GEODESIGN INC
AN NV5 COMPANY

Memorandum

To:	Panjini Balaraju, P.E.	From:	Mike F. Coenen, P.E. Lon R. Yandell, L.G.
Company:	Washington State Department of Ecology Toxics Cleanup Program, Southwest Regional Office	Date:	February 11, 2021
Address:	PO Box 47775 Olympia, WA 98504-7775		

cc:	Ramsey Zawideh, Golden Corral (via email only) Bassel Ayoub (via email only)

GDI Project:	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, GeoDesign, Inc. 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 (project site). GeoDesign performed the methane monitoring on January 29, 2021. A summary of the methane monitoring methods and results is presented below.

BACKGROUND

The project site 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 project site 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 project site 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

- 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.

FIELD ACTIVITIES

On January 29, 2021, GeoDesign conducted the initial semi-annual 2021 methane monitoring event at the project site. For each sub-slab probe, GeoDesign 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 until the difference between successive measurements is less than 10 percent

Using a calibrated Landtec GEM 2000+ gas analyzer and a GAST diaphragm pump, GeoDesign monitored the three sub-slab monitoring probes (SSP-1 through SSP-3). Additionally, 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 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 on Table 1. The sub-slab monitoring field form is presented in the Attachment. After purging approximately two casing volumes, methane was not detected in sub-slab monitoring probes SSP-1, SSP-2, and SSP-3 and vent risers VR-1, VR-2, and VR-4. Additionally, measurable static pressure was not observed in the sub-slab monitoring probes. 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 initial semi-annual 2021 methane monitoring event indicated methane is not accumulating under the slab and that static pressures under the slab remain consistently at or near zero. The data indicate that the methane mitigation system is functioning as intended by helping to prevent methane accumulation under the structure at the project site.

[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

SUMMARY

During the initial semi-annual 2021 methane monitoring event, methane was not detected in the sub-slab monitoring probes or vent risers. Additionally, static pressure was not observed in the sub-slab monitoring probes. The recent methane monitoring results indicate that methane is not accumulating beneath the building and the methane mitigation system is performing as intended. The next monitoring event is scheduled for July 2021.

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

SRV:MFC:LRY:sn
Attachments
One copy submitted (via email only)
Document ID: GCVan-1-01-021121-envm.docx

Signed 02/11/2021

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	0.0	0.0	0.0	20.5	Q4, 2019 monitoring event
SSP-2	12/12/19	1,008	0.0	0.0	0.1	20.4	Q4, 2019 monitoring event
SSP-3	12/12/19	1,008	0.0	0.0	0.1	20.4	Q4, 2019 monitoring event
SSP-1	02/28/20	1,012	0.0	0.0	0.0	20.9	Q1, 2020 monitoring event
SSP-2	02/28/20	1,012	0.0	0.0	0.1	20.8	Q1, 2020 monitoring event
SSP-3	02/28/20	1,012	0.0	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	0.0	0.0	0.0	21.0	Q1, 2020 supplemental monitoring event
SSP-3	03/26/20	1,013	0.0	0.0	0.0	20.9	Q1, 2020 supplemental monitoring event
SSP-1	06/25/20	1,010	0.0	0.0	0.0	21.2	Q2, 2020 monitoring event
SSP-2	06/25/20	1,010	0.0	0.0	0.0	21.1	Q2, 2020 monitoring event
SSP-3	06/25/20	1,010	0.0	0.0	0.0	21.1	Q2, 2020 monitoring event
SSP-1	01/29/21	1,010	0.0	0.0	0.0	21.2	S1, 2021 monitoring event
SSP-2	01/29/21	1,010	0.0	0.0	1.0	19.9	S1, 2021 monitoring event
SSP-3	01/29/21	1,010	0.0	0.0	0.0	21.4	S1, 2021 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

Notes:
--: Pressure was not measured because vent risers are open to the atmosphere.
I.D.: identification
mbars: millibars
NM: Static pressure not measured during this monitoring event.
pbv: percent by volume

ATTACHMENT

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

Device I.D.	Date	Time	Temp. (°C)	Baro. Pressure (mbar)	CH_4[1] (pbv)	CO_2 (pbv)	O_2 (pbv)	Static Pressure[2] (" H_2O)	GAST Vac. (" Hg)	Comments
SSP-1	1/29	0922	6	29.82	0.0	0.0	21.1	0.00	8	1 Volume (purged w/GAST 7 seconds)
		+234sec			0.0	0.0	21.1			1.5 volumes
		+467sec			0.0	0.0	21.2			2.0 volumes
SSP-2	1/29	0937			0.0	0.9	20.0	0.00	3	1 Volume (purged w/GAST 3 seconds)
		+137sec			0.0	1.0	19.9			1.5 volumes
		+273sec			0.0	1.0	19.9			2.0 volumes
SSP-3	1/29	0948			0.0	0.0	21.3	0.00	3	1 Volume (purged w/GAST 2 seconds)
		+116			0.0	0.0	21.3			1.5 volumes
		+232			0.0	0.0	21.4			2.0 volumes
VR-1		0959			0.0	0.0	21.3			
VR-2		1001			0.0	7.9	11.5			
VR-3		1005			0.0	0.1	21.3			

Note: The first casing volume was purged using the GAST diaphragm pump. Successive purging was performed with the GEM

Notes:
mbar: millibars
pbv: percent by volume

Equipment Used: GEM 2000+, purge rate = 300 mL/min = 5 mL/sec
GAST diaphragm pump, purge rate = 330 mL/sec @ 8 inH20 vacuum
purge rate = 520 mL/sec @ 3 inH20 vacuum

Casing Volumes		
	SSP-1	2340 mL
	SSP-2	1370 mL
	SSP-3	1160 mL