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king county - chrl 2015 ghg mrr audit memo v3.0

MEMORANDUM

TO: Toraj Ghofrani, PE & Mizanur Rahman, PE, PhD, PMP

FROM: Eric Sonsthagen, PE & John Richards, PE

SUBJECT: Cedar Hills Regional Landfill – U.S. Environmental Protection Agency (EPA) Greenhouse Gas (GHG) Mandatory Reporting Rule (MRR) – Calendar Year 2015 Audit

The King County Department of Natural Resources and Parks (DNRP) requested SCS Engineers (SCS) to complete an audit of the 2015 calendar year greenhouse gas (GHG) emission calculations and methodology for the Cedar Hills Regional Landfill (CHRL). This memorandum was prepared to provide a brief review of SCS's findings from the audit, a summary of the changes made to the 2015 report, and SCS's confirmation of the changes incorporated into the updated calculations.

The following files associated with the CHRL were provided by the DNRP and reviewed in detail to perform an audit of the 2015 calendar year GHG emission calculations under the U.S. Environmental Protection Agency (EPA) Mandatory Reporting Rule (MRR) protocol:

- 2015 Raw SCADA Data.xls
- 2015 Vagas Database.xls
- 2015 Emission Inventory.xls
- 2015 Final LFG Collection Efficiency-Area Cover System.xls
- Equation C-1, C-8 CalcSheet_2015 Mike Long.xls
- Equation HH-1 CalcSheet_2015 LFG Gen.xls
- Equation HH-4 CalcSheet_2015 CH4 Recovery.xls
- Equation HH-5 CalcSheet_2015 CH4 Gen Adj Soil Cover.xls
- Equation HH-6 HH-7 HH-8 CalcSheet_2015.slx
- HH Methane Flux CalcSheet_2015.xls
- LandGem with 2015 tonnage.xls

Upon completion of file review, SCS prepared an Initial Audit Findings Log, which was submitted to the DNRP on September 13, 2016. The audit findings log contained one additional information request, two corrective action requests, two requests for clarification, and 14 observations.

The audit findings were discussed in detail with the DNRP and it was determined that the calculations would need to be revised in order to be considered consistent with the MRR protocol. Specifically, the following modifications to the GHG emission calculations were needed:

- The pressures used to calculate the flow rates to a standard basis needed to include the static pressure applied to the landfill gas by the blowers at the flow monitoring point(s).

- Missing data for methane concentrations, pressures, and flows required that the substitute data values consist of the arithmetic averages of the quality-assured values of that parameter immediately preceding and immediately following the missing data incident.

- Tonnage data for calendar years 2014 and 2015 required updating to be consistent with the most recent site records.

On September 22, 2016, the DNRP provided revised files, which contained the changes above for review. SCS completed the review of the revised files provided on September 22, 2016 and confirmed that the modifications noted above were completed in accordance with the required protocol. As such, the revised 2015 calendar year GHG emission calculations conform to the EPA GHG MRR protocol and were found to be correct and are considered valid for reporting 2015 GHG emissions from the CHRL.

The emissions presented below in Table 1 were determined for the CHRL in 2015 and the emissions calculated using equation HH-6 are valid for reporting under the EPA GHG MRR protocol. As such, the reportable 2015 GHG emissions for the CHRL were approximately 1,949 metric tons of carbon dioxide equivalent ($MTCO_2e$), which includes both Subpart C and equation HH-6 emissions.

Table 1 – CHRL 2015 GHG MRR Emissions

Equation	Metric tons of methane (MT CH_4)	Metric tons of carbon dioxide equivalent (MT CO_2e)
Subpart C Total	--	145.3
HH-1 (Annual modeled generation)	49,428	1,235,698.9
HH-4 (Annual quantity recovered)	49,090	1,227,259.0
HH-5 (Annual generation from HH-1, adjusted for oxidation)	44,485	1,112,129.0
HH-6 (Generation based annual emissions)	72	1,803.8
HH-7 (Annual generation from HH-4, adjusted for oxidation)	48,558	1,213,959.6
HH-8 (Recovery based annual emissions)	2,530	63,252.1