1050 SW 6th Ave Suite 1650
Portland, Oregon 97204

T +1 503 488 5282
F +1 503 488 5142
erm.com

MEMO

TO	Katie Daugherty, ODEQ
FROM	Brendan Robinson, PE, ERM; Todd Slater, LSS
DATE	17 March 2025
REFERENCE	0732445.204
SUBJECT	Groundwater Source Control Measure Monthly Performance Monitoring Report

1. INTRODUCTION

The Oregon Department of Environmental Quality (ODEQ), in its letter dated 31 May 2019 and in the subsequent meeting with Legacy Site Services LLC (LSS) and Environmental Resources Management, Inc. (ERM) on 2 July 2019, requested that LSS initiate monthly status reports associated with the onsite groundwater source control measure (GW SCM) at the Arkema site (Site) consistent with the Performance Monitoring Plan (PMP; ERM 2014[1]) beginning July 2019. The Site is located at 6400 NW Front Avenue in Portland, Oregon, and the Site location is shown on Figure 1. The 2014 PMP was prepared pursuant to the Order on Consent issued by ODEQ, signed on 31 October 2008 (ODEQ No. LQVC-NWR-08-04; Consent Order). The purpose of the PMP was to present the monitoring, reporting, and adaptive management processes used during implementation of the GW SCM. On 30 November 2021, ODEQ directed LSS that following the October 2021 Monthly Performance Monitoring Report (MPR), subsequent MPRs would be suspended pending the implementation of the Groundwater Extraction Enhancement (GEE) project in 2022. During that time, ODEQ requested monthly schedule updates in lieu of MPRs. The trench wells installed as part of the GEE project were started on 27 November 2022, and MPR writing restarted in December 2022. The purpose of the GEE project was to install new extraction capacity to achieve the Capture Zone Objectives.

On 6 June 2024, ODEQ requested that LSS and ERM reduce the scope of future MPRs to facilitate faster review. On 11 September 2024, ODEQ agreed for the first amended MPR to be the August 2024 MPR submitted in October 2024.

[1] ERM-West, Inc. 2014. *Revised Final Performance Monitoring Plan – Groundwater Source Control Measure, Arkema Inc. Facility, Portland, Oregon*. July 2014.

2. GWET SYSTEM PERFORMANCE

The groundwater extraction and treatment (GWET) average influent flow rate was 40.37 gallons per minute (gpm) for the entire month of January 2025, including non-operational periods, and the average operational influent flow during operational periods was also 40.37 gpm.

Extraction wells, pumps, and conveyance lines become fouled with accumulated solids over time. A proactive pump removal and maintenance program is in place to address pump fouling. Regularly scheduled redevelopment is anticipated to maintain the productivity of the groundwater extraction trenches and recovery wells. Conveyance line cleaning will be conducted as needed based on analysis of backpressure.

Compared to December 2024, the January 2025 average system influent flow rate was 9.42 gpm greater. During this same time period, the average Shallow Zone groundwater elevation increased by 0.98 feet, and the average Intermediate Zone groundwater elevation increased by 0.94 feet, as shown on Attachments A-1 and A-2. The increase in average monthly groundwater extraction rate in January 2025 compared to December 2024 is likely a result of the seasonal increase in river elevation, and the resulting increase in the groundwater elevation, as well as groundwater flux from upgradient sources.

River elevations are shown over time on Attachments A-1 and A-2, and in an inset on the potentiometric surface maps (Figures 2 through 4). The river elevation has generally been trending upward since a seasonal low was observed in October 2024. The river elevation in January 2025 had an average elevation of 10.13 feet North American Vertical Datum of 1988 (NAVD88) with a minimum elevation of 6.80 feet NAVD88 and a maximum elevation of 13.49 feet NAVD88. The river elevation had an increase of 0.14 feet NAVD88 compared to December 2024.

LSS is continuing to optimize extraction rates within the system to increase flow rates at each operational well until either the extraction rates specified in the *Groundwater Extraction Enhancement Final Design Report* (ERM 2022[2]) are achieved, the wells are producing the maximum quantity of water possible, or until the Capture Zone Objectives are met.

Actions taken in January 2025 to optimize flow rates included:

- Received training on operating and troubleshooting the Hydropuls device to focus redevelopment of the horizontal well screens in the extraction wells. Redevelopment of the horizontal screen section at underperforming trenches is scheduled for February 2025.

2.1 GWET PLANT OPERATIONS

The GWET plant operated within permit conditions during the reporting period. There were three shutdowns during January 2025:

- 10 January 2025: The GWET system was shut down for 1 hour due to high tank levels.
- 11 January 2025: The GWET system was shut down for 1 hour to clean the plate separator.

[2] ERM-West, Inc. 2022. *Final Design Report, Arkema Inc. Facility, Portland, Oregon*. May 2022.

- 31 January 2025: The GWET system was shut down for 1 hour to clean the plate separator.

3. CAPTURE ZONE EVALUATION

As described in the PMP, the purpose of hydraulic monitoring (i.e., groundwater elevation data) is to provide sufficient data to demonstrate an inward hydraulic gradient across the groundwater barrier wall (GWBW) and to evaluate the effective hydraulic capture produced by the GW SCM.

3.1 GROUNDWATER ELEVATION MONITORING

Groundwater elevation monitoring was completed on 10 January 2025. The Serfes (1991)[3] method was used to account for tidal variations of groundwater and river elevations as described in the PMP. Horizontal and vertical gradients were calculated and plotted over time as shown in Attachments B-1 and B-2. Groundwater elevations, horizontal gradients, and vertical gradients from 10 January 2025 are tabulated in Attachment B-3 and Attachment B-4.

3.2 POTENTIOMETRIC SURFACE, GROUNDWATER ELEVATION DIFFERENCE MAPS, AND GROUNDWATER FLOW DIRECTIONS

Groundwater elevation data collected on 10 January 2025 was used to prepare potentiometric surface maps based on manual measurements and averaged transducer groundwater elevations (Figures 2 through 4) and vertical gradient difference maps (Figures 5 and 6).

The generalized flow direction indicated by the potentiometric surface maps shows groundwater flow from upgradient toward the GWBW. Potentiometric surface maps (Figures 2, 3, and 4) show generalized groundwater movement to the extraction trenches in the Shallow, Intermediate, and Deep Zones due to GW SCM pumping, and cones of depression are apparent around the groundwater extraction trenches in the Shallow and Intermediate Zones. Horizontal gradient in the Shallow Zone at gradient control cluster 2 (GCC 2) was inward in January 2025, nearly zero at GCC 1 and GCC 3 and outward at GCC 4, GCC 5, and GCC 6, as shown in Attachments B-1 and B-3.

Vertical gradients were calculated for each vertical well pair and are plotted on Figures 5 and 6. Vertical groundwater gradients and trend lines are shown in Attachments B-2 and B-4. Vertical groundwater gradients exterior to the GWBW were neutral to slightly downward between the Shallow and Intermediate Zones and between the Intermediate and Deep Zones with exception to between the Shallow and Intermediate Zones at GCC6.

Vertical gradients interior to the GWBW between the Shallow Zone and Intermediate Zone were upward at GCC 2 and GCC 5, nearly neutral at GCC 3, and downward at GCC 6, GCC 4, and GCC 1. Note that the vertical gradient for GCC 1 is exaggerated as a result of the localized pressure zone where soils are tight, and water is relatively immobile. Vertical gradients interior to the

[3] Serfes, Michael. 1991. “Determining the Mean Hydraulic Gradient of Ground Water Affected by Tidal Fluctuations.” *Groundwater* 29(4): July–August.

GWBW between the Intermediate Zone and Deep Zone were upward at GCC 2 and GCC 6, nearly neutral at GCC 3, and downward at GCC 5, GCC 4, and GCC 1.

4. CONCLUSIONS

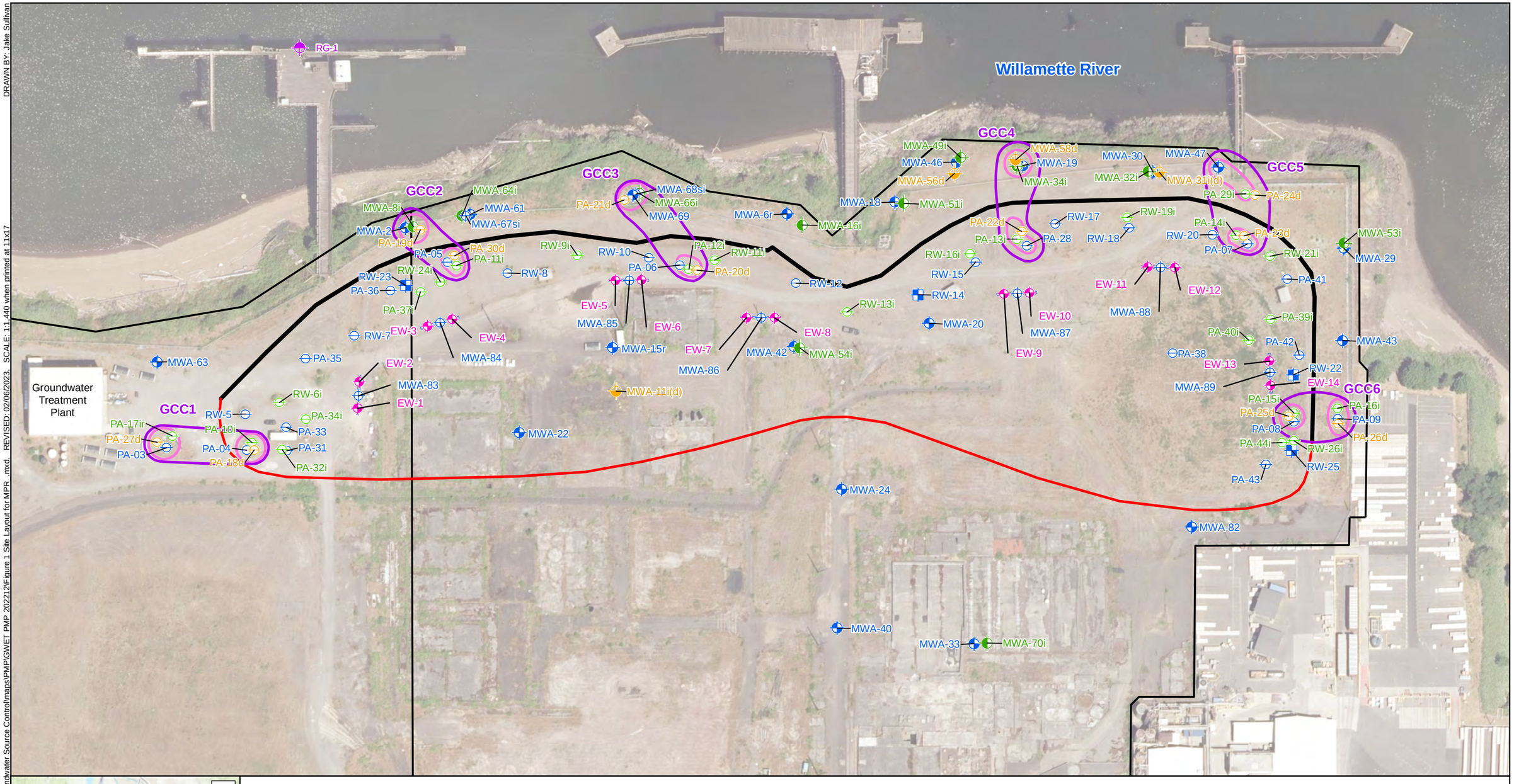
Analysis of horizontal gradients over time indicate that the extraction wells are performing better than the historical recovery wells, and horizontal gradients are periodically inward, and the magnitude of outward gradients are decreasing over time, as shown on Attachment B-1. The extraction rates throughout the GWET system will continue to be optimized to meet Target Capture Objectives. Redevelopment of the trenches is planned to mitigate accumulation of silt in the filter pack in both the vertical and horizontal sections using impulse redevelopment techniques, and resonant technology. These efforts will be targeted at trenches that are currently underperforming, including Trenches 1, 4, 5, and 6. LSS will continue to optimize new extraction wells, including pump maintenance and upgrades. Additional modifications to the system, if needed to progress toward capture objectives, will be included in subsequent MPRs. The project schedule provided as Attachment C summarizes planned activities.

Attachment D shows the average influent groundwater flow rate from April 2019 through January 2025. As shown on this figure, the extraction trenches are removing approximately three times more water than the legacy system and achieving lower horizontal gradients over time.

Regards,

Brendan Robinson, PE
Partner

ATTACHMENTS



Legend

- Shallow Zone Monitoring Well
- Intermediate Zone Monitoring Well
- Shallow-Intermediate Zone Monitoring Well
- Deep Zone Monitoring Well
- Shallow Zone Piezometer
- Intermediate Zone Piezometer
- Deep Zone Piezometer
- Shallow Zone Recovery Well
- River Gauge
- Trench Extraction Well
- Target Capture Zone
- Barrier Wall Alignment
- Parcel and Property Boundaries

GradientClusters

Type

- Gradient Control Cluster
- Vertical Flow Cluster
- Extraction Trench

N

0 120 240

Feet

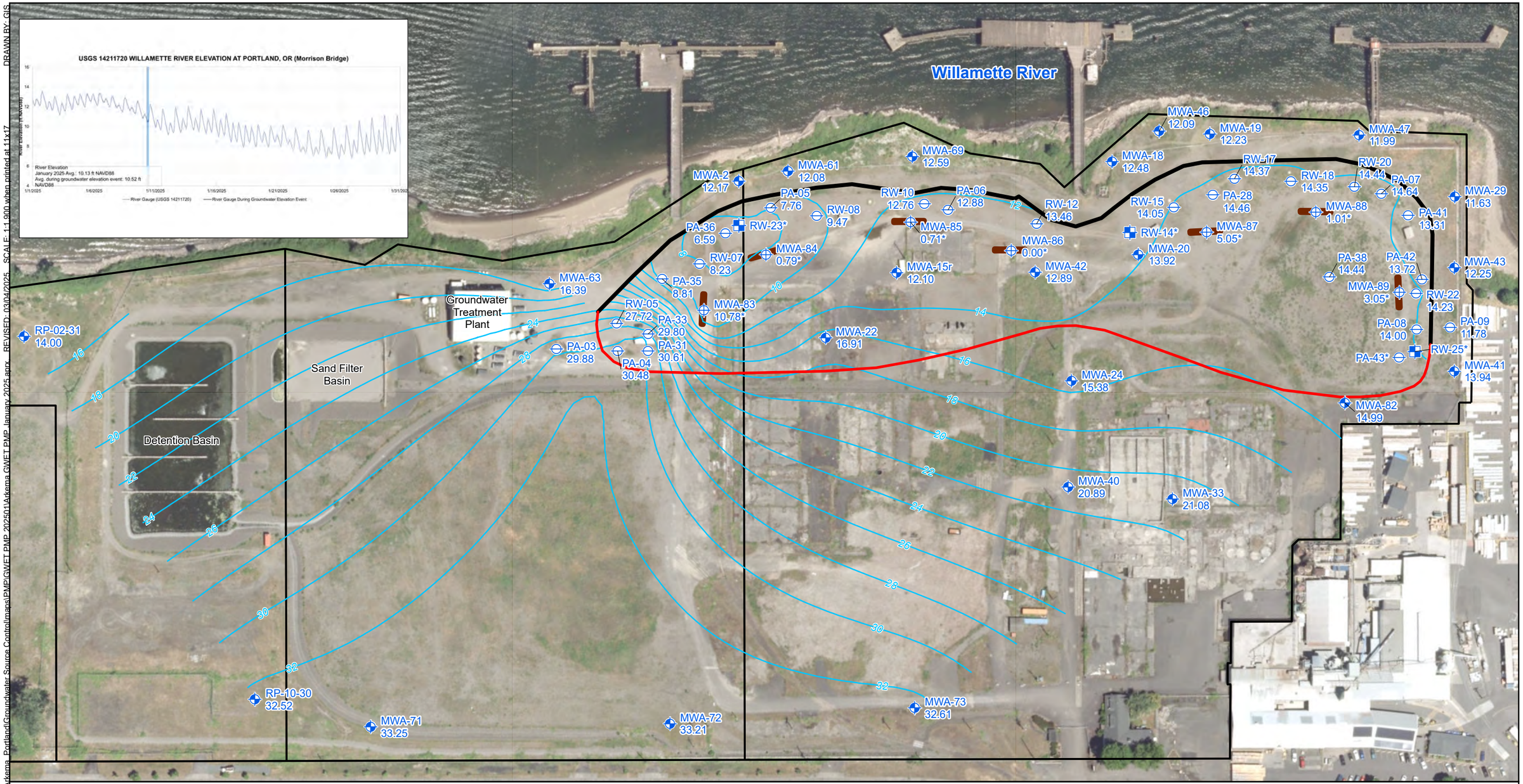
Figure 1
Site Layout
Monthly Progress Report
Groundwater Source Control Measure
Arkema Inc.
Portland, Oregon

Environmental Resources Management
www.erm.com

Source: City of Portland Aerial Imagery, flown Summer 2021; NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl

DRAWN BY: Jake Sullivan

M:\US\Projects\S-U\Total\Arkema_Portland\Groundwater Source Control\maps\PMP\GWET PMP 2022\2Figure 1 Site Layout for MPR_mxd_ REVISED 02/06/2023 SCALE: 1:1,440 when printed at 11x17



Legend

- Shallow Zone Piezometer
- Shallow Zone Monitoring Well
- Active Recovery Well; Not Used During Contouring
- Shallow-Intermediate Zone Monitoring Well
- 27.70 Groundwater Elevation (ft NAVD88)
- Shallow Zone Groundwater Contours (ft NAVD88) Dashed where Inferred
- Target Capture Zone
- Barrier Wall Alignment
- Extraction Trench (Not To Scale)

Notes:
* Value not used for contouring.
Water levels collected January, 2025.
ft NAVD88: feet North American Vertical Datum of 1988.
Aerial Photo: City of Portland, Summer 2017.

N

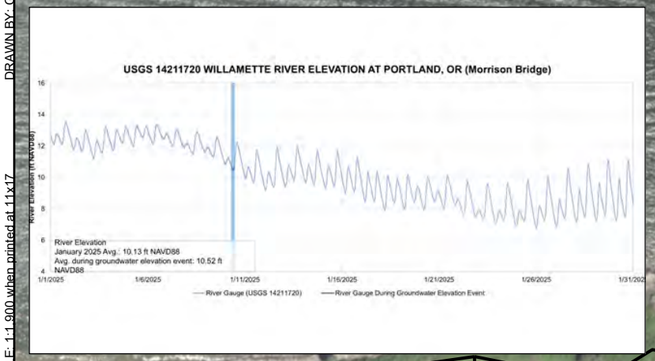
0 160 320
Feet

Figure 2
January 2025 Shallow Zone Groundwater Contours
Monthly Progress Report
Groundwater Source Control Measures
Arkema Inc.
Portland, Oregon

Environmental Resources Management
www.erm.com
ERM

NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl

DRAWN BY: GIS SCALE: 1:1,900 when printed at 11x17 REVISED: 03/04/2025 \\SCUSPRDGISFS01\Data\US\Projects\SJ\Total\Arkema_Portland\Groundwater Source Control\maps\PMP\GWET PMP 20250131Arkema.aprx



Willamette River

Groundwater Treatment Plant

Sand Filter Basin

Detention Basin

MWA-8i 11.74
PA-11i 11.83
PA-37i 10.04
RW-24i 9.39
MWA-84 0.79*
RW-09i 11.55
PA-12i 12.73
RW-11i 11.76
MWA-66i 11.60
MWA-85 0.71*
MWA-86 0.00*
MWA-16i 11.16
RW-13i 13.26
MWA-54i 13.43
MWA-49i 11.43
MWA-34iR 11.74
RW-16i 13.38
PA-13i 12.92
MWA-87 5.05*
RW-19i 12.50
MWA-88 1.01*
PA-14i*
PA-29i 11.65
MWA-53i 11.16
RW-21i 12.72
PA-39i 12.43
PA-40i 12.43
MWA-89 3.05*
PA-15i 12.40
PA-16i 12.62
PA-44i 12.38
RW-26i 12.75
MWA-81i 12.39
RW-06i 14.58
PA-34i 14.49
PA-32i 14.66
PA-10i 15.55
PA-17iR 14.00
MWA-83 10.78*
MWA-70i 17.00
MWA-74i 26.42
MWA-75i 30.82
MWA-07(I) 32.05

12 14 16 18 20 22 24 26 28 30

Legend

- Intermediate Zone Piezometer
- Intermediate Zone Monitoring Well
- Shallow-Intermediate Zone Monitoring Well
- 27.70 Groundwater Elevation (ft NAVD88)
- Intermediate Zone Groundwater Contours (ft NAVD88) Dashed where Inferred
- Target Capture Zone
- Barrier Wall Alignment
- Extraction Trench (Not To Scale)

Notes:
* Value not used for contouring.
Water levels collected January, 2025.
ft NAVD88: feet North American Vertical Datum of 1988.
Aerial Photo: City of Portland, Summer 2017.

N

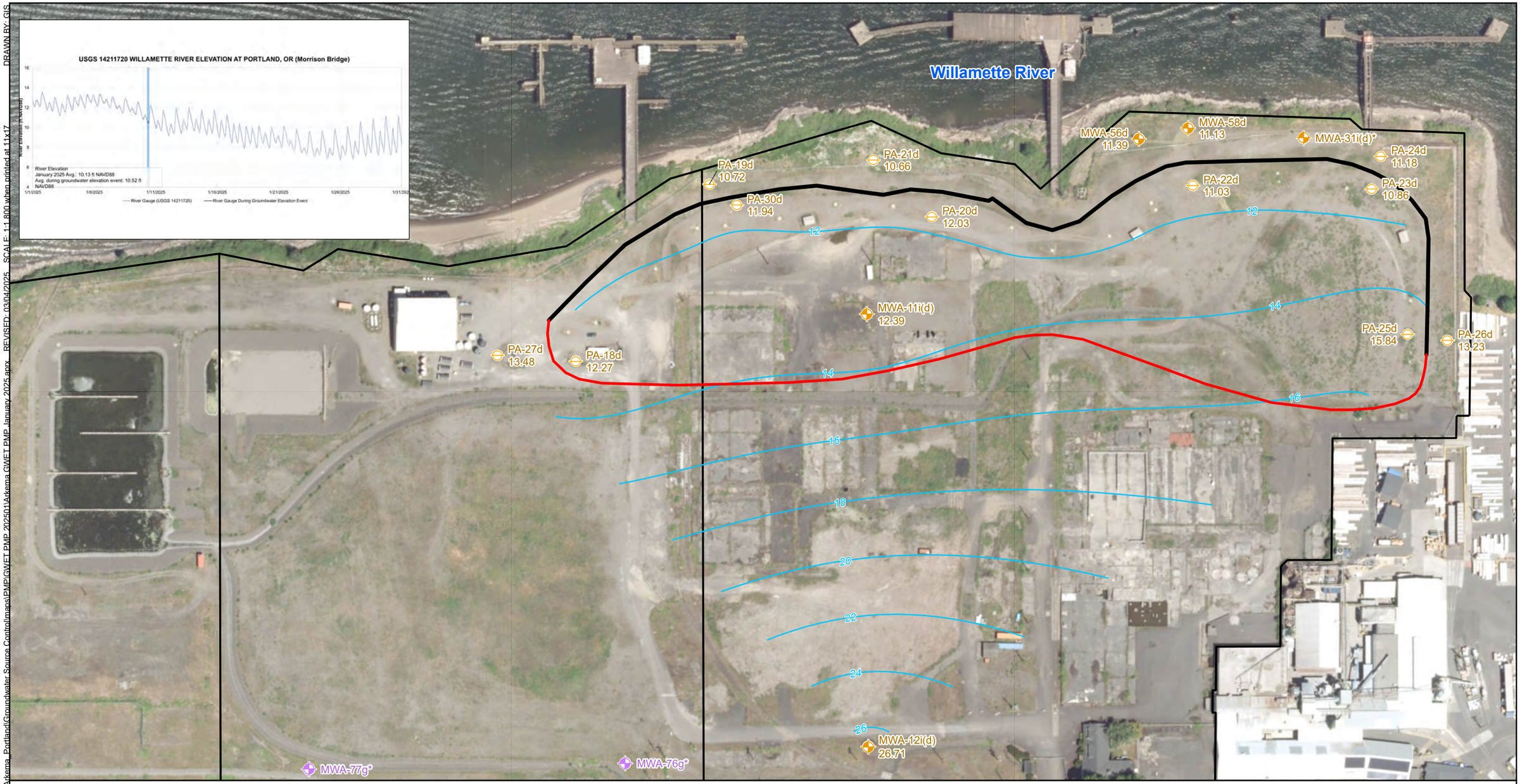
0 160 320
Feet

Figure 3
January 2025 Intermediate Zone Groundwater Contours
Monthly Progress Report
Groundwater Source Control Measures
Arkema Inc.
Portland, Oregon

Environmental Resources Management
www.erm.com
ERM

NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl

\\SCUSPRDGIS\ES\011\Data\GIS\Projects\SJ\Total\Arkema_Portland\Groundwater Source Control\maps\PMP\GWET PMP 20250110\Arkema GWET PMP January 2025.aprx REVISED: 03/04/2025 SCALE: 1:1,900 when printed at 11x17 DRAWN BY: GIS



Legend

- Deep Zone Piezometer
- Deep Zone Monitoring Well
- Gravel Zone Monitoring Well
- 27.70 Groundwater Elevation (ft NAVD88)
- Deep Zone Groundwater Contours (ft NAVD88) Dashed where Inferred
- Target Capture Zone
- Barrier Wall Alignment

Notes:
* Value not used for contouring.
Gravel zone wells not used in contouring.
Water levels collected January, 2025.
ft NAVD88: feet North American Vertical Datum of 1988.
Aerial Photo: City of Portland, Summer 2017.

N

0 150 300
Feet

Figure 4
January 2025 Deep Zone Groundwater Contours
Monthly Performance Report
Groundwater Source Control Measures
Arkema Inc.
Portland, Oregon

Environmental Resources Management
www.erm.com
ERM

NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl

\\SCUSPRDGIS\ES01\Data\US\Projects\US\Total\Arkema_Portland\Groundwater Source Control\maps\PMP\GWET PMP 20250110\Arkema GWET PMP January 2025.aprx REVISED: 03/04/2025 SCALE: 1:1,800 when printed at 11x17 DRAWN BY: GIS

Legend

- Shallow Zone Monitoring Well
- Intermediate Zone Monitoring Well
- Shallow Zone Piezometer
- Intermediate Zone Piezometer
- Shallow Zone Recovery Well
- Trench Extraction Well
- Active Recovery Well
- Trench Extraction Well
- Target Capture Zone
- Barrier Wall Alignment
- Extraction Trench
- Gradient Control Cluster
- Vertical Flow Cluster
- Downward Gradient
- Upward Gradient

Notes:
Brown gradient: Downward gradient.
Green gradient: Upward gradient.
Vertical gradient calculated as shallow zone minus intermediate zone potentiometric surfaces.
Water levels collected January, 2025.
Aerial Photo: City of Portland, Summer 2017.

N

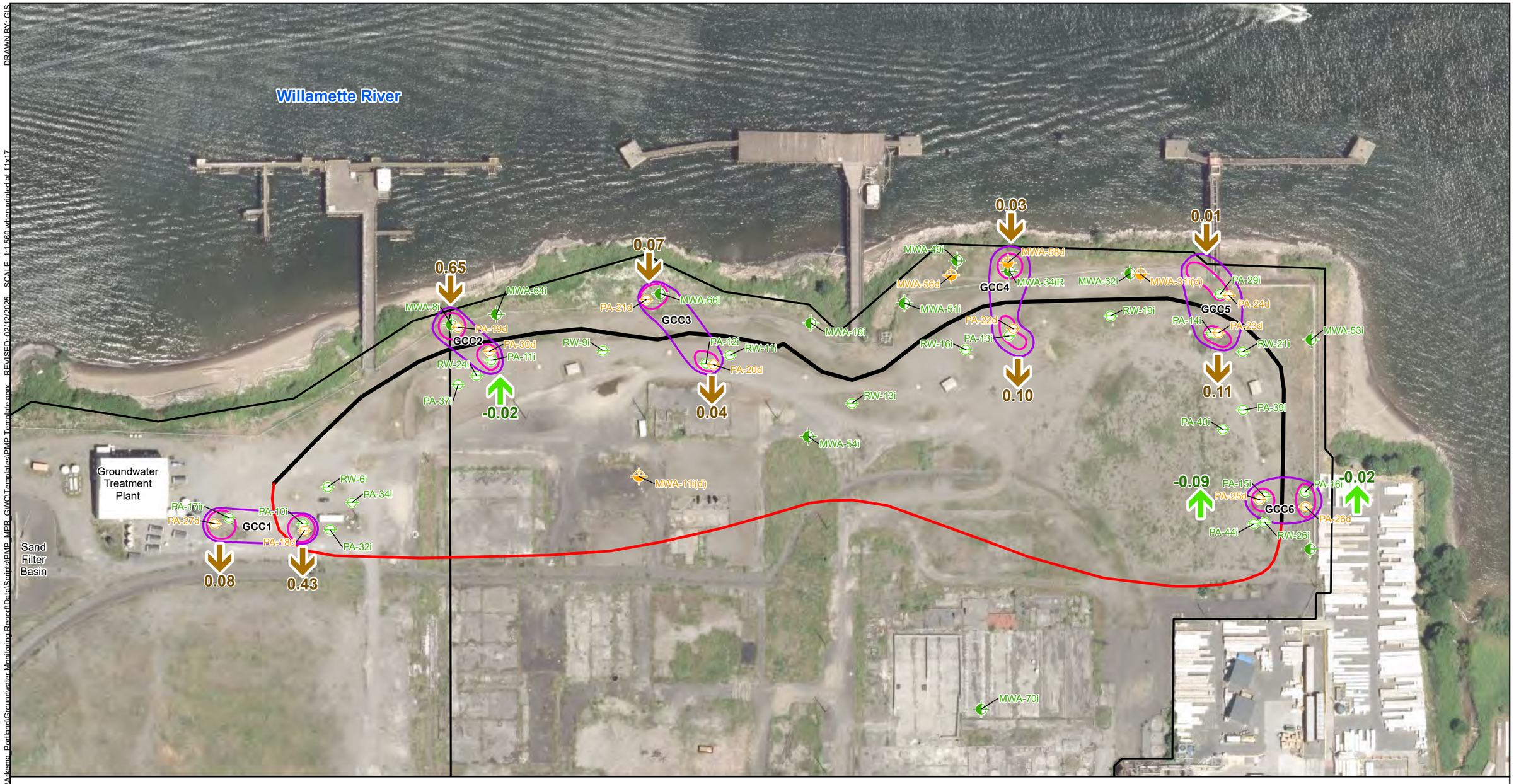
0 130 260
Feet

Figure 5
January 2025 Shallow to Intermediate Zone Vertical Head Difference
Monthly Progress Report
Groundwater Source Control Measures
Arkema Inc.
Portland, Oregon

Environmental Resources Management
www.erm.com
ERM

NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl

DRAWN BY: GIS
SCALE: 1:1,560 when printed at 11x17
REVISED: 02/12/2025
I:\GIS\PROGIS\ESRI\ArcGIS\Projects\LU\Total\Arkema_Portland\Groundwater Monitoring Report\Data\Scripts\PMP_MPR_GWCTemplates\PMP Template.aprx



Legend

- Intermediate Zone Monitoring Well
- Deep Zone Monitoring Well
- Intermediate Zone Piezometer
- Deep Zone Piezometer
- Shallow-Intermediate Zone Monitoring Well
- Trench Extraction Well
- Active Recovery Well
- Target Capture Zone
- Barrier Wall Alignment
- Extraction Trench
- Downward Gradient
- Upward Gradient

Notes:
Brown gradient: Downward gradient.
Green gradient: Upward gradient.
Vertical gradient calculated as intermediate zone minus deep zone potentiometric surfaces.
Water levels collected January, 2025.
Aerial Photo: City of Portland, Summer 2017.

N

0 130 260
Feet

NAD 1983 StatePlane Oregon North FIPS 3601 Feet Intl

Figure 6
January 2025 Intermediate to Deep Zone Vertical Head Difference
Monthly Progress Report
Groundwater Source Control Measures
Arkema Inc.
Portland, Oregon

Environmental Resources Management
www.erm.com
ERM

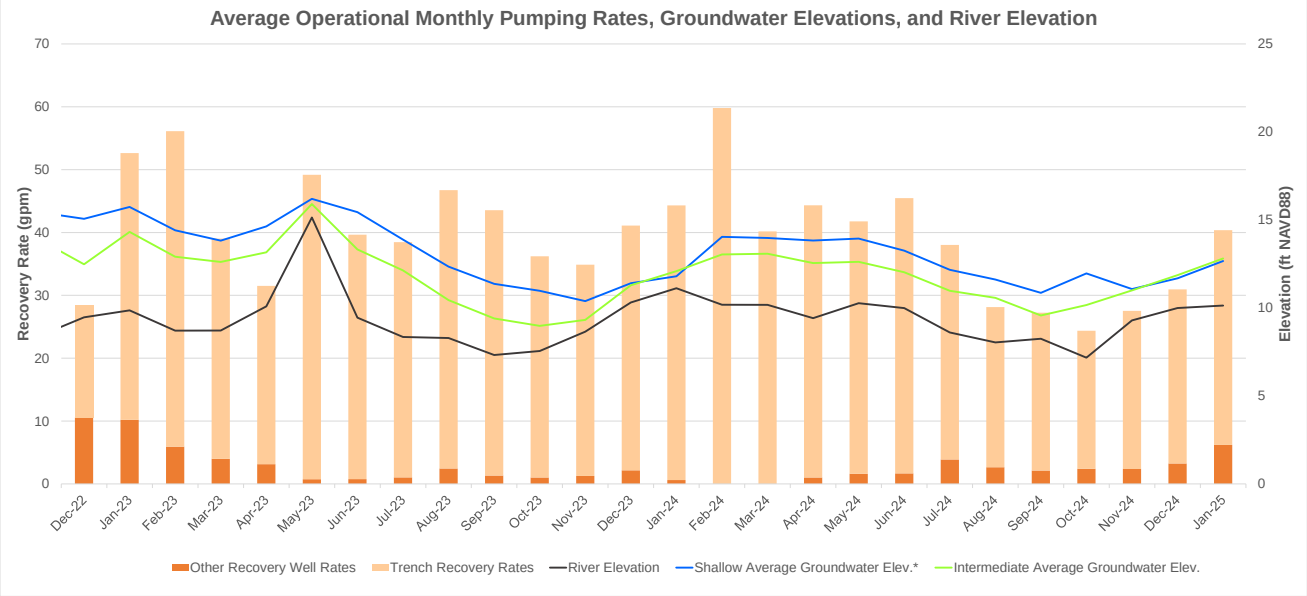
DRAWN BY: GIS
SCALE: 1:1,560 when printed at 11x17
REVISED: 02/12/2025
\\SCUSPRDGIS\ESI01\Data\GIS\Projects\SJ\Total\Arkema_Portland\Groundwater Monitoring Report\Data\Scripts\PMP_MPR_GWCTemplates\PMP Template.aprx

ERM

ATTACHMENT A-1 OPERATIONAL PUMPING RATE GRAPH

Attachment A-1

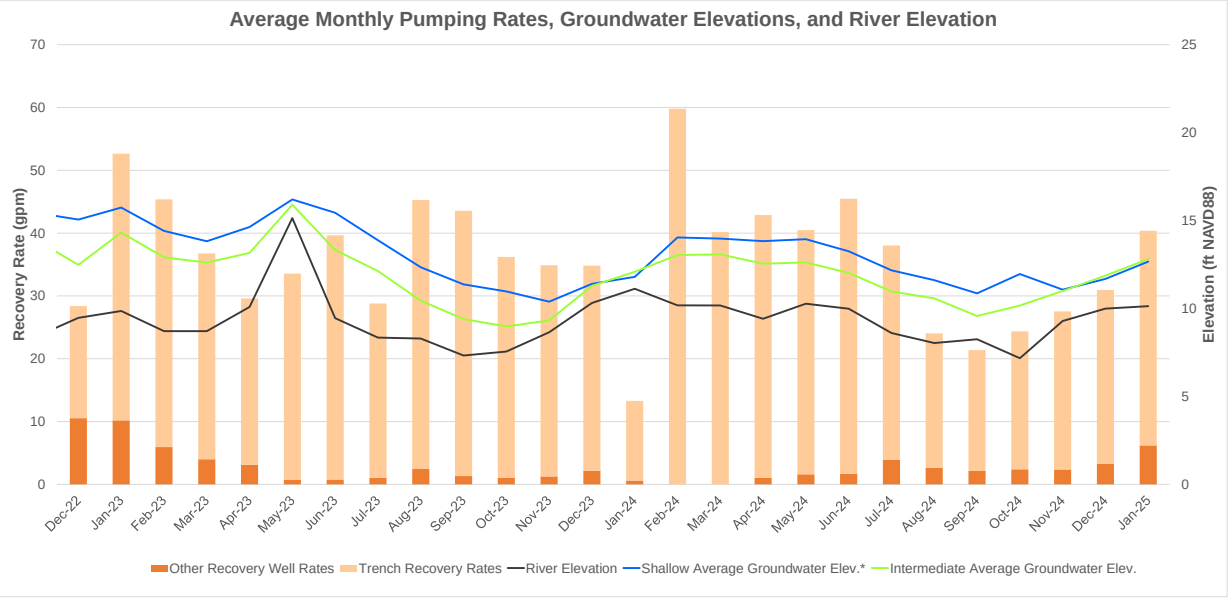
Operational Pumping Rate Graph
Arkema Inc. Facility
Portland, Oregon



ATTACHMENT A-2 AVERAGE MONTHLY PUMPING RATE GRAPH

Attachment A-2

Average Pumping Rate Graph
Arkema Inc. Facility
Portland, Oregon



ATTACHMENT A-3 GWET SYSTEM GROUNDWATER EXTRACTION RATES TABLE

Attachment A-3

GWET System Groundwater Extraction Rates Table
Arkema Inc. Facility
Portland, Oregon

Recovery Well	January 2025 Average Operational Pumping Rate (gpm)	January 2025 Average Monthly Pumping Rate (gpm)
RW-14	2.06	2.06
RW-22*	0.00	0.00
RW-23	1.91	1.91
RW-25	2.23	2.23
EW-01	1.16	1.16
EW-02*	0.00	0.00
EW-03	11.00	11.00
EW-04	1.56	1.56
EW-05	5.54	5.54
EW-06*	0.00	0.00
EW-07	0.22	0.22
EW-08	1.87	1.87
EW-09	3.22	3.22
EW-10*	0.00	0.00
EW-11	2.37	2.37
EW-12	0.13	0.13
EW-13	5.61	5.61
EW-14	1.48	1.48
Total	40.37	40.37

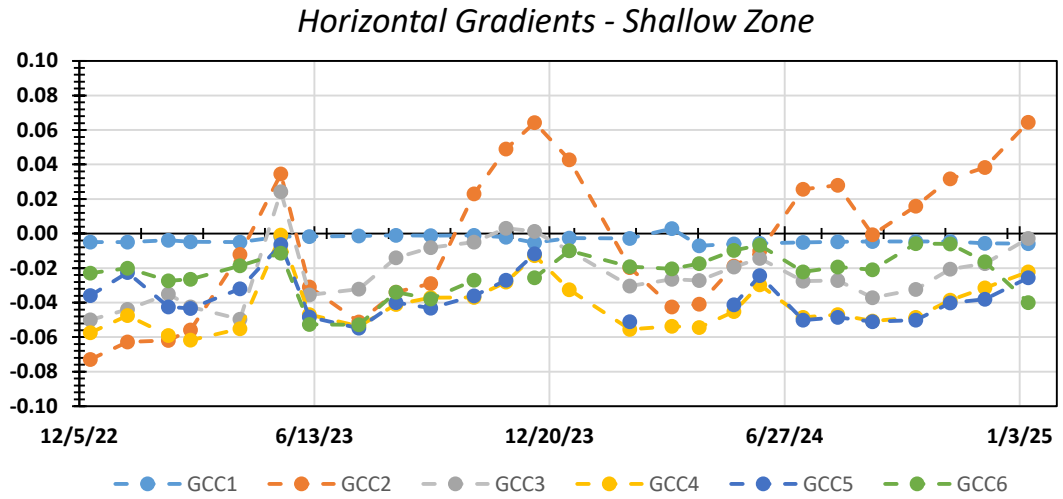
* = Recovery well not in service during reporting period

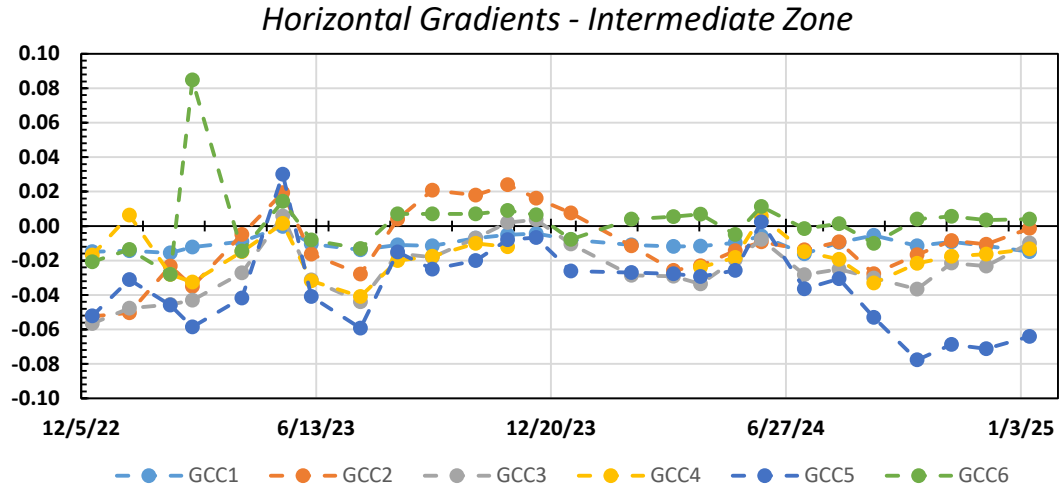
gpm = gallon per minute

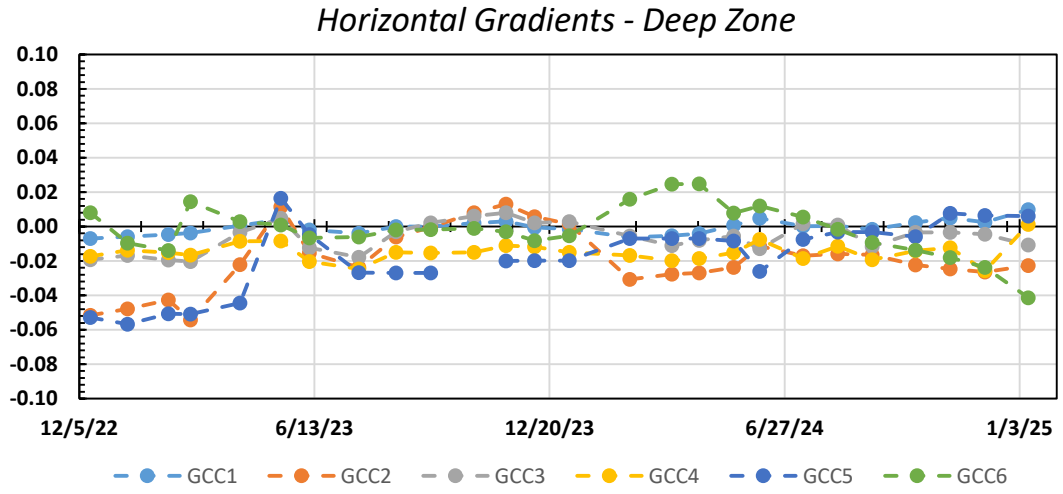
ATTACHMENT B-1 HORIZONTAL GRADIENTS SUMMARY GRAPH

Attachment B-1

Horizontal Gradients Summary: January 2025
Arkema Inc. Facility
Portland, Oregon







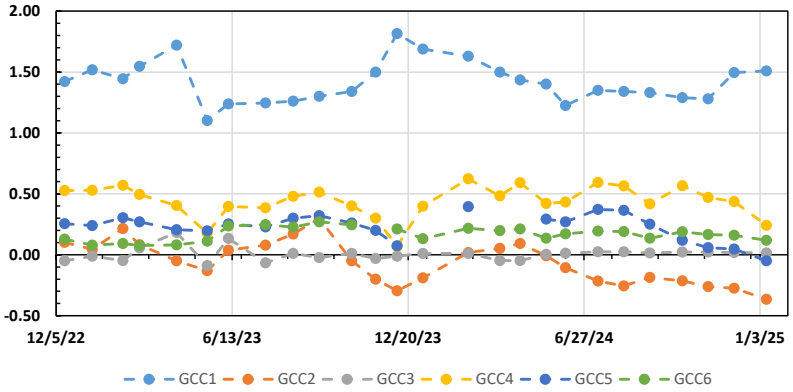
Positive horizontal gradient indicates an inward hydraulic gradient across the GWBW.

ATTACHMENT B-2 VERTICAL GRADIENTS SUMMARY GRAPH

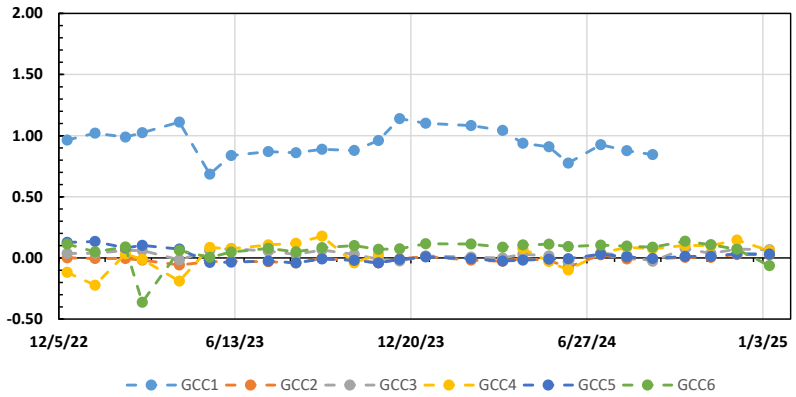
Attachment B-2

Vertical Gradients Summary: January 2025
Arkema Inc. Facility
Portland, Oregon

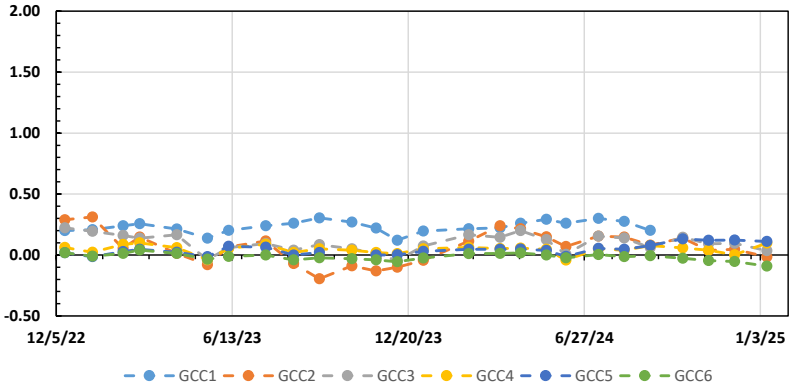
Vertical Gradients - Interior SZ-IZ



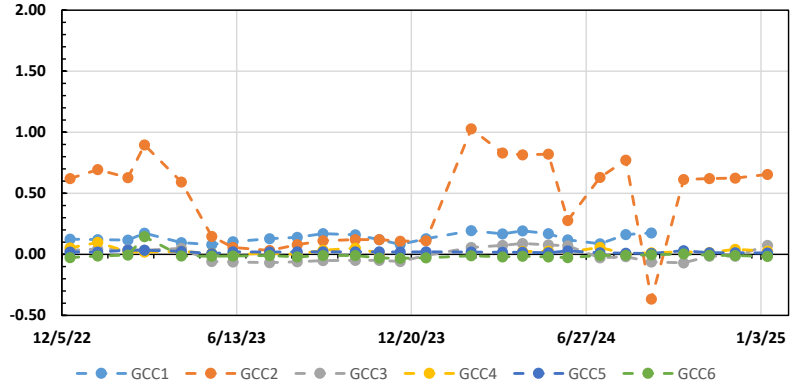
Vertical Gradients - Exterior SZ-IZ



Vertical Gradients - Interior IZ-DZ



Vertical Gradients - Exterior IZ-DZ



ATTACHMENT B-3 WATER LEVELS AND HORIZONTAL GRADIENTS TABLE

Attachment B-3

Water Levels and Horizontal Gradients Table
Arkema Inc. Facility
Portland, Oregon

Gradient Cluster	Well Pair Zone	Exterior Well	Water Elevation (ft NAVD88)	Interior Well	Water Elevation (ft NAVD88)	Horizontal Gradient (ft/ft)
GCC1	Shallow	PA-03	29.88	PA-04	30.48	-0.006
	Intermediate	PA-17iR	14.00	PA-10i	15.55	-0.015
	Deep	PA-27d	13.48	PA-18d	12.27	0.010
GCC2	Shallow	MWA-2	12.17	PA-05	7.76	0.064
	Intermediate	MWA-8i	11.74	PA-11i	11.83	-0.001
	Deep	PA-19d	10.72	PA-30d	11.94	-0.023
GCC3	Shallow	MWA-69	12.59	PA-06	12.88	-0.003
	Intermediate	MWA-66i	11.60	PA-12i	12.73	-0.010
	Deep	PA-21d	10.66	PA-20d	12.03	-0.011
GCC4	Shallow	MWA-19	12.23	PA-28	14.46	-0.022
	Intermediate	MWA-34iR	11.74	PA-13i	12.92	-0.013
	Deep	MWA-58d	11.13	PA-22d	11.03	0.001
GCC5	Shallow	MWA-47	11.99	PA-07	14.64	-0.026
	Intermediate	PA-29i	11.65	PA-14i	15.11	-0.064
	Deep	PA-24d	11.18	PA-23d	10.86	0.006
GCC6	Shallow	PA-09	11.78	PA-08	14.00	-0.040
	Intermediate	PA-16i	12.62	PA-15i	12.40	0.004
	Deep	PA-26d	13.23	PA-25d	15.84	-0.041

Positive horizontal gradient indicates an inward hydraulic gradient across the GWBW.

Horizontal gradient calculated as (Exterior Elevation – Interior Elevation) / Horizontal distance.

* = anonalous groundwater elevation

** = horizontal gradient cannot be calculated due to anomalous elevation reading

ft NAVD88 = feet North American Vertical Datum of 1988

[M] = manual groundwater elevation measurement

ATTACHMENT B-4 WATER LEVELS AND VERTICAL GRADIENTS TABLE

Attachment B-4

Water Levels and Vertical Gradients Table
Arkema Inc. Facility
Portland, Oregon

Region	Pair	Gradient Cluster	Upper Well	Water Elevation (ft NAVD88)	Lower Well	Water Elevation (ft NAVD88)	Vertical Gradient (ft/ft)
Interior	SZ-IZ	GCC1	PA-04	30.48	PA-10i	15.55	1.51
		GCC2	PA-05	7.76	PA-11i	11.83	-0.36
		GCC3	PA-06	12.88	PA-12i	12.73	0.01
		GCC4	PA-28	14.46	PA-13i	12.92	0.24
		GCC5	PA-07	14.64	PA-14i	15.11	-0.05
		GCC6	PA-08	14.00	PA-15i	12.40	0.12
	IZ-DZ	GCC1	PA-10i	15.55	PA-18d	12.27	0.43
		GCC2	PA-11i	11.83	PA-30d	11.94	-0.02
		GCC3	PA-12i	12.73	PA-20d	12.03	0.04
		GCC4	PA-13i	12.92	PA-22d	11.03	0.10
		GCC5	PA-14i	15.11	PA-23d	10.86	0.11
		GCC6	PA-15i	12.40	PA-25d	15.84	-0.09
Exterior	SZ-IZ	GCC1	PA-03	29.88	PA-17iR^{M}	14.00	1.01
		GCC2	MWA-2	12.17	MWA-8i	11.74	0.03
		GCC3	MWA-69	12.59	MWA-66i	11.60	0.07
		GCC4	MWA-19	12.23	MWA-34iR	11.74	0.06
		GCC5	MWA-47	11.99	PA-29i	11.65	0.03
		GCC6	PA-09	11.78	PA-16i	12.62	-0.06
	IZ-DZ	GCC1	PA-17iR^{M}	14.00	PA-27d	13.48	0.08
		GCC2	MWA-8i	11.74	PA-19d	10.72	0.65
		GCC3	MWA-66i	11.60	PA-21d	10.66	0.07
		GCC4	MWA-34iR	11.74	MWA-58d	11.13	0.03
		GCC5	PA-29i	11.65	PA-24d	11.18	0.01
		GCC6	PA-16i	12.62	PA-26d	13.23	-0.02

Positive vertical gradient indicates an donward hydraulic gradient.

Vertical gradient calculated as (Upper Elevation – Lower Elevation) / Screen Midpoint distance.

* = anonalous groundwater elevation

** = vertical gradient cannot be calculated due to anomalous elevation reading

DZ = Deep Zone

ft NAVD88 = feet North American Vertical Datum of 1988

IZ = Intermediate Zone

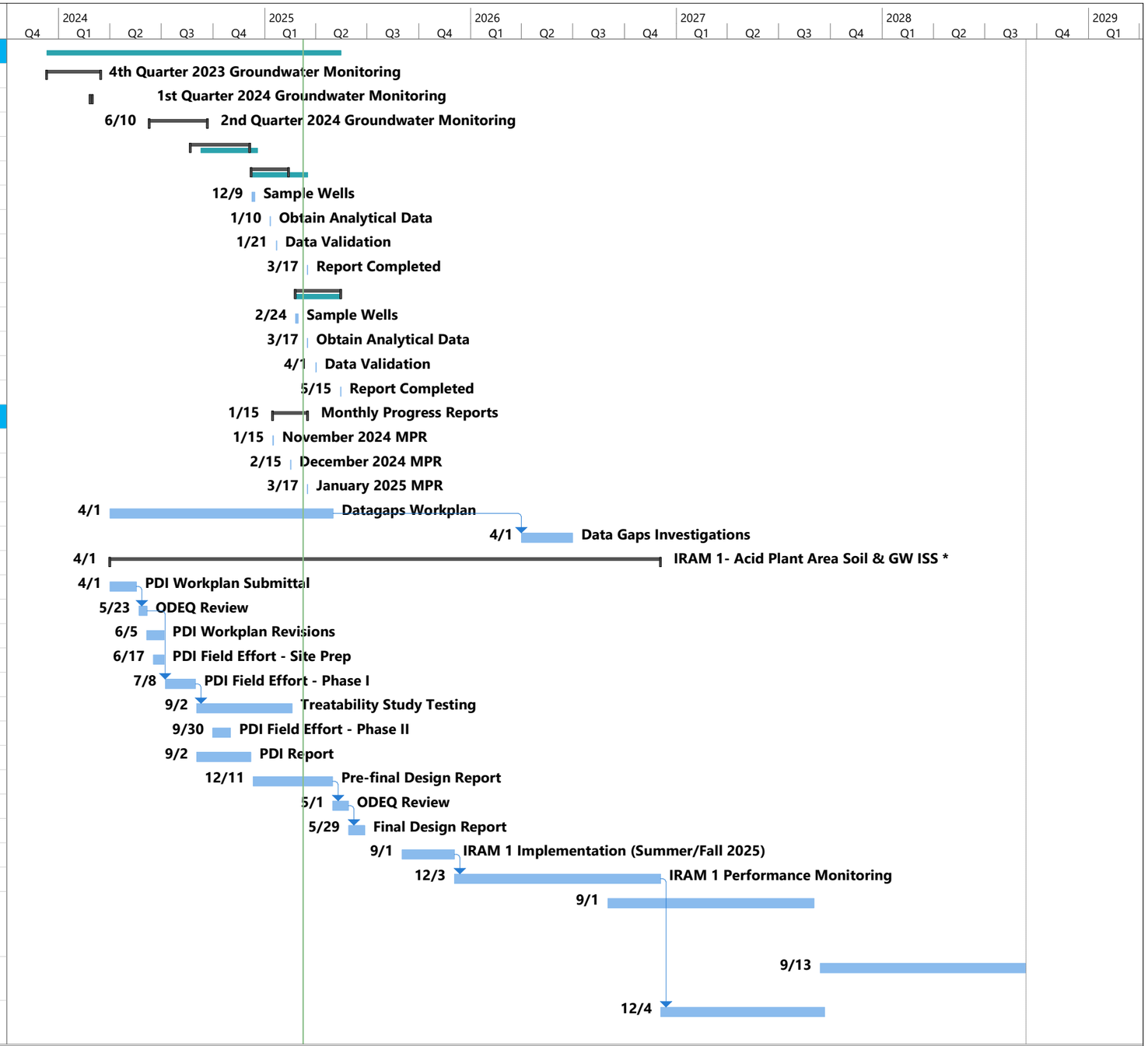
^{M} = manual groundwater elevation measurement

SZ = Shallow Zone

ERM

ATTACHMENT C PROJECT SCHEDULE

ID	Task Name	Duration	Start	Finish
1	**Quarterly GW Monitoring**			
2	4th Quarter 2023 Groundwater Monitoring	70 days	Mon 12/11/23	Fri 3/15/24
7	1st Quarter 2024 Groundwater Monitoring	4 days	Mon 2/26/24	Thu 2/29/24
12	2nd Quarter 2024 Groundwater Monitoring	75 days	Mon 6/10/24	Fri 9/20/24
17	3rd Quarter 2024 Groundwater Monitoring	75 days	Thu 8/22/24	Wed 12/4/24
22	**4th Quarter 2024 Groundwater Monitoring ***	**48 days**	**Sun 12/8/24**	**Tue 2/11/25**
23	*Sample Wells*	*5 days*	*Mon 12/9/24*	*Fri 12/13/24*
24	*Obtain Analytical Data*	*1 day*	*Fri 1/10/25*	*Fri 1/10/25*
25	*Data Validation*	*1 day*	*Tue 1/21/25*	*Tue 1/21/25*
26	Report Completed	1 day	Mon 3/17/25	Mon 3/17/25
27	**1st Quarter 2025 Groundwater Monitoring ***	**59 days**	**Mon 2/24/25**	**Thu 5/15/25**
28	*Sample Wells*	*5 days*	*Mon 2/24/25*	*Fri 2/28/25*
29	Obtain Analytical Data	1 day	Mon 3/17/25	Mon 3/17/25
30	Data Validation	1 day	Tue 4/1/25	Tue 4/1/25
31	Report Completed	1 day	Thu 5/15/25	Thu 5/15/25
32	**Monthly Progress Reports**	**45 days**	**Wed 1/15/25**	**Mon 3/17/25**
33	*November 2024 MPR*	*1 day*	*Wed 1/15/25*	*Wed 1/15/25*
34	*December 2024 MPR*	*1 day*	*Sat 2/15/25*	*Sat 2/15/25*
35	January 2025 MPR	1 day	Mon 3/17/25	Mon 3/17/25
36	**Datagaps Workplan**	285 days	Mon 4/1/24	Thu 5/1/25
37	**Data Gaps Investigations**	65 days	Wed 4/1/26	Tue 6/30/26
38	**IRAM 1- Acid Plant Area Soil & GW ISS ***	**700 days**	**Mon 4/1/24**	**Thu 12/3/26**
39	*PDI Workplan Submittal*	*35 days*	*Mon 4/1/24*	*Fri 5/17/24*
40	*ODEQ Review*	*10 days*	*Thu 5/23/24*	*Wed 6/5/24*
41	*PDI Workplan Revisions*	*23 days*	*Wed 6/5/24*	*Fri 7/5/24*
42	*PDI Field Effort - Site Prep*	*15 days*	*Mon 6/17/24*	*Fri 7/5/24*
43	*PDI Field Effort - Phase I*	*40 days*	*Mon 7/8/24*	*Fri 8/30/24*
44	*Treatability Study Testing*	*122 days*	*Mon 9/2/24*	*Mon 2/17/25*
45	*PDI Field Effort - Phase II*	*24 days*	*Mon 9/30/24*	*Thu 10/31/24*
46	*PDI Report*	*70 days*	*Mon 9/2/24*	*Fri 12/6/24*
47	Pre-final Design Report	102 days	Wed 12/11/24	Wed 4/30/25
48	ODEQ Review	20 days	Thu 5/1/25	Wed 5/28/25
49	Final Design Report	21 days	Thu 5/29/25	Thu 6/26/25
50	IRAM 1 Implementation (Summer/Fall 2025)	67 days	Mon 9/1/25	Tue 12/2/25
51	IRAM 1 Performance Monitoring	262 days	Wed 12/3/25	Thu 12/3/26
52	**IRAM 2-Enhanced ISCR Perchlorate & CrVI In Chlorate Plant Area, if needed (Late 2026/Early 2027 implementation)**	262 days	Tue 9/1/26	Wed 9/1/27
53	**IRAM 3-Remove Human Health Direct Contact Hot Spots, if needed (Summer 2028 implementation)**	261 days	Mon 9/13/27	Mon 9/11/28
54	**IRAM 4-Enhanced ISCR of Acid Plant Vicinity, if needed (Summer 2027 implementation)**	207 days	Fri 12/4/26	Mon 9/20/27



Arkema Portland
Monthly Progress Report
Attachment C

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone

ERM

ATTACHMENT D AVERAGE GROUNDWATER EXTRACTION RATE GRAPH

Attachment D

Average Groundwater Extraction Rate Graph
Arkema Inc. Facility
Portland, Oregon