SC **Global Rank:** G5 **State Rank:** S4

Last Observed Date: 2019

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	22, 23

Hybanthus concolor

Green violet — Vascular Plant

Federal Status: **State Status:** SC **Global Rank:** G5 **State Rank:** S3

Last Observed Date: 2021-06-04

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	18

Hydrastis canadensis

Goldenseal — Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G3G4 **State Rank:** S2

Last Observed Date: 2021-06-04

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	18

Hydrastis canadensis

Goldenseal

Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G3G4 **State Rank:** S2

Last Observed Date: 2021-05-24

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	19

Lasmigona compressa

Creek heelsplitter

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G5 **State Rank:** S3

Last Observed Date: 1934

County: Ingham

Watershed: Upper Grand

Town Range	Section
T03NR01E	5, 6
T03NR01W	1
T04NR01W	21, 25, 36
T04NR02W	21, 22, 23

Lasmigona costata

Flutedshell

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G5 **State Rank:** SNR

Last Observed Date:

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	9, 16, 20, 21

Lasmigona costata

Flutedshell

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G5 **State Rank:** SNR

Last Observed Date: 2015-7-22

County: Ingham

Watershed: Upper Grand

Town Range	Section
T03NR02E	4
T04NR01E	29, 35
T04NR01W	18, 21, 25, 36

Lasmigona costata

Flutedshell

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G5 **State Rank:** SNR

Last Observed Date: 2013-08-09

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	27

Lasmigona costata

Flutedshell

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G5 **State Rank:** SNR

Last Observed Date: 2002

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	35

Lithobates palustris

Pickerel frog

Vertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G5 **State Rank:** S3S4

Last Observed Date: 2015-05-25

County: Ingham

Watershed: Upper Grand

Town Range	Section
T03NR02W	10, 11, 14, 15

Lycopus virginicus

Virginia water-horehound

Vascular Plant

Federal Status: **State Status:** SC **Global Rank:** G5 **State Rank:** S2

Last Observed Date: 2013-09-05

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	17, 18, 20

Mertensia virginica

Virginia bluebells

Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G5 **State Rank:** S1S2

Last Observed Date: 2012-04-22

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	26

Mertensia virginica

Virginia bluebells

Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G5 **State Rank:** S1S2

Last Observed Date: 2017-05-09

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	18

Mesic Southern Forest

Federal Status: **State Status:** **Global Rank:** G2G3 **State Rank:** S3

Last Observed Date: 1985-07-08

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	17, 18, 19

Mesic Southern Forest

Federal Status: **State Status:** **Global Rank:** G2G3 **State Rank:** S3

Last Observed Date: 1982-05-24

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	30

Mesic Southern Forest

Federal Status: **State Status:** **Global Rank:** G2G3 **State Rank:** S3

Last Observed Date: 1984-05-30

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	27

Mesic Southern Forest

Federal Status: **State Status:** **Global Rank:** G2G3 **State Rank:** S3

Last Observed Date: 2006-05-04

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	19

Microtus pinetorum

Woodland vole

Vertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G5 **State Rank:** S3S4

Last Observed Date: 1938-07-13

County: Clinton, Ingham

Watershed: Upper Grand

Town Range	Section
T03NR01W	2, 3, 4, 5, 6, 7, 8, 9, 10
T03NR02W	1, 2, 3, 4, 10, 11, 12
T04NR01W	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
T04NR02W	1, 2, 3, 4, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 33, 34, 35, 36
T05NR01W	19, 20, 27, 28, 29, 30, 31, 32, 33, 34, 35
T05NR02W	24, 25, 26, 27, 33, 34, 35, 36

Morus rubra

Red mulberry — Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G5 **State Rank:** S2

Last Observed Date: 1969-10-07

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	18

Myotis lucifugus

Little brown bat — Vertebrate Animal

Federal Status: UR **State Status:** T **Global Rank:** G3G4 **State Rank:** S1

Last Observed Date: 1958

County: Clinton, Eaton, Ingham

Watershed: Upper Grand

Town Range	Section
T03NR01W	4, 5, 6
T03NR02W	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 17
T03NR03W	1, 2, 12
T04NR01W	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 26, 27, 28, 29, 30, 31, 32, 33, 34
T04NR02W	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
T04NR03W	1, 2, 10, 11, 12, 13, 14, 15, 22, 23, 24, 25, 26, 27, 35, 36
T05NR01W	17, 18, 19, 20, 21, 22, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35
T05NR02W	13, 14, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
T05NR03W	25, 35, 36

Myotis sodalis

Indiana bat

Vertebrate Animal

Federal Status: LE **State Status:** E **Global Rank:** G2 **State Rank:** S1

Last Observed Date: 1974-10-11

County: Clinton, Eaton, Ingham

Watershed: Upper Grand

Town Range	Section
T03NR01W	6
T03NR02W	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18
T03NR03W	1, 2, 3, 11, 12, 13
T04NR01W	6, 7, 18, 19, 30, 31
T04NR02W	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
T04NR03W	1, 2, 3, 10, 11, 12, 13, 14, 15, 22, 23, 24, 25, 26, 27, 34, 35, 36
T05NR02W	27, 28, 29, 30, 31, 32, 33, 34, 35, 36
T05NR03W	35, 36

Necturus maculosus

Mudpuppy

Vertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G5 **State Rank:** S3S4

Last Observed Date: 2010-01-04

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	18

Notropis texanus

Weed shiner

Vertebrate Animal

Federal Status: **State Status:** X **Global Rank:** G5 **State Rank:** S1

Last Observed Date: 1962-09-15

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	18, 20, 21
T04NR02W	13

Panax quinquefolius

Ginseng

Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G3G4 **State Rank:** S2S3

Last Observed Date: 2009-06-16

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	19

Panax quinquefolius

Ginseng

Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G3G4 **State Rank:** S2S3

Last Observed Date: 1964-09-07

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	17, 18, 19, 20

Panax quinquefolius

Ginseng

Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G3G4 **State Rank:** S2S3

Last Observed Date: 1895-06-06

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	18
T04NR02W	13

Panax quinquefolius

Ginseng

Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G3G4 **State Rank:** S2S3

Last Observed Date: 2021-08-12

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	30

Papaipema speciosissima

Regal fern borer

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S2S3

Last Observed Date: 1964-09-01

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	18

Pleurobema sintoxia

Round pigtoe

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G4G5 **State Rank:** S3

Last Observed Date: 2001-07-17

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	18
T04NR02W	13, 22, 23

Schoenoplectus torreyi

Torrey's bulrush

Vascular Plant

Federal Status: **State Status:** SC **Global Rank:** G5? **State Rank:** S2S3

Last Observed Date: 1893-08-08

County: Clinton, Ingham, Shiawassee

Watershed: Upper Grand

Town Range	Section
T03NR01E	5, 6
T03NR01W	1, 2, 3
T04NR01E	2, 3, 4, 5, 8, 9, 10, 11, 14, 15, 16, 17, 20, 21, 22, 23, 27, 28, 29, 31, 32, 33
T04NR01W	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 33, 34, 35, 36
T04NR02W	1, 12, 13, 24
T05NR01E	17, 20, 21, 22, 26, 27, 28, 29, 32, 33, 34, 35
T05NR01W	13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
T05NR02W	36

Silphium perfoliatum

Cup plant — Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G5 **State Rank:** S2

Last Observed Date: 1993-09-15

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	23

Sphaerium fabale

River fingernail clam — Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G5 **State Rank:** SNR

Last Observed Date:

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	21, 22, 23

Thamnophis butleri

Butler's garter snake — Vertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S4

Last Observed Date: 1991-04-07

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	9, 10, 11, 14, 15, 16, 20, 21, 22, 23, 27, 28, 29

Thamnophis butleri

Butler's garter snake

Vertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S4

Last Observed Date: 1961-05-31

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	6, 7, 18
T04NR02W	1, 12, 13

Thamnophis butleri

Butler's garter snake

Vertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S4

Last Observed Date: 2018-04-28

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	26

Tradescantia virginiana

Virginia spiderwort

Vascular Plant

Federal Status: **State Status:** T **Global Rank:** G5 **State Rank:** S2

Last Observed Date: 1923-06-08

County: Clinton, Ingham

Watershed: Upper Grand

Town Range	Section
T03NR01W	3, 4, 5, 6, 7, 8
T03NR02W	1, 2, 3, 4, 10, 11, 12
T04NR01W	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 26, 27, 28, 29, 30, 31, 32, 33, 34
T04NR02W	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 33, 34, 35, 36
T05NR01W	19, 20, 28, 29, 30, 31, 32, 33, 34
T05NR02W	22, 23, 24, 25, 26, 27, 28, 32, 33, 34, 35, 36

Venustaconcha ellipsiformis

Ellipse

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S3

Last Observed Date: 2001-07-09

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	13

Venustaconcha ellipsiformis

Ellipse

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S3

Last Observed Date: 2015-07-22

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	18
T04NR02W	13

Venustaconcha ellipsiformis

Ellipse

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S3

Last Observed Date: 2001-07-18

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	13

Venustaconcha ellipsiformis

Ellipse

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S3

Last Observed Date: 2001-07-12

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	13

Venustaconcha ellipsiformis

Ellipse

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S3

Last Observed Date: 2001-07-10

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	18

Venustaconcha ellipsiformis

Ellipse

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S3

Last Observed Date: 2001-07-09

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	13

Venustaconcha ellipsiformis

Ellipse

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S3

Last Observed Date: 2001-07-17

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	13

Venustaconcha ellipsiformis

Ellipse

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S3

Last Observed Date: 2018-4-30

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR02W	35

Venustaconcha ellipsiformis

Ellipse

Invertebrate Animal

Federal Status: **State Status:** SC **Global Rank:** G4 **State Rank:** S3

Last Observed Date: 1958-09-28

County: Ingham

Watershed: Upper Grand

Town Range	Section
T04NR01W	18
T04NR02W	13

Federal Protection Status Code Definitions

LE = Listed endangered
LT = Listed threatened
LE/LT = Partly listed endangered and partly listed threatened
PDL = Proposed delist
E(S/A) = Endangered based on similarities/appearance
PS = Partial status (federally listed in only part of its range)
C = Species being considered for federal status

State Protection Status Code Definitions

E = Endangered
T = Threatened
SC = Special concern
X = Presumed extirpated (legally 'threatened' if rediscovered)

Global Heritage Status Rank Definitions

The priority assigned by NatureServe 's national office for data collection and protection based upon the element's status throughout its entire world-wide range. Criteria not based only on number of occurrences; other critical factors also apply. Note that ranks are frequently combined.

G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences range-wide or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.
G2 = Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g. a single western state, a physiographic region in the East) or because of other factor(s) making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100.
G4 = Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.
G5 = Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
GH = Of historical occurrence throughout its range, i.e. formerly part of the established biota, with the expectation that it may be rediscovered (e.g. Bachman's Warbler).
GU = Possibly in peril range-wide, but status uncertain; need more information.
GX = Believed to be extinct throughout its range (e.g. Passenger Pigeon with virtually no likelihood that it will be rediscovered).
G? = Incomplete data
Q = Taxonomy uncertain
T = Subspecies
U = Unmappable through out the global geographic extent
? = Questionable

Subnational Heritage Status Rank Definitions

The priority assigned by the Michigan Natural Features Inventory for data collection and protection based upon the element's status within the state. Criteria not based only on number of occurrences; other critical factors also apply. Note that ranks are frequently combined.

S1 = Critically imperiled in the state because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation in the state.
S2 = Imperiled in state because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state.
S3 = Rare or uncommon in state (on the order of 21 to 100 occurrences).
S4 = Apparently secure in state, with many occurrences.
S5 = Demonstrably secure in state and essentially ineradicable under present conditions.
SA = Accidental in state, including species (usually birds or butterflies) recorded once or twice or only at very great intervals, hundreds or even thousands of miles outside their usual range.
SE = An exotic established in the state; may be native elsewhere in North America (e.g. house finch or catalpa in eastern states).
SH = Of historical occurrence in state and suspected to be still extant.
SN = Regularly occurring, usually migratory and typically nonbreeding species.
SR = Reported from state, but without persuasive documentation which would provide a basis for either accepting or rejecting the report.
SRF = Reported falsely (in error) from state but this error persisting in the literature.
SU = Possibly in peril in state, but status uncertain; need more information.
SX = Apparently extirpated from state.

ATTACHMENT B4.B-1 – 2021 AMBIENT AIR MONITORING RESULTS

AIR MONTORING RESULTS

Michigan State University
Hazardous Waste Facility – MID 053343976
State Registration Number K3249

October 15, 2021

INTRODUCTION

Michigan State University's (MSU) Office of Environmental Health and Safety (EHS) conducted ambient air monitoring at the MSU Waste Storage Facility (WSF) located at 3634 E. Jolly Road per the approved work plan dated June 16, 2016 with the approved sampling compound list (See Table 1). That plan provided the requirements outlined in Part VI "Monitoring/Recordkeeping" under the Renewable Operating Permit issued October 21, 2016, by Michigan Department of Environmental Quality (MDEQ) in accordance with the rules and regulations of Part 55 of Public Act 451, as amended. The air sampling program was conducted from August 9, 2021 through October 5, 2021.

AIR SAMPLING PROCESS

The samples were collected each week during lab pack consolidation and drum consolidation for a total of 10 samples. Testing was conducted in accordance with the current permit, which limits consolidation to only one hood at a time. The sampling was conducted at the northeast end of the property and located eight feet from ground level to compensate for ground slope. Background samples when not consolidating were not collected at this time, as MSU obtained reference background samples during the December 2010 sampling. MSU performed air sampling in accordance with procedures outlined in EPA Method TO-15: Determination of volatile organic compound in air collected canisters and analyzed by GC/MS. The air samples were collected in pre-cleaned Summa canisters and analyzed for 60 volatile compounds.

QUALITY CONTROL/ASSURANCE

The analytical laboratory at Fibertec Environmental Services, Inc., 1914 Holloway drive, Holt, Michigan supplied the Summa canisters and performed the sample analysis pursuant to the requirements of EPA Method TO-15. Quality control steps included cleaning each canister, testing each canister and regulator prior to use, evacuation of each canister to desired vacuum

pressure, laboratory blank sample, and a laboratory control sample with each analysis. The compounds that were tested and the detection limits are provided in Table 1.

Quality assurance steps in the field include a check that each sample is under vacuum, (a gauge on each sample allows for initial, periodic, and end sample checks of vacuum pressure) at least once during each sample event. The regulator that comes with each canister was pre-calibrated to allow samples to be collected over the desired time frame of four hours. A laboratory blank was also performed as part of the sample analysis.

RESULTS

Sample results show a total of six different compounds detected in various small concentrations throughout the sampling period: acetone, chloroform, methylene chloride, n-Hexane, MTBE, and toluene. Table 2 shows the amounts of specific chemicals detected on each of the sampling dates. All amounts listed are in ppbv. The Fibertec laboratory reports for each sampling event are included in Appendix 1.

TABLE 1 - 6/13/2016

Compounds and Detection Limits

Parameter	RDL	Units
1,1,1-Trichloroethane	1.5	ppbv
1,1,2,2-Tetrachloroethane	0.03	ppbv
1,1,2-Trichloroethane	0.12	ppbv
1,1,2-Trichlorotrifluoroethane	3	ppbv
1,1-Dichloroethane	1.5	ppbv
1,1-Dichloroethene	1.5	ppbv
1,2,4-Trichlorobenzene	3	ppbv
1,2,4-Trimethylbenzene	0.9	ppbv
1,2-Dichlorobenzene	1.5	ppbv
1,2-Dichloroethane	0.12	ppbv
1,2-Dichloropropane	0.3	ppbv
1,3,5-Trimethylbenzene	0.9	ppbv
1,3-Butadiene	0.08	ppbv
1,3-Dichlorobenzene	0.3	ppbv
1,4-Dichlorobenzene	0.3	ppbv
1,4-Dioxane	1.5	ppbv
2-Butanone	3	ppbv
2-Hexanone	3	ppbv
2-Methylnaphthalene	6	ppbv
4-Methyl-2-pentanone	3	ppbv
Acetone	15	ppbv
Benzene	0.9	ppbv
Benzyl Chloride	1.5	ppbv
Bromodichloromethane	0.12	ppbv
Bromoform	1.5	ppbv

5 RLs as of 6/10/16. Subject to change.

Bromomethane	0.9	ppbv
Carbon Disulfide	6	ppbv
Carbon Tetrachloride	0.12	ppbv
Chlorobenzene	3	ppbv
Chloroethane	1.5	ppbv
Chloroform	0.12	ppbv
Chloromethane	6	ppbv
cis-1,2-Dichloroethene	1.5	ppbv
cis-1,3-Dichloropropene	0.9	ppbv
Cyclohexane	3	ppbv
Dibromochloromethane	0.08	ppbv
Dichlorodifluoromethane	3	ppbv
Ethyl Acetate	3	ppbv
Ethylbenzene	1.5	ppbv
Ethylene Dibromide	0.03	ppbv
Hexachlorobutadiene	0.08	ppbv
Isopropanol	6	ppbv
m&p-Xylene	3	ppbv
Methylene Chloride	6	ppbv
MTBE	1.5	ppbv
n-Heptane	3	ppbv
n-Hexane	3	ppbv
Naphthalene	1.5	ppbv
o-Xylene	3	ppbv
Styrene	3	ppbv
Tetrachloroethene	0.9	ppbv
Tetrahydrofuran	1.5	ppbv
Toluene	1.5	ppbv
trans-1,2-Dichloroethene	1.5	ppbv
trans-1,3-Dichloropropene	0.9	ppbv
Trichloroethene	0.03	ppbv

Trichlorofluoromethane	1.5	ppbv
Vinyl Acetate	3	ppbv
Vinyl Chloride	0.9	ppbv
Xylenes	6	ppbv

TABLE 2 - 2021 Sample Results (ppbv)

Sample #	Date/Time	Unit	Acetone	Chloroform	Methylene chloride	n-Hexane	MTBE	Toluene
1	8/9/2021, 1:00pm	lab fume hood	-	-	-	-	-	-
2	8/10/2021, 12:50pm	drum hood	-	-	35	23	-	-
3	8/16/2021, 12:50pm	lab fume hood	-	-	-	-	-	-
4	8/23/2021, 1:10pm	lab fume hood	-	-	-	-	-	-
5	8/30/2021, 1:16pm	lab fume hood	-	-	-	-	-	-
6	8/31/2021, 12:51pm	drum hood	-	-	-	-	-	-
7	9/7/2021, 1:00pm	lab fume hood	-	0.86	-	-	-	-
8	9/8/2021, 12:30pm	drum hood	-	0.69	-	-	-	-
9	10/4/2021, 3:33pm	lab fume hood	-	-	-	-	-	-
10	10/5/2021, 2:50pm	drum hood	41	9.6	34	35	6.9	10

Appendix 1

Fibertec Laboratory Reports

Fibertec
environmental
services

Monday, August 23, 2021

Fibertec Project Number:	A03347
Project Identification:	WSF Air Monitoring /
Submittal Date:	08/11/2021

Ms. Mary Lindsey
Michigan State University - EHS
Environmental Health & Safety
4000 Collins Road, B20
Lansing, MI 48910

Dear Ms. Lindsey,

Thank you for selecting Fibertec Environmental Services as your analytical laboratory. The samples you submitted have been analyzed in accordance with NELAC standards and the results compiled in the attached report. Any exceptions to NELAC compliance are noted in the report. These results apply only to those samples submitted. Please note TO-15 samples will be disposed of 7 calendar days after the reporting date. All other samples will be disposed of 30 days after the reporting date.

If you have any questions regarding these results or if we may be of further assistance to you, please contact me at (517) 699-0345.

Sincerely,

Bailey Welch

By Bailey Welch at 4:30 PM, Aug 23, 2021

For Daryl P. Strandbergh
Laboratory Director

Enclosures

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 1, Sample 1**	Chain of Custody:	**195631**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**001**	Collect Date:	**08/09/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**13:00**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A03347-001** **Matrix: Air**
Method: EPA TO-15 **Description: Day 1, Sample 1**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Acetone	U		µg/m3	36	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
2. Benzene	U		µg/m3	2.9	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
3. Benzyl Chloride	U		µg/m3	0.41	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
4. Bromodichloromethane	U		µg/m3	0.80	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
5. Bromoform	U		µg/m3	15	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
6. Bromomethane	U		µg/m3	3.5	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
7. 1,3-Butadiene	U		µg/m3	0.18	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
8. 2-Butanone	U		µg/m3	8.8	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
‡ 9. Carbon Disulfide	U		µg/m3	19	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
10. Carbon Tetrachloride	U		µg/m3	0.75	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
11. Chlorobenzene	U		µg/m3	14	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
12. Chloroethane	U		µg/m3	4.0	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
13. Chloroform	U		µg/m3	0.59	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
14. Chloromethane	U		µg/m3	12	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
15. Cyclohexane	U		µg/m3	10	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
16. Dibromochloromethane	U		µg/m3	0.68	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
17. 1,2-Dichlorobenzene	U		µg/m3	9.0	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
18. 1,3-Dichlorobenzene	U		µg/m3	1.8	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
19. 1,4-Dichlorobenzene	U		µg/m3	1.8	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
20. Dichlorodifluoromethane	U		µg/m3	15	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
21. 1,1-Dichloroethane	U		µg/m3	6.1	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
22. 1,2-Dichloroethane	U		µg/m3	0.49	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
23. 1,1-Dichloroethene	U		µg/m3	5.9	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
24. cis-1,2-Dichloroethene	U		µg/m3	5.9	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
25. trans-1,2-Dichloroethene	U		µg/m3	5.9	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
26. 1,2-Dichloropropane	U		µg/m3	1.4	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
27. cis-1,3-Dichloropropene	U		µg/m3	1.4	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
28. trans-1,3-Dichloropropene	U		µg/m3	1.4	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
29. 1,4-Dioxane	U		µg/m3	5.4	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
‡ 30. Ethyl Acetate	U		µg/m3	11	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
31. Ethylbenzene	U		µg/m3	6.5	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
32. Ethylene Dibromide	U		µg/m3	0.23	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
33. n-Heptane	U		µg/m3	12	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
34. Hexachlorobutadiene	U		µg/m3	0.85	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
35. n-Hexane	U		µg/m3	11	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
‡ 36. 2-Hexanone	U		µg/m3	12	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
‡ 37. Isopropanol	U		µg/m3	15	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 1, Sample 1**	Chain of Custody:	**195631**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**001**	Collect Date:	**08/09/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**13:00**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A03347-001** **Matrix: Air**
Method: EPA TO-15 **Description: Day 1, Sample 1**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
38. 4-Methyl-2-pentanone	U		µg/m3	12	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
39. Methylene Chloride	U		µg/m3	21	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
‡ 40. 2-Methylnaphthalene	U		µg/m3	35	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
41. MTBE	U		µg/m3	5.4	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
‡ 42. Naphthalene	U		µg/m3	1.6	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
43. Styrene	U		µg/m3	13	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
44. 1,1,2,2-Tetrachloroethane	U		µg/m3	0.21	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
45. Tetrachloroethene	U		µg/m3	6.1	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
‡ 46. Tetrahydrofuran	U		µg/m3	4.4	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
47. Toluene	U		µg/m3	5.7	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
48. 1,2,4-Trichlorobenzene	U		µg/m3	22	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
49. 1,1,1-Trichloroethane	U		µg/m3	8.2	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
50. 1,1,2-Trichloroethane	U		µg/m3	0.65	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
51. Trichloroethene	U		µg/m3	0.16	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
52. Trichlorofluoromethane	U		µg/m3	8.4	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
‡ 53. 1,1,2-Trichlorotrifluoroethane	U		µg/m3	23	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
54. 1,2,4-Trimethylbenzene	U		µg/m3	4.4	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
55. 1,3,5-Trimethylbenzene	U		µg/m3	4.4	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
56. Vinyl Acetate	U		µg/m3	11	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
57. Vinyl Chloride	U		µg/m3	0.77	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
58. m&p-Xylene	U		µg/m3	13	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
59. o-Xylene	U		µg/m3	13	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
‡ 60. Xylenes	U		µg/m3	26	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 2, Sample 2**	Chain of Custody:	**195631**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**002**	Collect Date:	**08/10/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**12:50**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A03347-002** **Matrix: Air**
Method: EPA TO-15 **Description: Day 2, Sample 2**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Acetone	U		µg/m3	36	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
2. Benzene	U		µg/m3	2.9	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
3. Benzyl Chloride	U		µg/m3	0.41	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
4. Bromodichloromethane	U		µg/m3	0.80	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
5. Bromoform	U		µg/m3	15	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
6. Bromomethane	U		µg/m3	3.5	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
7. 1,3-Butadiene	U		µg/m3	0.18	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
8. 2-Butanone	U		µg/m3	8.8	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
‡ 9. Carbon Disulfide	U		µg/m3	19	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
10. Carbon Tetrachloride	U		µg/m3	0.75	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
11. Chlorobenzene	U		µg/m3	14	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
12. Chloroethane	U		µg/m3	4.0	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
13. Chloroform	U		µg/m3	0.59	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
14. Chloromethane	U		µg/m3	12	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
15. Cyclohexane	U		µg/m3	10	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
16. Dibromochloromethane	U		µg/m3	0.68	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
17. 1,2-Dichlorobenzene	U		µg/m3	9.0	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
18. 1,3-Dichlorobenzene	U		µg/m3	1.8	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
19. 1,4-Dichlorobenzene	U		µg/m3	1.8	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
20. Dichlorodifluoromethane	U		µg/m3	15	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
21. 1,1-Dichloroethane	U		µg/m3	6.1	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
22. 1,2-Dichloroethane	U		µg/m3	0.49	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
23. 1,1-Dichloroethene	U		µg/m3	5.9	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
24. cis-1,2-Dichloroethene	U		µg/m3	5.9	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
25. trans-1,2-Dichloroethene	U		µg/m3	5.9	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
26. 1,2-Dichloropropane	U		µg/m3	1.4	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
27. cis-1,3-Dichloropropene	U		µg/m3	1.4	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
28. trans-1,3-Dichloropropene	U		µg/m3	1.4	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
29. 1,4-Dioxane	U		µg/m3	5.4	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
‡ 30. Ethyl Acetate	U		µg/m3	11	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
31. Ethylbenzene	U		µg/m3	6.5	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
32. Ethylene Dibromide	U		µg/m3	0.23	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
33. n-Heptane	U		µg/m3	12	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
34. Hexachlorobutadiene	U		µg/m3	0.85	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
35. n-Hexane	**23**		µg/m3	11	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
‡ 36. 2-Hexanone	U		µg/m3	12	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
‡ 37. Isopropanol	U		µg/m3	15	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 2, Sample 2**	Chain of Custody:	**195631**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**002**	Collect Date:	**08/10/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**12:50**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A03347-002** **Matrix: Air**
Method: EPA TO-15 **Description: Day 2, Sample 2**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
38. 4-Methyl-2-pentanone	U		µg/m3	12	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
39. Methylene Chloride	**35**		µg/m3	21	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
‡ 40. 2-Methylnaphthalene	U		µg/m3	35	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
41. MTBE	U		µg/m3	5.4	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
‡ 42. Naphthalene	U		µg/m3	1.6	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
43. Styrene	U		µg/m3	13	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
44. 1,1,2,2-Tetrachloroethane	U		µg/m3	0.21	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
45. Tetrachloroethene	U		µg/m3	6.1	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
‡ 46. Tetrahydrofuran	U		µg/m3	4.4	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
47. Toluene	U		µg/m3	5.7	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
48. 1,2,4-Trichlorobenzene	U		µg/m3	22	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
49. 1,1,1-Trichloroethane	U		µg/m3	8.2	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
50. 1,1,2-Trichloroethane	U		µg/m3	0.65	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
51. Trichloroethene	U		µg/m3	0.16	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
52. Trichlorofluoromethane	U		µg/m3	8.4	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
‡ 53. 1,1,2-Trichlorotrifluoroethane	U		µg/m3	23	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
54. 1,2,4-Trimethylbenzene	U		µg/m3	4.4	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
55. 1,3,5-Trimethylbenzene	U		µg/m3	4.4	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
56. Vinyl Acetate	U		µg/m3	11	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
57. Vinyl Chloride	U		µg/m3	0.77	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
58. m&p-Xylene	U		µg/m3	13	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
59. o-Xylene	U		µg/m3	13	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD
‡ 60. Xylenes	U		µg/m3	26	1.0	08/21/21	VQ21H21B	08/22/21	VQ21H21B	VSD

Definitions/ Qualifiers:

A: Spike recovery or precision unusable due to dilution.
B: The analyte was detected in the associated method blank.
E: The analyte was detected at a concentration greater than the calibration range, therefore the result is estimated.
J: The concentration is an estimated value.
M: Modified Method
U: The analyte was not detected at or above the reporting limit.
X: Matrix Interference has resulted in a raised reporting limit or distorted result.
W: Results reported on a wet-weight basis.
***:** Value reported is outside QC limits
D: The sample or extract was analyzed at a DF greater than 1.

Exception Summary:

Analysis Locations:

All analyses performed in Holt.

Accreditation Number(s):

T104704518-19-8 (TX)

Fibertec
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Friday, August 27, 2021

Fibertec Project Number:	A03463
Project Identification:	WSF Air Monitoring /
Submittal Date:	08/18/2021

Ms. Mary Lindsey
Michigan State University - EHS
Environmental Health & Safety
4000 Collins Road, B20
Lansing, MI 48910

Dear Ms. Lindsey,

Thank you for selecting Fibertec Environmental Services as your analytical laboratory. The samples you submitted have been analyzed in accordance with NELAC standards and the results compiled in the attached report. Any exceptions to NELAC compliance are noted in the report. These results apply only to those samples submitted. Please note TO-15 samples will be disposed of 7 calendar days after the reporting date. All other samples will be disposed of 30 days after the reporting date.

If you have any questions regarding these results or if we may be of further assistance to you, please contact me at (517) 699-0345.

Sincerely,

Bailey Welch

By Bailey Welch at 8:26 AM, Aug 27, 2021

For Daryl P. Strandbergh
Laboratory Director

Enclosures

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 3**	Chain of Custody:	**196153**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**001**	Collect Date:	**08/16/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**12:50**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A03463-001** **Matrix: Air**
Method: EPA TO-15 **Description: Day 3**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Acetone	U		µg/m3	36	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
2. Benzene	U		µg/m3	2.9	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
3. Benzyl Chloride	U	V+	µg/m3	0.41	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
4. Bromodichloromethane	U		µg/m3	0.80	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
5. Bromoform	U		µg/m3	15	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
6. Bromomethane	U		µg/m3	3.5	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
7. 1,3-Butadiene	U		µg/m3	0.18	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
8. 2-Butanone	U		µg/m3	8.8	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
‡ 9. Carbon Disulfide	U		µg/m3	19	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
10. Carbon Tetrachloride	U		µg/m3	0.75	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
11. Chlorobenzene	U		µg/m3	14	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
12. Chloroethane	U		µg/m3	4.0	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
13. Chloroform	U		µg/m3	0.59	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
14. Chloromethane	U		µg/m3	12	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
15. Cyclohexane	U		µg/m3	10	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
16. Dibromochloromethane	U		µg/m3	0.68	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
17. 1,2-Dichlorobenzene	U		µg/m3	9.0	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
18. 1,3-Dichlorobenzene	U		µg/m3	1.8	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
19. 1,4-Dichlorobenzene	U		µg/m3	1.8	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
20. Dichlorodifluoromethane	U		µg/m3	15	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
21. 1,1-Dichloroethane	U		µg/m3	6.1	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
22. 1,2-Dichloroethane	U		µg/m3	0.49	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
23. 1,1-Dichloroethene	U		µg/m3	5.9	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
24. cis-1,2-Dichloroethene	U		µg/m3	5.9	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
25. trans-1,2-Dichloroethene	U		µg/m3	5.9	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
26. 1,2-Dichloropropane	U		µg/m3	1.4	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
27. cis-1,3-Dichloropropene	U		µg/m3	1.4	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
28. trans-1,3-Dichloropropene	U		µg/m3	1.4	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
29. 1,4-Dioxane	U		µg/m3	5.4	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
‡ 30. Ethyl Acetate	U		µg/m3	11	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
31. Ethylbenzene	U		µg/m3	6.5	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
32. Ethylene Dibromide	U		µg/m3	0.23	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
33. n-Heptane	U		µg/m3	12	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
34. Hexachlorobutadiene	U		µg/m3	0.85	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
35. n-Hexane	U		µg/m3	11	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
‡ 36. 2-Hexanone	U		µg/m3	12	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
‡ 37. Isopropanol	U		µg/m3	15	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 3**	Chain of Custody:	**196153**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**001**	Collect Date:	**08/16/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**12:50**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A03463-001** **Matrix: Air**
Method: EPA TO-15 **Description: Day 3**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
38. 4-Methyl-2-pentanone	U		µg/m3	12	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
39. Methylene Chloride	U		µg/m3	21	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
‡ 40. 2-Methylnaphthalene	U	V+	µg/m3	35	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
41. MTBE	U		µg/m3	5.4	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
‡ 42. Naphthalene	U		µg/m3	1.6	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
43. Styrene	U		µg/m3	13	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
44. 1,1,2,2-Tetrachloroethane	U		µg/m3	0.21	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
45. Tetrachloroethene	U		µg/m3	6.1	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
‡ 46. Tetrahydrofuran	U		µg/m3	4.4	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
47. Toluene	U		µg/m3	5.7	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
48. 1,2,4-Trichlorobenzene	U		µg/m3	22	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
49. 1,1,1-Trichloroethane	U		µg/m3	8.2	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
50. 1,1,2-Trichloroethane	U		µg/m3	0.65	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
51. Trichloroethene	U		µg/m3	0.16	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
52. Trichlorofluoromethane	U		µg/m3	8.4	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
‡ 53. 1,1,2-Trichlorotrifluoroethane	U		µg/m3	23	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
54. 1,2,4-Trimethylbenzene	U		µg/m3	4.4	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
55. 1,3,5-Trimethylbenzene	U		µg/m3	4.4	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
56. Vinyl Acetate	U		µg/m3	11	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
57. Vinyl Chloride	U		µg/m3	0.77	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
58. m&p-Xylene	U		µg/m3	13	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
59. o-Xylene	U		µg/m3	13	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD
‡ 60. Xylenes	U		µg/m3	26	1.0	08/25/21	VK21H25B	08/25/21	VK21H25B	VSD

Definitions/ Qualifiers:

A: Spike recovery or precision unusable due to dilution.
B: The analyte was detected in the associated method blank.
E: The analyte was detected at a concentration greater than the calibration range, therefore the result is estimated.
J: The concentration is an estimated value.
M: Modified Method
U: The analyte was not detected at or above the reporting limit.
X: Matrix Interference has resulted in a raised reporting limit or distorted result.
W: Results reported on a wet-weight basis.
***:** Value reported is outside QC limits
D: The sample or extract was analyzed at a DF greater than 1.

Exception Summary:

V+ : Recovery in the associated continuing calibration verification sample (CCV) exceeds the upper control limit. Results may be biased high.

Analysis Locations:

All analyses performed in Holt.

Accreditation Number(s):

T104704518-19-8 (TX)

Fibertec
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Monday, August 30, 2021

Fibertec Project Number:	A03549
Project Identification:	WSF Air Monitoring /
Submittal Date:	08/23/2021

Ms. Mary Lindsey
Michigan State University - EHS
Environmental Health & Safety
4000 Collins Road, B20
Lansing, MI 48910

Dear Ms. Lindsey,

Thank you for selecting Fibertec Environmental Services as your analytical laboratory. The samples you submitted have been analyzed in accordance with NELAC standards and the results compiled in the attached report. Any exceptions to NELAC compliance are noted in the report. These results apply only to those samples submitted. Please note TO-15 samples will be disposed of 7 calendar days after the reporting date. All other samples will be disposed of 30 days after the reporting date.

If you have any questions regarding these results or if we may be of further assistance to you, please contact me at (517) 699-0345.

Sincerely,

By Sue Ricketts at 3:02 PM, Aug 30, 2021

For Daryl P. Strandbergh
Laboratory Director

Enclosures

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 4**	Chain of Custody:	**195927**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**2952**	Collect Date:	**08/23/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**13:10**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A03549-001** **Matrix: Air**
Method: EPA TO-15 **Description: Day 4**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Acetone	U		µg/m3	36	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
2. Benzene	U		µg/m3	2.9	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
3. Benzyl Chloride	U	V+	µg/m3	0.41	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
4. Bromodichloromethane	U		µg/m3	0.80	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
5. Bromoform	U		µg/m3	15	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
6. Bromomethane	U		µg/m3	3.5	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
7. 1,3-Butadiene	U		µg/m3	0.18	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
8. 2-Butanone	U		µg/m3	8.8	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
‡ 9. Carbon Disulfide	U		µg/m3	19	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
10. Carbon Tetrachloride	U		µg/m3	0.75	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
11. Chlorobenzene	U		µg/m3	14	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
12. Chloroethane	U		µg/m3	4.0	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
13. Chloroform	U		µg/m3	0.59	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
14. Chloromethane	U		µg/m3	12	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
15. Cyclohexane	U		µg/m3	10	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
16. Dibromochloromethane	U		µg/m3	0.68	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
17. 1,2-Dichlorobenzene	U		µg/m3	9.0	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
18. 1,3-Dichlorobenzene	U		µg/m3	1.8	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
19. 1,4-Dichlorobenzene	U		µg/m3	1.8	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
20. Dichlorodifluoromethane	U		µg/m3	15	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
21. 1,1-Dichloroethane	U		µg/m3	6.1	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
22. 1,2-Dichloroethane	U		µg/m3	0.49	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
23. 1,1-Dichloroethene	U		µg/m3	5.9	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
24. cis-1,2-Dichloroethene	U		µg/m3	5.9	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
25. trans-1,2-Dichloroethene	U		µg/m3	5.9	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
26. 1,2-Dichloropropane	U		µg/m3	1.4	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
27. cis-1,3-Dichloropropene	U		µg/m3	1.4	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
28. trans-1,3-Dichloropropene	U		µg/m3	1.4	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
29. 1,4-Dioxane	U		µg/m3	5.4	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
‡ 30. Ethyl Acetate	U		µg/m3	11	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
31. Ethylbenzene	U		µg/m3	6.5	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
32. Ethylene Dibromide	U		µg/m3	0.23	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
33. n-Heptane	U		µg/m3	12	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
34. Hexachlorobutadiene	U		µg/m3	0.85	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
35. n-Hexane	U		µg/m3	11	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
‡ 36. 2-Hexanone	U		µg/m3	12	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
‡ 37. Isopropanol	U		µg/m3	15	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 4**	Chain of Custody:	**195927**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**2952**	Collect Date:	**08/23/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**13:10**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A03549-001** **Matrix: Air**
Method: EPA TO-15 **Description: Day 4**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
38. 4-Methyl-2-pentanone	U		µg/m3	12	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
39. Methylene Chloride	U		µg/m3	21	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
‡ 40. 2-Methylnaphthalene	U		µg/m3	35	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
41. MTBE	U		µg/m3	5.4	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
‡ 42. Naphthalene	U		µg/m3	1.6	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
43. Styrene	U		µg/m3	13	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
44. 1,1,2,2-Tetrachloroethane	U		µg/m3	0.21	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
45. Tetrachloroethene	U		µg/m3	6.1	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
‡ 46. Tetrahydrofuran	U		µg/m3	4.4	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
47. Toluene	U		µg/m3	5.7	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
48. 1,2,4-Trichlorobenzene	U		µg/m3	22	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
49. 1,1,1-Trichloroethane	U		µg/m3	8.2	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
50. 1,1,2-Trichloroethane	U		µg/m3	0.65	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
51. Trichloroethene	U		µg/m3	0.16	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
52. Trichlorofluoromethane	U		µg/m3	8.4	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
‡ 53. 1,1,2-Trichlorotrifluoroethane	U		µg/m3	23	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
54. 1,2,4-Trimethylbenzene	U		µg/m3	4.4	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
55. 1,3,5-Trimethylbenzene	U		µg/m3	4.4	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
56. Vinyl Acetate	U		µg/m3	11	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
57. Vinyl Chloride	U		µg/m3	0.77	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
58. m&p-Xylene	U		µg/m3	13	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
59. o-Xylene	U		µg/m3	13	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM
‡ 60. Xylenes	U		µg/m3	26	1.0	08/27/21	VK21H28A	08/28/21	VK21H28A	KCM

Definitions/ Qualifiers:

A: Spike recovery or precision unusable due to dilution.
B: The analyte was detected in the associated method blank.
E: The analyte was detected at a concentration greater than the calibration range, therefore the result is estimated.
J: The concentration is an estimated value.
M: Modified Method
U: The analyte was not detected at or above the reporting limit.
X: Matrix Interference has resulted in a raised reporting limit or distorted result.
W: Results reported on a wet-weight basis.
***:** Value reported is outside QC limits
D: The sample or extract was analyzed at a DF greater than 1.

Exception Summary:

V+ : Recovery in the associated continuing calibration verification sample (CCV) exceeds the upper control limit. Results may be biased high.

Analysis Locations:

All analyses performed in Holt.

Accreditation Number(s):

T104704518-19-8 (TX)

Fibertec
environmental
services

Friday, September 03, 2021

Fibertec Project Number:	A03712
Project Identification:	WSF Air Monitoring /
Submittal Date:	08/31/2021

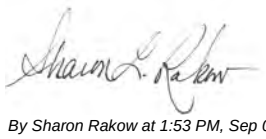
Ms. Mary Lindsey
Michigan State University - EHS
Environmental Health & Safety
4000 Collins Road, B20
Lansing, MI 48910

Dear Ms. Lindsey,

Thank you for selecting Fibertec Environmental Services as your analytical laboratory. The samples you submitted have been analyzed in accordance with NELAC standards and the results compiled in the attached report. Any exceptions to NELAC compliance are noted in the report. These results apply only to those samples submitted. Please note TO-15 samples will be disposed of 7 calendar days after the reporting date. All other samples will be disposed of 30 days after the reporting date.

If you have any questions regarding these results or if we may be of further assistance to you, please contact me at (517) 699-0345.

Sincerely,



By Sharon Rakow at 1:53 PM, Sep 03, 2021

For Daryl P. Strandbergh
Laboratory Director

Enclosures

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 5**	Chain of Custody:	**196245**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**001**	Collect Date:	**08/30/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**16:16**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A03712-001** **Matrix: Air**
Method: EPA TO-15 **Description: Day 5**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Acetone	U		µg/m3	36	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
2. Benzene	U		µg/m3	2.9	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
3. Benzyl Chloride	U	V+	µg/m3	0.41	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
4. Bromodichloromethane	U		µg/m3	0.80	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
5. Bromoform	U		µg/m3	15	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
6. Bromomethane	U		µg/m3	3.5	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
7. 1,3-Butadiene	U		µg/m3	0.18	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
8. 2-Butanone	U		µg/m3	8.8	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
‡ 9. Carbon Disulfide	U		µg/m3	19	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
10. Carbon Tetrachloride	U		µg/m3	0.75	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
11. Chlorobenzene	U		µg/m3	14	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
12. Chloroethane	U		µg/m3	4.0	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
13. Chloroform	U		µg/m3	0.59	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
14. Chloromethane	U		µg/m3	12	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
15. Cyclohexane	U		µg/m3	10	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
16. Dibromochloromethane	U		µg/m3	0.68	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
17. 1,2-Dichlorobenzene	U		µg/m3	9.0	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
18. 1,3-Dichlorobenzene	U		µg/m3	1.8	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
19. 1,4-Dichlorobenzene	U		µg/m3	1.8	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
20. Dichlorodifluoromethane	U		µg/m3	15	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
21. 1,1-Dichloroethane	U		µg/m3	6.1	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
22. 1,2-Dichloroethane	U		µg/m3	0.49	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
23. 1,1-Dichloroethene	U		µg/m3	5.9	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
24. cis-1,2-Dichloroethene	U		µg/m3	5.9	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
25. trans-1,2-Dichloroethene	U		µg/m3	5.9	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
26. 1,2-Dichloropropane	U		µg/m3	1.4	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
27. cis-1,3-Dichloropropene	U		µg/m3	1.4	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
28. trans-1,3-Dichloropropene	U		µg/m3	1.4	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
29. 1,4-Dioxane	U		µg/m3	5.4	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
‡ 30. Ethyl Acetate	U		µg/m3	11	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
31. Ethylbenzene	U		µg/m3	6.5	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
32. Ethylene Dibromide	U		µg/m3	0.23	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
33. n-Heptane	U		µg/m3	12	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
34. Hexachlorobutadiene	U		µg/m3	0.85	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
35. n-Hexane	U		µg/m3	11	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
‡ 36. 2-Hexanone	U		µg/m3	12	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
‡ 37. Isopropanol	U		µg/m3	15	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 5**	Chain of Custody:	**196245**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**001**	Collect Date:	**08/30/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**16:16**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A03712-001** **Matrix: Air**
Method: EPA TO-15 **Description: Day 5**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
38. 4-Methyl-2-pentanone	U		µg/m3	12	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
39. Methylene Chloride	U		µg/m3	21	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
‡ 40. 2-Methylnaphthalene	U		µg/m3	35	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
41. MTBE	U		µg/m3	5.4	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
‡ 42. Naphthalene	U		µg/m3	1.6	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
43. Styrene	U		µg/m3	13	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
44. 1,1,2,2-Tetrachloroethane	U		µg/m3	0.21	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
45. Tetrachloroethene	U		µg/m3	6.1	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
‡ 46. Tetrahydrofuran	U		µg/m3	4.4	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
47. Toluene	U		µg/m3	5.7	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
48. 1,2,4-Trichlorobenzene	U		µg/m3	22	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
49. 1,1,1-Trichloroethane	U		µg/m3	8.2	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
50. 1,1,2-Trichloroethane	U		µg/m3	0.65	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
51. Trichloroethene	U		µg/m3	0.16	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
52. Trichlorofluoromethane	U	L+	µg/m3	8.4	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
‡ 53. 1,1,2-Trichlorotrifluoroethane	U		µg/m3	23	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
54. 1,2,4-Trimethylbenzene	U		µg/m3	4.4	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
55. 1,3,5-Trimethylbenzene	U		µg/m3	4.4	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
56. Vinyl Acetate	U		µg/m3	11	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
57. Vinyl Chloride	U		µg/m3	0.77	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
58. m&p-Xylene	U		µg/m3	13	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
59. o-Xylene	U		µg/m3	13	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM
‡ 60. Xylenes	U		µg/m3	26	1.0	09/02/21	VK21I02D	09/03/21 01:15	VK21I02D	KCM

Surrogate Summary			Control Limits	Instrument	Batch	Run Time	Column	Inst. Method
4-Bromofluorobenzene(S)	**101**	%	80-120	VK	VK21I02D	9/3/2021 01:15	1	VK400

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 6**	Chain of Custody:	**196245**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**002**	Collect Date:	**08/31/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**12:53**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A03712-002** **Matrix: Air**
Method: EPA TO-15 **Description: Day 6**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Acetone	U		µg/m3	36	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
2. Benzene	U		µg/m3	2.9	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
3. Benzyl Chloride	U	V+	µg/m3	0.41	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
4. Bromodichloromethane	U		µg/m3	0.80	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
5. Bromoform	U		µg/m3	15	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
6. Bromomethane	U		µg/m3	3.5	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
7. 1,3-Butadiene	U		µg/m3	0.18	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
8. 2-Butanone	U		µg/m3	8.8	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
‡ 9. Carbon Disulfide	U		µg/m3	19	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
10. Carbon Tetrachloride	U		µg/m3	0.75	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
11. Chlorobenzene	U		µg/m3	14	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
12. Chloroethane	U		µg/m3	4.0	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
13. Chloroform	U		µg/m3	0.59	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
14. Chloromethane	U		µg/m3	12	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
15. Cyclohexane	U		µg/m3	10	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
16. Dibromochloromethane	U		µg/m3	0.68	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
17. 1,2-Dichlorobenzene	U		µg/m3	9.0	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
18. 1,3-Dichlorobenzene	U		µg/m3	1.8	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
19. 1,4-Dichlorobenzene	U		µg/m3	1.8	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
20. Dichlorodifluoromethane	U		µg/m3	15	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
21. 1,1-Dichloroethane	U		µg/m3	6.1	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
22. 1,2-Dichloroethane	U		µg/m3	0.49	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
23. 1,1-Dichloroethene	U		µg/m3	5.9	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
24. cis-1,2-Dichloroethene	U		µg/m3	5.9	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
25. trans-1,2-Dichloroethene	U		µg/m3	5.9	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
26. 1,2-Dichloropropane	U		µg/m3	1.4	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
27. cis-1,3-Dichloropropene	U		µg/m3	1.4	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
28. trans-1,3-Dichloropropene	U		µg/m3	1.4	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
29. 1,4-Dioxane	U		µg/m3	5.4	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
‡ 30. Ethyl Acetate	U		µg/m3	11	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
31. Ethylbenzene	U		µg/m3	6.5	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
32. Ethylene Dibromide	U		µg/m3	0.23	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
33. n-Heptane	U		µg/m3	12	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
34. Hexachlorobutadiene	U		µg/m3	0.85	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
35. n-Hexane	U		µg/m3	11	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
‡ 36. 2-Hexanone	U		µg/m3	12	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
‡ 37. Isopropanol	U		µg/m3	15	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 6**	Chain of Custody:	**196245**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**002**	Collect Date:	**08/31/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**12:53**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A03712-002** **Matrix: Air**
Method: EPA TO-15 **Description: Day 6**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
38. 4-Methyl-2-pentanone	U		µg/m3	12	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
39. Methylene Chloride	U		µg/m3	21	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
‡ 40. 2-Methylnaphthalene	U		µg/m3	35	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
41. MTBE	U		µg/m3	5.4	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
‡ 42. Naphthalene	U		µg/m3	1.6	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
43. Styrene	U		µg/m3	13	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
44. 1,1,2,2-Tetrachloroethane	U		µg/m3	0.21	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
45. Tetrachloroethene	U		µg/m3	6.1	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
‡ 46. Tetrahydrofuran	U		µg/m3	4.4	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
47. Toluene	U		µg/m3	5.7	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
48. 1,2,4-Trichlorobenzene	U		µg/m3	22	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
49. 1,1,1-Trichloroethane	U		µg/m3	8.2	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
50. 1,1,2-Trichloroethane	U		µg/m3	0.65	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
51. Trichloroethene	U		µg/m3	0.16	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
52. Trichlorofluoromethane	U	L+	µg/m3	8.4	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
‡ 53. 1,1,2-Trichlorotrifluoroethane	U		µg/m3	23	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
54. 1,2,4-Trimethylbenzene	U		µg/m3	4.4	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
55. 1,3,5-Trimethylbenzene	U		µg/m3	4.4	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
56. Vinyl Acetate	U		µg/m3	11	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
57. Vinyl Chloride	U		µg/m3	0.77	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
58. m&p-Xylene	U		µg/m3	13	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
59. o-Xylene	U		µg/m3	13	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM
‡ 60. Xylenes	U		µg/m3	26	1.0	09/02/21	VK21I02D	09/03/21 02:10	VK21I02D	KCM

Surrogate Summary			Control Limits	Instrument	Batch	Run Time	Column	Inst. Method
4-Bromofluorobenzene(S)	**95**	%	80-120	VK	VK21I02D	9/3/2021 02:10	1	VK400

Definitions/ Qualifiers:

A: Spike recovery or precision unusable due to dilution.
B: The analyte was detected in the associated method blank.
E: The analyte was detected at a concentration greater than the calibration range, therefore the result is estimated.
J: The concentration is an estimated value.
M: Modified Method
U: The analyte was not detected at or above the reporting limit.
X: Matrix Interference has resulted in a raised reporting limit or distorted result.
W: Results reported on a wet-weight basis.
***:** Value reported is outside QC limits
D: The sample or extract was analyzed at a DF greater than 1.

Exception Summary:

L+ : Recovery in the associated laboratory sample (LCS) exceeds the upper control limit. Results may be biased high.
V+ : Recovery in the associated continuing calibration verification sample (CCV) exceeds the upper control limit. Results may be biased high.

Analysis Locations:

All analyses performed in Holt.

NELAP ACCREDITED TNI LABORATORY

Accreditation Number(s):

T104704518-19-8 (TX)

Fibertec
environmental
services

Tuesday, September 14, 2021

Fibertec Project Number:	A03857
Project Identification:	WSF Air Monitoring /
Submittal Date:	09/08/2021

Ms. Mary Lindsey
Michigan State University - EHS
Environmental Health & Safety
4000 Collins Road, B20
Lansing, MI 48910

Dear Ms. Lindsey,

Thank you for selecting Fibertec Environmental Services as your analytical laboratory. The samples you submitted have been analyzed in accordance with NELAC standards and the results compiled in the attached report. Any exceptions to NELAC compliance are noted in the report. These results apply only to those samples submitted. Please note TO-15 samples will be disposed of 7 calendar days after the reporting date. All other samples will be disposed of 30 days after the reporting date.

If you have any questions regarding these results or if we may be of further assistance to you, please contact me at (517) 699-0345.

Sincerely,

Bailey Welch

By Bailey Welch at 4:11 PM, Sep 14, 2021

For Daryl P. Strandbergh
Laboratory Director

Enclosures

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 7**	Chain of Custody:	**196216**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**001**	Collect Date:	**09/07/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**13:00**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A03857-001** **Matrix: Air**
Method: EPA TO-15 **Description: Day 7**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Acetone	U		µg/m3	36	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
2. Benzene	U		µg/m3	2.9	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
3. Benzyl Chloride	U		µg/m3	0.41	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
4. Bromodichloromethane	U		µg/m3	0.80	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
5. Bromoform	U		µg/m3	15	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
6. Bromomethane	U		µg/m3	3.5	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
7. 1,3-Butadiene	U		µg/m3	0.18	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
8. 2-Butanone	U		µg/m3	8.8	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
‡ 9. Carbon Disulfide	U		µg/m3	19	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
10. Carbon Tetrachloride	U		µg/m3	0.75	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
11. Chlorobenzene	U		µg/m3	14	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
12. Chloroethane	U		µg/m3	4.0	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
13. Chloroform	**0.86**		µg/m3	0.59	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
14. Chloromethane	U		µg/m3	12	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
15. Cyclohexane	U		µg/m3	10	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
16. Dibromochloromethane	U		µg/m3	0.68	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
17. 1,2-Dichlorobenzene	U		µg/m3	9.0	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
18. 1,3-Dichlorobenzene	U		µg/m3	1.8	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
19. 1,4-Dichlorobenzene	U		µg/m3	1.8	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
20. Dichlorodifluoromethane	U		µg/m3	15	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
21. 1,1-Dichloroethane	U		µg/m3	6.1	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
22. 1,2-Dichloroethane	U		µg/m3	0.49	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
23. 1,1-Dichloroethene	U		µg/m3	5.9	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
24. cis-1,2-Dichloroethene	U		µg/m3	5.9	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
25. trans-1,2-Dichloroethene	U		µg/m3	5.9	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
26. 1,2-Dichloropropane	U		µg/m3	1.4	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
27. cis-1,3-Dichloropropene	U		µg/m3	1.4	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
28. trans-1,3-Dichloropropene	U		µg/m3	1.4	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
29. 1,4-Dioxane	U		µg/m3	5.4	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
‡ 30. Ethyl Acetate	U		µg/m3	11	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
31. Ethylbenzene	U		µg/m3	6.5	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
32. Ethylene Dibromide	U		µg/m3	0.23	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
33. n-Heptane	U		µg/m3	12	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
34. Hexachlorobutadiene	U		µg/m3	0.85	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
35. n-Hexane	U		µg/m3	11	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
‡ 36. 2-Hexanone	U		µg/m3	12	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
‡ 37. Isopropanol	U		µg/m3	15	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 7**	Chain of Custody:	**196216**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**001**	Collect Date:	**09/07/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**13:00**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A03857-001** **Matrix: Air**
Method: EPA TO-15 **Description: Day 7**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
38. 4-Methyl-2-pentanone	U		µg/m3	12	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
39. Methylene Chloride	U		µg/m3	21	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
‡ 40. 2-Methylnaphthalene	U		µg/m3	35	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
41. MTBE	U		µg/m3	5.4	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
‡ 42. Naphthalene	U		µg/m3	1.6	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
43. Styrene	U		µg/m3	13	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
44. 1,1,2,2-Tetrachloroethane	U		µg/m3	0.21	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
45. Tetrachloroethene	U		µg/m3	6.1	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
‡ 46. Tetrahydrofuran	U		µg/m3	4.4	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
47. Toluene	U		µg/m3	5.7	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
48. 1,2,4-Trichlorobenzene	U		µg/m3	22	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
49. 1,1,1-Trichloroethane	U		µg/m3	8.2	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
50. 1,1,2-Trichloroethane	U		µg/m3	0.65	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
51. Trichloroethene	U		µg/m3	0.16	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
52. Trichlorofluoromethane	U		µg/m3	8.4	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
‡ 53. 1,1,2-Trichlorotrifluoroethane	U		µg/m3	23	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
54. 1,2,4-Trimethylbenzene	U		µg/m3	4.4	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
55. 1,3,5-Trimethylbenzene	U		µg/m3	4.4	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
56. Vinyl Acetate	U		µg/m3	11	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
57. Vinyl Chloride	U		µg/m3	0.77	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
58. m&p-Xylene	U		µg/m3	13	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
59. o-Xylene	U		µg/m3	13	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM
‡ 60. Xylenes	U		µg/m3	26	1.0	09/10/21	VN21I10A	09/11/21 03:13	VN21I10A	CM

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 8**	Chain of Custody:	**196216**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**002**	Collect Date:	**09/08/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**12:30**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A03857-002** **Matrix: Air**
Method: EPA TO-15 **Description: Day 8**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Acetone	U		µg/m3	36	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
2. Benzene	U		µg/m3	2.9	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
3. Benzyl Chloride	U		µg/m3	0.41	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
4. Bromodichloromethane	U		µg/m3	0.80	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
5. Bromoform	U		µg/m3	15	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
6. Bromomethane	U		µg/m3	3.5	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
7. 1,3-Butadiene	U		µg/m3	0.18	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
8. 2-Butanone	U		µg/m3	8.8	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
‡ 9. Carbon Disulfide	U		µg/m3	19	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
10. Carbon Tetrachloride	U		µg/m3	0.75	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
11. Chlorobenzene	U		µg/m3	14	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
12. Chloroethane	U		µg/m3	4.0	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
13. Chloroform	**0.69**		µg/m3	0.59	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
14. Chloromethane	U		µg/m3	12	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
15. Cyclohexane	U		µg/m3	10	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
16. Dibromochloromethane	U		µg/m3	0.68	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
17. 1,2-Dichlorobenzene	U		µg/m3	9.0	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
18. 1,3-Dichlorobenzene	U		µg/m3	1.8	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
19. 1,4-Dichlorobenzene	U		µg/m3	1.8	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
20. Dichlorodifluoromethane	U		µg/m3	15	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
21. 1,1-Dichloroethane	U		µg/m3	6.1	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
22. 1,2-Dichloroethane	U		µg/m3	0.49	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
23. 1,1-Dichloroethene	U		µg/m3	5.9	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
24. cis-1,2-Dichloroethene	U		µg/m3	5.9	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
25. trans-1,2-Dichloroethene	U		µg/m3	5.9	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
26. 1,2-Dichloropropane	U		µg/m3	1.4	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
27. cis-1,3-Dichloropropene	U		µg/m3	1.4	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
28. trans-1,3-Dichloropropene	U		µg/m3	1.4	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
29. 1,4-Dioxane	U		µg/m3	5.4	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
‡ 30. Ethyl Acetate	U		µg/m3	11	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
31. Ethylbenzene	U		µg/m3	6.5	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
32. Ethylene Dibromide	U		µg/m3	0.23	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
33. n-Heptane	U		µg/m3	12	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
34. Hexachlorobutadiene	U		µg/m3	0.85	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
35. n-Hexane	U		µg/m3	11	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
‡ 36. 2-Hexanone	U		µg/m3	12	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
‡ 37. Isopropanol	U		µg/m3	15	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 8**	Chain of Custody:	**196216**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**002**	Collect Date:	**09/08/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**12:30**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A03857-002** **Matrix: Air**
Method: EPA TO-15 **Description: Day 8**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
38. 4-Methyl-2-pentanone	U		µg/m3	12	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
39. Methylene Chloride	U		µg/m3	21	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
‡ 40. 2-Methylnaphthalene	U		µg/m3	35	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
41. MTBE	U		µg/m3	5.4	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
‡ 42. Naphthalene	U		µg/m3	1.6	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
43. Styrene	U		µg/m3	13	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
44. 1,1,2,2-Tetrachloroethane	U		µg/m3	0.21	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
45. Tetrachloroethene	U		µg/m3	6.1	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
‡ 46. Tetrahydrofuran	U		µg/m3	4.4	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
47. Toluene	U		µg/m3	5.7	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
48. 1,2,4-Trichlorobenzene	U		µg/m3	22	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
49. 1,1,1-Trichloroethane	U		µg/m3	8.2	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
50. 1,1,2-Trichloroethane	U		µg/m3	0.65	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
51. Trichloroethene	U		µg/m3	0.16	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
52. Trichlorofluoromethane	U		µg/m3	8.4	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
‡ 53. 1,1,2-Trichlorotrifluoroethane	U		µg/m3	23	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
54. 1,2,4-Trimethylbenzene	U		µg/m3	4.4	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
55. 1,3,5-Trimethylbenzene	U		µg/m3	4.4	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
56. Vinyl Acetate	U		µg/m3	11	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
57. Vinyl Chloride	U		µg/m3	0.77	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
58. m&p-Xylene	U		µg/m3	13	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
59. o-Xylene	U		µg/m3	13	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM
‡ 60. Xylenes	U		µg/m3	26	1.0	09/13/21	VQ21I13A	09/14/21 04:44	VQ21I13A	KCM

Definitions/ Qualifiers:

A: Spike recovery or precision unusable due to dilution.
B: The analyte was detected in the associated method blank.
E: The analyte was detected at a concentration greater than the calibration range, therefore the result is estimated.
J: The concentration is an estimated value.
M: Modified Method
U: The analyte was not detected at or above the reporting limit.
X: Matrix Interference has resulted in a raised reporting limit or distorted result.
W: Results reported on a wet-weight basis.
***:** Value reported is outside QC limits
D: The sample or extract was analyzed at a DF greater than 1.

Exception Summary:

Analysis Locations:

All analyses performed in Holt.

Accreditation Number(s):

T104704518-19-8 (TX)

Fibertec
environmental
services

Friday, October 15, 2021

Fibertec Project Number:	A04433
Project Identification:	WSF Air Monitoring /
Submittal Date:	10/06/2021

Ms. Mary Lindsey
Michigan State University - EHS
Environmental Health & Safety
4000 Collins Road, B20
Lansing, MI 48910

Dear Ms. Lindsey,

Thank you for selecting Fibertec Environmental Services as your analytical laboratory. The samples you submitted have been analyzed in accordance with NELAC standards and the results compiled in the attached report. Any exceptions to NELAC compliance are noted in the report. These results apply only to those samples submitted. Please note TO-15 samples will be disposed of 7 calendar days after the reporting date. All other samples will be disposed of 30 days after the reporting date.

If you have any questions regarding these results or if we may be of further assistance to you, please contact me at (517) 699-0345.

Sincerely,

Bailey Welch

By Bailey Welch at 2:59 PM, Oct 15, 2021

For Daryl P. Strandbergh
Laboratory Director

Enclosures

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 9**	Chain of Custody:	**199332**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**001-2105**	Collect Date:	**10/04/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**15:33**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A04433-001** **Matrix: Air**
Method: EPA TO-15 **Description: Day 9**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Acetone	U		µg/m3	36	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
2. Benzene	U		µg/m3	2.9	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
3. Benzyl Chloride	U		µg/m3	0.41	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
4. Bromodichloromethane	U		µg/m3	0.80	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
5. Bromoform	U		µg/m3	15	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
6. Bromomethane	U		µg/m3	3.5	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
7. 1,3-Butadiene	U		µg/m3	0.18	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
8. 2-Butanone	U		µg/m3	8.8	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
‡ 9. Carbon Disulfide	U		µg/m3	19	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
10. Carbon Tetrachloride	U		µg/m3	0.75	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
11. Chlorobenzene	U		µg/m3	14	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
12. Chloroethane	U		µg/m3	4.0	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
13. Chloroform	U		µg/m3	0.59	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
14. Chloromethane	U		µg/m3	12	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
15. Cyclohexane	U		µg/m3	10	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
16. Dibromochloromethane	U		µg/m3	0.68	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
17. 1,2-Dichlorobenzene	U		µg/m3	9.0	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
18. 1,3-Dichlorobenzene	U		µg/m3	1.8	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
19. 1,4-Dichlorobenzene	U		µg/m3	1.8	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
20. Dichlorodifluoromethane	U		µg/m3	15	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
21. 1,1-Dichloroethane	U		µg/m3	6.1	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
22. 1,2-Dichloroethane	U		µg/m3	0.49	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
23. 1,1-Dichloroethene	U		µg/m3	5.9	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
24. cis-1,2-Dichloroethene	U		µg/m3	5.9	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
25. trans-1,2-Dichloroethene	U		µg/m3	5.9	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
26. 1,2-Dichloropropane	U		µg/m3	1.4	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
27. cis-1,3-Dichloropropene	U		µg/m3	1.4	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
28. trans-1,3-Dichloropropene	U		µg/m3	1.4	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
29. 1,4-Dioxane	U		µg/m3	5.4	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
‡ 30. Ethyl Acetate	U		µg/m3	11	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
31. Ethylbenzene	U		µg/m3	6.5	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
32. Ethylene Dibromide	U		µg/m3	0.23	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
33. n-Heptane	U		µg/m3	12	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
34. Hexachlorobutadiene	U		µg/m3	0.85	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
35. n-Hexane	U		µg/m3	11	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
‡ 36. 2-Hexanone	U		µg/m3	12	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
‡ 37. Isopropanol	U		µg/m3	15	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 9**	Chain of Custody:	**199332**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**001-2105**	Collect Date:	**10/04/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**15:33**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A04433-001** **Matrix: Air**
Method: EPA TO-15 **Description: Day 9**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
38. 4-Methyl-2-pentanone	U		µg/m3	12	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
39. Methylene Chloride	U		µg/m3	21	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
‡ 40. 2-Methylnaphthalene	U		µg/m3	35	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
41. MTBE	U		µg/m3	5.4	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
‡ 42. Naphthalene	U		µg/m3	1.6	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
43. Styrene	U		µg/m3	13	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
44. 1,1,2,2-Tetrachloroethane	U		µg/m3	0.21	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
45. Tetrachloroethene	U		µg/m3	6.1	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
‡ 46. Tetrahydrofuran	U		µg/m3	4.4	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
47. Toluene	U		µg/m3	5.7	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
48. 1,2,4-Trichlorobenzene	U		µg/m3	22	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
49. 1,1,1-Trichloroethane	U		µg/m3	8.2	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
50. 1,1,2-Trichloroethane	U		µg/m3	0.65	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
51. Trichloroethene	U		µg/m3	0.16	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
52. Trichlorofluoromethane	U		µg/m3	8.4	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
‡ 53. 1,1,2-Trichlorotrifluoroethane	U		µg/m3	23	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
54. 1,2,4-Trimethylbenzene	U		µg/m3	4.4	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
55. 1,3,5-Trimethylbenzene	U		µg/m3	4.4	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
56. Vinyl Acetate	U		µg/m3	11	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
57. Vinyl Chloride	U		µg/m3	0.77	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
58. m&p-Xylene	U		µg/m3	13	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
59. o-Xylene	U		µg/m3	13	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM
‡ 60. Xylenes	U		µg/m3	26	1.0	10/14/21	VK21J14A	10/15/21 06:11	VK21J14A	CM

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 10**	Chain of Custody:	**199332**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**002-2215**	Collect Date:	**10/05/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**14:50**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A04433-002** **Matrix: Air**
Method: EPA TO-15 **Description: Day 10**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
‡ 1. Acetone	**41**		µg/m3	36	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
2. Benzene	U		µg/m3	2.9	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
3. Benzyl Chloride	U		µg/m3	0.41	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
4. Bromodichloromethane	U		µg/m3	0.80	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
5. Bromoform	U		µg/m3	15	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
6. Bromomethane	U		µg/m3	3.5	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
7. 1,3-Butadiene	U		µg/m3	0.18	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
8. 2-Butanone	U		µg/m3	8.8	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
‡ 9. Carbon Disulfide	U		µg/m3	19	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
10. Carbon Tetrachloride	U		µg/m3	0.75	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
11. Chlorobenzene	U		µg/m3	14	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
12. Chloroethane	U		µg/m3	4.0	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
13. Chloroform	**9.6**		µg/m3	0.59	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
14. Chloromethane	U		µg/m3	12	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
15. Cyclohexane	U		µg/m3	10	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
16. Dibromochloromethane	U		µg/m3	0.68	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
17. 1,2-Dichlorobenzene	U		µg/m3	9.0	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
18. 1,3-Dichlorobenzene	U		µg/m3	1.8	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
19. 1,4-Dichlorobenzene	U		µg/m3	1.8	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
20. Dichlorodifluoromethane	U		µg/m3	15	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
21. 1,1-Dichloroethane	U		µg/m3	6.1	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
22. 1,2-Dichloroethane	U		µg/m3	0.49	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
23. 1,1-Dichloroethene	U		µg/m3	5.9	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
24. cis-1,2-Dichloroethene	U		µg/m3	5.9	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
25. trans-1,2-Dichloroethene	U		µg/m3	5.9	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
26. 1,2-Dichloropropane	U		µg/m3	1.4	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
27. cis-1,3-Dichloropropene	U		µg/m3	1.4	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
28. trans-1,3-Dichloropropene	U		µg/m3	1.4	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
29. 1,4-Dioxane	U		µg/m3	5.4	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
‡ 30. Ethyl Acetate	U		µg/m3	11	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
31. Ethylbenzene	U		µg/m3	6.5	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
32. Ethylene Dibromide	U		µg/m3	0.23	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
33. n-Heptane	U		µg/m3	12	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
34. Hexachlorobutadiene	U		µg/m3	0.85	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
35. n-Hexane	**35**		µg/m3	11	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
‡ 36. 2-Hexanone	U		µg/m3	12	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
‡ 37. Isopropanol	U		µg/m3	15	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM

Client Identification:	**Michigan State University - EHS**	Sample Description:	**Day 10**	Chain of Custody:	**199332**
Client Project Name:	**WSF Air Monitoring**	Sample No:	**002-2215**	Collect Date:	**10/05/21**
Client Project No:	**NA**	Sample Matrix:	**Air**	Collect Time:	**14:50**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

TO-15 (Summa) **Aliquot ID: A04433-002** **Matrix: Air**
Method: EPA TO-15 **Description: Day 10**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation P. Date	Preparation P. Batch	Analysis A. Date	Analysis A. Batch	Init.
38. 4-Methyl-2-pentanone	U		µg/m3	12	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
39. Methylene Chloride	**34**		µg/m3	21	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
‡ 40. 2-Methylnaphthalene	U		µg/m3	35	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
41. MTBE	**6.9**		µg/m3	5.4	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
‡ 42. Naphthalene	U		µg/m3	1.6	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
43. Styrene	U		µg/m3	13	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
44. 1,1,2,2-Tetrachloroethane	U		µg/m3	0.21	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
45. Tetrachloroethene	U		µg/m3	6.1	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
‡ 46. Tetrahydrofuran	U		µg/m3	4.4	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
47. Toluene	**10**		µg/m3	5.7	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
48. 1,2,4-Trichlorobenzene	U		µg/m3	22	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
49. 1,1,1-Trichloroethane	U		µg/m3	8.2	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
50. 1,1,2-Trichloroethane	U		µg/m3	0.65	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
51. Trichloroethene	U		µg/m3	0.16	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
52. Trichlorofluoromethane	U		µg/m3	8.4	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
‡ 53. 1,1,2-Trichlorotrifluoroethane	U		µg/m3	23	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
54. 1,2,4-Trimethylbenzene	U		µg/m3	4.4	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
55. 1,3,5-Trimethylbenzene	U		µg/m3	4.4	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
56. Vinyl Acetate	U		µg/m3	11	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
57. Vinyl Chloride	U		µg/m3	0.77	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
58. m&p-Xylene	U		µg/m3	13	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
59. o-Xylene	U		µg/m3	13	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM
‡ 60. Xylenes	U		µg/m3	26	1.0	10/14/21	VK21J14A	10/15/21 07:04	VK21J14A	CM

Definitions/ Qualifiers:

A: Spike recovery or precision unusable due to dilution.
B: The analyte was detected in the associated method blank.
E: The analyte was detected at a concentration greater than the calibration range, therefore the result is estimated.
J: The concentration is an estimated value.
M: Modified Method
U: The analyte was not detected at or above the reporting limit.
X: Matrix Interference has resulted in a raised reporting limit or distorted result.
W: Results reported on a wet-weight basis.
***:** Value reported is outside QC limits
D: The sample or extract was analyzed at a DF greater than 1.

Exception Summary:

Analysis Locations:

All analyses performed in Holt.

Accreditation Number(s):

T104704518-19-8 (TX)

FORM EQP 5111 ATTACHMENT TEMPLATE B5
ENVIRONMENTAL MONITORING PROGRAMS

This document is an attachment to the Michigan Department of Environment, Great Lakes, and Energy's (EGLE) *Form EQP 5111, Operating License Application Form for Hazardous Waste Treatment, Storage, and Disposal Facilities.* See the instructions for Form EQP 5111 for details on how to use this attachment. All references to Title 40 of the Code of Federal Regulations (40 CFR) citations specified herein are adopted by reference in R 299.11003.

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 299.9611 establishes requirements for the environmental monitoring programs for hazardous waste management facilities. Owners and operators of hazardous waste treatment, storage, or disposal facilities must develop an environmental monitoring program capable of detecting a release of hazardous waste or hazardous waste constituents from the facility to groundwater, air, or soil.

This license application template addresses requirements for an environmental monitoring program for hazardous waste management units and the hazardous waste management facility for the Michigan State University (MSU) Waste Storage Facility (WSF). The template includes either a monitoring program description or a demonstration for a waiver from the monitoring requirements in accordance with R 299.9611(3)(a) and (b) and R 299.9611(4) as indicated below:

Groundwater Monitoring Program *(Check as appropriate)*

☐ R 299.9612 compliance monitoring program and sampling and analysis plan for one or more units
☒ Waiver for one or more units

If appropriate, both boxes may be checked if different monitoring programs and waivers apply to the units at the facility.

Ambient Air Monitoring Program (Check as appropriate)

☒ Monitoring program and sampling and analysis plan

☐ Waiver

Annual Soil Monitoring Program (Check as appropriate)

☐ Monitoring program and sampling and analysis plan

☒ Waiver

Ensure that all samples collected for environmental monitoring 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.

This template is organized as follows:

B5.A GROUNDWATER MONITORING PROGRAM

[R 299.9611(2)(b) and (3), R 299.9612, and R 299.9629 and 40 CFR, Part 264, Subpart F, except 40 CFR §§264.94(a)(2) and (3), (b), and (c), 264.100, and 264.101]

This section describes the facility's unit-specific groundwater monitoring program as outlined in Table B5.A.1. The basis for determining the groundwater monitoring program for each unit described below is provided in the Template B3, Hydrogeological Report, attached separately to this application, which was prepared in accordance with R 299.9506.

B5.A.1 Unit-Specific Groundwater Monitoring Program

Table B5.A.1 Groundwater Monitoring Program

Unit	Name of Unit Subject to Monitoring[1]	Conditional Non-LDF Waiver[2]	No Migration Waiver[3]	Detection Monitoring[4]	Compliance Monitoring[5]	Corrective Action Monitoring[6]
MSU WSF	**WSF – Jolly Road**	**Yes**				

☞ *Different units can be in different programs. The following instructions should be considered and addressed as appropriate for each unit at the facility.*

1. *Please refer to R 299.9612. All treatment, storage, and disposal units are covered unless the groundwater monitoring requirements are waived.*

2. *Please refer to R 299.9611(3)(a). The Director shall waive the groundwater monitoring requirements of R 299.9612 if the facility is not a land disposal facility and the applicant complies with one of the following provisions: (1) All treatment, storage, and waste handling activities take place inside or under a structure that provides protection from precipitation and runoff and the facility is in compliance with the provisions of R 299.9604; (2) the applicant demonstrates, to the director's satisfaction, that monitoring is not required; or (3) the applicant demonstrates, to the director's satisfaction, that a lesser degree of monitoring, or that alternate monitoring conducted in conjunction with a response activity, can be used to demonstrate compliance with the provisions of Part 111.*

3. *Please refer to R 299.9611(3)(b). The Director shall waive the groundwater monitoring requirements of R 299.9612 if the Director finds that there is no potential for migration of liquid from the facility to the uppermost aquifer during the active life of the facility and the postclosure care period specified pursuant to the provisions of 40 CFR §264.117. The demonstration shall be certified by a qualified geologist or geotechnical engineer. The applicant shall base any predictions on assumptions that maximize the rate of liquid migration.*

4. *If an applicant is not required to implement a compliance monitoring program or a corrective action program, in all other cases, the applicant must institute a detection monitoring program under R 299.9612 and 40 CFR §264.98. The applicant must complete Sections B5.A.2 and 3.*

5. *Whenever hazardous constituents, as defined under 40 CFR §264.93, are detected at a compliance point, the applicant must institute a compliance monitoring program under 40 CFR §264.99. Detected is defined as statistically significant evidence of contamination as described in 40 CFR §264.98(f). The applicant must complete Sections B5.A.2 and 4.*

6. *If an unit is undergoing corrective action in accordance with R 299.9629 and 40 CFR Part 264, Subpart F, except for 40 CFR §§264.100 and 264.101, the application should refer to*

Template B2, Corrective Action Information, that discusses the groundwater monitoring associated with corrective action.

📖 EPA November 1992. *RCRA Groundwater Monitoring Draft Technical Guidance Document.* Document Number 530-R-93-001.

B5.A.2 Groundwater Monitoring Program Waiver
[R 299.9611(3)]

B5.A.2(a) Other Units
[R 299.9611(3)(a)]

The MSU WSF is not a land disposal unit and complies with one of the following provisions:

☒ All treatment, storage, and waste handling activities at the MSU WSF take place inside or under a structure that provides protection from precipitation and runoff, and the facility is in compliance with the provisions of R 299.9604.

The MSU WSF has been designed and constructed to control run-on, run-off, prevent the release of waste substances from the facility, and provide safe storage for the waste substances received. All loading and unloading of wastes occur inside the MSU WSF, underneath enclosed, diked canopies. In addition, the interior storage areas are completely enclosed to prevent any impact from precipitation. The raised grade and raised edges of the floors in all the container storage areas provide additional protection against run-on having an impact on any area of the facility.

Protection of run-off from the site is provided by the complete enclosure of the facility and the design of the storage areas.

The escape of waste substances from the facility is prevented by several features in the construction of the facility. Each container storage area has a 4-inch thick concrete floor reinforced with 6-inch x 6-inch 10/10 wire mesh. The concrete floor is considered impervious and free of any joints and cracks which might allow for the escape of spilled waste substances. Certification of the integrity of the concrete floor is contained in the letter included as **Appendix B6-2**.

☒ Groundwater monitoring is not required at the MSU WSF.

The MSU WSF has been designed and constructed to control run-on and run-off, prevent the release of waste substances from the facility, and provide safe storage for the waste substances received. The facility, including the loading dock, is completely enclosed. Refer to Section B3 – Hydrogeological Report for further information regarding geological conditions and hydrogeology beneath the MSU WSF.

☐ A lesser degree of groundwater monitoring is required at [*Facility Name*] facility.

B5.A.2(b) No Migration
[R 299.9611(3)(b)]

The MSU WSF has been designed and constructed to control run-on and run-off, prevent the release of waste substances from the facility, and provide safe storage for the waste substances received. The facility, including the loading dock, is completely enclosed. There is no potential for migration of liquid from the MSU WSF to the uppermost aquifer during the active life of the facility and the postclosure care period specified in 40 CFR §264.117.

B5.B AMBIENT AIR MONITORING PROGRAM
[R 299.9611(2)(c) and (4)]

B5.B.1 Sampling and Analysis Plan
[R 299.9611(2)(a)]

A sampling and analysis plan for ambient air monitoring for the MSU WSF is included in the QA/QC Plan. The sampling and analysis plan was prepared in accordance with the requirements specified in R 299.9611(2)(a). All sampling and analysis performed pursuant to this application will be consistent with the QA/QC Plan. All samples for the purpose of environmental monitoring will be collected, transported, stored, and disposed by trained and qualified individuals in accordance with the QA/QC Plan.

The MSU WSF will conduct ambient air monitoring to demonstrate compliance with the provisions of Part 55 of Act 451.

MSU EHS will perform air sampling in accordance with procedures outlined in EPA Method TO-15: Determination of volatile organic compound in air collected canisters and analyzed by GC/MS. The air samples will be collected in pre-cleaned Summa canisters and analyzed for 59 volatile compounds. The samples will be collected up to two times per week during lab pack consolidation and container consolidation for a total of 10 samples. Testing will be conducted in accordance with the current permit. The sampling will be conducted at the northeast end of the property and located eight feet from ground level to compensate for ground slope. Background samples when not consolidating will not be collected, as MSU will reference background samples taken during the December 2010 sampling.

Meteorological data, including wind speed and direction at the time of sampling, will be retrieved from online sources. Print outs will be collected and filed during each air monitoring event.

QUALITY CONTROL/ASSURANCE
The analytical laboratory at Fibertec, Inc 1914 Holloway Drive, Holt, Michigan will supply the Summa canisters and perform the sample analysis pursuant to the requirements of EPA Method TO-15. Quality control steps include cleaning each canister, testing each canister and regulator prior to use, evacuation of each canister to desired vacuum pressure, laboratory blank sample and a laboratory control sample with each analysis. The compounds to be tested and detection limits are listed in Attachment B5-1.

Quality Assurance steps in the field include a check that each sample is under vacuum, (a gauge on each sample allows for initial, periodic and end sample checks of vacuum pressure) at least once during each sample event. The regulator that comes with each canister is pre-calibrated to allow samples to be collected over the desired time frame, in this case four hours. A laboratory blank is also performed as part of the sample analysis.

B5.C ANNUAL SOIL MONITORING PROGRAM
[R 299.9611(2)(d) and (4)]

B5.C.1 Sampling and Analysis Plan
[R 299.9611(2)(a)]

MSU is requesting a waiver under R299.9611(4) for the MSU WSF. The canopy at both the East and West storage areas provides protective cover and prevents run-on and run-off during rain or snow events.

B5.D ANNUAL SURFACE WATER MONITORING PROGRAM
[R 299.9611(2)(d) and (4)]

B5.D.1 Sampling and Analysis Plan
[R 299.9611(2)(a)]

MSU is requesting a waiver under R299.9611 for the MSU WSF. The MSU WSF has been designed and constructed to control run-on and run-off, prevent the release of waste substances from the facility, and provide safe storage for the waste substances received. The facility, including the loading dock, is completely enclosed.

ATTACHMENT B5-1

AIR MONITORING COMPOUNDS AND DETECTION LIMITS

Table B5-1 - 07/24/2023

Air Monitoring Compounds and Detection Limits

Parameter(s)	Reporting limit
1.Acetone	15.00 ppbv
2.Benzene	0.90 ppbv
3.Benzyl Chloride	1.50 ppbv
4.Bromodichloromethane	0.12 ppbv
5.Bromoform	1.50 ppbv
6.Bromomethane	0.90 ppbv
7. 1,3-Butadiene	0.08 ppbv
8. 2-Butanone	3.00 ppbv
9.Carbon Disulfide	6.00 ppbv
10.Carbon Tetrachloride	0.12 ppbv
11.Chlorobenzene	3.00 ppbv
12.Chloroethane	1.50 ppbv
13.Chloroform	0.12 ppbv
14.Chloromethane	6.00 ppbv
15.Cyclohexane	3.00 ppbv
16.Dibromochloromethane	0.08 ppbv
17. 1,2-Dichlorobenzene	1.50 ppbv
18. 1,3-Dichlorobenzene	0.30 ppbv
19. 1,4-Dichlorobenzene	0.30 ppbv
20.Dichlorodifluoromethane	3.00 ppbv
21. 1,1-Dichloroethane	1.50 ppbv
22. 1,2-Dichloroethane	0.12 ppbv
23. 1,1-Dichloroethene	1.50 ppbv
24. cis-1,2-Dichloroethene	1.50 ppbv
25. trans-1,2-Dichloroethene	1.50 ppbv
26. 1,2-Dichloropropane	0.30 ppbv
27. cis-1,3-Dichloropropene	0.90 ppbv
28. trans-1,3-Dichloropropene	1.00 ppbv
29. 1,4-Dioxane	1.50 ppbv
30.Ethyl Acetate	3.00 ppbv
31.Ethylbenzene	1.50 ppbv
32.Ethylene Dibromide	0.03 ppbv
33. 2-Methylnaphthalene	6.00 ppbv
34. n-Heptane	3.00 ppbv
35.Hexachlorobutadiene	0.08 ppbv
36. n-Hexane	3.00 ppbv
37. 2-Hexanone	3.00 ppbv
38. Isopropyl Alcohol	6.00 ppbv
39.Methylene Chloride	6.00 ppbv
40. 4-Methyl-2-pentanone	3.00 ppbv
41.MTBE	1.50 ppbv
42.Naphthalene	1.50 ppbv
43.Styrene	3.00 ppbv
44. 1,1,2,2-Tetrachloroethane	0.03 ppbv
45. Tetrachloroethene	0.90 ppbv
46. Tetrahydrofuran	1.50 ppbv

Table B5-1 - 07/24/2023

Air Monitoring Compounds and Detection Limits

Parameter(s)	Reporting limit
47. Toluene	1.50 ppbv
48. 1,2,4-Trichlorobenzene	3.00 ppbv
49. 1,1,1-Trichloroethane	1.50 ppbv
50. 1,1,2-Trichloroethane	0.12 ppbv
51. Trichloroethene	0.03 ppbv
52. Trichlorofluoromethane	1.50 ppbv
53. 1,1,2-Trichloro-1,2,2-trifluoroethane	3.00 ppbv
54. 1,2,4-Trimethylbenzene	0.90 ppbv
55. 1,3,5-Trimethylbenzene	0.90 ppbv
56.Vinyl Acetate	3.00 ppbv
57.Vinyl Chloride	0.90 ppbv
58.m&p-Xylene	3.00 ppbv
59. o-Xylene	3.00 ppbv
60. Xylenes	6.00 ppbv

ATTACHMENT B5-2

ANNUAL MONITORING WAIVER REQUESTS

MICHIGAN STATE
UNIVERSITY

July 14, 2010

Mr. Joe Rogers, Geologist
Michigan Department of Natural Resources and Environment
Waste and Hazardous Material Division
P.O. Box 30241
Lansing, Michigan 48909

Re: Surface Water Monitoring Wavier, Michigan State University
Waste Storage Facility; MID053343976
3885 Jolly Road, East Lansing, MI 48910

Dear Mr. Rogers:

Michigan State University (MSU) under Part 111, R299.9504 (10(f) and 9508(1)(b) is requesting a surface water (Banta Drain) monitoring wavier to our Operating License. The existing enclosed canopy eliminates run-on/run-off and contains any type of incidental release within the canopy loading dock area. These measures prevent a release to the surface grounds and the Banta Drain located east and south of the WSF.

Background

MSU collects semi-annual samples of surface water from the Banta drain which is east of the WSF. Samples are analyzed for VOCs, metals, sulfides, chloride, nitrate sodium and iron, and results are submitted to the DNRE. During the past 10 years of sampling there have been no statistical exceedances of the above compounds.

Canopy Drawings

Section B6 of the license application provides construction design drawings. The canopy enclosure covers the loading dock area located north of the building. The canopy enclosure eliminates any rain and snowfall in the loading dock area.

OFFICE OF
ENVIRONMENTAL HEALTH AND SAFETY
Michigan State University
150 Giltner Hall
East Lansing, MI
48824-1101
(517) 355-0153
Fax: (517) 353-4871
Web: www.regaffairs.msu.edu

Surface Water Wavier

All waste handling activities take place inside the canopy loading dock structure that provides protection from precipitation and runoff. The largest container handled is a 55-gallon drum. In the event of a release the contents would be contained within the loading dock secondary containment structure (holding capacity of 200 gallons), thereby eliminating any potential for migration of liquids from the area into the environment.

Loading Dock Handling Activities and Inspection

MSU will continue to use the loading dock for the loading and off-loading of containers. The maximum single volume moved at any time will be a 55-gallon container. The secondary containment capacity of the loading dock as previously specified is 200-gallons.

Should you have any questions, please feel free to call me at 517-355-6651.

Sincerely,

Thomas F. Grover, CHMM
Environmental Compliance Officer

MICHIGAN STATE
UNIVERSITY

April 16, 2013

Ms. Kimberly Tyson
Mr. Joe Rogers
Michigan Department of Environmental Quality
Waste and Hazardous Material Division
P.O. Box 30241
Lansing, Michigan 48909

Re: Soil Sampling Wavier, Michigan State University
Waste Storage Facility; MID053343976
3885 Jolly Road, East Lansing, MI 48910

Dear Ms. Tyson and Mr. Rogers:

Michigan State University (MSU) under Part 111, R299.9504 (10(f) and 9508(1) (b) is requesting soil sampling wavier under our Operating License. The existing enclosed canopy eliminates run-on/run-off and contain any type of incidental release within the canopy loading dock area. These measures prevent a release to the surface grounds.

Background

MSU collects semi-annual soil samples around the WSF. Samples are analyzed for VOC's, metals, sulfides, chloride, nitrate sodium and iron, results are submitted to the DEQ. During the past sampling events, there has been no evidence of statistical exceedances for the above compounds.

Canopy Drawings

Attachment 6 of our operating license provides construction design drawing for the canopy at the WSF. The canopy enclosure covers the loading dock area located north of the building. The canopy enclosure eliminates any rain and snowfall in the loading dock area.

Soil Sampling Wavier

All waste handling activities take place inside the canopy loading dock structure that provides protection from precipitation and runoff. The largest container handled is a 55-gallon container. In the event of a release the contents is contained within the loading dock secondary containment structure (holding

Vice President for Research and Graduate Studies

Office of Environmental Health & Safety

Giltner Hall
293 Farm Lane, Room 150
East Lansing, MI 48824

517-355-0153
Fax: 517-432-6686
ehs.msu.edu

capacity of 200 gallons) and eliminate any potential for migration of liquids from the area into the environment.

Loading Dock Handling Activities and Inspection

MSU uses the loading dock for the loading and off-loading of containers. The maximum single volume moved at any time will be a 55-gallon container. The secondary containment capacity of the loading dock as previously specified is 200-gallons.

Should you have any questions, please feel free to call me at 517-355-6651.

Sincerely,

Thomas F. Grover, CHMM
Environmental Compliance Officer

B6. ENGINEERING PLANS

Facility Design and Operating Standards: PA 451 R 299.9604

B6.1 Introduction

The Michigan State University (MSU) Waste Storage Facility (WSF) has been designed and constructed to control run-on, run-off, prevent the release of waste substances from the facility, and provide safe storage for the waste substances received. The storage areas are completely enclosed to prevent any impact from precipitation. The raised grade and raised edges of the floors in all the container storage areas provide additional protection against run-on having an impact on any area of the facility.

Protection of run-off from the site is provided by the complete enclosure of the facility buildings and the design of the storage areas.

The escape of waste substances from the facility is prevented by several features in the construction of the facility. Each container storage area has a minimum 4-inch thick concrete floor reinforced with 6-inch x 6-inch 10/10 wire mesh. The concrete floor is considered impervious and free of any joints and cracks which might allow for the escape of spilled waste substances.

B6.2 Containment Capacities of the MSU WSF

Each storage room has a 6-inch concrete containment lip built into every wall. This provides ample containment in the event of an accidental release of waste substances. 264.175(a)(3) indicates that a storage containment system must have a capacity to contain 10 percent of the volume of containers, or 10 percent of the volume of the largest container. Bearing this in mind, the following containment capacities have been established for each storage room:

EAST STORAGE BUILDING

Room 100: Consolidation Room

A. Existing Containment Capacity:

29 feet x 29.5 feet x 0.5 feet = 427.75 cu. ft. x 7.48 gallons/cu. ft. = 3200 gallons

B. Maximum Storage:

80	1 gallon or less bottles (i.e. 80 x 1 gal or 320 x 1 qt)	80 gallons
100	5 gallon containers	500 gallons
5	30 gallon containers	150 gallons
50	55 gallon metal or polyethylene barrels	2750 gallons
	TOTAL:	**3480 gallons**

C. Necessary Containment: 348 gallons

The 3200-gallon capacity is adequate for Room 100.

Room 120 - Lab Pack Room

A. Existing Containment:

20 feet x 16.5 feet x 0.5 feet = 165.0 cu. ft. x 7.48 gallons/cu. ft. = 1234 gallons

B. Maximum Storage:

An assortment of containers being prepared for consolidation as well as items only suitable for lab packing are stored in this room. They range in size from 1 milliliter to 5 gallons. The maximum storage volume for this room is 225 gallons.

C. Necessary Containment: 23 gallons

The 1234-gallon containment capacity is adequate for Room 120.

Room 130: Storage Room

A. Existing Containment Capacity:

16.5 feet x 6.3 feet x 0.5 feet = 51.97 cu. ft. x 7.48 gallons/cu. ft. = 389 gallons

B. Maximum Storage:

150	5 gallon or less containers		750 gallons
3	55 gallon		165 gallons
		TOTAL:	**915 gallons**

C. Necessary Containment: 92 gallons.

The 389-gallon capacity is adequate for Room 130.

The containment calculations for each storage room in the East Storage Building (ESB) clearly indicate that the necessary containment requirements are achieved for each storage room of the facility. The total containment capacity of the facility is 4823 gallons, while the necessary total capacity for the total facility is only 463 gallons.

Smaller containers may be substituted for larger containers when calculating the storage limit of a particular room. So, for example, if there were 120, 5-gallon containers in room 100, but only 25, 55-gallon containers, the Facility would not be considered out of storage compliance.

WEST STORAGE BUILDING

The West Storage building contains a 3-inch concrete lip surrounding the storage room. With dimensions of 62’ by 50’, the containment capacity is calculated as follows:

62 feet x 50 feet x 0.25 feet = 775 cu.feet x 7.48 gallons/cubic foot = 5797 gallons

The maximum storage volume for this room is 4500 gallons. The necessary containment is 450 gallons, ten percent of volume. The 5797-gallon containment capacity is more than the required containment.

In addition to the containment capabilities of the storage areas, other features have been incorporated into the facility to prevent the release of waste substances. These include the absence of floor drains in any of the storage areas, effectively preventing the migration of released substances into the septic field.

B6.3 Engineering Plans

Engineering plans of the East Storage Building are enclosed as **Appendix B6-1**. Engineering plans of the West Storage Building are enclosed as **Appendix B6-2**. Original plans were designed and approved by Professional Engineers on Staff with the Engineering Services Division of the MSU Physical Plant. Recent plans were designed and approved by MacMillan Associates The plans contain views, elevations, and cross-sections which provide information to facilitate the review of the facility. In addition, the specifications of the building and materials are provided in **Appendix B6-3**.

The building design permits easy, close access to the outside in each of the storage areas. The ESB Consolidation Room (100), the Lab-Pack Room (120), and the Mechanical Room (110) all contain access doors directly to the outside. The Storage Room (130) has a 4-foot by 2-foot emergency knock-out door installed in the west wall as an emergency escape route. The WSB consists of a large 62’ x 50’ room for storage with an overhead door, and an exit door at opposite ends. This storage room also connects to a separate office area with access to the outside.

The basis for the design and construction of the ESB was to enable the separation of different types of wastes into distinct storage areas of the facility and to provide the necessary containment in each storage area. The building has been designed and constructed both to avoid emergency situations and to facilitate the handling of these situations if they should occur. Each of the storage rooms in the ESB has been constructed with containment capabilities which have been discussed. In addition, the electrical controls of the ESB have been placed in the Middle Storage Building, which is completely separate from the storage areas.

Extensive security devices and emergency equipment have been installed at the MSU WSF. The purpose of the security system is to keep unauthorized personnel and livestock out of the active portion of the facility, to provide for the detection of hazardous vapors and flames, and to activate an alarm and fire suppression system to facilitate response to those possible situations. Details of the security and fire suppression system are discussed in section A4 "Security Procedures and Equipment".

The ESB is equipped with explosion-proof lighting and wiring. An emergency eye-wash station and shower have been installed adjacent to the toilet in the Lab-Pack Room (120). The shower consists of a drench shower head with a "panic-ring-activated, stay-open" valve while the eye-wash has a "panic-bar" operated valve. In addition, a second emergency eye-wash station is present in the Consolidation Room (100). Assistance can be summoned from the appropriate

local emergency response units via personal cell phones. A list of additional equipment is provided as **Appendix A7-3.** The locations of the equipment maintained in the WSF are shown on **Figure A7-3** (after the list of equipment). The stationary equipment in the chemical waste building includes a toilet, three floor-mounted drum hoods, one bench-top fume hood, a no-drain sink, two eye-wash stations, shower, as well as many items listed in the table. Storage areas of the items included in the equipment list are identified in **Appendix A7-3.**

The facility has been constructed to provide for adequate storage capacity, adequate containment capability and sufficient aisle space. In order to allow for the unobstructed movement of all personnel within the facility, the aisle spaces in all the storage areas are maintained at a minimum of 2 feet. This spacing allows for the passage of emergency equipment, if necessary, and for effective spill management in the event of a release.

The ESB Storage Room (130) has been equipped with a 4-foot by 2-foot knock-out emergency door on the west wall to provide an emergency escape route. This feature was not installed as part of the original building and as such is not shown on the original engineering plans. In addition, this room is equipped with explosion-proof lights, and blowout designed hinged metal walls.

The floor construction of the storage rooms includes a feature to provide for the raising of some of the 55-gallon containers off the floor surface. This promotes the detection of leaks and prevents the contact of the containers with any standing liquids. To this end, polyethylene spill pads are placed throughout each of the areas where 55-gallon drums are stored. This arrangement will allow for storage of most of the drums and 5-gallon containers awaiting consolidation above floor level. Incompatible corrosive wastes, i.e. acids and bases, which are currently segregated, are separated by the concrete diking within the corrosive consolidation and storage areas of Room 100, as indicated in **Figure C1-1**.

The concrete floor of the storage rooms are coated with the polyurea described in **Appendix B6-4**. This appendix contains the manufacturer's specifications for the coating materials, the chemical compatibilities, and the application instructions. The coating prevents any release of waste materials which could compromise containment integrity from contacting the cement floor.

The construction of the loading docks was intended to facilitate the safe handling of wastes both into and out of the facility. Engineering plans for the diking around the loading dock are and for the canopy over the loading dock are included as **Appendix B6-5.**

B6.4 Operation Standards

The ESB is equipped with a dual, independent gas fired, forced air heating system. The independent, dual feature allows for the backup system to compensate following the failure of one unit. These furnaces, along with all electrical controls, are housed on exterior concrete pads immediately to the north of Room 110 of the ESB. A facility-wide natural gas back-up generator is located near the canopy of the WSB in the event of a power failure.

Flow patterns for the WSF are uncomplicated due to the fact that the facility is limited to only storage of the waste substances, and the simplicity of the structure. The flow pattern for the different types of waste are described in detail in section A2 "Chemical and Physical Analyses." In summary, the materials are all sorted according to the waste stream categories identified in section A3 "Waste Analysis Plan." Following packaging or consolidation, readied containers are stored in designated storage locations.

When unloading, the Consolidation Room generally receives all ignitable solvents and corrosive or poisonous liquids in containers greater than 1 gallon capacity. All materials received in containers of less than or equal to 1 gallon capacity are moved to the Lab Pack Room for further segregation and placement into secondary containment. Upon placement into secondary containment, materials appropriate for consolidation are stored in the Consolidation Room.

Ignitable materials taken to the Consolidation Room (100) are stored there until either transport or consolidation. Corrosive waste materials are either stored or consolidated; the consolidated corrosive wastes are then transported directly from this room.

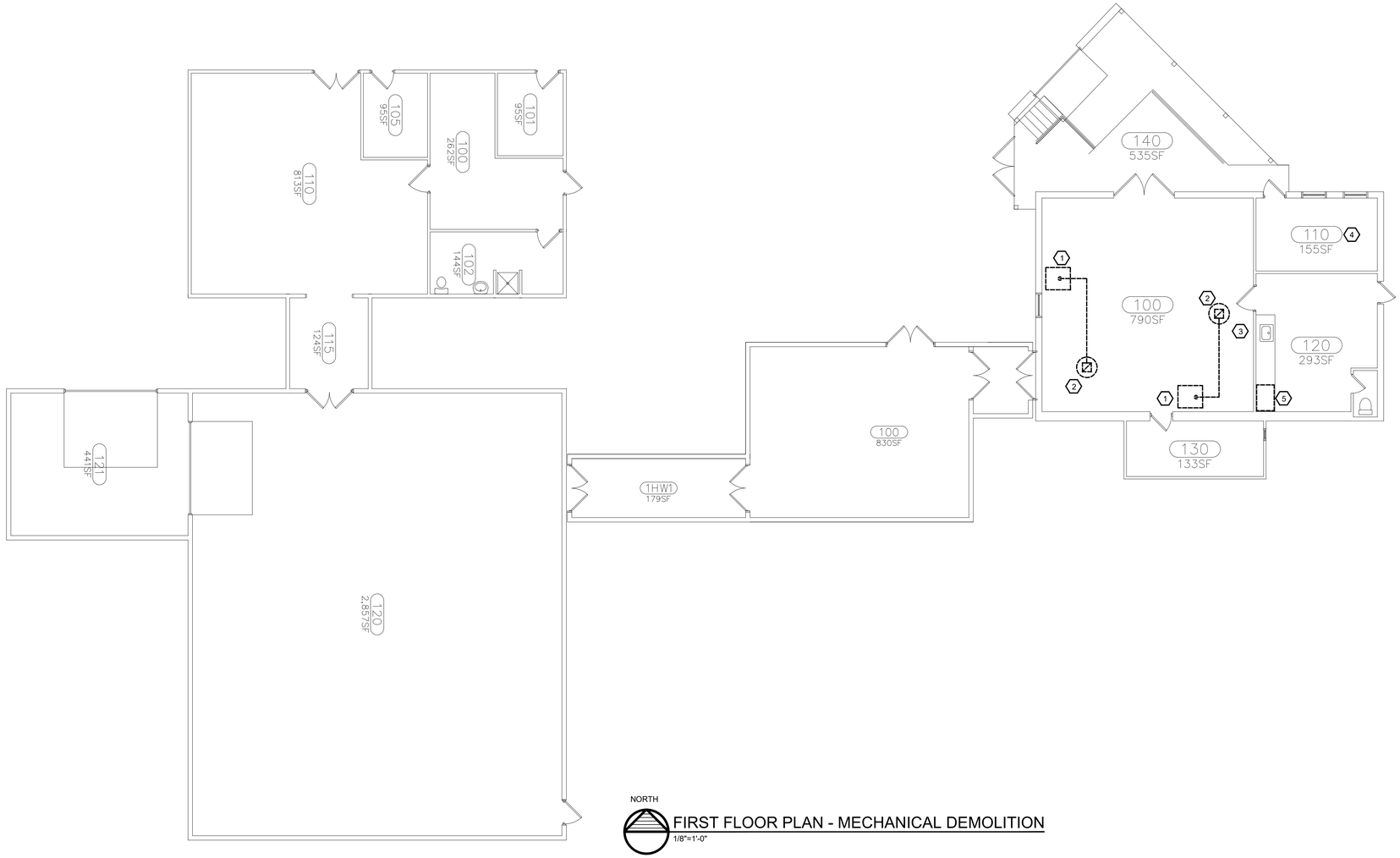
Corrosive waste materials are also taken from the loading dock directly into the Consolidation Room where they are either stored or consolidated. The consolidated corrosive wastes are then stored for subsequent removal by the contracted vendor.

The WSB is used for the storage of 5-, 30- and 55-gallon containers for off-site disposal at an approved facility. No consolidation or mixing occurs in the WSB. Waste streams will be properly segregated and stored in designated areas by trained staff. The structure is design to contain any accidental spill of the largest container stored. Concrete is lined with a polyurea coating resistant to organic and non-organic liquids.

The WSB is designed to allow a truck to back-up into the inside of the canopy for the loading of containers.

ATTACHMENT B6-1

East Storage Building Engineering Plans



NORTH

FIRST FLOOR PLAN - MECHANICAL DEMOLITION

1/8"=1'-0"

KEYED NOTES

1. REMOVE EXISTING DRUM FUME HOOD. REMOVE EXHAUST DUCTWORK ASSOCIATED WITH HOOD FROM HOOD TO CEILING. ABANDON DUCT ABOVE CEILING. FURNISH AND INSTALL SHEET METAL CAP AT CEILING OPENING. COORDINATE REMOVAL WITH ELECTRICAL TRADES.
2. REMOVE ROOF EXHAUST FAN AND ROOF CURB. COORDINATE FAN REMOVAL WITH ELECTRICAL TRADES. PATCH ROOF OPENING AND REPAIR ROOF TO MATCH EXISTING.
3. RELOCATE EXISTING EYEWASH STATION. COORDINATE REMOVAL WITH NEW FUME HOOD LOCATION. REWORK PIPING AS NECESSARY TO SERVE NEW EYEWASH LOCATION.
4. REMOVE REDUNDANT/REMOTE FUME HOOD SWITCHES. REFER TO NEW PLAN FOR LOCATION OF NEW SWITCHES. COORDINATE WITH ELECTRICAL TRADES.
5. REMOVE EXISTING BENCHTOP FUME HOOD. EXHAUST DUCTWORK TO BE RE-USED FOR NEW HOOD. REFER TO NEW PLANS.

GENERAL DEMOLITION NOTES

1. FIELD VERIFY LOCATION OF ALL EQUIPMENT TO BE REMOVED.
2. COORDINATE THE PATCHING OF ALL BUILDING MATERIALS (ROOF, WALLS, FLOORS, CEILINGS, ETC.) AS REQUIRED BASED ON SCOPE OF DEMOLITION WORK.
3. ALL WORK WITH WALLS AND CEILINGS (CUTTING, PATCHING AND REPAIRING) SHALL BE AWARE THAT EXISTING CONSTRUCTION MATERIALS ARE LINED WITH TRANSITE. ENGINEER SHALL NOT BE RESPONSIBLE FOR IDENTIFYING EXISTING TRANSITE, COORDINATION, ABATEMENT SPECIFICATIONS, PROCEDURES OR ANY COST OR WORK INVOLVED WITH REMOVAL.

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GS	DF	JG	2023-294

MICHIGAN STATE UNIVERSITY

Infrastructure Planning and Facilities

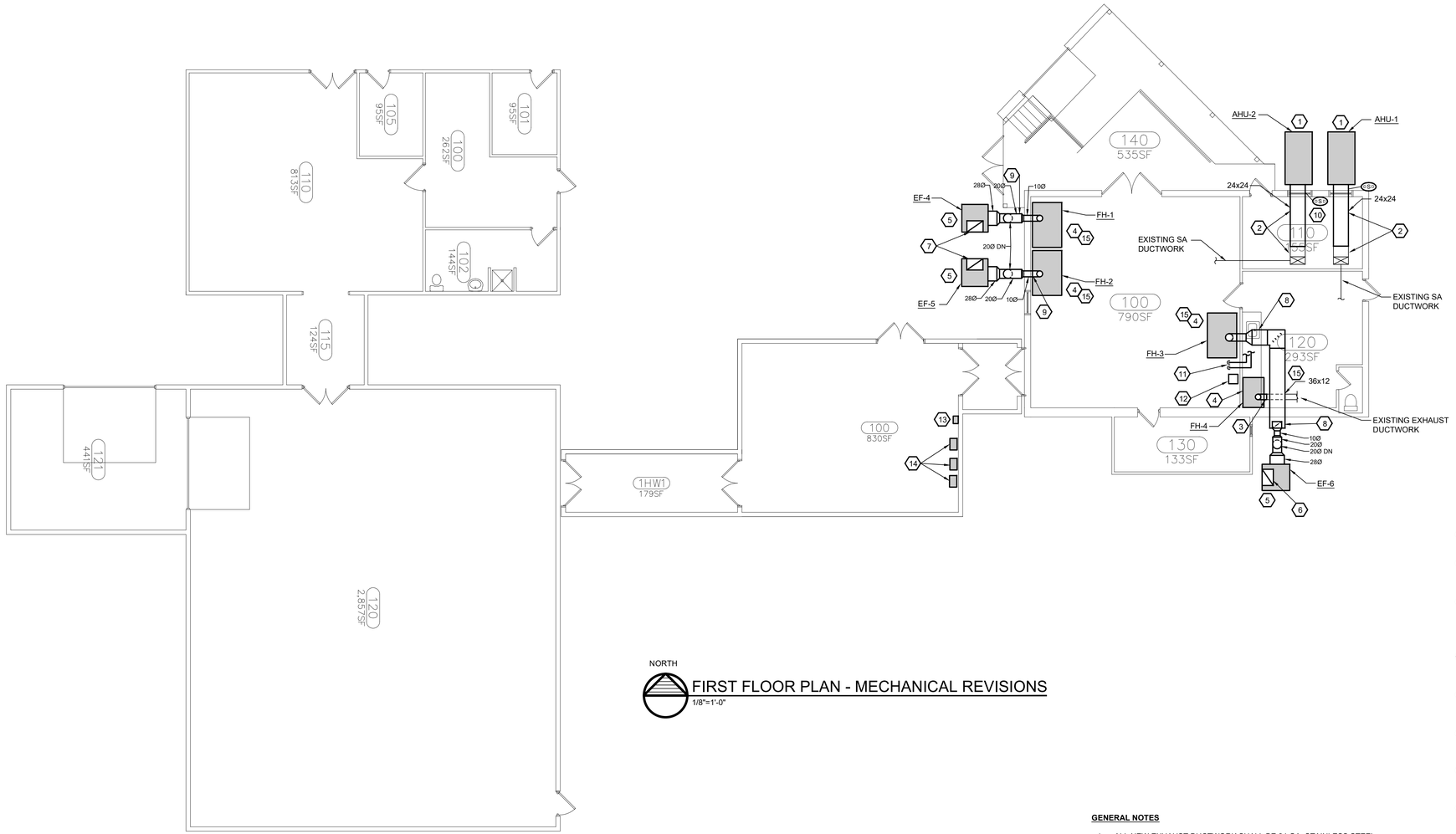
CHEMICAL WASTE FACILITY
FUME HOOD REPLACEMENTS

LEAD	BINGHAM
ARCH.	
MECH.	
ELEC.	
CIVIL	
L.A.	
INT. DES.	
REP.	
APPR.	
DATE	07/17/23
SCALE	AS NOTED
ISSUED	

FOR CONSTRUCTION 07/17/23

MECHANICAL DEMOLITION

M0.0



NORTH

FIRST FLOOR PLAN - MECHANICAL REVISIONS

1/8"=1'-0"

GENERAL NOTES

1. ALL NEW EXHAUST DUCTWORK SHALL BE 24 GA. STAINLESS STEEL.
2. FIELD VERIFY ALL EXISTING EQUIPMENT.
3. REFER TO M2.0 FOR FUME HOOD FAN CONTROL DIAGRAM.

KEYED NOTES

1. NEW MAKE-UP AIR UNIT TO BE LOCATED OUTSIDE. UNIT SHALL BE MOUNTED ON SUPPORT BASE WITH SPRING ISOLATORS.
2. ROUTE SUPPLY DUCTWORK FROM NEW UNIT TO BUILDING. CONNECT TO EXISTING DUCTWORK INSIDE BUILDING. TRANSITION DUCT AS NEEDED TO MATCH EXISTING DUCT SIZE.
3. CONNECT EXHAUST DUCT FROM NEW FUME HOOD TO EXISTING DUCTWORK WHICH IS SERVED BY EXISTING EXHAUST FAN WITH PLUME EXHAUST DISCHARGE. TRANSITION FROM HOOD OUTLET SIZE TO EXISTING DUCT SIZE.
4. NEW FUME HOOD. COORDINATE LOCATION WITH LAB USERS. FURNISH AND INSTALL STATIC PRESSURE SENSOR, SASH POSITION SENSOR AND SWITCH TO CONTROL HOOD. REFER TO CONTROL DIAGRAM.
5. NEW EXHAUST FAN TO BE LOCATED OUTSIDE. FAN SHALL BE MOUNTED ON SUPPORT STAND. COORDINATE LOCATION TO ALLOW FOR MAINTENANCE ACCESS. MOUNT FAN ON FROST-FREE CONCRETE PAD.
6. EXHAUST STACK TO BE ROUTED A MINIMUM OF 30 FEET ABOVE GRADE. COORDINATE EXACT HEIGHT WITH EXISTING CONDITIONS. SUPPORT STACK PROPERLY.
7. EXHAUST STACKS TO BE ROUTED A MINIMUM OF 30 FEET ABOVE GRADE. COORDINATE EXACT HEIGHT WITH EXISTING CONDITIONS. STACKS SHALL BE SUPPORTED TOGETHER.
8. TRANSITION EXHAUST DUCT TO CONNECTION SIZE AT FUME HOOD AND TO THE CONNECTION SIZE AT THE FAN.
9. ROUTE EXHAUST DUCT FROM FUME HOOD TO OUTSIDE AND THEN TRANSITION AS NECESSARY TO CONNECT TO FAN INLET.
10. COORDINATE DUCT SMOKE DETECTOR INSTALLATION WITH ELECTRICAL TRADES.
11. ROUTE 1/2" CW PIPING AND 1/2" COMPRESSED AIR PIPING TO NEW FUME HOOD. FIELD VERIFY EXISTING PIPING TO CONNECT TO.
12. RELOCATE EXISTING EYEWASH STATION TO MAKE ROOM FOR FUME HOOD. EXTEND PIPING AS NECESSARY.
13. NEW REDUNDANT SWITCHES TO OPERATE FUME HOODS (AND ASSOCIATED EXHAUST FANS) FROM A REMOTE LOCATION. COORDINATE WITH ELECTRICAL TRADES AND MSU-IPF.
14. VFD'S FOR EXHAUST FANS EF-4, EF-5, AND EF-6. COORDINATE LOCATION WITH ELECTRICAL TRADES. COORDINATE WITH SWITCH WIRING.
15. REPLACE EXISTING DIFFUSERS IN FRONT OF FUME HOOD WITH 3-WAY DIFFUSERS.

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Infrastructure
Planning and Facilities

MICHIGAN STATE UNIVERSITY

CHEMICAL WASTE FACILITY
FUME HOOD REPLACEMENTS

LEAD	BINGHAM
ARCH.	
MECH.	
ELEC.	
CIVIL	
L.A.	
INT. DES.	
REP.	
APPR.	
DATE	07/17/23
SCALE	AS NOTED

ISSUED
FOR CONSTRUCTION 07/17/23

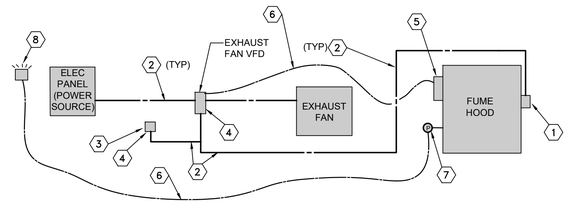
MECHANICAL REVISIONS

M1.0

MECHANICAL SYMBOL LIST

SAN	SANITARY PIPING BELOW FLOOR OR GRADE
SAN	SANITARY PIPING ABOVE FLOOR
COND	STEAM CONDENSATE RETURN PIPING
CD	MISC. EQUIP. COND DRAIN PIPING
	DOMESTIC COLD WATER PIPING
	DOMESTIC HOT WATER PIPING
	HOT WATER PIPE WITH ELECTRICAL HEAT TRACE
	DOMESTIC HOT WATER RETURN PIPING
	THREE WAY CONTROL VALVE
	ISOLATION GATE VALVE
	FLOW ARROW
	VALVE IN RISER
	ELBOW RISING UP
	ELBOW DROPPING DOWN
	TEE WITH PIPE UP
	TEE WITH PIPE DOWN
	INLINE PUMP
COND	CONDENSATE
CW	COLD WATER
EX	EXISTING
FCV	FLOW CONTROL VALVE
FD	FLOOR DRAIN
FS	FLOOR SINK
GPM	GALLONS PER MINUTE
HW	HOT WATER
HWR	HOT WATER RETURN
NC	NORMALLY CLOSED
NO	NORMALLY OPENED
DSD	DUCT SMOKE DETECTOR

1. LOCAL SWITCH TO OPERATE FUME HOOD (ON/OFF)
2. ELECTRICAL WIRING (IN RIGID METAL CONDUIT)
3. AUXILIARY OVERRIDE SWITCH TO POWER FAN/HOOD ON OR OFF FROM A REMOTE LOCATION. SWITCH SHALL BE 3-POSITION, WITH "NORMAL/AUTO" ALLOWING LOCAL FUME HOOD SWITCH TO CONTROL FAN STATUS. "ON" POSITION SHALL POWER VFD/FAN ON, NO MATTER WHAT LOCAL SWITCH POSITION IS. "OFF" POSITION SHALL COMMAND VFD/FAN OFF, NO MATTER WHAT LOCAL SWITCH POSITION IS.
4. VFD AND AUXILIARY/OVERRIDE SWITCH SHALL BE LOCATED NEAR POWER PANEL.
5. SASH POSITION SENSOR. WHEN SASH IS FULLY OPEN, VFD SHALL COMMAND EXHAUST FAN TO FULL AIRFLOW.
6. LOW VOLTAGE WIRING (IN RIGID METAL CONDUIT)
7. MAGNEHELIC PRESSURE SENSOR WITH LOCAL READOUT, AS WELL AS CONTACT TO SEND SIGNAL TO REMOTE AUDIBLE/VISUAL ALARM. ALL DEVICES TO BE CLASS 1/DIV 1 RATED.
8. REMOTE AUDIBLE/VISUAL ALARM.



FUME HOOD FAN CONTROL DIAGRAM (TYPICAL FOR ALL HOODS)
NO SCALE

FUME HOOD SCHEDULE

MARK	SERVED FROM	TYPE	MANUFACTURER	MODEL	CFM	SP	OVERALL DIMENSIONS	INSIDE OPENING DIMENSIONS	WEIGHT (LBS)
FH-1	EF-4	WALK-IN	AIR MASTER SYSTEMS CORP.	EH-411-60	2002	0.5	72"W X 35"D X 93"H	62"W x 34.75"D x 72"H	790
FH-2	EF-5	WALK-IN	AIR MASTER SYSTEMS CORP.	EH-411-60	2002	0.5	72"W X 35"D X 93"H	62"W x 34.75"D x 72"H	790
FH-3	EF-6	WALK-IN	AIR MASTER SYSTEMS CORP.	EH-411-60	2002	0.5	72"W X 35"D X 93"H	62"W x 34.75"D x 72"H	790
FH-4	N/A	BENCH TOP	AIR MASTER SYSTEMS CORP.	EH-111-48	521	0.25	48"W X 33-1/4"D X 56"H	38"W x 30"D x 29"H	385

NOTES:

1. FUME HOODS FH-1, FH-2, AND FH-3 SHALL HAVE FACTORY INSTALLED EXPLOSION PROOF INCANDESCENT LIGHT. ELECTRICAL TRADES SHALL WIRE LIGHT AND FURNISH AND INSTALL SWITCH FOR LIGHT.
2. FUME HOOD FH-4 SHALL HAVE LED LIGHT, LIGHT SWITCH AND RECEPTACLES FACTORY WIRED TO JUNCTION BOX. ELECTRICAL TRADES SHALL WIRE TO JUNCTION BOX.
3. FUME HOODS SHALL HAVE AIR MONITOR DISPLAY WITH SEPARATE 120V WIRING (FROM ELECTRICAL TRADES).
4. FUME HOOD OPERATING AIRFLOW SHALL BE AT LOWEST SASH POSITION AND 100 FPM FACE VELOCITY.

EXHAUST FAN SCHEDULE

MARK	SERVING	MAXIMUM AIRFLOW (CFM)	EXTERNAL STATIC PRESSURE (IN. W.G.)	MOTOR	BHP	HP	FLA	VOLTS/PH/HZ	MANUFACTURER MODEL NUMBER	SONES	WEIGHT (LBS)	DIMENSIONS
EF-4	FH-1	3246	1.7	DIRECT-DRIVE	2.77	7.5	22	230/3/60	COOK CPSLE-S		981	44-7/16"W X 42-1/8"L X 87"H
EF-5	FH-2	3246	1.7	DIRECT-DRIVE	2.77	7.5	22	230/3/60	COOK CPSLE-S		981	44-7/16"W X 42-1/8"L X 87"H
EF-6	FH-3	3246	1.7	DIRECT-DRIVE	2.77	7.5	22	230/3/60	COOK CPSLE-S		981	44-7/16"W X 42-1/8"L X 87"H

NOTES:

1. DIRECT DRIVE MOTOR.
2. DISCONNECT SWITCH SHALL BE NEMA 4X SS LOCKABLE DISCONNECT(PROVIDED BY FAN MANUFACTURER).
3. EXHAUST FANS SHALL BE RATED FOR CONTINUOUS OPERATION.
4. FURNISH FAN WITH ISOLATION BASE, SPRING ISOLATORS AND STACK EXTENSION.
5. EXHAUST FANS SHALL BE INTERLOCKED WITH HOODS AND SHALL RUN WHENEVER HOODS ARE OPERATIONAL.
6. FAN SPEED AND ON/OFF OPERATION SHALL BE CONTROLLED BY REMOTE VFD (SEE PLANS). VFD SHALL BE YASKAWA Z1000 CONFIGURED, RATED FOR 15 HP, 46.2 AMPS.

GAS-FIRED VERTICAL MAKE-UP AIR UNIT SCHEDULE

MARK	MANUFACTURER	MODEL	TYPE	AIRFLOW	STATIC PRESSURE (IN WG)		FAN MOTOR		HEATING CAPACITY (INPUT)	HEATING CAPACITY (OUTPUT)	MAX TEMP. RISE (F)	UNIT WEIGHT (LBS)	UNIT DIMENSIONS (L x W x H)	ELECTRICAL				NOTES
					EXT.	TOTAL	HP	BHP	MBH	MBH				VOLTS	PHASE	UNIT AMPS	FULL LOAD AMPS	
AHU-1	MODINE	HBP200TMRHN41D2H N1DDA00	INDIRECT-FIRED	2,500	0.60	0.73	0.75	0.74	200	162	60	731	82" X 41" X 44"	208	1	4.96	3.5	N/A
AHU-2	MODINE	HBP200TMRHN41D2H N1DDA01	INDIRECT-FIRED	2,500	0.60	0.73	0.75	0.74	200	162	60	731	82" X 41" X 44"	208	1	4.96	3.5	N/A

NOTES:

1. FACTORY INSTALLED, LOCKABLE NEMA 3R DISCONNECT.
2. DOUBLE-WALL, I" INSULATION WALL CONSTRUCTION. HINGED ACCESS DOORS.
3. 36" HIGH UNIT MOUNTING STAND.
4. SUPPLY AIR FILTERS PROVIDED BY MANUFACTURER.
5. UNIT WITH GREATER THAN 2,000 CFM SHALL HAVE DRY CONTACTS FOR DUCT SMOKE DETECTOR CIRCUIT FACTORY WIRED TO STOP UNIT UPON DETECTION OF SMOKE. DUCT SMOKE DETECTOR SHALL BE FURNISHED AND WIRED BY ELECTRICAL CONTRACTOR, WITH SHEET METAL INSTALLATION BY MECHANICAL TRADES.

GENERAL MECHANICAL NOTES

1. SLOPE ALL CONDENSATE DRAIN PIPING AWAY FROM EQUIPMENT (DRAIN PAN). AFTER DISCHARGE FROM SUMP PUMP, THE CONDENSATE SHALL BE ROUTED AS HIGH AS POSSIBLE AND THEN SLOPED FROM THAT POINT TOWARDS FINAL DRAIN DESTINATION.
2. DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO SHOW APPROXIMATE LOCATION AND GENERAL ARRANGEMENT OF SYSTEMS AND EQUIPMENT. DRAWINGS SHALL NOT BE SCALED FOR LOCATION OF SYSTEMS, EQUIPMENT,ETC. ALL LOCATIONS OF SYSTEMS AND EQUIPMENT SHALL BE VERIFIED IN FIELD AND COORDINATED WITH ALL OTHER TRADES AND EXISTING FIELD CONDITIONS. SOME SYSTEMS (PIPING, DUCTWORK, ETC.) AND EQUIPMENT LOCATIONS MAY REQUIRE CHANGES IN LOCATION DUE TO FIELD CONDITIONS AND COORDINATION WITH OTHER TRADES. THESE CHANGES SHALL BE MADE WITH NO ADDITIONAL COST TO THE OWNER. FAILURE TO VERIFY AND COORDINATE WILL BE NO REASON FOR ADDITIONAL COMPENSATION.
3. THE INSTALLATION OF ALL SYSTEMS, EQUIPMENT, ETC., IS SUBJECT TO CLARIFICATION WITH SUBMITTED SHOP DRAWINGS AND FIELD COORDINATION REQUIREMENTS.EQUIPMENT OUTLINES SHOWN ON DRAWINGS OR DIMENSIONED ON DRAWINGS ARE LIMITING DIMENSIONS. ANY EQUIPMENT THAT REDUCES THE INDICATED CLEARANCES OR EXCEEDS SPECIFIED OR SCHEDULED EQUIPMENT DIMENSIONS SHALL NOT BE USED.
4. THE MECHANICAL CONTRACTOR SHALL COORDINATE FINAL LOCATION OF ALL EQUIPMENT WITH PIPING, DUCTWORK, ETC., AT THE TIME OF ROUGH-IN. ALL EQUIPMENT TO BE SERVICEABLE. ABOVE CEILING EQUIPMENT SHALL BE WITHIN 18" OF CEILING WITHOUT ANY OBSTRUCTIONS AND SHALL HAVE ALL SERVICE AND ACCESS SPACES KEPT CLEAR. PERFORM ABOVE CEILING COORDINATION WITH ALL TRADES.
5. THE MECHANICAL TRADES SHALL TAKE OUT ALL PERMITS AND ARRANGE FOR NECESSARY INSPECTIONS AND SHALL PAY ALL FEES AND COSTS.
6. THE MECHANICAL TRADES SHALL VERIFY AMOUNT OF EXISTING PIPING, VALVES, DUCTWORK, ETC. TO BE REMOVED OR RELOCATED TO ALLOW FOR INSTALLATION OF NEW PIPING, DUCTWORK, VALVES, EQUIPMENT, WALLS, ETC. ALL ABANDONED PIPING, VALVES, ETC., SHALL BE REMOVED.
7. THE MECHANICAL TRADES SHALL COORDINATE ALL WORK WITH OTHER TRADES AND SHALL COORDINATE ANY SYSTEMS SHUT-DOWN WITH THE ARCHITECT/ENGINEER AND OWNER.
8. ALL EXISTING EQUIPMENT, PIPING, DUCTWORK, ETC. THAT IS TO BE REMOVED SHALL REMAIN THE PROPERTY OF THE OWNER. THE CONTRACTOR SHALL REMOVE AND LOCATE THIS MATERIAL THAT REMAINS THE PROPERTY OF THE OWNER TO A LOCATION DETERMINED BY THE OWNER SOMEWHERE ON SITE. IF THE OWNER DOES NOT WANT TO MAINTAIN POSSESSION OF THE REMOVED MATERIAL, THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING MATERIAL FROM THE SITE AND DISPOSING OF THIS MATERIAL AS NECESSARY TO MEET ALL CODES AND REQUIREMENTS AND SHALL PAY ALL COSTS AS REQUIRED FOR ANY DISPOSAL FEES, INSPECTIONS, PERMITS, ETC.
9. ATTACHMENTS OF MECHANICAL OR ELECTRICAL EQUIPMENT TO STRUCTURAL MEMBERS ARE THE RESPONSIBILITY OF THE INSTALLING TRADE. STRUCTURAL MEMBERS SHALL NOT BE FIELD CUT, WELDED OR OTHERWISE MODIFIED WITHOUT APPROVAL OF THE ARCHITECT/ENGINEER. ATTACHMENT TO STEEL JOISTS SHALL BE MADE AT PANEL POINTS WHENEVER POSSIBLE. STEEL JOISTS SHALL BE REINFORCED FOR NON-PANEL POINT CONCENTRATED LOADS IN ACCORDANCE WITH THE STRUCTURAL DETAILS; THIS WORK SHALL BE PERFORMED BY CERTIFIED WELDERS AND IS THE RESPONSIBILITY OF THE TRADE INSTALLING THE SUBJECT LOAD. STRUCTURAL MEMBERS SHALL NOT BE OVERLOADED AS A RESULT OF ATTACHMENTS. ATTACHMENT/EQUIPMENT LOADING FOR ALL TRADES RESULTING IN TOTAL LOAD GREATER THAN AN EQUIVALENT UNIFORM 5 PSF FOR ANY MEMBER SHALL BE SUBMITTED TO THE ARCHITECT/ENGINEER FOR REVIEW.
10. SEE MSU STANDARD SPECIFICATION FOR FURTHER INFORMATION.

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CHEMICAL WASTE FACILITY
FUME HOOD REPLACEMENTS

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MECH.	
ELEC.	
CIVIL	
L.A.	
INT. DES.	
REP.	
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DATE	07/17/23
SCALE	AS NOTED
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FOR CONSTRUCTION 07/17/23

SCHEDULES AND DETAILS

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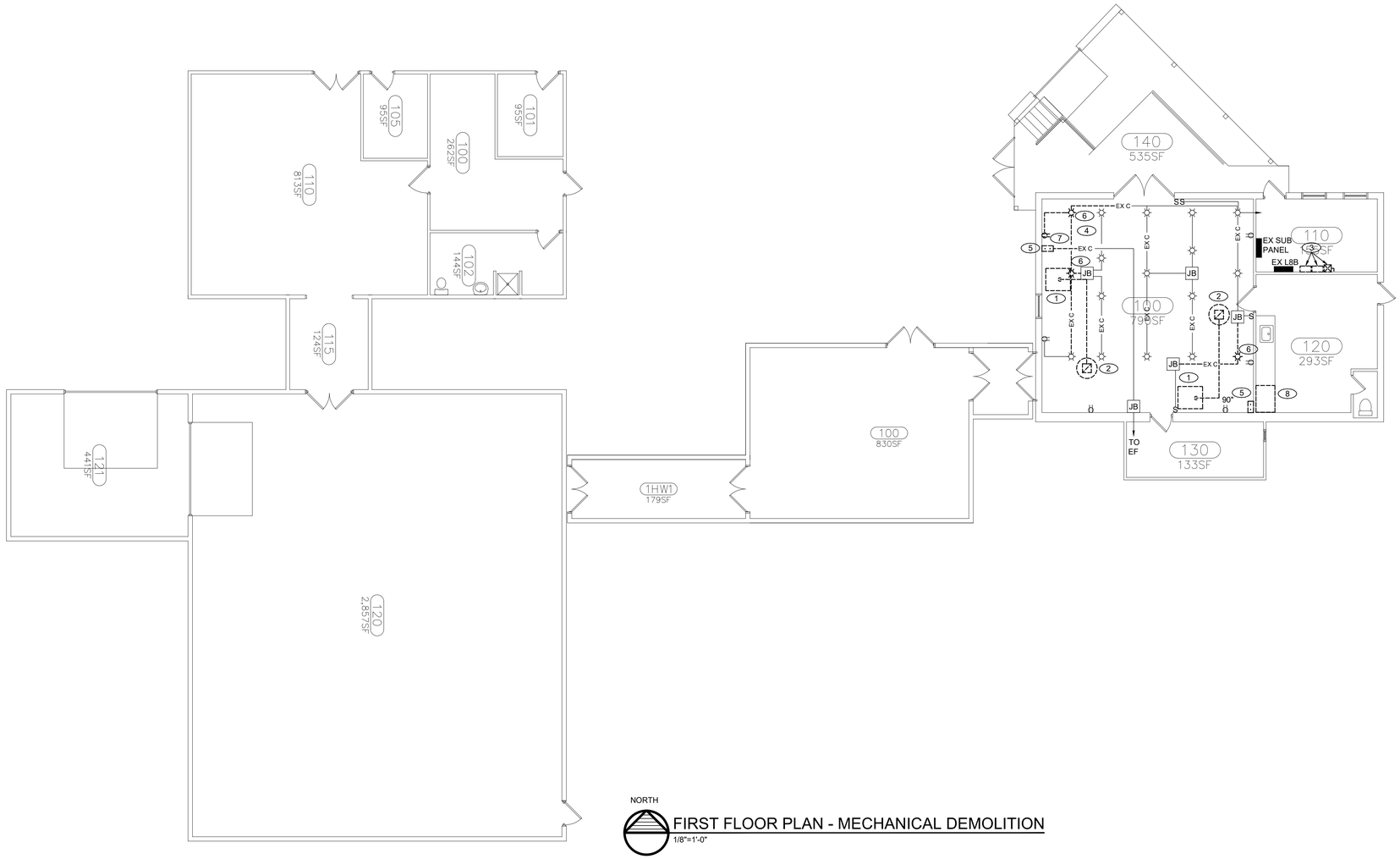

NORTH

FIRST FLOOR PLAN - MECHANICAL DEMOLITION

1/8"=1'-0"

KEYED NOTES

1. REMOVE EXISTING DRUM FUME HOOD. REMOVE EXISTING CIRCUIT INCLUDING WIRING AND CONDUIT BACK TO SOURCE. NEW HOOD SHALL BE POWERED FROM A NEW PANEL AS INDICATED.
2. REMOVE ROOF EXHAUST FAN EXISTING CIRCUIT INCLUDING WIRING AND CONDUIT BACK TO SOURCE. NEW FAN SHALL BE POWERED FROM A NEW PANEL AS INDICATED.
3. REMOVE THE EXISTING FAN OVERRIDE "ON" STARTER SWITCH.
4. REMOVE/REWORK RIGID CONDUIT AS REQUIRED TO ALLOW FOR THE NEW HOODS AND DUCT WORK TO BE INSTALLED. COORDINATE WORK WITH MECHANICAL TRADES.
5. ELECTRICAL CONTRACTOR SHALL REMOVE THE MANUAL ON/OFF SWITCH FOR THE EXISTING HOOD AS SHOWN. REMOVE ASSOCIATED CONDUIT AND WIRING BACK TO SOURCE.
6. ELECTRICAL CONTRACTOR SHALL DISCONNECT, REMOVE AND REINSTALL THE EXISTING LIGHT TO IN FRONT OF THE NEW HOOD'S LOCATION. REWORK/EXTEND CONDUIT AND WIRING AS SHOWN ON THE REVISED ELECTRICAL PLAN.
7. ELECTRICAL CONTRACTOR SHALL DISCONNECT, REMOVE AND REINSTALL THE EXISTING RECEPTACLE TO THIS WALL TO AVOID THE NEW HOOD'S LOCATION. REWORK/EXTEND CONDUIT AND WIRING AS SHOWN ON THE REVISED PLAN.
8. ELECTRICAL CONTRACTOR SHALL DISCONNECT POWER TO THE TABLE TOP FUME HOOD TO ALLOW FOR ITS REMOVAL. SAVE CIRCUIT FOR REUSE WITH NEW HOOD.

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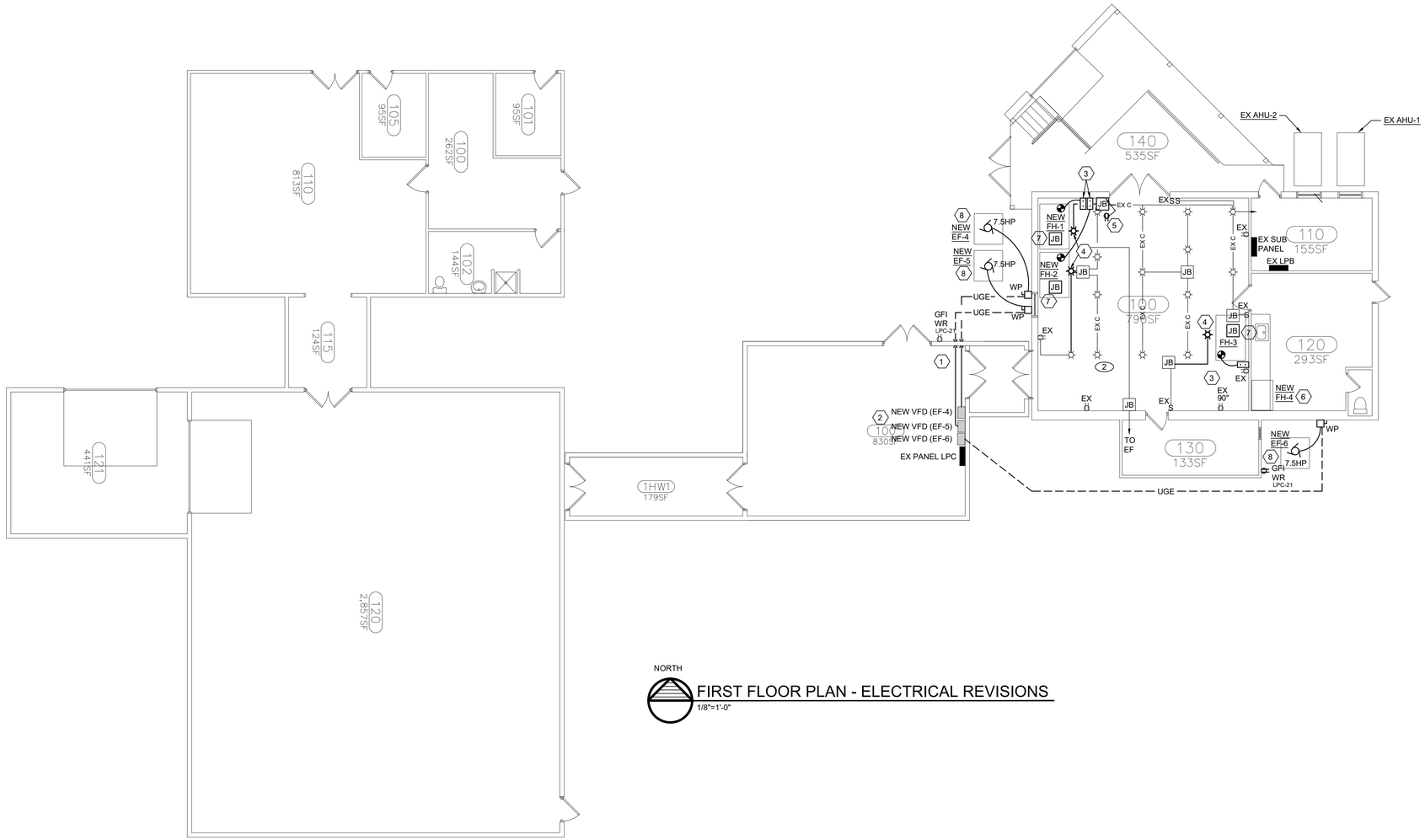

NORTH

FIRST FLOOR PLAN - ELECTRICAL REVISIONS

1/8"=1'-0"

KEYED NOTES

1. ELECTRICAL CONTRACTOR SHALL ROUTE THE CONDUIT FROM VFD-4 AND 5 EXPOSED UP THE WALL ACROSS THE CEILING TO THE EXTERIOR WALL. THEN DOWN THE WALL AND LB OUT THROUGH THE WALL AT 18" AFF, THEN UNDERGROUND TO EACH RESPECTIVE DISCONNECT.(SAW CUTTING THE FLOOR IS NOT PROHIBITED)
2. MODIFY THE EXISTING UNISTRUT SUPPORT INSTALLED FOR THE LPC TO THEN INSTALL VFD-4,5, AND 6. VDF'S ARE OVERSIZED TO ALLOW FOR SINGLE PHASE INPUT AND A THREE PHASE OUTPUT TO EACH RESPECTIVE LOAD
3. ELECTRICAL CONTRACTOR SHALL FURNISH INSTALL NEW HAZARDOUS RATED ON/OFF SWITCH FOR THE NEW FUME HOOD. KILLARK #XS-51C OR EQUAL
4. RELOCATED EXISTING LIGHT REWIRED AS SHOWN.
5. RELOCATED EXISTING RECEPTACLE REWIRED AS SHOWN.
6. ELECTRICAL CONTRACTOR SHALL REUSE THE EXISTING POWER FOR TABLE TOP FUME HOOD TO POWER THE NEW TABLE TOP FUME HOOD FH-4 AS A ONE FOR ONE DIRECT REPLACEMENT. EXTEND THIS 120 VOLT TO ALSO POWER THE NEW AIR MONITOR.
7. ELECTRICAL CONTRACTOR SHALL PROVIDE A 120 VOLT POWER CIRCUIT TO THE HOODS FACTORY MOUNTED JUNCTION BOX WHICH WILL POWER THE HOODS LIGHT AND RECEPTACLE. ELECTRICAL CONTRACTOR SHALL ALSO UTILIZE THIS CIRCUIT TO POWER THE AIR MONITOR.
8. CONTRACTOR SHALL INSTALL A COMPLETE NEW LIGHTNING PROTECTION SYSTEM ON THIS EXHAUST STACK. INSTALL SYSTEM IN CONJUNCTION WITH THE NEW EXHAUST STACKS. INSTALL ALL AIR TERMINALS, GROUND CONDUCTORS, GROUNDING LOOPS, FASTENERS, GROUND RODS AND OTHER LIGHTNING PROTECTION EQUIPMENT TO MEET NFPA 780 AND COMPLY WITH LPI-175.

GENERAL WIRING NOTES

1. ALL CONDUIT WITHIN HAZARDOUS AREAS SHALL BE RIGID METAL CONDUIT.
2. PROVIDE SEAL OFFS FOR ANY NEW CONDUITS PENETRATING THROUGH THE WALL OR ROOF OF THE HAZARDOUS AREA.
3. ALL EXTERIOR DISCONNECTS SHALL BE STAINLESS STEEL NEMA 4X TO MATCH MSU STANDARDS.
4. PAINT ALL NEW CONDUIT TO MATCH EXISTING.
5. ANY UNDERGROUND CONDUIT SHALL BE SCHEDULE 40 PVC.
6. REFER TO MSU SPECIFICATIONS AND STANDARDS.
7. ALL EXTERIOR RECEPTACLES SHALL HAVE A DIECAST INUSE COVER WEATHERPROOF COVER

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EX LP-B

MAIN: SIZE & TYPE: **175** A MLO | PANEL LOCATION:
BUS RATING: **225** A | FEED SIZE:
VOLTAGE: **120 / 240** V **1** Ø, **3** WIRE | FED FROM:
MOUNTING: SURFACE | MIN RMS AMPS:

CKT #	CIRCUIT DESCRIPTION	LOAD (kVA) A		C	AMPS / POLES	CKT #	LOAD TYPE	CKT #	AMPS / POLES	LOAD (kVA) A		C	CIRCUIT DESCRIPTION	CKT #
1	LIGHTS WORK ROOM 120				20/1	1		16	20/1				TOP PLUG-WORK RM 120-W WALL	16
2	LTS WORK RM 120 & REST RM				20/1	2		17	20/1				PLUGS- WORK RM 120	17
3	EXHAUST FAN-REST RM				20/1	3		18	20/1				SECURITY PNL	18
4	LIGHTS STORAGE RM 100				20/1	4		19	20/1				LOADING DOCK LIGHTS	19
5	LIGHTS SOLVENT STORAGE 130				20/1	5		20	20/1				WP PLUG ON DOCK	20
6	LTS OUTSIDE & MECH RM 110				20/1	6		21	20/1				SOUTH EAST FLOOD LIGHT	21
7	PLUGS-STORAGE RM 100				20/1	7		22	20/1				EXHAUST FAN	22
8	GAS DET PNL, EXHAUST FANS				20/1	8		23	20/1				EXHAUST FAN	23
9	SUB PANEL				60/	9		24	20/1				FUME MONITOR	24
10	SUB PANEL				2	10		25	25/				FUME MONITOR	25
11	DOOR OPENER				20/1	11		26	2				FUME MONITOR	26
12	LIGHTS-FUME HOOD				20/1	12		27	20/1				FIRE ALARM, SYSTEM 3 POWER	27
13	ALARM COILS CR1/CR2 AIR/FIRE				20/1	13		28	20/1				SPARE	28
14	PLUG AT AIR MONITORING PNL				20/1	14		29	20/				WATER HEATER	29
15	PLUG AT FIRE PNL				20/1	15		30	2				WATER HEATER	30

NOTES: EC TO UPDATE THE PANEL SCHEDULE ONCE EXISTING LOADS ARE REMOVED.

EX SUB PANEL

MAIN: SIZE & TYPE: **60** A MLO | PANEL LOCATION:
BUS RATING: A | FEED SIZE:
VOLTAGE: **120 / 240** V **1** Ø, **3** WIRE | FED FROM: LP-B
MOUNTING: SURFACE | MIN RMS AMPS:

CKT #	CIRCUIT DESCRIPTION	LOAD (kVA) A		C	AMPS / POLES	CKT #	LOAD TYPE	CKT #	AMPS / POLES	LOAD (kVA) A		C	CIRCUIT DESCRIPTION	CKT #
1	EXHAUST FAN 1&2 RM 130				20/1	1		2	30/				SPARE	2
3	SAFEGARD SG-200				20/1	3		4	2				SPARE	4
5	HVAC CONTROL PANEL				20/1	5		6	20/				HV2 220V	6
7	HV2 SERVICE PLUG				20/1	7		8	2				HV2 220V	8
9	HV1 220V				20/	9		10	20/1				HV1 SERVICE PLUG	10
11	HV1 220V				2	11		12	20/1				SPARE	12
13	BLANK					13		14					BLANK	14
15	BLANK					15		16					BLANK	16

NOTES: EC TO UPDATE THE PANEL SCHEDULE ONCE EXISTING LOADS ARE REMOVED.

EX LP-C

MAIN: SIZE & TYPE: **225** A MLO | PANEL LOCATION:
BUS RATING: **225** A | FEED SIZE:
VOLTAGE: **120 / 240** V **1** Ø, **3** WIRE | FED FROM:
MOUNTING: SURFACE | MIN RMS AMPS:

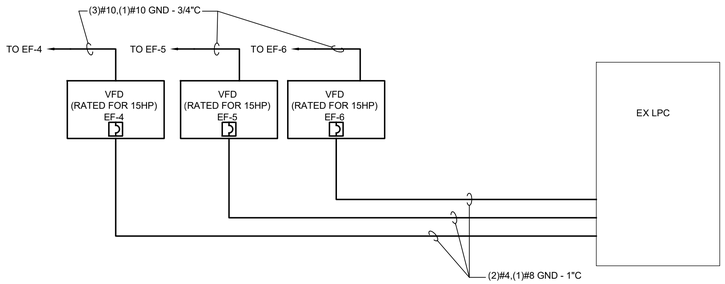
	CKT #	CIRCUIT DESCRIPTION	LOAD (kVA) A		C	AMPS / POLES	CKT #	LOAD TYPE	CKT #	AMPS / POLES	LOAD (kVA) A		C	CIRCUIT DESCRIPTION	CKT #	
1	1	EF-4	3.900			70A	1	H	16	70A	3.900			EF-6	2	1
1	3	EF-4			3.900	2P	2	H	17	2P			3.900	EF-6	4	1
1	5	EF-5	3.900			70A	3	H	18	20/1	0.700			FH-1 LIGHTS/ AIR MONITOR	6	
1	7	EF-5			3.900	2P	4	H	19	20/1			0.700	FH-2 LIGHTS/ AIR MONITOR	8	
	9	SPARE				20/1	5	R	20	20/1	0.700			FH-3 LIGHTS/ AIR MONITOR	10	
	11	SPARE				20/1	6	R	21	20/1			0.180	GFI RECEPTACLE	12	
	13	SPARE				20/1	7		22	20/1				SPARE	14	
	15	SPARE				20/1	8		23	20/1				SPARE	16	
	17	SPARE				20/1	9		24	20/1				SPARE	18	
	19	SPARE				20/1	10		25	20/1				SPARE	20	
	21	SPARE				20/1	11		26	20/1				SPARE	22	
	23	SPARE				20/1	12		27	20/1				SPARE	24	
	25	SPARE				20/1	13		28	20/1				SPARE	26	
	27	SPARE				20/1	14		29	20/1				SPARE	28	
	29	SPARE				20/1	15		30	20/1				SPARE	30	
	31	SPARE				20/1	31		32	20/1				SPARE	32	
	33	SPARE				20/1	33		34	20/1				SPARE	34	
	35	SPARE				20/1	35		36	20/1				SPARE	36	
	37	SPARE				20/1	37		38	20/1				SPARE	38	
	39	SPARE				20/1	39		40	20/1				SPARE	40	
	41	SPARE				20/1	41		42					BLANK	42	

LOAD SUMMARY		KVA CONNECTED A		C	KVA SUMMARY TOTAL		DEMAND	
RECEPTACLES	R	1.400		0.880	2.280		2.280	
LIGHTING	L	0.000		0.000	0.000	1.000	0.000	
HVAC	H	11.700		11.700	23.400	0.950	22.230	
OTHER	O	0.000		0.000	0.000	0.600	0.000	
EXISTING	E	0.000		0.000	0.000	1.000	0.000	
TOTAL KVA		13.100		12.580	25.680		24.510	TOTAL ESTIMATE KVA
VOLTS / PHASE		120		120	240		240	SYSTEM VOLTAGE
AMPS / PHASE		109.167		104.833	107.000		102.125	AMPS

NOTES:

PANEL SCHEDULE KEYED NOTES

1 INSTALL NEW BREAKERS AS SHOWN TO POWER NEW LOAD.



PARTIAL ONE LINE DIAGRAM

VFD SCHEDULE

YAS Z1C1D046PC

YASKAWA Z1000 CONFIGURED DRIVE

15HP, 46.2 AMPS, 3-60, 208 VOLT, WITH CIRCUIT BREAKER/DISCONNECT, NEMA 1 ENCLOSURE

ELECTRICAL SYMBOLS

- DOWNLIGHT OR SURFACE LIGHT FIXTURE
- S SINGLE POLE SWITCH
- SINGLE RECEPTACLE
- CIRCUIT BREAKER DISCONNECT
- DEVICE CONNECTION
- NON-FUSED DISCONNECT SWITCH
- JB JUNCTION BOX
- PANELBOARD
- THREE PHASE MOTOR
- PUSH BUTTON STATION
- WP DENOTES WEATHER PROOF
- EC ELECTRICAL CONTRACTOR
- EX EXISTING
- GFI GROUND FAULT CIRCUIT INTERRUPTER
- WR WEATHER RESISTANT
- C CONDUIT
- VFD VARIABLE FREQUENCY DRIVE
- ---- INDICATES REMOVAL

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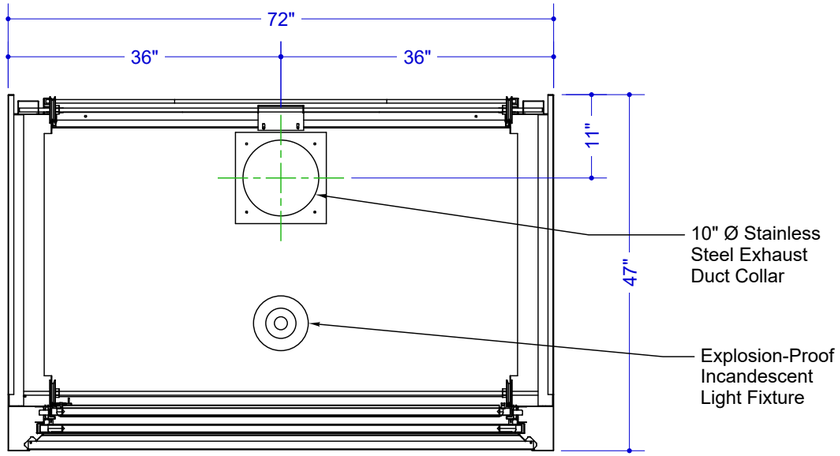

BB / 1.0 PLAN VIEW
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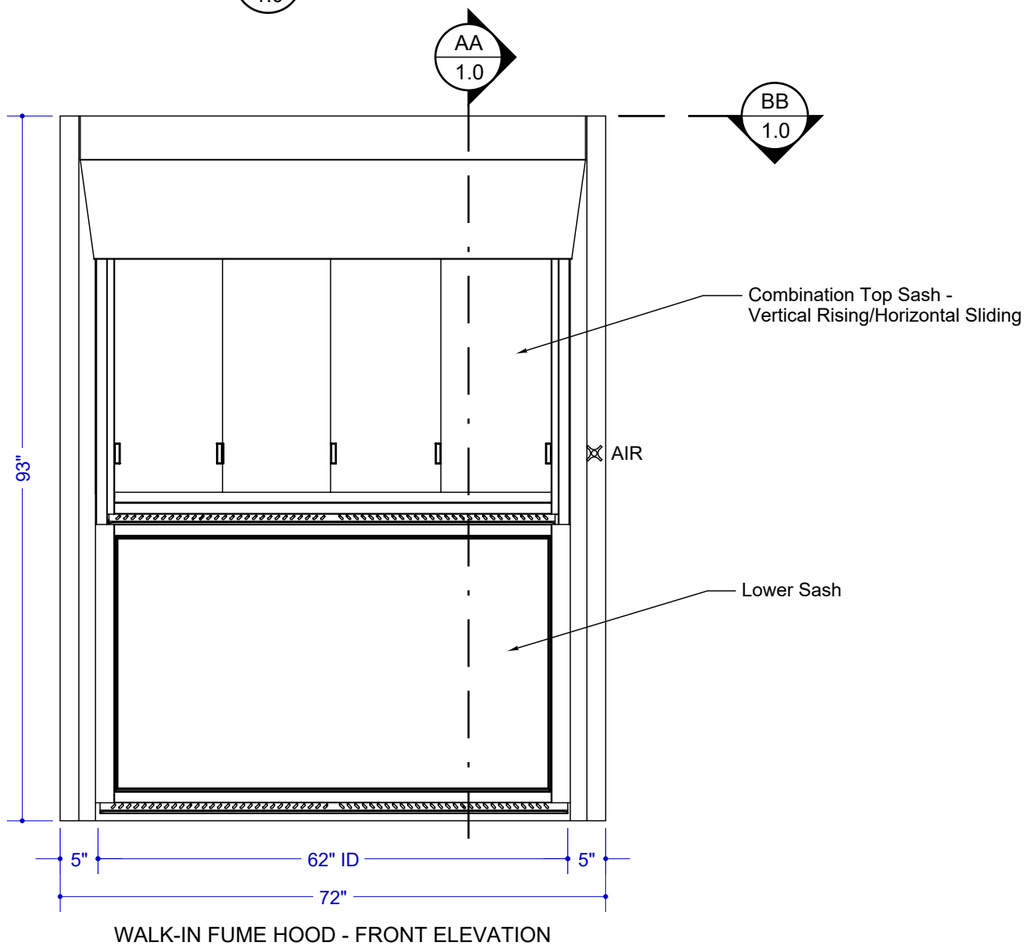
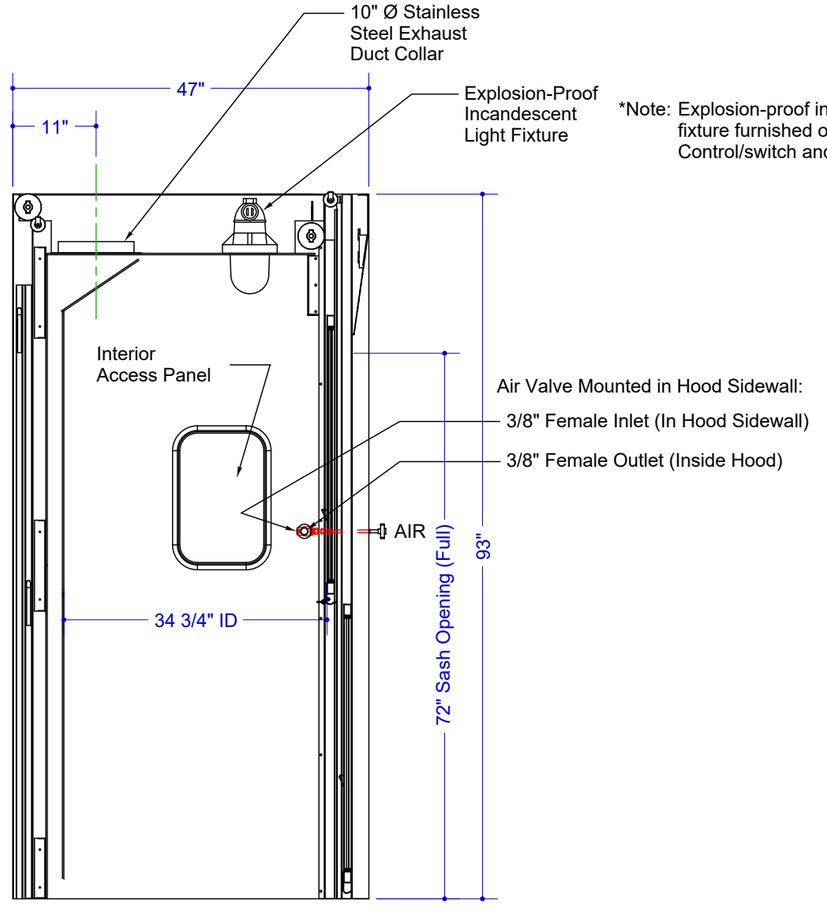


WALK-IN FUME HOOD - FRONT ELEVATION

EH-411-72 Exhaust Air Requirements

Sash Position	Volume of Exhaust Air Reqd. to Achieve 100 FPM Face Velocity	Static Pressure Loss Due to Hood
Full Open	3,246 CFM	0.50”



*Note: Explosion-proof incandescent light fixture furnished only. Control/switch and wiring by others.

AA / 1.0 SECTION
Scale: 1:20

EH-411-72 X-Depth 6' Walk-In Fume Hood
Qty: Three (3) Reqd.
Finish:

R.D. Landstra :: December 12, 2022

EH-411-72 X-Depth 6' Walk-In Fume Hood

:: MSU - Chemical Waste Facility :: ::

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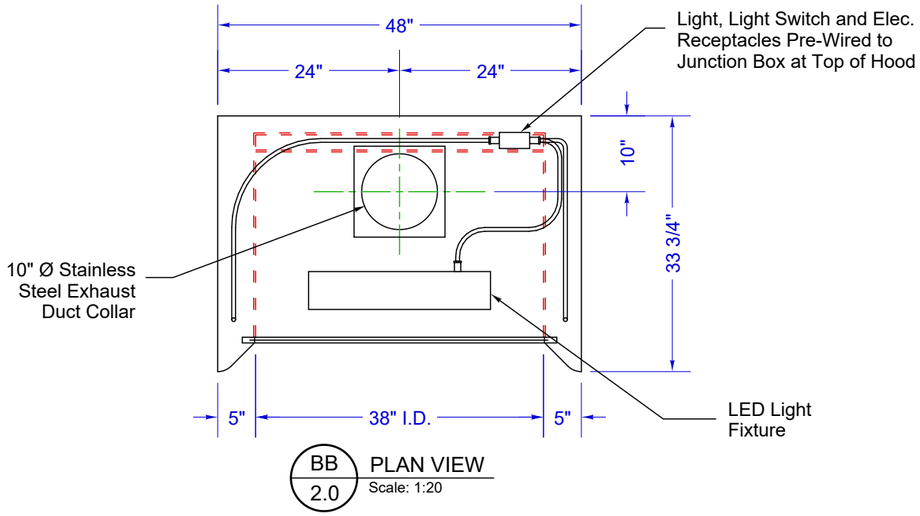
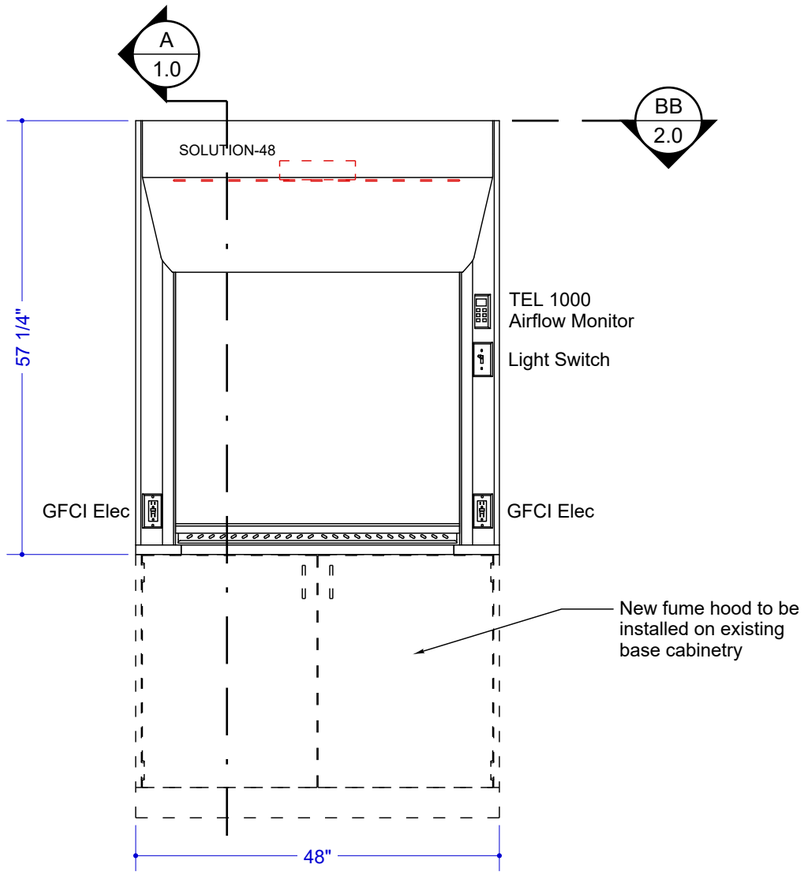


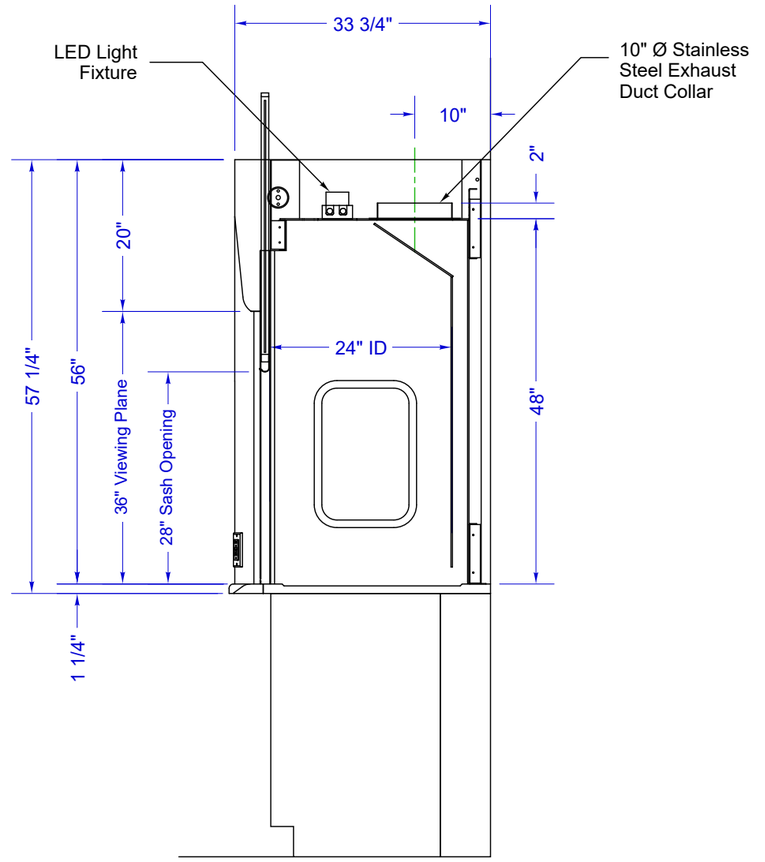
BB / 2.0 PLAN VIEW
Scale: 1:20



BENCH FUME HOOD - FRONT ELEVATION

Solution-48 Exhaust Air Requirements

Sash Height	Volume of Exhaust Air Reqd. to Achieve 100 FPM Face Velocity	Static Pressure Loss Due to Hood
28”	739 CFM	0.25”



AA / 2.0 SECTION
Scale: 1:20

SOL-48 4' Bench Fume Hood
Qty: One (1) Reqd.
Finish:

AMS AIR MASTER SYSTEMS

R.D. Landstra :: December 12, 2022

SOL-48 4' Bench Fume Hood

:: MSU - Chemical Waste Facility

:: ::

2.0

ATTACHMENT B6-2

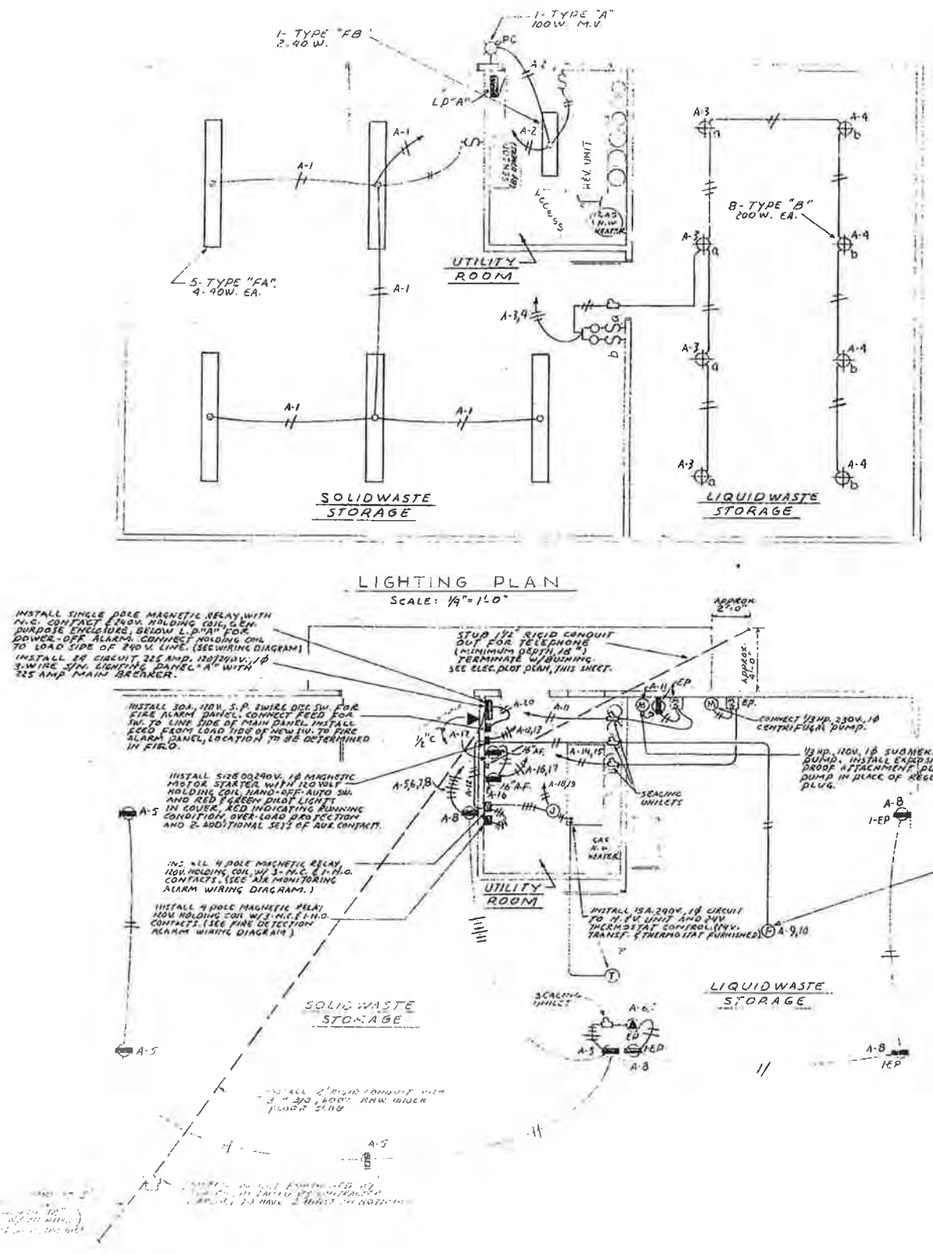
West Storage Building Engineering Plans

NOTE: ELECTRICAL CONTRACTOR TO FURNISH SIGN TO BE MOUNTED OVER SUMP PUMP SWITCH

ENGRAVED PLASTIC SIGN BLACK BACKGROUND WITH WHITE LETTERS

SUMP PUMP SWITCH
SHUT OFF SWITCH
WHEN HOSE IS NOT
IN RECEIVER TANK
ON TRUCK.

LIGHTING PLAN
SCALE: 1/8" = 1'-0"



INSTALL SINGLE POLE MAGNETIC RELAY WITH N.C. CONTACT 240V. HOLDING COIL, GEN. PURPOSE ENCLOSURE, BELOW L.P. "A" FOR POWER-OFF ALARM. CONNECT HOLDING COIL TO LOAD SIDE OF 240 V. LINE. (SEE WIRING DIAGRAM)

INSTALL 30 CIRCUIT, 225 AMP., 120/240 V., 1Ø 3-WIRE SIN. LIGHTING PANEL "A" WITH 225 AMP MAIN BREAKER.

STUB 1½" RIGID CONDUIT OUT FOR TELEPHONE (MINIMUM DEPTH, 18") TERMINATE W/BUSHING. SEE ELEC. PLOT PLAN, THIS SHEET.

INSTALL 30A., 120 V., S.P. 2 WIRE DISC SW. FOR FIRE ALARM PANEL. CONNECT FEED FROM THI TO LINE SIDE OF MAIN PANEL. INSTALL FEED FROM LOAD SIDE OF NEW SW. TO FIRE ALARM PANEL, LOCATION TO BE DETERMINED IN FIELD.

INSTALL SIZE 00 240 V., 1Ø MAGNETIC MOTOR STARTER, WITH 120 VOLT HOLDING COIL, HAND-OFF-AUTO SW. AND RED & GREEN PILOT LIGHT IN COVER, ACT. INDICATING RUNNING CONDITION, OVER-LOAD PROTECTION AND 2- ADDITIONAL SETS OF AUX. CONTACTS.

INSTALL 4 POLE MAGNETIC RELAY, 120 V. HOLDING COIL, W/ 3-N.C. & 1-N.O. CONTACTS. (SEE 3/R MONITORING ALARM WIRING DIAGRAM.)

INSTALL 4 POLE MAGNETIC RELAY, 120 V. HOLDING COIL W/ 2-N.C. & 2-N.O. CONTACTS. (SEE FIRE DETECTION ALARM WIRING DIAGRAM.)

INSTALL 15A. 240 V., 1Ø CIRCUIT TO H.V. UNIT AND H.V. THERMOSTAT CONTROL (H.V. TRANSF. & THERMOSTAT FURNISHED)

CONNECT 1/3 H.P. 230 V., 1Ø EXHAUST FAN MOTOR & CONTROL. (DISCONNECT SW. INCLUDED ON FAN.)

CONNECT 1/2 H.P., 110 V., 1Ø SUBMERSIBLE SUMP. INSTALL EXPLOSION PROOF ATTACHMENT PLUG ON PUMP IN PLACE OF REGULAR PLUG.

CONNECT 1/3 H.P., 110 V. SUBMERSIBLE SUMP. (BUILT IN LEVEL CONTROL)

SEALING UNIONS

GAS H.W. HEATER

UTILITY ROOM

SOLIDWASTE STORAGE

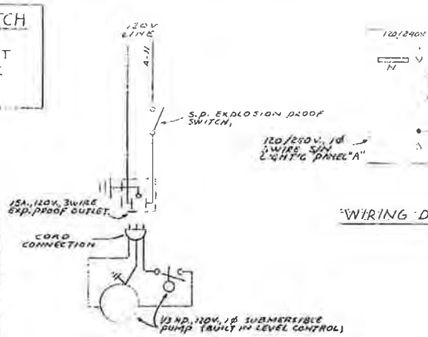
LIQUIDWASTE STORAGE

SCALE 4" RIGID CONDUIT WITH 4 - #3/0, 600 V. RHW WIRES FLOOR SLAB

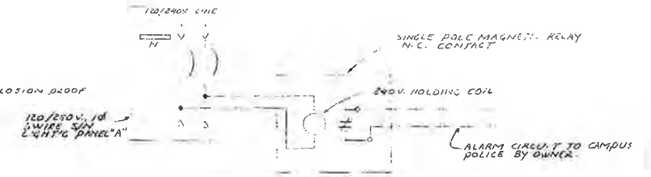
APPROX. 240'-0"

APPROX. 40'-0"

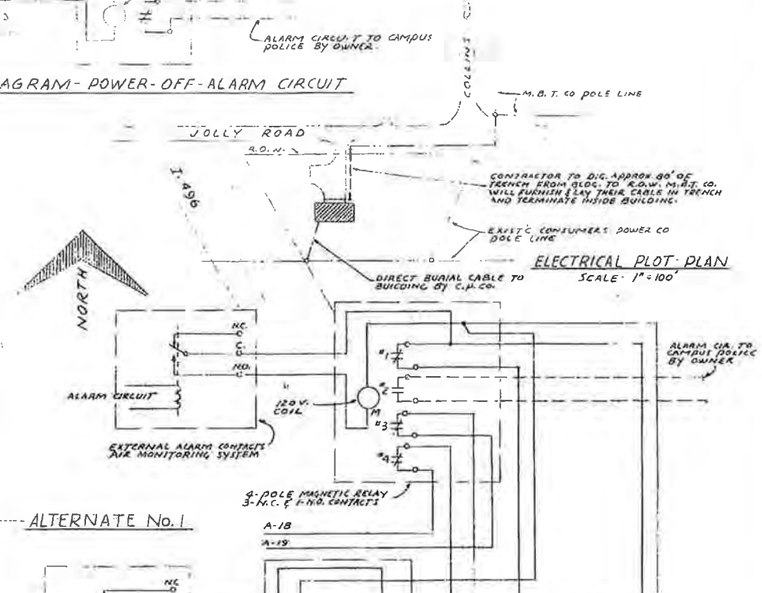
SUBMERSIBLE PUMP-WIRING DIAGRAM



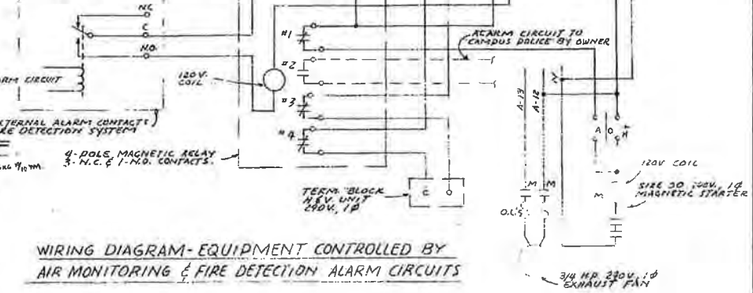
WIRING DIAGRAM - POWER-OFF-ALARM CIRCUIT



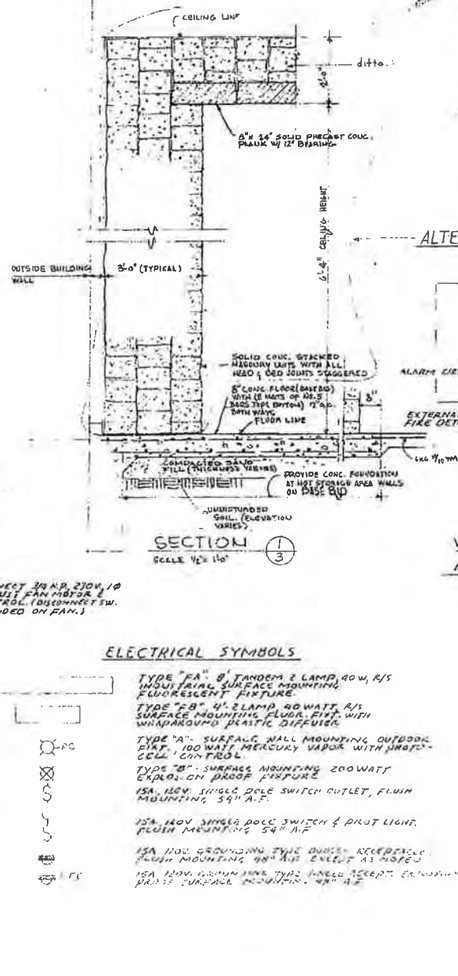
ELECTRICAL PLOT PLAN
SCALE: 1" = 100'



ALTERNATE No. 1



WIRING DIAGRAM - EQUIPMENT CONTROLLED BY AIR MONITORING & FIRE DETECTION ALARM CIRCUITS



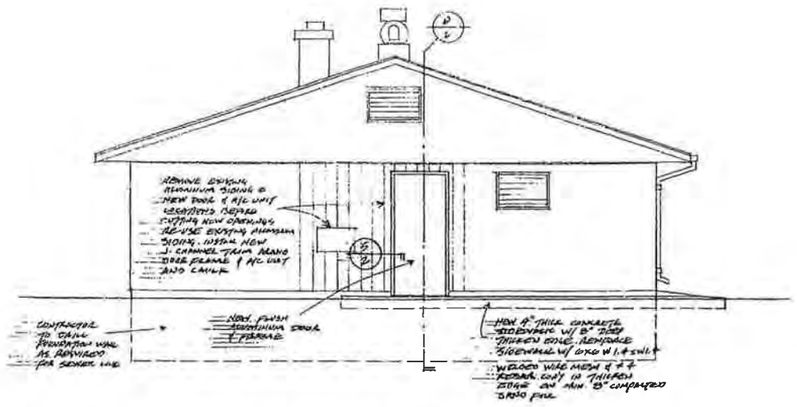
ELECTRICAL SYMBOLS

- TYPE "FA" 8' TANDEM 2 LAMP, 40 W, R/S INDUSTRIAL SURFACE MOUNTING FLUORESCENT FIXTURE.
- TYPE "FB" 4' 2 LAMP, 40 WATT, R/S SURFACE MOUNTING FLUOR. FIXT. WITH WHITEMOUND PLASTIC DIFFUSERS.
- TYPE "A": SURFACE WALL MOUNTING, OUTDOOR FIXT., 100 WATT MERCURY VAPOR WITH PHOTO-ELEC. CONTROL.
- TYPE "B": SURFACE MOUNTING 200 WATT FLOOD LIGHT ON BRACE FIXTURE
- 15A., 120 V. SINGLE POLE SWITCH OUTLET, FLUSH MOUNTING, 54" A.F.
- 15A., 120 V. SINGLE POLE SWITCH & PILOT LIGHT, FLUSH MOUNTING, 54" A.F.
- 15A., 120 V. GROUNDING TYPE DUPLEX RECEPTACLE FLUSH MOUNTING, 18" A.F. EXCEPT AS NOTED
- 15A., 120 V. GROUNDING TYPE DUPLEX RECEPT. EXPLOSION PROOF SURFACE MOUNTING, 48" A.F.

- SURFACE MOUNTED JUNCTION BOX
- MOTOR (FURNISHED BY MECH.)
- EXHAUST FAN (FURNISHED BY MECH.)
- 30A., 240 V., 2 POLE, 3 WIRE GROUNDING FUSE RECEPT., EXPLOSION PROOF MOUNTED NEAR H.V. MANUAL MOTOR STARTER, EXPLOSION PROOF SURFACE MOUNTING, 54" A.F.
- 24 V. THERMOSTAT (BY MECHANICAL)
- FLUSH MOUNTED TELEPHONE OUTLET STANDARD SWITCH BOX, 54" A.F.

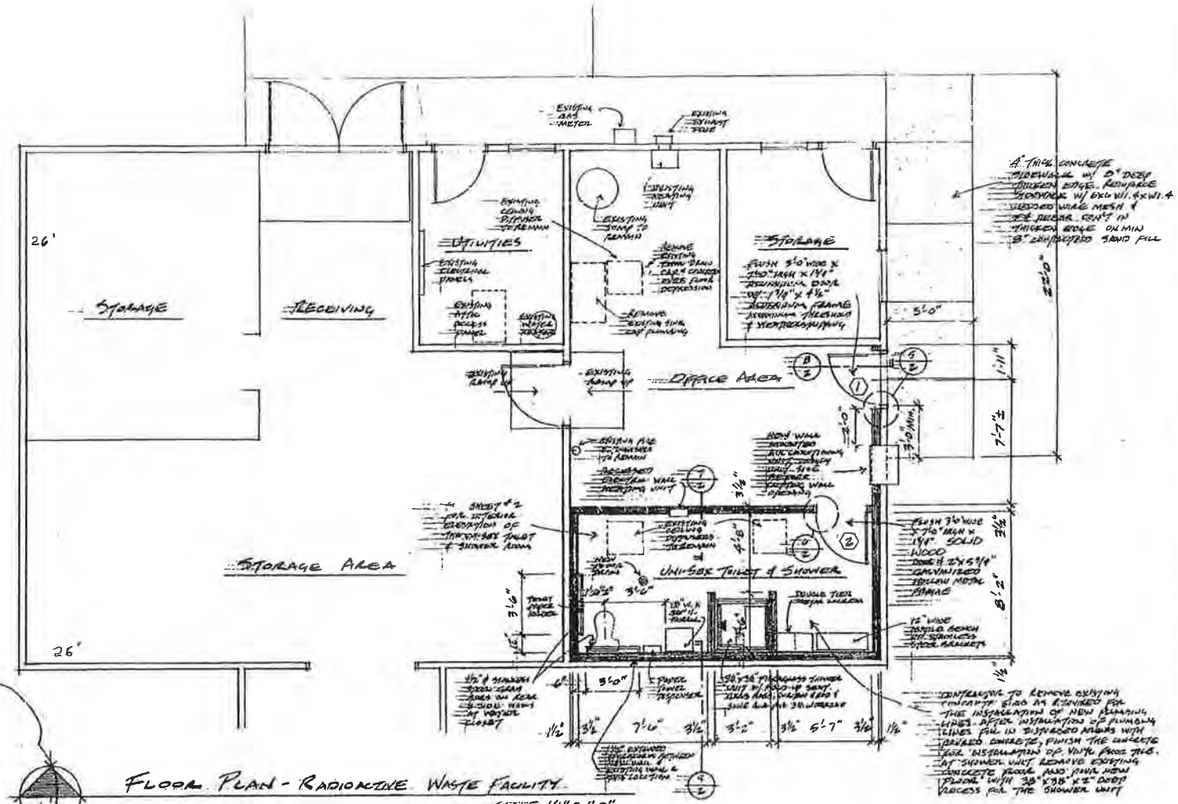
ELECTRICAL SHEET NO. 3 OF

REVISIONS	TITLE: RADIOACTIVE WASTE FACILITY MICHIGAN STATE UNIVERSITY EAST LANSING, MICHIGAN PHYSICAL PLANT DIVISION ENGINEERING SERVICES DEPARTMENT	DRAWN BY DESIGNED BY DATE APPROVED FILE NO.



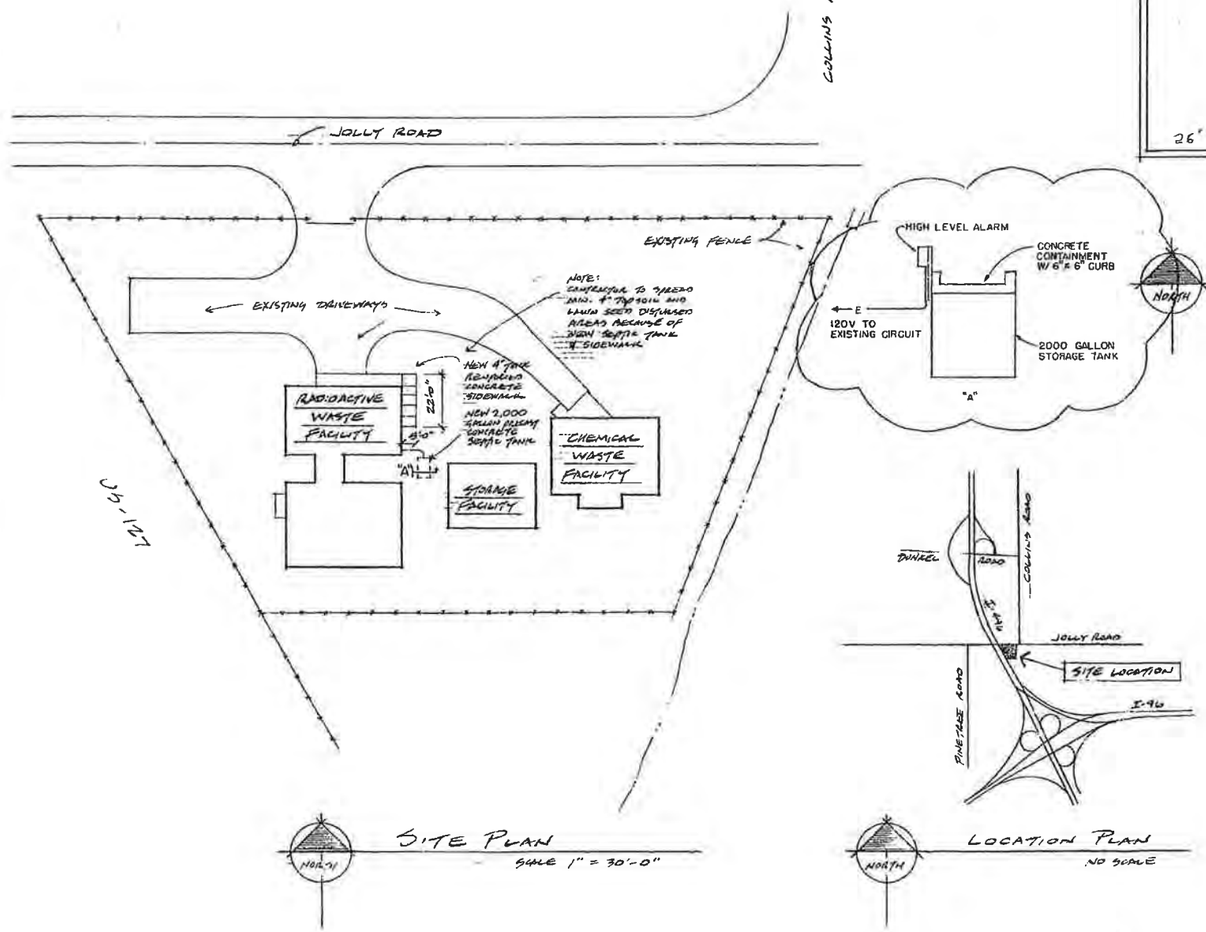
EAST EXTERIOR ELEVATION - RADIOACTIVE WASTE FACILITY

SCALE 1/4" = 1'-0"



FLOOR PLAN - RADIOACTIVE WASTE FACILITY

SCALE 1/4" = 1'-0"



SITE PLAN

SCALE 1" = 30'-0"

LOCATION PLAN

NO SCALE

ROOM FINISH NOTES:

OFFICE AREA	FLOOR -	NEW VINYL TILE OVER EXISTING CONCRETE FLOOR
	BASE -	NONE
	WALLS -	EXISTING ASBESTOS PANELS TO REMAIN & 1/2" REGULAR GYPSUM BOARD ON NEW 3X10 WALLS SEMI-GLOSS PAINT ON GYPSUM BOARD
	CEILING -	EXISTING ASBESTOS PANELS TO REMAIN
UNI-SEX TOILET & SHOWER	FLOOR -	NEW VINYL TILE OVER EXISTING CONCRETE FLOOR
	BASE -	4" HIGH COVED VINYL BASE
	WALLS -	1/2" MOISTURE RESISTANT GYPSUM BOARD ON NEW 3X10 WALLS - SEMI-GLOSS PAINT
	CEILING -	EXISTING ASBESTOS PANELS TO REMAIN

REST OF AREAS TO REMAIN AS IS:

GENERAL NOTES:

1. GENERAL CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO PROJECT REPRESENTATIVE.
2. CONTRACTOR(S) SHALL USE CAUTION WHEN WORKING NEAR EXISTING BUILDING STRUCTURE, AND SHALL TAKE PRECAUTIONS TO INSURE THAT ANY NEW CONSTRUCTION DOES NOT DAMAGE EXISTING STRUCTURE.
3. CONTRACTOR TO BE AWARE THAT EXISTING WALLS AND CEILINGS ARE ASBESTOS PANELS. THE GENERAL CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND DISPOSAL OF ASBESTOS MATERIALS AS NECESSARY FOR NEW ARCHITECTURAL, MECHANICAL, AND ELECTRICAL WORK; IN ACCORDANCE WITH ALL APPLICABLE CODES. CONTRACTOR SHALL ALSO ANNEX NEW STUD WALLS TO ASBESTOS WALLS AND CEILING PER APPLICABLE CODES.

SHEET INDEX

AS-BUILT ORDRAWING

Date: 3/9/98

Project Rep. _____

Designer _____

SHEET 1 of 6

Bernath-Coakley Associates Architects, Inc.
4104 W. St. Joseph Hwy.
Lansing, Michigan 48917

CHEMICAL WASTE FACILITIES

SHOWER FACILITIES & VENTILATION SYSTEMS

MICHIGAN STATE UNIVERSITY
EAST LANSING MICHIGAN
PHYSICAL PLANT DIVISION

DRAWN BY: JLB
APP'D BY: AA CWS
DATE: 10-3-96
SCALE: AS NOTED
DWG NO.: E-1750-9 E-1750-10

EXISTING BUILDING

FLOOR PLAN

SOUTH ELEVATION

NORTH ELEVATION

EAST ELEVATION

WEST ELEVATION

SITE PLAN

LOCATION MAP

5½ X 15' LAM BEAM

PLYWOOD CIELING

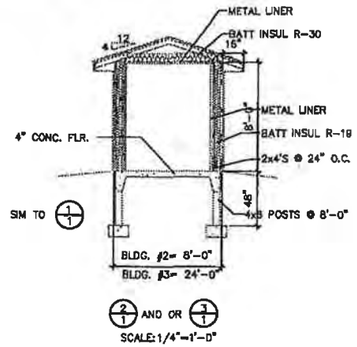
CONSTRUCTION DETAIL

AS BUILT

TITLE
RADIOACTIVE WASTE FACILITY - CONSTRUCT STORAGE BUILDING

MICHIGAN STATE UNIVERSITY
EAST LANSING, MICHIGAN
PHYSICAL PLANT DIVISION
ENGINEERING SERVICES DEPARTMENT

DRAWN BY:
APP'D BY:
DATE: JUNE 16, '89
SCALE: AS SHOWN
DWG NO.: E-8479-A-4
PROJ NO.: 8769



CODE REVIEW

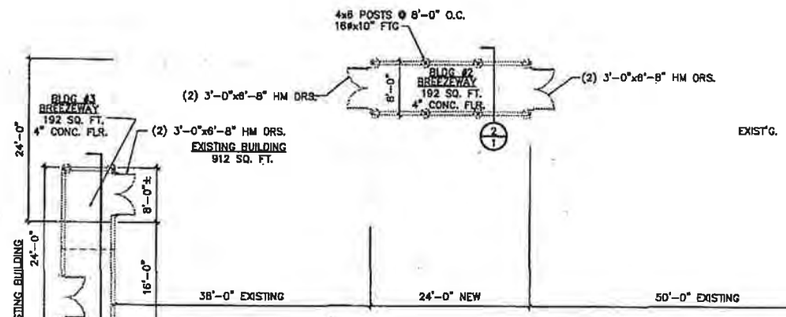
MICHIGAN BUILDING CODE: 2009
MICHIGAN BARRIER FREE: 2009
USE GROUP: S-1
TYPE OF CONSTRUCTION: 5B
BUILDING HEIGHT: 8' & 16'
SINGLE STORY
FLOOR AREA:
BLDG #1: 480 SQ. FT.
BLDG #2: 192 SQ. FT.
BLDG #3: 192 SQ. FT.

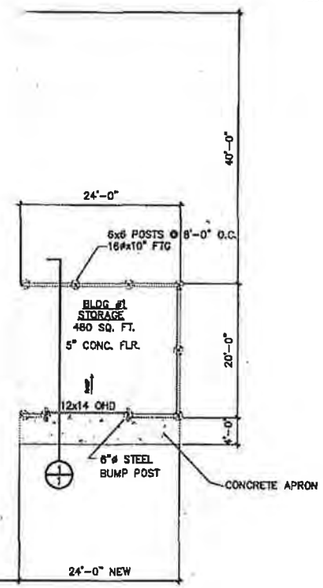
ENGINEERING DATA

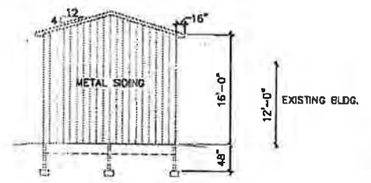
DESIGN SOIL BEARING PRESSURE (NET)	3000 PSF
DESIGN STRESSES	
CONCRETE (FOUNDATIONS AND GRADE WALLS	f'c=3000 P.S.I.
ROOF SNOW LOAD	
GROUND SNOW LOAD(Pg)	35 PSF
WIND LOAD	
BASIC WIND SPEED(3 SEC.)	90 MPH
WIND IMPORTANCE FACTOR(I)	1.0
BUILDING CATAGORY	I
WIND EXPOSURE	B
INTERNAL PRESSURE COEFF.(GCpi)	0.18
COMPONENTS & CLADDING DESIGN PRESSURE	30 PSF
EARTHQUAKE	
SEISMIC IMPORTANCE FACTOR, IE	1.0
SEISMIC USE GROUP	I
SPECTRAL RESPONSE	Ss=.09 SD1=.042
	Ss=.056 SD1=.027
SITE CLASS	D
SEISMIC DESIGN CAVEGORY	"A"
BASIC SEISMIC FORCE RESISTING SYSTEM	ORDINARY PLAIN MASONRY SHEAR WALLS
DESIGN BASE SHEAR	(4X0 LRS)
SEISMIC RESPONSE COEFFICIENT, Cs	(0.07)
RESPONSE MODIFICATION FACTOR, R,	2.0
ANALYSIS PROCEDURE	EQUIVALENT LATERAL FORCE

SPECIFIC DESIGN LOADS
SEE TRUSS DESIGN LOADS BY OTHERS
BOTTOM OF FTG MIN 42" BELOW GRADE REGARDLESS OF WHAT DRAWINGS SHOW.

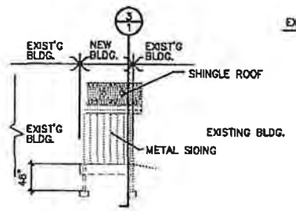
EXISTING BUILDING
3,000 SQ. FT.

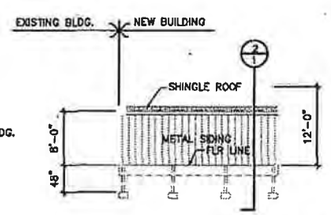




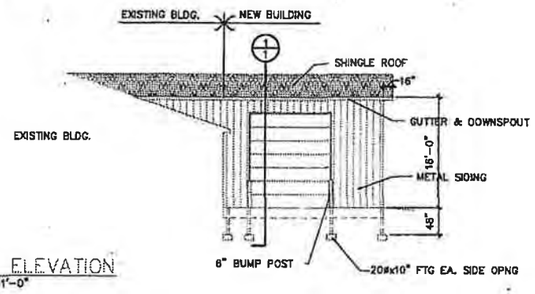


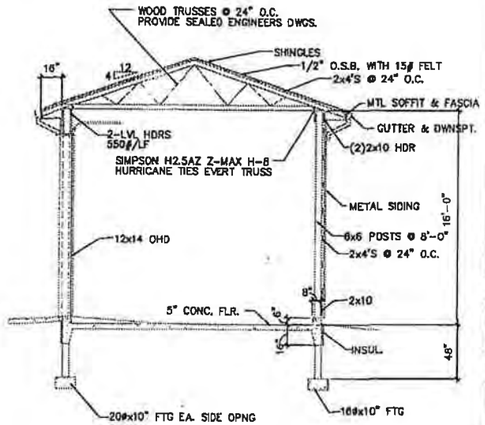
WEST ELEVATION
SCALE:1/8"=1'-0"





NORTH ELEVATION
SCALE:1/8"=1'-0"





SCALE:1/4"=1'-0"

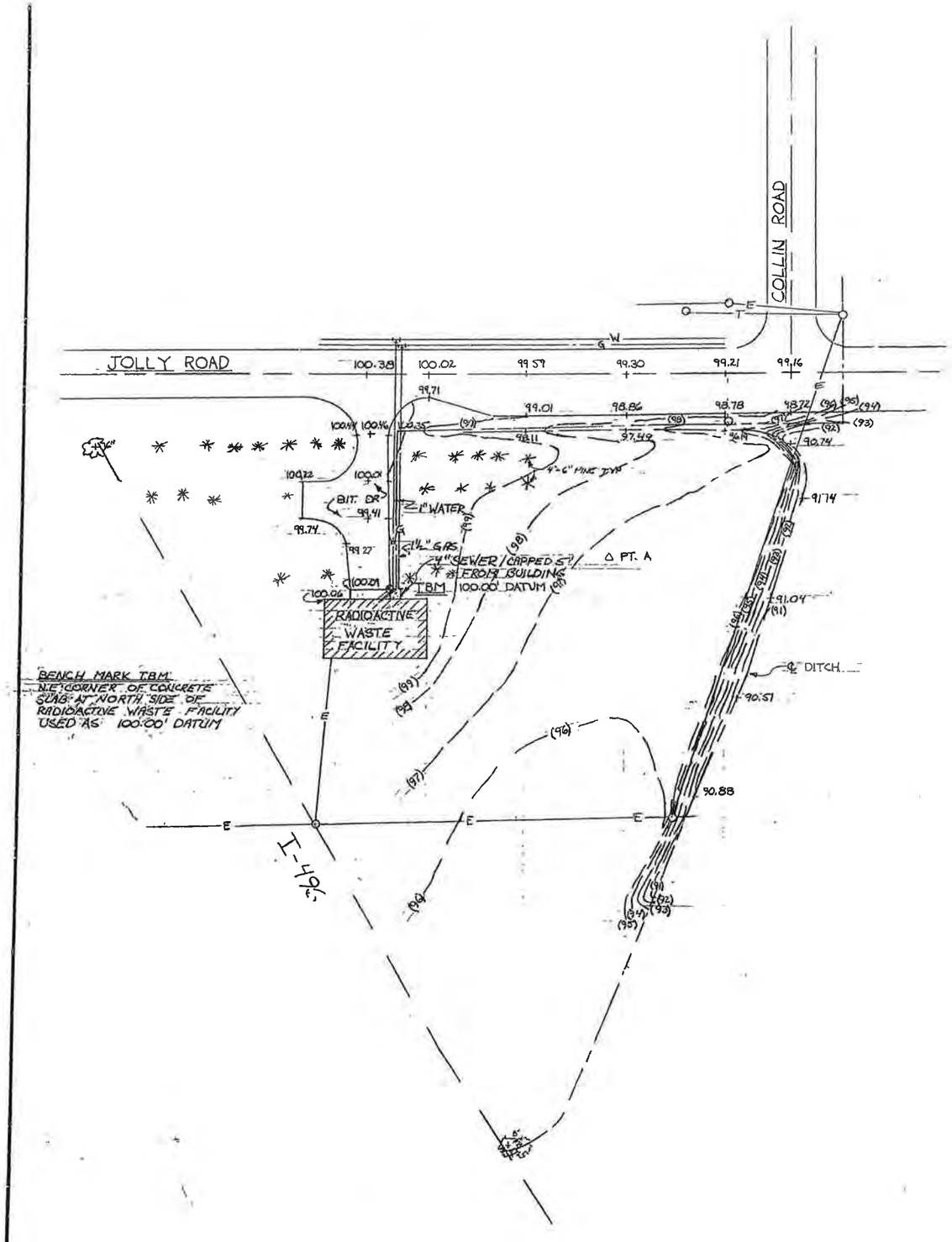
CONSTRUCTION BY
STEDFAST CONSTRUCTION
ALTO, MICHIGAN

MSU HAZARDOUS STORAGE
EAST LANSING, MICHIGAN

DATE
2-3-2013

REVISED
2-6-2013

SHEET
1
OF 1 SHEETS



LEGEND

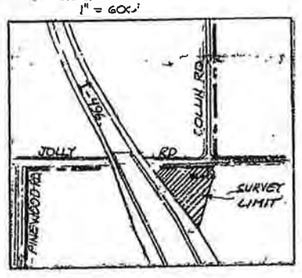
- BENCH MARK
- TRAVERSE POINT
- (96) EXISTING CONTOURS
- W WATER LINE
- G GAS LINE
- FIRE HYDRANT
- WATER VALVE
- GAS VALVE
- UNDERGROUND TELEPHONE
- DECIDOUS TREES
- S SEWER LINE
- CONIFEROUS TREES
- ET ELECTRIC & TELEPHONE (OVERHEAD)

N

NORTH
SCALE 1" = 40'

NOTE - CONTOURS ARE AT 1'-0" INTERVALS

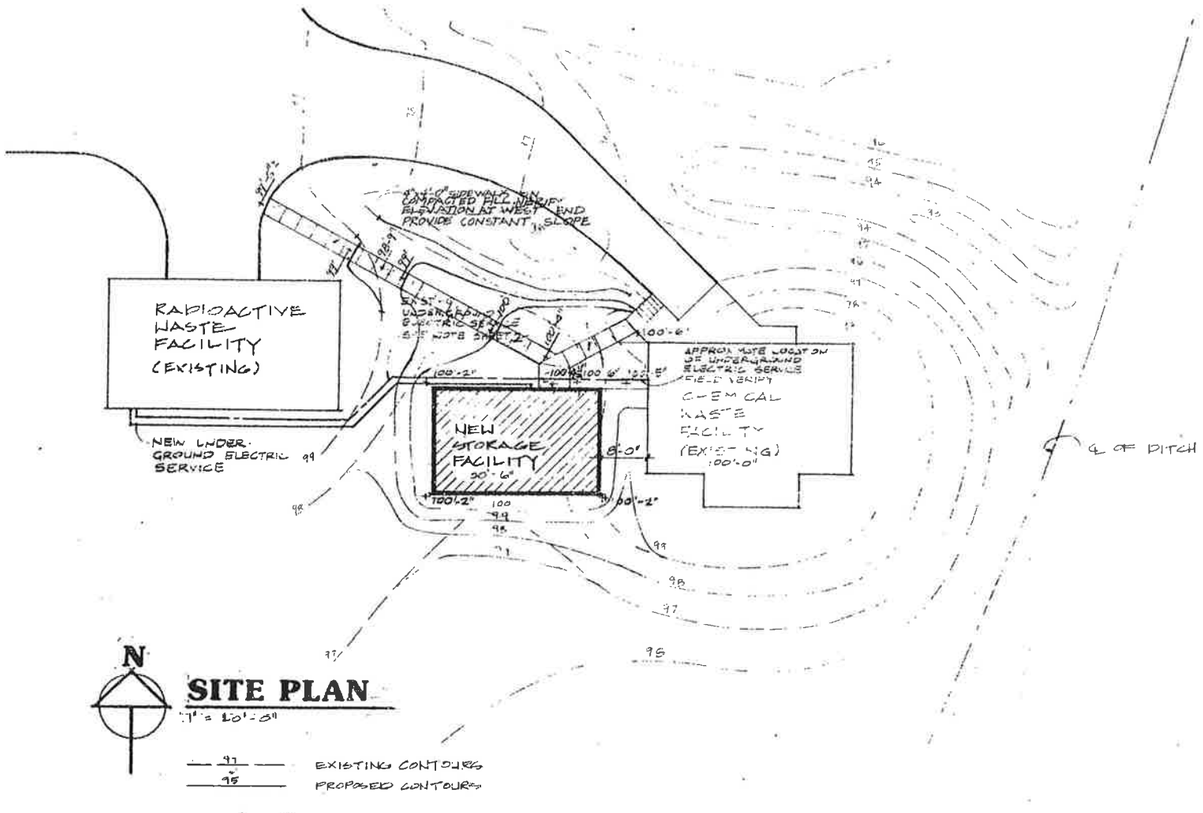
LOCATION MAP
1" = 600'



TITLE
CHEMICAL WASTE FACILITY
TOPO SURVEY

MICHIGAN STATE UNIVERSITY
EAST LANSING, MICHIGAN
PHYSICAL PLANT DIVISION
ENGINEERING SERVICES DEPARTMENT

DRAWN BY: E. R. SEABERG
APP'D BY: R. T.
DATE: 6-15-81
SCALE: AS SHOWN
DW'G NO.: TO-145
CARD NO



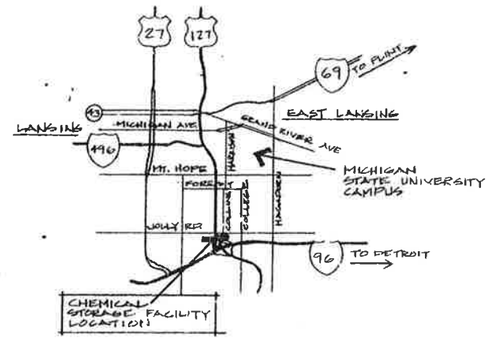
N

SITE PLAN

1" = 20'-0"

—97— EXISTING CONTOURS

97 PROPOSED CONTOURS



N

LOCATION MAP

NOT TO SCALE

STORAGE FACILITY

MICHIGAN STATE UNIVERSITY

EAST LANSING MICHIGAN

BUILDING NO. 415.C.

architectural consortium

a professional corporation

120 WEST OTTAWA STREET
LANSING, MICHIGAN 48933
TELEPHONE (517) 371-1484

PROJECT:	SHEET NUMBER:
83270	1
DATE: MAY 23, 1985	

ATTACHMENT B6-3

Building Materials Specifications

PHYSICAL SERVICE CONDITIONS

For data on Systems, refer to "Description of Systems"

CORROSIVE	PERCENT CONCENTRATION	A Severe Traffic Abuse	B Medium Traffic Abuse	C Foot Traffic
Acetone	—	1	4,3	4,3
Acetic acid	2	2,1	4,3	4,3
Acetic acid	5	1	4,3	4,3
Acetic acid	10	NR	4,3	4,3
Acetic acid	20	NR	3	3
Glacial acetic acid	—	NR	NR	NR
Ammonium chloride	10	2,1	4,3	8,4
Ammonium chloride	25	2,1	4,3	4,3
Ammonium hydroxide	10	2,1	4,3	4,3
Ammonium hydroxide	30	1	4,3	4,3
Ammonium nitrate	20	2,1	4,3	8,4
Ammonium nitrate	50	2,1	4,3	4,3
Beer	—	2,1	4,3	8,7,6
Boric acid	10	2,1	4,3	8,7,6
N-butanol	—	2,1	4,3	4,3
Butyl acetate	—	1	4,3	4,3
Calcium chloride	30	2,1	5,4,3	5,8,7
Carbon tetrachloride	—	1	4,3	4,3
Chlorine water (sat'd.)	—	2,1	4,3	4,3
Chloroform	—	1	4,3	4,3
Chloroacetic acid	5	1	3	3
Chromic acid	5	1	3	3
Chromic acid	10	1	3	3
Citric acid	10	2,1	4,3	8,7,6
Copper sulfate	20	2,1	4,3	8,7,6
Copper chloride	20	2,1	4,3	8,7,6
Detergent in water	20	2,1	5,8,4	5,8,7
Detergent	10	2,1	5,8,4	5,8,7
Ethyl alcohol	—	2,1	4,3	4,8,7
Ethyl acetate	—	1	4,3	4,3
Ferric chloride	10	2,1	4,3	6,7
Ferric chloride	30	1	3	6
Ferric sulfate	10	2,1	4,3	6,7
Hydrosilicofluoric acid	10	1	3	3
Formaldehyde	10	2,1	3,4	4
Formaldehyde	40	1	3,4	4
Formic acid	10	1(a)	3,4	3,4
Formic acid	30	1(a)	3,4	3,4
Fruit Juices	—	2,1	4,3	7,6,4
Furfuryl alcohol	—	1	3	4,3
Gasoline	—	2,1	4,3	8,7,6
Glycerine	—	2,1	4,3	5,8,7

CORROSIVE	PERCENT CONCENTRATION	A Severe Traffic Abuse	B Medium Traffic Abuse	C Foot Traffic
Heptane	—	2,1	4,3	8,7,6
Hydrochloric acid	5	2,1	4,3	7,4
Hydrochloric acid	10	1	3	6,3
Hydrochloric acid	20	1	3	3
Hydrochloric acid	28	1,2	3	3
Hydrochloric acid	37	1	3	3
Hydrofluoric acid	5	NR	3	3
Hydrofluoric acid	40	NR	NR	3
Hydrogen peroxide	3	2,1(b)	4,3	4,7,6
Lactic acid	10	1(b)	4,3	4
Methyl acetate	—	1	3,4	4
Methyl alcohol	—	1,2	3,4	4,7,6
Methyl ethyl ketone	—	1	3,4	3,4
Milk	—	2,1	5,4,3	5,8,7
Monochlorobenzene	—	1	4,3	4,3
Nitric acid	2	1,2	4,3	4,7,6
Nitric acid	5	1	3	3
Nitric acid	15	1(a)(b)	—	—
Nitric acid	30	1(a)(b)	—	—
Oil, lubricating	—	2,1	8,4	8,7,6
Oil, mineral	—	2,1	8,4	8,7,6
Phenol (in ethanol)	80	2,1	3	3
Phosphoric acid	10	1(b)	4,3	4,7,6
Phosphoric acid	30	NR	3	6,3
Phosphoric acid	50	NR	3	6,3
Phosphoric acid	85	NR	3	3
Potassium permanganate	5	2,1	4,3	4,3
Sodium chloride	10	2,1	5,8,4	5,8,7
Sodium chloride	30	2,1	5,8,4	5,8,7
Sodium hydroxide	10	2,1	4,3	7,4
Sodium hydroxide	20	2,1	4,3	7,4
Sodium hydroxide	50	2,1	4,3	4,3
Sulfuric acid	5	2,1	4,3	4,7,6
Sulfuric acid	10	1,2	4,3	6,4
Sulfuric acid	20	1	3	6,3
Sulfuric acid	40	—	3	3
Sulfuric acid	65	—	3	3
Tartaric acid	—	2,1	4,3	4
Toluene	—	1	4,3	4,7
Tricresyl phosphate	—	2,1	4,3	4,7
Turpentine	—	2,1	4,3	7,4
Vegetable oil	—	2,1	4,3	5,8,7
Wine	—	2,1	4,3	8,7,4
Xylol	—	1	4,3	4,7

NOTES:

Recommendations are based on splash and spillage service at temperatures not exceeding 150°F.
NR — No recommendation can be made for this service.
(a) — Surface must be flushed after spills
(b) — Will stain or remove color

PHYSICAL SERVICE DESCRIPTIONS

A. Severe abuse. Steel wheeled traffic, loading and unloading areas where pallets and fork trucks are used.
B. Medium abuse. Rubber wheeled traffic, light loading and unloading areas.
C. Light abuse. Involves light foot and cart traffic. No cutting action.

NON-CHEMICAL AREAS:

For areas of light foot and cart traffic and little or no splash and spillage of chemicals, System F-4 or F-8 is recommended. These systems are attractive, economical and long wearing. If you can anticipate that the substrate will be subject to future cracking, then consideration should be given to System F-6.

System F-1 or F-2 should be used when traffic conditions are more severe. These systems will protect against abuse from heavy steel-wheel trucking.

SELECTION CHART

KEY:
E = Excellent G = Good
VG = Very Good F = Fair
P = Poor

CARBOLINE FLOOR SYSTEM	DESCRIPTION	GENERIC TYPE	NORMAL FILM THICKNESS	NON SKID SURFACE	APPLICATION: spray	APPLICATION: roller	APPLICATION: trowel	WEAR RESISTANCE: heavy traffic	WEAR RESISTANCE: medium traffic	WEAR RESISTANCE: light traffic	WEAR RESISTANCE: flexibility	PHYSICAL PROPERTIES: severe abuse & impact resistance	PHYSICAL PROPERTIES: resistance to staining	CHEMICAL RESISTANCE: acids	CHEMICAL RESISTANCE: alkalies	CHEMICAL RESISTANCE: solvents	EASE OF CLEANING
F-1	Phenoline 300 Floor Finish	Modified Phenolic	3/32"	Yes	—	—	X	E	E	E	F	E	E	VG	E	VG	G
F-2	Carboline 194	Epoxy Polyamide	3/32"-1/8"	Yes	X	—	X	E	E	E	G	E	E	F	E	F	G
F-3	Phenoline 300 Orange/ Phenoline 300 Finish	Modified Phenolic	16-24 mils	No	X	—	—	—	E	E	F	G	VG	E	E	E	E
F-4	Phenoline 305 Concrete Primer/ Phenoline 305 Finish	Modified Phenolic	8-12 mils	No	X	X	—	—	VG	E	G	G	VG	VG	E	VG	E
F-5	Carboline 3615 Non-Skid	Synthetic Elastomer	3-4 mils	Yes	X	X	—	—	G	E	E	E	F	G	G	P	F
F-6	Carboline 1340/1327/ 130 Finish	Urethane	44 mils	Yes / No	X	X	—	—	E	E	E	E	P	VG	VG	G	F / E
F-7	Carboline 1340/1341 Glaze	Epoxy Urethane	6 mils	No	X	X	—	—	G	E	VG	G	G	G	G	VG	E
F-8	Carboline 193 Finish 2 Coats	Epoxy Polyamide	6-8 mils	No	X	X	—	—	G	E	G	G	G	G	G	G	VG

1. All Systems are functional in use and appearance. Systems F-4, F6, F-7 and F-8 are also decorative.
2. For detailed chemical resistance information, see Carboline Floor Coating Recommendation Chart included in this guide.

carboline®

PHENOLINE® 300 ORANGE

600

SELECTION DATA

GENERIC TYPE: Modified phenolic. Part A, Part B and Special Mica Filler mixed prior to application.

GENERAL PROPERTIES: A heavy-duty primer with excellent bond to most surfaces including steel and concrete. Special Mica Filler is always added to give maximum bond strength. Outstanding resistance to severe chemicals, alkalies, salts and solvents (except immersion in strong oxidizing acids). Excellent resistance to sub-film corrosion.

RECOMMENDED USES: PHENOLINE 300 Orange is used as a primer for Phenoline topcoats in heavy duty splash and spillage service, for lining of tanks and protection of floors.

NOT RECOMMENDED FOR: Lining steel tanks where the temperature exceeds 180°F (82°C) or where heating-cooling cycles occur. Not recommended for immersion service in strong oxidizing acids.

CHEMICAL RESISTANCE GUIDE: (with proper topcoat)

Exposure	Immersion
Acids	Very Good
Alkalies	Excellent
Solvents	Very Good
Salt	Excellent
Water	Excellent

TEMPERATURE RESISTANCE: (Non-immersion)
Continuous: 200°F (93°C)

FLEXIBILITY: Poor WEATHERING: Good (chalks)

ABRASION RESISTANCE: Excellent

SUBSTRATES: Apply to properly prepared concrete, steel, stainless steel, aluminum or other surfaces as recommended.

TOPCOAT REQUIRED: May be topcoated with modified phenolics, catalyzed epoxies or others as recommended. Usual topcoats are PHENOLINE 300 Finish, PHENOLINE 300 Floor Finish, PHENOLINE 302 or others.

COMPATIBILITY WITH OTHER COATINGS: Apply directly to substrate. Use as a primer only.

SPECIFICATION DATA

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
PHENOLINE 300 Orange with Mica Filler	82% ± 2%

RECOMMENDED DRY FILM THICKNESS PER COAT: 8 mils (200 microns).

THEORETICAL COVERAGE PER MIXED KIT*: (2.75 Gals. including Mica Filler)
3617 mil sq. ft. (32.8 sq. m/l at 25 microns)
452 sq. ft. at 8 mils (4.1 sq. m/l at 200 microns)

*NOTE: Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE: 12 months minimum.

COLORS: Orange only.

GLOSS: Medium

ORDERING INFORMATION

Prices may be obtained from Carboline sales representative or main office.

APPROXIMATE SHIPPING WEIGHT:

	2.5 Gal. Kit
PHENOLINE 300 Orange	50 lbs. (22.7 kg)
PHENOLINE Thinner	9 lbs. in 1's (4.1 kg) 45 lbs. in 5's (20.4 kg)

FLASH POINT: (Pensky-Martens Closed Cup)

PHENOLINE 300 Orange Part A	77°F (25°C)
PHENOLINE 300 Part B	54°F (12°C)
Special Mica Filler	Over 200°F (93°C)
PHENOLINE Thinner	77°F (25°C)

July 84 Replaces April 83

APPLICATION INSTRUCTIONS

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining correct surface preparation, mixing instructions, and application procedure. It is assumed that the proper product recommendations have been made. These instructions should be followed closely to obtain the maximum service from the materials.

SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in Carboline Thinner #2 or toluol in accordance with SSPC-SP 1-82.

STEEL: For immersion service, dry abrasive blast to a White Metal finish in accordance with SSPC-SP 5 to a degree of cleanliness in accordance with NACE #1 to obtain a 2 to 3 mil (50-75 micron) blast profile. Weld slag must be removed and welds ground to a rounded contour.

For non-immersion service, dry abrasive blast to a Commercial Finish in accordance with SSPC-SP 6 to a degree of cleanliness in accordance with NACE #3 to obtain a 2-3 mil (50-75 micron) blast profile.

CONCRETE: Remove fins and other protrusions by stoning, sanding or grinding. Concrete must be cured at least 28 days at 70°F (21°C) and 50% R.H. or equivalent time. Remove form oils, incompatible curing agents and hardeners by abrasive blasting.

Immersion Service — Abrasive blast to open all voids and obtain a surface similar to medium grit sandpaper (horizontal surfaces may be acid etched). Blow or vacuum off sand and dust. Extremely rough concrete surfaces may require CARBOLINE 195 Surfacer prior to application of PHENOLINE 300 Orange.

Non-Immersion Service — Horizontal surfaces must be acid etched or abrasive blasted to remove laitance. For other surfaces blow off with compressed air to remove dust.

MIXING: Power mix Part A and Part B separately, then combine and mix in the following proportions:

	2.5 Gal. Kit
PHENOLINE 300 Orange Part A	Two-1 Gal. cans
PHENOLINE 300 Part B	1/2 Gal.
Special Mica Filler (6-1/2 lbs.)	1 Gal.

Thin up to 30% by volume with PHENOLINE Thinner.

NOTE: Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

POT LIFE: One hour at 75°F (24°C) and less at higher temperatures. Pot life ends when coating loses body and begins to sag.

APPLICATION TEMPERATURES:

	Material	Surfaces
Normal	65-85°F (18-29°C)	65-85°F (18-29°C)
Minimum	60°F (16°C)	60°F (16°C)
Maximum	85°F (29°C)	100°F (38°C)
	Ambient	**Humidity**
Normal	65-85°F (18-29°C)	30-70%
Minimum	50°F (10°C)	0%
Maximum	110°F (43°C)	85%

Do not apply when the surface temperature is less than 5°F (2°C) above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: Use sufficient air volume for correct operation of equipment.

Use a 50% overlap with each pass of the gun. On irregular surfaces, coat the edges first, making an extra pass later.

NOTE: The following equipment has been found suitable, however, equivalent equipment may be substituted.

Conventional: Use 1/2" minimum I.D. material hose. Hold gun approximately 12-14 inches from the surface and at a right angle to the surface.

Mfr. & Gun	Fluid Tip	Air Cap
Binks #18 or #62	67	67 PB
DeVilbiss P-MBC or JGA	D	64
	approx. .086" I.D.	

Airless*: Use 3/8" minimum I.D. material hose. Hold gun approximately 18-20 inches from the surface and at a right angle to the surface.

*NOTE: This material contains abrasive fillers which will abrade tips and possibly cause wear to other airless equipment parts with prolonged use.

Mfr. & Gun	Pump**
DeVilbiss JGN-502	QFA 519 32:1
Graco 205-591	Bulldog 30:1
Binks Model 700	B8-36 37:1

**Teflon packings are recommended and are available from pump manufacturer. Use a .023-.027" tip with 2200 psi.

BRUSH: Use short bristled brush and work material into all corners and crevices.

DRYING TIMES:

Between coats:	Minimum	Maximum*
60°F (16°C)	36 hours	14 days
75°F (24°C)	18 hours	7 days
90°F (32°C)	12 hours	3 days

NOTE: Before topcoating, scrub surface with bristle brushes and clean water. Allow to dry thoroughly before topcoating.

*IF MAXIMUM DRYING TIME BETWEEN COATS IS EXCEEDED, PRIMER MUST BE THOROUGHLY CLEANED WITH CARBOLINE SURFACE PREPARATION #1 PRIOR TO TOPCOATING.

NOTE: When used as a tank lining, thorough air circulation must be used during and after application until the coating is cured. The ventilation system should be capable of preventing the solvent vapor concentration from reaching the lower explosion limit for the solvents used. In addition to proper ventilation, fresh air respirators or fresh air hoods must be used by all application personnel. Where flammable solvents exist, explosion-proof lighting equipment must be used. Hypersensitive persons should wear clean protective clothing, gloves and/or protective cream on face, hands and all exposed areas.

CLEAN UP: Use CARBOLINE Thinner #2 or xylol.

STORAGE CONDITIONS:
Temperature: 40-110°F (4-43°C) Humidity: 0-100%

CAUTION: CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WEAR FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPMENT AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHERE EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AND NONSPARKING SHOES.

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PHENOLINE® 300 FINISH

600

SELECTION DATA

GENERIC TYPE: Modified phenolic. Part A and Part B mixed prior to application.

GENERAL PROPERTIES: A high build, high solids material having a long established record of successful applications in severe chemical exposures. Hard, tough film has excellent abrasion resistance. Withstands continuous temperatures up to 200°F (93°C). Resistant to a wide range of acids, alkalies, solvents, salts and combinations of these corrosives, both in immersion and heavy duty maintenance.

RECOMMENDED USES: Primarily used as part of a tank lining or floor coating system for severe chemical resistance.

NOT RECOMMENDED FOR: Immersion or splash and spillage of hot or concentrated oxidizing acids.

CHEMICAL RESISTANCE GUIDE: (Consult Carboline representative for specific recommendations).

Exposure	Immersion	Splash and Spillage
Acids	Very Good	Excellent
Alkalies	Very Good	Excellent
Solvents	Very Good	Excellent
Salt	Excellent	Excellent
Water	Excellent	Excellent

TEMPERATURE RESISTANCE: (non-immersion)
Continuous: 200°F (93°C)
Non-continuous. 250°F (121°C)

Immersion temperature resistance depends on exposure, but should not exceed 180°F (82°C).

Metal tanks must be insulated when operating temperatures exceed 140°F (60°C).

ABRASION RESISTANCE: Excellent.

SUBSTRATES: Can be used over suitably primed steel, concrete, aluminum and others as recommended. Accepted primers are normally PHENOLINE® 300 Orange or CARBOLINE® 195 Surfacer.

TOPCOAT REQUIRED: Normally none.

COMPATIBILITY WITH OTHER COATINGS: May be applied over modified phenolics or others as recommended.

SPECIFICATION DATA

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
PHENOLINE 300 Finish	78% ± 2%

RECOMMENDED DRY FILM THICKNESS PER COAT: 8 mils (200 microns)

THEORETICAL COVERAGE PER MIXED KIT*:
(1.25 gals.)
1564 mil sq. ft. (31.2 m^2 /l at 25 microns)
195 sq. ft. at 8 mils (3.9 m^2 /l at 200 microns)

*NOTE: Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE: 24 months minimum.

COLORS: Available in a variety of colors. Consult your local Sales Representative or Carboline Customer Service for availability.

GLOSS: Semi-Gloss.

ORDERING INFORMATION

Prices may be obtained from Carboline sales representative or main office.

APPROXIMATE SHIPPING WEIGHT:

	1.25's	6.25's
PHENOLINE 300 Finish	18 lbs. (8.2 kg)	83 lbs. (37.7 kg)
PHENOLINE Thinner	9 lbs. (4.1 kg)	45 lbs. (20.4 kg)

FLASH POINT: (Pensky-Martens Closed Cup)

PHENOLINE 300 Finish Part A	77°F (25°C)
PHENOLINE 300 Part B	54°F (12°C)
PHENOLINE THINNER	77°F (25°C)

Oct. 84 Replaces Aug. 82

APPLICATION INSTRUCTIONS

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining correct surface preparation, mixing instructions and application procedure. It is assumed that the proper product recommendations have been made. These instructions should be followed closely to obtain the maximum service from the materials.

600

SURFACE PREPARATION: Remove any oil or greaase from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 or toluol in accordance with SSPC-SP 1-82.

Steel: Apply over clean, dry recommended primer.

Concrete: Apply over clean, dry recommended primer or surfacer as recommended.

MIXING: Mix separately, then combine and mix in the following proportions:

	1.25 Gal. Kit	6.25 Gal. Kit
PHENOLINE 300 Finish Part A	1 Gal. Can	1-5 Gal. Can
PHENOLINE 300 Part B	1 Qt. Can	1-5 Qt. Can

Thin up to 25% by volume with PHENOLINE Thinner.

NOTE: Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

POT LIFE: One hour at 75°F (24°C) and less at higher temperatures. Pot life ends when coating loses body and begins to sag.

APPLICATION TEMPERATURES:

	Material	Surfaces
Normal	65-85°F (18-29°C)	60-85°F (16-29°C)
Minimum	55°F (13°C)	50°F (10°C)
Maximum	90°F (32°C)	120°F (49°C)

	Ambient	Humidity
Normal	60-85°F (16-29°C)	30-70%
Minimum	50°F(10°C)	0%
Maximum	120°F (40°C)	85%

Special thinning and application techniques may be required above or below normal conditions.

Do not apply when the surface temperature is less than 5°F (2°C) above dew point.

SPRAY: Use sufficient air volume for correct operation of equipment.

Use a 50% overlap with each pass of the gun. On irregular surfaces, coat the edges first, making an extra pass later.

NOTE: The following equipment has been found suitable; however, equivalent equipment may be substituted.

Conventional: Use 1/2" minimum I.D. material hose. Hold gun approximately 12-14 inches from the surface and at a right angle to the surface.

Mfr. & Gun	Fluid Tip	Air Cap
Binks #18 or #62	63C	63 PB
DeVilbiss P-MBC or JGA	FF	704
	approx. .052" I.D.	

*Airless: Use 3/8" minimum I.D. material hose. Hold gun approximately 18-20 inches from the surface and at a right angle to the surface.

Mfr. & Gun	Pump
DeVilbiss JGB or JGN	QFA-514 or QFA-519
Graco 205-591	President 30:1 or Bulldog 30:1
Binks Model 700	B5-18 29:1 or B8-36 37:1

*Teflon packings are recommended and are available from pump manufacturer.

Use a .017-.019" tip with 2200 psi.

BRUSH: Brush out well using full strokes. Avoid rebrushing.

DRYING TIMES:

	Minimum	Maximum
Between coats	24 hours at 50°F (10°C)	4 days
	18 hours at 60°F (16°C)	3 days
	12 hours at 75°F (24°C)	2 days
	6 hours at 90°F (32°C)	1 day

If maximum drying time between coats is exceeded, special surface preparation will be required.

Final cure:	Immersion	Dry
50°F (10°C)	28 days	4 days
60°F (16°C)	14 days	3 days
75°F (24°C)	7 days	2 days
90°F (32°C)	5 days	1 day

NOTE: Excessive film thickness or poor ventilating conditions require longer dry times, and in extreme cases may cause premature failure. Excessive humidity or condensation on the surface during curing may result in a surface haze or blush; any haze or blush should be removed by water washing before recoating.

VENTILATION & SAFETY: When used as a tank lining, thorough air circulation must be present during and after application until the coating is cured. The ventilation system should be capable of preventing the solvent vapor concentration from reaching the lower explosion limit for the solvents used. In addition to proper ventilation, fresh air respirators or fresh air hoods must be used by all application personnel. Where flammable solvents exist, explosion-proof lighting equipment must be used. Hypersensitive persons should wear clean protective clothing, gloves and/or protective cream on face, hands and all exposed areas.

CLEAN UP: Use CARBOLINE Thinner #2 or ketone solvent.

STORAGE CONDITIONS: (store indoors)
Temperature: 45-110°F (7-43°C) Humidity: 0-100%

CAUTION: CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WEAR FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPMENT AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHERE EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AND NONSPARKING SHOES.

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DIVISION 3 - CONCRETE

03001 GENERAL

Additives of any kind shall not be allowed in any concrete except for that which is allowed in this standard.

03100 CONCRETE FORMWORK

Forms shall be wood or metal, complete with shores, bracing, etc., as required and shall conform to the shapes, lines, and dimensions of the members shown on the drawings.

Forms for exposed concrete shall be constructed of metal or smooth A-A plywood.

Forms shall be substantially constructed and securely braced so as to maintain position and shape, and resist springing or settling as concrete is placed, and sufficiently tight to prevent leakage of mortar.

Before concrete is poured, forms shall be cleaned of all shorings, wood cuttings, and other debris. The University Representative shall inspect all forms prior to placing the concrete.

All forms shall be cleaned and oiled each time they are used.

03200 CONCRETE REINFORCEMENT

03210 STEEL BAR AND WELDED WIRE FABRIC REINFORCING

SCOPE

This section involves completing the following in accordance with the requirements of this section and division 1:

1. Install welded wire mesh concrete reinforcements where shown on drawing.

QUALITY ASSURANCE

Reference Standards :

The latest publication of the following standards shall be establish the minimum requirements when not otherwise specified in this section:

Placing Reinforcing Bars - CRSI

Manual of Standard Practice for Detailing Reinforced Concrete Structures - No. 315 by ACI.

PRODUCT DESCRIPTION

Bar reinforcement strength shall be 60,000 PSI minimum per ASTM A 185, Grade 60.

EXECUTION

Wire, bar, and chain type reinforcement supports shall be corrosive resistant, hot dipped galvanized, or plastic coated in accordance with CRSI recommendations. Fasten the reinforcement securely to the support. At control joints the reinforcement shall be held 1-1/2" short of the joint and 1" minimum above bottom of slab.

03300 CAST-IN PLACE CONCRETE

03310 CONCRETE

The Contractor will retain the services of an approved testing laboratory, to determine the quality of all concrete. The laboratory personnel will take the samples, cast the cylinders, or perform other tests as required. The Owner will receive reports of all tests directly from the testing laboratory.

SCOPE

This section involves completing the following in accordance with the requirements of this section and division 1:

1. Install new concrete work where shown on drawings.

QUALITY ASSURANCE

Codes and Standards :

ACI 301 "Specifications for Structural Concrete Buildings"; ACI 318, "Building Code Requirements for Reinforced Concrete"; comply with applicable provisions except as otherwise indicated.

Installer Qualifications:

This contractor shall be a competent, experienced installer of latex modified concrete and their use on the type of work in this project.

Test Reports and Certifications:

Provide the required testing and inspection as indicated in Section 01400 - Quality Control. Perform one (1) test for slump and air content, and one (1) test for compressive strength from each concrete batch. Provide two (2) unnotarized copies of the test report to the owner for each test. Concrete sampling, testing, and inspection shall conform to the following requirement:

Sampling Fresh Concrete

ASTM C172, except initial samples will be taken immediately after first 1/4 c.y. has been discharged and subsequent samples will be taken as specified herein. If found to be in non-conformance, the concrete will be removed from the forms.

Slump

ASTM C143, except initial sample will be taken in accordance with paragraph 2. Additional tests will be made for each set of compressive strength test

specimens and as additional tests may be required by the Project Representative.

Air Content

ASTM C231, except as specified in paragraph 2 and additional tests at the end of the load, if possible.

Concrete Temperature

Taken each time compression test specimens are made hourly when temperature is 40 degrees F and below and over 80 degrees F.

Unit Weight

ASTM C138, except the sample volume will be equal to air content specimen.

Compressive Strength

ASTM C31 and C39, except on set of 3 cylinders for every 40 c.y. or fraction thereof. One specimen will be tested at 7days and the remaining 2 specimens will be tested at 28 days. Strength level of the concrete will be considered unsatisfactory if the 7 day compressive strength does not equal or exceed 60% of the 28 day design strength. Strength level of concrete will be considered satisfactory if the average compressive strength of two consecutive 28 day tests equals or exceeds the 28 day design strength, and neither individual strength test resuit falls below the specified compressive strength requirement by more than 100 psi.

Inspection

All concrete place shall also conform to the installation procedures of this specification.

Concrete Replacement

Failure of any test or to follow proper installation procedures will require that the concrete be removed and properly replaced at Contractor's expense.

Additional Tests

The Contractor may have testing service make additional tests of in-place concrete when test results indicated specified concrete strengths and other characteristics have not been attained. The testing inspection agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42. Contractor shall be for all such tests conducted any holes made shall patched by the Contractor at his expense.

Mix Proportions and Design :

Proportion mixes complying with mix design procedures specified in ACI 301.

SUBMITTALS

Product Data

Submit manufacturers' technical data for each product indicated including recommendations for their application and use. Include test reports and certifications substantiating that products comply with requirements.

PRODUCT DELIVERY, STORAGE, AND HANDLING

Store materials in a dry area, off the floor or ground.

PRODUCT DESCRIPTION

Portland Cement:

The concrete shall be a Portland cement conforming to the requirements of the current specifications for Portland Cement ASTM C150 Type 1A.

Aggregate (Coarse):

Aggregate shall be clean, sound crushed stone or crushed gravel meeting the requirements of ASTM C 33. The maximum size of particle shall not be larger than 3/4" and in no case greater than one half the depth of the section to be placed.

Sand:

Shall be clean and sharp; conform to the requirements of ASTM C 33 for concrete sand.

Water: Potable.

CONCRETE PROPORTIONING

The mixture shall contain 6 sack Portland cement, sand, coarse aggregate, fine aggregate, and water. The minimum compressive strength at 28 days shall be 4,000 psi. The maximum allowable slump shall be 4-1/2 inches. Aggregates will be batched by weight, and the approximate batch proportions shall be 1:2-1/4:3-1/4. Water/cement ratio of .45 pounds of water per pound of cement.

The Contractor shall provide the Project Representative with delivery tickets which shall list slump, sack mix, percent of air entraining agent, time the truck left the plant, arrival on the job site and departed the job site, and water added at the site.

When requested, the Contractor shall provide documentation from the concrete supplier certifying the concrete meets the specifications of this section.

Retempered concrete shall not be used and concrete shall at no time be retempered.

Where conditions make compacting of concrete difficult, or where the reinforcement is congested, batches of mortar containing the same proportions of cement to sand as used in the concrete, shall first be deposited in the forms to a depth of at least on (1) inch.

EXECUTION

Clean and adjust forms prior to concrete placement. Apply form release agents or wet forms, as required. Re-tighten forms during concrete placement if required to eliminate mortar leaks.

Position, support and secure reinforcement against displacement. Locate and support with metal chairs, runners, bolsters, spacers and hangers, as required. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

Provide construction, isolation, and control joints as indicated or required. Locate construction joints so as to not impair strength and appearance of structure. Place isolation and control joints in slabs-on-ground to stabilize differential settlement and random cracking.

Mix and place concrete in accordance with the manufacturer's printed instructions and as specified herein. Form for new slab with surrounding control joints. Install reinforcement and pour new slab. Screed concrete to wash sharply away from fieldstone for 2-3 inches.

Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placement and curing.

In cold weather comply with ACI 306.

In hot weather comply with ACI 305.

Concrete Finishes :

Concrete shall be carefully compacted and screeded off to the correct elevations:

Machine float surface to remove all irregularities and secure a uniformly dense floor.

Mechanical steel troweling and a minimum of one hand troweling shall be used to bring slabs to a true hard surface such as well ring with the touch of a trowel.

Apply a surface hardener to all exposed interior floor slab surfaces which will not be covered by other material. Hardener shall be a chemical hardener, Sonneborns - Lapidality- , A.C. Borns - Hornolith-, or approved equal. Apply sealer as recommended by hardener manufacturer.

The same above described procedure will follow for exterior slabs on ground except instead of applying a finished troweled surface, apply a finished steel float surface of an approved -broomed- finish.

Provide all the necessary jointing, edging, etc., to complete the work outlined in this section of the specification.

Floor surfaces shall not vary from a true plane more than 1/8 inch in 10 ft. - 0 in. Except hose areas of door opening and swing. In these areas, the floor shall be completely level.

All concrete floors and steps not receiving additional finish should be thoroughly cleaned by scrubbing with a good detergent or vegetable oil soap.

Curing :

Begin initial curing as soon as free water has disappeared from exposed surfaces. Where possible, keep continuously moist for not less than 72 hours. Cure formed surfaces by moist curing until forms are removed. Provide protections as required to prevent damage to exposed concrete surfaces.

PERFORMANCE REQUIREMENTS

BASIC TYPES	CONO/CRETE 101	CONO/CRETE 115	CONO/CRETE 116	FIBRE/CRETE MORTAR 121	FIBRE/CRETE MORTAR 122	FIBRE/CRETE* 203	FIBRE/CRETE* 201
CLEANABILITY & SANITATION	G	VG	VG	G	VG	E	E
ABRASION RESISTANCE	E	E	E	E	E	E	E
VIBRATION & FLEXING	NR	NR	NR	VG	VG	E	E
THERMAL SHOCK	G	E	E	G	G	G	G
REFRIGERATED AREAS	NR	E	E	NR	G	NR	G
IMPACT RESISTANCE	VG	VG	VG	VG	VG	E	E

CONDITIONS

HEAVY FORKLIFT	E	E	E	NR	NR	NR	NR
MODERATE FORKLIFT	E	E	E	E	E	G	G
LIGHT FORKLIFT	NQ	NQ	NQ	E	E	E	E
NO FORKLIFT	NQ	NQ	NQ	NQ	NQ	E	E
CONTINUOUS PALLET JACKS	E	E	E	VG	VG	G	G
OCCASIONAL PALLET JACKS	NQ	NQ	NQ	E	E	E	E
HAND CARTS ONLY	NQ	NQ	NQ	NQ	NQ	E	E
NO WHEELED TRAFFIC	NQ	NQ	NQ	NQ	NQ	E	E

KEY—E-Excellent—VG-Very Good—G-Good—NR-Not Recommended—NQ-Not Required, except on eroded surfaces.
*(Fibre/Crete 203 topcoated with Cono/Glaze 201—Fibre/Crete 204 topcoated with Cono/Glaze 202).

TECHNICAL HIGHLIGHTS

	FLOOR SURFACERS			UNDERLAYMENT	TOPCOATS	PRIMER
	CONO/CRETE	FIBRE/CRETE MORTAR	FIBRE/CRETE	FIBRE/MENT	CONO/GLAZE	CONO/WELD PRIMER
BASIC TYPES	101, 115 and 116	121 and 122	203 and 204	124	201 and 202	501
DESCRIPTION	Epoxy surfacing mortars	Reinforced epoxy surfacing mortars	Reinforced high build epoxy surfacers	Steel reinforced cement mortar	High build epoxy coatings	Low viscosity penetrating epoxy
SOLIDS BY VOL. (Approx.)	100%	100%	98%	N/A	98%	75%
UNIT SIZES	Reg. & Lge.	Reg. & Lge.	1-Gal., 2½-Gal. 5-Gal.	3.4 cu. ft.	1 Gal., 3 Gal., 5 Gal.	1 Gal., 3 Gal
COVERAGE (Typical)	Reg: 40 sq. ft. @ 1/4" Lge: 100 sq. ft. @ 1/4"	Reg: 40 sq. ft. @ 1/8" Lge: 100 sq. ft. @ 1/8"	40 sq. ft./gal. @ 40 mils	3.4 cu. ft. 40 sq. ft. @ 1"	130 sq. ft./gal. @ 12 mils	200 sq. ft./g
TYPICAL THICKNESS RANGE PER COAT	¼" (min.)	⅛" (min.)	40-80 mils	⅝" (min.)	10-15 mils	5-10 mils (wft)
APPLICATION METHODS	Trowel	Trowel, roller	Trowel, spray, roller, brush	Trowel	Spray, roller, brush	Spray, roller, brush
POT LIFE @ 70°F (Gal.)	1 hour	50 min.	45 min.	45 min.	40 min.	30-40 min.
INITIAL SET TIME @ 70°F	8-10 hrs.	8-10 hrs.	8-10 hrs.	6-8 hrs.	8-10 hrs.	6-8 hrs.
CURE TIME FOR SERVICE @ 70°F	18-24 hrs.	20-24 hrs.	24-30 hrs.	48-96 hrs.	24-30 hrs.	N/A
RECOAT TIME RANGE @ 70°F	N/A	8 hrs.-7 days	8 hrs.-7 days	48 hrs.-14 days	8 hrs.-4 days	2-48 hrs.
SUGGESTED TOPCOAT	Rarely topcoated	Usually not topcoated	Cono/Glaze 201 for Fibre/Crete 203 Cono/Glaze 202 for Fibre/Crete 204	Any of the floor surfacers	N/A	Any of the floor surfacers
THINNER	N/A	N/A	NC65	Water	NC65	N/A
CLEANING SOLVENT	NC65	NC65	NC65	Soap & water	NC65	NC65
SHELF LIFE @ 50-100°F	1 yr.	1 yr.	1 yr.	1 yr.	1 yr	1 yr.
SHIPPING WEIGHT (Approx.)	Reg: 105 lbs. Lge: 250 lbs.	Reg. 55 lbs. Lge: 140 lbs.	12.5 lbs./gal.	3.4: 360 lbs.	12.5 lbs. gal.	12.5 lbs./gal.
GENERAL USE	101: Abrasion resistant surfacing mortar for eroded floors. 115 & 116: Chemical resistant surfacing mortar for eroded floors.	121: Abrasion resistant reinforced surfacer for lightly eroded floors. 122: Chemical resistant reinforced surfacer for lightly eroded floors.	203: Cleanable and sanitary reinforced surfacer for smooth floors. 204: Chemical resistant reinforced surfacer for smooth floors.	Steel wire reinforced polyacrylic cement mortar for pitched underlayment or surfacing deeply eroded areas.	201 High build sanitary coating. 202: High build chemical resistant coating.	As penetrating primer to promote adhesion by more extensive surface contact.

This information is a general guide only. Contact your Coatings/Composites sales representative or the Technical Service Department for additional technical information.

COATINGS / COMPOSITES

10105 Doty Avenue • Inglewood, CA 90303
(213) 671-8666 • Outside California: (800) 421-5418

FLOORIN
COATINGS
LININGS

PHYSICAL PROPERTIES

TEST METHOD AND DESCRIPTION	CONO/CRETE SYSTEMS	FIBRE/CRETE MORTAR SYSTEMS	FIBRE/CRETE SYSTEMS
IMPACT STRENGTH (ASTM D-2794)(1)	300 in./lbs.	300 in./lbs.	300 in./lbs.
COMPRESSIVE STRENGTH @ 7 DAYS (ASTM D-695)	7,000 psi(2)	6,500 psi	N/A(3)
COMPRESSIVE STRENGTH – ULTIMATE (ASTM D-695)	12,000 psi	11,000 psi	N/A(3)
TENSILE STRENGTH (ASTM D-638)	1,800 psi	1,700 psi	2,100 psi (3.2% elongation)
FLEXURAL STRENGTH (ASTM C-293)	3,500 psi	4,200 psi	5,100 psi

(1) American Society For Testing & Materials – standard test methods
(2) Pounds per square inch
(3) Fibre/Crete is classified as a "coating" – thus cannot be tested per ASTM D-695, which is applicable for mortars only. (See "Crushing Load" below.)

COMPARATIVE PHYSICAL PROPERTIES

(Coatings/Composites test methods. Testing performed at typical applied thicknesses: Cono/Crete—1/4", Fibre/Crete Mortar—1/8". Fibre/Crete—50 mils plus 10 mil Cono/Glaze topcoat.)

TEST METHOD AND DESCRIPTION	CONO/CRETE SYSTEMS	FIBRE/CRETE MORTAR SYSTEMS	FIBRE/CRETE SYSTEMS
ADHESION (QCTM-31) Elcometer test – vertical pull. Application on unprimed steel sandblasted to SSPC-10-63T.	600 psi	600 psi	700 psi
CRUSHING LOAD (QCTM-27) Application on ½" steel plate. Vertical "point load" compression with ¼ sq. in. surface area steel rod.	11,000 psi	11,000 psi	15,000 psi
ABRASION RESISTANCE (QCTM-28) Depth of wear – average of 4 readings. Rotating 1½" wide steel wheels – onto applied surface. 100 lb. wheel load. 63,000 wheel passes.	.041 inch (1/25 inch)	.033 inch (1/30 inch)	.022 inch (1/45 inch)

CHEMICAL RESISTANCE GUIDE

Chemical Spillage At 70°F(1)

BASIC TYPES	CONO/CRETE(2)			FIBRE/CRETE		
	101	115	116	203	204	214
ORGANIC ACIDS	G	E	VG	G	E	VG
MINERAL ACIDS	G	VG	E	G	VG	E
ALKALIES	E	VG	VG	E	VG	VG
FUELS & PETROLEUM	G	VG	E	G	VG	E
FATTY ACIDS & VEGETABLE OILS	G	E	E	VG	E	E
CHLORINATED SOLVENTS	NR	G	E	NR	G	E
AROMATIC SOLVENTS	G	VG	E	G	VG	E

KEY
E – Excellent
VG – Very Good
G – Good
NR – Not Recommended

NOTES:
(1) Special formulations available for exposure to higher concentrations and temperatures, and most immersion service.
(2) Cono/Crete 101 & 115 same as Fibre/Crete Mortar 121 & 122 respectively.

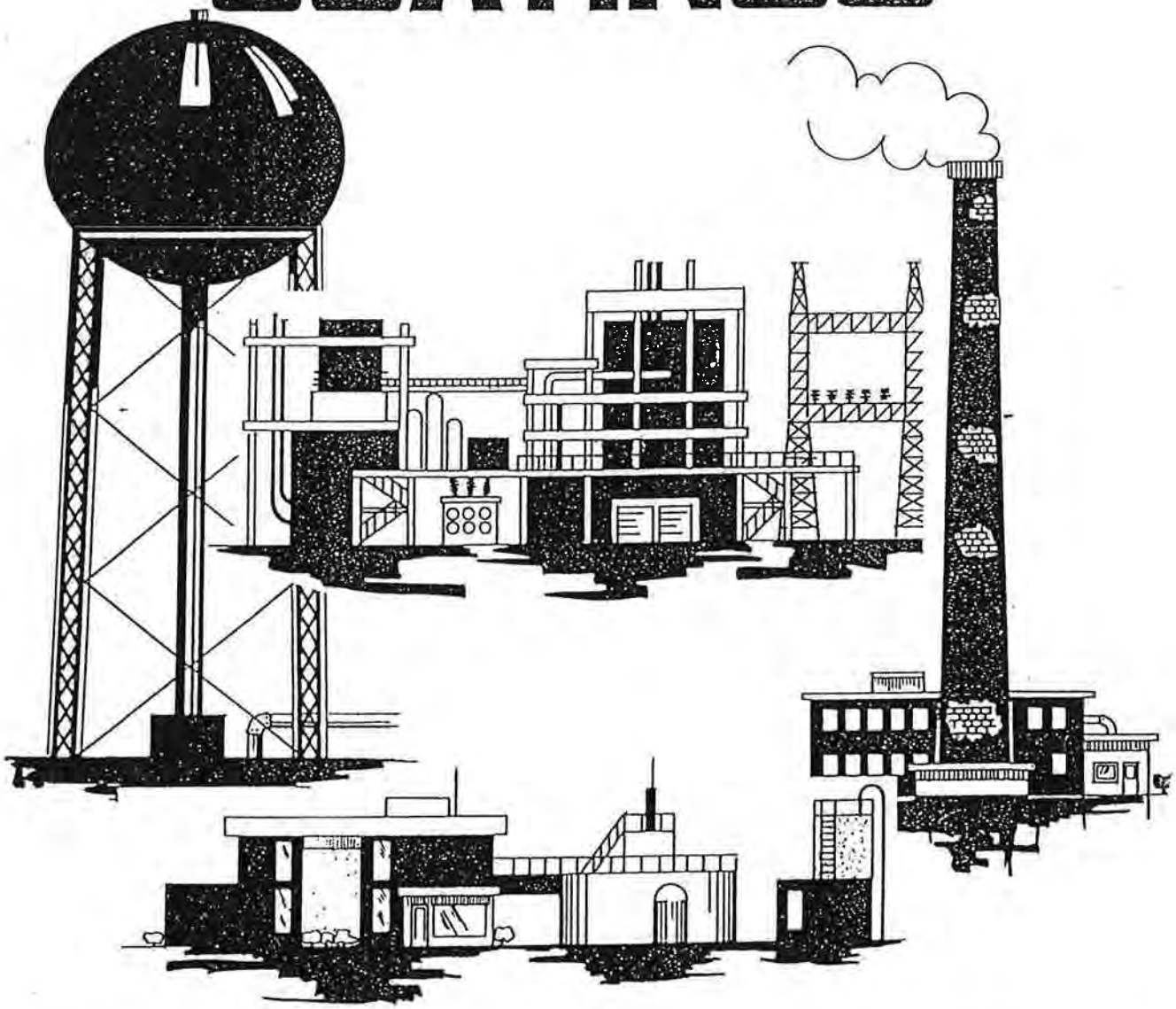
This information is a general guide only. Contact your Coatings/Composites sales representative, or the Technical Service Department for additional technical information.

Coronado

Coronado Paints

Coronado

INDUSTRIAL COATINGS



CORROSION EXPOSURE CHART

This Corrosion Chart is not intended to completely cover the field of chemicals found in manufacturing operations, but rather to cover the most common and most often encountered as problem chemicals. A detailed analysis of your plant may be necessary to determine, by department, the chemical and environmental factors which must be used to govern the selection of the proper coating systems for your particular plant and environment.

In addition to chemical exposure, the problem of impact, abrasion, moisture, atmospheric heat and cold exposure must also be included before recommendations can be finalized.

Where chemical corrosion is a threat, surface preparation becomes even more critical. Under less demanding conditions, without this, even properly qualified coatings have little chance to deliver satisfactory service.

TESTING PROCEDURE COMMENT

The test reportings on this chart were run at normal ambient temperature exposures. Where complete immersion in very aggressive chemicals at temperatures higher than room temperatures is expected, additional submersion tests, under actual operating conditions, must be performed.

SPECIALIZATION IS REQUIRED IN THE FIELD OF HEAVY DUTY COATINGS

Paint technology is a dynamic moving force. Each year the paint industry develops new abilities and methods in utilizing new raw materials and adds refinements to already existing formulations. Each individual coating, by the very nature of its formulation, has certain attributes and characteristics which enable it to perform well within a given range of conditions, on specified surfaces.

To meet the great variety of requirements for industry, water treatment plants, water tanks, sewage treatment, chemical processing, food processing, etc., specialization is a real necessity, not a luxury. Coatings which give excellent results on metal, frequently can not withstand the attack of lime found in masonry. Coatings which perform well in a dry atmosphere do not necessarily have the ability to withstand conditions of extreme moisture and condensation. Most frequently, coatings that provide optimum protection on interior surfaces, react unfavorably when exposed to direct sunlight. Coatings which perform exceptionally well when in contact with ordinary water, break down when they are submerged in sewage. Those that have good resistance to caustics may have poor resistance to acids.

Out of the sometimes bewildering array of coating types available . . . including alkyds, modified alkyds, polyamide epoxies, coal tars, asphaltic, chlorinated rubbers, amine epoxies, vinyls, etc. . . it is impossible to select one of these coatings that could be used under all, or even most of the situations and conditions found in industry. For this reason, we have Maintenance Coatings Engineers to serve our customers. They will design definitive specifications to meet any of a series of problems, and their knowledge and experience equips them to select specific coatings to be used to fit any set of existing operating conditions.

coronado paint company

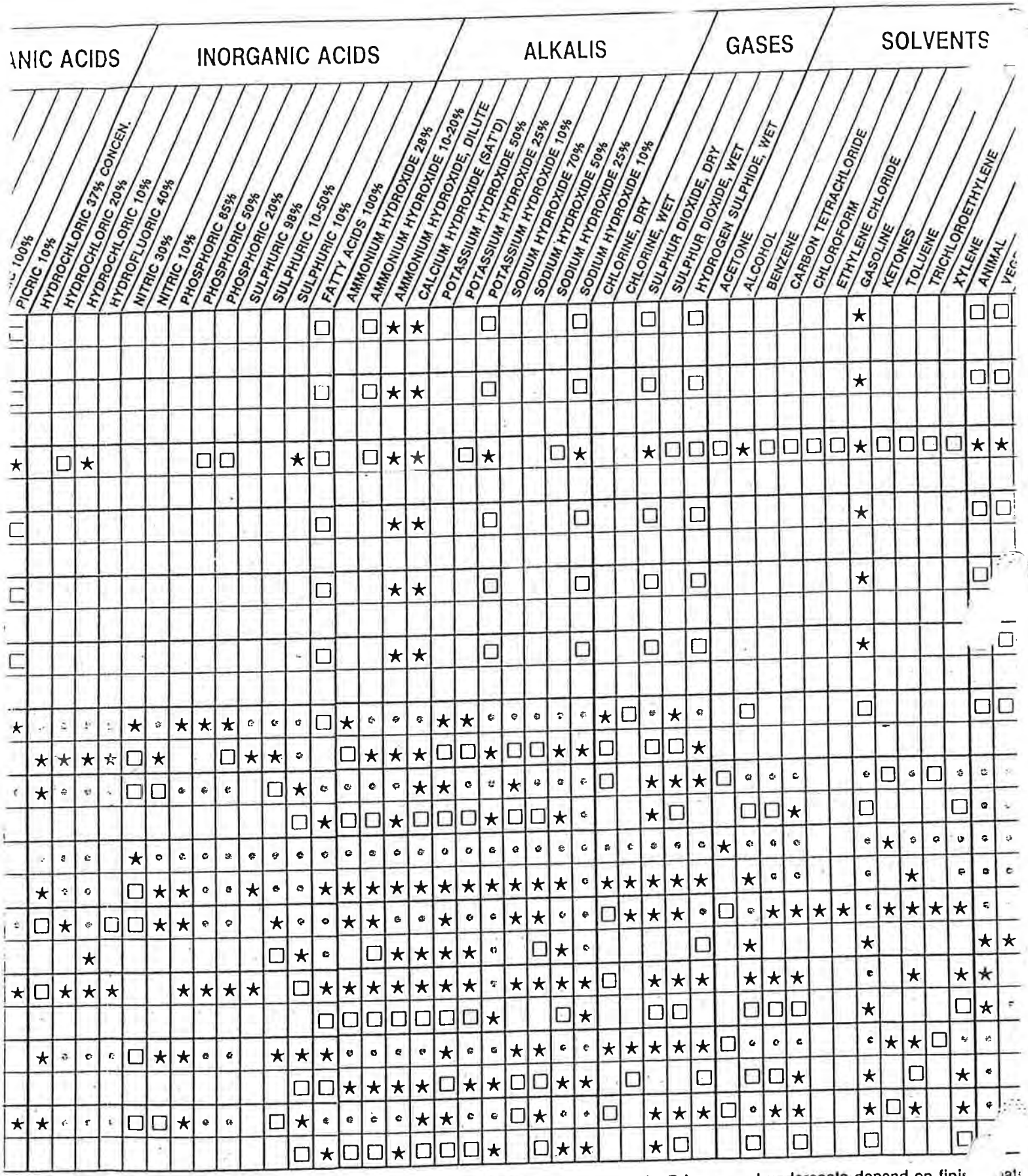
CORROSION EXPOSURE CHART

DEFINITION OF RATINGS

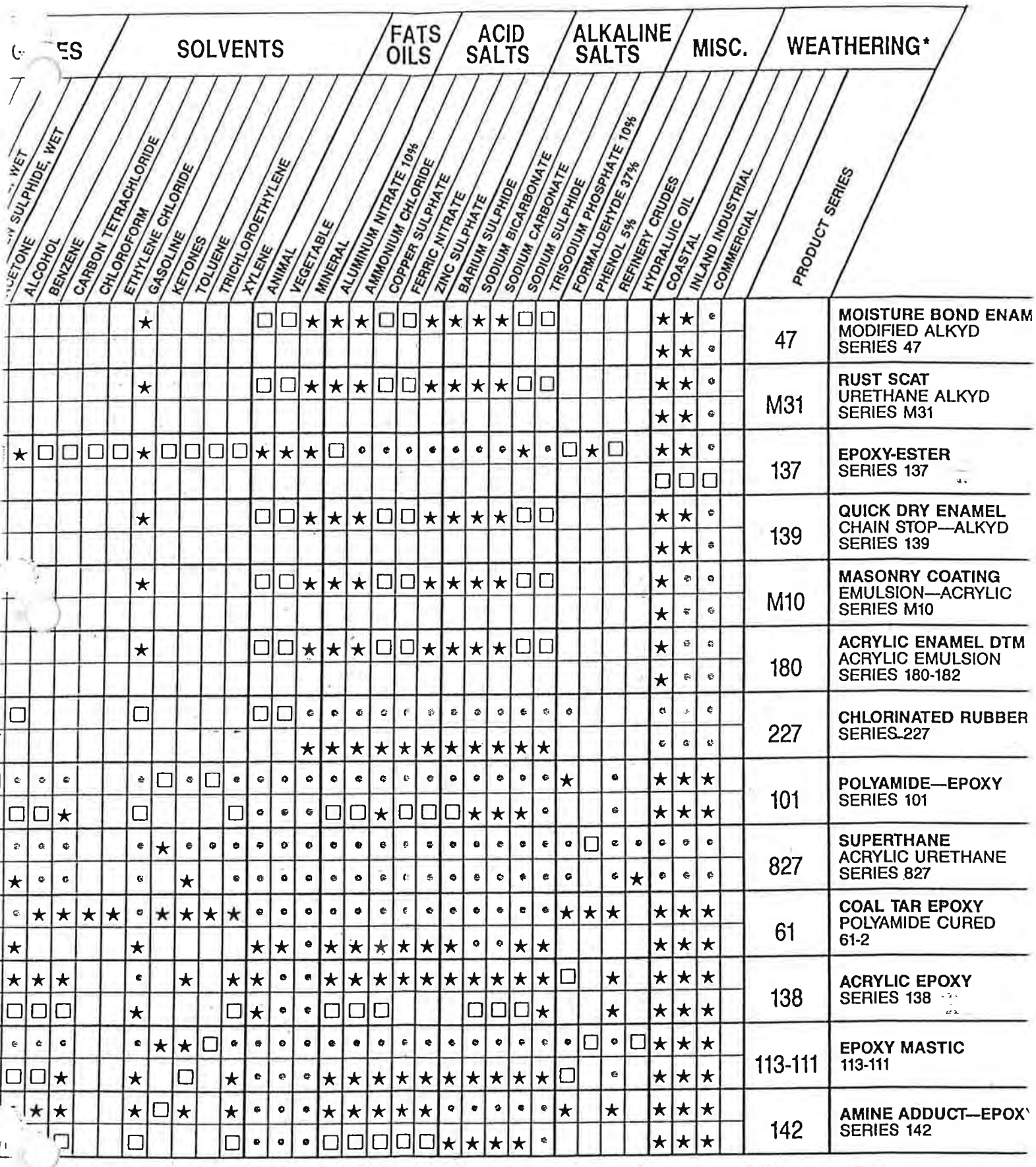
- ⊙ EXCELLENT — No effect on normal coating life
- ★ GOOD — None to minimal shortening of coating life.
- □ FAIR — Usable, but reduced coating life.
- ☐ NOT RECOMMENDED — Impractical coating life.

			WATER						ORGANIC							
			FRESH	SALT	FRESH, 150°F.	SALT, 150°F.	ACETIC 10%	ACETIC, GLACIAL	BENZOIC	BORIC	CITRIC 10%	LACTIC, DILUTE 25%	MALEIC 25%	OLEIC 100%	PICRIC 10%	HYDR
ENAMELS	MOISTURE BOND ENAMEL MODIFIED ALKYD SERIES 47	Splash & Spill, short interval	⊙	⊙	★	★			□	□	□	□	□	□	□	
		Direct exposure for extended periords														
	RUST SCAT URETHANE ALKYD SERIES M31	Splash & Spill, short interval	⊙	⊙	★	★			□	□	□	□	□	□	□	
		Direct exposure for extended periods														
	EPOXY-ESTER SERIES 137	Splash & Spill, short interval	⊙	⊙	★	★			★	★	★	★	★	★	★	
		Direct exposure for extended periods														
	QUICK DRY ENAMEL CHAIN STOP—ALKYD SERIES 139	Splash & Spill, short interval	★	★	□	□			□	□	□	□	□	□	□	
		Direct exposure for extended periods														
EMULSIONS	MASONRY COATING EMULSION—ACRYLIC SERIES M10	Splash & Spill, short interval	⊙	⊙	□	□			□	□	□	□	□	□	□	
		Direct exposure for extended periods														
	ACRYLIC ENAMEL DTM ACRYLIC EMULSION SERIES 180-182	Splash & Spill, short interval	⊙	⊙	□	□			□	□	□	□	□	□	□	
		Direct exposure for extended periods														
CHEM RESIST	CHLORINATED RUBBER SERIES 227	Splash & Spill, short interval	⊙	⊙	★	★	★		⊙	⊙	⊙	⊙	★	□	★	⊙
		Direct exposure for extended periods	⊙	⊙	□	□					⊙					★
2-COMPONENT	POLYAMIDE—EPOXY SERIES 101	Splash & Spill, short interval	⊙	⊙	⊙	⊙	⊙		⊙	⊙	⊙	⊙	★	★	⊙	★
		Direct exposure for extended periods	⊙	⊙	★	★	★				★	★	□	★		
	SUPERTHANE ACRYLIC URETHANE SERIES 827	Splash & Spill, short interval	⊙	⊙	⊙	⊙	□				⊙	⊙	⊙	⊙		⊙
		Direct exposure for extended periods	⊙	⊙	⊙	⊙					□	⊙	⊙	★		★
	COAL TAR EPOXY POLYAMIDE CURED 61-2	Splash & Spill, short interval	⊙	⊙	⊙	⊙	⊙		⊙	⊙	⊙	⊙	★	★	⊙	□
		Direct exposure for extended periods	⊙	⊙	⊙	⊙			□	⊙	⊙	⊙	★	□		
	ACRYLIC EPOXY SERIES 138	Splash & Spill, short interval	⊙	⊙	⊙	★	★		⊙	⊙	⊙	⊙	□	□	★	□
		Direct exposure for extended periods	★	★	□	□	□									
	EPOXY MASTIC 113-111	Splash & Spill, short interval	⊙	⊙	⊙	⊙	★	□	⊙	⊙	⊙	⊙				★
		Direct exposure for extended periods	⊙	⊙	⊙	⊙	□		□	□	□	□		★		
	AMINE ADDUCT—EPOXY SERIES 142	Splash & Spill, short interval	⊙	⊙	⊙	⊙	⊙		⊙	⊙	⊙	⊙	□	□	★	★
		Direct exposure for extended periods	★	★	□	□	□				★	★		□		

COATINGS MUST BE FULLY CURED TO MEET THESE EXPOSURES.



Note: This chart covers finish coats only. Primers and undercoats depend on finis oat
as well as on substrate to be finished, its condition, and the degree of surface preparation



and undercoats depend on finish coats selected and the degree of surface preparation possible.

*Resistance to fading and loss of gloss, not necessarily re to any change in chemical resistance.

INDUSTRIAL

SUPERTHANE ACRYLIC URETH
827 Series

Type	Sheen	Spread Rate	Recommended Application	Thinner	Clean Up	Dry Time		
						Tack Free	Recoat	Full Cure
Acrylic Urethane	Gloss	440 Sq. Ft. Per Gallon	Spray Brush or Roller	45-202	45-202	1 Hour	4 Hours	7-10 Days

Product Name: Superthane 827 Series	Superthane provides outstanding gloss and color retention, plus, excellent abrasion, chemical and solvent resistance. It is particularly well suited for high performance uses where baking systems are not practical. This product equals the performance of baked finishes and may be used on properly prepared and primed substrates of nearly any composition. Superthane is ideal as an anti-graffiti coating system. Superthane 827-1 white and 827-10 clear are U.S.D.A. approved. Interior or exterior.
Where to Use: Steel, Galvanized, Aluminum, Concrete, Fiberglass	May be used on metal buildings, ships, offshore equipment, chemical plants, water towers, structural supports, tanks, bridges, heavy equipment, floors, or other surfaces where maximum chemical, solvent and weather resistance is demanded. Not recommended for direct application over zinc rich primers, unprimed galvanized or concrete surfaces or in areas of continuous food contact.
Surface Preparation:	The surface to be coated must be dry, clean and free of rust, dirt, oil, grease, form release agents, laitance, efflorescent deposits, or any other surface contaminates that could interfere with adhesion. Dirt, oil, grease and release agents should be removed by washing with Coronado Sur-Prep I Oil and Grease Emulsifier. Laitance and efflorescent deposits should be removed using Sur-Prep IV Concrete Etch or by thorough water blasting with abrasive injection. Rust, mill scale and old paint should be removed by abrasive blast cleaning SSPC-SP10 near white metal. Previous finishes that are glossy must be dulled. Always check compatibility of Superthane over previous coats of paint; a tie coat of 111-111 may be required. PRIMERS: (New or bare surfaces) STEEL — Use Epoxy Metal Primers 101-147 or 101-155. GALVANIZED — Use Epoxy Hi-Build 111-111. ALUMINUM — Use Wash Primer 316-200 followed by Epoxy Metal Primer 101-155. CONCRETE — For rough surfaces use 101-11 Epoxy Block Filler. For smooth surfaces use 101-10 Epoxy Clear Sealer. Superthane finish coats should be applied within 48 hours after primer application to insure maximum intercoat adhesion.
Application:	Stir 827A component to assure even dispersement of pigment. Mix the 'A' and 'B' components together (3 to 1 ratio) thoroughly and allow 15 minute induction time before application. Apply Superthane by conventional, airless or HVLP spray to achieve 2.0 mils DFT. Reduce with 45-202 as needed, to achieve proper spray consistancy. It is very important to use an NIOSH-23C approved respirator when spraying Superthane. *If Superthane needs to be brushed or rolled, reduce with 827-607 Superthane Retarder; Up to one pint per mixed gallon. Do not apply Superthane over lacquers. Do not apply Superthane when surface or air temperatures are below 60°F. or above 90°F. Do not apply if rain is threatening or if surface temperature is within 5°F. of critical dew point.
Heat Resistance: Dry Wet	 200° Fahrenheit 125° Fahrenheit

NOTE: Formulated without mercury or lead.

Revised 2/95

esin Type:	Aliphatic Acrylic Urethane (3:1 mixing ratio, kit)
olids:	Weight - 60.0% Volume - 56.5%
ht Per Gallon:	11.9 lbs.
'iscosity:	65 ± 5 Krebs Units (mixed)
lash Point:	49° F. (Seta)
pecular Gloss:	85 - 90% @ 60 degrees
ag Rating:	Pass 6 mils (Lenetta)
ecommended Film Thickness:	Wet - 3.5 mils Dry - 2.0 mils
ot Life:	4 to 6 hours @ 70° F.
brasion Resistance: dhesion: lexibility: ccelerated Weathering: alt Fog Resistance:	ASTM D4060 — 80 mg. loss after 1,000 cycles (CS-10 Wheel) ASTM D3359 - Pass 5B ASTM D1737 - Pass ¼" Mandrel ASTM G53 - 95% Gloss retention @ 1,000 hours ASTM B117 - 2,000 hours (two coats over 101-153 primer) Rating - 10, Rust Area - 0.01%
VOS Statement:	This product contains a maximum of 3.8 pounds VOC/VOS per gallon of coating.
hemical Abstract Number:	Ingredient — CAS. NO. Hexamethylene Diisocyanate Polymer ... 28182-81-2 nButyl Acetate 123-86-4 Xylene 1330-20-7 Methoxy Propanol Acetate 0010-865-6 Methyl Isobutyl Ketone 108-10-1
erification:	Meets performance MIL-C-83286, MIL-C-83445

IMA-707

coronado paint company

308 OLD COUNTY ROAD
EDGEWATER, FLORIDA, USA
PHONE: 904-428-6461
FAX: 904-427-7130

7451 FM 3009
SCHERTZ, TEXAS, USA
PHONE: 210-651-6996
FAX: 210-651-5261

SECTION 1 IDENTITY

Manufacturers Name and FSCM Coronado Paint Company, Inc. FSCM 2851	Emergency Telephone Number 904-428-6461
Address 308 Old County Road, Edgewater, FL 32132	Trade Name and Product Code Superthane II 827-A/B
Product Class, Generic Acrylic/Aliphatic Polyurethane	Date Prepared and Contact 8/3/93 Raj Dhawan
NFPA Codes Health=2 Flammability= 3 Reactivity= 1	Volatile Organic Compounds 3.3-3.8 lbs. per gallon

SECTION 2 HAZARDOUS INGREDIENTS

Ingredient C.A.S.#	Percent	TLV PPM	TLV Mg/M³	PEL	Vapor Pressure/mmHg
Hexamethylene Diisocyanate Polymer 28182-81-2	17-20	Not est.	1.0	Not est.	7.5×10^{-5}
nButyl Acetate 123-86-4	3-12	100	---	150 ppm	15
Ethyl Benzene *100-41-4 Xylene * 1330-20-7	2-4 8-16	100	---	100 ppm	9
Methoxy Propanol Acetate 0010-865-6	5-10	Not est.		Not est.	Unknown
Methyl Isobutyl Ketone 108-10-1	1-5	50		100 ppm	16

SECTION 3 PHYSICAL / CHEMICAL CHARACTERISTICS

Boiling Point 235-280°F	Specific Gravity (H_2O=1) 1.05-1.25
Vapor Density X Heavier ___ Lighter than air	Percent Volatile By Volume 40-50
Evaporation Rate (Ether=1) >1	Appearance and Odor Two component kit. Wh mixed; white or colored opaque liqu solvent odors prevail.
Solubility in Water less than 10%	

SECTION 4 FIRE AND EXPLOSION HAZARD DATA

Flammability Classification	Flash Point and Method	Flammable Limits	
Flammable Liquid	60°F (SETA)	LEL 1.4	UEL 7.4

Extinguishing Media
Carbon dioxide, dry chemical, foam

Special Fire Fighting Procedures
A self-contained breathing apparatus should be worn. Closed container may explode whe exposed to extreme heat or burst when contaminated with water. Vapors may build up ex travel along the ground to an ignition source which may result in a flash back to the source of vapors.

Unusual Fire and Explosion Hazards
Isolate from heat, electrical equipment, sparks, and open flame.

DOT Class and Markings
Paint, Flammable Liquid. Red Label Required.

*This chemical is subject to the reporting requirements of Section 313 SARA, Title

SECTION 5 REACTIVITY DATA

STABILITY	Unstable	X	Conditions to Avoid Do not mix water with uncured material.
	Stable		

Incompatibility (Materials to Avoid) Avoid contact with water, alcohols, amines, strong bases, metal compounds or surface active materials.

Hazardous Decomposition Products

Thermal decomposition may yield CO_2, CO, oxides of nitrogen, traces of HCN, HDI

Hazardous Polymerization	May Occur		Conditions to Avoid NA
	Will Not Occur	X	

SECTION 6 HEALTH HAZARD DATA

Threshold Limit Value
Not established for product as a whole. Refer to Section 2 for individual components.

Health Hazards (Acute and Chronic)
See attached sheet.

Carcinogenicity
Not listed NTP, IARC, OSHA

Signs and Symptoms of Exposure Burning sensation in the mucous membranes of the respiratory tract. Possible asthma attack.

Medical Conditions Generally Aggravated by Exposure: Pre-existing respiratory disorders, skin allergies

Primary Route(s) of Entry: Inhalation, skin&eye contac

Emergency First Aid Procedures
See attached sheet

SECTION 7 PRECAUTIONS FOR SAFE HANDLING & USE

Steps to be taken if material is released or spilled
See attached sheet

Waste Disposal Method
See attached sheet

Precautions to be taken in handling and storing
See attached sheet

SECTION 8 CONTROL MEASURES

Respiratory Protection
See attached sheet

Ventilation
See attached sheet

Protective Gloves
attached sheet

Eye Protection
See attached sheet

Other Protective Clothing and Equipment
See attached sheet

V. HEALTH EFFECTS DATA

EFFECTS OF OVEREXPOSURE

To vapor and/or mist: Can cause irritation to skin, eyes and respiratory tract (nose, throat, lungs). Symptoms may be watering of eyes, dryness of throat, coughing, headache, tightness in chest or burning sensation. Allergic skin or respiratory reaction may occur in some individuals. Respiratory sensitivity results in asthma-like symptoms on subsequent exposure even below the TLV. Skin sensitivity results in allergic dermatitis which may include rash, itching, hives and swelling of extremities. Headache, dizziness or nausea may be experienced by some as a result of exposure to solvents.

EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT: Flush with clean, lukewarm water (low pressure) for at least 15 minutes, occasionally lifting eye lids. Obtain medical attention.

SKIN CONTACT: Remove contaminated clothing. Wash affected skin areas thoroughly with soap and water. Wash contaminated clothing thoroughly before re-use.

INHALATION: Move to an area free from risk of further exposure. Administer oxygen or artificial respiration as needed. Obtain medical attention.

INGESTION: Consult physician.

NOTE TO PHYSICIAN: Medical supervision of all employees who handle this product is recommended. These should include pre-employment and periodic medical examinations with respiratory function tests (FEV, FVC as a minimum). Persons with asthmatic-type conditions, chronic bronchitis, other chronic respiratory diseases or recurrent skin exzema or sensitization should be excluded from working with this product. Once a person is diagnosed as sensitized to isocyanates no further exposure can be permitted.

EMPLOYEE PROTECTION RECOMMENDATIONS

Precautions must be taken so that persons handling this product do not breathe the vapors or have it contact the eyes or skin. In spray operations, protection must be afforded against exposure to both vapor and spray mist.

EYE PROTECTION: Safety glasses, splash goggles or face shield. Contact lenses should not be worn.

SKIN PROTECTION: Chemical resistant gloves. Cover as much of the exposed skin area as possible with appropriate clothing. If skin creams are used, keep the area protected only by the cream to a minimum.

VENTILATION AND RESPIRATORY PROTECTION: Exhaust ventilation sufficient to keep the airborne concentrations of the solvent and HDI below their respective TLV's must be utilized. Exhaust air may need to be cleaned by scrubbers or filters to reduce environmental contamination. In addition a respirator that is recommended or approved for use in isocyanate containing environments (air

purifying or fresh air supplied) may be necessary. Consider type of application and environmental concentrations. Observe OSHA regulations for respirator use (29 CFR 1910.134). In spray application, when the airborne isocyanate monomer concentrations are known to be below 0.2 ppm and if the polysiocyanate (polymeric, oligomer) concentrations are known to be below 10 mg/m^3, a properly fitted air-purifying (combination organic vapor and particulate) respirator, proven by test to be effective in isocyanate-containing spray paint environments, will provide sufficient protection. When the airborne isocyanate concentrations are not known, or if either of the above guidelines is exceeded, or if spraying is performed in a confined space or area with limited ventilation, the use of a positive pressure supplied air respirator is mandatory.

Even during non-spray operations such as mixing, brush or roller application, etc., depending on the conditions (for example, heating of material or application to a hot substrate), it is possible to be exposed to airborne solvent or isocyanate vapors. Therefore, when airborne concentrations during such non-spray operations exceed the suggested TLV of 0.02 ppm for isocyanate monomer, but are below 0.2 ppm, at least an air purifying (organic vapor) respirator is required. If airborne concentrations are unknown or if they exceed 0.2 ppm, or operations are performed in a confined space, a supplied air respirator must be worn. In addition, solvent concentrations should be considered when determining the selection and use of a respirator.

OTHER: Safety showers and eyewash stations should be available. Educate and train employees in safe use of product.

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Evacuate non-essential personnel. Remove all sources of ignition. Ventilate the area. Equip clean-up crew with appropriate protective equipment (See Employee Protection Recommendations). Dike or impound spilled material and control further spillage if feasible. Notify appropriate authorities if necessary. Cover spill with sawdust, vermiculite or other absorbant material; pour liquid decontaminant over spillage - allow to react at least 10 minutes, collect material in open containers - add further amounts of decontamination solution. Remove containers to safe place - cover loosely. Wash down areas with liquid decontaminant and flush spill area with water. Decontamination solutions: Ammonium hydroxide (0-10%), detergent (2-5%) and balance water; or solution of Union Carbide's Tergitol TMN-10 (20%) and water (80%).

WASTE DISPOSAL METHOD: Waste material must be disposed of in accordance with federal, state and local environmental control regulations. Empty containers must be handled with care due to product residue and flammable solvent vapor. Decontaminate

containers prior to disposal. DO NOT HEAT OR CUT EMPTY CONTAINER WITH ELECTRIC OR GAS TORCH.

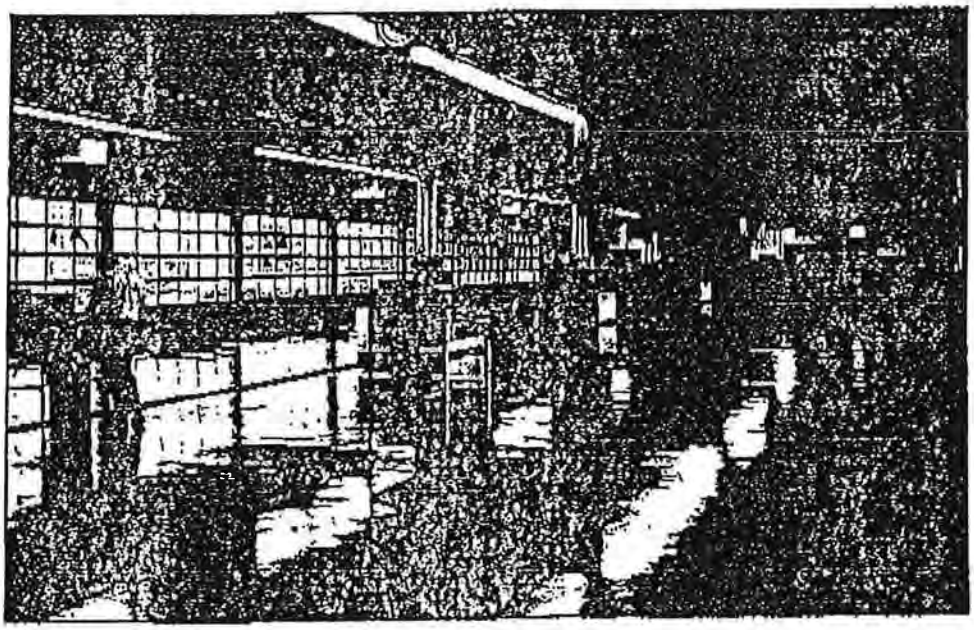
IX. SPECIAL PRECAUTIONS

STORAGE TEMPERATURE (MIN./MAX): 32°F (0°C) / 122°F (50°C)
AVERAGE SHELF LIFE: 12 months at 77°F (25°C)
SPECIAL SENSITIVITY (HEAT, LIGHT, MOISTURE): If container of material is exposed to heat, container can pressurize and burst. If moisture enters container, pressure can build up to reaction producing CO_2 which can cause sealed container to pressurize and burst. Do not reseal if contamination is suspected.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Keep away from heat, sparks and open flame. Store in tightly closed container and protect from moisture and foreign materials. At maximum storage temperatures noted, material may slowly polymerize without hazard. Ideal storage temperature range is 50-81°F (10-27°C). For additional information refer to label and other product literature.

CORONADO SUPERTHANE

CONCRETE FLOOR SPECIFICATION



ABRASION RESISTANT - CHEMICAL RESISTANT
HIGH GLOSS - EXCELLENT GLOSS RETENTION

PROTECT YOUR FLOORS FOR YEARS!

GENERAL:

Coronado has developed an Allphatic Acrylic Urethane that exhibits excellent abrasion resistance, color and gloss retention, and chemical resistance.

The Coronado Aliphatic Acrylic Urethane system is designed in companion with the Sur-Prep pre-treatment products for the proper cleaning and etching processes so important for a successful coatings project.

Therefore, we have chosen our Aliphatic Acrylic Urethane system for the following reasons:

1. Aliphatic Acrylic Urethane provides outstanding abrasion resistance, making it an ideal choice industrial applications where heavy traffic and abuse from equipment is a requirement.
2. Allphatic Acrylic Urethane exhibits excellent color and gloss retention for interior or exterior use, which means the original appearance is preserved longer.
3. Aliphatic Acrylic Urethane will withstand exposure to a variety of chemicals including brake fluid, oil, salt, gasoline, and skydrol (ref: Coronado Corrosion Exposure Chart).
4. Aliphatic Acrylic Urethane is formulated for quick recoat time, which reduces undesirable down time.

With all of this in mind, Coronado has prepared this coating system that will give maximum protection to your concrete floor at the lowest cost per square foot, per year of coating life.

I. SURFACE PREPARATION

A. EXISTING COATING REMOVAL

Remove all existing coatings from the floor area to be coated. This can be accomplished in various proven ways, which are listed below. The choice of which method is to be used can vary, due to size of area to be prepared, location of area to be done, who will be coating the area and the condition of the area to be coated.

1. Remove all coating film by scarifying the floor using Wheelabrator Blastrac.
2. Remove all conventional coating film by using water neutralized paint and varnish remover applied using manufacturer's recommended methods.
3. Remove all of the finish using Coronado industrial grade epoxy-urethane remover, applied at a spreading rate of 100 square feet per gallon. Allow this remover to remain on the floor for 15-20 minutes. At this point the floor should be scrubbed by using a commercial floor scrubber with a wire brush attachment. Rinse freely with clean water and pick up all residue with a wet or dry vacuum cleaner. Repeat this operation until all film is removed from the surface. Dispose of residue according to local or state guidelines.

B. OIL REMOVAL

All areas to be painted should be cleaned thoroughly with a solution of 1 part Coronado Sur-Prep I reduced with 6 parts of water and applied at 100 square feet per gallon of solution. This cleaner emulsifies all of the oily substances and lifts the oil or grease out of the concrete floor.

C. HARDENER OR CURING COMPOUND REMOVAL

At this point, it should be determined if there is a hardening compound that has been applied to the floor at the time the floor was installed. This is best accomplished by applying a solution of 1 part hydrochloric acid to 2 parts water. If this solution does not react with the concrete, causing a boiling action, which will be yellow/green in color, then there is a hardening compound on the surface.

If this is the case, the floor should be treated with Coronado epoxy urethane remover, which will attack and lift out the concrete hardener. This material should be applied at a spreading rate of approximately 100 square feet per gallon and allowed to lay on the floor for a period of 20 minutes. At this point, the floor should be scrubbed using a commercial floor scrubber with a wire brush attachment.

Rinse freely with clean water and pick up this residue with a wet or dry industrial vacuum cleaner.

D. ETCHING AND LATENT REMOVAL

Now that the floor is cleaned, the surface should be etched with a solution of 1 part Coronado Sur-Prep IV reduced with 3 parts water. Apply this to the floor at approximately 100 square feet per gallon. This will dissolve the latent alkalies and any other cement contaminants on the floor area. Also, it opens up the surface to permit the floor coatings to penetrate into the floor surface. After thoroughly rinsing the floor, pick up the residue with a wet or dry commercial vacuum cleaner. If proper etch has been accomplished, the concrete will have a surface texture like #1 or #2 sandpaper.

E. NEUTRALIZING

It is important now to neutralize the floor by using a solution of 5% ammonia mixed with 95% water. Pick up residual solution with a wet or dry vacuum and dry up the floor completely.

II. BASE COAT

A. Apply one coat of Coronado 101-10A Polyamide Epoxy Clear mixed with 101-250B Activator, then reduce 1 to 1 with 45-187 solvent. Apply this coating at a spread rate of 250 square feet per gallon.

B. The reason for this base coat is to penetrate deeply and adhere to the concrete surface, and to form the base film thickness needed for this type of exposure.

C. Allow 2 to 4 hours dry before applying the topcoat system.

D. Coronado Polyamide Epoxy is a two component epoxy, which uses a 1 - 1 mixing ratio and offers a usable pot life of 8 - 12 hours at 70 degrees F. Stir the mixture well, allow 30 minutes induction time and stir well again before applying the coating.

III. FOR ANTI-SLIP PROCEDURE

A. If an anti-slip finish is desired, apply one coat of Coronado 111-111 A and B Polyamide Epoxy Hi-Build Intermediate coat at a spread rate of 150 square feet per gallon.

B. While this coat is being applied by roller, it is recommended that 40 - 70 mesh clean dry sand or 3M color quartz be broadcast by hand into the wet coating. This can be accomplished by casting the aggregate into the air allowing it to fall into the wet coating in a raining fashion.

C. Keep in mind that you do not need very much aggregate to give a good anti-slip quality and the more you apply, the harder it is to sweep or mop the surface, which will affect the housekeeping job.

D. After broadcasting the anti-slip sand into the epoxy, it is recommended the coating be back rolled in order to encapsulate the sand into the epoxy coating. This technique will give good anti-slip qualities, but will not detract from the aesthetic value of the floor coating.

E. Coronado 111-111 is a two component material mixed in a 1 to 1 ratio. It offers a usable pot life of 8 hours at 70 degrees F. Clean up with 45-187 solvent.

IV. COLOR COAT SYSTEM

A. Apply one coat of Coronado Aliphatic Acrylic Urethane at a spread rate of 400 to 450 square feet per gallon.

B. The color of this topcoat should be chosen from the Coronado industrial color system.

C. Allow 4 hours dry time for recoating and overnight dry time before putting area back in service.

D. Coronado Aliphatic Urethane is a two component material, which uses a 3 - 1 mixing ratio and offers a usable pot life of 6 hours at 70 degrees F. Stir the mixture well, allow 15 minutes induction time and stir well again before applying the coating. Clean up with 45-202 solvent.

E. Coronado Aliphatic Urethane Clear 827-10 can be used as a final coat over the color coat of Aliphatic Urethane. This application provides additional durability.

V. RECOATING ALIPHATIC ACRYLIC URETHANE COATED FLOORS

A. SURFACE PREPARATION

1. Remove all loose failing material to expose tight adhering tapered edges.
2. Remove all gloss from existing coating by using a heavy duty floor buffer and sanding screens by 3M Company (or equivalent).
3. Remove all oil, grease or other foreign matter that would be detrimental to the coating adhesion, by using a mixture of one part Sur-Prep I (93-500) mixed with 10 parts water. Rinse well with clean water, vacuum up residue with heavy duty wet or dry vacuum cleaner and allow to dry.

B. PRIMER SYSTEM

1. Spot prime all bare concrete using Coronado 101-10A Polyamide Epoxy Clear, mixed with 101-250B Activator, then thin 1 to 1 with 45-187 solvent, applied at a rate of 250 square feet per gallon.
2. Allow 2 to 4 hours dry time before applying topcoat system.

C. TOPCOAT SYSTEM

1. Apply one coat of Coronado Acrylic Urethane at a spread rate of 400 to 450 square feet per gallon.
2. Allow 4 hours dry time for recoating and overnight dry time before putting area back in service.

*The Coronado Paint Company can accept no responsibility as to the results and procedures recommended unless the products specified and procedures outlined in this specification are used exactly as outlined.

COMPANION PRODUCTS

SUR-PREP SERIES CLEANERS AND PRETREATMENTS

SUR-PREP I
OIL & GREASE
EMULSIFIER

For cleaning walls, ceilings, floors, and equipment.

This cleaner is extremely effective in removing oil, grease, wax, fats, blood, and animal by-products. May also be used in cleaning concrete, asphalt, vinyl, and asbestos floors. It has been very effective in cleaning equipment, tools, brushes, rollers and spray equipment. The emulsifying process causes it to reach into voids, cracks, and crevices and converts oily matter into a soapy solution which permits easy removal. Rinse thoroughly with clean water and allow to dry.

KEEP OUT OF REACH OF CHILDREN.

SUR-PREP II
EPOXY & URETHANE
REMOVER

For stripping old epoxy or urethane coatings from surfaces to be recoated.

This remover does not perform as well on conventional coatings.

The heavy body of this remover permits it to cling to vertical surfaces and the self-forming film retards the evaporation of the solvents and extends the working time needed in removing epoxies. This remover is free of phenols, cresols, and chromates which reduces waste disposal problems. This remover is nonflammable and performs best at ambient temperatures of 65°F. Remover and residue may be rinsed with high pressure, high volume cold water. Conforms to requirements of MIL-R-81903, Type II.

WARNING!

Caution — Avoid contact with skin, eyes and clothing, which may cause burns. For skin contact wash immediately with large quantities of water.

KEEP OUT OF REACH OF CHILDREN.

SUR-PREP IV
CONCRETE
PRE-TREATMENT & ETCH

For use in removing laitance and etching smooth concrete, which will improve coating adhesion.

This pretreatment includes wetting agents that provide better penetration for removing foreign materials and contaminates. It also contains extenders which gives a more even etch over a larger area. The inhibitors in this formulation will protect metal equipment against any corrosive action of the material. This product may also be used full strength for removal of rust and mill scale from steel.

WARNING!

Irritant to eyes and mucous membranes. Contains hydrochloric acid. In case of external contact flush with cool water. If irritation persists, get medical attention.
If swallowed give 1 to 2 glasses of water or milk and call physician.

KEEP OUT OF REACH OF CHILDREN.

coronado paint company

EDGEWATER, FLORIDA U.S.A. 32132-0308 • SCHERTZ, TEXAS U.S.A. 78154-1210

IMA-1110
Rev. 3/93

ATTACHMENT B6-4

Building Flooring Specifications

FSS 45DC

Spray Polyurea

Technical Data Sheet

686 S. Adams St. | Kansas City, KS 66105 | (913) 321-9000 | www.versaflex.com

Selection & Specification Data

Description

VersaFlex FSS 45DC is a 100% solid, fast setting, plural component, polyurea elastomer and high performance coating. **FSS 45DC** is primarily designed for properly prepared concrete and masonry, due to it's higher elongation and extended gel time, but will bond tenaciously to steel and other properly prepared substrates. **FSS 45DC** is an economical coatings solution for industrial applications requiring a resilient liner for waterproofing and/or abrasion resistance. **FSS 45DC** can be applied horizontally, vertically, and overhead, making it ideal for industrial applications with a variety of substrates, and complex geometries.

Ideal For

- Below grade waterproofing
- Wastewater facilities
- Concrete and masonry secondary containment
- Washout facilities
- Food processing, bottling and canning facilities
- Mining facilities

Advantages

- Made in the USA at a ISO 9001:2015 Certified Facility
- 100% solid, no VOC's
- Tough, resilient , elastomeric membrane
- Fast return to service
- Dry exposure range of –20°F to 250°F
- Excellent adhesion to concrete, masonry, and metals
- Meets FDA 21CFR 175.300

Color & Stability (Limitations)

Standard colors are White (VF1213), Black (VF1280), Tan (VF1223), Dark Gray (VF1220), and Light Gray (VF1221). Custom colors are available upon request. Note: Custom colors are not returnable; custom color options can be viewed at www.versaflex.com. The A-side (Iso) color could vary from clear to amber.

Limitations

FSS 45DC is an aromatic polyurea and discoloration from exposure to ultraviolet light may occur, however the physical properties are unaffected. FSS 45DC should not be used for direct contact with extremely high or low pH levels.

Physical Properties (Typical) (Post cured at 225°F for 24 hours)

Description	Method	Result
VOC (g/l)	Theoretical	**0**
Solid Content	Theoretical	**100%**
Gel Time	ASTM D1640	**~30 sec.**
Tack Free Time	ASTM D1640	**~60 sec.**
Light Traffic	ASTM D1640	**120 min.**
Tensile Strength	ASTM D638	**1,635psi**
Elongation	ASTM D638	**368%**
100% Modulus	ASTM D638	**1,009 psi**
200% Modulus	ASTM D638	**1,238 psi**
300% Modulus	ASTM D638	**1,482 psi**
Die C Tear Strength	ASTM D624	**371 pli**
Shore D Hardness	ASTM D2240	**45**
Adhesion to Steel	ASTM D4541	**> 500 psi**
Adhesion to Concrete	ASTM D7234	**> 200 psi**

The value ranges stated in this Technical Data Sheet are based on system processing under controlled laboratory conditions. Equipment configuration and/or field application conditions may produce variances in the final system values.

Coverage Rate

FSS 45DC is designed for a variety of substrates and applications. Application method, substrate roughness, profile, and porosity will effect coverage rates. Always consult the specification and contract documents prior to installation.

Recommended Dry Film Thickness (Typical exposure)	
Concrete:	80-100+ mils dft.
Steel (Carbon)	60-80 mils dft.
High Abrasion Service:	100-125 mils dft.

FSS 45DC

Spray Polyurea

Technical Data

Substrate and Surface Preparation

General

Prior to coating, the substrate must be prepared in a manner that provides a uniform, clean, sound, neutralized surface suitable for the specified coating. The substrate shall be free of all contaminants, such as oil, grease, rust, scale or deposits. The substrate shall be free of all dirt, dust, debris, and deleterious material. Coating performance is dependent on the degree of surface preparation.

Concrete & Masonry

Reference SSPC-SP 13/NACE No. 6 Surface Preparation of Concrete. Minimum surface profile equivalent to ICRI CSP3 to CSP5 in accordance with ICRI Technical Guideline No. 310.2R-2013. Maximum Moisture Content of 3 lb./24 hr./1,000 ft² per ASTM F1869 and/or less than 5% maximum moisture content per ASTM F2420.

Steel (Atmospheric/Non-Immersion Service)

Visible deposits of oil, grease, or other contaminants shall be removed according to SSPC-SP 1. Prepare in accordance with SSPC-SP6/NACE No. 3 Commercial Blast Cleaning. Provide a sharp angular anchor profile of 3.0 or greater.

Non-Ferrous Metals

Reference SSPC SP-16 Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals. Only use non-metallic blast media.

Recommended Primers	
Concrete & Masonry	VF-20 VF-15 Raven 175 Raven 171FS
Ferrous Metal (Optional)	PW-1 AquataPoxy 190
Wood & Fiberglass	VF-20 VF-15

Note: Substrate composition and moisture, application temperature, exposure temperature, and site conditions may effect primer selection.

VersaFlex is part of a family of companies. Specific primers may be available for different substrates or service conditions.

Contact VersaFlex Technical Service for more information and recommendations.

Mixing, Thinning and Pre-Warming

Mixing:

B Side component must be thoroughly agitated prior to use. Mix using a manufactures recommended 3-tier, collapsible blade power mixer through the center bung hole. Mixer diameter should be ⅓ diameter of the container. Mix for at least 30 minutes prior to processing. Color should be a consistent uniform color without striations.

Components & Mix Ratio:

Mix ratio is 1:1 by volume

Thinning:

DO NOT THIN.

Pre-warming:

A and B components should be warmed to a minimum of 70°F prior to processing.

FSS 45DC

Spray Polyurea

Technical Data

Application and Equipment Guidelines

General

VersaFlex FSS 45DC must be installed using plural component, direct impingement mix application equipment.

Recommend Equipment Operating Parameters	
A Side Primary Heat	160˚F
B Side Primary Heat	160˚F
Hose Heat	160˚F
Dynamic Pressure	2,000—2500 psi
Dynamic Pressure Differential	< 200 psi
Inlet Pressure	> 90 psi

- Material supply capacity should be 4x the material output of the selected spray gun configuration.
- Processing equipment should be capable of maintaining set temperatures and pressures at rest and during operation.
- Proper equipment selection and maintenance is critical to achieve material properties.
- Additional equipment manufacturers and set-ups are acceptable. Contact VersaFlex Technical Services for additional information and recommendations.

Recommended Proportioners	
Graco	Reactor E-XP2 Reactor H-XP2 Reactor H-XP-3

Recommended Spray Gun Configuration		
Graco	Fusion AP	AR/AF 2929
		AR/AF 3737
		AR/AF 4242
	Fusion MP	XR/XF 3535
		XR/XF 4747
	Probler P2	00 - 02

Apply in a uniform manner to desired thickness. Lift thickness is determined by spray gun configuration and speed of application. Lower output configurations are recommended for vertical and overhead applications to avoid runs, drips and sags. Excessive thickness does not negatively impact the material properties.

Application & Service Conditions

Environmental & Substrate Conditions

Substrate temperatures must be greater than -20°F. Lower substrate and ambient temperatures will reduce ultimate cure time.

Do not install over damp, wet, or saturated substrates. Concrete and masonry substrate moisture shall be less than 5% when measured with a Tramex CME meter. If the substrate is below freezing, tradition methods of determining moisture content are not effective. Additional steps should be taken to validate moisture readings.

The substrate must be 5°F above dew point and rising before application of coating materials.

Service Temperatures (Temperature Resistance):

Dry temperature resistance is -40°F to 250°F.

Limitations:

VersaFlex FSS 45DC is not recommended for direct contact with extremely high or low pH chemicals.

Refer to the VersaFlex Chemical Resistance Technical Bulletin or contact Technical Services for more information and recommendations.

FSS 45DC is an aromatic based polyurea. Discoloration from exposure to ultraviolet light may occur without affecting the performance characteristics.

FSS 45DC

Spray Polyurea

Technical Data Sheet

Curing Schedule, Re-Coat Windows, and Top Coats

Cure Time

Return to service is determined by ambient temperature, the service environment and exposures. Foot and light vehicle traffic can typically be allowed within 2 hrs. Full cure is achieved in 14 days at 72°F.

Top Coating

VersaFlex FSS 45DC can be built to thickness or touched up immediately during application. **FSS 45DC** may be top-coated with non-solvent based coatings after curing for 30 minutes.

Re-coat Time

VersaFlex FSS 45DC can be re-coated up to 24 hrs. after application at 72°F. Warmer temperatures will reduce the re-coat window. If the re-coat window is exceeded, additional preparation is required. Prior to coating **FSS 45DC** shall be clean, dry, and free of all dirt, dust, debris, contamination, or deleterious material. Use **VersaFlex Tack Coat** as a re-activating primer.

Cleanup and Safety

Cleanup

Cured product may be disposed of without restriction. Excess material should be mixed together and allowed to cure and disposed of in a normal manner. Product containers that are "drip free" may be disposed of according to local, state, and federal laws.

Caution: VersaFlex FSS 45DC contains isocyanate. All safety precautions must be followed including proper skin protection and breathing protection. Consult SDS for proper safety suggestions.

Safety

Read, understand, and follow all recommendations on the SDS. Review SDS at www.versaflex.com

Wash thoroughly after handling, and before eating, drinking, or smoking. Have proper First Aid and PPE on site prior to opening or processing the material. Use chemical safety glasses, or goggles with splash shields. Use impervious body coverings including long sleeve clothing and boots. Use neoprene or nitrile chemical resistant gloves. Use a combination particulate filter and organic vapor respirator.

Packaging, Handling, and Storage

Packaging

FSS 45DC is available in **10-gallon, 30-gallon, 60-gallon, and 110-gallon** kits. Containers are filled by weight.

Shelf-Life and Storage

One year from date of shipment, in original, unopened factory containers, stored in a sheltered area between 60°F - 95°F. Seal tightly after use to prevent introduction of moisture laden air. Store open 'A' side with a nitrogen cap after each use.

Warranty

Limited Warranty. Company warrants its goods to be free of manufacturing defects. Goods manufactured by Company will comply with all applicable federal, state and local laws and regulations. Company makes no warranty as to any parts or equipment manufactured by others. Customer shall look solely and only to the manufacturer of such parts or equipment with respect to any warranty claims. Company hereby assigns to Customer the original manufacturer's warranties to all such equipment and parts, to the full extent permitted. THE AFORESAID IS THE EXCLUSIVE WARRANTY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. SPECIFICALLY, THERE ARE NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

Limitation of Liability. COMPANY'S LIABILITY FOR DEFECTIVE OR NON-CONFORMING GOODS SHALL BE LIMITED TO, AND SHALL IN NO EVENT EXCEED, THE AMOUNT PAID BY CUSTOMER FOR SUCH DEFECTIVE OR NON-CONFORMING GOODS. UNDER NO CIRCUMSTANCES SHALL COMPANY BE LIABLE FOR ANY SPECIAL, PUNITIVE, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR FOR LOST PROFITS. In no event may any claim by Customer arising from or relating to any sale of any goods or services referenced herein be brought more than one year after the date of delivery of such Goods.

SAFETY DATA SHEET

Section 1. Identification

Product Name: FSS 45DC (A-Side)

VersaFlex Incorporated
686 S. Adams Street
Kansas City, KS 66105
913.321.9000

Spill, leak, fire, exposure, or accident, call
CHEMTREC day or night
Domestic North America **800.424.9300**
International **703.527.3887**
e-mail: ehs@versaflex.com

Section 2. Hazards Identification

GHS Ratings:

Inhalation Toxicity	Acute Tox. 4	Gases>2500+<=5000ppm, Vapors>10+<=20mg/l, Dusts&mists>1+<=5mg/l
Skin corrosive	2	Reversible adverse effects in dermal tissue, Draize score: >= 2.3 < 4.0 or persistent inflammation
Eye corrosive	2A	Eye irritant: Subcategory 2A, Reversible in 21 days
Respiratory sensitizer	1	Respiratory sensitizer
Skin sensitizer	1	Skin sensitizer
Carcinogen	2	Limited evidence of human or animal carcinogenicity
Organ toxin single exposure	3	Transient target organ effects- Narcotic effects- Respiratory tract irritation
Organ toxin repeated exposure	2	Presumed to be harmful to human health- Animal studies with significant toxic effects relevant to humans at generally moderate exposure (guidance)- Human evidence in exceptional cases

GHS Hazards

H315	Causes skin irritation
H317	May cause an allergic skin reaction
H319	Causes serious eye irritation
H332	Harmful if inhaled
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled
H335	May cause respiratory irritation
H351	Suspected of causing cancer
H373	May cause damage to organs through prolonged or repeated exposure

GHS Precautions

P201	Obtain special instructions before use
P202	Do not handle until all safety precautions have been read and understood
P260	Do not breathe dust/fume/gas/mist/vapours/spray
P261	Avoid breathing dust/fume/gas/mist/vapours/spray
P264	Wash exposed skin thoroughly after handling
P271	Use only outdoors or in a well-ventilated area
P272	Contaminated work clothing should not be allowed out of the workplace

P280	Wear protective gloves/protective clothing/eye protection/face protection
P281	Use personal protective equipment as required
P285	In case of inadequate ventilation wear respiratory protection
P312	Call a POISON CENTER or doctor/physician if you feel unwell
P314	Get Medical advice/attention if you feel unwell
P321	Specific treatment (as detailed on this label)
P362	Take off contaminated clothing and wash before reuse
P363	Wash contaminated clothing before reuse
P302+P352	IF ON SKIN: Wash with soap and water
P304+P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P304+P341	IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing
P305+P351+P338	IF IN EYES: Rinse continuously with water for several minutes. Remove contact lenses if present and easy to do - continue rinsing
P308+P313	IF exposed or concerned: Get medical advice/attention
P332+P313	If skin irritation occurs: Get medical advice/attention
P333+P313	If skin irritation or a rash occurs: Get medical advice/attention
P337+P313	Get medical advice/attention
P342+P311	Call a POISON CENTER or doctor/physician
P405	Store locked up
P403+P233	Store in a well ventilated place. Keep container tightly closed
P501	Dispose of contents/container in accordance with applicable regional, national and local laws and regulations.

Danger

Section 3. Composites/Information on Ingredients

Chemical Name / CAS No.	OSHA Exposure Limits	ACGIH Exposure Limits	Other Exposure Limits
Poly[oxy(methyl-1,2-ethanediyl)], .alpha.-hydro-.omega.-hydroxy-, polymer with 1,1'-methylenebis[4-isocyanatobenzene] 9048-57-1 60 to 70%	OELs not established	OELs not established	
Benzene, 1-isocyanato-2-[(4-isocyanatophenyl)methyl]- 5873-54-1 10 to 20%	OELs not established	OELs not established	
4,4'-Methylenediphenyl diisocyanate 101-68-8 10 to 20%	PELs - 0.02 ppm Ceiling PELs - 0.2 mg/m3 Ceiling	TLV - 0.005 ppm TWA (listed under Methylene bisphenyl isocyanate (MDI))	
Propylene carbonate 108-32-7 1 to 5%	OELs not established	OELs not established	
Benzene, 1,1'-methylenebis [2-isocyanato- 2536-05-2 0.1 to 1.0%	OELs not established	OELs not established	

Section 4. First-aid Measures

Move exposed person to fresh air. Get medical attention immediately. Treatment is symptomatic for primary irritation or bronchospasm. If breathing is labored, oxygen should be administered by qualified personnel.

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.

After contact with skin, wash immediately with plenty of warm, soapy water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. A poly-glycol based skin cleanser or corn oil may be more effective than soap and water. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Provided the patient is conscious, wash out mouth with water. Get medical attention if symptoms appear.

Section 5. Fire-fighting Measures

Extinguishing Media: Foam, CO2 or dry powder. (**Note:** Water may be used if no other available media is available **AND** used in copious quantities. Reaction between water and hot material may be vigorous. Prevent washings from entering water courses, keep fire exposed containers cool by spraying with water.)

Caution:

Due to reaction with water producing CO2 gas, a hazardous build-up of pressure could result if contaminated containers are re-sealed. Containers may burst if overheated.

Hazardous decomposition products:
Combustion products may include: carbon monoxide, carbon dioxide, nitrogen oxides, hydrocarbons and HCN.
Special protective actions for fire-fighters:
Promptly isolate the scene by removing all persons from the vicinity of the incident, if there is a fire. No action shall be taken involving any personal risk or without suitable training.
Special protective equipment for fire-fighters:
Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. PVC boots, gloves, safety helmet and protective clothing should be worn.

Section 6. Accidental Release Measures

No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).

Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and Storage

Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Do not get in eyes or on skin or clothing.

Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and may be hazardous.

Material is to be stored in accordance with local regulations. Store in original container protected from direct sunlight in a dry and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not reseal contaminated containers. Uncontaminated containers, free of moisture, may be resealed only after placing under a nitrogen blanket. Do not store in unlabeled containers.

Use appropriate containment to avoid environmental contamination.

Unsuitable containers: Do not store in containers made of copper, copper alloys or galvanized surfaces.

Section 8. Exposure Controls/Personal Protection

Chemical Name / CAS No.	OSHA Exposure Limits	ACGIH Exposure Limits	Other Exposure Limits
Poly[oxy(methyl-1,2-ethanediyl)], .alpha.-hydro-.omega.-hydroxy-, polymer with 1,1'-methylenebis[4-isocyanatobenzene] 9048-57-1	OELs not established	OELs not established	
Benzene, 1-isocyanato-2-[(4-isocyanatophenyl)methyl]- 5873-54-1	OELs not established	OELs not established	
4,4'-Methylenediphenyl diisocyanate 101-68-8	PELs - 0.02 ppm Ceiling PELs - 0.2 mg/m3 Ceiling	TLV - 0.005 ppm TWA (listed under Methylene bisphenyl isocyanate (MDI))	
Propylene carbonate 108-32-7	OELs not established	OELs not established	
Benzene, 1,1'-methylenebis [2-isocyanato- 2536-05-2	OELs not established	OELs not established	

Engineering Controls: Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. Smell is not an adequate indicator of hazard.

Medical supervision of all employees who handle or come in contact with respiratory sensitizers is recommended. Personnel with a history of asthma-type conditions, bronchitis or skin sensitization conditions should not work with this material.

Ventilation: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Protective Gear: In case of inadequate ventilation, wear respiratory protection. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Section 9. Physical and Chemical Properties

Appearance: Pale yellow to amber	**Odor:** Faint odor
Vapor Pressure: No Data	**Odor threshold:** No Data
pH: No Data	**Melting point:** No Data
Freezing point: No Data	**Flash point:** 226 F,108 C
Evaporation rate: No Data	**Flammability:** No Data
Explosive Limits: No Data	**Vapor pressure:** No Data
Vapor Density: No Data	**Specific Gravity** 1.13
Solubility: No Data	**Partition coefficient (n-octanol/water):** No Data
Boiling range: No Data	**Autoignition temperature:** No Data
Decomposition temperature: No Data	**Viscosity:** N/A
% Weight Volatile (VOC) 0.00	

Section 10. Stability and Reactivity

Chemical Stability: Stable at room temperature. No specific test data related to reactivity is available for this product or its ingredients.
Hazardous reactions: Reaction with water (moisture) produces CO2 gas. An exothermic reaction with materials containing active hydrogen groups can occur. The reaction becomes progressively more vigorous and can be violent at higher temperatures if the miscibility of the reaction partners is good or is supported by stirring or by the presence of solvents. This material is insoluble with, and heavier than, water and sinks to the bottom, but reacts slowly at the interface. A solid water-insoluble layer of polyurea is formed at the interface by liberating carbon dioxide.
The material will react with water, alcohols, amines, bases and acids.

Section 11. Toxicological Information

Inhalation Toxicity LC50: 1mg/L

Component Toxicity

108-32-7 Propylene carbonate
Dermal LD50: 20 mL/kg (Rabbit)

Routes of Entry

Inhalation **Skin Contact** **Eye Contact** **Ingestion**

Target Organs

Eyes **Lungs** **Skin** **Respiratory System**

Effects of Overexposure

NO DATA

Carcinogenicity

CAS Number	Description	% Weight	Carcinogen Rating
101-68-8	4,4'-Methylenediphenyl diisocyanate	10 to 20%	4,4'-Methylenediphenyl diisocyanate:
2536-05-2	Benzene, 1,1'-methylenebis[2-isocyanato-	0.1 to 1.0%	Benzene, 1,1'-methylenebis[2-isocyanato-:

Section 12. Ecological Information

Only component information is listed, if any. No testing has been performed on this mixture as it relates to ecological impact.

Component Ecotoxicity

Propylene carbonate	72 Hr EC50 Desmodesmus subspicatus: >500 mg/L; 96 Hr LC50 Cyprinus carpio: >1000 mg/L [semi-static]; 48 Hr EC50 Daphnia magna: >500 mg/L

Section 13. Disposal Considerations

The generation of waste should be avoided or minimized by using excess product in an alternate, beneficial application wherever possible.

Empty containers may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material, runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Section 14. Transport Information

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

Agency	Proper Shipping Name	UN Number	Packing Group	Hazard Class
DOT	Not Regulated			
IATA	Not Regulated			
IMDG	Not Regulated			

Section 15. Regulatory Information

State of California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): WARNING!

This product contains the following chemicals which are listed by the State of California as carcinogenic or a reproductive toxin:

- None

WHMIS Symbol(s)

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30, unless listed below:

- None

This product contains the following substance(s), which are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and which are listed in 40 CFR 372:

101-68-8	4,4'-Methylenediphenyl diisocyanate	10 - 20%

Section 16. Other Information

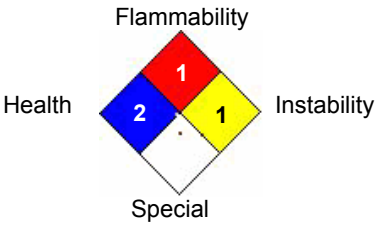
The customer is responsible for determining the proper PPE code for this material within their respective process.

Hazardous Material Information System (HMIS)

HEALTH	*	2
FLAMMABILITY		1
PHYSICAL HAZARD		1
PERSONAL PROTECTION		X

HMIS & NFPA Hazard Rating Legend
*** = Chronic Health Hazard**
0 = INSIGNIFICANT
1 = SLIGHT
2 = MODERATE
3 = HIGH

National Fire Protection Association (NFPA)



Date Prepared: 5/29/2015
Date revised: 2015-05-26

Reviewer Revision 2

Notice to reader:

While the information and recommendations in this publication are to the best of our knowledge, information and belief accurate at the date of publication, NOTHING HEREIN IS TO BE CONSTRUED AS A WARRANTY, EXPRESS OR OTHERWISE.

IN ALL CASES, IT IS THE RESPONSIBILITY OF THE USER TO DETERMINE THE APPLICABILITY OF SUCH INFORMATION AND RECOMMENDATIONS AND THE SUITABILITY OF ANY PRODUCT FOR ITS OWN PARTICULAR PUPOSE.

THE PRODUCT MAY PRESENT HAZARDS AND SHOULD BE USED WITH CAUTION. WHILE CERTAIN HAZARDS ARE DESCRIBED IN THIS PUBLICATION, NO GUARANTEE IS MADE THAT THESE ARE THE ONLY HAZARDS THAT EXIST.

Hazards, toxicity and behavior of the products may differ when used with other materials and are dependent upon the manufacturing circumstances or other processes. Such hazards, toxicity and behavior should be determined by the user and made known to handlers, processors and end users.

SAFETY DATA SHEET

Section 1. Identification

Product Name: FSS 45DC (B-Side)

VersaFlex Incorporated
686 S. Adams Street
Kansas City, KS 66105
913.321.9000

Spill, leak, fire, exposure, or accident, call
CHEMTREC day or night
Domestic North America **800.424.9300**
International **703.527.3887**
e-mail: ehs@versaflex.com

Section 2. Hazards Identification

GHS Ratings:

Oral Toxicity	Acute Tox. 4	Oral>300+<=2000mg/kg
Eye corrosive	2A	Eye irritant: Subcategory 2A, Reversible in 21 days

GHS Hazards

H302	Harmful if swallowed
H319	Causes serious eye irritation

GHS Precautions

P264	Wash exposed skin thoroughly after handling
P270	Do not eat, drink or smoke when using this product
P280	Wear protective gloves/protective clothing/eye protection/face protection
P330	Rinse mouth
P301+P312	IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
P305+P351+P338	IF IN EYES: Rinse continuously with water for several minutes. Remove contact lenses if present and easy to do - continue rinsing
P337+P313	Get medical advice/attention
P501	Dispose of contents/container in accordance with applicable regional, national and local laws and regulations.

Warning

Section 3. Composites/Information on Ingredients

Chemical Name / CAS No.	OSHA Exposure Limits	ACGIH Exposure Limits	Other Exposure Limits
Propylene glycol diamine, 2-amino-, diether with Propylene 9046-10-0 40 to 50%	OELs not established	OELs not established	
Benzenamine, 4,4'-methylenebis[N-(1-methylpropyl)- 5285-60-9 20 to 30%	OELs not established	OELs not established	
Diethyltoluenediamine 68479-98-1 10 to 20%	OELs not established	OELs not established	
Poly[oxy(methyl-1,2-ethanediyl)] , .alpha.,.alpha.',.alpha."-1,2,3-propanetriyltris[.omega.-(2-aminomethylethoxy)- 64852-22-8 10 to 20%	OELs not established	OELs not established	
Trade Secret 1 to 5%	OELs not established	OELs not established	

Section 4. First-aid Measures

Move exposed person to fresh air. If breathing is labored, oxygen should be administered by qualified personnel.
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.
After contact with skin, wash immediately with plenty of warm, soapy water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Wash clothing before reuse. Clean shoes thoroughly before reuse.
Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Provided the patient is conscious, wash out mouth with water. Get medical attention if symptoms appear.

Section 5. Fire-fighting Measures

Extinguishing Media: Water, Foam, CO2 or dry powder.

Caution:
Heating or fire can release toxic gas.
Hazardous decomposition products:
Combustion products may include: carbon monoxide, carbon dioxide, nitrogen oxides, and hydrocarbons.
Special protective actions for fire-fighters:
Promptly isolate the scene by removing all persons from the vicinity of the incident, if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters:
Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. PVC boots, gloves, safety helmet and protective clothing should be worn.

Section 6. Accidental Release Measures

No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).

Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and Storage

Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Do not get into eyes.

Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and may be hazardous.

Material is to be stored in accordance with local regulations. Store in original container protected from direct sunlight in a dry and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers.

Use appropriate containment to avoid environmental contamination.

Unsuitable containers: Do not store in containers made of copper, copper alloys or galvanized surfaces.

Section 8. Exposure Controls/Personal Protection

Chemical Name / CAS No.	OSHA Exposure Limits	ACGIH Exposure Limits	Other Exposure Limits
Propylene glycol diamine, 2-amino-, diether with Propylene 9046-10-0	OELs not established	OELs not established	

Benzenamine, 4,4'-methylenebis[N-(1-methylpropyl)- 5285-60-9	OELs not established	OELs not established	
Diethyltoluenediamine 68479-98-1	OELs not established	OELs not established	
Poly[oxy(methyl-1,2-ethanediyl)] , .alpha.,.alpha.',.alpha."-1,2,3-propanetriyltris [.omega.-(2-aminomethylethoxy)- 64852-22-8	OELs not established	OELs not established	
Trade Secret N/A	OELs not established	OELs not established	

Engineering Controls: Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. Smell is not an adequate indicator of hazard.

Ventilation: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Protective Gear: In case of inadequate ventilation, wear respiratory protection. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Section 9. Physical and Chemical Properties

Appearance: As color specified	**Odor:** Faint odor
Vapor Pressure: No Data	**Odor threshold:** No Data
pH: No Data	**Melting point:** No Data
Freezing point: No Data	**Flash point:** 320 F, 160 C
Evaporation rate: No Data	**Flammability:** No Data
Explosive Limits: No Data	**Vapor pressure:** No Data
Vapor Density: No Data	**Specific Gravity** 1.001
Solubility: No Data	**Partition coefficient (n-octanol/water):** No Data
Boiling range: No Data	**Autoignition temperature:** No Data
Decomposition temperature: No Data	**Viscosity:** N/A
% Weight Volatile (VOC) 0.00	

Section 10. Stability and Reactivity

Chemical Stability: Stable at room temperature. No specific test data related to reactivity is available for this product or its ingredients.
Hazardous reactions: None known. Stable under normal conditions.

Section 11. Toxicological Information

Oral Toxicity LD50: 1,175mg/kg
Dermal Toxicity LD50: 3,482mg/kg

Component Toxicity

9046-10-0	Propylene glycol diamine, 2-amino-, diether with Propylene Oral LD50: 480 mg/kg (Rat) Dermal LD50: 2,090 mg/kg (Rabbit)
68479-98-1	Diethyltoluenediamine Oral LD50: 485 mg/kg (Rat) Dermal LD50: 700 mg/kg (Rabbit)

Routes of Entry

Skin Contact **Eye Contact** **Ingestion**

Target Organs

Eyes **Skin**

Effects of Overexposure

Carcinogenicity

CAS Number	Description	% Weight	Carcinogen Rating
None			No Data

Section 12. Ecological Information

Only component information is listed, if any. No testing has been performed on this mixture as it relates to ecological impact.

Component Ecotoxicity

Section 13. Disposal Considerations

The generation of waste should be avoided or minimized by using excess product in an alternate, beneficial application wherever possible.

Empty containers may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material, runoff and contact with soil, waterways, drains and sewers .

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Section 14. Transport Information

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

Agency	Proper Shipping Name	UN Number	Packing Group	Hazard Class
DOT	Not Regulated			
IATA	Not Regulated			
IMDG	Not Regulated			

Section 15. Regulatory Information

THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

WHMIS Symbol(s)

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30, unless listed below:

- None

This product contains the following substance(s), which are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and which are listed in 40 CFR 372:

- None

Section 16. Other Information

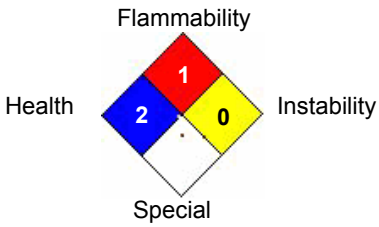
The customer is responsible for determining the proper PPE code for this material within their respective process.

Hazardous Material Information System (HMIS)

HEALTH	2
FLAMMABILITY	1
PHYSICAL HAZARD	0
PERSONAL PROTECTION	X

HMIS & NFPA Hazard Rating Legend
*** = Chronic Health Hazard**
0 = INSIGNIFICANT
1 = SLIGHT
2 = MODERATE
3 = HIGH

National Fire Protection Association (NFPA)



Date Prepared: 5/30/2015
Date revised: 2015-05-30

Reviewer Revision 4

Notice to reader:

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THE PRODUCT MAY PRESENT HAZARDS AND SHOULD BE USED WITH CAUTION. WHILE CERTAIN HAZARDS ARE DESCRIBED IN THIS PUBLICATION, NO GUARANTEE IS MADE THAT THESE ARE THE ONLY HAZARDS THAT EXIST.

Hazards, toxicity and behavior of the products may differ when used with other materials and are dependent upon the manufacturing circumstances or other processes. Such hazards, toxicity and behavior should be determined by the user and made known to handlers, processors and end users.

FORM EQP 5111 ATTACHMENT TEMPLATE C1
USE AND MANAGEMENT OF CONTAINERS

This document is an attachment to the Michigan Department of Environment, Great Lakes, and Energy'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.

R 299.9614 of 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 29.4101 to R 29.4505 promulgated pursuant to the provisions of the Michigan Fire Protection Act, PA 207, as amended (Act 207); and Title 40 of the Code of Federal Regulations (CFR) §§270.14(d), 270.15, and Part 264, Subpart I, establish requirements for the use and management of containers. All references to 40 CFR citations specified herein are adopted by reference in R 299.11003.

This license application template addresses requirements for the use and management of containers at the Michigan State University (MSU) Waste Storage Facility (WSF) in Lansing, Michigan. This template addresses the condition of containers, compatibility of waste with containers, management of containers, inspections, containment, special requirements for ignitable or reactive waste, special requirements for incompatible wastes, and closure.

(Check as appropriate)

Applicant for Operating License for Existing Facility:

☒ R 299.9614 use and management of containers

Applicant for Operating License for New, Altered, Enlarged, or Expanded Facility:

☐ R 299.9614 use and management of containers

This template is organized as follows:

C1.F.2(a) Containment System Drainage
C1.F.2(b) Container Management
C1.G SPECIAL REQUIREMENTS OF IGNITABLE OR REACTIVE WASTE
C1.H SPECIAL REQUIREMENTS FOR INCOMPATIBLE WASTES
C1.I CLOSURE

📖 "Guidance for Permit Writers: Facilities Storing Hazardous Waste in Containers." EPA Publication PB88-105689.

INTRODUCTION

The container standards are performance standards for containers and container storage areas. Completion of this template should result in a demonstration of how your facility will meet these standards.

Please note that Template C11, Subpart CC, Air Emissions from Tanks, Containers, and Surface Impoundments, addresses air emissions for containers. Also note that while specific closure requirements for container storage areas are addressed in this template, you may reference information in Template A11, Closure and Postclosure Care Plans.

C1.A DESCRIPTION OF CONTAINERS
[R 299.9614 and 40 CFR §264.171]

See attached Tables C1-1 Container Types, and C1-2 Container Specifications for a listing of the number, types, specifications, and description of waste for containers used at the WSF.

C1.B CONDITION OF CONTAINERS
[R 299.9614 and 40 CFR §264.171]

Container integrity begins at the point of generation and follows to the MSU WSF. When MSU WSF personnel pick up waste from MSU locations, each container is inspected for integrity and signs of leaking or degradation prior to characterization and packaging for transport. Any container that is visibly leaking or damaged will be transferred into a new container prior to transport.

Once waste containers are transported to the MSU WSF for storage, they become part of the regular inspection schedule as identified in Template A5 of this license. Wastes are not unloaded/loaded or processed daily at the MSU WSF, and as such, only on days that waste is processed, all containers at the MSU WSF are inspected for signs of leaking or failure. If any problems are observed, the contents of the container are immediately transferred to a different, compatible container which inspection has identified as being in proper condition for storage. At the same time, all caps are checked to ensure that no harmful vapor release can occur, and that a harmful buildup of pressure has not occurred.

If any leaks have occurred, the spill is immediately absorbed with absorbent materials and containerized as a waste itself. Following cleanup, the floor and/or shelving are inspected for signs of deterioration.

C1.C COMPATIBILITY OF WASTE WITH CONTAINERS
[R 299.9614 and 40 CFR §264.172]

Compatibility of containers with waste is ensured by the careful matching of identified waste materials with the appropriate containers. A listing of the containers which are compatible with each of the waste streams has been provided in **Table C1-1**. Though not listed on the table, glass is considered compatible with all classes of waste except hydrofluoric acid and piranha solution.

C1.D MANAGEMENT OF CONTAINERS

[R 299.9614 and 40 CFR §264.173]

Materials transferred to the MSU WSF are transported and sorted by persons trained in the proper handling of hazardous waste (Section A10 – Personnel Training Program). Each container brought into the MSU WSF is immediately segregated by hazard class and either placed into the Labpack Room (120), the main Consolidation Room (100) of the East Storage Building (ESB), or into the West Storage Building (WSB). Containers staged in the Labpack room are stored in DOT-rated shipping boxes and packed according to compatibility. These smaller (<5-gallon) containers are inspected during unboxing for any signs of leakage or degradation. If containers are leaking, they are immediately placed into a secondary containment overpack container and/or transferred into another container.

Containers in the labpack room are either consolidated into larger container if compatible with profiled waste streams or are placed onto shelves according to DOT hazard class to be shipped off-site via a licensed hazardous waste vendor. All containers in the Labpack and Consolidation rooms are kept closed unless waste is actively being poured, or to relieve pressure when necessary.

In order to control the volume of stored materials, a maximum inventory of containers has been established, as indicated in Table C1-2. Figure C1-1 and C2 provide a detailed exhibit of the storage areas, staging areas, and container arrangements.

Before transport to a licensed disposal facility, consolidated materials are assigned a proper DOT shipping name and UN/NA number (if applicable). The required marking and labeling are placed on each container stating the major chemical contents and identifying MSU as the generator of the waste along with the EPA identification number.

C1.E INSPECTIONS

[R 299.9614 and 40 CFR §264.174]

A regular schedule of container inspection has been established for the Waste Storage Facility. Included in this program are daily, weekly and monthly programs of inspection. The weekly program includes an inspection of the floors, safety equipment, security devices, and the operational structural equipment. Details of this program are provided in Section A5 Inspection Schedules.

C1.F CONTAINMENT

[R 299.9614 and 40 CFR §§264.175 and 270.15]

C1.F.1 Secondary Containment System Design and Operation for Containers with Free Liquids

[R 299.9614 and 40 CFR §§264.175(a) and 270.15(a)]

The detailed plans and description of the containment area of the MSU WSF is provided in Section B6-Engineering Plans. These plans indicate that all waste materials are enclosed in the WSF and are protected from intrusion, precipitation, run-on and run-off. All containers are stored in rooms having concrete floors and coatings which are certified as sufficiently impervious to contain leaks and spills. Each floor is free of cracks and gaps which might allow the escape of released materials.

Container storage areas have a containment system consisting of 4-inch-thick concrete floor pads which are reinforced with 6-inch by 6-inch 10/10 wire mesh. The concrete floors are constructed to facilitate the remediation of any accidental releases. No floor drains are present to allow the escape of materials to septic fields or sewer systems.

Each room of the ESB is separated by a 6-inch containment lip which allows for segregation of incompatible waste and sufficient containment volume. The containment volumes for each storage area are provided in Section B6-Engineering Plans. This system prevents materials in one room from mixing with materials in another room in the event of an emergency. At no time is free standing or uncontained waste allowed to remain in any part of the facility.

The hazardous waste handling and management procedure utilized at the WSF is designed to prevent the mixing of incompatible wastes into containers stored at the facility. Details of the program which prevents the mixing of incompatible wastes are provided in the Sections A2 Chemical and Physical Analyses and A3 Waste Analysis Plan.

The storage facility design permits the separation of incompatible waste into distinct areas of the facility. Upon transport to the ESB, the reactive and ignitable wastes are stored in separate rooms each with sufficient containment capacities. The two rooms are divided by a single wall containing a fire door. The reactive wastes or small bottles are stored in the Lab Pack Room (120) and the ignitable and corrosive wastes in the Consolidation Room (100) separated by a 2-inch dike. The containers housing ignitable wastes are not opened at the facility unless the container is leaking or during consolidation with compatible wastes. Reactive waste is stored in separate areas of the Lab Pack Room, with each waste stream stored in a distinct, separate area.

The concrete floor of the storage rooms in the ESB are coated as described in **Appendix B6-4**. This appendix contains the manufacturer's specifications for the coating material, the chemical compatibilities, and the application instructions. This coating will prevent the possibility of the concrete floor reacting with materials which may be accidentally released at the facility.

After consolidation, some hazardous waste may be transported to the West Storage Building for storage. In addition, the West building will also store Liquid Industrial By-Product, used oil and universal waste.

C1.F.1(a) Requirement for Base or Liner
[R 299.9614 and 40 CFR §§264.175(b)(1) and 270.15(a)(1)]

All containers are stored in rooms with concrete floors which are certified as sufficiently impervious to contain leaks and spills. Each floor is free of cracks and gaps which might allow the escape of released materials. The concrete floor of the storage rooms is coated as described in **Appendix B6-4**. This appendix contains the manufacturer's specifications for the

coating material, the chemical compatibilities, and the application instructions. This coating will prevent the possibility of the concrete floor reacting with materials which may be accidentally released at the facility.

C1.F.1(b) Containment System Drainage
[R 299.9614 and 40 CFR §§264.175(b)(2) and 270.15(a)(2)]

The container storage area has a containment system consisting of 4-inch-thick concrete floor pads which are reinforced with 6-inch by 6-inch 10/10 wire mesh. The concrete floors are constructed to facilitate the remediation of any accidental releases. No floor drains are present to allow the escape of materials to septic fields.

C1.F.1(c) Containment System Capacity
[R 299.9614 and 40 CFR §§264.175(b)(3) and 270.15(a)(3)]

The containment system has sufficient capacity to contain 10 percent of the volume of the containers or the volume of the largest container, whichever is greater. This information is described in detail in Section B6 Engineering Plans.

C1.F.1(d) Control of Run-on
[R 299.9614 and 40 CFR §§264.175(b)(4) and 270.15(a)(4)]

Run-on to the containment is prevented by the building elevation, the fact that the area is entirely enclosed, and because a conventional drainage system completely surrounds the building. Precipitation falling in the vicinity naturally drained into the nearby drainage creek, and the site is well away from the 100-year flood plain.

C1.F.1(e) Removal of Liquids from Containment System
[R 299.9614 and 40 CFR §§264.175(b)(5) and 270.15(a)(5)]

If any leaks have occurred, the spill is immediately absorbed with absorbent materials and containerized as a waste itself. Following cleanup, the floor and/or shelving is inspected for signs of deterioration.

C1.F.2 Secondary Containment System Design and Operation for Containers with No Free Liquids
[R 299.9614 and 40 CFR §§264.175 and 270.15(b)(1)]

C1.F.2(a) Containment System Drainage
[R 299.9614 and 40 CFR §§264.175 and 270.15(b)(2)]

As stated previously in this section, all waste materials are enclosed in the WSF and are protected from intrusion, precipitation, run-on and run-off. All containers are stored in rooms having concrete floors which are certified as sufficiently impervious to contain leaks and spills. Each floor is free of cracks and gaps which might allow the escape of released materials.

C1.F.2(b) Container Management
[R 299.9614 and 40 CFR §§264.175 and 270.15(b)(2)]

Any of the small volumes of waste containing no free liquids are either elevated on shelves in

the Lab Pack Room (120) or placed in plastic tubs with other like materials.

C1.G SPECIAL REQUIREMENTS FOR IGNITABLE OR REACTIVE WASTE

[R 299.9614 and 40 CFR §§264.176 and 270.15(b)(2)]

Upon transport to the WSF, the reactive and ignitable wastes are stored in the ESB in separate areas, each with sufficient containment capacities. The two rooms are divided by a single wall containing a fire door. The reactive wastes or small bottles are stored in the Lab Pack Room (120) and the ignitable and corrosive wastes in the Consolidation Room (100) separated by a 2-inch dike. The containers housing ignitable wastes are not opened at the facility unless the container is leaking or during consolidation with compatible wastes. Reactive waste is stored in separate areas of the Lab Pack Room, with each waste stream stored in a distinct, separate area. As stated in Section A9, Location Standards, the facility is 34 meters from the property line and at least 60 meters from other properties or rights-of-way.

C1.H SPECIAL REQUIREMENTS FOR INCOMPATIBLE WASTES

[R 299.9614 and 40 CFR §§264.177(c) and 270.15(b)(2)]

The hazardous waste handling and management procedure utilized at the Waste Storage Facility is designed to prevent the mixing of incompatible wastes into containers stored at the facility. Details of the program which prevents the mixing of incompatible wastes are provided in the sections A2 Chemical and Physical Analyses and A3 Waste Analysis Plan.

C1.I CLOSURE

[R 299.9614 and 40 CFR §264.178]

At closure of the facility all the hazardous waste and residues will be removed from the facility. All the hazardous waste materials will be transported to a licensed disposal facility. All used containers will also be transported to a licensed disposal facility and treated as hazardous waste. All new, unused containers will be removed from the facility. The entire facility will be closed according to the specifications identified in Section A11-Closure and Post Closure Plan.

Because neither tanks, surface impoundments, waste piles, land treatment facilities, landfills, nor incinerators are present or utilized at the site, the regulations pertaining to these units do not apply.

Figure C1-1 - East Storage Building

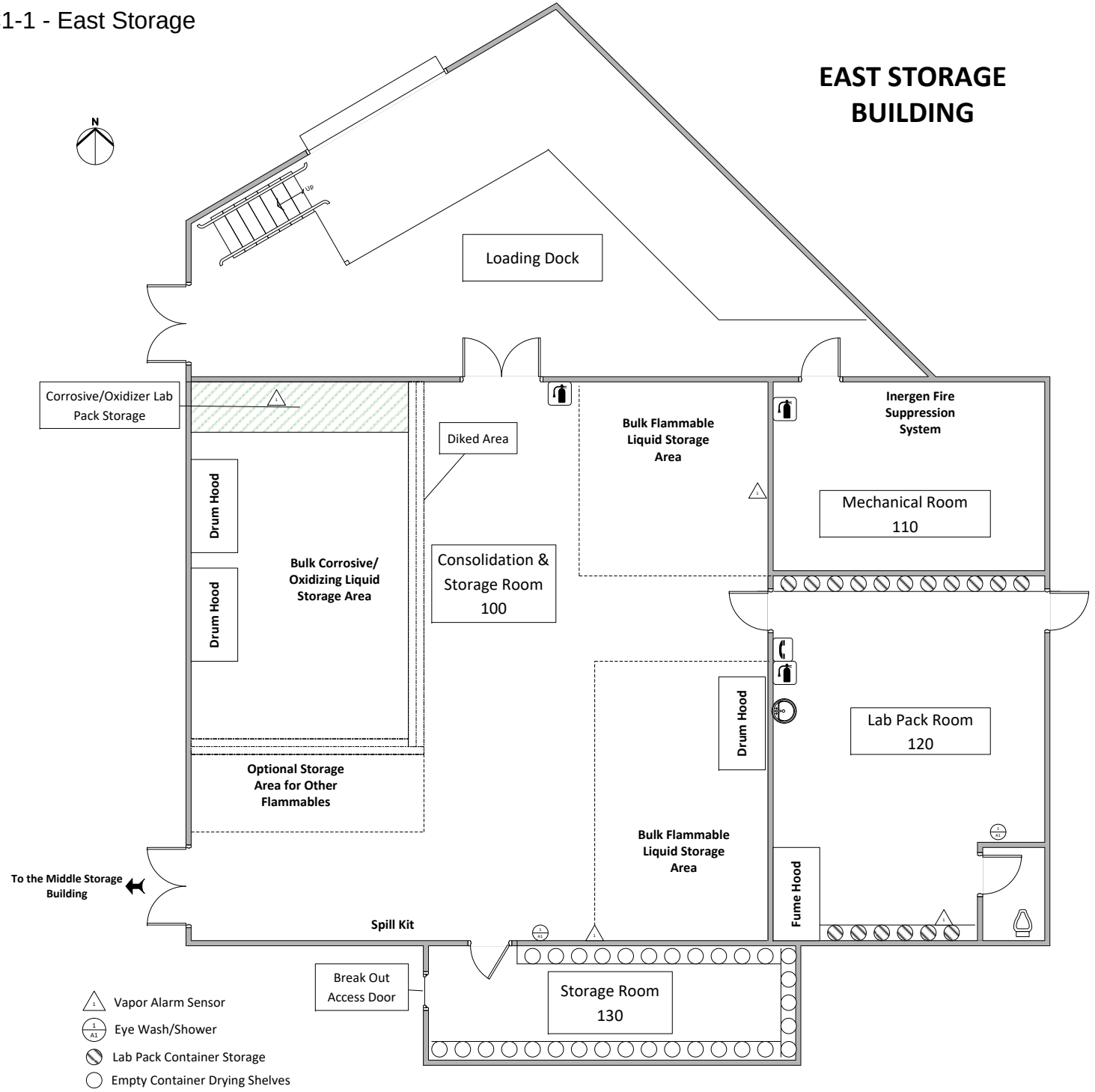

Figure C1-2 - West Storage Building

WEST STORAGE BUILDING

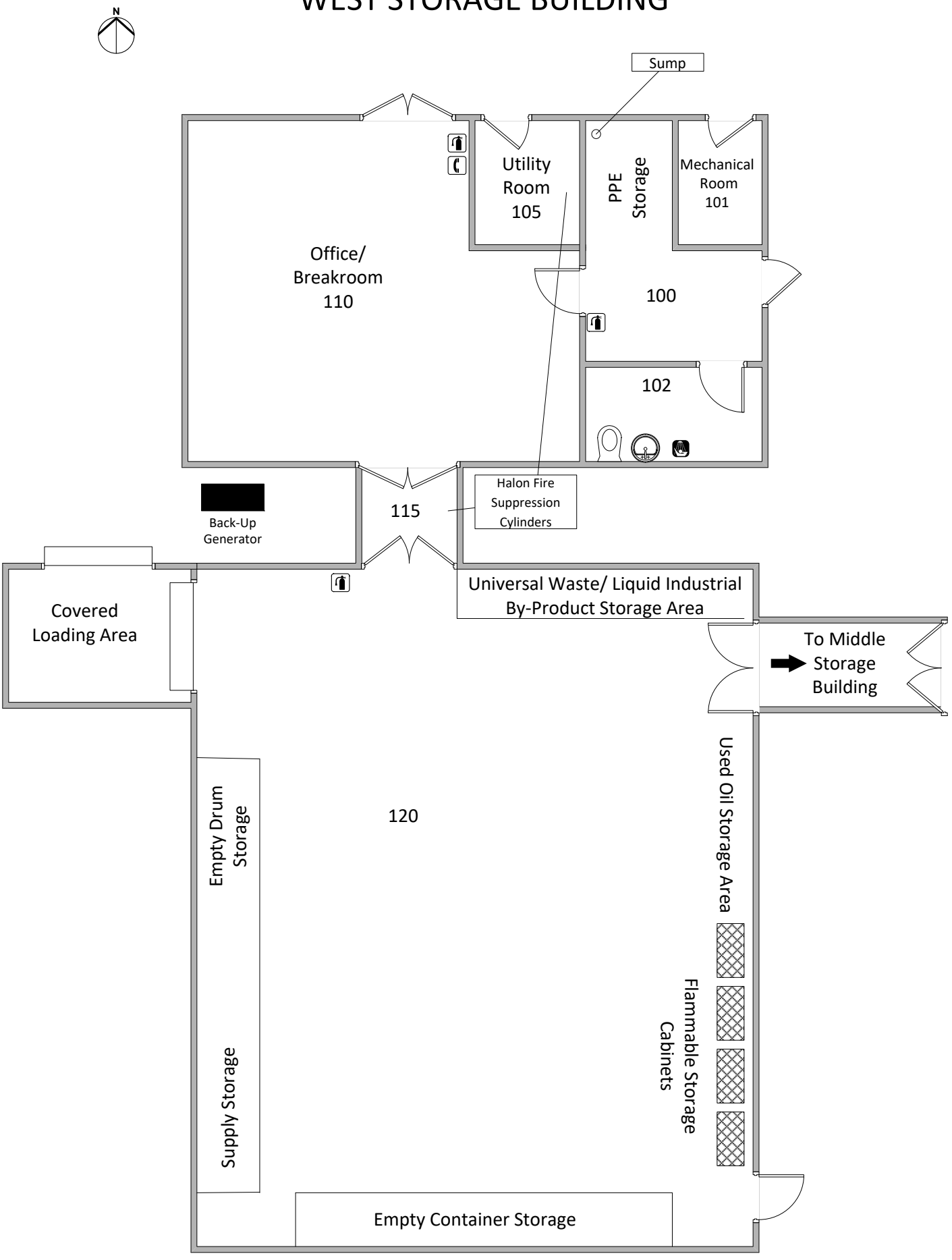

Table C1-1 – Container Types

This table identifies which containers are utilized per waste stream for storing hazardous materials at the MSU WSF. All containers are marked with MSU Hazardous Waste labels and MSU Waste Materials Pick Up tags identifying contents of the containers, as well as appropriate Department of Transportation (DOT) hazard class shipping requirements. See Attachment C-1 for copies of MSU Hazardous Waste labels and MSU Waste Materials Pick up tags.

Waste Stream	Container Type	Hazardous Waste	DOT Hazard Class	Minimum Container Type
Flammable Liquid, Toxic	Poly	X	3, 6.1	1H1/Y1.8/100 1A1/Y1.2/100 1A2/Y1.2/100 13H4/X DOT-SP 9168
Flammable Liquid, Corrosive	Poly	X	3, 8	
Dilute Mixed Acid	Poly	X	8	
Dilute Chromic Acid	Poly	X	8, 5.1	
Dilute Nitric Acid	Poly	X	8, 5.1	
Paint Related Material	Steel, Poly	X	3	
Paint (Cans)	Steel, poly	X	3	
Flammable Solids	Steel, Poly	X	4.1	
Tissues in Ethanol	Steel, Poly	X	3	
Mercury Contaminated Debris	Steel	X	6.1, 8	
Toxic Debris/Solids	Steel, Poly	X	6.1, 9	
Labpacks	Steel, Poly, Fiber	X	2.1, 2.2, 3, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 8, 9	
Aerosols	Fiber	Universal Waste	2.1	
Pharmaceutical Waste	Fiber, Hybrid	Universal Waste	6.1	
Pesticides	Steel, Poly	Universal Waste	6.1	
Liquid Industrial By-Product	Poly	No	N/A	
Latex Paint	Fiber, Hybrid	No	N/A	
Tissues in Formalin	Steel, Poly	No	N/A	
Oils	Steel, Poly	No	N/A	

Table:
Fiber = fiberboard open head drum
Steel = steel open or tight head drum
Poly = polyethylene open or tight head drum
Hybrid = CleanPak, polypropylene/fiber flat top

Table C1-2
Container Specifications

All containers comply with DOT regulations as stated in 49 CFR

Container Type	Usable Volume	Liner Specifications	Status	Container/Max No. Containers
Glass, Plastic	≤1 gal	None	Original	500
HD Polyethylene	5 gal	None	New	225
Metal	5 gal	None	Original/New	29
HD Polyethylene	30 gal	None	New	21
Metal/HD polyethylene	55 gal	None	New	70
Fiberboard	55 gal	6 mil polyethylene	New	15
Metal	55 gal	15 mil polyethylene	New	15

The actual number of individual containers may exceed those listed above. The total volume of all containers may not exceed 7900 gallons (the amount equal to the total volume of all containers, assuming they were full).

ATTACHMENT C1-1

MSU HAZARDOUS WASTE LABELS

MSU WASTE MATERIALS PICK UP TAG

Project Leader_____ Dept._____

Bldg & Room No._____ Phone _____

Filled Out By_____ Accumulation Start Date_____

Container Size _____ ☐ Solid ☐ Liquid ☐ Contaminated Items

CONTENTS:

UNABBREVIATED Chemical Names(s)	Amount Volume, Percentage, or Concentration (ppm)
☐ Water	Balance

COLOR ☐ Colorless ☐ Light Brown ☐ Other _____

CONSISTENCY ☐ Waterlike ☐ Viscous/Oily ☐ Other _____

BIOLOGICAL & ANIMAL ITEMS:

☐ Biohazardous Agents_____

FOR EHS USE ONLY

TO BE COMPLETED AS WASTE IS ACCUMULATED AT POINT OF GENERATION
If material is hazardous, please check all hazards that apply:

IGNITABLE

- ☐ Flammable Liquid
- ☐ Flammable Gas
- ☐ Flammable Solid
- ☐ Oxidizer
- ☐ Organic Peroxide

CORROSIVE

- ☐ Acid
- ☐ Base

TOXIC

- ☐ Heavy Metal
- ☐ Poison/Toxic

REACTIVE

- ☐ Peroxide
- ☐ Sulfide
- ☐ Cyanide
- ☐ Pyrophoric
- ☐ Water Reactive
- ☐ Organic Peroxide

WASTE DISPOSAL INSTRUCTIONS

1) Enter information as waste is added to container.
2) Keep waste containers closed.
3) Keep solid waste separate from liquid wastes.
4) Do not place incompatible wastes in same container, including mixtures of: organics, oxidizers, or inorganic acids in any amounts.
5) Do not move waste from the point of generation.
6) All waste containers are limited to 90-days of accumulation once started. Submit an online pickup request prior to deadline.
7) When using your own container for waste, label the waste container or tag with the words “Hazardous Waste”.
8) Place leaking containers in secondary container and call EHS immediately for disposal.
9) Store animal carcasses in an appropriate freezer, walk-in cooler, or refrigerator.
10) Autoclave, chemically disinfect, or incinerate infectious wastes.
11) Place autoclaved biohazard waste bags in an opaque bag prior to disposal.
12) Refer to EHS website for more detailed instructions about waste disposal.

The chemicals below are a hazardous waste at or above these concentrations, so please be specific on the front of this tag when filling it out.

D001	Ignitable	D026	Cresol (> 200ppm)
D002	Corrosive (pH<2 or > 12.5)	D027	1,4-Dichlorobenzene (> 7.5ppm)
D003	Reactive (w/ water or air)	D028	1,2-Dichloroethane (> 0.5ppm)
D004	Arsenic (> 5ppm)	D029	1,1-Dichloroethylene (> 0.7ppm)
D005	Barium (> 100ppm)	D030	2,4-Dinitrotoluene (> 013ppm)
D006	Cadmium (> 1ppm)	D031	Heptachlor (> 0.008ppm)
D007	Chromium (> 5ppm)	D032	Hexachlorobenzene (> 0.13ppm)
D008	Lead (> 5ppm)	D033	Hexachloro-1,3-benzene (> 0.5ppm)
D009	Mercury (> 0.2ppm)	D034	Hexachloroethane (> 3.0ppm)
D010	Selenium (> 1ppm)	D035	Methyl ethyl ketone (> 200ppm)
D011	Silver (> 5ppm)	D036	Nitrobenzene (> 2ppm)
D012	Endrin (> 0.02ppm)	D037	Pentachlorophenol (> 100ppm)
D013	Lindane (> 0.4ppm)	D038	Pyridine (> 5ppm)
D014	Methoxychlor (> 10ppm)	D039	Tetrachloroethylene (> 0.7ppm)
D015	Toxaphene (> 0.5ppm)	D040	Trichloroethylene (> 0.5ppm)
D016	2,4-D (> 10ppm)	D041	2,4,5-Trichlorophenol (> 400ppm)
D017	2,4,5-TP (> 1ppm)	D042	2,4,6-Trichlorophenol (> 2ppm)
D018	Benzene (> 0.5ppm)	D043	Vinyl Chloride (> 0.2ppm)
D019	Carbon Tetrachloride (> 0.5ppm)	001S	Aflatoxin (>1ppm)
D020	Chlordane (> 0.03ppm)	002S	2,3,7,8-Tetrachlorodibenzo-p-dioxin (>1ppm)
D021	Chlorobenzene (> 100ppm)	003S	1,2,3,7,8-Pentachlorodibenzo-p-dioxin (>1ppm)
D022	Chloroform (> 6ppm)	004S	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (>1ppm)
D023	o-Cresol (> 200ppm)	005S	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (>1ppm)
D024	m-Cresol (> 200ppm)	006S	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (>1ppm)
D025	p-Cresol (> 200ppm)	007S	2,3,7,8-Tetrachloridibenzo furan (>1ppm)

Hazardous Waste

Hazardous Waste - Federal Law Prohibits Improper Disposal. If found, contact the nearest police or public safety authority or the U.S. Environmental Protection Agency

Michigan State University, Environmetal Health & Safety
4000 Collins Rd., B20, Lansing, MI 48910

DO NOT MIX INCOMPATIBLE CHEMICALS

ALLOW 2" FROM TOP FOR EXPANSION

EPA ID# MID985569516_____ EPA WASTE NO._____

_____UN/NA#_____

D.O.T. PROPER SHIPPING NAME AND UN OR NA NO. WITH PREFIX

FORM EQP 5111 ATTACHMENT TEMPLATE C11 - SUBPART AA
AIR EMISSIONS FROM PROCESS VENTS

This document is an attachment to the Michigan Department of Environment, Great Lakes, and Energy's (EGLE) *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, R 299.9605, and R 299.9630; and Title 40 of the Code of Federal Regulations (CFR), Part 264, Subpart AA, and 40 CFR §270.24 establish requirements for controlling organic air emissions from process vents. All references to 40 CFR citations specified herein are adopted by reference in R 299.11003.

This license application template includes the information required by 40 CFR §270.24 to address air emission control requirements for process vents at hazardous waste management facilities for the Michigan State University Waste Storage Facility in Lansing, Michigan.

(Check as Appropriate)

☒ Applicant for Operating License for Existing Facility

☐ Applicant for Operating License for New, Altered, Enlarged, or Expanded Facility

☐ Process Vents Subject to 40 CFR Part 264, Subpart AA (R 299.9630)

☒ No Process Vents Exist That Are Subject to 40 CFR Part 264, Subpart AA (R 299.9630)

FORM EQP 5111 ATTACHMENT TEMPLATE C11 - SUBPART BB AIR EMISSIONS FROM EQUIPMENT LEAKS

This document is an attachment to the Michigan Department of Environment, Great Lakes, and Energy's (EGLE) *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, R 299.9605, and R 299.9631; and Title 40 of the Code of Federal Regulations (CFR), Part 264, Subpart BB, and 40 CFR §270.25 establish requirements for controlling organic air emissions from equipment leaks. All references to 40 CFR citations specified herein are adopted by reference in R 299.11003.

This license application template addresses air emission control requirements for equipment leaks at the hazardous waste management facility for the Michigan State University Waste Storage Facility in Lansing, Michigan.

(Check as Appropriate)

☒ Applicant for Operating License for Existing Facility

☐ Applicant for Operating License for New, Altered, Enlarged, or Expanded Facility

☐ Equipment Subject 40 CFR Part 264, Subpart BB (R 299.9631)

☒ No Equipment Exists That Is Subject to 40 CFR Part 264, Subpart BB (R 299.9631)

☐ Applicant Elects to Document Compliance with the Relevant Provisions of the Regulations at 40 CFR Part 60, Part 61, or Part 63 Rather than 40 CFR Part 264, Subpart BB

FORM EQP 5111 ATTACHMENT TEMPLATE C11 - SUBPART CC
AIR EMISSIONS FROM TANKS, CONTAINERS, AND SURFACE IMPOUNDMENTS

This document is an attachment to the Michigan Department of Environment, Great Lakes, and Energy's (EGLE) *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, R 299.9605, and R 299.9634; and Title 40 of the Code of Federal Regulations (CFR), Part 264, Subpart CC, and 40 CFR §270.27, establish requirements for controlling organic air emissions from tanks, containers, and surface impoundments. All references to 40 CFR citations specified herein are adopted by reference in R 299.11003.

This license application template addresses air emission control requirements for tanks, containers, and surface impoundments at the hazardous waste management facility for the Michigan State University (MSU) Waste Storage Facility (WSF) in Lansing, Michigan.

(Check as Appropriate)

☒ Applicant for Operating License for Existing Facility

☐ Applicant for Operating License for New, Altered, Enlarged, or Expanded Facility

☒ Tanks, Containers, or Surface Impoundments Subject to 40 CFR Part 264, Subpart CC (R 299.9634)

☐ No Tanks, Containers, or Surface Impoundments Subject to 40 CFR Part 264, Subpart CC, Exist at the Facility (R 299.9634)

📖 EPA 1990. *Hazardous Waste TSDF – Technical Guidance Document for RCRA Air Emission Standards for Process Vents and Equipment Leaks.* Document No. EPA-450/3-89-021. July.

This template is organized as follows:

INSTRUCTIONS

This template requires that you demonstrate how your facility meets, or will meet, the performance standards for Air Emissions from Tanks, Surface Impoundments and Containers. You are to specifically address the requirements below, but you may also summarize and reference information that is detailed in other existing reports, assessments, etc. You may also reference information that has been submitted in other license templates within this application (e.g., Template C1, Containers, and Template C2, Tanks). Facility-specific documentation that is referenced within this template but has not been submitted to EGLE must be submitted as attachments to this license template with references included at the end of the template table of contents. Attachments shall be labeled sequentially starting with Attachment C11.C.1.

C11.C AIR EMISSIONS FROM TANKS, CONTAINERS, AND SURFACE IMPOUNDMENTS

[R 299.9634 and 40 CFR Part 264, Subpart CC]

For each unit that is subject to 40 CFR Part 264, Subpart CC, identify the process, unit type, regulatory status, and documentation of any exemption claimed under 40 CFR §§264.1080 and 264.1082(c). Check appropriate boxed below to identify the types of units that exist at your facility.

☐ Tanks

☒ Containers

☐ Surface Impoundments

C11.C.1 Waste Streams

[R 299.9634 and 40 CFR §264.1082(c)]

The waste streams stored at the MSU WSF originate in the teaching and research laboratories and the service units for Michigan State University's campus and off-site locations. These wastes are transported out to the WSF in vehicles licensed by EGLE for hazardous waste and liquid industrial by-products. Because of the diversity of hazardous waste stored at the WSF, an assortment of containers is utilized. See Section C-1, Tables C-1 and C-2, for a listing of the number, types and specifications for containers used at the WSF.

C11.C.1(a) Average VO Concentration Determination Via Direct Measurement at the Point of Waste Origination

[R 299.9634 and 40 CFR §264.1083]

No exemption is claimed.

C11.C.1(b) Average VO Concentration Determination Via Process Knowledge at the Point of Waste Origination
[R 299.9634 and 40 CFR §264.1083(a)(2)]

No exemption is claimed.

C11.C.1(c) Average VO Concentration Determination Via Direct Measurement at the Point of Waste Treatment
[R 299.9634 and 40 CFR §264.1083(b)]

No exemption is claimed.

C11.C.2 Tanks Description
[R 299.9634 and 40 CFR §270.27(a)(1) and (3)]

The MSU WSF does not utilize tanks for hazardous waste storage.

C11.C.3 Surface Impoundment Description
[R 299.9634 and 40 CFR §264.1085]

The MSU WSF does not utilize surface impoundments for hazardous waste storage.

C11.C.4 Container Descriptions
[R 299.9634 and 40 CFR §§264.1086, and 270.27(a)(2)]

See Section C1, Tables C1-1 and C1-2, for a listing of the number, types, and specifications for containers used at the WSF.

C11.C.4(a) Description of Container Level 1 Controls
[R 299.9634 and 40 CFR §264.1086(b) and (c)]

The areas in the East Storage Building subject to subpart CC regulations under 40CFR Part 264 are the Consolidation Room (100), and occasionally the Storage Room (130), and the lab-pack room (120) where drums may be temporarily stored. The West Storage Building area used for drum storage is also subject to subpart CC regulations. Containers subject to the subpart CC regulations are the 55-gallon drums into which chemicals are consolidated and occasionally the drums received from campus in 30-gallon or 55-gallon size. The conditions of Subpart CC are met using these containers as permitted in 246.1086(c)(1) under the provisions for control of air pollutant emissions in containers greater than 0.1m^3 and less than 0.46m^3.

C11.C.4(a)(1) Michigan Department of Transportation Specifications
[R 299.9634 and 40 CFR §264.1086(c)(1)]

Containers subject to the subpart CC regulations are the 55-gallon drums into which chemicals are consolidated and occasionally the drums received from campus in 30 gallon or 55-gallon size. The drums are MDOT approved shipping containers and are equipped with closure devices. The drums are at a minimum 1H1/Y1.8/100, 1A1/Y1.8/100, or 1A2/Y1.8/100 and come from campus locations which received them as new containers with product.

C11.C.4(a)(2) Cover and Closure Devices
[R 299.9634 and 40 CFR §264.1086(c)]

Not applicable.

C11.C.4(a)(3) Open-Top Containers with Organic Vapor-Suppressing Barrier
[R 299.9634 and 40 CFR §264.1086(c)]

No open-top containers are used at the MSU WSF.

C11.C.4(a)(4) Inspection Procedures
[R 299.9634 and 40 CFR §264.1086(c)(4)]

Before use, containers are inspected for visible signs of corrosion, structural damage, or residues. Once filled, the drums are not shipped until at least a 24-hour period thereafter. As described in Section A5.A.1, containers are inspected frequently for corrosion, leaks in seals, overflows, tightness of lids, as well as possible signs of corrosion, degradation, weakness or other factors that could lead to an accidental release. If leakage or the imminent possibility of leakage from any of the containers is observed, an immediate transfer of waste materials from the damaged container to a secure container is performed.

C11.C.4(b) Description of Container Level 2 Controls
[R 299.9634 and 40 CFR §264.1086(d)]

No Level 2 Controls are used at the MSU WSF.

C11.C.4(c) Description of Container Level 3 Controls
[R 299.9634 and 40 CFR §264.1086(e)]

No Level 3 Controls are used at the MSU WSF.

C11.C.5 Description of Closed-Vent Systems and Control Devices
[R 299.9634 and 40 CFR §§264.1087 and 270.27(a)(5)]

The MSU WSF does not utilize closed-vent systems and control devices.

C11.C.6 Description of Record Keeping Procedures
[R 299.9634 and 40 CFR §264.1089(a)]

The MSU WSF does not utilize tanks, surface impoundments, or closed-vent systems for waste storage.

MICHIGAN STATE
UNIVERSITY

MSU WSF Subpart CC Certification

I certify that the requirements in 40 CFR 264, subpart CC for container Level 1 standards are being used to demonstrate compliance. MSU uses containers that meet MDOT regulations, and containers are equipped with covers and closure devices. Containers are also inspected prior to being accepted at the WSF and are part of the facility inspection plan.

Mary Lindsey
Environmental Compliance Officer

7/6/23
Date

Vice President for Research and Graduate Studies

Office of Environmental Health & Safety

4000 Collins Rd, Suite B20
Lansing, MI 48910

517-355-0153
Fax: 517-353-4871
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