

MEMORANDUM

To:	Andrew Smith	From:	Steven Vandecoevering, E.I.T. Mike F. Coenen, P.E.
Company:	Washington State Department of Ecology Toxics Cleanup Program, Southwest Regional Office	Date:	April 3, 2023
Address:	PO Box 47775 Olympia, WA 98504-7775		
cc:	Ramsey Zawideh, Golden Corral Bassel Ayoub		
Project No.:	GCVan-1-01		
RE:	Methane Monitoring Results Golden Corral 11801 NE Fourth Plain Boulevard Vancouver, Washington Cleanup Site Identification No. 4677		

INTRODUCTION

On behalf of Golden Corral, NV5 is pleased to provide this technical memorandum summarizing the results of the methane monitoring event at the Golden Corral restaurant located at 11801 NE Fourth Plain Boulevard in Vancouver, Washington (subject property). NV5 performed methane monitoring on March 23, 2023. The methane monitoring methods and results are summarized below.

BACKGROUND

The subject property is a former landfill and a listed cleanup site in the Washington State Department of Ecology (Ecology) Cleanup Site database. In 2000, Ecology determined the subject property was eligible for a No Further Action determination, which included institutional controls in the form of a restrictive covenant. In general, the restrictive covenant prohibits the use of groundwater at the subject property and requires approval from Ecology and local agencies with jurisdiction for all redevelopment plans on the property. In 2017, the west portion of the former landfill was redeveloped with the construction of a Golden Corral restaurant under Ecology oversight. As part of redevelopment, construction of the restaurant included a methane mitigation system consisting of the following elements:

- A sub-slab passive venting system
- A low permeable membrane installed underneath the floor slab

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- Trench dams to prevent methane migration along utility trenches
- Conduit plugs and seals to prevent methane migration into the structure through utility conduits

Construction was substantially complete in 2018. At the request of Ecology, quarterly monitoring activities began in 2019 to evaluate the performance of the methane mitigation system. Following the June 2020 monitoring event, Ecology reduced the monitoring frequency requirements to a semi-annual basis and then to annual monitoring events after the September 2021 monitoring event.

FIELD ACTIVITIES

On March 23, 2023, NV5 conducted the 2023 annual methane monitoring event at the subject property. For each sub-slab probe, NV5 used the following sampling methodology:

- Purge at least one casing volume
- Collect a set of gas measurements
- Continue to purge the sub-slab probe and collect gas measurements at approximately one-half casing volume intervals until the difference between successive measurements is less than 10 percent

Using a calibrated Landtec GEM 2000+ gas analyzer, NV5 monitored the three sub-slab monitoring probes (SSP-1 through SSP-3). In addition, the Landtec GEM 2000+ gas analyzer was used to monitor the three vent risers (VR-1, VR-2, and VR-4). For each monitoring point, the percent by volume (pbv) of methane, oxygen, and carbon dioxide was measured and recorded. Lastly, the date, time, atmospheric barometric pressure, and static pressures (sub-slab probes only) were recorded during the monitoring event.

METHANE MONITORING RESULTS

Methane monitoring results are summarized in Table 1. The methane monitoring data sheet is presented in the Attachment. After approximately two casing volumes were purged, 0.2 pbv methane was detected in sub-slab monitoring probes SSP-1, SSP-2, and SSP-3. Methane was detected in ambient air at 0.1 pbv while purging the GEM between probes. A calibration check performed after field activities confirmed that the GEM was accurately calibrated. Static pressure was detected at 0.03, 0.02, and 0.00 iow in the sub-slab monitoring probes, respectively.

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Methane monitoring indicated methane discharging from vent risers VR-1, VR-2, and VR-4 at concentrations of 0.2, 1.8, and 3.5 pbv, respectively. As noted in the Construction Completion Report, vent riser VR-3 was combined with vent riser VR-4 and the vent pipe through the roof was designated VR-4.¹

DISCUSSION OF METHANE MONITORING RESULTS

Results from the 2023 annual methane monitoring event indicated low methane concentrations in the sub-slab monitoring probes with static pressures ranging between 0 inches and 0.03 inch of water. The detected methane concentrations were well below the trigger value for continued sub-slab probe monitoring of 5 pbv, as set forth in the engineering design report.²

Methane was detected in the vent risers at concentrations up to 3.5 pbv, which is within the historical range of methane concentrations (0.0 to 6.8 pbv) measured in vent risers at the subject property. Based on previous monitoring results, the presence of methane in vent risers is expected to be transitory. The data indicate that the methane mitigation system is functioning as intended by helping to prevent methane accumulation under the structure at the subject property.

SUMMARY

During the 2023 annual methane monitoring event, methane was detected at low concentrations in the sub-slab monitoring probes. In addition, sub-slab static pressures were slightly greater than 0 pbv. Methane was detected in vent risers VR-1, VR-2, and VR-4 at concentrations of 0.2, 1.8, and 3.5 pbv, respectively. Based on over four years of monitoring data, monitoring results indicate that methane is not accumulating beneath the building at concentrations of concern, conditions are stable, and that the methane mitigation system is performing as intended. Based on this, NV5 recommends discontinuing the monitoring program.

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¹ GeoDesign, Inc., 2019. *Construction Completion Report; Proposed Development – Former Turnbull Landfill; Southeast of SR 500 and NE Fourth Plain Boulevard; Vancouver, Washington*, dated July 3, 2019. GeoDesign Project: Orchard-1-01

² GeoDesign, Inc., 2017. *Engineering Design Report; Proposed Development – Former Turnbull Landfill; Southeast of SR 500 and NE Fourth Plain Boulevard; Vancouver, Washington*, dated January 27, 2017. GeoDesign Project: Orchard-1-01

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NV5 appreciates Ecology's continued support on this project. Please call if you have questions concerning the information provided.

SRV:MFC:sn

Attachments

One copy submitted

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Signed 04/03/2023

TABLES

TABLE 1 Summary of Methane Monitoring Results Golden Corral Vancouver, Washington							
Location I.D.	Date	Barometric Pressure (mbars)	Pressure (inches water)	Concentration (pbv)			Comments
				Methane	Carbon Dioxide	Oxygen	
Sub-Slab Probes							
SSP-1	08/27/19	1,013	NM	0.0	0.0	19.8	Q3, 2019 monitoring event
SSP-2	08/27/19	1,013	NM	0.0	0.0	20.0	Q3, 2019 monitoring event
SSP-3	08/27/19	1,013	NM	0.0	0.0	20.1	Q3, 2019 monitoring event
SSP-1	12/12/19	1,008	0.00	0.0	0.0	20.5	Q4, 2019 monitoring event
SSP-2	12/12/19	1,008	0.00	0.0	0.1	20.4	Q4, 2019 monitoring event
SSP-3	12/12/19	1,008	0.00	0.0	0.1	20.4	Q4, 2019 monitoring event
SSP-1	02/28/20	1,012	0.00	0.0	0.0	20.9	Q1, 2020 monitoring event
SSP-2	02/28/20	1,012	0.00	0.0	0.1	20.8	Q1, 2020 monitoring event
SSP-3	02/28/20	1,012	0.00	0.0	0.0	20.7	Q1, 2020 monitoring event
SSP-1	03/26/20	1,013	-0.01	0.0	0.0	21.1	Q1, 2020 supplemental monitoring event
SSP-2	03/26/20	1,013	0.00	0.0	0.0	21.0	Q1, 2020 supplemental monitoring event
SSP-3	03/26/20	1,013	0.00	0.0	0.0	20.9	Q1, 2020 supplemental monitoring event
SSP-1	06/25/20	1,010	0.00	0.0	0.0	21.2	Q2, 2020 monitoring event
SSP-2	06/25/20	1,010	0.00	0.0	0.0	21.1	Q2, 2020 monitoring event
SSP-3	06/25/20	1,010	0.00	0.0	0.0	21.1	Q2, 2020 monitoring event
SSP-1	01/29/21	1,010	0.00	0.0	0.0	21.2	S1, 2021 monitoring event
SSP-2	01/29/21	1,010	0.00	0.0	1.0	19.9	S1, 2021 monitoring event
SSP-3	01/29/21	1,010	0.00	0.0	0.0	21.4	S1, 2021 monitoring event
SSP-1	09/02/21	1,018	0.00	0.0	0.0	21.2	S2, 2021 monitoring event
SSP-2	09/02/21	1,018	0.00	0.0	0.0	21.4	S2, 2021 monitoring event
SSP-3	09/02/21	1,017	0.00	0.0	0.0	21.5	S2, 2021 monitoring event
SSP-1	03/22/22	1,021	0.00	0.0	0.1	20.6	2022 monitoring event
SSP-2	03/22/22	1,021	0.00	0.0	0.1	20.4	2022 monitoring event
SSP-3	03/22/22	1,021	0.00	0.0	0.0	20.8	2022 monitoring event
SSP-1	03/23/23	1,009	0.03	0.2	0.0	21.5	2023 monitoring event
SSP-2	03/23/23	1,009	0.02	0.2	0.0	21.1	2023 monitoring event
SSP-3	03/23/23	1,009	0.00	0.2	0.2	21.5	2023 monitoring event
Vent Risers							
VR-1	08/27/19	1,013	--	0.1	0.0	20.4	Q3, 2019 monitoring event
VR-2	08/27/19	1,013	--	0.1	0.0	20.3	Q3, 2019 monitoring event
VR-4	08/27/19	1,013	--	0.1	7.1	10.4	Q3, 2019 monitoring event
VR-1	12/12/19	1,008	--	0.0	0.1	20.3	Q4, 2019 monitoring event
VR-2	12/12/19	1,008	--	0.0	0.1	20.3	Q4, 2019 monitoring event
VR-4	12/12/19	1,008	--	0.0	0.1	79.7	Q4, 2019 monitoring event
VR-1	02/28/20	1,012	--	0.0	0.1	21.0	Q1, 2020 monitoring event
VR-2	02/28/20	1,012	--	0.5	7.3	13.3	Q1, 2020 monitoring event
VR-4	02/28/20	1,012	--	6.8	16.6	1.8	Q1, 2020 monitoring event
VR-1	03/26/20	1,013	--	0.0	0.1	20.7	Q1, 2020 supplemental monitoring event
VR-2	03/26/20	1,013	--	0.0	6.5	14.1	Q1, 2020 supplemental monitoring event
VR-4	03/26/20	1,013	--	1.2	6.9	12.8	Q1, 2020 supplemental monitoring event
VR-1	06/25/20	1,010	--	0.0	0.1	21.0	Q2, 2020 monitoring event
VR-2	06/25/20	1,010	--	0.0	3.8	16.8	Q2, 2020 monitoring event
VR-4	06/25/20	1,010	--	0.0	5.3	13.7	Q2, 2020 monitoring event
VR-1	01/29/21	1,010	--	0.0	0.0	21.3	S1, 2021 monitoring event
VR-2	01/29/21	1,010	--	0.0	7.9	11.5	S1, 2021 monitoring event
VR-4	01/29/21	1,010	--	0.0	0.1	21.3	S1, 2021 monitoring event
VR-1	09/02/21	1,017	--	0.0	0.0	21.4	S2, 2021 monitoring event
VR-2	09/02/21	1,017	--	0.0	4.7	15.1	S2, 2021 monitoring event
VR-4	09/02/21	1,017	--	0.0	0.1	21.3	S2, 2021 monitoring event
VR-1	03/22/22	1,022	--	0.6	5.5	12.8	2022 monitoring event
VR-2	03/22/22	1,022	--	6.0	16.4	1.0	2022 monitoring event
VR-4	03/22/22	1,022	--	0.7	5.3	14.0	2022 monitoring event
VR-1	03/23/23	1,009	--	0.2	0.0	21.5	2023 monitoring event
VR-2	03/23/23	1,009	--	1.8	14.8	4.0	2023 monitoring event
VR-4	03/23/23	1,009	--	3.5	14.8	2.5	2023 monitoring event
Notes: I.D.: identification mbars: millibars NM: Static pressure not measured during this monitoring event. --: Pressure was not measured because vent risers are open to the atmosphere.							

ATTACHMENT

TABLE 1A
Methane Monitoring Data Sheet
GCVan-1-01

Device I.D.	Date	Time	Temp. (°C)	Baro. Pressure (mbar)	Static Pressure ² (¹ / ₂ H ₂ O)	CH ₄ ¹ (pbv)	CO ₂ (pbv)	O ₂ (pbv)	Comments
SSP-1 @ 1 vol	03/23/23	0935	7.22	1,009	.03	0.2	0.0	21.3	
SSP-1 @ 1.5 vol	"	0946	"	"	—	0.2	0.0	21.4	
SSP-1 @ 2 vol	"	1001	"	"	—	0.2	0.0	21.5	
SSP-2 @ 1 vol	"	1005	"	"	.02	0.2	0.0	21.5	
SSP-2 @ 1.5 vol	"	1011	"	"	—	0.2	0.2	21.1	
SSP-2 @ 2 vol	"	1016	"	"	—	0.2	0.2	21.1	
SSP-3 @ 1 vol	"	1020	"	"	.00	0.2	0.0	21.2	
SSP-3 @ 1.5 vol	"	1025	"	"	—	0.2	0.0	21.5	
SSP-3 @ 2 vol	"	1028	"	"	—	0.2	0.0	21.5	
VR-1	"	1035	7.7	"	—	0.2	0.0	21.5	
VR-2	"	1038	7.7	"	—	1.8	14.8	4.0	
VR-4	"	1042	7.7	"	—	3.5	14.8	2.5	

Notes:

mbar: millibars

pbv: percent by volume