

Memo



TO
Joe Rogers, EGLE

COPIES
Christine Matlock, EGLE
John McCabe, EGLE
Dave Favero, RACER Trust

DATE
March 9, 2021

PROJECT NUMBER
30042872

FROM
Patrick Curry, Arcadis

SUBJECT
Monitoring Well Abandonment Documentation – 2020
RACER Trust, Plants 2, 3 and 6, Lansing, Michigan

Arcadis of Michigan, LLC (Arcadis) on behalf of Revitalizing Auto Communities Environmental Response (RACER) Trust has completed monitoring well abandonment activities on Plants 2, 3, and 6 (site) in Lansing, Michigan. The well abandonment work was initially proposed as part of the *Revised Interim Groundwater Monitoring Plan – 2019* (Arcadis 2019) and modified via email correspondence with the Michigan Department of Environment, Great Lakes and Energy (EGLE). Final approval of the well abandonment list and approach was provided via email for Joe Rogers on November 5, 2020. Eleven of the perched groundwater monitoring wells from the approved well abandonment list were successfully abandoned on December 10-11, 2020.

In addition, a weathered bedrock monitoring well (TW-14-01), originally part of the pilot test area on the southern part of Plant 2, was abandoned on December 16th, 2020 consistent with the approach discussed in our email to EGLE on November 13, 2020 and approved verbally during our update meeting on December 4, 2020. Well TW-14-01 was venting during lower 1,4-dioxane biosparge system operation.

All abandoned well locations are shown on **Figure 1**. Well Abandonment Logs are included in **Attachment 1**.

Perched Groundwater Monitoring Well Abandonment

Three perched monitoring wells were abandoned near the southeastern boundary of Plant 2:

- MW-02(2),
- MW-03(2), and
- MW-12-17.

Four perched monitoring wells were abandoned in the central well cluster on Plant 3:

- MW-02(3),
- MW-03(3),
- MW-04(3), and
- UNK-09.

Four perched monitoring wells were abandoned near the southern boundary of Plant 6:

- MWBP-10-UST1-4,
- MWBP-10A-UST1-4,

Joe Rogers
EGLE
March 9, 2021

- MWBP-12A-UST1-4, and
- MWBP-13A-UST1-4.

All eleven shallow wells were pressure grouted from the bottom up using Type 1 Portland cement with 10% bentonite powder added, meeting the requirements of ASTM D5229 Section 6. The full well casing was not over drilled because of the potential risk of exacerbating shallow groundwater impacts, allowing vertical migration to deeper portions of the perched aquifer. Instead, the wells were abandoned in-place; the PVC well casing was cut 1-foot below grade and the cement was brought up to the ground surface. For wells located in gravel or degraded asphalt, the manhole casing and cement collar was removed and then backfilled with the Portland cement. Wells located in concrete did not have the manhole collar removed but were backfilled with the Portland cement to grade.

Weathered Bedrock Monitoring Well Abandonment

One weathered bedrock monitoring well, TW-14-01, was also abandoned during this scope of work. This well was located within the former pilot test area at the southern end of the lower 1,4-dioxane plume on Plant 2. Well TW-14-01 was installed through the glacial till confining unit into the underlying weathered bedrock aquifer. To mitigate the risk of vertical migration through the confining layer, the well casing was pressure grouted from the bottom up with thick bentonite grout and allowed to cure for 24 hours. Then the upper portion of the well casing was over drilled using a 10-in sonic casing to a depth of 25 feet below grade, approximately 2 feet into the underlying clay till confining unit. The borehole was then backfilled with a cement-bentonite mixture using a tremie line to seal the borehole as the 10-inch casing was retracted.

Should you have any questions regarding the completed work, please contact David Favero at (217) 741-6235 or Patrick Curry at (810) 225-1926.

References:

Arcadis. 2019. Revised Interim Groundwater Monitoring Work Plan - 2019. RACER Trust, Plants 2, 3, and 6, Lansing, Michigan. October 28, 2019.

Enclosures:

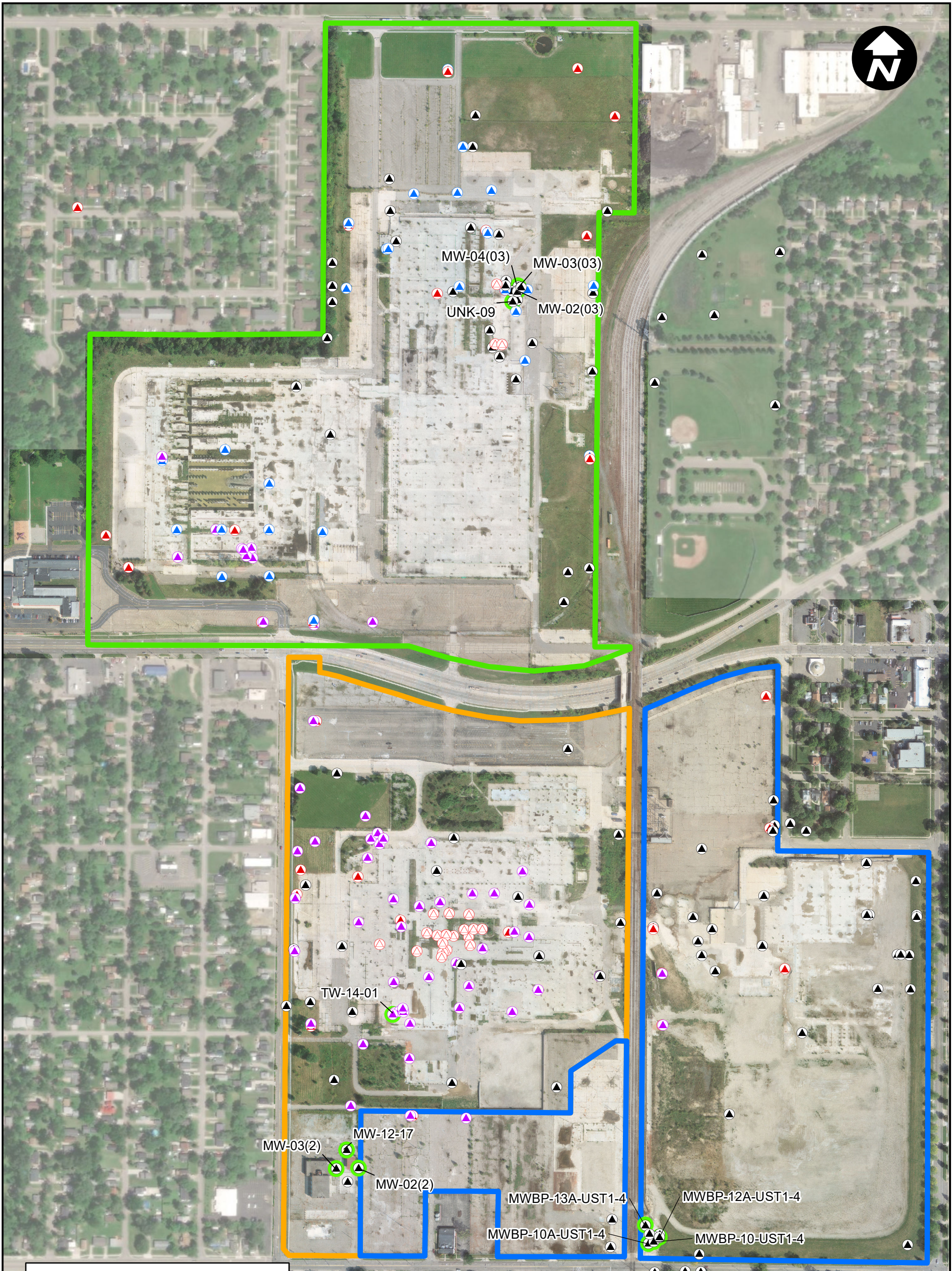
Figures

- 1 Summary of Monitoring Well Abandonment Locations

Attachments

- 1 Well Abandonment Logs

CITY: KNOXVILLE DIV: ENV DB: A SMITH PIC: J BARRETT PM: R CHRISTENSEN TM: A VILLHAUER TR: PROJECT NUMBER: 30006870 COORDINATE SYSTEM: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl
 T:_ENV\RACER\Buffalo\MXDs\2020 Well Abandonment\Plant 2, 3, and 6 Well Abandonment.mxd PLOTTED: 1/27/2021 4:06:36 PM BY: Mboye

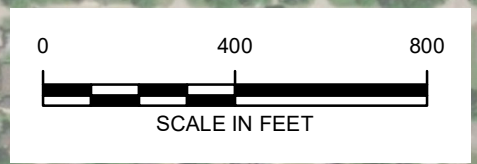


LEGEND

- ▲ PERCHED ZONE MONITORING WELL
- △ LNAPL MONITORING WELL
- ▲ WEATHERED BEDROCK MONITORING WELL
- ▲ DEEP OVBURDEN MONITORING WELL
- ▲ BEDROCK MONITORING WELL
- ABANDONED WELLS

APPROXIMATE PLANT BOUNDARIES

- PLANT 2
- PLANT 3
- PLANT 6



RACER TRUST
 PLANTS 2, 3 & 6
 LANSING, MICHIGAN

2020 WELL ABANDONMENT



FIGURE
1

Attachment 1

Well Abandonment Logs

RACER Lansing, MW-02(2), 2020-12-10

Created	2020-12-10 16:05:35 UTC by Austin Westhuis
Updated	2020-12-11 14:26:43 UTC by Austin Westhuis
Location	42.73469469514, -84.5866807737244

General Section

Client	RACER Lansing
Project Number	30042872
Site Name	RACER Lansing
County	Ingham
Date	2020-12-10

Well Information

Well ID	MW-02(2)
Date Installed	1993-10-05
Date Abandoned	2020-12-10

Photo of Well Before Abandonment



Install Drilling Firm	Geo Tek, Inc.
Abandon Drilling Firm	Terra Probe Environmental
Depth to Bottom (ft)	21.21
Screen depth measured from TOC or Ground Surface	Ground Surface
Screen Depth from Ground Surface (ft)	22
Water Table Depth from TOC (in ft)	11.01
Casing Type	PVC, SCH-40

Screen Type	PVC, 10-slot
Inside Diameter	2 inch
Abandoned Screen Length (ft)	10
Casing	Cut
Casing Cut Depth (ft bgs)	1
Grouted	Yes
Annulus Grouted From (ft)	0
Annulus Grouted To (ft)	22
Grout Type	Cement
Grout Method	Tremie pipe
Crew	Pat Hogan and Floyd Kanavel

Photo of Area After Abandonment



Providing Location Sketch or Site Map?	Site Map
Please remember to attach a site map to the well decommission log after printing.	
Comments	Monitoring well pressure grouted from the bottom up using Type 1 Portland cement.

Signature of Consultant/Engineer

A handwritten signature in black ink, appearing to read "Abdul Waheed". The signature is fluid and cursive, with the first name "Abdul" and the last name "Waheed" clearly distinguishable.

Signed 2020-12-10 16:13:49 UTC

Date of Signature

2020-12-10

RACER Lansing, MW-02(03), 2020-12-10

Created	2020-12-10 18:10:22 UTC by Austin Westhuis
Updated	2020-12-11 15:14:40 UTC by Austin Westhuis
Location	42.7451938251431, -84.5838605147643

General Section

Client	RACER Lansing
Project Number	30042872
Site Name	RACER Lansing
County	Ingham
Date	2020-12-10

Well Information

Well ID	MW-02(03)
Date Abandoned	2020-12-10

Photo of Well Before Abandonment



Install Drilling Firm	Not available
Abandon Drilling Firm	Terra Probe Environmental
Depth to Bottom (ft)	16
Screen depth measured from TOC or Ground Surface	Ground Surface
Screen Depth from Ground Surface (ft)	16
Water Table Depth from TOC (in ft)	0.68
Casing Type	PVC
Inside Diameter	4 inch

Casing	Cut
Casing Cut Depth (ft bgs)	1
Grouted	Yes
Annulus Grouted From (ft)	0
Annulus Grouted To (ft)	16
Grout Type	Cement
Grout Method	Tremie pipe
Crew	Pat Hogan and Floyd Kanavel

Photo of Area After Abandonment

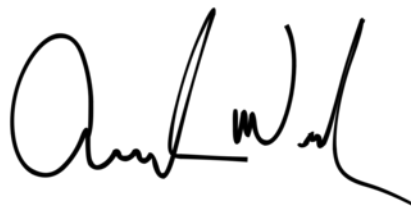


Providing Location Sketch or Site Map? Site Map

Please remember to attach a site map to the well decommission log after printing.

Comments Monitoring well pressure grouted from the bottom up using Type 1 Portland cement.

Signature of Consultant/Engineer

A handwritten signature in black ink, appearing to be 'A. M. H.', written in a cursive style.

Signed 2020-12-10 18:12:50 UTC

Date of Signature

2020-12-10

RACER Lansing, MW-03(2), 2020-12-10

Created	2020-12-10 16:37:23 UTC by Austin Westhuis
Updated	2020-12-11 14:29:57 UTC by Austin Westhuis
Location	42.7349007642295, -84.5864938572837

General Section

Client	RACER Lansing
Project Number	30042872
Site Name	RACER Lansing
County	Ingham
Date	2020-12-10

Well Information

Well ID	MW-03(2)
Date Installed	1993-10-04
Date Abandoned	2020-12-10

Photo of Well Before Abandonment



Install Drilling Firm	Geo Tek, Inc.
Abandon Drilling Firm	Terra Probe Environmental
Depth to Bottom (ft)	19.12
Screen depth measured from TOC or Ground Surface	Ground Surface
Screen Depth from Ground Surface (ft)	22
Water Table Depth from TOC (in ft)	10.34
Casing Type	PVC, SCH-40

Screen Type	PVC, 10-slot
Inside Diameter	2 inch
Abandoned Screen Length (ft)	10
Casing	Cut
Casing Cut Depth (ft bgs)	1
Grouted	Yes
Annulus Grouted From (ft)	0
Annulus Grouted To (ft)	22
Grout Type	Cement
Grout Method	Tremie pipe
Crew	Pat Hogan and Floyd Kanavel

Photo of Area After Abandonment



Providing Location Sketch or Site Map?	Site Map
Please remember to attach a site map to the well decommission log after printing.	
Comments	Monitoring well pressure grouted from the bottom up using Type 1 Portland cement.

Signature of Consultant/Engineer

A handwritten signature in black ink, appearing to read "Amal Wadhwa". The signature is fluid and cursive, with the first name "Amal" and the last name "Wadhwa" clearly distinguishable.

Signed 2020-12-10 16:40:05 UTC

Date of Signature

2020-12-10

RACER Lansing, MW-03(03), 2020-12-10

Created	2020-12-10 18:10:48 UTC by Austin Westhuis
Updated	2020-12-11 15:15:18 UTC by Austin Westhuis
Location	42.7451781928937, -84.5838557370795

General Section

Client	RACER Lansing
Project Number	30042872
Site Name	RACER Lansing
County	Ingham
Date	2020-12-10

Well Information

Well ID	MW-03(03)
Date Abandoned	2020-12-10

Photo of Well Before Abandonment



Install Drilling Firm	Not available
Abandon Drilling Firm	Terra Probe Environmental
Depth to Bottom (ft)	12.82
Screen depth measured from TOC or Ground Surface	Ground Surface
Screen Depth from Ground Surface (ft)	13
Water Table Depth from TOC (in ft)	0.18
Casing Type	PVC
Inside Diameter	2 inch

Casing	Cut
Casing Cut Depth (ft bgs)	1
Grouted	Yes
Annulus Grouted From (ft)	0
Annulus Grouted To (ft)	13
Grout Type	Cement
Grout Method	Tremie pipe
Crew	Pat Hogan and Floyd Kanavel

Photo of Area After Abandonment



Providing Location Sketch or Site Map? Site Map

Please remember to attach a site map to the well decommission log after printing.

Comments Monitoring well pressure grouted from the bottom up using Type 1 Portland cement.

Signature of Consultant/Engineer

A handwritten signature in black ink, appearing to be 'A. M. K.', written in a cursive style.

Signed 2020-12-10 18:12:59 UTC

Date of Signature

2020-12-10

RACER Lansing, MW-04(03), 2020-12-10

Created	2020-12-10 18:11:13 UTC by Austin Westhuis
Updated	2020-12-11 15:16:03 UTC by Austin Westhuis
Location	42.7452201862286, -84.5838388894541

General Section

Client	RACER Lansing
Project Number	30042872
Site Name	RACER Lansing
County	Ingham
Date	2020-12-10

Well Information

Well ID	MW-04(03)
Date Abandoned	2020-12-10

Photo of Well Before Abandonment



Install Drilling Firm	Not available
Abandon Drilling Firm	Terra Probe Environmental
Depth to Bottom (ft)	15.71
Screen depth measured from TOC or Ground Surface	Ground Surface
Screen Depth from Ground Surface (ft)	16
Water Table Depth from TOC (in ft)	0.84
Casing Type	PVC
Inside Diameter	2 inch

Casing	Cut
Casing Cut Depth (ft bgs)	1
Grouted	Yes
Annulus Grouted From (ft)	0
Annulus Grouted To (ft)	16
Grout Type	Cement
Grout Method	Tremie pipe
Crew	Pat Hogan and Floyd Kanavel

Photo of Area After Abandonment



Providing Location Sketch or Site Map?	Site Map
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Please remember to attach a site map to the well decommission log after printing.

Comments	Monitoring well pressure grouted from the bottom up using Type 1 Portland cement.
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Signature of Consultant/Engineer

A handwritten signature in black ink, appearing to be 'A. W. L.', written in a cursive style.

Signed 2020-12-10 18:13:09 UTC

Date of Signature

2020-12-10

RACER Lansing, MW-12-17, 2020-12-10

Created	2020-12-10 16:23:35 UTC by Austin Westhuis
Updated	2020-12-11 14:28:06 UTC by Austin Westhuis
Location	42.73469469514, -84.5866807737244

General Section

Client	RACER Lansing
Project Number	30042872
Site Name	RACER Lansing
County	Ingham
Date	2020-12-10

Well Information

Well ID	MW-12-17
Date Installed	2012-11-20
Date Abandoned	2020-12-10

Photo of Well Before Abandonment



Install Drilling Firm	Boart Longyear
Abandon Drilling Firm	Terra Probe Environmental
Depth to Bottom (ft)	13.99
Screen depth measured from TOC or Ground Surface	Ground Surface
Screen Depth from Ground Surface (ft)	14.5
Water Table Depth from TOC (in ft)	9.22
Casing Type	PVC

Screen Type	Stainless Steel, 10-slot
Inside Diameter	2 inch
Abandoned Screen Length (ft)	5
Casing	Cut
Casing Cut Depth (ft bgs)	1
Grouted	Yes
Annulus Grouted From (ft)	0
Annulus Grouted To (ft)	14.5
Grout Type	Cement
Grout Method	Tremie pipe
Crew	Pat Hogan and Floyd Kanavel

Photo of Area After Abandonment



Providing Location Sketch or Site Map?	Site Map
Please remember to attach a site map to the well decommission log after printing.	
Comments	Monitoring well pressure grouted from the bottom up using Type 1 Portland cement.

Signature of Consultant/Engineer

A handwritten signature in black ink, appearing to read 'Amal M. ...' with a long horizontal stroke at the end.

Signed 2020-12-10 16:26:45 UTC

Date of Signature

2020-12-10

RACER Lansing, MWBP-10A-UST1-4, 2020-12-11

Created	2020-12-10 21:11:50 UTC by Austin Westhuis
Updated	2020-12-11 22:40:30 UTC by Austin Westhuis
Location	42.7342733787771, -84.5816204511417

General Section

Client	RACER Lansing
Project Number	30042872
Site Name	RACER Lansing
County	Ingham
Date	2020-12-10

Well Information

Well ID	MWBP-10A-UST1-4
Date Installed	1993-10-31
Date Abandoned	2020-12-11

Photo of Well Before Abandonment



Install Drilling Firm	Geo Tek, Inc.
Abandon Drilling Firm	Terra Probe Environmental
Depth to Bottom (ft)	11.54
Screen depth measured from TOC or Ground Surface	Ground Surface
Water Table Depth from TOC (in ft)	1.04
Casing Type	PVC
Inside Diameter	4 inch

Casing	Cut
Casing Cut Depth (ft bgs)	1
Grouted	Yes
Annulus Grouted From (ft)	0
Annulus Grouted To (ft)	11.54
Grout Type	Cement
Grout Method	Tremie pipe
Crew	Pat Hogan and Floyd Kanavel

Photo of Area After Abandonment



Providing Location Sketch or Site Map? Site Map

Please remember to attach a site map to the well decommission log after printing.

Comments Monitoring well pressure grouted from the bottom up using Type 1 Portland cement.

Signature of Consultant/Engineer

A handwritten signature in black ink, appearing to read 'A. W. W.', written in a cursive style.

Signed 2020-12-10 21:12:03 UTC

Date of Signature

2020-12-10

RACER Lansing, MWBP-10-UST1-4, 2020-12-11

Created	2020-12-10 21:10:47 UTC by Austin Westhuis
Updated	2020-12-11 22:40:38 UTC by Austin Westhuis
Location	42.7342290804188, -84.5816059504492

General Section

Client	RACER Lansing
Project Number	30042872
Site Name	RACER Lansing
County	Ingham
Date	2020-12-10

Well Information

Well ID	MWBP-10-UST1-4
Date Abandoned	2020-12-11

Photo of Well Before Abandonment



Install Drilling Firm	Geo Tek, Inc.
Abandon Drilling Firm	Terra Probe Environmental
Depth to Bottom (ft)	11.47
Screen depth measured from TOC or Ground Surface	Ground Surface
Water Table Depth from TOC (in ft)	2.3
Casing Type	PVC
Inside Diameter	4 inch
Casing	Cut

Casing Cut Depth (ft bgs)	1
Grouted	Yes
Annulus Grouted From (ft)	0
Annulus Grouted To (ft)	11.47
Grout Type	Cement
Grout Method	Tremie pipe
Crew	Pat Hogan and Floyd Kanavel

Photo of Area After Abandonment



Providing Location Sketch or Site Map?	Site Map
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Please remember to attach a site map to the well decommission log after printing.

Comments	Monitoring well pressure grouted from the bottom up using Type 1 Portland cement.
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Signature of Consultant/Engineer

A handwritten signature in black ink, appearing to read "Ahmad M. Al...". The signature is written in a cursive style with a horizontal line at the end.

Signed 2020-12-10 21:11:42 UTC

Date of Signature

2020-12-10

RACER Lansing, MWBP-12A-UST1-4, 2020-12-11

Created	2020-12-10 21:12:09 UTC by Austin Westhuis
Updated	2020-12-11 22:40:19 UTC by Austin Westhuis
Location	42.7342733787771, -84.5816204511417

General Section

Client	RACER Lansing
Project Number	30042872
Site Name	RACER Lansing
County	Ingham
Date	2020-12-10

Well Information

Well ID	MWBP-12A-UST1-4
Date Installed	1993-10-30
Date Abandoned	2020-12-11

Photo of Well Before Abandonment



Install Drilling Firm	Geo Tek, Inc.
Abandon Drilling Firm	Terra Probe Environmental
Depth to Bottom (ft)	36.8
Screen depth measured from TOC or Ground Surface	Ground Surface
Water Table Depth from TOC (in ft)	27.93
Casing Type	PVC
Inside Diameter	2 inch

Casing	Cut
Casing Cut Depth (ft bgs)	1
Grouted	Yes
Annulus Grouted From (ft)	0
Grout Type	Cement
Grout Method	Tremie pipe
Crew	Pat Hogan and Floyd Kanavel

Photo of Area After Abandonment



Providing Location Sketch or Site Map?	Site Map
Please remember to attach a site map to the well decommission log after printing.	
Comments	Monitoring well pressure grouted from the bottom up using Type 1 Portland cement.

Signature of Consultant/Engineer

A handwritten signature in black ink, appearing to read 'Amir Wad'.

Signed 2020-12-10 21:12:28 UTC

Date of Signature

2020-12-10

RACER Lansing, MWBP-13A-UST1-4, 2020-12-11

Created	2020-12-10 21:13:05 UTC by Austin Westhuis
Updated	2020-12-11 22:40:24 UTC by Austin Westhuis
Location	42.7342536813046, -84.5816121530575

General Section

Client	RACER Lansing
Project Number	30042872
Site Name	RACER Lansing
County	Ingham
Date	2020-12-10

Well Information

Well ID	MWBP-13A-UST1-4
Date Installed	1991-08-27
Date Abandoned	2020-12-11

Photo of Well Before Abandonment



Install Drilling Firm	Geo Tek, Inc.
Abandon Drilling Firm	Terra Probe Environmental
Depth to Bottom (ft)	37.99
Screen depth measured from TOC or Ground Surface	Ground Surface
Water Table Depth from TOC (in ft)	31.71
Inside Diameter	2 inch
Casing	Cut

Casing Cut Depth (ft bgs)	1
Grouted	Yes
Annulus Grouted From (ft)	0
Grout Type	Cement
Grout Method	Tremie pipe
Crew	Pat Hogan and Floyd Kanavel

Photo of Area After Abandonment



Providing Location Sketch or Site Map?	Site Map
Please remember to attach a site map to the well decommission log after printing.	
Comments	Monitoring well pressure grouted from the bottom up using Type 1 Portland cement.
Date of Signature	2020-12-10

RACER Lansing, UNK-09, 2020-12-10

Created	2020-12-10 18:11:29 UTC by Austin Westhuis
Updated	2020-12-11 15:17:20 UTC by Austin Westhuis
Location	42.7452201862286, -84.5838388894541

General Section

Client	RACER Lansing
Project Number	30042872
Site Name	RACER Lansing
County	Ingham
Date	2020-12-10

Well Information

Well ID	UNK-09
Date Abandoned	2020-12-10

Photo of Well Before Abandonment



Install Drilling Firm	Not available
Abandon Drilling Firm	Terra Probe Environmental
Depth to Bottom (ft)	15.28
Screen depth measured from TOC or Ground Surface	Ground Surface
Screen Depth from Ground Surface (ft)	16
Water Table Depth from TOC (in ft)	0.45
Casing Type	PVC
Inside Diameter	4 inch

Casing	Cut
Casing Cut Depth (ft bgs)	1
Grouted	Yes
Annulus Grouted From (ft)	0
Annulus Grouted To (ft)	16
Grout Type	Cement
Grout Method	Tremie pipe
Crew	Pat Hogan and Floyd Kanavel

Photo of Area After Abandonment



Providing Location Sketch or Site Map? Site Map

Please remember to attach a site map to the well decommission log after printing.

Comments Monitoring well pressure grouted from the bottom up using Type 1 Portland cement.

Signature of Consultant/Engineer

A handwritten signature in black ink, appearing to be 'Amal W. L.', written in a cursive style.

Signed 2020-12-10 18:13:17 UTC

Date of Signature

2020-12-10

RACER Lansing, TW-14-01, 2020-12-16

Created	2020-12-16 14:22:58 UTC by Austin Westhuis
Updated	2020-12-16 21:10:43 UTC by Austin Westhuis
Location	42.7367948228891, -84.5857376419795

General Section

Client	RACER Lansing
Project Number	30042872
Site Name	RACER Lansing
County	Ingham
Date	2020-12-16

Well Information

Well ID	TW-14-01
Date Installed	2014-08-19
Date Abandoned	2020-12-16

Photo of Well Before Abandonment



Install Drilling Firm	Cascade Drilling
Abandon Drilling Firm	Cascade Drilling
Depth to Bottom (ft)	78.12
Screen depth measured from TOC or Ground Surface	Ground Surface
Screen Depth from Ground Surface (ft)	78.12 - original well construction log listed screen set from 70.0-75.0
Water Table Depth from TOC (in ft)	67.31
Casing Type	PVC

Screen Type	Stainless Steel, 10-slot
Inside Diameter	2 inch
Abandoned Screen Length (ft)	5
Casing	Cut
Casing Cut Depth (ft bgs)	25
Grouted	Yes
Annulus Grouted From (ft)	0
Annulus Grouted To (ft)	78.12
Grout Type	Bentonite
Grout Method	Tremie pipe
Crew	Joe Lary, Shane Hix, Ray Doran, and Chris Koski

Photo of Area After Abandonment

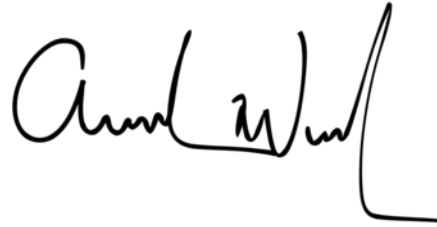


Providing Location Sketch or Site Map?	Site Map
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Please remember to attach a site map to the well decommission log after printing.

Comments	Monitoring well pressure grouted from the bottom up with tremie line line using a thick bentonite grout. Once the grout set up, the upper 25ft of the well was over drilled using a 10-inch sonic casing. The upper 25ft of the well was then removed and the borehole down to 25ft into the underlying glacial till was abandoned with cement/bentonite grout from the bottom up using tremie line.
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Signature of Consultant/Engineer

A handwritten signature in black ink, appearing to read "Ahmad W. Al...". The signature is fluid and cursive, with a long, sweeping tail on the right side.

Signed 2020-12-16 14:36:11 UTC

Date of Signature

2020-12-16
