



# 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:	September 15, 2021
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 (project site). NV5 performed methane monitoring on September 2, 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 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:

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- 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 September 2, 2021 NV5 conducted the second semi-annual 2021 methane monitoring event at the project site. 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). 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 (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 on 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 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.<sup>1</sup>

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<sup>1</sup> 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

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## DISCUSSION OF METHANE MONITORING RESULTS

Results from the second 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.

NV5 conducted one year of quarterly monitoring and one year of semi-annual monitoring for a total of seven monitoring events at the project site. As shown on Table 1, methane concentrations in the sub-slab monitoring probes were 0.0 pbv during each monitoring event. Methane concentrations in the vent risers ranged from 0.0 pbv to 6.8 pbv (measured in VR-4 on February 28, 2020). Following the detected concentration of 6.8 pbv in VR-4, NV5 conducted supplemental methane monitoring to further evaluate methane in the vent risers. The supplemental monitoring data indicated that methane concentrations measured in VR-4 decreased to 1.2 pbv, which is less than the lower explosive limit of 5 pbv for methane. Since June 2020, methane concentrations have been consistently 0.0 pbv in the three vent risers. The methane monitoring data demonstrate stable conditions and indicate that methane is not accumulating under the building. Based on this, it is our opinion that further monitoring is not warranted.

## SUMMARY

During the second 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. Based on two years of monitoring data, monitoring results indicate stable conditions at the project site, that methane is not accumulating beneath the building, and that the methane mitigation system is performing as intended. Based on this, NV5 recommends discontinuing the monitoring program.



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

SRV:MFC:LRY:sn  
 Attachments  
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Signed 09/15/2021

## 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	
<b>Sub-Slab Probes</b>							
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
<b>Vent Risers</b>							
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

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 <sub>4</sub> <sup>1</sup> (pbv)	CO <sub>2</sub> (pbv)	O <sub>2</sub> (pbv)	Static Pressure <sup>2</sup> (" H <sub>2</sub> O)	GAST Vac. (" Hg)	Comments
SSP-1	9/2/21	0816	10	1018	0.0	0.0	21.0	0.00	8.	1 volume (purged w/GAST 7 seconds)
		+234 sec			0.0	0.0	21.1			1.5 volumes
		+467 sec			0.0	0.0	21.2			2.0 volumes
SSP-2		0833			0.0	0.0	21.3	0.00	3	1 volume (purged w/GAST 3 seconds)
		+137 sec			0.0	0.0	21.3			1.5 volumes
		+273 sec			0.0	0.0	21.4			2.0 volumes
SSP-3		0840		1017	0.0	0.0	21.4	0.00	2	1 volume (purged w/GAST 2 seconds)
		+116 sec			0.0	0.0	21.4			1.5 volumes
		+232 sec			0.0	0.0	21.5			2.0 volumes
VR-1		0850	12		0.0	0.0	21.4			
VR-2		0852	12		0.0	4.7	15.1			
VR-4		0856	13		0.0	0.1	21.3			

Notes:  
mbar: millibars  
pbv: percent by volume