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The Shaw Group Inc.™

July 17, 2002  
Project 838009.01000000

Ms. Patricia Baldwin  
Environmental Engineer  
AIR-4  
USEPA Region IX  
75 Hawthorne Street  
San Francisco, California 94105

Re: Gas Collection and Control System Changes; Sunrise Landfill

Dear Ms. Baldwin:

EMCON/OWT, Inc. (EMCON/OWT) has completed a review of the proposed Gas Collection and Control System (GCCS) prepared by SCS Engineers dated April 6, 2001. EMCON/OWT has prepared this letter to present changes to the proposed GCCS plan based on additional field testing results conducted earlier this year.

On behalf of Republic Services of Southern Nevada (RSSN), EMCON/OWT conducted a landfill gas (LFG) flow test at the Sunrise Mountain Landfill. The test was performed between May 8<sup>th</sup> and 24<sup>th</sup> consistent with the protocols agreed upon by RSSN and EMCON/OWT. The results of the field testing are contained in the enclosed "Landfill Gas Flow Test Report" by EMCON/OWT, dated July 2002. In summary, based on the observations during the field tests, EMCON/OWT has revised the landfill gas well spacing to approximately 750 feet.

Based on the testing results, EMCON/OWT has revised the SCS GCCS plan as follows:

- Section 4.3 Vertical Extraction Well Depth and Spacing – revised text regarding total number of LFG wells in GCCS and effective radius of influence of each extraction well.
- Section 5.2.1 Density of Gas Collection Devices – revised text regarding total number of LFG wells in GCCS.

Attachment A presents revised text to Republic's GCCS plan. Attachment B presents the landfill gas well schedule and Attachment C presents the updated gas collection system plan.

Ms. Patricia Baldwin  
July 17, 2002  
Page 2

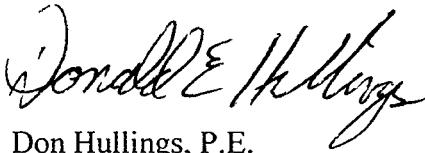
Project 838009.01000000

EMCON/OWT is pleased to work with the USEPA to revise the proposed GCCS plan based on additional field observations.

If you have any questions or require additional information, please contact me at (408) 350-5622.

Sincerely,

**EMCON/OWT Solid Waste Services**

A handwritten signature in black ink, appearing to read "Don Hullings", is written over the printed name.

Don Hullings, P.E.  
Project Manager

Attachments: Attachment A Revised Text  
Attachment B Landfill Gas Well Schedule  
Attachment C Updated Gas Collection System Plan

cc: Stephen Deyo – Department of Air Quality Management  
Alan Gaddy – Republic Services of Southern Nevada

**ATTACHMENT B**  
**LANDFILL GAS WELL SCHEDULE**

**ATTACHMENT B  
SUNRISE LANDFILL  
LANDFILL GAS WELL SCHEDULE**

Well ID	Site Grid System Coordinates		Site Grid Elev. (ft)	Bottom Elev. (ft)	D <sub>s</sub> (ft)	D <sub>R</sub> (ft)	D <sub>B</sub> (ft)
	N	E					
1	10510 57	11656 91	1922 0	1856 5	19	65 5	49 0
2	12596 80	12006 67	1977 5	1880 0	22	97 5	73 0
3	12325 54	11590 52	1962 5	1896 5	21	66 0	49 5
4	13585 77	14462 97	2172 0	2028 0	35	144 0	108 0
5	13483 18	14114 28	2160 0	1979 0	39	181 0	136 0
6	14389 37	14198 16	2186 0	2011 0	36	175 0	131 0
7	15410 34	14329 27	2215 0	2063 0	32	152 0	114 0
8	12757 69	11648 79	1979 0	1887 0	26	92 0	69 0
9	17622 62	15031 51	2237 5	2184 0	20	53 5	40 1
10	17114 73	14510 99	2240 0	2160 0	20	80 0	60 0
11	16904 59	15008 07	2225 0	2145 0	20	80 0	60 0
12	16398 34	14396 28	2235 0	2115 0	20	120 0	90 0
13	16250 29	15074 98	2216 0	2136 0	20	80 0	60 0
14	16003 62	14096 50	2230 0	2110 0	20	120 0	90 0
15	15555 28	15041 55	2205 0	2125 0	20	80 0	60 0
16	14891 43	14802 57	2192 5	2126 0	20	66 5	49 9
17	14154 17	14820 82	2182 0	2128 5	20	53 5	40 1
18	13901 86	13925 78	2162 5	2083	20	79 5	59 6
19	13427 80	13714 84	2125 0	2072	20	53 0	39 8
20	15297 55	13868 73	2245 0	2125	20	120 0	90 0

- Notes
- (1) D<sub>R</sub> Based on Owner Provided Waste Thicknesses
  - (2) D<sub>B</sub> based on current waste depth information (SCS, April 6, 2001 GCCS Plan)
  - (3)  $D_B = 0.75 \cdot D_R$
  - (4) Actual well depths will be based on field conditions
  - (5) Landfill gas wells 1 through 8 already installed

**ATTACHMENT B  
SUNRISE LANDFILL  
LANDFILL GAS WELL SCHEDULE**

Well ID	Site Grid System Coordinates		Site Grid Elev.	Bottom Elev.	D <sub>S</sub>	D <sub>R</sub>	D <sub>B</sub>
	N	E	(ft)	(ft)	(ft)	(ft)	(ft)
21	14599.00	13629.84	2110.0	2030	20	80.0	60.0
22	14059.86	13432.93	2080.0	2026.5	20	53.5	40.1
23	12491.04	12806.50	1995.0	1941.5	20	53.5	40.1
24	11762.13	12938.43	1956.0	1876	20	80.0	60.0
25	11067.10	12892.77	1937.5	1857.5	20	80.0	60.0
26	10515.98	12466.62	1925.0	1845	20	80.0	60.0
27	12064.03	12446.99	1960.0	1854	20	106.0	79.5
28	11457.85	12441.22	1946.0	1826	20	120.0	90.0
29	10989.50	12302.87	1935.0	1815.0	20	120.0	90.0
30	10361.95	11920.05	1915.0	1861.5	20	53.5	40.1
31	11094.25	11790.72	1934.0	1814.0	20	120.0	90.0
32	11868.74	11596.19	1950.0	1830.0	20	120.0	90.0
33	11225.06	11283.82	1917.5	1811.0	20	106.5	79.9
34	10734.27	11076.96	1900.0	1846.5	20	53.5	40.1
35	11446.42	10763.28	1900.0	1820.0	20	80.0	60.0
36	11981.07	10953.31	1933.0	1879.5	20	53.5	40.1

- Notes
- (1) D<sub>R</sub> Based on Owner Provided Waste Thicknesses.
  - (2) D<sub>B</sub> based on current waste depth information (SCS, April 6, 2001 GCCS Plan)
  - (3)  $D_B = 0.75 \cdot D_R$
  - (4) Actual well depths will be based on field conditions

**ATTACHMENT C**  
**UPDATED GAS COLLECTION SYSTEM PLAN**

Revised 7/17/02

**GAS COLLECTION AND CONTROL SYSTEM PLAN  
FOR  
SUNRISE MOUNTAIN LANDFILL  
CLARK COUNTY, NEVADA**

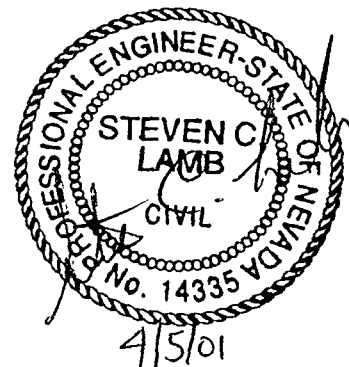
*Prepared for:*

**REPUBLIC SERVICES OF SOUTHERN NEVADA (RSSN)**

770 East Sahara Avenue  
Las Vegas, Nevada 89104  
(702) 644-4595

*Prepared by:*

**SCS ENGINEERS**  
2702 North 44<sup>th</sup> Street  
Suite 105B  
Phoenix, Arizona 85008  
(602) 840-2596



April 6, 2001  
File No. 10.99007.01



## SCS ENGINEERS

April 5, 2001

Ms. Patricia Bowlin  
Environmental Engineer  
AIR-4  
USEPA Region IX  
75 Hawthorne Street  
San Francisco, CA 94105

Re: Gas Collection and Control System Design Plan  
Sunrise Mountain Landfill  
Clark County, Nevada

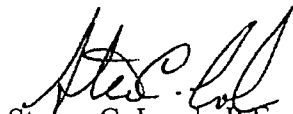
Dear Ms. Bowlin:

SCS Engineers, on behalf of Republic Services of Southern Nevada (RSSN), hereby provides the Gas Collection and Control System (GCCS) Design Plan required by the Federal Municipal Solid Waste Landfills Emission Guidelines effective January 7, 2000 (in accordance with the Federal Plan schedule).

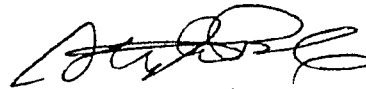
The GCCS Design Plan was developed based on known current information about the site. When existing conditions of the site are further defined pursuant to ongoing field investigations/evaluations, the GCCS design may be modified.

If you have any questions or comments regarding this submittal, please contact Mr. Alan Gaddy of RSSN at (702) 734-5400.

Sincerely,



Steven C. Lamb, P.E.  
Project Manager



Stephen B. Smith, P.E.  
Vice President  
SCS ENGINEERS

### Attachments

cc. Mr. Mason McNinch, Clark County Health District, Air Quality Division  
Mr. Steve Wall, USEPA Region 9  
Mr. Tom Gardner, RSSN  
Mr. Derek Reeve, SCS Engineers

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## SECTION 1.0 INTRODUCTION AND BACKGROUND

### 1.1 INTRODUCTION

This report was prepared by SCS Engineers (SCS) to fulfill the requirements of the New Source Performance Standards (NSPS), 40 CFR Part 60, Subpart Cc (Emission Guidelines –EG) “Rule”, for a Gas Collection and Control System (GCCS) Design Plan (Plan) for the Sunrise Mountain Landfill (Site), in Las Vegas, Nevada. The Site is owned by the Bureau of Land Management (BLM), leased to Clark County, and was formerly operated by Republic Disposal Urban Maintenance Processing Company, Inc. (DUMPCo). The Site is now operated by Republic Services of Southern Nevada (RSSN). The Site is regulated under the NSPS based upon a design capacity exceeding 2.5 million Megagrams {metric tons (Mg) which is approximately 2,750,000 U.S. tons}, and based upon a non-methane organic compounds (NMOC) emission rate calculation that demonstrated an annual NMOC emission rate exceeding 50 Mg per year.

The following GCCS Plan fulfills the requirements set forth in 40 CFR §60.752 and §60.759, as described herein (referred to hereafter as §60.752 and §60.759). The scope of this GCCS Plan is limited to description, documentation, and certification that the GCCS meets the requirements set forth in §60.752 - *Standards for Air Emissions from Municipal Solid Waste Landfills* and §60.759 - *Specifications for Active Collection Systems*.

This GCCS Plan was developed in general accordance with the NSPS and the guidance set forth in the *Enabling Document for the New Source Performance Standards and Emission Guideline for Municipal Solid Waste Landfills* (Enabling Document). As required by the NSPS, the GCCS Plan addresses areas defined as active areas where the first refuse deposited in the area has reached an age of 5 years or more; or areas closed or at final grade where the first refuse deposited in the areas has reached an age of 2 years or more (§60.752(b)(2)(ii)(A)). The last receipt of waste at the Site was prior to October 9, 1993; therefore all waste is over five years old.

### 1.2 NEW SOURCE PERFORMANCE STANDARDS AND EMISSION GUIDELINES

On March 12, 1996, EPA promulgated New Source Performance Standards (NSPS) and Emissions Guidelines (EG) for existing and new landfills under Section III (b) of the Clean Air Act (CAA). The NSPS and EG are intended to control NMOC emissions. According to the regulation, landfills larger than 2.5 million Mg of waste are required to estimate NMOC emissions in accordance with a three-tiered process. Landfills with NMOC emissions greater than 50 Mg/year will be further required to install a LFG collection system in accordance with the design and operational criteria set forth in the regulation.

NSPS applies to landfill facilities permitted, modified or reconstructed after May 30, 1991. The EG applies to landfills that accepted waste after November 1987, but had no permit modifications (footprint expansion) after May 30, 1991. The Sunrise Mountain Landfill, therefore, falls under the EG, and will be required to meet the compliance schedule associated



with the EG, which differs from the NSPS schedule. The EPA promulgated regulations effective January 7, 2000 for EG sites, which include the following milestones:

- Design capacity report and emissions statement (Tier 1) was due 90 days after the effective date (submitted on April 6, 2000).
- Optional Tier 2 emissions statement would be due 180 days after submittal date of Tier 1.
- Optional Tier 3 submittal would be due 12 months after submittal date of Tier 1.
- The GCCS plan showing the proposed LFG collection system design would also be due 12 months after submittal date of the Tier 1 assuming the landfill exceeds the 50 megagrams per year of NMOC emissions.

System construction must be completed 30 months after submittal date of Tier 1, or October 6, 2002. RSSN reserves the right to construct the LFG collection system is a phased-approach pending the outcome of ongoing field investigations/evaluations associated with the Administrative Orders (see below).

### 1.3 BACKGROUND

The United States Environmental Protection Agency, Region 9 (USEPA) issued an Administrative Order on April 26, 1999 (USEPA Docket No. RCRA-7003-09-99-0005) to several respondents regarding the Sunrise Mountain Landfill Site. The Order was issued by the Administrator of the USEPA, Region 9, under the authority of Section 7003 of the Solid Waste Disposal Act of 1976, commonly referred to as the Resource Conservation and Recovery Act (RCRA).

The Administrative Order (Order) included 24 Findings of Fact, which were ascertained from historical data, site inspection/observation results, and relevant technical information. The Order required the respondents to submit to the USEPA a Landfill Assessment Work Plan. RSSN is the primary respondent and acting as the lead party. The submittal of the Final Landfill Assessment Work Plan (Work Plan) (SCS Engineers, 2001) was the first of six steps required by the USEPA Order. Step 2 of the Order is currently being implemented; Step 2 involves conducting activities cited in the Work Plan and preparing a Landfill Assessment Report. Steps 3 and 4 involve preparing and implementing a Landfill Corrective Measures Plan. Steps 5 and 6 involve closure certification and long-term operation and maintenance of the Site.

Several landfill gas-related issues are addressed in the Work Plan, and will be further defined in Steps 2 through 4. These issues include:

- Landfill gas characterization by surface emissions monitoring and probe installations;
- Evaluation of the landfill's final cover;
- Determination of the actual quantity and location of disposed wastes;



- Possible waste relocation; and
- Evaluation of future storm water control structures.

The resolution of these issues may influence the extent of the GCCS design, and impact the schedule for implementation of the GCCS design. These issues were considered during the development of this GCCS Plan.

#### **1.4 COMPLIANCE SUMMARY TABLE**

A summary of the compliance requirements and the project specific conditions is presented in Table 1.1.



**TABLE 1.1 REGULATORY COMPLIANCE CHECKLIST  
SUNRISE MOUNTAIN LANDFILL**

Regulatory Reference	Regulatory Requirement	Description of Site-Specific Conditions	Regulatory Review
§60.752(b)(2)(i) 3745-76-07(B)(2)(a)	Submit a collection and control system design plan prepared by a professional engineer to the Administrator within 1 year of the calculated NMOC emission rate equaling or exceeding 50 Mg per year.	This Plan fulfills requirement.	
§60.752(b)(2)(i)(A) 3745-76-07(B)(2)(a)(i)	The collection and control system as described in this plan shall meet the design requirements of paragraph (b)(2)(ii) of this section.	As presented in this Plan, the proposed system meets the design requirements.	
§60.752(b)(2)(i)(B) 3745-76-07(B)(2)(a)(ii)	The collection and control system design plan shall include any alternatives to the operational standards, test methods, procedures, compliance measures, monitoring, record keeping, or reporting provisions of §60.753 through §60.758 as proposed by the owner or operator.	No alternatives are specified.	
§60.752(b)(2)(i)(C) 3745-76-07(B)(2)(a)(iii)	The collection and control system design plan shall either conform with specifications for active collection systems in §60.759, or include a demonstration to the Administrator's satisfaction of the sufficiency of alternative provisions under §60.759.	As presented in this Plan, the proposed system meets the design requirements, as will be confirmed during future surface emissions testing.	
§60.752(b)(2)(i)(D) 3745-76-07(B)(2)(a)(iv)	The Administrator shall review the information submitted under this section, and either approve it, disapprove it, or request that additional information be submitted. Because of the many site-specific factors involved with LFG system design, alternative systems may be necessary. A wide variety of system designs are possible such as vertical wells, combination horizontal and vertical collection systems, or horizontal trenches only, leachate collection components, and passive systems.	Information required for review is presented within this Plan.	

**TABLE 1.1 REGULATORY COMPLIANCE CHECKLIST  
SUNRISE MOUNTAIN LANDFILL**

Regulatory Reference	Regulatory Requirement	Description of Site-Specific Conditions	Regulatory Review
§60.752(b)(2)(ii) 3745-76-07(B)(2)(b)	Install a collection and control system within 18 months of the submittal of the design plan that effectively captures the gas generated within the landfill.	RSSN will install the GCCS design within 18 months provided future developments associated with the Administrative Order do not hinder an efficient installation	
§60.752(b)(2)(ii)(A)(1) 3745-76-07(B)(2)(b)(i)(a)	An active collection system shall be designed to handle the maximum expected flow rate from the entire area of the landfill that warrants control over the intended use period of the gas control or treatment system equipment.	The proposed system is designed to handle the maximum flow for the GCCS, as estimated from U.S. EPA's landfill gas generation model (LANDGem).	
§60.752(b)(2)(ii)(A)(2) 3745-76-07(B)(2)(b)(i)(b)	The GCCS shall collect gas from each area, cell, or group of cells in the landfill in which the initial solid waste has been placed for a period of 5 years or more if active, or 2 years or more if closed or at final grade.	The proposed system is designed to collect gas from all areas of the landfill that warrant collection. All areas are at final grade pending developments associated with the Administrative Order.	
§60.752(b)(2)(ii)(A)(3) 3745-76-07(B)(2)(b)(i)(c)	The GCCS shall collect gas at a sufficient extraction rate.	Landfill gas will be collected at a sufficient rate, as will be confirmed during future surface emissions monitoring of the landfill. Rates of collection may be modified based upon results of surface emissions monitoring.	
§60.752(b)(2)(ii)(A)(4) 3745-76-07(B)(2)(b)(i)(d)	The GCCS shall be designed to minimize off-site migration of subsurface gas.	The GCCS outlined in this Plan is designed to minimize off-site migration of subsurface gas by reducing gas pressures within the landfill.	
§60.752(b)(2)(iii)(A) 3745-76-07(B)(2)(b)(ii)(c)(i)	All collected gas shall be routed to an open flare designed and operated in accordance with §60.18.	A flare will be designed and operated according to §60.18.	



**TABLE 1.1 REGULATORY COMPLIANCE CHECKLIST  
SUNRISE MOUNTAIN LANDFILL**

§60.752(b)(2)(iii)(B) 3745-76- 07(B)(2)(b)(ii)(c)(ii)	All collected gas shall be routed to a control system designed and operated to reduce NMOC by 98 percent weight, or when an enclosed combustion device is used for control, to either reduce NMOC by 98 percent weight or to reduce the outlet NMOC concentration to less than 20 parts per million by volume, dry basis as hexane, at 3 percent oxygen.	The control system will consist of a flare operated to reduce NMOC by 98 percent.	
§60.752(b)(2)(iii)(B) 3745-76- 07(B)(2)(b)(ii)(c)(ii)	The reduction efficiency or parts per million by volume shall be established by an initial performance test, required under §60.8, using the test methods specified in §60.754(d).	Initial performance testing will occur following completion of the system.	
§60.752(b)(2)(iii)(B)(1) 3745-76- 07(B)(2)(b)(ii)(c)(i)(a)	If a boiler or process heater is used as a control device, the landfill gas stream shall be introduced into the flame zone.	Not applicable.	
§60.752(b)(2)(iii)(B)(2) 3745-76- 07(B)(2)(b)(ii)(c)(i)(b)	The control device shall be operated within the parameter ranges established during the initial or most recent performance test. The operating parameters to be monitored are specified in §60.756.	The flare will be operated within the parameters established during the initial performance testing, as will be presented in the initial Annual Compliance Report.	
3745-76- 07(B)(2)(b)(ii)(c)(i)(b)	Route the gas to a treatment system that processes the collected gas for subsequent sale or use. All emissions from any atmospheric vent from the gas treatment system shall be subject to the requirements of paragraph 3745-76-07 (B)(2)(c)(i) or (B)(2)(c)(ii) of this rule.	Not applicable.	
§60.759(a)(1) 3745-76-14(A)(1)	A professional engineer shall certify collection devices within the interior and along the perimeter areas to achieve comprehensive control of surface gas emissions.	Collection devices will provide comprehensive control of surface emissions, as will be confirmed by future surface emissions monitoring.	

**TABLE 1.1 REGULATORY COMPLIANCE CHECKLIST  
SUNRISE MOUNTAIN LANDFILL**

§60.759(a)(1) 3745-76-14(A)(1)	The following issues shall be addressed in the design: depth of refuse, refuse gas generation rates, flow characteristics, cover properties, gas system expandability, leachate management, condensate management, accessibility, compatibility with filling operations, integration with closure end use, air intrusion control, corrosion resistance, fill settlement, and resistance to the refuse decomposition heat.	All applicable issues are addressed within this Plan.	
§60.759(a)(2) 3745-76-14(A)(2)	Gas collection devices shall be installed in sufficient density to address landfill gas migration issues and augmentation of the collection system through use of active or passive systems at the landfill perimeter or exterior.	Gas collection devices will be installed at a sufficient density to facilitate control, as will be confirmed by future surface emissions monitoring.	
§60.759(a)(3) 3745-76-14(A)(3)	Placement of gas collection devices shall control all gas producing areas, except those from asbestos, non-degradable, and non-productive areas of the landfills as delineated below.	Gas will be controlled in all gas-producing areas of the landfill as described in this Plan.	
§60.759(a)(3)(i) 3745-76-14(A)(3)(a)	Segregated areas of asbestos or non-degradable material may be excluded from collection if sufficiently documented.	Segregated areas containing asbestos and non-degradable materials are excluded from the GCCS as documented in this Plan.	
§60.759(a)(3)(ii) 3745-76-14(A)(3)(b)	Any non-productive areas of the landfill may be excluded from control, provided excluded areas can be shown to contribute less than 1 percent of the total amount of NMOC emissions from the landfill.	The Northeast Canyon area and portions of the Eastern Perimeter area have been excluded from the GCCS for reasons addressed in this Plan.	
3745-76-14(A)(3)(c)	The values for $k$ , $L_o$ , and $C_{NMOC}$ determined in field-testing shall be used, if field-testing has been performed in determining the NMOC emission rate or radii of influence. If field-testing has not been performed, the default values for $k$ , $L_o$ , and $C_{NMOC}$ provided in paragraph (A)(1) of rule 3745-76-09 of the Administrative Code shall be used.	The $C_{NMOC}$ value from AP-42 (595 ppmv as hexane) will be used in calculating emission from the landfill. The AP-42 default values for $k$ and $L_o$ will be used: $0.02 \text{ yr}^{-1}$ and $100 \text{ m}^3/\text{Mg}$ , respectively.	

**TABLE 1.1 REGULATORY COMPLIANCE CHECKLIST  
SUNRISE MOUNTAIN LANDFILL**

§60.759(b)(1) 3745-76-14(B)(1)	LFG extraction components shall be constructed of PVC, HDPE, fiberglass, stainless steel, or other non-porous corrosion-resistant material.	The GCCS will be constructed of non-porous, corrosive resistant materials, including PVC or HDPE.	
§60.759(b)(1) 3745-76-14(B)(1)	Dimensions of gas extraction components shall be sufficient to convey projected amounts of gas; withstand installation, static, and settlement forces; and withstand planned overburden or traffic loads.	The GCCS design is sized sufficiently to convey the projected amount of gas for the system. Adequacy of the proposed system will be confirmed during future surface emissions monitoring. The system components are consistent with the "state-of-the-practice" for modern GCCS designs and can withstand the installation and operational stresses placed on the components.	
§60.759(b)(1) 3745-76-14(B)(1)	The collection system shall extend as necessary to comply with the emission and migration standards.	The GCCS will be expanded as necessary to conform to emission standards set forth in the NSPS. Future expansion of the GCCS will be performed in accordance with scheduling requirements set forth in the NSPS or an approved alternative schedule. Adequacy of the proposed system will be confirmed during future surface emissions monitoring.	
§60.759(b)(1) 3745-76-14(B)(1)	Collection devices such as wells and horizontal collectors shall be perforated to allow gas entry without head loss sufficient to impair performance across the intended extent of control.	Collection wells are perforated so as not to increase head loss, in accordance with current "state-of-the-practice" methods.	
§60.759(b)(1) 3745-76-14(B)(1)	Perforations shall be situated with regard to the need to prevent excessive air infiltration.	Perforations typically are at least 10 to 15 feet below existing grade, which is sufficient to control excessive air infiltration.	

**TABLE 1.1 REGULATORY COMPLIANCE CHECKLIST  
SUNRISE MOUNTAIN LANDFILL**

§60.759(b)(2) 3745-76-14(B)(2)	Vertical wells shall be placed so as not to endanger underlying liners and shall address the occurrence of water within the landfill.	This Site does not have a liner.	
§60.759(b)(2) 3745-76-14(B)(2)	Holes and trenches constructed for piped wells and horizontal collectors shall be of sufficient cross-sectional area so as to allow for their proper construction and completion including the centering of pipes and placement of gravel backfill.	Wells will be designed with boreholes of diameter sufficient for proper installation of well casings and backfill materials.	
§60.759(b)(2) 3745-76-14(B)(2)	Collection devices shall be designed so as not to allow indirect short-circuiting of air into the cover or refuse into the collection system or gas into the air.	Wells are designed to prohibit short-circuiting of air into cover or refuse.	
§60.759(b)(2) 3745-76-14(B)(2)	Any gravel used around pipe perforations shall be of sufficient dimension so as not to penetrate or block perforations.	Gravel used for backfill will be of sufficient size to not penetrate or block perforations.	
§60.759(b)(3) 3745-76-14(B)(3)	Collection devices may be connected to the collection header pipes below or above the landfill surface.	Collection devices will be connected above grade to the header system.	
§60.759(b)(3) 3745-76-14(B)(3)	The connector assembly shall include a positive closing throttle valve, any necessary seals and couplings, access couplings, and at least one sampling port.	Wells will incorporate a control valve, sampling ports, seals and couplings, and access points.	
§60.759(b)(3) 3745-76-14(B)(3)	Collection devices shall be constructed of PVC, HDPE, fiberglass, stainless steel, or other non-porous material of suitable thickness.	The system is constructed of "state-of-the-practice" materials, with proven performance in landfills across the United States. The wells and piping shall be constructed of PVC or HDPE.	
§60.759(c) 3745-76-14(C)	The gas mover equipment shall be sized to handle the maximum gas generation flow rate expected over the intended use period of the gas moving equipment.	The proposed gas moving system was designed to handle the maximum flow rate derived from the LANDGem model for the GCCS service area.	

**TABLE 1.1 REGULATORY COMPLIANCE CHECKLIST  
SUNRISE MOUNTAIN LANDFILL**

§60.759(c)(1) 3745-76-14(C)(1)	For existing gas collection systems, existing flow data shall be used to project the maximum flow rate. If no flow data exists, procedures delineated in the item below shall be used.	No existing gas collection system is present.	
§60.759(c)(2) 3745-76-14(C)(2)	For new collection systems, the maximum flow rate shall be in accordance with the methods specified in §60.755(a)(1). This value shall be based on use of the modified Scholl Canyon LFG Emissions Model, and may use AP-42 defaults for k and $L_0$ .	The maximum flow for evaluating the existing system was derived from the LANDGem model using AP-42 defaults.	

## SECTION 2.0 EXISTING SITE CONDITIONS

### 2.1 LANDFILL DESCRIPTION

The Site includes the Sunrise Mountain Landfill, which lies on a 720-acre parcel of land that is leased to Clark County by the BLM; and three adjacent areas known as the Northeast Canyon Area, the Eastern Perimeter Area, and the Western Burn Pit Area. The Site is located approximately 3 miles east of Las Vegas, in Clark County, Nevada (Figure 1, Site Location Map, Appendix A), and is situated on the eastern edge of Las Vegas Valley, immediately southeast of Frenchman Mountain. The Site location is also depicted on the title sheet (Drawing 1, Appendix A). Drawing 2, Appendix A, depicts existing conditions at the Site.

According to the Historical Landfill Assessment Report (SCS Engineers, 2001), the Site began to receive municipal solid waste (MSW) in 1951 under management of the Southern Nevada Disposal Service Company. Disposal Urban Maintenance Processing Company, Inc. (DUMPCo) began operating the landfill in 1955 and stopped accepting waste on October 8, 1993.

#### 2.1.1 Waste Quantity And Types

Using the data obtained as part of the Historic Landfill Assessment Report (SCS Engineers, 2001), the total volume of MSW at the Site was estimated. At the beginning of this analysis (in 1952), the daily waste rate was assumed to be 400 tons per day. In years that the daily rate or annual waste rate was not known, the rate was assumed. Refer to Tables 2.1a and 2.1b below for a summary of MSW tonnages.

**Table 2.1a**  
**Summary of MSW Tonnages**  
**Using Daily Waste Rates Based on Historical Research**

Year	Number of Years	Daily Rate (tons) (1)	Annual Tonnage (tons)	Period Total (tons)	Cumulative Tonnage (tons)
1952-60	9	400	146,000	1,314,000	1,314,000
1961-70	10	730	266,450	2,664,500	3,978,500
1971-80	10	1060	386,900	3,869,000	7,847,500
1981-85	5	1390	507,350	2,536,750	10,384,250
1986	1	1710	<b>624,000</b>	624,000	11,008,250
1887	1	2160	788,400	788,400	11,796,650
1988	1	2610	952,650	952,650	12,749,300
1989	1	3060	1,116,900	1,116,900	13,866,200
1990	<b>1</b>	<b>3500</b>	1,277,500	1,277,500	15,143,700
1991-93	3	3425	<b>1,250,000</b>	3,750,000	18,831,700

(1) Bold figures were obtained from historical documents. All others were assumed or extrapolated.



**Table 2.1b**  
**Summary of Extrapolated Annual and Cumulative MSW Tonnages**

Year	Tons disposed	Cumulative tons
1951	146,000	146,000
1952	146,000	292,000
1953	146,000	438,000
1954	146,000	584,000
1955	146,000	730,000
1956	146,000	876,000
1957	146,000	1,022,000
1958	146,000	1,168,000
1959	146,000	1,314,000
1960	146,000	1,460,000
1961	266,450	1,726,450
1962	266,450	1,992,900
1963	266,450	2,259,350
1964	266,450	2,525,800
1965	266,450	2,792,250
1966	266,450	3,058,700
1967	266,450	3,325,150
1968	266,450	3,591,600
1969	266,450	3,858,050
1970	266,450	4,124,500
1971	386,900	4,511,400
1972	386,900	4,898,300
1973	386,900	5,285,200
1974	386,900	5,672,100
1975	386,900	6,059,000
1976	386,900	6,445,900
1977	386,900	6,832,800
1978	386,900	7,219,700
1979	386,900	7,606,600
1980	386,900	7,993,500
1981	507,350	8,500,850
1982	507,350	9,008,200
1983	507,350	9,515,550
1984	507,350	10,022,900
1985	507,350	10,530,250
1986	624,000	11,154,250
1987	788,400	11,942,650
1988	952,650	12,895,300
1989	1,116,900	14,012,200
1990	1,277,500	15,289,700
1991	1,250,000	16,539,700
1992	1,250,000	17,789,700
1993	1,042,000	18,831,700



Assuming the MSW was compacted at 1,000 pounds per cubic yard, the cumulative volume of 18,831,700 tons equates to 37,787,400 cubic yards of waste.

Based on the documents reviewed and the interviews conducted as part of the Historic Landfill Assessment Report (SCS Engineers, 2001), the waste-in-place at the Site includes the following types:

- Municipal Solid Waste;
- Petroleum Contaminated Soil;
- Asbestos;
- Construction Debris;
- Sewage Sludge;
- Septage Waste;
- Medical Waste; and
- Dead Animals Waste.

### 2.1.2 Landfill Areas

The Site consists of the 720-acre leased property, the Northeast Canyon Area, the Eastern Perimeter Area, and the Western Burn Pits Area. The Site was further differentiated into twelve distinct regions as shown in Drawing 2, in Appendix A.

Using the information contained in the Historical Landfill Assessment Report (SCS Engineers, 2001), the approximate size and average waste depth for each region was assumed. This data is summarized in Table 2.2.

**Table 2.2**  
**Summary of Distinct Site Regions**

Region No.	Region Description	Approximate Area (Acres)	Assumed Average Waste Depth (ft)
1	Western Side of Lower Southern Flats	59.7	35
2	Eastern Side of Lower Southern Flats	89.4	35
3	Dead Animals	2.3	25
4	Side Slopes of Top Deck	117.0	105
5	Upper Deck of the Top Deck	73.2	105
6	Asbestos Waste	8.6	20
7	Construction Debris	3.4	15
8	Eastern Perimeter	27.5	28
9	Northeast Canyon	44.4	17





RSSN will evaluate the data obtained during the on-going landfill assessment, and use this data as necessary to develop the final design of the GCCS.

### **Off-Lease Areas**

The Northeast Canyon and Eastern Perimeter Areas are located off the 720-acre lease property. The Northeast Canyon Area consists of approximately 44.4-acres, which contains an estimated waste volume of 1,216,505 cubic yards. Thus, the average depth of waste in the Northeast Canyon Area equals less than 17 feet. The Eastern Perimeter Area consists of approximately 27.5-acres, which contains approximately 1,257,738 cubic yards of waste. Thus, the average depth of waste in the Eastern Perimeter Area equals approximately 28 feet.

#### **2.1.3 Final Cover System**

According to the Sunrise Mountain Landfill Closure Plan (Harding Lawson, 1994), an EPA-prescriptive final cover system was constructed over portions of the Site regulated by EPA Subtitle D. Approximately 180 acres of EPA-prescriptive final cover was constructed on the following regions:

- Western Side of Southern Flats.
- Upper Deck of the Top Deck.

The EPA-prescriptive final cover consists of the following layers:

- Infiltration layer consisting of a minimum of 18 inches of low permeability soil ( $k < 1.0 \times 10^{-5}$  cm/sec.)
- Erosion soil layer consisting of a minimum of 6 inches of native soil materials.

Prior to installing the infiltration layer, a minimum 12-inch thick structural fill layer was placed over the existing intermediate cover to achieve closure grades.

According to the Historical Landfill Assessment Report (SCS Engineers, 2001), portions of the Site that accepted waste prior to October 9, 1991 were closed in accordance with September 1990 Clark County Health District Regulations Governing Solid Waste Sites & Facilities. These regulations required a final cover of at least 24 inches of earthen material (in addition to the daily cover) to be placed over the entire surface of all completed portions of the landfill.

## **2.2 LANDFILL GAS MODELING**

Preliminary LFG modeling using conservative default values specified in the Initial Design Capacity Report and Tier 1 NMOC Emission Rate Report, (SCS Engineers, 2000) indicated that the Sunrise Mountain Landfill currently emits in excess of 50 Mg/year of NMOCs. According to the guidelines, RSSN may opt to perform Tier 2 and Tier 3 analyses using specific data acquired through field-testing. However, RSSN has decided to implement a LFG



control system based on Tier 1 results. The proposed LFG system design will meet the NMOC emissions control system design and operation criteria.

### 2.3 LANDFILL GAS SURFACE EMISSION MONITORING

Between December 15, 1999 and January 28, 2000, SCS performed surface emissions monitoring of methane ( $\text{CH}_4$ ) concentrations at the Sunrise Mountain Landfill property (720-acre parcel), the Eastern Perimeter Area, the Northeast Canyon Area, and the Western Burn Pit Area. This surface monitoring including 2,078 points at the Site. The purpose of the monitoring was to provide data for LFG characterization and to estimate the level of coverage needed for LFG collection system design. Methane gas concentrations were measured using a Landtech GEM 500 portable flame ionization detector (FID) equipped with a probe extension to allow the measurement of methane concentrations approximately 3 inches above the ground surface.

Thirteen points out of 2,078 possessed elevated methane concentrations of 500 parts per million (ppm) or above during the December 15, 1999 monitoring event. The elevated methane measurements were found in two general areas within the 720-acre leased property: in the east-central portion and in the west-southwest portion. No elevated methane (i.e., at or above 500 ppm) measurements were located in the Eastern Perimeter Area, the Northeast Canyon Area, or the Western Burn Pit Area. On January 28, 2000, only three points were identified above 500 ppm methane. Those three points were re-tested and found to be below 500 ppm methane.



### SECTION 3.0 FUTURE SITE DEVELOPMENT

Future developments at the Site may have an impact on the development of a GCCS Plan. These future developments include investigations, characterizations, and remedial actions associated with the Administrative Order and the facility's Work Plan. Requirements of the Work Plan could effect this GCCS Plan for the Site include landfill gas surface emissions monitoring, assessment of the landfill's existing final cover, possible amendments to the final cover, installation of storm water control structures, and possible relocation of waste that is currently outside the 720-acre lease area.



## SECTION 4.0 LANDFILL GAS COLLECTION AND CONTROL SYSTEM

### 4.1 SYSTEM OBJECTIVES

Consistent with SCS' scope of services, the LFG collection and control system components will be sized to control LFG generated in the existing methane-generating portions of Site. The objectives of the proposed landfill gas collection and control system are as follows:

- Complying with air emissions regulations;
- Controlling odors;
- Maintaining LFG migration control, and
- Maintaining the integrity of the cap.

All of the above objectives rely on efficient collection of LFG generated in the landfill. The collected LFG is routed to combustion equipment. Uncollected LFG emitted to the atmosphere can cause odors, as well as violate new regulations regarding emissions of non-methane organic compounds (NMOC). The presence of a cap greatly reduces the potential for such emissions, but does not reduce the need for LFG collection to control LFG.

### 4.2 BASIS OF DESIGN

#### 4.2.1 Landfill Gas Generation Modeling

SCS compiled an approximate fill history of the landfill. This information was assimilated and inserted into the EPA's Landfill Gas Generation Model (LANDGem Model) to provide a preliminary assessment of LFG recovery potential at the landfill and to provide a basis for the conceptual LFG collection system design.

Since the landfill ceased receiving municipal solid waste (MSW) in October 1993, LFG (and, thus methane) generation peaked in 1994. Since 1994, LFG generation has decreased and will continue to do so. The LANDGem Model estimates the maximum LFG generation rate at Site to be 5.21 million cubic feet per day (MMcfd), which equates to approximately 3,619 cfm occurring in 1994. The LANDGem estimates that in year 2002, the Site will generate approximately 4.44 MMcfd, or 3,084 cfm.

The maximum collection rate for a GCCS at this Site, assuming 75% collection efficiency, is estimated to be 2,313 cfm in year 2002. For purposes of sizing collection piping, the blower station, and estimating condensate production, SCS used a design flow rate equal to 2,400 cfm. The tabular outputs from the LANDGem Model are included in Appendix B. If additional information is obtained as a result of field investigations and evaluations, the design flow may be adjusted.



#### 4.2.2 GCCS Coverage

According to the *Enabling Document for the New Source Performance Standards and Emission Guideline for Municipal Solid Waste Landfills* (Enabling Document) (§60.759(a)(3)(i) 3745-76-14(A)(3)(a), segregated areas of asbestos or non-degradable material may be excluded from collection if sufficiently documented. In addition, item §60.759(a)(3)(ii) 3745-76-14(A)(3)(b)) states that any non-productive areas of the landfill may be excluded from control, provided excluded areas can be shown to contribute less than 1 percent of the total amount of NMOC emissions from the landfill. SCS has identified areas both within the 720-acre leased area as well as outside it, which fall into one of the two categories.

Land devoted exclusively to asbestos, construction and demolition debris (CDD), medical waste, septic waste (now empty), and soil biotreatment (the soil was remediated and utilized as daily cover) will be excluded from the GCCS. These areas are located within the 720-acre leased area, and occupy approximately 30 acres.

The Northeast Canyon area and portions of the Eastern Perimeter area are believed to contain some of the oldest waste disposed of at the site. Induced polarization (IP), aerial photography, topographic maps, calculations, and test pits demonstrate that waste in the majority of these areas is shallow (~20-30-feet). These areas, illustrated on Drawing 2, are estimated to contain approximately 2.5 million cubic yards (cy) of waste. Assuming a waste density of 1,000 pounds per cubic yard (lb/cy), approximately 1.24 million tons of waste is located in these areas. The LANDGem Model estimated methane and NMOC generation rates in these areas. Assuming the waste in these areas was deposited from 1951-1960, the resulting NMOC generation in 2002 from waste placed in these areas was approximately 4% of the Site's total NMOC generation in 2002.

The Northeast Canyon area and portions of the Eastern Perimeter area are excluded from the GCCS based on the following factors:

- Surface emissions monitoring in the area revealed no detectable concentrations of methane at or above 500 parts per million (ppm).
- NMOC concentrations are close to the 1 percent NSPS exclusion requirement threshold;
- GCCS design in these areas would be premature based on the on going investigations, characterizations, and remedial actions associated with the Administrative Order, and
- Shallow waste depths prohibit effective landfill gas extraction with vertical wells;

Surface emissions monitoring will continue in these areas in accordance with the Administrative Order. If methane emissions in these areas exceed 500 ppm, the expansion of the GCCS design will be evaluated.



### 4.3 VERTICAL EXTRACTION WELL DEPTH AND SPACING

A total of 28 vertical wells are proposed for the Site as shown on the revised Gas Collection and Control Plan submitted by EMCON/OWT, Inc. Vertical extraction wells will be installed up to depths equivalent to 3/4 of the depth of refuse. The actual well depth and spacing may be modified based on field conditions when compared to modeling data. The radius of influence used for the well spacing is based on field testing conducted by EMCON/OWT, Inc. in May 2002. The effective radius of influence of each extraction well is approximately 500 feet which supports a wells spacing of approximately 750 feet.

A well schedule containing a list of all 28 proposed extraction wells, their locations, depths, and slotted pipe lengths is presented in Attachment B.

### 4.4 WELL FIELD PIPE SIZING

The LFG collection piping which delivers the LFG to the blower/flare station or utilization facilities is sized to consider the head losses throughout the piping network to minimize the vacuum requirements of the system. The extraction blower and header piping will be designed to deliver a minimum of 10 inches of water column (in.-w.c.) of vacuum to each extraction wellhead in the LFG collection system. The collection system components will be conservatively sized based on the LFG generation rate. Sample headloss/pipe sizing calculations are contained in Appendix B.

Criteria that will control the sizing of header piping are as follows:

- **Gas Velocity** - Design gas velocities will not exceed 2,400 feet per minute (fpm) for flows concurrent with the slope, and 1,200 fpm for flows against the slope.
- **Unit Head Loss** - Head losses in any given section of piping will be standardized to a 100-foot section which shall not have head losses in excess of one inch of water column.

The header and lateral piping will be constructed of PVC or HDPE, and will be, installed above grade. A minimum slope of one percent is specified for piping when LFG flow is concurrent with condensate flow. When LFG flow opposes condensate flow, a minimum two percent slope is specified. A three percent slope is planned for piping on the landfill surface.

Since the landfill area in the 720-acre leased area consists of essentially two distinct areas, the Top Deck and the Southern Flats, the GCCS was designed with two main headers linked by a common blower/flare station.

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## 4.5 BLOWER/FLARE STATION

### 4.5.1 Blower Selection

Blower selection for the GCCS is based on the landfill gas generation model results presented earlier in Section 4.2.1. As a conservative measure when sizing blowers, SCS typically uses the LFG generation rate in lieu of the collection rate to account for the unpredictable nature of LFG production. Since the Site ceased accepting waste in October 1993, the LFG generation in 2002 represents the maximum generation, which the system will need to be capable of handling. Additionally, for purposes of conservative modeling and due to a lack of exact fill data, SCS did not subtract potentially non-productive or inert tonnage from the total MSW used in the LANDGem. In other words, waste volumes from areas excluded from the GCCS, discussed in Section 4.2.2, were not excluded from the modeling analysis. This tactic ensures that the blower and flare will be sized sufficiently to handle gas generation. Thus, the maximum LFG generation rate that the system must control (occurring in 2002) is 3,084 cfm. Assuming a collection efficiency of 75% (based on AP-42), the collection rate equals 2,313 cfm. For purposes of sizing the blower station on a conceptual level, SCS used a maximum design flow rate equal to 3,000 cfm. Blower and flare design calculations are contained in Appendix B.

Two blowers at 1,500 cfm each are specified to operate in parallel for a combined total flow capacity of 3,000 cfm. The use of two blowers offers increased flexibility in LFG control.

SCS anticipates the following specifications for the blower. Actual specifications will be developed during the development of Construction Drawings and Specifications:

- Blowers are industrial grade, centrifugal type to provide a wide range of flows and long-term service. The blowers shall have non-sparking totally enclosed fan cooled (TEFC) motors appropriate for National Electric Code (NEC) Class 1 Division 2 environments. The blowers will not be housed in an enclosed structure; therefore, they are not required to be explosion proof.
- Blower capacity of 1,500 cfm at approximately 60 inches of water column inlet vacuum and 20 inches outlet pressure (vacuum ratings based on similarly sized extraction systems at other landfills).
- 20 to 30 HP TEFC motors wired for 480V, 3-phase service.
- Piping, fittings, and blind flanges to allow for future system modification.

### 4.5.2 Flare Selection

The LFG collection system at Site will require a flare to control LFG emissions. The flare does not preclude the implementation of a LFG utilization facility and would be necessary if the utilization system were off line. The flare is intended to be a candle-stick type.





### 4.5.3 Instrumentation/Control System Design

The flare system will be equipped with an automatic control system. When activated, the flare controller automatically will activate the pilot system; upon successful ignition of the pilot, the controller will start the blower and ignite the flare. The pilot will be extinguished following successful ignition of the main flame. If the flame is extinguished, the controller will sense the outage, shut off the LFG supply, and reset/restart the system after a prescribed shutdown time. The system will automatically restart for any number of flameouts unless prevented by equipment malfunctions. Several conditions (primarily equipment malfunctions and temperature extremes) will propagate a system shutdown; these conditions will trip an alarm and will not allow a restart of the system without a manual reset.

- Anticipated flare control equipment will include:
- Flow indicator.
- Thermocouples to indicate stack temperatures for blower shutdown for low or high temperature alarm conditions.
- Chart recorder to record temperature and flow.
- Automatic propane pilot for ignition.
- Interface with blower controls for automatic motor starting following pilot ignition.
- Alarm indicators for high and low temperatures, flame outage, and blower failure.
- A programmable logic controller (PLC) will be specified to receive signals from the devices listed above and communicate with the appropriate equipment (flare, blower, valves, etc.) to perform the necessary function.

### 4.5.4 Condensate Production and Control

Condensate is formed as the temperature of LFG extracted from the landfill decreases in the collection system piping. Seven condensate traps and two condensate sumps are planned for the GCCS. The actual number of traps and sumps may vary depending on field conditions. Management of LFG condensate at the Sunrise Mountain Landfill will be handled as follows:

- Condensate formed in the lateral piping from the wellhead to the header will drain into the header pipes (except when laterals are at localized low points).
- Condensate formed in the header piping will drain into either a condensate trap (designated CT-# on Drawing 4) or a condensate sump/tank (designated CS-# on Drawing 4). Traps and sump/tanks are designed at low points in the piping system.



Condensate traps are designed to collect condensate from the header system and dispose it back into the landfill. Condensate sump/tanks were designed to collect condensate in areas where traps were not feasible. The sump/tanks will store condensate temporarily prior to proper disposal.

Condensate in header piping can form a blockage in the gas system if it collects in a low point and is not removed from the header system. To maintain positive drainage, a minimum 3 percent slope is specified for collection piping on the landfill surface. Differential settlement under the collection piping is less of a concern in areas off the refuse mounds, so a minimum slope of 1 percent is anticipated for piping located on natural soil when LFG flow is in the direction of condensate flow. On natural ground, when LFG flow opposes condensate flow in the header, a minimum 2 percent slope is anticipated.

The total quantity of condensate collected by the LFG system is expected to be highest during the winter months when the temperature differential of LFG from the wellhead to the flare station is greatest. Condensate collection estimates for winter were calculated (see Appendix B) to be approximately 1,905 gallons per day for both sections of the landfill. This value represents the anticipated maximum daily amount from 2,400 cfm of LFG, which is the anticipated collection rate if an LFG temperature of 120 degrees F at the wellhead and 40 degrees F at the blower is assumed.



## SECTION 5

### COMPLIANCE REVIEW AND EVALUATION

The purpose of this Section is to describe and document information required to certify compliance of the GCCS with the applicable sections of *40 CFR 60.759 - Specifications for active collection systems*, including:

- §60.759 (a) - Compliance with §60.752 (b) (2) (ii).
- §60.759 (b) - Construction procedures.
- §60.759 (c) - Conveyance of LFG in compliance with §60.752 (b) (2) (iii).

Additionally, portions of *40 CFR 60.755 - Compliance provisions* relevant to GCCS specifications are addressed, including:

- §60.755 (a) (1) - Calculations for maximum expected gas generation flow rate.
- §60.755 (a) (2) - Sufficient density of gas collectors.
- §60.755 (a) (3) - Collection system flow rate sufficiency.
- §60.755 (a) (5) - Identification of excess air infiltration.

The information presented below is applicable to the existing GCCS.

#### 5.1 COMPLIANCE WITH §60.759 (a) (1)

The following report sections address compliance with the applicable sections of §60.759 (a).

##### 5.1.1 Control of Surface Emissions

Surface emissions will be controlled by the collection of LFG utilizing the GCCS and the final cover system at the landfill. Currently the existing cover is controlling surface emissions without the active GCCS for the majority of the Site, as documented in Section 2.3.

##### 5.1.2 Depths of Refuse

The elevation of the landfill bottom, peak elevations, maximum estimated depth of refuse, and estimated average depth of refuse for the entire landfill is provided herein.

##### 5.1.3 Refuse Gas Generation Rates and Flow Characteristics

LFG generation modeling was used to estimate the LFG generation rate for the landfill. The LFG generation rate provided by this method was then used to evaluate the adequacy of the GCCS design. Waste disposal rates used in the model were obtained from the Historical Landfill Assessment Report (SCS Engineers, 2001).

Modeling was performed using the LANDGem Model, with k and L<sub>0</sub> inputs recommended by



EPA's AP-42 (November 1998) for dry sites. As shown in Appendix B, the model uses a  $k$  of 0.02 and  $L_0$  of 100 cubic meters per megagram ( $m^3/Mg$ ).

As shown in Appendix B, LFG generation peaked in 1994, the year after closure, and has been declining since then. The LFG collection system is designed to handle the maximum LFG flows expected to occur in 2002. Appendix B shows that the landfill is expected to generate  $8.10 \times 10^8$  cubic feet of methane in 2002, which equates to 3,084 scfm of LFG, assuming a methane content of 50 percent. Assuming a LFG collection efficiency of 75 percent, which, according to AP-42, is typical for most landfills, the estimated average LFG flow from the landfill is about 2,313 scfm. Actual LFG flow will vary based on field conditions encountered.

#### **5.1.4 Landfill Final Cover System**

See Section 2.1.3.

#### **5.1.5 Gas System Expandability**

As described above, the GCCS has sufficient capability to accommodate collection of up to 2,400 scfm of LFG. The GCCS also has sufficient capacity to accommodate installation of additional wells or other collection methods at the Site, should they be required, based upon surface emissions monitoring.

#### **5.1.6 Condensate Management**

For the GCCS, seven (7) condensate traps and two (2) condensate sumps/tanks will collect the condensate, by gravity, from the low points along the GCCS LFG header. The condensate sump/tanks will be emptied manually on a regular basis. The actual number and location of the traps and sumps will be determined during the development of Construction Drawings and Specifications based on field conditions at that time.

#### **5.1.7 Leachate Management**

There is no leachate collection system constructed at the landfill.

#### **5.1.8 Accessibility**

Access roads provide site access.

#### **5.1.9 Integration with Closure End Use**

No end uses currently are proposed for the closed landfill.



### 5.1.10 Air Intrusion Control

Air intrusion control for the GCCS is provided by installation of the final cover system installed over the entire site. The use of 10 to 15-foot minimum blank sections on the vertical well casings in the interior extraction wells and bentonite plugs at top of casings provide additional control for potential air intrusion. Air intrusion control is also provided by well field tuning to reduce the oxygen and nitrogen content of the collected LFG to a level at or below the regulatory limits of 5 percent oxygen and 20 percent nitrogen. Oxygen and nitrogen levels will be reduced (as necessary) by reducing the vacuum placed on individual wells

### 5.1.11 Corrosion Resistance

In general, the system components described in Section 4 of this report represent "state-of-the-practice" materials, and have proven to be resistant to corrosion with proper installation, operations, and maintenance in GCCS applications across the United States.

### 5.1.12 Fill Settlement

Settlement or subsidence of waste fill can affect a GCCS in numerous ways, including:

- Damage or destruction of header and lateral piping systems.
- Blockage of header and lateral piping systems, as a result of condensate collecting in the piping (at locations where the elevation of the top of the pipe drops below the elevation of the bottom of nearby pipe sections due to settlement), thereby blocking the flow of gas.
- Damage, displacement or destruction of well casings, seals, and filter materials, as a result of settlement in the landfill mass adjacent to the well.

Components or features incorporated into the GCCS design to address potential effects of settlement include collection system piping above the landfill surface, and flexible couplings installed in the header pipe.

### 5.1.13 Resistance to Decomposition Heat

The components incorporated into the GCCS have performed well historically when subjected to the heat of decomposition under normal operating conditions. Typically, the components used in a modern GCCS are resistive to temperatures not exceeding 150°F. The GCCS components which are most susceptible to heat damage include vertical extraction wells. PVC or HDPE well casings will be installed within the refuse mass. PVC and HDPE pipe has proven successful for numerous GCCS applications across the United States. Above grade pipe shall be either PVC or HDPE.



## **5.2 COMPLIANCE WITH §60.759 (a) (2)**

The following section describes compliance with §60.759 (a) (2).

### **5.2.1 Density of Gas Collection Devices**

Surface emissions are currently controlled over a majority of the Site without a GCCS. Based on surface emissions monitoring, only a few extraction wells would be required to control methane surface emissions at the Site. However, 28 wells are included in the GCCS design to collect landfill gas. Installation of these wells may be in a phased-approach based on actual field conditions encountered at the time of installation.

Based upon the criteria used for the evaluation, the GCCS should provide sufficient collection coverage to meet the NSPS surface emissions monitoring requirements. The adequacy of the well density will be confirmed during future surface emissions monitoring, including identifying any areas that may require additional control measures based upon the monitoring results.

## **5.3 COMPLIANCE WITH §60.759 (a) (3)**

### **5.3.1 Collection Devices Placement**

Collection devices will be installed throughout the landfill, as shown on Drawing 4 (Appendix A) with the exception of areas of asbestos or other non-degradable and/or non-productive waste fill.

## **5.4 COMPLIANCE WITH §60.759 (b) (1), (2), AND (3)**

### **5.4.1 Construction of System Components**

As described in previous sections of this report, the GCCS components are constructed of materials suitable for LFG applications.

## **5.5 COMPLIANCE WITH §60.759 (c) (1), (2)**

### **5.5.1 Landfill Gas Conveyance**

The GCCS blower/flare station is designed for a flow rate of 3,000 scfm, which is expected to provide sufficient gas management. The two header pipes are each capable of transporting up to 1,500 scfm of LFG. This collection rate exceeds the projected

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maximum gas flow rate of 1,200 scfm in each area. Therefore, the header piping system is anticipated to have sufficient capacity to provide LFG collection for the site.

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## **5.6 PLAN FOR SURFACE EMISSION MONITORING**

Surface emissions monitoring will be performed as specified herein. These monitoring requirements have been developed in general accordance with the requirements set forth in NSPS. The required date to operate the GCCS is 18 months following the submittal of this GCCS Plan, or October 6, 2002. The first quarterly monitoring event (required by NSPS) will occur within three (3) months of the required operation date of the GCCS Plan, or January 6, 2003. Subsequent monitoring events will be scheduled in accordance with the NSPS Enabling Document. The actual route used for monitoring events will be shown on a field sketch attached to each future Surface Emissions Monitoring Report.

## **5.7 RECORDKEEPING**

No variances to the recordkeeping requirements set forth in 40 CFR §60.757 (f) and (g) are proposed in this Plan. Recordkeeping shall be performed as set forth in the regulations.

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