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ZF Active Safety US Inc.

PROGRESS REPORT NO. 5

Former Kelsey-Hayes Company Site, Milford,  
Michigan

Administrative Order for Response Activity, EGLE  
Docket No. AO-RRD-22-001

September 15, 2022

**PROGRESS REPORT NO. 5  
FORMER KELSEY-HAYES COMPANY  
MILFORD, MICHIGAN  
ADMINISTRATIVE ORDER FOR RESPONSE ACTIVITY EGLE  
DOCKET NO. AO-RRD-22-001**

This progress report has been prepared and is being submitted pursuant to Section XII of the Administrative Order for Response Activity, Docket No. AO-RRD-22-001 (AO) issued by the Department of Environment, Great Lakes, and Energy (EGLE) to ZF Active Safety US Inc. (ZF or Respondent) on March 16, 2022 (effective date), with respect to the former Kelsey-Hayes site in Milford, Michigan (the "Site"). This progress report provides information regarding response activities and other matters related to the AO that have occurred from August 13, 2022 through September 15, 2022.

**Chronological Description of Activities Conducted during the Specified Reporting Period:**

- Observation Wells OW-16D2, OW-16D2R1, and OW-16D2R2 were sampled on September 8, 2022. The samples were submitted to Fibertec Environmental Services of Holt, Michigan (Fibertec) for expedited analysis of volatile organic compounds (VOCs) using United States Environmental Protection Agency (USEPA) Test Method 8260D. Laboratory analytical results of the September 8, 2022 samples were submitted to EGLE and the Village of Milford (VOM) on September 14, 2022, and are included in **Attachment 1**. Vinyl chloride was not detected at or above the reporting limit of 1.0 ug/L in any of the September 8, 2022 samples.
- Arcadis responded to comments received from Ms. Yusko-Kotimko (EGLE) on ZF's Permit Application for Water Supply Systems pursuant to Act 399 for construction of the VOM treatment system improvements via email on September 14, 2022. A copy of the email and attachments are included in **Attachment 2**.
- ZF and EGLE have been working together to schedule a meeting to discuss ZF's letter and Technical Summary Report submitted on August 9, 2022. A meeting has been scheduled for September 21, 2022.

**Results of Sampling and Tests and other Data**

- Observation Wells OW-16D2, OW-16D2R1, and OW-16D2R2 were sampled on September 8, 2022. The samples were submitted to Fibertec for expedited analysis of VOCs using USEPA Test Method 8260D. A copy of the laboratory analytical report for the September 8, 2022 samples is included in **Attachment 1**. Vinyl chloride was not detected at or above the reporting limit of 1.0 ug/L in any of the September 8, 2022 samples.

**Status of Access Issues**

- There have been no issues with access during the reporting period.

### **Scheduled for the Next Reporting Period**

- Sample Observation Well OW-16D2 during the month of October 2022, with analysis conducted by Fibertec or Eurofins Canton, Ohio (Eurofins) within 10 to 14 days.
- Conduct sampling at Observation Wells OW-16D2R1 and OW-16D2R2 during the month of October 2022, with analysis conducted by Fibertec or Eurofins within 10 to 14 days.
- Continue to work with Ms. Yusko-Kotimko (EGLE) on ZF's Permit Application for Water Supply Systems pursuant to Act 399 for construction of the VOM treatment system improvements.

### **Other Relevant Information**

- No other relevant information was identified during this reporting period.

### **Attachments**

1. Laboratory Analytical Report (Observation Wells OW-16D2, OW-16D2R1, and OW-16D2R2)
2. Response to Comments – ZF's Act 399 Permit Application for VOM Treatment System Improvements

# **ATTACHMENT 1**

**Laboratory Analytical Report (Observation Wells OW-16D2, OW-16D2R1, and OW-16D2R2)**



Tuesday, September 13, 2022

Fibertec Project Number: A10763  
Project Identification: TRW Milford (30136112) /30136112  
Submittal Date: 09/08/2022

Ms. Stacey Hannula  
Arcadis U.S., Inc. - Novi  
28550 Cabot Drive  
Suite 500  
Novi, MI 48377

Dear Ms. Hannula,

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 Bailey Welch at 4:59 PM, Sep 13, 2022

For Daryl P. Strandbergh  
Laboratory Director

Enclosures

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Analytical Laboratory Report  
Laboratory Project Number: A10763  
Laboratory Sample Number: A10763-001

Order: A10763  
Date: 09/13/22

Client Identification:	Arcadis U.S., Inc. - Novi	Sample Description:	OW-16D2_090822	Chain of Custody:	212794
Client Project Name:	TRW Milford (30136112)	Sample No:		Collect Date:	09/08/22
Client Project No:	30136112	Sample Matrix:	Ground Water	Collect Time:	09:20

Sample Comments:

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

Volatile Organic Compounds (VOCs) by GC/MS

Aliquot ID: A10763-001 Matrix: Ground Water

Method: EPA 5030C/EPA 8260D

Description: OW-16D2\_090822

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation		Analysis		
						P. Date	P. Batch	A. Date	A. Batch	Init.
1. Acetone	U		µg/L	50	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
‡ 2. Acrylonitrile	U		µg/L	2.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
3. Benzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
4. Bromobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
5. Bromochloromethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
6. Bromodichloromethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
‡ 7. Bromoform (SIM)	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
8. Bromomethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
9. 2-Butanone	U		µg/L	25	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
10. n-Butylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
11. sec-Butylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
12. tert-Butylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
13. Carbon Disulfide	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
14. Carbon Tetrachloride	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
15. Chlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
16. Chloroethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
17. Chloroform	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
18. Chloromethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
19. 2-Chlorotoluene	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
‡ 20. 1,2-Dibromo-3-chloropropane (SIM)	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
21. Dibromochloromethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
22. Dibromomethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
23. 1,2-Dichlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
24. 1,3-Dichlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
25. 1,4-Dichlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
26. Dichlorodifluoromethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
27. 1,1-Dichloroethane	3.9		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
28. 1,2-Dichloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
29. 1,1-Dichloroethene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
30. cis-1,2-Dichloroethene	21		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
31. trans-1,2-Dichloroethene	1.8		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
32. 1,2-Dichloropropane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
33. cis-1,3-Dichloropropene	U		µg/L	0.50	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
34. trans-1,3-Dichloropropene	U		µg/L	0.50	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
35. Ethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
36. Ethylene Dibromide	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC
37. 2-Hexanone	U		µg/L	50	1.0	09/09/22	VM22109A	09/09/22 13:41	VM22109A	SNC

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Client Identification:	<b>Arcadis U.S., Inc. - Novi</b>	Sample Description:	<b>OW-16D2_090822</b>	Chain of Custody:	<b>212794</b>
Client Project Name:	<b>TRW Milford (30136112)</b>	Sample No:		Collect Date:	<b>09/08/22</b>
Client Project No:	<b>30136112</b>	Sample Matrix:	<b>Ground Water</b>	Collect Time:	<b>09:20</b>

Sample Comments:

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

**Volatile Organic Compounds (VOCs) by GC/MS**

**Method: EPA 5030C/EPA 8260D**

**Aliquot ID: A10763-001**

**Matrix: Ground Water**

**Description: OW-16D2\_090822**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation		Analysis		
						P. Date	P. Batch	A. Date	A. Batch	Init.
38. Isopropylbenzene	U		µg/L	5.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
39. 4-Methyl-2-pentanone	U		µg/L	50	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
40. Methylene Chloride	U		µg/L	5.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
‡ 41. 2-Methylnaphthalene	U		µg/L	5.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
42. MTBE	U		µg/L	5.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
43. Naphthalene	U		µg/L	5.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
44. n-Propylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
45. Styrene	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
46. 1,1,1,2-Tetrachloroethane	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
47. 1,1,2,2-Tetrachloroethane	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
48. Tetrachloroethene	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
49. Toluene	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
50. 1,2,4-Trichlorobenzene	U		µg/L	5.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
51. 1,1,1-Trichloroethane	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
‡ 52. 1,1,2-Trichloroethane	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
53. Trichloroethene	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
54. Trichlorofluoromethane	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
55. 1,2,3-Trichloropropane	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
‡ 56. 1,2,3-Trimethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
57. 1,2,4-Trimethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
58. 1,3,5-Trimethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
59. Vinyl Chloride	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
60. m&p-Xylene	U		µg/L	2.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
61. o-Xylene	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC
‡ 62. Xylenes	U		µg/L	3.0	1.0	09/09/22	VM22I09A	09/09/22 13:41	VM22I09A	SNC

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Client Identification:	<b>Arcadis U.S., Inc. - Novi</b>	Sample Description:	<b>OW-16D2R1_090822</b>	Chain of Custody:	<b>212794</b>
Client Project Name:	<b>TRW Milford (30136112)</b>	Sample No:		Collect Date:	<b>09/08/22</b>
Client Project No:	<b>30136112</b>	Sample Matrix:	<b>Ground Water</b>	Collect Time:	<b>10:07</b>

Sample Comments:

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

**Volatile Organic Compounds (VOCs) by GC/MS**

**Method: EPA 5030C/EPA 8260D**

**Aliquot ID: A10763-002**

**Matrix: Ground Water**

**Description: OW-16D2R1\_090822**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation		Analysis		
						P. Date	P. Batch	A. Date	A. Batch	Init.
1. Acetone	U		µg/L	50	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
‡ 2. Acrylonitrile	U		µg/L	2.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
3. Benzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
4. Bromobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
5. Bromochloromethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
6. Bromodichloromethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
‡ 7. Bromoform (SIM)	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
8. Bromomethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
9. 2-Butanone	U		µg/L	25	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
10. n-Butylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
11. sec-Butylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
12. tert-Butylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
13. Carbon Disulfide	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
14. Carbon Tetrachloride	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
15. Chlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
16. Chloroethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
17. Chloroform	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
18. Chloromethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
19. 2-Chlorotoluene	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
‡ 20. 1,2-Dibromo-3-chloropropane (SIM)	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
21. Dibromochloromethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
22. Dibromomethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
23. 1,2-Dichlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
24. 1,3-Dichlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
25. 1,4-Dichlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
26. Dichlorodifluoromethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
27. 1,1-Dichloroethane	2.5		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
28. 1,2-Dichloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
29. 1,1-Dichloroethene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
30. cis-1,2-Dichloroethene	22		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
31. trans-1,2-Dichloroethene	1.4		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
32. 1,2-Dichloropropane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
33. cis-1,3-Dichloropropene	U		µg/L	0.50	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
34. trans-1,3-Dichloropropene	U		µg/L	0.50	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
35. Ethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
36. Ethylene Dibromide	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
37. 2-Hexanone	U		µg/L	50	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC

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Client Identification:	<b>Arcadis U.S., Inc. - Novi</b>	Sample Description:	<b>OW-16D2R1_090822</b>	Chain of Custody:	<b>212794</b>
Client Project Name:	<b>TRW Milford (30136112)</b>	Sample No:		Collect Date:	<b>09/08/22</b>
Client Project No:	<b>30136112</b>	Sample Matrix:	<b>Ground Water</b>	Collect Time:	<b>10:07</b>

Sample Comments:

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

**Volatile Organic Compounds (VOCs) by GC/MS**

**Method: EPA 5030C/EPA 8260D**

**Aliquot ID: A10763-002**

**Matrix: Ground Water**

**Description: OW-16D2R1\_090822**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation		Analysis		
						P. Date	P. Batch	A. Date	A. Batch	Init.
38. Isopropylbenzene	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
39. 4-Methyl-2-pentanone	U		µg/L	50	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
40. Methylene Chloride	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
‡ 41. 2-Methylnaphthalene	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
42. MTBE	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
43. Naphthalene	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
44. n-Propylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
45. Styrene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
46. 1,1,1,2-Tetrachloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
47. 1,1,2,2-Tetrachloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
48. Tetrachloroethene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
49. Toluene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
50. 1,2,4-Trichlorobenzene	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
51. 1,1,1-Trichloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
‡ 52. 1,1,2-Trichloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
53. Trichloroethene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
54. Trichlorofluoromethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
55. 1,2,3-Trichloropropane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
‡ 56. 1,2,3-Trimethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
57. 1,2,4-Trimethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
58. 1,3,5-Trimethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
59. Vinyl Chloride	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
60. m&p-Xylene	U		µg/L	2.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
61. o-Xylene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC
‡ 62. Xylenes	U		µg/L	3.0	1.0	09/09/22	VM22109A	09/09/22 14:10	VM22109A	SNC

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F: (231) 775-8584

Client Identification:	<b>Arcadis U.S., Inc. - Novi</b>	Sample Description:	<b>OW-16D2R2_090822</b>	Chain of Custody:	<b>212794</b>
Client Project Name:	<b>TRW Milford (30136112)</b>	Sample No:		Collect Date:	<b>09/08/22</b>
Client Project No:	<b>30136112</b>	Sample Matrix:	<b>Ground Water</b>	Collect Time:	<b>10:55</b>

Sample Comments:

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

**Volatile Organic Compounds (VOCs) by GC/MS**

**Method: EPA 5030C/EPA 8260D**

**Aliquot ID: A10763-003**

**Matrix: Ground Water**

**Description: OW-16D2R2\_090822**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation		Analysis		
						P. Date	P. Batch	A. Date	A. Batch	Init.
1. Acetone	U		µg/L	50	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
‡ 2. Acrylonitrile	U		µg/L	2.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
3. Benzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
4. Bromobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
5. Bromochloromethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
6. Bromodichloromethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
‡ 7. Bromoform (SIM)	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
8. Bromomethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
9. 2-Butanone	U		µg/L	25	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
10. n-Butylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
11. sec-Butylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
12. tert-Butylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
13. Carbon Disulfide	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
14. Carbon Tetrachloride	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
15. Chlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
16. Chloroethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
17. Chloroform	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
18. Chloromethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
19. 2-Chlorotoluene	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
‡ 20. 1,2-Dibromo-3-chloropropane (SIM)	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
21. Dibromochloromethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
22. Dibromomethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
23. 1,2-Dichlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
24. 1,3-Dichlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
25. 1,4-Dichlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
26. Dichlorodifluoromethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
27. 1,1-Dichloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
28. 1,2-Dichloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
29. 1,1-Dichloroethene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
30. cis-1,2-Dichloroethene	12		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
31. trans-1,2-Dichloroethene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
32. 1,2-Dichloropropane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
33. cis-1,3-Dichloropropene	U		µg/L	0.50	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
34. trans-1,3-Dichloropropene	U		µg/L	0.50	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
35. Ethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
36. Ethylene Dibromide	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
37. 2-Hexanone	U		µg/L	50	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC

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F: (517) 699-0388  
F: (810) 220-3311  
F: (231) 775-8584

Client Identification:	<b>Arcadis U.S., Inc. - Novi</b>	Sample Description:	<b>OW-16D2R2_090822</b>	Chain of Custody:	<b>212794</b>
Client Project Name:	<b>TRW Milford (30136112)</b>	Sample No:		Collect Date:	<b>09/08/22</b>
Client Project No:	<b>30136112</b>	Sample Matrix:	<b>Ground Water</b>	Collect Time:	<b>10:55</b>

Sample Comments:

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

**Volatile Organic Compounds (VOCs) by GC/MS**

**Method: EPA 5030C/EPA 8260D**

**Aliquot ID: A10763-003**

**Matrix: Ground Water**

**Description: OW-16D2R2\_090822**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation		Analysis		
						P. Date	P. Batch	A. Date	A. Batch	Init.
38. Isopropylbenzene	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
39. 4-Methyl-2-pentanone	U		µg/L	50	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
40. Methylene Chloride	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
‡ 41. 2-Methylnaphthalene	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
42. MTBE	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
43. Naphthalene	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
44. n-Propylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
45. Styrene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
46. 1,1,1,2-Tetrachloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
47. 1,1,2,2-Tetrachloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
48. Tetrachloroethene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
49. Toluene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
50. 1,2,4-Trichlorobenzene	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
51. 1,1,1-Trichloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
‡ 52. 1,1,2-Trichloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
53. Trichloroethene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
54. Trichlorofluoromethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
55. 1,2,3-Trichloropropane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
‡ 56. 1,2,3-Trimethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
57. 1,2,4-Trimethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
58. 1,3,5-Trimethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
59. Vinyl Chloride	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
60. m&p-Xylene	U		µg/L	2.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
61. o-Xylene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC
‡ 62. Xylenes	U		µg/L	3.0	1.0	09/09/22	VM22109A	09/09/22 14:38	VM22109A	SNC

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Client Identification:	<b>Arcadis U.S., Inc. - Novi</b>	Sample Description:	<b>TRIP BLANK</b>	Chain of Custody:	<b>212794</b>
Client Project Name:	<b>TRW Milford (30136112)</b>	Sample No:		Collect Date:	<b>09/08/22</b>
Client Project No:	<b>30136112</b>	Sample Matrix:	<b>Blank: Trip</b>	Collect Time:	<b>NA</b>

Sample Comments:

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

**Volatile Organic Compounds (VOCs) by GC/MS**

**Method: EPA 5030C/EPA 8260D**

**Aliquot ID: A10763-004**

**Matrix: Blank: Trip**

**Description: TRIP BLANK**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation		Analysis		
						P. Date	P. Batch	A. Date	A. Batch	Init.
1. Acetone	U		µg/L	50	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
‡ 2. Acrylonitrile	U		µg/L	2.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
3. Benzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
4. Bromobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
5. Bromochloromethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
6. Bromodichloromethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
‡ 7. Bromoform (SIM)	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
8. Bromomethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
9. 2-Butanone	U		µg/L	25	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
10. n-Butylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
11. sec-Butylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
12. tert-Butylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
13. Carbon Disulfide	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
14. Carbon Tetrachloride	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
15. Chlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
16. Chloroethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
17. Chloroform	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
18. Chloromethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
19. 2-Chlorotoluene	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
‡ 20. 1,2-Dibromo-3-chloropropane (SIM)	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
21. Dibromochloromethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
22. Dibromomethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
23. 1,2-Dichlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
24. 1,3-Dichlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
25. 1,4-Dichlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
26. Dichlorodifluoromethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
27. 1,1-Dichloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
28. 1,2-Dichloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
29. 1,1-Dichloroethene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
30. cis-1,2-Dichloroethene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
31. trans-1,2-Dichloroethene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
32. 1,2-Dichloropropane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
33. cis-1,3-Dichloropropene	U		µg/L	0.50	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
34. trans-1,3-Dichloropropene	U		µg/L	0.50	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
35. Ethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
36. Ethylene Dibromide	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
37. 2-Hexanone	U		µg/L	50	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC

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F: (231) 775-8584

Client Identification:	<b>Arcadis U.S., Inc. - Novi</b>	Sample Description:	<b>TRIP BLANK</b>	Chain of Custody:	<b>212794</b>
Client Project Name:	<b>TRW Milford (30136112)</b>	Sample No:		Collect Date:	<b>09/08/22</b>
Client Project No:	<b>30136112</b>	Sample Matrix:	<b>Blank: Trip</b>	Collect Time:	<b>NA</b>

Sample Comments:

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

**Volatile Organic Compounds (VOCs) by GC/MS**

**Method: EPA 5030C/EPA 8260D**

**Aliquot ID: A10763-004**

**Matrix: Blank: Trip**

**Description: TRIP BLANK**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation		Analysis		
						P. Date	P. Batch	A. Date	A. Batch	Init.
38. Isopropylbenzene	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
39. 4-Methyl-2-pentanone	U		µg/L	50	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
40. Methylene Chloride	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
‡ 41. 2-Methylnaphthalene	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
42. MTBE	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
43. Naphthalene	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
44. n-Propylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
45. Styrene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
46. 1,1,1,2-Tetrachloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
47. 1,1,2,2-Tetrachloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
48. Tetrachloroethene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
49. Toluene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
50. 1,2,4-Trichlorobenzene	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
51. 1,1,1-Trichloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
‡ 52. 1,1,2-Trichloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
53. Trichloroethene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
54. Trichlorofluoromethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
55. 1,2,3-Trichloropropane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
‡ 56. 1,2,3-Trimethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
57. 1,2,4-Trimethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
58. 1,3,5-Trimethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
59. Vinyl Chloride	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
60. m&p-Xylene	U		µg/L	2.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
61. o-Xylene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC
‡ 62. Xylenes	U		µg/L	3.0	1.0	09/09/22	VM22109A	09/09/22 12:16	VM22109A	SNC

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Client Identification:	<b>Arcadis U.S., Inc. - Novi</b>	Sample Description:	<b>FIELD BLANK_090822</b>	Chain of Custody:	<b>212794</b>
Client Project Name:	<b>TRW Milford (30136112)</b>	Sample No:		Collect Date:	<b>09/08/22</b>
Client Project No:	<b>30136112</b>	Sample Matrix:	<b>Blank: Field</b>	Collect Time:	<b>10:40</b>

Sample Comments:

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

**Volatile Organic Compounds (VOCs) by GC/MS**

**Method: EPA 5030C/EPA 8260D**

**Aliquot ID: A10763-005 Matrix: Blank: Field**

**Description: FIELD BLANK\_090822**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation		Analysis		
						P. Date	P. Batch	A. Date	A. Batch	Init.
1. Acetone	U		µg/L	50	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
‡ 2. Acrylonitrile	U		µg/L	2.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
3. Benzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
4. Bromobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
5. Bromochloromethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
6. Bromodichloromethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
‡ 7. Bromoform (SIM)	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	KYD
8. Bromomethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
9. 2-Butanone	U		µg/L	25	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
10. n-Butylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
11. sec-Butylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
12. tert-Butylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
13. Carbon Disulfide	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
14. Carbon Tetrachloride	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
15. Chlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
16. Chloroethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
17. Chloroform	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
18. Chloromethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
19. 2-Chlorotoluene	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
‡ 20. 1,2-Dibromo-3-chloropropane (SIM)	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
21. Dibromochloromethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
22. Dibromomethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
23. 1,2-Dichlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
24. 1,3-Dichlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
25. 1,4-Dichlorobenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
26. Dichlorodifluoromethane	U		µg/L	5.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
27. 1,1-Dichloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
28. 1,2-Dichloroethane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
29. 1,1-Dichloroethene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
30. cis-1,2-Dichloroethene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
31. trans-1,2-Dichloroethene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
32. 1,2-Dichloropropane	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
33. cis-1,3-Dichloropropene	U		µg/L	0.50	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
34. trans-1,3-Dichloropropene	U		µg/L	0.50	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
35. Ethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
36. Ethylene Dibromide	U		µg/L	1.0	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC
37. 2-Hexanone	U		µg/L	50	1.0	09/09/22	VM22109A	09/09/22 12:44	VM22109A	SNC

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Client Identification:	<b>Arcadis U.S., Inc. - Novi</b>	Sample Description:	<b>FIELD BLANK_090822</b>	Chain of Custody:	<b>212794</b>
Client Project Name:	<b>TRW Milford (30136112)</b>	Sample No:		Collect Date:	<b>09/08/22</b>
Client Project No:	<b>30136112</b>	Sample Matrix:	<b>Blank: Field</b>	Collect Time:	<b>10:40</b>

Sample Comments:

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

**Volatile Organic Compounds (VOCs) by GC/MS**

**Method: EPA 5030C/EPA 8260D**

**Aliquot ID: A10763-005 Matrix: Blank: Field**

**Description: FIELD BLANK\_090822**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Preparation		Analysis		
						P. Date	P. Batch	A. Date	A. Batch	Init.
38. Isopropylbenzene	U		µg/L	5.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
39. 4-Methyl-2-pentanone	U		µg/L	50	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
40. Methylene Chloride	U		µg/L	5.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
‡ 41. 2-Methylnaphthalene	U		µg/L	5.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
42. MTBE	U		µg/L	5.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
43. Naphthalene	U		µg/L	5.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
44. n-Propylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
45. Styrene	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
46. 1,1,1,2-Tetrachloroethane	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
47. 1,1,2,2-Tetrachloroethane	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
48. Tetrachloroethene	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
49. Toluene	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
50. 1,2,4-Trichlorobenzene	U		µg/L	5.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
51. 1,1,1-Trichloroethane	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
‡ 52. 1,1,2-Trichloroethane	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
53. Trichloroethene	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
54. Trichlorofluoromethane	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
55. 1,2,3-Trichloropropane	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
‡ 56. 1,2,3-Trimethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
57. 1,2,4-Trimethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
58. 1,3,5-Trimethylbenzene	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
59. Vinyl Chloride	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
60. m&p-Xylene	U		µg/L	2.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
61. o-Xylene	U		µg/L	1.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC
‡ 62. Xylenes	U		µg/L	3.0	1.0	09/09/22	VM22I09A	09/09/22 12:44	VM22I09A	SNC

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**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

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**Exception Summary:**

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**Analysis Locations:**

All analyses performed in Holt.

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Accreditation Number(s):

**T104704518-22-14 (TX)**

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VM22I09A: Method Blank (MB)

EPA 8260D

Run Time: VM22I09A.MB 09/09/2022 11:19 [VM22I09A]

Analyte	MB Result µg/L	MB Qualifier	MB RDL µg/L
Acetone	U		50
Acrylonitrile	U		2.0
Benzene	U		1.0
Bromobenzene	U		1.0
Bromochloromethane	U		1.0
Bromodichloromethane	U		1.0
Bromomethane	U		5.0
2-Butanone	U		25
n-Butylbenzene	U		1.0
sec-Butylbenzene	U		1.0
tert-Butylbenzene	U		1.0
Carbon Disulfide	U		5.0
Carbon Tetrachloride	U		1.0
Chlorobenzene	U		1.0
Chloroethane	U		5.0
Chloroform	U		1.0
Chloromethane	U		5.0
2-Chlorotoluene	U		5.0
1,2-Dibromo-3-chloropropane (SIM)	U		1.0
Dibromochloromethane	U		5.0
Dibromomethane	U		5.0
1,2-Dichlorobenzene	U		1.0
1,3-Dichlorobenzene	U		1.0
1,4-Dichlorobenzene	U		1.0
Dichlorodifluoromethane	U		5.0
1,1-Dichloroethane	U		1.0
1,2-Dichloroethane	U		1.0
1,1-Dichloroethene	U		1.0
cis-1,2-Dichloroethene	U		1.0
trans-1,2-Dichloroethene	U		1.0
1,2-Dichloropropane	U		1.0
cis-1,3-Dichloropropene	U		0.50
trans-1,3-Dichloropropene	U		0.50

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VM22I09A: Method Blank (MB)

EPA 8260D

Run Time: VM22I09A.MB 09/09/2022 11:19 [VM22I09A]

Analyte	MB Result µg/L	MB Qualifier	MB RDL µg/L
Ethylbenzene	U		1.0
Ethylene Dibromide	U		1.0
2-Hexanone	U		50
Isopropylbenzene	U		5.0
4-Methyl-2-pentanone	U		50
Methylene Chloride	U		5.0
2-Methylnaphthalene	U		5.0
MTBE	U		5.0
Naphthalene	U		5.0
n-Propylbenzene	U		1.0
Styrene	U		1.0
1,1,1,2-Tetrachloroethane	U		1.0
1,1,2,2-Tetrachloroethane	U		1.0
Tetrachloroethene	U		1.0
Toluene	U		1.0
1,2,4-Trichlorobenzene	U		5.0
1,1,1-Trichloroethane	U		1.0
1,1,2-Trichloroethane	U		1.0
Trichloroethene	U		1.0
Trichlorofluoromethane	U		1.0
1,2,3-Trichloropropane	U		1.0
1,2,3-Trimethylbenzene	U		1.0
1,2,4-Trimethylbenzene	U		1.0
1,3,5-Trimethylbenzene	U		1.0
Vinyl Chloride	U		1.0
m&p-Xylene	U		2.0
o-Xylene	U		1.0
4-Bromofluorobenzene(S)	100		80-120
Dibromofluoromethane(S)	106		80-120
1,2-Dichloroethane-d4(S)	101		80-120
Toluene-d8(S)	102		80-120

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VM22I09A: Laboratory Control Sample (LCS)/Laboratory Control Sample Duplicate (LCSD)

EPA 8260D

Run Time: VM22I09A.LCS: 09/09/2022 09:54 [VM22I09A] VM22I09A.LCSD: 09/09/2022 10:22 [VM22I09A]

Analyte	LCS Spike Amount µg/L	LCS Result µg/L	LCS Rec. %	Rec. Limits %	LCS Qualifier	LCSD Spike Amount µg/L	LCSD Result µg/L	LCSD Rec. %	LCSD Qualifier	RPD %	RPD Limits %	RPD Qualifier
Acetone	50.0	24.9	50	40-130		50.0	26.4	53		6	20	
Acrylonitrile	50.0	50.4	101	70-130		50.0	52.8	106		5	20	
Benzene	50.0	49.4	99	80-120		50.0	47.9	96		3	20	
Bromobenzene	50.0	45.4	91	75-125		50.0	44.7	89		2	20	
Bromochloromethane	50.0	51.8	104	70-130		50.0	52.4	105		1	20	
Bromodichloromethane	50.0	50.8	102	75-120		50.0	50.5	101		1	20	
Bromomethane	50.0	51.0	102	68-135		50.0	49.4	99		3	20	
2-Butanone	50.0	35.1	70	40-129		50.0	37.3	75		7	20	
n-Butylbenzene	50.0	49.9	100	70-133		50.0	47.6	95		5	20	
sec-Butylbenzene	50.0	48.6	97	70-125		50.0	46.6	93		4	20	
tert-Butylbenzene	50.0	47.9	96	70-130		50.0	46.1	92		4	20	
Carbon Disulfide	50.0	56.7	113	70-130		50.0	55.1	110		3	20	
Carbon Tetrachloride	50.0	50.0	100	70-130		50.0	48.8	98		2	20	
Chlorobenzene	50.0	50.0	100	80-120		50.0	48.7	97		3	20	
Chloroethane	50.0	51.1	102	61-130		50.0	49.6	99		3	20	
Chloroform	50.0	50.5	101	80-120		50.0	50.1	100		1	20	
Chloromethane	50.0	54.8	110	67-125		50.0	54.1	108		2	20	
2-Chlorotoluene	50.0	47.6	95	75-125		50.0	46.1	92		3	20	
1,2-Dibromo-3-chloropropane (SIM)	50.0	43.4	87	70-130		50.0	44.9	90		3	20	
Dibromochloromethane	50.0	50.1	100	70-130		50.0	50.2	100		0	20	
Dibromomethane	50.0	47.7	95	75-125		50.0	47.9	96		1	20	
1,2-Dichlorobenzene	50.0	48.8	98	70-120		50.0	48.5	97		1	20	
1,3-Dichlorobenzene	50.0	49.2	98	75-125		50.0	48.0	96		2	20	
1,4-Dichlorobenzene	50.0	48.7	97	75-125		50.0	47.7	95		2	20	
Dichlorodifluoromethane	50.0	58.4	117	70-136		50.0	56.9	114		3	20	
1,1-Dichloroethane	50.0	51.6	103	70-130		50.0	51.2	102		1	20	
1,2-Dichloroethane	50.0	47.4	95	70-130		50.0	47.7	95		0	20	
1,1-Dichloroethene	50.0	47.3	95	78-120		50.0	50.2	100		5	20	
cis-1,2-Dichloroethene	50.0	51.9	104	70-125		50.0	51.4	103		1	20	
trans-1,2-Dichloroethene	50.0	52.2	104	70-130		50.0	51.1	102		2	20	
1,2-Dichloropropane	50.0	51.7	103	80-121		50.0	50.6	101		2	20	
cis-1,3-Dichloropropene	50.0	51.9	104	70-130		50.0	51.6	103		1	20	
trans-1,3-Dichloropropene	50.0	53.3	107	70-132		50.0	53.2	106		1	20	

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VM22I09A: Laboratory Control Sample (LCS)/Laboratory Control Sample Duplicate (LCSD)

EPA 8260D

Run Time: VM22I09A.LCS: 09/09/2022 09:54 [VM22I09A] VM22I09A.LCSD: 09/09/2022 10:22 [VM22I09A]

Analyte	LCS Spike Amount µg/L	LCS Result µg/L	LCS Rec. %	Rec. Limits %	LCS Qualifier	LCSD Spike Amount µg/L	LCSD Result µg/L	LCSD Rec. %	LCSD Qualifier	RPD %	RPD Limits %	RPD Qualifier
Ethylbenzene	50.0	49.1	98	80-120		50.0	47.8	96		2	20	
Ethylene Dibromide	50.0	44.6	89	80-120		50.0	45.2	90		1	20	
2-Hexanone	50.0	36.5	73	70-130		50.0	38.5	77		5	20	
Isopropylbenzene	50.0	49.1	98	75-125		50.0	47.9	96		2	20	
4-Methyl-2-pentanone	50.0	52.0	104	70-130		50.0	54.4	109		5	20	
Methylene Chloride	50.0	51.3	103	70-130		50.0	51.5	103		0	20	
2-Methylnaphthalene	50.0	43.7	87	70-130		50.0	43.3	87		0	20	
MTBE	50.0	55.6	111	70-125		50.0	57.4	115		4	20	
Naphthalene	50.0	46.1	92	70-130		50.0	46.8	94		2	20	
n-Propylbenzene	50.0	49.4	99	70-130		50.0	47.7	95		4	20	
Styrene	50.0	48.5	97	70-130		50.0	47.2	94		3	20	
1,1,1,2-Tetrachloroethane	50.0	50.7	101	80-130		50.0	49.5	99		2	20	
1,1,2,2-Tetrachloroethane	50.0	53.1	106	70-130		50.0	53.8	108		2	20	
Tetrachloroethene	50.0	50.3	101	70-130		50.0	48.2	96		5	20	
Toluene	50.0	50.2	100	80-120		50.0	48.7	97		3	20	
1,2,4-Trichlorobenzene	50.0	48.5	97	70-130		50.0	48.0	96		1	20	
1,1,1-Trichloroethane	50.0	52.1	104	70-130		50.0	51.1	102		2	20	
1,1,2-Trichloroethane	50.0	48.7	97	75-125		50.0	48.9	98		1	20	
Trichloroethene	50.0	45.9	92	71-125		50.0	44.3	89		3	20	
Trichlorofluoromethane	50.0	54.7	109	70-133		50.0	53.6	107		2	20	
1,2,3-Trichloropropane	50.0	46.0	92	75-125		50.0	47.7	95		3	20	
1,2,3-Trimethylbenzene	50.0	48.3	97	70-130		50.0	46.5	93		4	20	
1,2,4-Trimethylbenzene	50.0	51.2	102	75-130		50.0	49.5	99		3	20	
1,3,5-Trimethylbenzene	50.0	48.7	97	75-130		50.0	47.4	95		2	20	
Vinyl Chloride	50.0	51.7	103	74-125		50.0	50.5	101		2	20	
m&p-Xylene	100	99.2	99	75-130		100	95.8	96		3	20	
o-Xylene	50.0	47.6	95	80-120		50.0	46.6	93		2	20	
4-Bromofluorobenzene(S)			99	80-120				101				
Dibromofluoromethane(S)			103	80-120				107				
1,2-Dichloroethane-d4(S)			98	80-120				101				
Toluene-d8(S)			100	80-120				101				

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**Definitions/ Qualifiers:**

- U: The analyte was not detected at or above the Reporting Limit (RL).  
\*: Value reported is outside QC limits

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**Exception Summary:**

Exceptions have been properly noted on reported results or affected samples have been scheduled for reanalysis when appropriate.

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**Report Generated By:**



By Bailey Welch at 5:08 PM, Sep 13, 2022

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## Geoprobe

**11766 E. Grand River Rd.**

**Brighton, MI 48116**

**Phone: 810 220 3300**

**Fax: 810 220 3311**

Chain of Custody #

212794

PAGE \_\_\_\_ of \_\_\_\_

Client Name: <b>Arcadis</b>			PARAMETERS												Matrix Code		Deliverables		
Contact Person: <b>Stacey Hannula</b>															<input checked="" type="checkbox"/> Soil <input checked="" type="checkbox"/> GW Ground Water		<input checked="" type="checkbox"/> Level 2		
Project Name/ Number: <b>30136112 TRW Milford</b>															<input type="checkbox"/> Air <input type="checkbox"/> SW Surface Water		<input type="checkbox"/> Level 3		
Email distribution list: <b>stacey.hannula@arcadis.com</b> <b>john.mcinnis@arcadis.com</b>															<input type="checkbox"/> Oil <input type="checkbox"/> ww Waste Water		<input type="checkbox"/> Level 4		
Quote#															<input type="checkbox"/> Wipe <input type="checkbox"/> x Other: Specify		<input type="checkbox"/> EDD		
Purchase Order# <b>30136112</b>																			
Date	Time	Sample #	Client Sample Descriptor	MATRIX (SEE RIGHT CORNER FOR CODE)	# OF CONTAINERS													Remarks:	
9-8-22	0920		OW-16D2-090822	GW	3	X											rush TAT		
9-8-22	1007		OW-16D2 R1-090822	GW	3	X											rush TAT		
9-8-22	1055		OW-16D2 R2-090822	GW	3	X											rush TAT		
-			TRIP BLANK		3	X											std TAT ok		
9-8-22	1040		FIELD BLANK-090822		3	X											std TAT ok		
Received By Lab SEP 08 2022 Initials: <b>JS</b>																			
Comments:																			
Sampled/Relinquished By: <b>Arcadis/Stacey Hannula</b>				Date/Time: <b>9-8-22 1:00 PM</b>				Received By: <b>[Signature]</b>											
Relinquished By: <b>[Signature]</b>				Date/Time: <b>9/8/22 18:42</b>				Received By: <b>[Signature]</b>											
Relinquished By: <b>[Signature]</b>				Date/Time: <b>9/8/22 18:42</b>				Received By: <b>[Signature]</b>											
Turnaround Time ALL RESULTS WILL BE SENT BY THE END OF THE BUSINESS DAY																			
LAB USE ONLY																			
Fibertec project number: <b>A10763</b>																			
Temperature upon receipt at Lab: <b>4.4°C</b>																			
Please see back for terms and conditions																			

# **ATTACHMENT 2**

**Response To Comments - ZF's Act 399 Permit Application for VOM  
Treatment System Improvements**

## McInnis, John

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**From:** Hitts, Brad  
**Sent:** Wednesday, September 14, 2022 3:15 PM  
**To:** Yusko-Kotimko, Tiffany (EGLE)  
**Cc:** cwuerth; Detwiler Scott MSA HEEN; mkarll; McInnis, John; Bleazard Robert; Vant Erve, Joost (DHHS); Alger, Brandon (EGLE)  
**Subject:** RE: Milford (4390) - Air Stripper Permit Comments  
**Attachments:** Labeled Tower NSF Information.pdf; Design Memo Attachments.pdf; CES-XF-Nozzle-Specification-Rev-1-05-03-171.pdf

Tiffany,

Please see replies in red below. We have not yet made the revisions to the drawings and specifications. I want to first confirm the replies are generally acceptable. Or if not, make revisions as needed. Then we will make the changes to the drawings and specifications and submit for review.

Regards,  
Brad.

1. The Design Memo in the fourth paragraph on page 1 stated that the manufacturer calculated removal efficiencies and preliminary layout drawing were attached to the memo, and on page 2, the last sentence states that a preliminary cut sheet and pump curve was provided with the memo. However, this was not the case. Please provide this important information.  
**See attached.**
2. Sheet G-004, under Process Pipe & Fittings A. 6 Gaskets – Typically, fluoroelastomer gaskets are required where chlorinated compounds are present. Do you have documentation that nitrile gaskets will have the chemical resistance to the low-level chlorinated compounds?  
**No. Specification revised to require fluoroelastomer gaskets, NSF61.**
3. Sheet G-004, under Process Pipe & Fittings B. 1 & B. 2 - PVC pipe must be certified to NSF 14 (which includes NSF 61).  
**Certification to NSF14 added to specification.**
4. Sheet G-004, under Process Pipe & Fittings B. 3 - Add “for potable water systems” after “for piping containing chlorine solution”.  
**Added “for potable water systems”.**
5. Sheet G-004, under Process Specialties A – Why was a propeller style meter selected? I believe most of the meters at the plant are mag meters. What is the pressure loss across this meter? What are the requirements for straight length of pipe upstream and downstream and is this being met? Does it have a strainer that would requirement regular cleaning or maintenance? Does the meter meet AWWA standard C704? What is the flow rate range? Please provide the third-party certification to NSF 61. Are there any chemical compatibility issues for the polypropylene propellers?  
**To match their existing raw and finished water meters. Based on photographs from site visit and our communication with vendor, we believe the existing meters at the plant are as we have specified here. Pressure loss across the meter is less than 0.1 psi at 1,400 gpm. Straight pipe length requirements are 5x the piping diameter upstream (60”), 1x the piping diameter downstream (12”). Straight pipe requirements are being met. The meter does not have a strainer. The meter meets AWWA C704. It has a standard flow rate range of 200-3,000 gpm for 12” diameter meter. These meters have a NSF61 certified internal lining, but the unit is not**



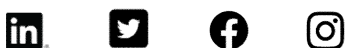
NSF61 certified. If that is not acceptable, we will change to a mag meter with NSF61 liner. No known or expected chemical compatibility issues.

6. Sheet G-004, under Process Specialties B and C - The description for both refers to “Bunan NSF 61 Gaskets”; however, upgraded gaskets are being required. Therefore, these should be fluoroelastomer gaskets as noted above. **Specification revised to require fluoroelastomer gaskets, NSF61.**
7. Sheet G-004, under Process Specialties C - Is the “optional chlorine injection” referring to a fitting that would accept an injection quill? Please also specify the position of the tap on the pipe. The preferred injection location is typically in the lower half of the pipe at a 45-degree angle (4 or 8 o’clock positions) on a horizontal pipe. The location where this will be installed is not shown on the plans. Please identify the location on the plan sheets M-001 and M-002.  
**The service saddle has a ¾” threaded connection. A plugged threaded PVC quill has been added to specification for future connection. Injection location and position (lower half of pipe at 45-degree angle) added to drawings.**
8. Sheet G-004, under Process Piping Installation A - Please include additional information to this section. There are some typical processes that could be included here.  
**Specification expanded to include additional installation detail.**
9. Sheet G-004, under Disinfection G - This will need to state that (1) bacteriological samples are to be collected following the completion of disinfection and final flushing, (2) collect two samples 24-hours apart from each sampling point, and (3) samples are to be analyzed at a State-approved drinking water laboratory.  
**Specification revised to include these requirements.**
10. Sheet G-004, under Cleaning - Please include additional information to this section. There are some recommendations under C653-20 4.1 that should be incorporated into this section such as those related to what type of cleaning agents would be acceptable. The manufacture may also have some typical procedures for the packed tower.  
**This heading has been deleted. Cleaning requirements have been included in the specification for piping and air stripping towers. For piping; thoroughly clean all piping in a manner approved by Owner prior to installation which complies with AWWA C651-14 4.8 Preventative and Corrective Measures during New Construction. For Air Stripping Tower; thoroughly clean wetted tower components in a manner approved by Owner prior to installation which complies with AWWA C653-20 4.1 Cleaning.**
11. Sheet G-004, under Disinfection H - What is the 50 to 100 ppm and the 25 mg/L based on? The three AWWA standards, C651, C653 and C654, have different requirements for the concentration of the solution. For example, C653 requires 50 mg/L while C651 requires 25 mg/L and a minimum of 10 mg/L. **Specification has been revised to reference chlorine solution concentrations and methods from relevant AWWA standards. For the wells and well pumps (AWWA C654), piping (AWWA C651), and air stripping tower (AWWA C653).**
12. Sheet G-004, under Disinfection I - Is the phrase “closed drain line” correct? Is the highly chlorinated water being containerized prior to disposal? What is the likely disposal method? Depending on where the chlorinated water is being discharged to, it may require dichlorination (C655). There is also a NPDES General Permit that covers this type of discharge if discharging to surface waters of the state.  
**Method of disposal or discharge to be determined by installing contractor. This paragraph has been revised to reflect the relevant AWWA standards. The environment to which the chlorinated water is to be discharged to shall be inspected. If there is any possibility that the chlorinated discharge will cause damage to the environment, a neutralizing chemical shall be applied to the water to be wasted to thoroughly neutralize the residual chlorine (see ANSI/AWWA C655 for neutralizing chemicals). Where necessary, federal, state, local, or provincial regulatory agencies should be contacted to determine special provisions for the disposal of heavily chlorinated water.**

13. Sheet G-005, under Air Stripping Towers, Design Requirements, A.6. – Please list the air to water ratio for all flow scenarios. Does the removal rate for vinyl chloride change under the various scenarios?  
**Air to water ratio added to specifications. See calculation datasheet for the removal rates under various scenarios.**
14. Sheet G-005, under Air Stripping Towers, Design Requirements, A.7. – Please provide the range of water loading rate for the varying flow conditions (split flow (700 gpm), 1400 gpm, and 2100 gpm). Does the removal rate for vinyl chloride change under the various scenarios?  
**Range of water loading rates added to specifications. See calculation datasheet for removal rates.**
15. Is there any further information regarding NSF 61 certification for air stripping components - body, water distribution tray, packing support plates, etc.? Documents were provided for Wilsonart LLC (NSF51 certification), Specification Rubber Products, Inc. (NSF61 certification), EPDM Sheet Rubber Material (webpage noting NSF61 certification, but the certification), BETE Spray Technologies webpage (certification?), and Charlotte Pie & Foundry Company solvent cement (NSF-14 certification). Are these components of the tower? If so, please clarify what components these are in the tower. Please circle or identify the key information/applicable products.  
**Labels added to the information (attached). For the water distribution nozzles, the intent is to match the existing aerator's pan type distributor nozzles make and model. However, we've determined they do not carry the NSF61 certification. A cut sheet is attached for general information. To date, the tower vendor has not been able to locate an alternate manufacturer of an equivalent nozzle that carries the NSF61 certification. Can we request an exemption for the distribution nozzles if no certified suitable equivalent can be found? Otherwise, we would need to go to a header lateral distribution system with NSF spray nozzles. With this there is a higher inlet pressure requirement. We would need to increase the pump design point (TDH) to accommodate.**
16. Sheet G-005, under Air Stripping Tower Description, F. - What is the material of construction for the tripack media? It is noted as polypropylene in the box 6 of the permit. Based on the NSF61 certification, only polypropylene material was approved. This needs to be stated in the description. Was the material's chemical compatibility with vinyl chloride, cis-1,2-DCE, or chlorine solutions (although not pre-chlorinating at this time) confirmed?  
**Polypropylene is the material of construction. It has been added to the specifications. No believed chemical compatibility issues with low level volatile organic compounds in the raw water, or with chlorine concentrations associated with drinking water.**
17. Sheet G-005, under Air Stripping Tower Description, H. - Please clarify that the mist eliminator is above the water distribution tray.  
**Confirmed. Added to specifications.**
18. Sheet G-005, under Air Stripping Tower Description - There is no mention of side wiper redistribution rings/devices that would prevent flow/short circuiting along the walls of the tower. Please explain why this was not included.  
**Requirement for side wiper redistribution ring every 10 feet has been added to the specifications.**
19. Sheet G-005, under Air Stripping Tower Description L - Will the air outlet have a shroud that extends over the screen to prevent rainwater, etc. from entering the screen and will there be a lip to prevent drainage from the tower roof from entering the tower?  
**Yes. Indication added to specification.**
20. Sheet G-005, under Air Stripping Tower Description – Is an effluent sump being provided?  
**No. Effluent sump is existing concrete detention tank below.**

21. Sheet G-005, under Air Stripping Tower Description – There is no mention of sample taps on the influent and effluent piping. Typically, these would be used to evaluate removal efficiency of each tower and are helpful when trouble shooting operational problems. Why were these taps not included?  
Influent samples can be obtained from existing taps at well pump discharge lines. Effluent sample tap has been added to the base of each tower.
22. Sheet G-005, under Air Stripping Tower Description – There is no mention of a blow-off line that could be used to discharge water/cleaning solutions when cleaning the tower. Why wasn't this included?  
A valved blow off/drain line at the base of the tower that could be used to discharge water/cleaning solutions will be included. Specifications have been revised to require.
23. Sheet G-005, under Air Stripping Tower Description – There is no mention of overflow discharge line. Please provide an explanation of what would happen if the tower overflows.  
The existing sump (detention tank) has two 12" overflows. This would prevent the water level from backing up into the tower.
24. As proposed on plan sheet M-001 and M-002, there isn't a valve at the effluent of each tower. Therefore, if one tower has been taken out of service it can't be fully isolated from the system. Therefore, any debris or cleaning solutions/rinsate would be able to enter the clear well. Valves should be added on the effluent piping. The existing aerators do not have isolation valves. A discharge valve would be difficult to access directly beneath the tower and would also require the tower to be elevated to accommodate. In lieu of a discharge valve, a flange on the top of the outlet pipe is being provided with a blind flange (supplied loose); along with an access hatch at the outlet. To isolate, the access hatch would need to be removed and the blind flange installed. This would direct cleaning solutions and rinsate to the blowoff/drain and isolate the unit from the detention tank below.
25. Sheet G-005, under Air Assembly – Is the air intake protected with 24-mesh screen and a louver or shroud? Is the screen accessible for maintenance and inspection? Yes. Indication added to specification.
26. Please clarify the method for cleaning media. I recalled that there was some discussion that the media would typically be removed and cleaned externally. How would build up on the interior surfaces of the tower be cleaned? It is recommended that the packing be removed and cleaned externally. Interior surfaces of the tower could be cleaned by powerwashing with the unit isolated from the detention tank below via installation of the blind flange on the outlet pipe.
27. The plans M-001 & M002 do not show a safety cage on the ladder. Please confirm whether a safety cage is required by OSHA. A ladder safety system has been included in the specification for the ladder. Safety cage is not required by OSHA.
28. Sheet G-005 under Well Pumps A 1 and 2 – Why is there a 2<sup>nd</sup> design point? Not required to be included in specification for this application. Deleted to avoid confusion.

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**From:** Yusko-Kotimko, Tiffany (EGLE) <YuskoKotimkoT@michigan.gov>  
**Sent:** Tuesday, August 9, 2022 9:22 AM  
**To:** Hitts, Brad <Brad.Hitts@arcadis.com>  
**Cc:** cwuerth <cwuerth@villageofmilford.org>; Detwiler Scott MSA HEEN <scott.detwiler@zf.com>; mkarll <mkarll@villageofmilford.org>; McInnis, John <John.McInnis@arcadis.com>; Bleazard Robert <Robert.Bleazard@zf.com>; Vant Erve, Joost (DHHS) <vantErveJ@michigan.gov>; Alger, Brandon (EGLE) <algerb@michigan.gov>  
**Subject:** Milford (4390) - Air Stripper Permit Comments

Hi Brad,

I have reviewed the permit application for the Groundwater Treatment System Improvements (upgrade to air strippers) for the Village of Milford to address vinyl chloride should it enter the drinking water wells. Below is a summary of my comments. Revised pages may be provided by email for my review. Hard copies will be requested as needed.

- The Design Memo in the fourth paragraph on page 1 stated that the manufacturer calculated removal efficiencies and preliminary layout drawing were attached to the memo, and on page 2, the last sentence states that a preliminary cut sheet and pump curve was provided with the memo. However, this was not the case. Please provide this important information.
- Sheet G-004, under Process Pipe & Fittings A. 6 Gaskets – Typically, fluoroelastomer gaskets are required where chlorinated compounds are present. Do you have documentation that nitrile gaskets will have the chemical resistance to the low-level chlorinated compounds?
- Sheet G-004, under Process Pipe & Fittings B. 1 & B. 2 - PVC pipe must be certified to NSF 14 (which includes NSF 61).
- Sheet G-004, under Process Pipe & Fittings B. 3 - Add “for potable water systems” after “for piping containing chlorine solution”.
- Sheet G-004, under Process Specialties A – Why was a propeller style meter selected? I believe most of the meters at the plant are mag meters. What is the pressure loss across this meter? What are the requirements for straight length of pipe upstream and downstream and is this being met? Does it have a strainer that would require regular cleaning or maintenance? Does the meter meet AWWA standard C704? What is the flow rate range? Please provide the third-party certification to NSF 61. Are there any chemical compatibility issues for the polypropylene propellers?
- Sheet G-004, under Process Specialties B and C - The description for both refers to “Bunan NSF 61 Gaskets”; however, upgraded gaskets are being required. Therefore, these should be fluoroelastomer gaskets as noted above.
- Sheet G-004, under Process Specialties C - Is the “optional chlorine injection” referring to a fitting that would accept an injection quill? Please also specify the position of the tap on the pipe. The preferred injection location is typically in the lower half of the pipe at a 45-degree angle (4 or 8 o’clock positions) on a horizontal pipe. The location where this will be installed is not shown on the plans. Please identify the location on the plan sheets M-001 and M-002.
- Sheet G-004, under Process Piping Installation A - Please include additional information to this section. There are some typical processes that could be included here.
- Sheet G-004, under Disinfection G - This will need to state that (1) bacteriological samples are to be collected following the completion of disinfection and final flushing, (2) collect two samples 24-hours apart from each sampling point, and (3) samples are to be analyzed at a State-approved drinking water laboratory.
- Sheet G-004, under Cleaning - Please include additional information to this section. There are some recommendations under C653-20 4.1 that should be incorporated into this section such as those related to what type of cleaning agents would be acceptable. The manufacture may also have some typical procedures for the packed tower.

- Sheet G-004, under Disinfection H - What is the 50 to 100 ppm and the 25 mg/L based on? The three AWWA standards, C651, C653 and C654, have different requirements for the concentration of the solution. For example, C653 requires 50 mg/L while C651 requires 25 mg/L and a minimum of 10 mg/L.
- Sheet G-004, under Disinfection I - Is the phrase “closed drain line” correct? Is the highly chlorinated water being containerized prior to disposal? What is the likely disposal method? Depending on where the chlorinated water is being discharged to, it may require dichlorination (C655). There is also a NPDES General Permit that covers this type of discharge if discharging to surface waters of the state.
- Sheet G-005, under Air Stripping Towers, Design Requirements, A.6. – Please list the air to water ratio for all flow scenarios. Does the removal rate for vinyl chloride change under the various scenarios?
- Sheet G-005, under Air Stripping Towers, Design Requirements, A.7. – Please provide the range of water loading rate for the varying flow conditions (split flow (700 gpm), 1400 gpm, and 2100 gpm). Does the removal rate for vinyl chloride change under the various scenarios?
- Is there any further information regarding NSF 61 certification for air stripping components - body, water distribution tray, packing support plates, etc.? Documents were provided for Wilsonart LLC (NSF51 certification), Specification Rubber Products, Inc. (NSF61 certification), EPDM Sheet Rubber Material (webpage noting NSF61 certification, but the certification), BETE Spray Technologies webpage (certification?), and Charlotte Pie & Foundry Company solvent cement (NSF-14 certification). Are these components of the tower? If so, please clarify what components these are in the tower. Please circle or identify the key information/applicable products.
- Sheet G-005, under Air Stripping Tower Description, F. - What is the material of construction for the tripack media? It is noted as polypropylene in the box 6 of the permit. Based on the NSF61 certification, only polypropylene material was approved. This needs to be stated in the description. Was the material’s chemical compatibility with vinyl chloride, cis-1,2-DCE, or chlorine solutions (although not pre-chlorinating at this time) confirmed?
- Sheet G-005, under Air Stripping Tower Description, H. - Please clarify that the mist eliminator is above the water distribution tray.
- Sheet G-005, under Air Stripping Tower Description - There is no mention of side wiper redistribution rings/devices that would prevent flow/short circuiting along the walls of the tower. Please explain why this was not included.
- Sheet G-005, under Air Stripping Tower Description L - Will the air outlet have a shroud that extends over the screen to prevent rainwater, etc. from entering the screen and will there be a lip to prevent drainage from the tower roof from entering the tower?
- Sheet G-005, under Air Stripping Tower Description – Is an effluent sump being provided?
- Sheet G-005, under Air Stripping Tower Description – There is no mention of sample taps on the influent and effluent piping. Typically, these would be used to evaluate removal efficiency of each tower and are helpful when trouble shooting operational problems. Why were these taps not included?
- Sheet G-005, under Air Stripping Tower Description – There is no mention of a blow-off line that could be used to discharge water/cleaning solutions when cleaning the tower. Why wasn’t this included?
- Sheet G-005, under Air Stripping Tower Description – There is no mention of overflow discharge line. Please provide an explanation of what would happen if the tower overflows.
- As proposed on plan sheet M-001 and M-002, there isn’t a valve at the effluent of each tower. Therefore, if one tower has been taken out of service it can’t be fully isolated from the system. Therefore, any debris or cleaning solutions/rinsate would be able to enter the clear well. Valves should be added on the effluent piping.
- Sheet G-005, under Air Assembly – Is the air intake protected with 24-mesh screen and a louver or shroud? Is the screen accessible for maintenance and inspection?
- Please clarify the method for cleaning media. I recalled that there was some discussion that the media would typically be removed and cleaned externally. How would build up on the interior surfaces of the tower be cleaned?
- The plans M-001 & M002 do not show a safety cage on the ladder. Please confirm whether a safety cage is required by OSHA.
- Sheet G-005 under Well Pumps A 1 and 2 – Why is there a 2<sup>nd</sup> design point?

**RE: Design information – Vinyl Chloride****June 10, 2022****PROJECT / REF: Milford, MI****PHYSICAL PROPERTIES OF CONTAMINANTS**

Contaminant – Vinyl chloride  
Molecular weight – 62.5 g/mol  
Boiling point – 9 degrees F  
Molar volume – 0.0653L/mol  
Henry's constant – 3.400  
Temperature const. – 1904 degrees K

**PHYSICAL PROPERTIES OF PACKING**

Type – Raschig Tripack  
Nominal size – 3.5"  
Material – Polypropylene  
Specific area – 38 sq. ft./ cu. ft.  
Packing factor – 14

**DESIGN PARAMETERS WITH REMOVAL EFFICIENCY**

Influent flow rate – 700 GPM, 1400 GPM, 2100 GPM  
Tower – 7'-6" sq.  
Load rate – @ 700 GPM = 12.4 GPM/sq. ft.  
                  @ 1400 GPM = 24.9 GPM/sq. ft.  
                  @ 2100 GPM = 37.3 GPM/sq. ft.

Influent temp. – 50 degrees

Media – 3.5" Tripack

Media depth – 14'-0"

Air to Water ratio – @ 700 GPM = 60:1 (5615 cfm)  
                              @ 1400 GPM = 40:1 (5615 CFM)  
                              @ 2100 GPM = 20:1 (5615 CFM)

Atmospheric pressure – 1.0 atm

Air pressure gradient - <.06" H<sub>2</sub>O/ft.

Contaminant – Vinyl chloride (VCM)

VCM influent concentration – 50 ug/L

Removal efficiency (VCM) @ 700 GPM – 99.4%

Effluent VCM concentration – 0.3 ug/L

Stripping factor – 124.6

(VCM) @ 1400 GPM – 98.7%

Effluent VCM concentration – 0.7 ug/L

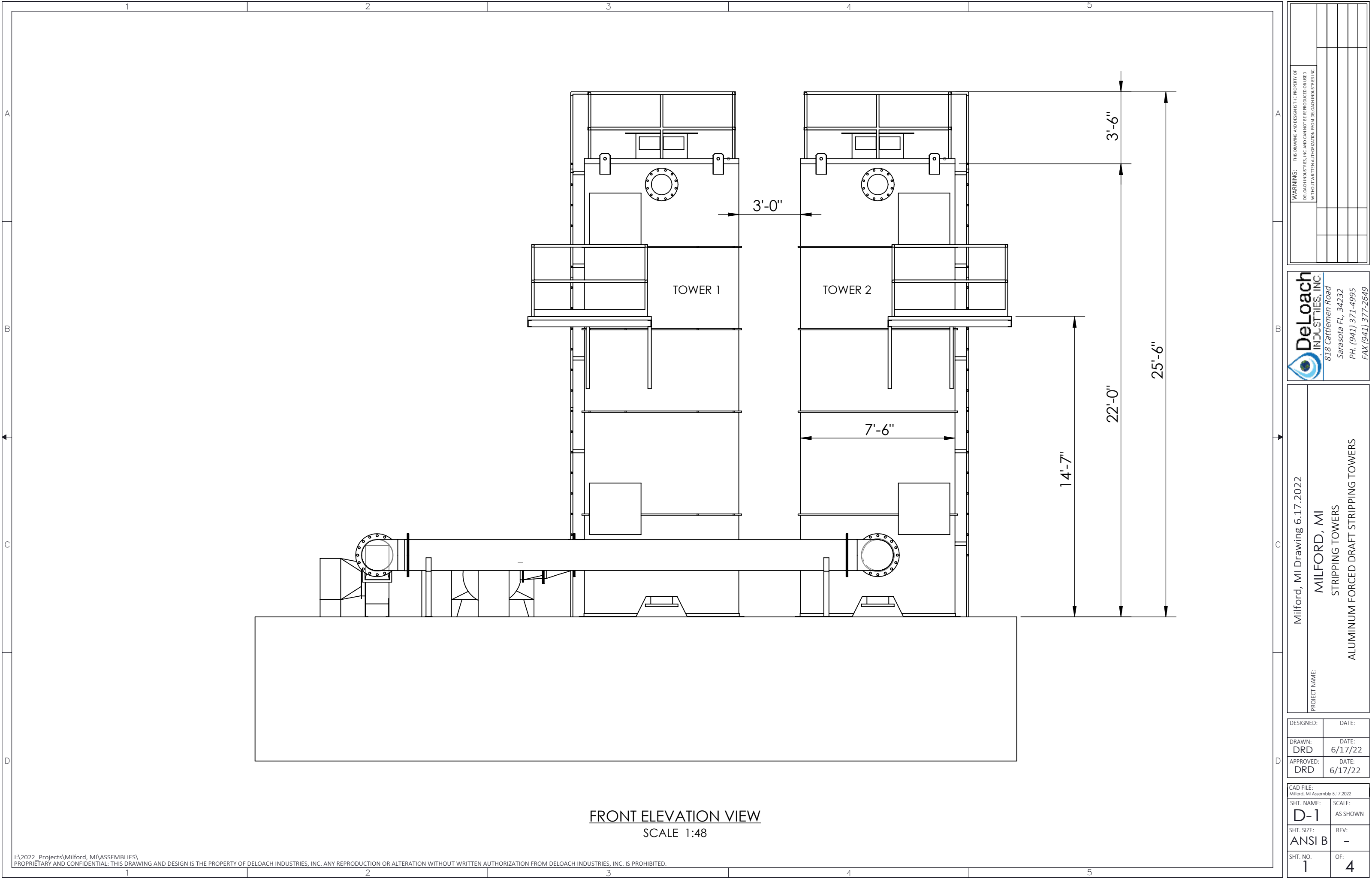
Stripping factor – 62.3

(VCM) @ 2100 GPM – 97.9%

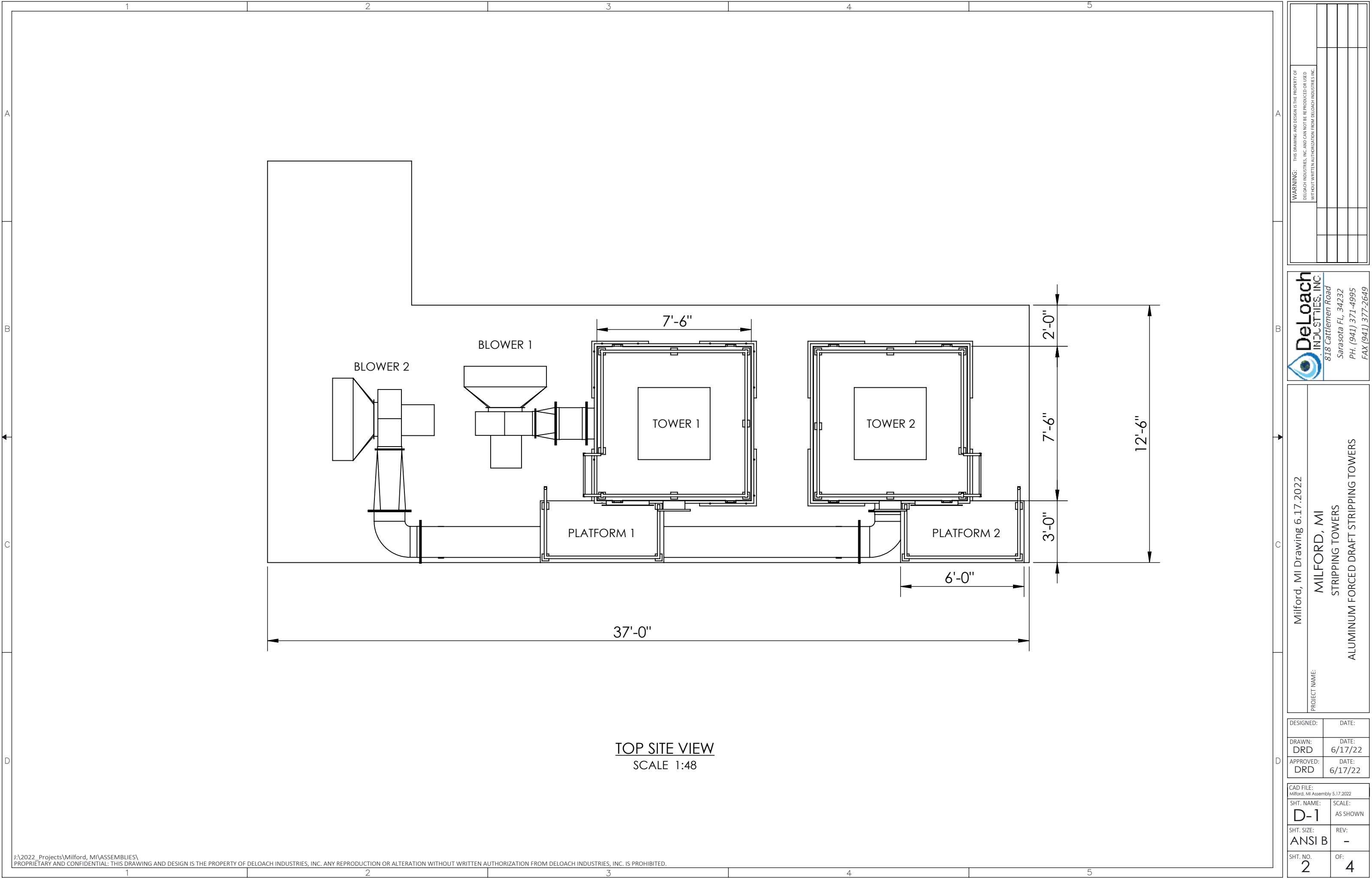
Effluent VCM concentration – 1.1 ug/L

Stripping factor – 41.5

Air pressure gradient for all scenarios is < .06" H<sub>2</sub>O per ft



FRONT ELEVATION VIEW  
SCALE 1:48



TOP SITE VIEW  
SCALE 1:48

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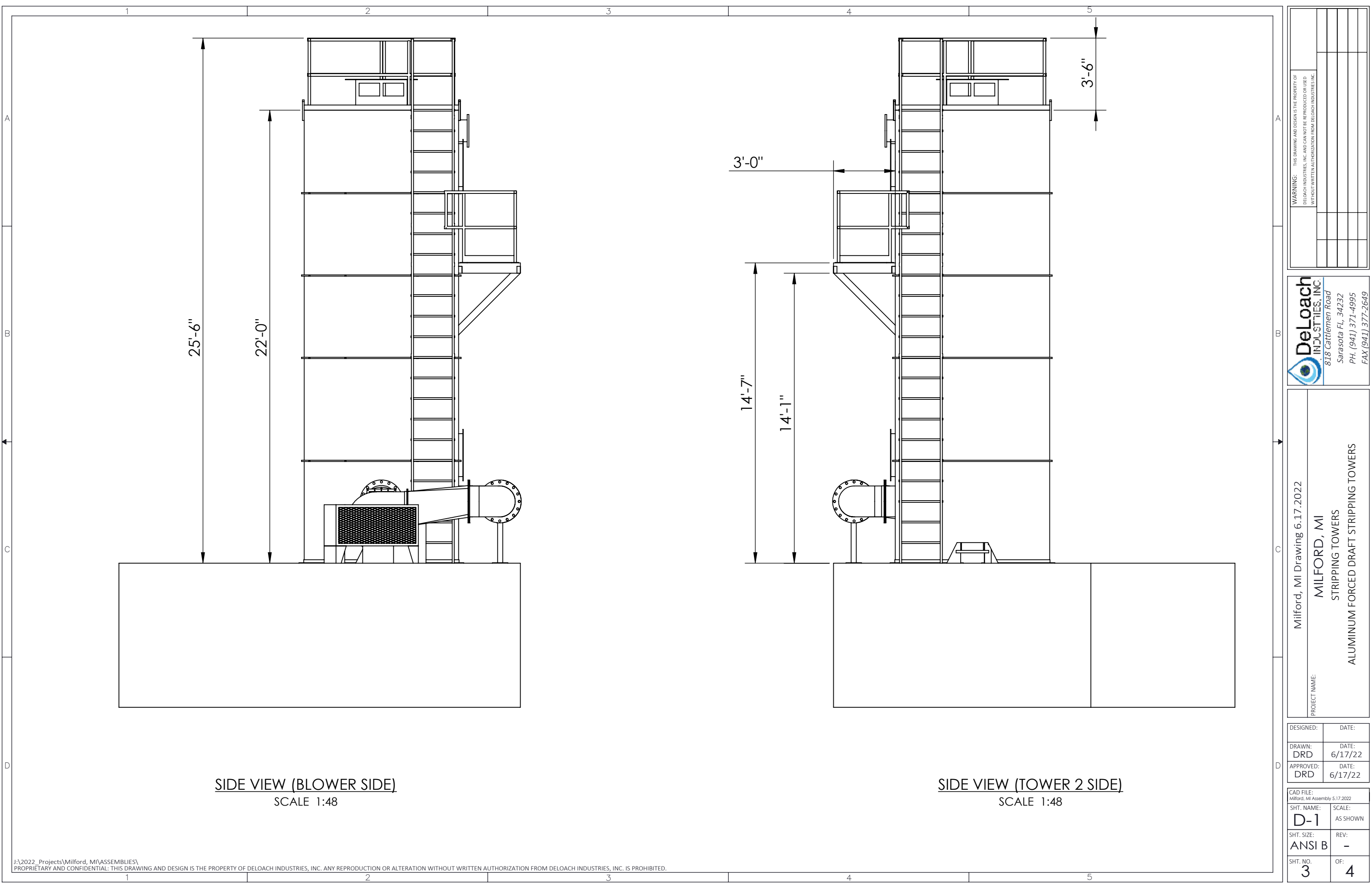
Milford, MI Drawing 6.17.2022

PROJECT NAME:  
MILFORD, MI  
STRIPPING TOWERS  
ALUMINUM FORCED DRAFT STRIPPING TOWERS

DESIGNED:	DATE:
DRAWN: DRD	DATE: 6/17/22
APPROVED: DRD	DATE: 6/17/22

CAD FILE: Milford, MI Assembly 5.17.2022	
SHT. NAME: D-1	SCALE: AS SHOWN
SHT. SIZE: ANSI B	REV: -
SHT. NO. 2	OF: 4





SIDE VIEW (BLOWER SIDE)  
SCALE 1:48

SIDE VIEW (TOWER 2 SIDE)  
SCALE 1:48

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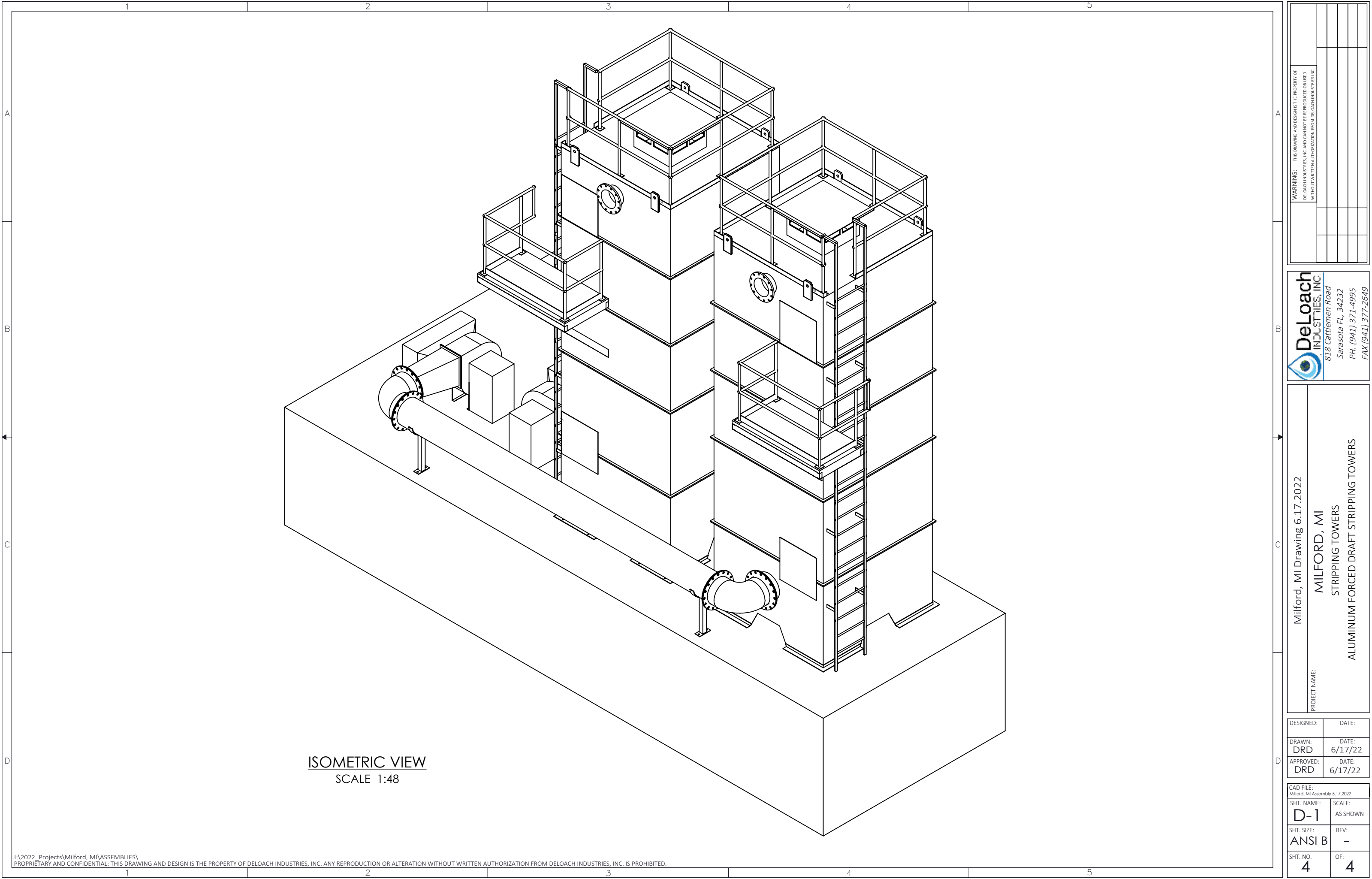
Milford, MI Drawing 6.17.2022

PROJECT NAME:

MILFORD, MI  
STRIPPING TOWERS  
ALUMINUM FORCED DRAFT STRIPPING TOWERS

DESIGNED:	DATE:
DRAWN: DRD	DATE: 6/17/22
APPROVED: DRD	DATE: 6/17/22

CAD FILE: Milford, MI Assembly 5.17.2022	
SHT. NAME: D-1	SCALE: AS SHOWN
SHT. SIZE: ANSI B	REV: -
SHT. NO. 3	OF: 4



ISOMETRIC VIEW  
SCALE 1:48

1	2	3	4	5
A				
B				
C				
D				

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FAX (941) 377-2649

Milford, MI Drawing 6.17.2022

PROJECT NAME: MILFORD, MI STRIPPING TOWERS

ALUMINUM FORCED DRAFT STRIPPING TOWERS

DESIGNED:	DATE:
DRAWN: DRD	DATE: 6/17/22
APPROVED: DRD	DATE: 6/17/22

CAD FILE: Milford, MI Assembly 5.17.2022	
SHT. NAME: D-1	SCALE: AS SHOWN
SHT. SIZE: ANSI B	REV: -
SHT. NO. 4	OF: 4

# VERTICAL TURBINE PUMP



## MOTOR

MFGR US HP 40 ENCLOSURE WP1 RPM 1800  
 TYPE VHS PHASE 3 HERTZ 60 VOLTS 230/460  
 S.F. 1.15 EFF. INV BD 16.50" BX 1.25"  
 KWT 0.25" CPLG NRR THRUST 5700 FRAME 324TPH  
 MODEL NO. HO40V2BLG CD 28.22"

## DISCHARGE HEAD

MODEL HH30 W/16.5" BD  
8" - ANSI CLASS 125-FF DISCHARGE FLANGE  
X PACKING BOX SPLIT BRZ PACKING GLAND  
N/A MECHANICAL SEAL N/A  
N/A TENSION ASSEMBLY YES SOLE PLATE

## COLUMN

8" X 0.322" WALL X THD N/A FLG'D  
 LINESHAFT X OPEN (N/A) ENCLOSED  
 SHAFT DIA 1.50" TPI 10 TPI TUBE DIA N/A

## BOWL

2 STAGE H12MC BOWL ASSEMBLY  
1400 US GPM FLOW 71 FT. HEAD  
 STRAINER YES X NO TYPE NONE

## MATERIALS

BOWLS CIEN COLUMN A53, GR B  
 IMPELLERS 876 BZ (STD) COLUMN CPLG DI  
 BWL SFT 416 SS SHAFT TUBE N/A  
 COLLETS 1215 CS BRG RET 304 SS  
 BOWL BRG BOWL DWG LINE SFT BRGS RUBBER  
 BOLTING GR. 5 LINE SHAFT SS (416)  
 TENSION BRG N/A SHAFT SLEEVES SS (304)  
 MECH SEAL N/A SHAFT CPLG SS (304)  
 SOLE PLATE A-36 PACKING GRAPHITE  
 BOWL WR N/A STRAINER N/A  
 IMP WR N/A HEAD CI  
 HEAD SHAFT 416 SS HEAD SHAFT CPG SS (304)  
 BOWL SURFACE FINISH STD PAINT; OD  
 COLUMN SURFACE FINISH NO COATING  
 HEAD SURFACE FINISH NO COATING

## PROJECT NAME

Well #2 & Well #4

## WEIGHT & THRUST ESTIMATES

BOWL 455 LBS COLUMN 131 LBS HEAD ? LBS  
 SHAFT 372 LBS TUBE 0 LBS DRIVER 600 LBS  
 HYD THRUST 1150 LBS DRIVER MAX THRUST 5700 LBS

SPECIAL NOTE: DO NOT ASSEMBLE AS A SCVT PUMP

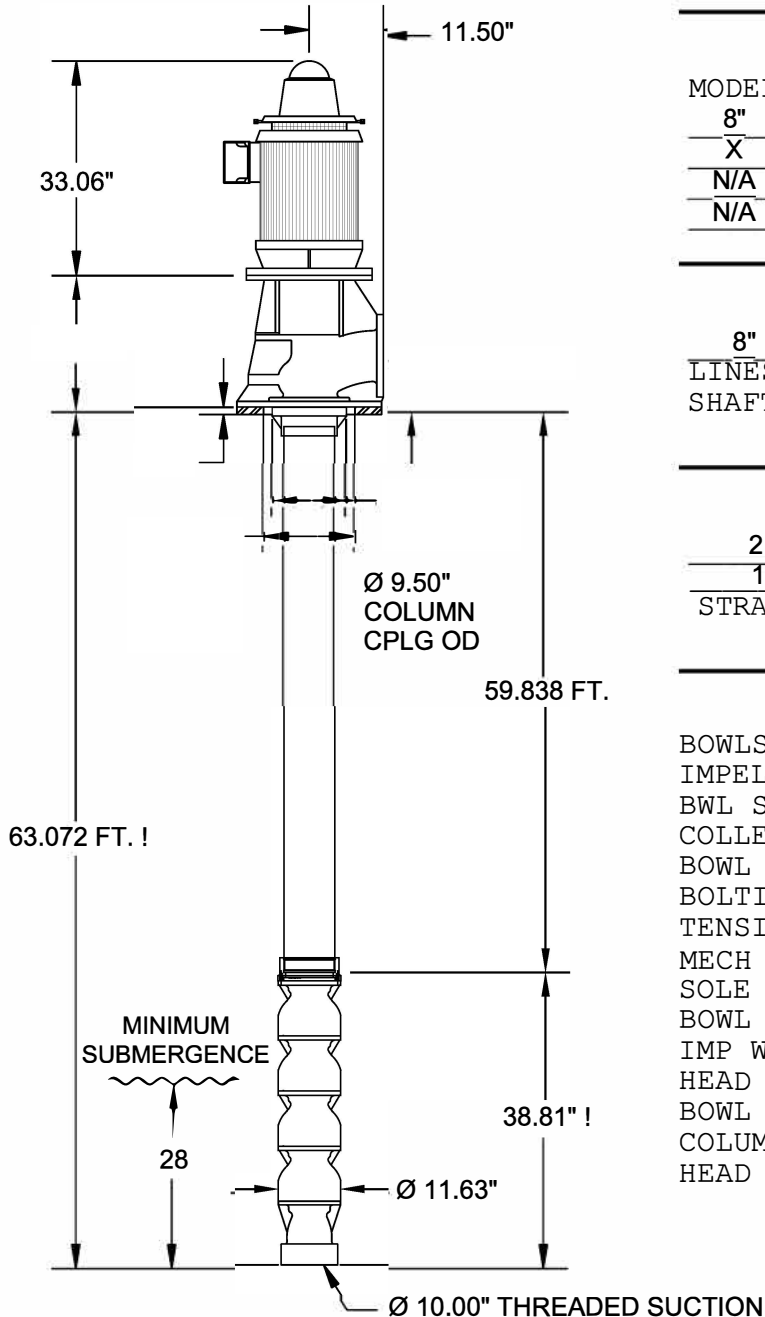
ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SHOWN.

FOUR STAGE ASSEMBLY SHOWN.

NOT FOR CONSTRUCTION UNLESS CERTIFIED.

C-167320

BUILD - 2



! OPTIONAL SUCTION PIPE LENGTH OF 10 FT. NOT INCLUDED IN TPL OR BOWL LENGTH DIMENSIONS

MFG. BY NATIONAL PUMP COMPANY

# Pump Data Sheet - National Pump Company

Company: Peerless-Midwest, Inc.

Milford, MI - Well #2 & Well #4

Name: Nathan Shail

Date: 5/27/2022



## Pump:

Size: H12MC (2 stage)  
Type: VERT.TURB.ENCLOSED  
Synch Speed: 1800 rpm  
Curve: CVH12MC4P6CY  
Specific Speeds:  
Dimensions:  
Vertical Turbine:  
Speed: 1770 rpm  
Dia: 8.58 in  
Impeller: H12MC (1/8 )  
Ns: 4200  
Nss: 9500  
Suction: ---  
Discharge: ---  
Bowl Size: 11.6 in  
Max Lateral: 1 in  
Thrust K Factor: 15.8 lbf/ft

## Search Criteria:

Flow: 1400 US gpm Head: 71 ft

## Fluid:

Water  
Density: 62.32 lb/ft<sup>3</sup>  
Viscosity: 0.9946 cP  
NPSHa: ---  
Temperature: 68 °F  
Vapor Pressure: 0.3391 psi a  
Atm Pressure: 14.7 psi a

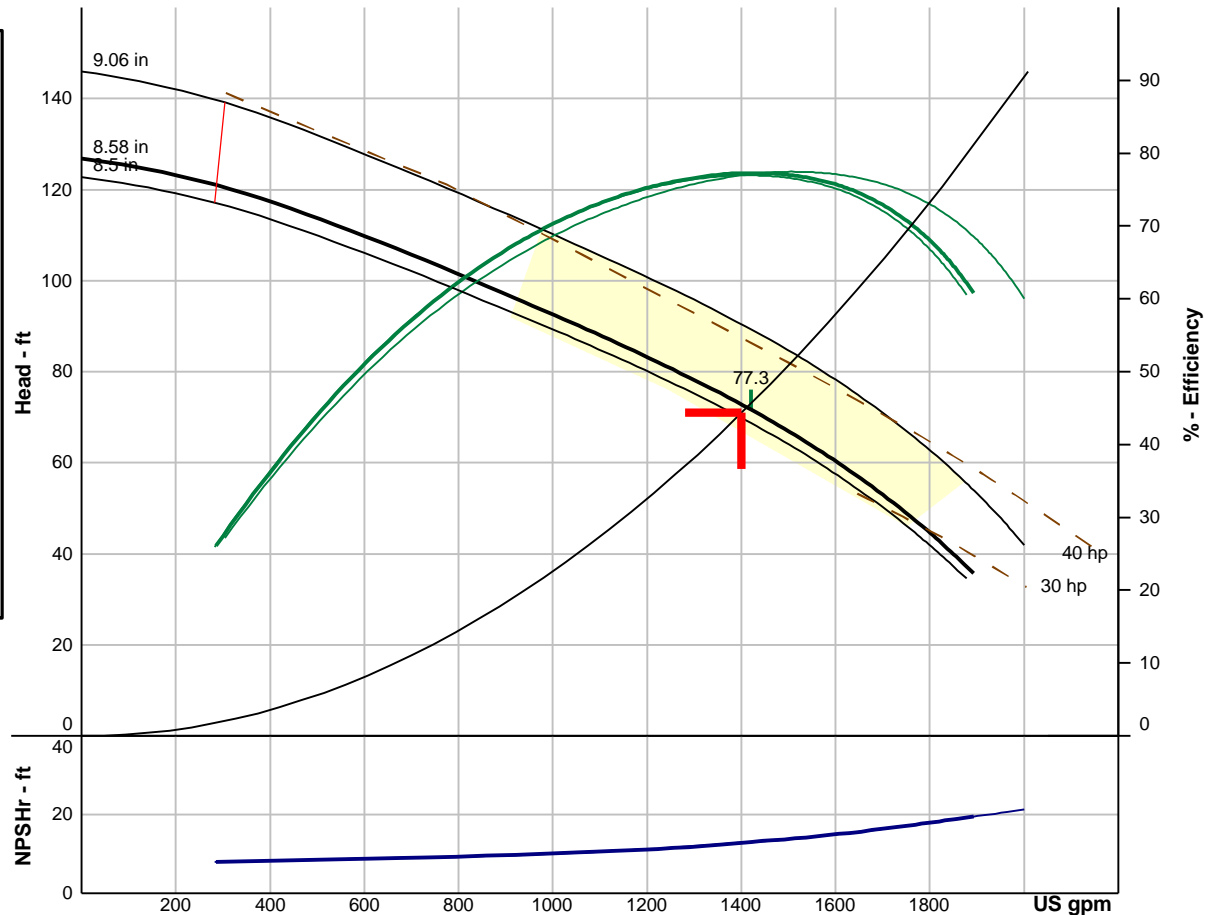
## Motor:

Standard: NEMA  
Enclosure: WP-I  
Sizing Criteria: Max Power on Design Curve  
Size: 40 hp  
Speed: 1800 rpm  
Frame: 324

## Pump Limits:

Temperature: 180 °F  
Pressure: 410 psi g  
Sphere Size: 0.9 in  
Power: 417 hp  
Eye Area: 33.5 in<sup>2</sup>

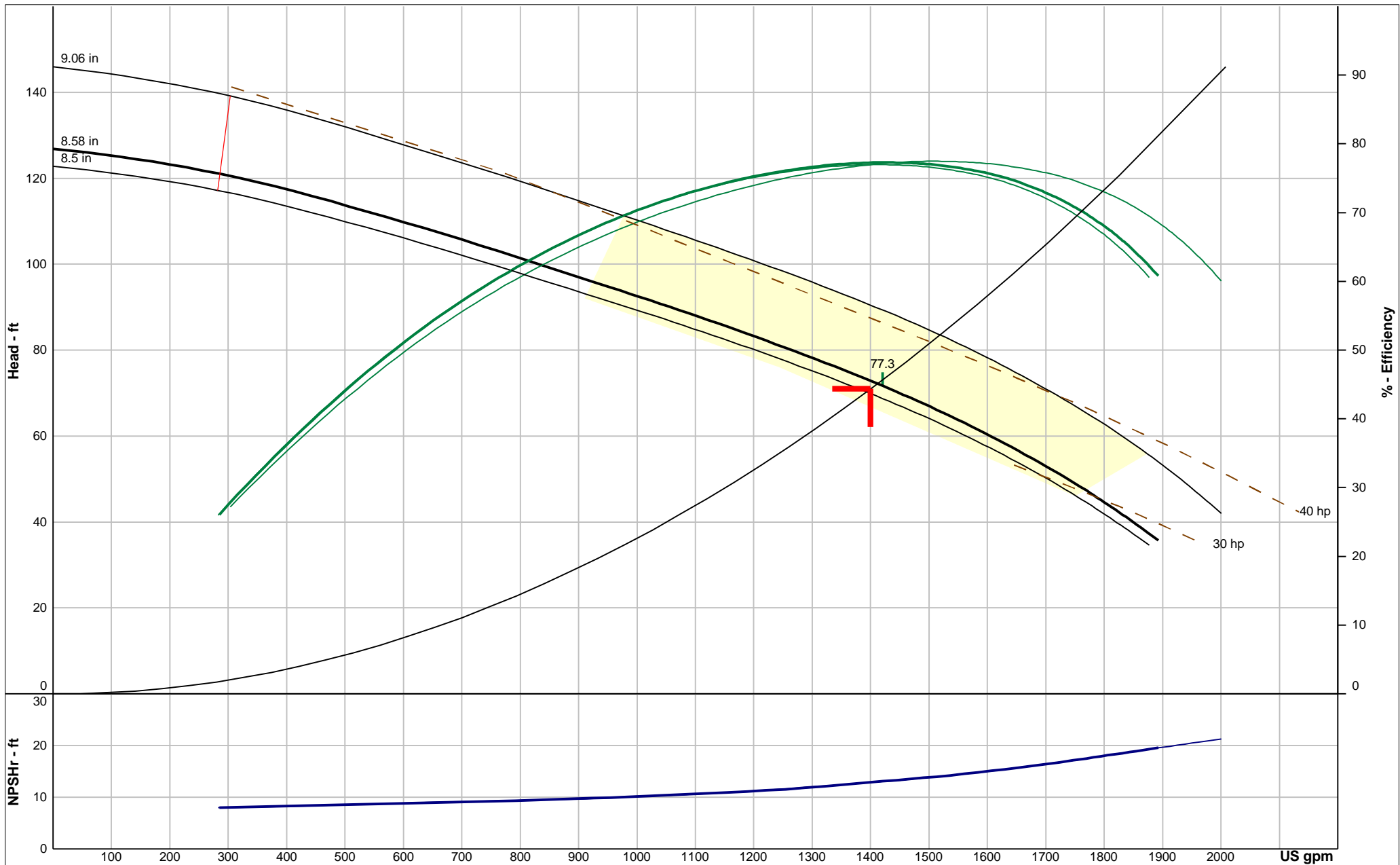
---- Duty Point ----	
Flow:	1400 US gpm
Head:	72.8 ft
Eff:	77%
Power:	33.3 hp
NPSHr:	12.9 ft
---- Design Curve ----	
Shutoff Head:	127 ft
Shutoff dP:	54.9 psi
Min Flow:	284 US gpm
BEP:	77.3% @ 1421 US gpm
NOL Power:	33.5 hp @ 1254 US gpm
-- Max Curve --	
Max Power:	41.5 hp @ 1335 US gpm



UNLESS OTHERWISE SPECIFIED: [1] LIMITS AND PERFORMANCE BASED ON STANDARD MATERIALS. [2] PERFORMANCE SHOWN MEETS HI 14.6-2011 GRADE 1B TOLERANCES AT THE RATED CONDITION WITHIN THE SELECTION WINDOW. [3] NPSHR AT 1ST STAGE IMPELLER CENTERLINE.

## Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
1680	1770	54.4	73	31.4	16.2
1400	1770	72.8	77	33.3	12.9
1120	1770	87.1	74	33.4	10.8
840	1770	99.6	63	32.9	9.6
560	1770	111	48	32.6	8.77

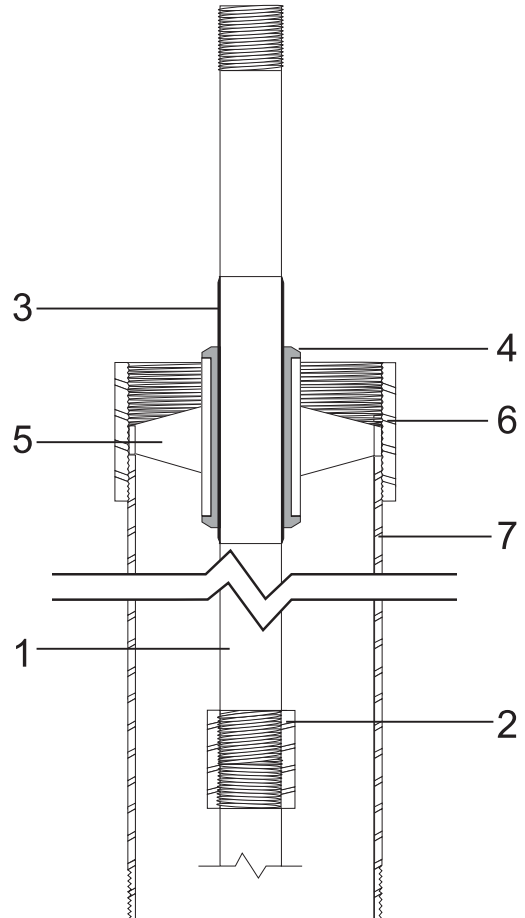


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## COLUMN ASSEMBLY PRODUCT LUBRICATED TYPE FOR LINESHAFT TURBINE PUMPS

COLUMN SIZE SCH. WALL THICKNESS	SHAFT SIZE	WEIGHT IN LBS.		MAX. AWWA REC'D. GPM	O.D. PIPE CPLG.
		5 FT.	10 FT.		
4"  SCH. 40 0.237"	1"	71	139	150	5.20"
	1-3/16"	77	150	100	
	1-1/4"	79	154	100	
5"  SCH. 40 0.258"	1"	95	182	325	6.30"
	1-3/16"	101	193	250	
	1-1/4"	103	197	250	
	1-1/2"	113	216	225	
6"  SCH. 40 0.280"	1"	118	227	600	7.39"
	1-3/16"	124	238	500	
	1-1/4"	126	242	500	
	1-1/2"	136	261	400	
	1-11/16"	144	277	400	
8"  SCH. 40 0.322"	1"	172	329	1350	9.63"
	1-3/16"	178	340	1300	
	1-1/4"	180	344	1300	
	1-1/2"	190	363	1150	
	1-11/16"	198	379	1150	
	1-15/16"	212	405	950	
10"  0.279"	1"	245	461	2800	11.75"
	1-3/16"	251	472	2600	
	1-1/4"	253	474	2600	
	1-1/2"	263	495	2450	
	1-11/16"	271	511	2450	
	1-15/16"	285	538	2000	
12"  SCH. 30 0.330"	1"	304	565	4700	14.00"
	1-3/16"	310	577	4300	
	1-1/4"	312	581	4300	
	1-1/2"	322	602	4000	
	1-11/16"	330	616	4000	
	1-15/16"	344	642	3600	
	2-3/16"	359	671	3400	

THREADED COLUMN ASSEMBLY  
PRODUCT LUBRICATED (PRL)



### TYPICAL COLUMN ASSEMBLY CONSISTS OF:

1. 416 STAINLESS STEEL LINESHAFT
2. 304 STAINLESS STEEL SHAFT COUPLING
3. 304 SS SLEEVE
4. NEOPRENE LINESHAFT BEARING
5. 304 STAINLESS STEEL BEARING RETAINER
6. DUCTILE IRON PIPE COUPLINGS
7. A53 GRADE B STEEL PIPE

CONSULT THE FACTORY FOR  
MATERIAL AVAILABILITY AND  
PRICES OTHER THAN STANDARD.

EFFECTIVE:  
**20-JUL-11**

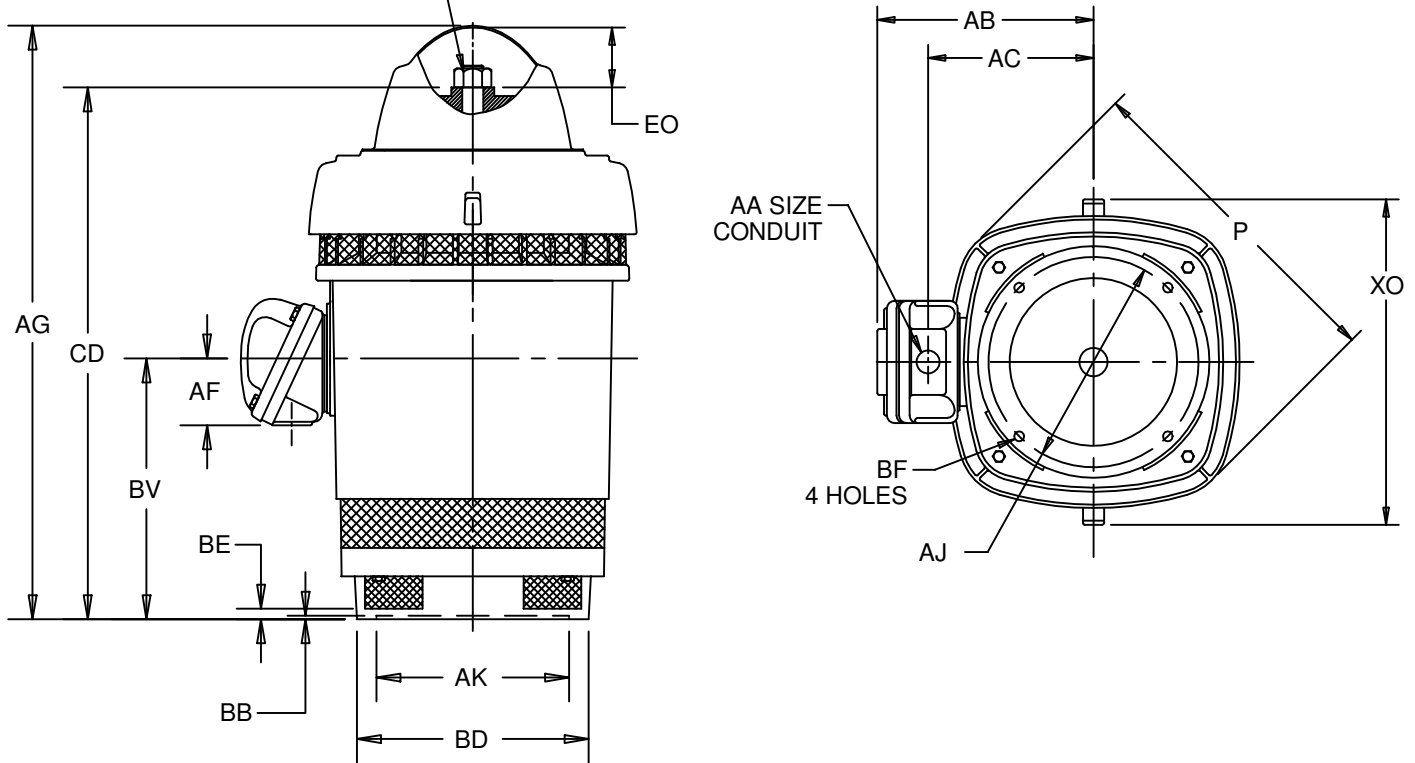
SUPERSEDES:  
**22-FEB-11**

**VERTICAL MOTORS**  
WEATHER PROTECTED TYPE 1  
FRAME: 324, 326TP, TPH  
BASIC TYPE: RU

PRINT:  
**09-2291**

SHEET:  
**1 OF 1**

PUMP SHAFT, ADJUSTING NUT AND  
LOCKING SCREWS ARE NOT  
FURNISHED WITH MOTOR



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

UNITS	P <sup>2</sup>	AG	BE	BV	CD	EO	XO
IN	19.06	33.06	.69	11.06	28.22	4.69	21.69
MM	484	840	18	281	717	119	551

FRAME	UNITS	AJ	AK	BB MIN	BD MAX	BF
324, 326TP	IN	14.750	13.500	.25	16.50	.69
	MM	374.65	342.90	6	419	18
324,326TPH	IN	9.125	8.250	.19	12.00	.44
	MM	231.78	209.55	5	305	11

CONDUIT BOX MATERIAL	UNITS	AA	AB	AC	AF
STEEL	IN	3.00	15.84	11.56	3.38
	MM		402	294	86
CAST IRON	IN	3 NPT	16.63	12.25	4.63
	MM		422	311	118

- 1: ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.  
2: LARGEST MOTOR WIDTH.  
3: CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES REGARDLESS OF LOCATION.  
STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.  
4: TOLERANCES SHOWN ARE IN INCHES ONLY.

TOLERANCES	8.250 AK	13.500 AK
FACE RUNOUT	.004 T.I.R.	.007 T.I.R.
PERMISSIBLE ECCENTRICITY OF MOUNTING RABBET	.004 T.I.R.	.007 T.I.R.
TOLERANCE ON AK DIMENSION	+.003	+.005

09-2291/C

**Nidec Motor Corporation**  
St. Louis, Missouri

INFORMATION DISCLOSED ON THIS DOCUMENT  
IS CONSIDERED PROPRIETARY AND SHALL NOT BE  
REPRODUCED OR DISCLOSED WITHOUT WRITTEN  
CONSENT OF NIDEC MOTOR CORPORATION



ISSUED BY  
**E. WENDT**  
APPROVED BY  
**K. POTTER**

IHP\_DP\_NMCA (MAR-2011) SOLIDEDGE

# NAMEPLATE DATA

CATALOG NUMBER		HO40V2BLG		NAMEPLATE PART #:		422707-005	
MODEL	DT97	FR	324TP	TYPE	RUSI	ENCL	WPI
SHAFT END BRG		6211-J - QTY 1		OPP END BRG		7220 BEP - QTY 1	
PH	3	MAX AMB	40 C	ID#			
INSUL CLASS	F	Asm. Pos.			DUTY	CONT	
HP	40	RPM	1780	HP		RPM	
VOLTS	460	230		VOLTS			
FL AMPS	45.0	91.0		FL AMPS			
SF AMPS	52.0	104.0		SF AMPS			
SF	1.15	DESIGN	B	CODE	G		
NEMA NOM EFFICIENCY	94.5	NOM PF	87.8	KiloWatt	29.840		
GUARANTEED EFFICIENCY	93.6	MAX KVAR		HZ	60		

**HAZARDOUS LOCATION DATA (IF APPLICABLE):**

DIVISION		CLASS I		GROUP I	
TEMP CODE		CLASS II		GROUP II	

**VFD DATA (IF APPLICABLE):**

VOLTS	460	230		
AMPS	47.3	95.6		
TORQUE 1	117.9LB-FT		TORQUE 2	
VFD LOAD TYPE 1	VT/PWM		VFD LOAD TYPE 2	
VFD HERTZ RANGE 1	6-60		VFD HERTZ RANGE 2	
VFD SPEED RANGE 1	180-1800		VFD SPEED RANGE 2	
SERVICE FACTOR	1.00		FL SLIP	
NO. POLES			MAGNETIZING AMPS	
VECTOR MAX RPM			Encoder PPR	
Radians / Seconds			Encoder Volts	

**TEAO DATA (IF APPLICABLE):**

HP (AIR OVER)		HP (AIR OVER M/S)		RPM (AIR OVER)		RPM (AIR OVER M/S)	
FPM AIR VELOCITY		FPM AIR VELOCITY M/S		FPM AIR VELOCITY SEC			



**ADDITIONAL NAMEPLATE DATA:**

Decal / Plate	WD=159833	Customer PN	
Notes		Non Rev Ratchet	NRR
Max Temp Rise		OPP/Upper Oil Cap	3 QT/2.8 L
Thermal (WDG)	OVER TEMP PROT 2	SHAFT/Lower Oil Cap	GREASE
Altitude			
Regulatory Notes		Regulatory Compliance	
COS		Marine Duty	
Balance	0.08 IN/SEC	Arctic Duty	
3/4 Load Eff.	94.4	Inrush Limit	
Motor Weight (LBS)	635	Direction of Rotation	
Sound Level		Special Note 1	
Vertical Thrust (LBS)	5700	Special Note 2	
Thrust Percentage	100% HT	Special Note 3	
Bearing Life		Special Note 4	
Starting Method		Special Note 5	
Number of Starts		Special Note 6	
200/208V 60Hz Max Amps		SH Max. Temp.	
190V 50 hz Max Amps		SH Voltage	SH VOLTS=115V
380V 50 Hz Max Amps		SH Watts	SH WATTS= 96W
NEMA Inertia		Load Inertia	
Sumpheater Voltage		Sumpheater Wattage	
Special Accessory Note 1		Special Accessory Note 16	
Special Accessory Note 2		Special Accessory Note 17	
Special Accessory Note 3		Special Accessory Note 18	
Special Accessory Note 4		Special Accessory Note 19	
Special Accessory Note 5		Special Accessory Note 20	
Special Accessory Note 6		Special Accessory Note 21	
Special Accessory Note 7		Special Accessory Note 22	
Special Accessory Note 8		Special Accessory Note 23	
Special Accessory Note 9		Special Accessory Note 24	
Special Accessory Note 10		Special Accessory Note 25	
Special Accessory Note 11		Special Accessory Note 26	
Special Accessory Note 12		Special Accessory Note 27	
Special Accessory Note 13		Special Accessory Note 28	
Special Accessory Note 14		Special Accessory Note 29	
Special Accessory Note 15		Special Accessory Note 30	

**NIDEC MOTOR CORPORATION**  
ST. LOUIS, MO



TYPICAL NAMEPLATE DATA  
ACTUAL MOTOR NAMEPLATE LAYOUT MAY VARY  
SOME FIELDS MAY BE OMITTED

Nidec trademarks followed by the ® symbol are registered with the U.S. Patent and Trademark Office.

## MOTOR PERFORMANCE

MODEL NO.	CATALOG NO.	PHASE	TYPE	FRAME
DT97	HO40V2BLG	3	RUSI	324TP

ORDER NO.	22256	LINE NO.
-----------	-------	----------

MPI:	141535	141537
HP:	40	40
POLES:	4	4
VOLTS:	460	230
HZ:	60	60
SERVICE FACTOR:	1.15	1.15
EFFICIENCY (%):		
S.F.	94	94
FULL	94.1	94.1
3/4	94.4	94.4
1/2	93.6	93.6
1/4	90	90
POWER FACTOR (%):		
S.F.	87.9	87.9
FULL	87.8	87.8
3/4	86.4	86.4
1/2	81.3	81.3
1/4	64.8	64.8
NO LOAD	7.9	7.9
LOCKED ROTOR	36.4	36.4
AMPS:		
S.F.	52	104
FULL	45	91
3/4	34	69
1/2	24.6	49
1/4	16.1	32
NO LOAD	11.8	23.5
LOCKED ROTOR	286	572
NEMA CODE LETTER	G	G
NEMA DESIGN LETTER	B	B
FULL LOAD RPM	1780	1780
NEMA NOMINAL EFFICIENCY (%)	94.5	94.5
GUARANTEED EFFICIENCY (%)	93.6	93.6
MAX KVAR	8	8
AMBIENT (°C)	40	40
ALTITUDE (FASL)	3300	3300
SAFE STALL TIME-HOT (SEC)	30	30
SOUND PRESSURE (DBA @ 1M)	65	65
TORQUES:		
BREAKDOWN{% F.L.}	251	251
LOCKED ROTOR{% F.L.}	192	192
FULL LOAD{LB-FT}	117.9	117.9

NEMA Nominal and Guaranteed Efficiencies are up to 3,300 feet above sea level and 25 ° C ambient

The Above Data Is Typical, Sinewave Power Unless Noted Otherwise

**NIDEC MOTOR CORPORATION**  
ST. LOUIS, MO



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Please contact me if you have any questions.

Regards,

Tiffany

**Tiffany Yusko-Kotimko**

Environmental Engineer

Drinking Water and Environmental Health Division

Michigan Department of Environment, Great Lakes & Energy

Warren District Office | 27700 Donald Court | Warren, MI 48092

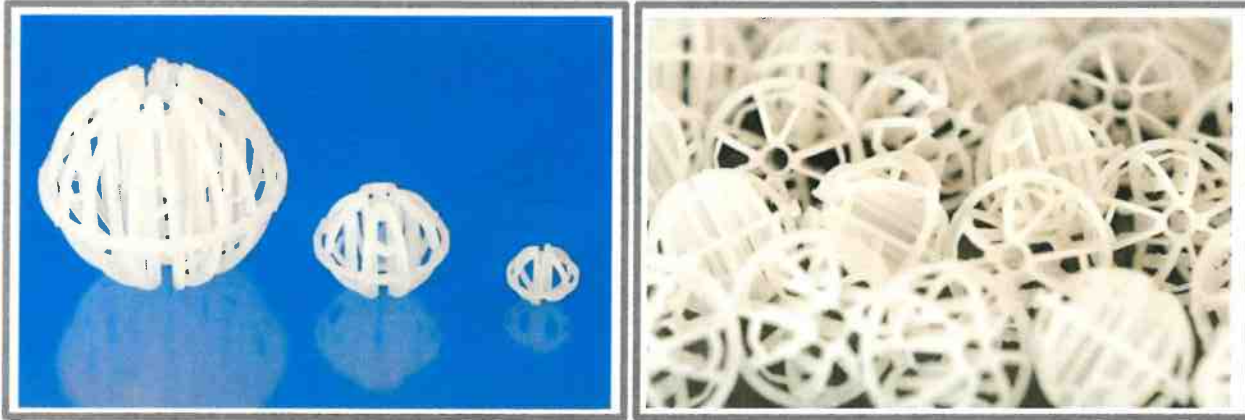
586-817-9120 | [YuskoKotimkoT@michigan.gov](mailto:YuskoKotimkoT@michigan.gov)

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**\*\*ATTENTION: Our office is closed to the public, but we are receiving deliveries.\*\***

# Jaeger Tri-Packs®

High-performance, free-flowing random spherical packing for scrubber and stripper applications. NSF certified or listed for potable water contact.



Size		1"	2"	3.5"
<b>Geometric Surface Area</b>	ft <sup>2</sup> /ft <sup>3</sup>	85	48	38
<b>Packing Factor</b>	1/ft	28	16	12
<b>Void Space</b>	%	90.0	93.5	95.0
<b>Bulk Density</b> (reference: polypropylene)	lb <sub>m</sub> /ft <sup>3</sup>	6.2	4.2	3.3

**Jaeger Tri-Packs®** (all sizes) are National Sanitation Foundation (NSF) certified or listed for potable water contact. No reground or recycled plastic resin is used to mold Jaeger Tri-Packs ®. Only virgin resin direct from a primary supplier is used. This assures that the rigid requirements of NSF including passing unannounced audits of our production facility are assured. A customer can purchase product in complete confidence that the integrity of their drinking water will be assured.

For more information and design assistance, please contact us at:

**Raschig USA, Inc.**  
Formerly Raschig Jaeger Technologies  
2201 E. Lamar Blvd. #240  
Arlington, TX 76006  
800-678-0345  
817-695-5680  
info@raschig-usa.com

Jaeger Tri-Packs® is a Registered Trademark of Raschig USA, Inc.

IMPORTANT: The following supercedes Buyer's Documents. SELLER MAKES NO REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, INCLUDING OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. No statements herein are to be construed as inducements to infringe any relevant patent. Under no circumstances shall Seller be liable for incidental, consequential or indirect damages for alleged negligence, breach of warranty, strict liability, tort or contract arising in connection with the product(s). Buyer's sole remedy and Seller's sole liability for any claims shall be Buyer's purchase price. Data and results are based on controlled or lab work and must be confirmed by Buyer by testing for intended conditions of use. The product(s) has not been tested for, and is therefore not recommended for, uses for which prolonged contact with mucous membranes, abraded skin, or blood is intended; or for uses for which implantation within the human body is intended.



The Public Health and Safety Organization

## NSF Product and Service Listings

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### NSF/ANSI/CAN 61 Drinking Water System Components - Health Effects

**NOTE: Unless otherwise indicated for Materials, Certification is only for the Water Contact Material shown in the Listing. Click here for a list of [Abbreviations used in these Listings](#). Click here for the definitions of [Water Contact Temperatures denoted in these Listings](#).**

---

Raschig USA Inc.  
2201 East Lamar Boulevard  
Suite 240  
Arlington, TX 76006  
United States

800-678-0345  
281-449-9500

**Facility :** El Dorado, KS

**Process Media**

Trade Designation	Size	Water Contact Temp	Water Contact Material
<b>Aeration</b>			
Nor-Pac Tower Packing 2", PP	2"	CLD 23	PP
Jaeger Tri-Packs PP	[1]	CLD 23	PP
Low Profile Rings (LPR)	[2]	CLD 23	PP

[1] Jaeger Tri-Packs PP is Certified for the following diameters: 1" - 3.5".  
[2] Low Profile Rings (LPR) is Certified for the following diameters: 1" - 3".

NOTE: Certified for water treatment plant applications.  
This product has not been evaluated for point of use applications.

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Number of matching Manufacturers is 1  
Number of matching Products is 3  
Processing time was 0 seconds



Need information, help, a quote?

- (817) 695-5680
- [info@raschig-usa.com](mailto:info@raschig-usa.com)

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# Product Specifications, Bulletins, Technical Articles

Questions? Need Help? Comments? [info@raschig-usa.com](mailto:info@raschig-usa.com)



## Tower Packings

## Column Internals & Product Bulletins

---

### Plastic Packings



## Plastic Random Packing

- **Jaeger Tri-Packs®** *Made in the USA* All sizes of this product in polypropylene are **NSF 61** listed for potable water contact. File in **Spanish**.
- **Low Profile Rings®**
- **Star Rings**
- **Raschig Super Ring®, Plastic**
- File in **Spanish**.
- **Pall Rings (also called Jaeger Rings, Ballast Rings, Basic Rings, etc.)**
- **Saddles**

## Plastic Packing: Technical Information

- **Maximum Temperature Tolerances of Available Plastic Resins**
- **National Sanitation Foundation NSF 61 Potable Water Certification**: Our listed products are the three sizes of the Jaeger Tri-Packs® in polypropylene.
- **Chemical Resistance of Plastics and Metals: Cole-Parmer® Chemical Compatibility Data Base**
- **Maintenance and Cleaning of Random Plastic Packings**

## Metal Packings

### Metal Random Packing

- **Raschig Super Ring®, Metal**
- **Raschig Super Ring® Plus, Metal**
- **Ralu-Ring, Metal**
- **Pall Ring, Metal**
- **Raschig Rings** – The Famous Packing Invented by Dr. Raschig
- **Low Profile Rings – Metal**

## Column Internals

### Column Internals

- **Liquid Distributors – Support Plates**
- **Hydroprocessing Reactor Internals**

### Column Internals: Technical Information

- **“Influence of Liquid Redistributors on Mass Transfer Efficiency of Packed Columns”**; Industrial & Engineering Chemistry Research, Dr. Michael Schultes, Raschig GmbH
- **“The impact of tower internals on column performance”**, Petroleum Technology Quarterly Q1 2016, Dr. Michael Schultes, Raschig GmbH
- **“A Modern Liquid Distributor and Redistributor Design”**, **Hydrocarbon Engineering** Part 1 January 2009 and Part 2 February 2009
  - **Part 1**
  - **Part 2**

## Product Bulletins

- **Product Bulletin 100** – Introduction to our various packings
- **Raschig Super Rings® Metal and Plastic Random Packings Bulletin 200**
- **Product Bulletin 251** – RSR Plus Data – 5th Generation Random Metal Packing
- **Wire Mesh Mist Eliminators Product Bulletin 300**
- **Fractionation Tray Technology Bulletin 401**
- **Raschig Super-Pak® Structured Metal Packing Bulletin 501**
- **Jaeger Tri-Packs®/Hacketten Product Bulletin 600**
- **Raschig Super-Rings® Product Bulletin 625**



## Metal Structured Packing

- [Raschig Super-Pak®](#)

## Metal Packing: Technical Information

- [Comparison Guide: Raschig USA Packing Equivalency Chart](#)
- [Fractionation Research Institute – Tests of Raschig Super Ring® Results](#)
- Raschig Super Ring®, Metal
  - [Raschig Super Ring®](#) versus Pall Rings – Table 2  
Data from the paper immediately below
  - [Raschig Super Ring®, 4th Generation Packing](#)
  - Dr. Michael Schultes, Raschig GmbH; [Researching Rings](#)
  - Fractionation Research, Inc.
    - [Report of Raschig Super Ring® No. 0.3 Test](#)
    - [Report of Raschig Super Ring® No. 0.7 Test](#)
    - [Fractionation Research Institute RSR Test Results as a Brochure](#)
- Raschig Super-Pak®
  - [Raschig Super-Pak®: 4th Generation Packing Design](#)
  - [Raschig Super-Pak®: How to Surpass Conventional and High Capacity Structured Packings](#)
  - [Reaching New Performance Levels With Surface Enhanced Raschig Super-Pak®](#)
  - Fractionation Research Institute: [Test of Raschig Super-Pak® 250](#)

- [Low Profile Rings Product Bulletin 650](#)
- [Jaeger \(Pall\) Rings and Super Torus Saddles Bulletin 700](#)
- [Low Profile rings Bulletin 800](#)
- [Column Internals Product Bulletin 1100](#)
- [Column Internals Product Bulletin 1101](#) (large file, 6.43 MB)

## General Technical Articles

- [“How Sensitive is Your Treating Plant to Operating Conditions?”](#) presented at the 2014 AIChE meeting in New Orleans, Dr. Michael Schultes Raschig GmbH co-author
- [“Research on Mass Transfer Columns: passé?”](#), Dr. Michael Schultes Raschig GmbH, Chemical Engineering Technology 2013, 36, No.9, 1539-1549
- [“The Impact of Tower Internals on Packing Performance”](#), Dr. Michael Schultes Raschig GmbH, Chem. Ing. Tech. 2014, 86, No.5, 1-9
- [Raschig High Capacity Mini Fixed Valves FRI Tested](#) AIChE Spring Meeting Austin TX April 2015

## Carbon Packings

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## Carbon Random Packing

- **Raschig Rings**

## Ceramic Packings

### Ceramic Random Packing

- **Raschig Rings – Pall Rings – Saddles**

### Ceramic Structured Packing

- **Raschig-Pak Ceradur®**

Jaeger Tri-Packs®, Nor-Pac®, Raschig Super Ring®, and Raschig Super-Pak® are registered trademarks of Raschig USA, Inc.

Cole Parmer® is a registered trademark of [Cole Parmer, Inc.](#)





**Raschig USA, Inc.**

**Phone** 817.695.5680  
800.678.0345 (Toll-Free)

**Fax** 817.695.5697

**Location** 2201 East Lamar Blvd.  
Suite 240 Arlington, TX  
76006

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*Raschig USA was formerly called Raschig Jaeger Technologies, as the result of the purchase of Jaeger Products.*

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**ALUMINUM**

The Public Health and Safety Organization

## **NSF Product and Service Listings**

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### **NSF/ANSI 51 Food Equipment Materials**

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#### **Wilsonart LLC**

2400 Wilson Place

P.O. Box 6110

Temple, TX 76503

United States

254-207-7000

**Facility : # 1 USA**

Trade Designation	Color	Type of Food	Maximum Temperature of Use in °F
<b>Anodized Aluminum Sheet for Splash Zone[1]</b>			
Wilsonart® 6240 (419)	Polished Mirror	N/A	212°
Wilsonart® 6251 (419)	Polished Natural Aluminum	N/A	212°
Wilsonart® 6252 (419)	Matte Natural Aluminum	N/A	212°
Wilsonart® 6256 (419)	Brite Brushed Natural Aluminum	N/A	212°
Wilsonart® 6257 (419)	Satin Brushed Natural Aluminum	N/A	212°
Wilsonart® 6277 (419)	Alumasteel™	N/A	212°
Wilsonart® 6253 (419)	Brite Brushed Gold Aluminum	N/A	212°
		N/A	212°
Wilsonart® 6254 (419)	Matte Gold Aluminum	N/A	212°
Wilsonart® 6255 (419)	Polished Gold Aluminum	N/A	212°
Wilsonart® 6258 (419)	Satin Brushed Gold Aluminum	N/A	212°
Wilsonart® 6284 (419)	Satin Brushed Copper Aluminum	N/A	212°
Wilsonart® 6285 (419)	Polished Copper Aluminum	N/A	212°
Wilsonart® 6280 (419)	Polished Smoke Aluminum	N/A	212°
Wilsonart® 6281 (419)	Satin Brushed Smoke Aluminum	N/A	212°
Wilsonart® 6295 (419)	Polished Black Aluminum	N/A	212°
Wilsonart® 6261 (419)	Satin Brushed Light Bronze Aluminum	N/A	212°
Wilsonart® 6262 (419)	Satin Brushed Medium Bronze Aluminum	N/A	212°
Wilsonart® 6296 (419)	Satin Brushed Black Aluminum	N/A	212°

[1] Decorative Metals

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Number of matching Manufacturers is 1

Number of matching Products is 18

Processing time was 0 seconds



## GASKET

The Public Health and Safety Organization

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### NSF/ANSI/CAN 61 Drinking Water System Components - Health Effects

**NOTE: Unless otherwise indicated for Materials, Certification is only for the Water Contact Material shown in the Listing. Click here for a list of Abbreviations used in these Listings. Click here for the definitions of Water Contact Temperatures denoted in these Listings.**

---

Specification Rubber Products, Inc.

P.O. Box 568

Alabaster, AL 35007

United States

205-663-2521

**Facility : Alabaster, AL****Joining and Sealing Materials**

<b>Trade Designation</b>	<b>Size</b>	<b>Water Contact Temp</b>	<b>Water Contact Material</b>
<b>Gasket/Sealing Materials</b>			
Amarillo Fast-Grip® Gasket EPDM (43650)	>= 4"	CLD 23	EPDM
Amarillo Fast-Grip® Gasket FKM (9355Y)[G]	>= 3"	CLD 23	FE
Amarillo Fast-Grip® Gasket FKM (9365Y)[G]	>= 3"	CLD 23	FE
Amarillo Fast-Grip® Gasket NBR (53650)	>= 4"	CLD 23	NBR
Amarillo Fast-Grip® Gasket SBR (63650)[1] [G]	>= 3"	CLD 23	SBR
Barracuda® RJ Gasket (43650)	>= 4"	CLD 23	EPDM
Barracuda® RJ Gasket (53650)	>= 4"	CLD 23	NBR
Barracuda® RJ Gasket FKM (9355O)[G]	>= 3"	CLD 23	FE
Barracuda® RJ Gasket FKM (9365O)[G]	>= 3"	CLD 23	FE
EPDM AMERICAN Fast-Grip® Gasket (46502)	>= 3"	CLD 23	EPDM
EPDM AMERICAN Toruseal® Flange Gasket (43650)	>= 2"	CLD 23	EPDM
EPDM AMERICAN Toruseal® Flange Gasket (47501)	>= 2"	CLD 23	EPDM
EPDM Baker Coupling Gasket (46502)	>= 3"	CLD 23	EPDM
EPDM Barracuda® RJ Gasket (46502)	4" - 24"	CLD 23	EPDM
EPDM Bonnet Gasket (47501)	4" - 12"	CLD 23	EPDM
EPDM FASTITE® Joint Gasket (46502)	>= 3"	CLD 23	EPDM
EPDM FULL FACE FLANGE TYTE® Gasket (47501)	>= 3"	CLD 23	EPDM
EPDM Filler Flange Gasket (47501)	4" - 12"	CLD 23	EPDM
EPDM Flat Ring Style Gasket (47501)	2" - 30"	CLD 23	EPDM



EPDM Full Face Flat Gasket (47501)	2" - 30"	CLD 23	EPDM
EPDM Griffin TALON™ RJ Gasket (45501)	>= 3"	CLD 23	EPDM
EPDM MJ Transition Gasket (47501)	>= 3"	CLD 23	EPDM
EPDM Mechanical Joint Gasket (47501)	>= 3"	CLD 23	EPDM
EPDM Meter Gasket (47501)	>=2"	CLD 23	EPDM
EPDM MeterSeal™ Gasket (47501)	>=2"	CLD 23	EPDM
EPDM Sheet Gasket Material (47501)	>= 3"	CLD 23	EPDM
EPDM TR Flex® Gasket (45501)	>= 3"	CLD 23	EPDM
EPDM TYTON® Joint Gasket (45501)	>= 3"	CLD 23	EPDM
FKM Mechanical Joint Gasket (97501)	>= 3"	CLD 23	FE
FKM MeterSeal™ Gasket (97501)	>=3"	CLD 23	FE
Fluoroelastomer AMERICAN Fast-Grip® Gasket (95301/96001)	3" - 64"	CLD 23	FE
Fluoroelastomer AMERICAN Fastite® Joint Gasket (95301/96001)	3" - 64"	CLD 23	FE
Fluoroelastomer AMERICAN Toruseal® Flange Gasket (9365Y)[G]	>= 2"	CLD 23	FE
Fluoroelastomer AMERICAN Toruseal® Flange Gasket (97501)	>= 2"	CLD 23	FE
Fluoroelastomer Barracuda® RJ Gasket (95301)	4" - 24"	CLD 23	FE
Fluoroelastomer Griffin TALON™ RJ Gasket (95301)	3" - 64"	CLD 23	FE
Fluoroelastomer MJ Transition Gasket (97501)	>= 3"	CLD 23	FE
Fluoroelastomer Mechanical Joint Gasket (97501)	>= 3"	CLD 23	FE
Fluoroelastomer Tyton® Joint Gasket (95301)	3" - 64"	CLD 23	FE
Fluoroelastomer (FKM) Mechanical Joint Gasket (97501)	>= 3"	CLD 23	FE
NBR AMERICAN Fast-Grip® Gasket (56502)	>= 3"	CLD 23	NBR
NBR AMERICAN Toruseal® Flange Gasket (53650)	>= 2"	CLD 23	NBR
NBR AMERICAN Toruseal® Flange Gasket (57502)	>= 2"	CLD 23	NBR
NBR Baker Coupling Gasket (57502)	>= 3"	CLD 23	NBR
NBR Barracuda® RJ Gasket (56502)	4" - 24"	CLD 23	NBR
NBR Bonnet Gasket (57502)	4" - 12"	CLD 23	NBR
NBR FASTITE® Joint Gasket (56502)	>= 3"	CLD 23	NBR
NBR Griffin TALON™ RJ Gasket (55301)	>= 3"	CLD 23	NBR
NBR MJ Transition Gasket (57502)	>= 3"	CLD 23	NBR



**SPECIFICATION  
RUBBER  
PRODUCTS, INC.**

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[Industrial](#)

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## EPDM Sheet Rubber Material

### STATS

- NSF-61 Certified
- Formulated to meet or exceed ANSI/AWWA C111/A21.11 compound requirements
- EPDM Elastomer sulfur cured 75 Shore A Black, Smooth Finished
- Branded "EPDM NSF-61 Made in USA" for ease of identification
- 1/16", 1/8", 1/4" and 1/2" thicknesses available
- Sold by the linear foot or in roll lengths
- Stocked and ready for immediate shipment
- Produced in the USA under a stringent ISO quality system



### PDF DOWNLOAD

 [Product Spotlight](#)

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**Specification Rubber Products, Inc**

Begun in 1968 as a manufacturer of rubber components for the waterworks industry, our company today is a primary supplier to ductile iron pipe, valve and hydrant producers. We also offer specialty mechanical molded goods for industrial applications.

**Contact Us**

📍 1568 1st Street North  
Alabaster, Alabama 35007  
([Google Maps](#))

☎ 800.633.3415

✉ [Email Us](#)

🌐 [LinkedIn](#)

**Certifications**

NSF Certified  
ISO 9001:2015  
Made In The USA

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News



AMERICAN  
THE RIGHT WAY

Specification Rubber Products is a subsidiary of  
AMERICAN Cast Iron Pipe Company,  
Birmingham, AL



Made in USA



A+ Rating



**PVC**

The Public Health and Safety Organization

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---

### NSF/ANSI 14 Plastics Piping System Components and Related Materials

[Click here for a list of End Use Code Designations.](#)

Click on Product Standards or footnote in blue to view the referenced document

---

#### A.Y. McDonald Mfg. Co.

4800 Chavenelle Road

Dubuque, IA 52002

United States

563-583-7311

**Facility :** Kaohsiung, Taiwan

#### Potable Water - Pipe and Fittings

Product Type	Material Type	Trade Name	Product Standard
Valves# +++	CPVC	AY McDonald	ASTM F1970

- (2) This product was evaluated by NSF according to the requirements of NSF/ANSI/CAN 61, Section 4.
- (3) The compliance of this product with the health effects requirements of NSF/ANSI/CAN 61 was determined based on the testing of pipe and fittings assembled using the cement and P48 Strong Weld Primer M1.

C.I. MEXICHEM COMPUESTOS COLOMBIA S.A.S.

Mamonal KM 8  
Cartegena  
Colombia  
57 5 672 3150

Facility : Cartegena, Colombia

Potable Water - Materials

Material Type	End Use	Trade Name	Product Standard
CPVC 4120-06	1	Durovin CPVC-EXT03	24448 ASTM D1784

+ Material complies with NSF/ANSI/CAN 61 health effects requirements when tested at 73° F.

NOTE: All Listed products from this facility are NSF Certified, whether or not they bear the NSF Mark.



Charlotte Pipe & Foundry Company  
Plastics Division  
4210 Old Charlotte Highway  
P.O. Box 1339  
Monroe, NC 28111-1339  
United States

(<http://www.charlottepipe.com>)

704-291-3218

[Visit this company's website \(http://www.charlottepipe.com\)](http://www.charlottepipe.com)**Facility : # 1 USA****Joining Materials**

Product Type	General Material	For Use With	Trade Name	Product Standard
Solvent Cement (1,2,3)+++ [G]	CPVC	PW, DWV, SW	ChemDrain® One-Step CPVC Solvent Cement	ASTM F493
Solvent Cement (1,2,3)# [G]	CPVC	CW	ChemDrain® One-Step CPVC Solvent Cement	ASTM F2618

# Product has been Certified as part of the Charlotte Pipe ChemDrain System to ASTM F2618.

+++ Material complies with NSF/ANSI/CAN 61 health effects requirements when tested at temperatures up to and including Commercial Hot (180° F).

[G] Product is Certified to NSF/ANSI 372 and conforms with the lead content requirements for “lead free” plumbing as defined by California, Vermont, Maryland, and Louisiana state laws and the U.S. Safe Drinking Water Act.

- (1) This product was evaluated by NSF according to the requirements of NSF/ANSI/CAN 61, Section 4.
- (2) The compliance of this product with the health effect requirements of NSF/ANSI/CAN 61 was determined based on the testing of pipe and fittings assembled using the cement and either Weld-On® P-68®, P-70® Clear or Purple, or P-72 Clear Primers.
- (3) This product is acceptable for use with pipe and fittings sized 1/2" and greater diameter.

**Facility : Huntsville, AL****Potable Water - Pipe and Fittings**

Product Type	Material Type	Trade Name	Product Standard
--------------	---------------	------------	------------------



## INDUSTRY STANDARDS

### OVERVIEW

Minimum product standards for piping components provide the specifying engineer and consumer with the confidence that the thermoplastic piping products will perform as intended. The most frequently referenced standards for Colonial products are listed here as well as installation standards for joining and buried pipe.

### ASTM

Voluntary-consensus standards are updated annually by the American Society for Testing and Materials (ASTM). Most appear in volume 08.04, Plastic Pipe and Building Products.

American Society for Testing and Materials (ASTM)  
100 Barr Harbor Drive  
West Conshohocken, PA 19428-2959  
Phone: (610) 832-9500  
Fax: (610) 832-9555  
Web site: [www.astm.org](http://www.astm.org)  
E-mail: [service@astm.org](mailto:service@astm.org)

### PVC & CPVC MATERIALS

ASTM D-1734  
Classifies compounds by minimum physical and chemical properties into cell classifications.

### POLYPROPYLENE MATERIALS

ASTM D-4101  
Classifies injection (formerly D-2146) molding and extrusion grades according to physical properties.

### PVDF MATERIALS

ASTM D-3222  
Covers polymerization method and classifies compounds by physical properties.

### PVC SCH 40, 80 & 120 PIPE

ASTM D-1785  
Outlines dimensional specifications, burst strength and maximum operating pressures.

### CPVC SCH 40 & 80 PIPE

ASTM F-441  
Outlines dimensional specifications, burst strength and maximum operating pressures.

### PVC SCH 40 FITTINGS

ASTM D-2466  
Outlines specifications for wall thickness and socket and thread dimensions.

### PVC SCH 80 FITTINGS

ASTM D-2467  
Outlines specifications for wall thickness and socket dimensions.

### PVC SCH 80 FITTINGS

ASTM D-2464  
Outlines specifications for wall thickness and thread dimensions.

### CPVC SCH 80 FITTINGS

ASTM F-439  
Outlines specifications for wall thickness and socket dimensions.

### CPVC SCH 80 FITTINGS

ASTM F-437  
Outlines specifications for wall thickness and thread dimensions.

### CPVC-CTS (COPPER TUBE SIZE) FITTINGS

ASTM D-2846  
Outlines specifications for wall thickness and socket and thread dimensions for hot and cold water distribution systems.

### CPVC SOLVENT CEMENT SPECIFICATION

ASTM F-493

### PVC SOLVENT CEMENT SPECIFICATION

ASTM D-2564

### PVC SOLVENT CEMENTING PROCEDURE

ASTM D-2855

### PRIMERS FOR SOLVENT CEMENTING

ASTM F-656

### UNDERGROUND INSTALLATION OF THERMOPLASTIC PRESSURE PIPING

ASTM D-2774

### UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY-FLOW APPLICATIONS

ASTM D-2321

### SELECTION, DESIGN, AND INSTALLATION OF THERMOPLASTIC WATER PRESSURE PIPING SYSTEMS

ASTM F-645



#### ANSI

Some ASTM standards are adopted verbatim and labeled as the ANSI (American National Standards Institute) standard on the subject. Some specific ANSI standards for threading, flanges, calibration, etc., are referenced in some sections of the ASTM standard.

American National Standards  
Institute (ANSI)  
11 West 42nd Street  
New York, NY 10036  
Phone: (212) 642-4900  
Fax: (212) 398-0023

#### ANSI SPECIFICATION FOR TAPER PIPE THREADS

ANSI B1.20.1, ASTM F-645  
(formerly B2.1)

#### ANSI SPECIFICATION FOR BOLT HOLE PATTERNS FOR CLASS 150 STEEL FLANGES

ANSI B16.5

#### NSF INTERNATIONAL

NSF International acts as a third party certification agency which tests and certifies that certain products do, in fact, meet the manufacturing standard or specifications claimed. Further, they may also test material and parts to verify compliance to NSF International health standards for potable water use. The World Health Organization (WHO) has designated NSF International as the collaborative center for drinking water safety and treatment.

NSF International  
739 Dixboro Road  
P.O. Box 130140  
Ann Arbor, MI 48113-0140  
Phone: (800) 769-8010  
Fax: (734) 769-0109

#### STANDARD 14

This standard provides specifications for toxicological and organoleptic levels of contamination to determine the suitability of plastic piping for potable water service. It further specifies minimum quality control programs and the adherence to specific standards to which products are made. To meet this standard, a manufacturer allows NSF to sample and test products to verify that they do, in fact, conform.

#### STANDARD 61

This newer standard was developed to establish minimum requirements for control of potential adverse human health effects from products which contact drinking water. It does not attempt to include product performance requirements but conformance to NSF 61 is a prerequisite for NSF Standard 14 certification.

#### STANDARD 14 SPECIAL ENGINEERING APPURTENANCE PROGRAM (S.E.)

This standard is sometimes referred to simply as the NSF S.E. program. The NSF S.E. program establishes product performance requirements where no directly applicable ASTM specifications exist. NSF S.E. specifications are developed from a combination of applicable portions of ASTM specifications and manufacturers' design specifications as a standard for conformance verification.

#### DIN

Deutsches Institut Für Normung (DIN), German (West) Standards like ASTM standards are also published annually. English translations of these standards can be obtained from the Cleveland Public Library, Photo Duplication.

Deutsches Institut Für Normung (DIN)  
Phone: (216) 623-2901  
Fax: (216) 623-7078

#### DIN 3441

Part 1; Requirements and testing of PVC valves. This standard issued in 1982 and revised in 1989 is, as of 1996, the only published consensus standard for PVC plastic valves. Many DIN requirements will be incorporated in an expected ASTM standard. Of particular interest, thermoplastic valves must meet a long-term hydrostatic test based upon their assigned room temperature pressure ratings (see example below).

Test Temperature: 20°C (68°F)  
Test Duration: 1 hour @ 4.2 X maximum pressure rating and 1000 hours @ 3.2 X maximum pressure rating.

## STANDARDS BY PRODUCT LINE

### PVC VALVES

**True Union, Single Union,  
Multi-Port, MIP (Molded In Place),  
Compact (Super "C"), Ball Check,  
Butterfly**

ASTM D-1784	Material Standard
ASTM D-2467	Socket Dimensions
ASTM D-2464	Thread Dimensions
ASTM D-2564	PVC Solvent Cement
ASTM D-2855	PVC Solvent Cementing Procedure
ASTM F-656	Primers for Solvent Cementing
ANSI B1.20.1	Taper Pipe Threads (formerly B2.1)
ANSI B16.5	Class 150 Steel Flange Hole Pattern
DIN 3441	Requirements and Testing of PVC Valves ( <i>True Union, Single Union &amp; Multi-Port valves only.</i> )

### CPVC VALVES

**True Union, Single Union,  
Multi-Port, MIP (Molded In Place),  
Compact (Super "C"), Ball Check**

ASTM D-1784	Material Standard
ASTM F-439	Socket Dimensions
ASTM F-437	Thread Dimensions
ASTM F-493	CPVC Solvent Cement
ANSI B1.20.1	Taper Pipe Threads (formerly B2.1)
ANSI B16.5	Class 150 Steel Flange Hole Pattern
DIN 3441	Requirements and Testing of PVC Valves ( <i>CPVC True Union, Single Union &amp; Multi-Port valves meet the pressure testing requirements of this standard.</i> )

### PP VALVES

**True Union, Single Union,  
Multi-Port, Ball Check**

ASTM D-4101	Polypropylene Materials
ANSI B1.20.1	Taper Pipe Threads (formerly B2.1)

### PVDF VALVES

**True Union, Single Union, Ball Check**

ASTM D-3222	PVDF Materials
ANSI B1.20.1	Taper Pipe Threads (formerly B2.1)
DIN 3441	Requirements and Testing of PVC Valves ( <i>PVDF True Union &amp; Single Union valves meet the pressure testing requirements of this standard.</i> )

### CPVC CTS (COPPER TUBE SIZE) VALVES

ASTM D-1784	Material Standard
ASTM D-2846	Dimensional Specifications (sockets, threads and wall thickness)
ASTM F-493	CPVC Solvent Cement
ANSI B1.20.1	Taper Pipe Threads (formerly B2.1)
NSF14/61	Potable Water

### PVC SCH 40 FITTINGS (White or Gray)

ASTM D-1784	Material Standard
ASTM D-2466	Dimensional Specifications
ASTM D-2774	Buried Pipe Specifications
ASTM D-2564	PVC Solvent Cement
ASTM D-2855	PVC Solvent Cementing Procedure
ASTM F-656	Primers for Solvent Cementing
ANSI B1.20.1	Taper Pipe Threads (formerly B2.1)
NSF14/61	Potable Water

### PVC SCH 80 FITTINGS (Gray)

ASTM D-1784	Material Standard
ASTM D-2467	Dimensional Specifications (sockets)
ASTM D-2464	Dimensional Specifications (threads)
ASTM D-2774	Buried Pipe Specifications
ASTM D-2564	PVC Solvent Cement
ASTM D-2855	PVC Solvent Cementing Procedure
ASTM F-656	Primers for Solvent Cementing
ANSI B1.20.1	Taper Pipe Threads (formerly B2.1)
NSF14/61	Potable Water
ANSI B16.5	Class 150 Flange Hole Pattern

# Product Specification

## CES Crossflow Nozzles



### Product Description

CES Crossflow Cooling Tower Nozzles are constructed of injected molded polypropylene and are designed for both ease of installation and uniformity of water distribution. The nozzles are available in three configurations (Crown, Clog-Free and Target) all of which are available with various orifice sizes to accommodate different water flows.

The "Crown" nozzle is designed to eliminate potential vortex spirals of water passing through the nozzle which results in a consistent and uniform water diffusion pattern at any operating level of water head. The vortex "Crown" also serves as an anti-clog feature helping to prevent debris from entering the nozzle body. The "Crown" nozzle fits a 1-3/4" hot water basin floor opening.

The "Clog-Free" nozzle includes an improved water diffusion device supported by a single rigid arm. Any debris entering the nozzle easily passes through the orifice and does not get trapped by other nozzle structural components. The "Clog-Free" nozzle fits a 1-3/4" hot water basin floor opening.

The "Target" nozzles are designed to provide uniform water distribution in the minimum vertical distance from the underside of the hot water basin by distributing the water both laterally and vertically. An optional nozzle screen can be added to prevent solid particles from clogging the nozzle orifice. The optional screens snap securely onto tabs that are an integral part of the nozzle body. The "Target" nozzle fits a 1-5/8" HWB floor opening.

All CES nozzles are manufactured from polypropylene and are suitable for a standard operating temperature of 140°F with a softening temperature of 214°F.



**CES  
Crown  
Nozzle**



**CES  
Clog-Free  
Nozzle**



**CES  
Target  
Nozzle**

### CE Shepherd Company L.P.

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