MEMORANDUM

To:	Panjini Balaraju, P.E.	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 6, 2022
Address:	PO Box 47775 Olympia, WA 98504-7775		

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

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 22, 2022. A summary of the methane monitoring methods and results is presented 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 western 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 and then to annual monitoring events after the September 2021 monitoring event.

FIELD ACTIVITIES

On March 22, 2022, NV5 conducted the 2022 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 and a GAST diaphragm pump, 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, methane was not detected in sub-slab monitoring probes SSP-1, SSP-2, and SSP-3. In addition, measurable static pressure was not observed in the sub-slab monitoring probes. Methane monitoring indicated methane discharging from vent risers VR-1, VR-2, and VR-4 at concentrations of 0.6, 6.0, and 0.7 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]

[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

DISCUSSION OF METHANE MONITORING RESULTS

Results from the 2022 annual methane monitoring event indicated methane is not accumulating under the slab and that static pressures under the slab remain consistently at or near zero. Methane was detected in the vent risers at concentrations up to 6.0 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 2022 annual methane monitoring event, methane was not detected in the sub-slab monitoring probes. In addition, static pressure was not observed in the sub-slab monitoring probes. Methane was detected in vent risers VR-1, VR-2, and VR-4 at concentrations of 0.6, 6.0, and 0.7 pbv, respectively. Based on over two years of monitoring data, monitoring results indicate that methane is not accumulating beneath the building and that the methane mitigation system is performing as intended. The next round of methane monitoring is scheduled for February/March 2023.

♦ ♦ ♦

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

SRV:MFC:kt
Attachments
One copy submitted
Document ID: GCVan-1-01-040622-envm.docx

Signed 04/06/2022

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
SSP-1	09/02/21	1,018	0.0	0.0	0.0	21.2	S2, 2021 monitoring event
SSP-2	09/02/21	1,018	0.0	0.0	0.0	21.4	S2, 2021 monitoring event
SSP-3	09/02/21	1,017	0.0	0.0	0.0	21.5	S2, 2021 monitoring event
SSP-1	03/22/22	1,021	0.0	0.0	0.1	20.6	2022 monitoring event
SSP-2	03/22/22	1,021	0.0	0.0	0.1	20.4	2022 monitoring event
SSP-3	03/22/22	1,021	0.0	0.0	0.0	20.8	2022 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

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)	CH_4[1] (pbv)	CO_2 (pbv)	O_2 (pbv)	Static Pressure[2] (" H_2O)	GAST Vac. (" Hg)	Comments
VR-1	3/22	0919	11	1022	0.6	5.5	12.8	–	–	
VR-2	↓	0915	↓	↓	6.0	16.4	1.0	–	–	
VR-4	↓	0922	↓	↓	0.7	5.3	14.0	–	–	
SSP-1	3/22	0939	12	1021	0.0	0.1	20.4	0.00	8	
↓	↓	+234 sec	↓	↓	0.0	0.1	20.5	–	–	
↓	↓	+467 sec	↓	↓	0.0	0.1	20.6	–	–	
SSP-2	↓	0952	↓	↓	0.0	0.1	20.4	0.00	2	
↓	↓	+137 sec	↓	↓	0.0	0.1	20.4	–	–	
↓	↓	+273 sec	↓	↓	0.0	0.1	20.4	–	–	
SSP-3	↓	1001	↓	↓	0.0	0.0	20.7	0.00	2	
↓	↓	+116 sec	↓	↓	0.0	0.0	20.8	–	–	
↓	↓	+232 sec	↓	↓	0.0	0.0	20.8	–	–	

Notes:
mbar: millibars
pbv: percent by volume