APPENDIX A

For Consent Decree
in U.S. v. Republic Dumpco, Inc., et al., (D. Nev.)

Scope of Work
For
Sunrise Mountain Landfill

Sunrise Mountain Landfill - Scope of Work

TABLE OF CONTENTS

Table of Attachments

All attachments to this Appendix A, Scope of Work, are hereby incorporated by this reference.

1.0 INTRODUCTION

This Scope of Work for Sunrise Mountain Landfill ("SOW") is Appendix A to the Consent Decree in U.S. v. Republic Dumpco, et al. (D.Nev.) ("Consent Decree").

2.0 DEFINITIONS

Unless otherwise expressly provided herein, terms used in this SOW that are defined in the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. Section 6901 et seq., and the Clean Water Act (CWA), 33 U.S.C. Section 301 et seq., shall have the meanings assigned to them in those Acts. Except where otherwise noted, the definitions provided in the Consent Decree will apply to this SOW, as modified and/or supplemented by the following definitions:

"Approval" or "EPA approval" shall mean approval as described in the Consent Decree.

"Area" shall refer to the eleven parts of the Sunrise Mountain Landfill identified for site assessment purposes and shown in Attachment 1 (Site Map):

Area A:	Eastern Perimeter
Area B:	Eastern Side of Lower Southern Flats
Area C:	Western Side of Lower Southern Flats
Area D:	Top Deck
Area E:	Side Slopes of Top Deck
Area F:	Construction Debris
Area G:	Septic Lagoon
Area H:	Dead Animal
Area I:	Asbestos Waste
Area J:	Northeast Canyon,
Area K:	Western Burn Pits Area (the Black Lagoons).

"Borrow Source" or "Borrow Source Areas" shall mean the soil borrow areas otherwise approved by EPA, or analyzed pursuant to Task 4.1.4.4.1 and determined eligible to be used as set forth in Tasks 4.1.3, 4.1.4.2, and 4.1.4.3.

"BMPs" shall mean Best Management Practices for storm water controls, as defined in the Nevada Storm Water General Permit NVR050000 and 40 C.F.R. § 122.2.

"BLM" shall mean the United States Department of the Interior, Bureau of Land Management, or any successor agency.

"CFP" shall mean the Exponent Controlled Flow Plan Report and Design and Drawings dated December 17, 2003, with any approved amendments. (See Section 6, Background Documents.)

"Cover" shall mean the cover to be constructed at the Landfill in accordance with the requirements of this SOW.

"CQAP" shall mean the Construction Quality Assurance Plan required pursuant to this SOW.

"Defendants" for purposes of this SOW only shall mean Republic Silver State Disposal, Inc. and Republic Dumpco, Inc.

"Design Storm Event" shall mean a 200-year, 6-hour storm water flow event and corresponding duration precipitation depths as shown in the Exponent Report dated January 24, 2003, page 12, Table 1, and as reproduced below:

Table 1 200-year Design Storm Rainfall Depths.

Duration	Depth
5-minute	0.99 in
15-minute	1.95 in
1-hour	3.42 in
2-hour	3.69 in
3-hour	3.80 in
6-hour	4.20 in

"Dispersive Clays" shall mean clays whose particles readily detach in the presence of water and may be transported by water, leading to rapid erosion.

"Drainage Area" shall mean a subarea of the Landfill surface defined as a unit on Attachments 5, 6 and 7.

"DMRs" shall mean Discharge Monitoring Reports as defined in the CWA.

"HASP" shall mean the Health and Safety Plan required pursuant to this SOW.

"Landfill" or "Sunrise Mountain Landfill" shall mean the areal extent of waste disposal at the former operating landfill generally situated within portions of Section 1 and 12, Township 21 South, Range 62 East, Mount Diablo Meridian, which for purposes of this SOW and Consent Decree shall include disposal areas adjacent to the permitted disposal area, including the waste deposited on the approximately 40 acres of the Northeast

Canyon Landfill, as well as waste deposited on 23 acres in the Eastern Perimeter area, and any disturbed land associated with waste disposal, even if these areas are not part of the land leased by Clark County from the BLM for waste disposal. "Landfill" and "Sunrise Mountain Landfill" shall also include the detention dam, drainage facilities and conveyances required by this SOW and the Consent Decree as well as existing drainage structures and facilities, any additional land necessary for the implementation of the Work, and, in the case of a future Act or Acts of Congress conveying title to Clark County for the purpose of facilitating the performance of the Work, all such land conveyed. The boundary of the Sunrise Mountain Landfill as defined herein is generally shown on the Site Map provided in Attachment 1 to this Scope of Work. If Congress acts in the future to convey land to Clark County for the purpose of facilitating the performance of the Work, Attachment 1 shall be updated to reflect the boundaries of the land conveyed.

"N.A.C." shall mean the Nevada Administrative Code.

"NDEP" shall mean the Nevada Division of Environmental Protection or any successor agency.

"NTU" shall mean nephelometric turbidity unit, which represents the average volume scattering over a defined angular range.

"Operating Record" shall mean the maintenance of documentary records of closure and post-closure as required by 40 C.F.R. § 258.60 and N.A.C. Section 444.6897.

"SAP" shall mean the Sampling and Analysis Plan required pursuant to this SOW.

"Schedule" shall mean the Implementation Schedule provided as Attachment 2 to this SOW.

"SOW" shall mean this Appendix A to the Consent Decree in U.S. v. Republic Dumpco, Inc. (D. Nev.), Scope of Work for Sunrise Mountain Landfill.

"SOW Work" or "the SOW Work" shall mean all of the tasks and other obligations identified in this SOW.

"SWCW" shall mean the Storm Water Control Workplan.

"SWPPP" shall mean a Storm Water Pollution Prevention Plan as defined in Nevada's Storm Water General Permit NVR050000, section I.B.

"SWMP" shall mean the Storm Water Monitoring Plan required pursuant to this SOW.

3.0 WORK PLAN DEVELOPMENT, IMPLEMENTATION AND REPORTING

Required Tasks: As specified below, and consistent with Attachment 2 (Implementation Schedule), Defendants shall submit, in compliance with Task 3.7.2, proposed plans and workplans for all of the required tasks and provide proposed schedules for conducting the SOW Work. The schedule for all tasks shall run from the date of receipt of EPA's written approval of the appropriate prior submittal. Where relevant, all schedules shall account for the need to obtain BLM approvals. EPA intends to provide an opportunity for review and comment by NDEP and BLM prior to EPA's approval, approval with modifications or disapproval of Defendants' deliverables. Defendants shall conduct all tasks in this SOW using qualified personnel, in accordance with industry standards and applicable laws and requirements.

Defendants Required to Implement as Approved: Defendants shall implement all workplans and other tasks in this SOW as approved by EPA and in accordance with the approved schedule. Defendants may submit requests for modifications of such workplans and schedules. Defendants are required to continue implementing all approved workplans in accordance with the approved schedule, unless and until such workplan or schedule modifications are approved by EPA or by the Court following the invocation of Dispute Resolution, pursuant to Section X of the Consent Decree.

Sequencing of Tasks: EPA is aware that there are a variety of options for sequencing of tasks. Defendants shall propose appropriate sequencing as part of the initial workplan submittals required by this SOW.

Task 3.1. Health and Safety Plan ("HASP")

Within forty-five (45) Days of the Effective Date, Defendants shall prepare and submit for EPA review and comment a Health and Safety Plan ("HASP") that ensures protection of human health and safety during performance of the Work. The HASP shall be prepared and updated in accordance with the applicable portions of EPA's Standard Operating Safety Guide (November 1984, updated July 1988, and any additional updates). In addition, the HASP shall comply with all currently applicable Occupational Safety and Health Administration ("OSHA") regulations, including but not limited to Hazardous Waste Operations and Emergency Response (29 C.F.R. Part 1910), Construction Standards (29 C.F.R. Part 1926), General Industry Standards (29 C.F.R. Part 1910), and the general duty requirement of Section 5(a)(1) of the Occupational Safety and Health Act of 1970 (29 U.S.C. §651 et seq.).

Task 3.2. Sampling and Analysis Plans

Task 3.2.1. Sampling and Analysis Plan ("SAP")

Within sixty (60) Days of the Effective Date, Defendants shall submit a Sampling and Analysis Plan ("SAP") that complies with all relevant EPA guidance, including EPA Region 9 Quality Assurance Guidance provided on-line at: http://www.epa.gov/region09/qa/fieldsamp.html and any amendments thereto, which are incorporated herein by this reference. The SAP shall provide procedures for sampling and analysis of soil, groundwater and landfill gases.

Task 3.2.2. Storm Water Monitoring Plan ("SWMP")

Defendants shall continue to sample, analyze, and report in accordance with the SWMP submitted November 26, 2003. Within sixty (60) Days of the Effective Date, Defendants shall revise and resubmit the SWMP to fully incorporate EPA comments dated May 12, 2004, with one exception: Defendants may choose not to incorporate EPA's comment that the 40 C.F.R. 445 limits & N.A.C. WQS limits for nitrites, nitrates, and TDS should be applied to their DMRs.

Task 3.3. Construction Quality Assurance Plan ("CQAP")

Within sixty (60) Days of the Effective Date, Defendants shall submit a CQAP. The CQAP must identify measures to be taken by the Defendants to determine compliance with plans and specifications through tests and a system of inspections. The CQAP shall document required coordination with regulatory agencies and certifications confirming that all SOW Work has been constructed as designed. Particular areas of importance with respect to the CQAP are: cover soil properties, thickness of layers, grades, slopes, geomembrane construction and storm water conveyance structures. The CQAP must include provisions for an independent third party CQA consulting firm to confirm that the Defendants CQAP activities are done in accord with the CQAP.

Task 3.4. Overall Project Workplan and Project Schedule

Task 3.4.1. Overall Project Workplan

Within sixty (60) Days of the Effective Date, Defendants shall submit a detailed Overall Project Workplan for completing all of the tasks in this SOW by the dates described in the Schedule. The Overall Project Workplan shall include a work breakdown structure for all tasks included in this SOW and all sub-tasks to be completed by Defendants. Defendants' Overall Project Workplan shall also include the HASP required in Task 3.1 above, the SAP and SWMP required in Task 3.2 above and the CQAP required in Task

3.3 above. The Overall Project Workplan shall also include a schedule for and description of the workplans required by Tasks 4.1 through 4.5, specifically the Final Cover Corrective Measures Workplan (Task 4.1), the Gas Monitoring and Corrective Action Workplan (Task 4.2), the Groundwater Monitoring Workplan (Task 4.3), the Storm Water Control Workplan (Task 4.4) and the Long-Term Operation and Maintenance Workplan (Task 4.5), and for all other tasks required by this SOW.

Defendants shall include in the Overall Project Workplan a detailed description of Defendants' project team, including name, role, company affiliation, address, phone number, mobile phone number/pager, e-mail address, fax number, and the Curriculum Vitae (CV) of the key members of the project team. The Overall Project Workplan shall also include a project team organization chart. When significant changes occur in the project plan, HASP, SAP, SWMP, CQAP, Schedule and/or project team, the appropriate documents shall be updated or addenda shall be prepared and submitted along with the next Monthly Progress Report after the significant change occurs.

The Overall Project Workplan shall include proposed tables of contents and schedules of submission for all reports to be submitted pursuant to this SOW. These reports shall include, but are not limited to:

1) Monthly Progress Reports (including Monthly Data Report)
2) Monthly Meeting Minutes
3) Final Overall Project Workplan Implementation Report (including as-built drawings)
4) Well Installation Evaluation Field Reports
5) Well and Boring Installation Reports
6) Quarterly Groundwater Monitoring Reports
7) Quarterly and Annual DMRs
8) Storm Water Control Workplan Implementation Report
9) Operation & Maintenance Reports

Defendants shall submit all deliverables in compliance with the distribution and reporting requirements specified in Task 3.7.

Task 3.4.2. Project Schedule for All Tasks

Within sixty (60) Days of the Effective Date, Defendants shall submit an Overall Project Schedule utilizing MS Project 98 (or an equivalent software package approved by EPA) that is consistent with Attachment 2, Implementation Schedule. This Project Schedule shall be updated and resubmitted by Defendants on a monthly basis and included in both electronic (able to edit using MS Project 98) and hard copy format in the Monthly

Progress Report. The Project Schedule shall show the deadlines for Defendants' submittals for all phases of the Work required by this SOW. Once approved by EPA, Defendants shall implement the Work in accordance with the approved Project Schedule. Defendants may also propose to alter the phasing or sequencing of the required Work, subject to EPA approval. The critical path shall be shown on the Project Schedule.

Task 3.4.3. Implementation of Overall Project Workplan and Completion Report

After EPA has approved the Overall Project Workplan and the Project Schedule, Defendants shall implement the Overall Project Workplan, as approved, in accordance with the approved Project Schedule. Within ninety (90) Days of completion of all tasks listed in the Overall Project Workplan and Project Schedule, with the exception of Task 4.5, Long-Term Operation and Maintenance and any ongoing document retention and reporting tasks, Defendants shall submit, for approval by EPA, a Final Overall Project Workplan Implementation Report, describing the implementation of the SOW Work that has been completed.

Task 3.5. Monthly Progress Reports

During all phases of SOW implementation, in addition to all other submittals required by this SOW, Defendants shall submit Monthly Progress Reports, unless EPA approves a change in this reporting requirement.

Monthly Progress Reports shall include the following:

1) Progress for the reporting period on each individual task
2) Overall progress to date on each individual task
3) Storm events and documentation of damage and repairs, if any, resulting from storm events during the month
4) A summary of all environmental sampling activities pursuant to this SOW during the month
5) A description of the work anticipated to be performed on each individual task during the following month
6) A copy of the most recent final minutes from Monthly Technical Meetings (see Task 3.6)
7) A description of any problems encountered in the month or anticipated in performing the tasks required by this SOW in the following month and Defendant's plans for addressing these problems
8) For tasks for which compliance requirements were not satisfied by Defendants, the Defendants shall provide an explanation of reasons why compliance with the requirements was not achieved
9) A summary of any public inquiries and complaints received by Defendants in the

month related to the SOW Work

10) Current Project Schedule.

Task 3.6. Monthly Technical Compliance Meetings/Teleconferences

The purpose of the monthly technical compliance meetings will be to provide a forum, on a regular basis, to discuss compliance with this SOW, including technical and project management issues related to implementation of the SOW tasks. If approved by EPA, Technical Compliance Meetings may be held by telephone. The frequency of Technical Compliance Meetings may be changed with EPA approval.

Task 3.7. EPA Project Coordinators and Submission of Deliverables

Task 3.7.1 Communication with Project Coordinators

Until EPA informs Defendants of a change, EPA's Project Coordinators shall be:

Steve Wall (WST-7)
Sunrise Project Coordinator
EPA Region IX
75 Hawthorne St.
San Francisco, CA 94105
(415) 972-3381

Ann Murphy (WTR-7)
Sunrise Alternate Project Coordinator
EPA Region IX
75 Hawthorne St.
San Francisco, CA 94105
(415) 972-3640

Until otherwise specified by EPA, Steve Wall will be the Project Coordinator for compliance with the Consent Decree and Ann Murphy will be the Alternate Project Coordinator. Defendants shall contact the Alternate Project Coordinator whenever the Project Coordinator is not available.

Task 3.7.2. Submission of Deliverables

Whenever Defendants are required to provide more than one deliverable on the same day, Defendants may combine deliverables into a single submittal, as long as the submittal indicates which reports or other deliverables are included in the submittal.

Defendants shall provide in both hard copy (Task 3.7.2.1.) and electronic format (Task 3.7.2.2.) the deliverables required pursuant to this SOW to each of the parties listed below in the manner prescribed in this task.

Defendants shall provide all electronic deliverables without electronic document security or protection features that would prevent any of the following: (1) word processing, (2) extraction of text, (3) extraction of pages, (4) printing, (5) viewing of formulas and macros, and (6) modifications to spreadsheet and database structure. Defendants may provide additional electronic copies in an unalterable format at their discretion.

Task 3.7.2.1. Hard Copy Distribution

Defendants shall provide one hard copy of deliverables required pursuant to this SOW to EPA's Project Coordinator and one copy to EPA's Alternate Project Coordinator.

Defendants shall also provide one hard copy of deliverables required pursuant to this SOW to each of the following unless EPA or one of the below named parties notifies Defendants of a change in contact information:

EPA's Contractor
Sandra Doty
5303 W. Oberlin
Denver, CO 80235

BLM
Mike Moran
U.S. Bureau of Land Management,
Las Vegas Field Office
4701 North Torrey Pines Drive
Las Vegas, NV 89130-2301

Clark County
Alan S. Pinkerton, Deputy Director
Department of Air Quality & Environmental Management
500 South Grand Central Parkway, 1st Floor
Las Vegas, NV 89155

Nevada Division of Environmental Protection ("NDEP"):
Ed Glick, Solid Waste Branch Supervisor
Nevada Division of Environmental Protection
333 West Nye Lane
Carson City, NV 89710

Task 3.7.2.2. Electronic Distribution

All deliverables required pursuant to the SOW shall also be delivered in the electronic format specified below via e-mail (for electronic files under 2 megabytes) or via CD-ROM (for electronic files over 2 megabytes).

Task 3.7.2.2.1. CD-ROM. For files delivered via **CD-ROM**, Defendants shall submit the deliverables to the following at the addresses shown above.

1) Steve Wall, EPA's Project Coordinator
2) Ann Murphy, EPA's Alternate Project Coordinator
3) Sandra Doty, EPA's Contractor
4) Mike Moran, BLM
5) Alan Pinkerton, Clark County
6) Ed Glick, NDEP

Task 3.7.2.2.2. Email. For files delivered by electronic mail ("e-mail") Defendants are required to satisfy the requirements below:

1) The header or subject line of all e-mail messages shall include the words "Sunrise Landfill Consent Decree."
2) The text of the message shall include a description of the attachments, and
3) All messages shall be sent to all of the individuals listed in the following E-Mail Distribution List.

E-Mail Distribution List

Name	Organization	E-Mail Address
Steve Wall	EPA	wall.steve@epa.gov
Ann Murphy	EPA	murphy.ann@epa.gov
Sandra Doty	EPA Contractor	sandra.g.doty@saic.com
Cliff Anderson	EPA Contractor	cliff@ahymo.com
Mike Moran	BLM	mmoran@nv.blm.gov
Ed Glick	NDEP Waste	eglick@ndep.nv.gov
Alan Pinkerton	Clark County	AZP@co.clark.nv.us

4.0 CORRECTIVE ACTION AND STORM WATER CONTROL TASKS

Defendants shall perform all of the tasks in this Task 4.0 in compliance with all requirements and specifications provided herein.

Until EPA approves the Long-Term Operation and Maintenance Plan for the Landfill, Defendants shall, on an annual basis, inspect, repair and submit a report on the maintenance of the corrective actions implemented pursuant to Task 4 (the Corrective Action and Storm Water Control Tasks).

Task 4.1. Final Cover Corrective Measures Workplan and Implementation

Within one hundred and twenty (120) Days of the Effective Date, Defendants shall submit a Final Cover Corrective Measures Workplan. Defendants shall include in this Workplan, at minimum, all Work required by Tasks 4.1.1 through 4.1.10.

Task 4.1.1. Design Criteria for Final Cover and Associated Surface Water Control Features

This Task provides design criteria that Defendants shall use during the Final Cover construction process. Tables 5.1 and 5.2 generally summarize these design criteria. In the case of any inconsistency between this Task 4.1 and Tables 5.1 and/or 5.2, the language of Task 4.1 shall control.

Design standards for "Associated Surface Water Control Features" should be compared to the Clark County Regional Flood Control District Hydrologic Criteria and Drainage Design Manual (CCRFCD Manual 1999) minimum criteria and designed in accordance with the CCRFCD Manual if those design standards are more stringent.

Task 4.1.2. General Final Cover Design Requirements:

Alternative Non-Vegetated Soil Cover: Defendants shall construct a non-vegetated soil cover, including a soil barrier layer and an armored surface element (erosion layer) to minimize erosion. Defendants shall construct the Final Cover with a total cover thickness of at least 3 feet, comprised of a soil barrier layer and an erosion layer meeting the requirements specified in Tasks 4.1.3 and 4.1.4 below. The 2.5 feet thick soil barrier layer requirement detailed in Task 4.1.3 is for total depth above waste, and existing cover can be used to meet this 2.5 feet requirement. Defendants and EPA have agreed that the intention is to use onsite borrow sources as much as possible to accomplish these requirements.

Task 4.1.3. Soil Barrier Layer - Minimum Thickness and Required Soil Properties

Defendants shall ensure that the Final Cover contains a soil barrier layer above all waste that is a minimum of 2.5 feet thick. Existing cover soil thickness measurements are shown in Attachment 3 and documented in the "Shallow Boring and Geotechnical Sampling Report" (SCS, November 13, 2001). Defendants shall apply supplemental cover soils to any existing cover soils so that the total combined thickness is a minimum of 2.5 feet. The supplemental cover soils will utilize a minimum of 10% fines and a maximum of 75% fines, with fines being the soil particles passing a No. 200 (0.075 mm) sieve. See Interstate Technology and Regulatory Council ("ITRC"), December 2003 [Final] Alternative Landfill Technology, Technical and Regulatory Guidance for Design, Installation, and Monitoring of Alternative Final Landfill Covers (ITRC 2003). Defendants shall remove rock and gravel out of the supplemental cover soils so that between 45% and 100% of the remaining soils pass a No.4 (4.75 mm) sieve, between 90% and 100% of the remaining soils pass a 2-inch (50.8 mm) sieve, and 100% of the remaining soils pass a 4-inch (102 mm) sieve. The supplemental cover soils shall have a liquid limit between 0 and 45, and a plasticity index between 0 and 25. Any selection and processing of supplemental cover soils shall use material property limits so that transport and placement does not cause the in-place supplemental cover soils to exceed these limits.

The existing in-place soils shall be considered as acceptable existing cover soils provided: (1) they do not contain any solid waste or deleterious materials, (2) the top 1.0 foot of the in-place soils have between 45% and 100% passing a 4-inch (102 mm) sieve, and (3) the surface does not have any surface rock particles that project more than three inches above the mean soil surface. Any existing surface soils with rock particles projecting more than 3 inches above the mean soil surface shall be bladed, rolled, picked, or otherwise improved so that the surface meets requirement (3). Borrow area soils not meeting the requirements for supplemental cover soils may be screened or blended with other soils to create cover soils that meet the requirements for the supplemental cover soils. Defendants shall utilize these criteria in selecting soils to create the required 2.5-feet minimum soil barrier thickness above the waste throughout the Landfill.

Task 4.1.4 Erosion Layer - Minimum Thicknesses and Required Soil Properties

4.1.4.1. Erosion Layer Minimum Thicknesses and Required Soil Properties for Slopes Greater Than or Equal to10%. For areas with slopes greater than or equal to10%, Defendants shall construct a gravel-soil erosion layer with the layer thicknesses shown on Attachment 7. The method used to determine the erosion layer as set forth in this Task 4.1.4.1 is based on modifications to the method described by Steve Abt and Terry

Johnson in "Riprap Design for Overtopping Flow" published in the "Journal of Hydraulic Engineering" (ASCE, 1991). A 200-year event runoff rate of 245 mm/hour is prescribed for the cover design. The modified gravel-soil erosion layer calculation method was prepared specifically for this project by Cliff Anderson, a consultant to EPA. This calculation method is used to devise a single gravel-soil erosion layer thickness instead of a riprap layer underlain by a granular filter layer. The modified calculation method for slopes greater than or equal to 10% along with background calculations used by EPA in its analysis of gravel-soil erosion layer gradations and thicknesses have been provided to the defendants and are available in EPA's Sunrise Mountain Landfill Site File. The gradation ranges shown in Attachments 7a, 7b, and 7c were developed and approved as part of a compromise agreement between Defendants and EPA . Curves that summarize the slope and slope length relationships for each of these gradations based on this method are shown in Attachment 7g.

Defendants shall construct the erosion layer for each layer thickness shown in Attachment 7 consistent with the gravel-soil gradation ranges shown in Attachments 7a, 7b, and 7c. For 12-inch through 18-inch layer thicknesses, the gradation range is shown in Attachment 7a. For 10-inch layer thickness, the gradation range is shown in Attachment 7b. For 6-inch layer thickness, the gradation range is shown in Attachment 7c. For each gradation range associated with a particular layer thickness, the rock size can exceed the maximum gradation line for specified rock diameter above D_{75} if the total erosion layer thickness at that location is increased, if necessary, to match or exceed the increased D_{98} rock size diameter as yielded by extrapolation from actual test results.

Defendants shall prepare construction drawings and specifications (hereafter referred to as "construction drawings") as part of the Workplan, which show the locations of the erosion layer thicknesses and the final contours of the surface of the erosion layer. When erosion layer design involves more than one thickness within any side-slope Drainage Area, the line of thickness transition shall include an increase in thickness of the thinner layer to provide a smooth surface without flow concentration, or a designed drainage conveyance shall be placed at the transition. The construction drawings shall be provided to EPA for review and approval in accordance with the approved schedule. The final contours of the construction drawings are anticipated to differ from the figures in Attachments 4 through 7 due to regrading, new topographic data and increased level of detail. Therefore, it is anticipated that a limited number of final slopes and slope lengths will change from those shown in Attachments 4 – 7. Inconsistencies with Attachments 4 through 7 shall be analyzed during preparation of the Final Cover Corrective Measures Workplan and erosion layer construction drawings. Where construction drawings differ from figures in this SOW, erosion layer gradations and layer thicknesses shall be adjusted to conform with slope and length computations shown in the Attachment 7g - Field Exhibit for Slopes Greater Than or Equal to10%. To the extent that construction of the

cover differs from the construction drawings due to physical properties of the Landfill, construction constraints, or the opportunity to improve the design, erosion layer gradations and layer thicknesses shall be adjusted to conform to slope and length computations shown in the Attachment 7g.

4.1.4.2. Erosion Layer Minimum Thicknesses and Required Soil Properties for Slopes Less Than 10%. For areas with slopes less than 10%, Defendants shall construct an erosion layer with the layer thicknesses shown on Attachment 7. The method used to determine the erosion layer as set forth in this Task 4.1.4.2 is based on modifications to the calculation method described by Abt and Johnson (1991) and a modified gravel admixture calculation method. The modified calculation method was prepared specifically for this project by Cliff Anderson, a consultant to EPA. This method is used to compute the minimum D_{50} size (size that 50% by weight will pass) of the gravel portion of the gravel admixture, the scour depth, and the total gravel admixture layer thickness. The modified calculation method for slopes greater than or equal to 10% along with background calculations used by EPA in its analysis of gravel admixture erosion layer gradations and thicknesses have been provided to the defendants and are available in EPA's Sunrise Mountain Landfill Site File. The gradation ranges shown in Attachments 7d, 7e, and 7f were developed and approved as part of a compromise agreement between RSSN and EPA . Curves that summarize the slope and slope length relationships for each of these gradations based on this method are shown in Attachment 7h.

Defendants shall construct the erosion layer for each layer thickness as shown in Attachment 7 consistent with gravel-soil gradation ranges shown in Attachments 7d, 7e, and 7f. For the 12-inch layer thicknesses, the gradation range is shown in Attachment 7d. For the 10-inch layer thickness, the gradation range is shown in Attachment 7e. For the 6-inch layer, the gradation range is shown in Attachment 7f. The erosion layers may contain clay particles provided they are non-dispersive, have a liquid limit between 0 and 30%, and have a plasticity index between 0 and 10.

Defendants shall prepare construction drawings, which show the locations of the erosion layer thicknesses and the final contours of the surface of the erosion layer. When erosion layer design types are used to provide more than one thickness within any Drainage Area, the line of thickness transition shall include an increase in thickness of the thinner layer to provide a smooth surface without flow concentration, or a designed drainage conveyance shall be placed at the transition. The construction drawings shall be provided to EPA for review and approval in accordance with the approved schedule. The final contours of the construction drawings are anticipated to differ from the figures in Attachments 4 through 7 due to regrading, new topographic data and increased level of detail. Therefore, it is anticipated that a limited number of final slopes and slope lengths will change from those

shown in Attachments 4 - 7. Inconsistencies with Attachments 4 through 7 shall be analyzed during preparation of the Final Cover Corrective Measures Workplan and erosion layer construction drawings. Where construction drawings differ from figures in this SOW, erosion layer gradations and layer thicknesses shall be adjusted to conform with slope and length computations shown in the Attachment 7h - Field Exhibit for Slopes Less Than 10%. To the extent that construction of the cover differs from the construction drawings due to physical properties of the Landfill, construction constraints, or the opportunity to improve the design, erosion layer gradations and layer thicknesses shall be adjusted to conform with slope and length computations shown in the Attachment 7h.

4.1.4.3. Special Barrier Soil Provisions for Gravel-Soil Erosion Layer Locations on Slopes Greater Than or Equal to 10%. When gravel-soil erosion layer material is utilized on slopes greater than or equal to 10%, the top 1.0 foot of the underlying 2.5 foot barrier layer must be verified to comport with specifications of the supplemental cover soils detailed in Task 4.1.3. In the event that the barrier soils appear, in the judgment of the third-party CQA under Task 3.3, to have significant amounts of gravel either through the filling in of eroded gullies from previous storm events or through the spreading of gravel, this requirement may either be achieved by processing existing soils to meet the Task 4.1.3 specifications and/or by adding supplemental cover soils that already meet the specifications of Task 4.1.3. This requirement is expected to apply to areas of the side slopes of the landfill that have had retrofits and repairs.

Task 4.1.4.4. Soil Material Sampling and Analysis. Defendants shall submit a Final Cover Corrective Measures Plan that includes a detailed sampling and analysis plan for cover barrier layer soil and cover erosion layer materials prior to placement in conformance with Tasks 4.1.3, 4.1.4.1, 4.1.4.2, and 4.1.4.3.

Task 4.1.4.4.1 Borrow Source Soils and Gravel-Soils Analysis. Defendants shall analyze Borrow Source soil material to determine if the material is suitable for barrier layer soil or for the erosion layers. Defendants shall determine the particle size distribution by using the ASTM Standard D422. Defendants shall use the Atterberg Limits test, ASTM Standard D4318 to find the plasticity index and liquid limit of the materials. Defendants shall use the Standard Test Method for Dispersive Characteristics of Clay Soil by Double Hydrometer, ASTM Standard D4221-99 (2005) to determine the dispersive characteristics of the clay within the soil.

Task 4.1.4.4.2 Produced Erosion Layer Gravel-Soils Analysis
Defendants shall analyze the gravel-soil material to determine if the material is suitable for the applicable erosion layers. Defendants shall determine the particle

size distribution as detailed below. For each new rock source the Defendants shall perform a minimum of two size appropriate L.A. Abrasion tests using ASTM C535 or ASTM C131 and two tests of specific gravity using ASTM C127. L. A. Abrasion and specific gravity tests shall be applied to material retained on a 0.5 inch (12.7 mm) sieve. L. A. Abrasion (ASTM C535 and ASTM C131) shall not be greater than 40% after 500 revolutions. Specific gravity (ASTM C127) shall not be less than 2.60. For produced gravel-soil material used on slopes of less than 10% Defendants shall use the Atterberg Limits test, ASTM Standard D4318 to find the plasticity index and liquid limit of the fines.

Particle Size Analysis of Erosion Layer Materials. Particle size analysis of the erosion layer materials shall be conducted prior to placement. Bulk samples for particle size analysis shall have sufficient weight to ensure an error no greater than 10%. For erosion layer materials having a maximum particle size exceeding 3 inches, the sample shall be separated by a 3-inch screen prior to testing, and the mass retained and passing the 3-inch screen determined. Particle size analysis of material retained on the 3-inch screen shall be conducted following Method D 5519-Test Procedure A. For these larger materials the Defendant may also propose for approval alternative testing methods including inline material handling and digital photographic reference methods. For material passing the 3-inch screen, particle size analysis shall be conducted following Method D 422 using a composite sieving procedure with a single separation on the 3/4–inch sieve, as described in Section 11.5 of ASTM D 6913. Particle size analysis shall be conducted no more frequently than once for each 5,000 cubic yards of erosion layer material. This frequency of testing should be based on the techniques used to produce materials and on experience gained during construction.

The particle size distribution shall be graphed as a single curve by combining the methods described in ASTM D 422 and D 5519. Uncertainty in the particle size distribution due to test reproducibility shall be included on the graph as a band defined by ±2 standard deviations of particle size for each data point on the particle size distribution. Standard deviations for particle sizes less than 3 inches shall be calculated using the procedure defined in Sec. 14 of D 6913. A precision and bias statement has not been developed for ASTM D 5519. Thus, the standard deviation for particle sizes greater than or equal to 3 inches shall be determined by a field trial conducted prior to construction. Erosion layer materials shall be deemed acceptable if the particle size band defined by ±2 standard deviations fully overlaps the specified particle size distribution defined in Attachments 7a through 7f.

Task 4.1.5. Repair of Cracking in the Existing Cover

Defendants shall submit a Final Cover Corrective Measures Plan that includes tasks requiring inspection of the existing cover for significant cracks, with directions to repair the identified cracks. Defendants shall complete these repairs prior to adding additional barrier layer soil or the erosion layer. Existing significant cracks shall be repaired by over-excavating the cover soil until the crack is removed. The excavation shall be replaced in six inch lifts with soil meeting the specifications detailed in Tasks 4.1.3, Soil Barrier Layer.

Task 4.1.6. Cover Construction and Compaction Methods

As part of the Final Cover Corrective Measures Plan, Defendants shall develop and provide to EPA for review and approval final cover construction specifications, methods, and quality assurance procedures.

4.1.6.1 Construction and Compaction Methods of Erosion Layers Required in Task 4.1.4.1 (Slopes Greater Than or Equal to 10%)

For construction and compaction of erosion layers required in Task 4.1.4.1, as described below, Defendants shall develop performance specifications and provide them to EPA for review and approval as part of the Final Cover Corrective Measures Plan. Alternative methods may be developed and provided to EPA for review and approval, if necessitated by field conditions.

Material meeting the gradation requirements shown in Attachments 7a, 7b, and 7c for the erosion control layer on slopes greater than or equal to 10% will be transported from the processing area to the landfill slope in large off-road dump trucks, scrapers, or conveyors. It is recognized that the longer the distance the erosion layer materials are pushed after being deposited, the greater the tendency for segregation of the particle sizes. For this reason, transporting equipment will place materials as close to their final position as practical. Further, as the materials are being spread to final thickness, efforts will be made to minimize the lateral distance over which the gravel-soil material is spread and the degree to which the materials are repeatedly handled.

There is no ASTM standard for in-place compaction testing for large diameter crushed aggregate, therefore, a performance specification will be developed and provided to EPA for review and approval as part of the Final Cover Corrective Measures Plan. In lieu of specifying a minimum dry density for the in-place large diameter material, a minimum

acceptable operating procedure will be specified for compacting the material. To assure adequate compaction is achieved during final cover construction, during preparation of the final cover design, Defendants shall construct a test fill and use this test fill to develop the ≥ 10% erosion layer compaction performance specification. Defendants shall submit the proposed performance specification to EPA for approval.

4.1.6.2 Construction and Compaction Methods of Barrier Layer Soils, Erosion Layers Required in Task 4.1.4.2 (Slopes Less Than 10%), and Replacement of Excavated Cover Soils

Defendants shall develop construction specifications, methods, and quality assurance procedures in compliance with the Cover Construction guidance presented in Section 5, pages 69 - 89 of Interstate Technology and Regulatory Council (ITRC), December 2003 [Final] Alternative Landfill Technology, Technical and Regulatory Guidance for Design, Installation, and Monitoring of Alternative Final Landfill Covers (ITRC 2003). However, unlike Alternative Vegetated Soil Covers which require lower soil densities (80 to 85 % of standard Proctor) to facilitate plant growth, the Alternative Non-Vegetated Soil Cover required at Sunrise shall have higher compaction rates of at least 90 % maximum dry unit weight/defined by standard Proctor (ASTM D 698). To limit density variations from top of the lift to the lift bottom, a maximum one foot lift thickness is allowed. Lifts shall be placed at drier than optimum moisture conditions. This compaction requirement shall apply to all new cover soils, including the soil barrier layer and erosion layer, and any replacement of excavated cover soils. In order to obtain the required compaction for the new cover soils that are placed on existing cover soils, some of the existing cover soils may require surface compaction.

Task 4.1.7. Final Cover Design Requirements Specific to the Top Deck at Area D

4.1.7.1. Minimum and Maximum Grade of Top Deck (Area D) Surface. Defendants shall regrade the surface of the Top Deck area (Area D) to a minimum 3% slope consistent with Attachment 6.

4.1.7.2. Option to Use Northeast Canyon Waste on Top Deck (Area D). Increasing the cover grade to a minimum of 3% on Area D may require fill placement in some areas in depths greater than the required 3 feet. In such areas, Defendants have the option to remove waste from the Northeast Canyon (Area J) and use this waste as fill to achieve the required minimum 3% and maximum less than 10% slope on the Top Deck (Area D). However, at all locations on the Top Deck, Defendants shall ensure that there is a 2.5 foot soil barrier layer above the waste and a 6 inch minimum thickness erosion layer as provided in this SOW. If Defendants exercise the option of using Northeast Canyon waste to achieve the required minimum slope, Defendants shall excavate, sample, and

transport the waste in accordance with the procedures specified in the SCS Engineers "General Waste Removal Work Plan" and any approved amendments, submitted February 24, 2000, on behalf of Defendants. Defendants shall follow standard landfill practices in excavating, transporting, placing, compacting, and covering (including the use of daily cover) for any waste which is relocated from the Northeast Canyon to the Top Deck, Area D.

Task 4.1.8 Final Cover Design Requirements Specific to all Cover and Sideslope Areas

4.1.8.1. Piping for the Landfill Gas Collection and Control System. Defendants shall cover the piping for the landfill gas collection and control system. The gas lines shall be marked with buried marker tape along the length of the pipe and vertical surface markers spaced at 100 feet on centers. Defendants must ensure this alternative adequately addresses all cover erosion, surface drainage, and surface water control issues.

4.1.8.2. Surface Water Control Features. Defendants are required to construct surface water control features, including perimeter berms, diversion berms, pipe inlet structures and down drains as detailed below. The goal is to design the final landfill cover with surface water control features, as identified in this SOW, which control stormwater runoff in a manner that controls erosion and manages sediment loss and infiltration. Defendants shall update prior submittals of surface water control features in accordance with these requirements in an updated Storm Water Pollution Prevention Plan (SWPPP). The specific location and type of all such surface water control features or specifically designed erosion layer protection shall be identified on construction drawings. For all landfill areas with slopes flatter than 10%, maps of the existing and proposed surface grades shall be prepared, with the existing surface described by 1-foot (maximum) contour interval mapping. For slopes at 10% or steeper than 10%, 5-foot (maximum) contour interval mapping may be used provided that any surface control features can be identified. Final construction drawings for all surface water control features shall be prepared in sufficient detail to allow their construction by an independent construction company. Surface water control features shall incorporate the following:

- Runoff to accommodate the 200-year rainfall design storm event, using appropriate time of concentration for areas contributing to flows.
- Lining or hardening to convey the computed flows.
- Additional conveyance depth needed to carry water through bends, curved sections, and hydraulic jumps.
- Freeboard necessary to accommodate irregular flow conditions that shall be in addition to computed normal flow depths, bend or curve depths, and hydraulic jumps. The minimum freeboard shall be computed with the equation: Fb = 1.0 +

0.025 V (d)1/3, where Fb is the freeboard height (feet), V is the velocity (fps) and d is the depth of flow (feet). When computed flows are in excess of 300 cubic feet per second ("cfs"), the freeboard shall not be less than 2.0 feet. Channels with computed flows in excess of 100 cfs and where channel flow depths are raised above the surrounding conditions on one or both sides of the conveyance shall have a bank freeboard with a height computed with the equation: BFb = 0.63 ln (Q) - 0.90, where BFb is the bank freeboard (feet), ln is the natural logarithmic function, and Q is the flow rate in cfs. For channel side slopes that are steeper than 25% and for channels with side slopes in fill sections, lining or erosion protection must extend to the full height of the freeboard. When channel slopes are in cut sections with side slopes flatter than 25%, the lining or erosion protection must extend above the normal water depth sufficient to protect the conveyance.

- When a channel is placed so that one or both sides are raised above the surroundings, the top of the channel section shall have a horizontal earthen embankment not less than 4 feet in width. Alternatively, the minimum horizontal width can be reduced provided that an embankment stability analysis shows that embankment widths can convey the design condition.
- All channels conveying 300 cfs or more shall have a continuous parallel maintenance road on one side of the channel. The Rockfall Channel is exempted from this requirement.
- Design standards, including flow rates, volumes and channel conveyance requirements, shall be compared to those outlined in the Clark County Regional Flood Control District Hydrologic Criteria and Drainage Design Manual (CCRFCD Manual, 1999). The more stringent of the two shall be applied. The maximum velocity requirements of the CCRFCD Manual must be satisfied for all proposed channel lining.
- Surface water control features will be placed to minimize runoff from Area E from reaching Areas B and C.
- Down Drains to be identified in the Clark County review process as conveying minor flows will not be considered by the County, in its sole discretion, as storm sewers within the meaning of the Clark County Code.
- Concentrated offsite run-on flows onto the final erosion layer will require analysis to determine if additional surface water control measures are necessary to control offsite run-on flows from locations within the zones shown in orange highlighting on Attachment 4. Defendants shall prepare construction drawings to show the location of any necessary surface water control measures to control off-site run-on from such orange highlighted zones, which in the construction drawings shall be expanded or reduced as necessary from the areal extent of the orange highlighted zones shown on Attachment 4. The construction drawings shall be provided to EPA for review and approval in accordance with the Project Schedule.

- Concentrated on-site flows across the final erosion layer will have surface water control measures in the zones identified in yellow highlighting on Attachment 4. Alternatively, an analysis could be done to demonstrate if such surface water control measures are necessary. Defendants shall prepare construction drawings to show the location of any necessary surface water control measures in such yellow highlighted zones, which in the construction drawings shall be expanded or reduced as necessary from the areal extent of the yellow highlighted zones shown on Attachment 4. The construction drawings shall be provided to EPA for review and approval in accordance with the Project Schedule.
- Berms to control flow concentrations where steeper side slopes are conveyed directly onto landfill areas with flatter slopes, as identified on Attachment 5, will be constructed to address the following flows: runoff traveling from Area E15 to I1, from E11 to E17, from the steep slopes of E5 to flatter slopes of E5, from E8 and E5 to E9, and from E16 to the top of E13, unless EPA approves modifications based on changes due to grading or other considerations.

4.1.8.3. Perimeter Drainage Diversions (Perimeter Drainage Berms). Defendants shall construct perimeter drainage diversions to receive all flows that drain from the Top Deck (Area D) and all areas of the landfill cover with slopes at less than 10%. The perimeter drainage diversions shall convey all top surface flows to down drains so the drainage is not directly conveyed to areas with slopes at 10% or greater. Defendants shall size the perimeter drainage diversions to control the runoff generated during the Design Storm Event (i.e., 200-year, 6-hour storm event). Defendants shall ensure that the drainage courses along the perimeter drainage diversions are hardened to convey the computed flows without erosion and that the hardening accommodates the required freeboard. The downslope side of the perimeter drainage diversions shall include a horizontal soil embankment not less than 4 feet wide to provide structural stability for the diversion channels.

In some cases specifically designed erosion layer protection, surface grade modification or diversion berms may be constructed to control slope transitions where flatter sloped areas (<10% slope) drain directly to steeper sloped areas so that perimeter drainage diversions are not required.

4.1.8.4. Diversion Berms. Defendants shall construct diversion berms on all landfill areas with slopes less than 10% so that the length of the drainage slope conforms to the design for the surface erosion layer. Defendants shall design the diversion berms with a capacity equal to the volume of runoff predicted for the Design Storm Event. Defendants shall construct the diversion berms along the slopes that are less than 10% so that the slope lengths are no more than 1200 feet, consistent with any regrading and the location of perimeter drainage diversions, pipe inlet structures and down drains. Defendants shall

line the diversion berms to convey the computed flows without erosion. The lining shall accommodate the required freeboard. The downslope side of all diversion berm channels shall include a horizontal soil embankment not less than 4 feet wide to provide structural stability for the channel. Defendants shall update the SWPPP in accordance with these requirements.

4.1.8.5. Pipe and Channel Inlet Structures. Defendants shall construct inlets to down drains that contain erosion control features, including headwalls and concrete-lined aprons that direct surface water into the inlet structures. Defendants shall size and locate the inlet structures and down drains from the Top Deck (Area D) and landfill areas with slopes less than 10% consistent with all regrading and the design of the other storm water control features (i.e., diversion berms, and Top Deck perimeter drainage diversions). Defendants shall evaluate the existing inlet structures to ensure they will accommodate runoff from the Design Storm Event. The analysis shall include consideration of sediment from upstream channels and diversions that may be deposited due to lower entrance velocities at the inlet structures. Where the flow velocities from an upstream structure cannot be maintained due to bends, junctions, restrictions, grade changes or similar flow conditions, the inlet structures shall be designed for weir flow conditions. Inlets shall have additional height to accommodate required freeboard. For new inlet structures at the perimeter of the Top Deck (Area D) and the areas with slopes at less than 10%, Defendants shall construct these inlet structures using the general arrangement specified in PBS&J "Sunrise Landfill Drainage Mitigation Facilities Report", Figure E, submitted on behalf of RSSN, January 26, 2000, but with the addition of appropriate sediment and weir flow design provisions, freeboard and a horizontal earth embankment. An alternative to this design may be submitted for approval by EPA.

4.1.8.6. Down Drains. Defendants shall construct down drains that accommodate the runoff from the Design Storm Event. Defendants shall connect these down drains into all adjacent berms, channels, and/or diversions. Defendants shall construct these down drains such that they do not compromise the integrity of the cover by reducing the thickness of the cover and erosion layer. The down drains may be constructed above the normal cover slope so they do not cut into it, or the cover and erosion layer may be increased in thickness to accommodate the down drain section. The termination of the down drains shall have designed exit or grade control structures so that water exiting the drains does not damage the cover or downstream facilities. Unless the down drains are within a fully enclosed pipe, their design must incorporate freeboard requirements as specified in Task 4.1.8.2. Any conveyances that can create hydraulic jump conditions shall be evaluated for sequent depth conditions, standing waves, and surge waves. Exit structures shall include design for any hydraulic jump conditions that may exist. Defendants shall design the down drains to control flow velocities to prevent erosion along their length and at their discharge locations. They shall be designed to allow

removal of sediment. Defendants shall remove and replace the existing half-culvert down drains, unless it can be demonstrated that they can function properly during the design flow and meet the flow and hydraulic requirements specified in this SOW.

4.1.8.7. Construction Drawings and Specifications. Defendants shall prepare construction drawings, including grading plans, that show the layout and details of all cover materials and surface water control features to be placed at the Landfill. At a minimum, the design drawing package shall provide plan view drawings of all surface water conveyance structures, all erosion layer construction, all modified surfaces, modified side slope areas, and the Northeast Canyon Area with waste removal areas, if any. Details should include the various cover design features (i.e., soil barrier layer and soil erosion layer components) and surface water control features (diversion berms, perimeter channels, perimeter drainage conveyances, inlet structures, terrace drains, hardened surfaces, down drains, and Landfill Gas Collection and Control System pipe alignment). All such features shall be identified on plans and in design computations. For all landfill areas with slopes less than 10%, maps of the existing and proposed surface grades shall be prepared, with the existing surface described by 1 foot (maximum) contour interval mapping. For slopes equal to or greater than 10%, 5 foot (maximum) contour interval mapping may be used provided that any surface control features can be identified. Final plans for all surface control features shall be prepared in sufficient detail to allow their construction by an independent construction company. Design computations for all storm water conveyances shall show the area and topography of the contributing watershed, land surface features, and methodology for determining precipitation losses and runoff rates and volumes.

Task 4.1.9. Final Cover Design Requirements Specific to Other Areas of the Landfill

4.1.9.1. Settling Basins. Defendants shall submit a workplan for construction of settling basins, consistent with the basin locations shown on Attachment 4. This workplan shall ensure reductions in runoff velocities at the southern lease boundary and collection of surface water monitoring samples. Defendants shall design the basins to reduce flow velocities in accordance with standard practices, and in a manner that will not damage downstream property. Defendants shall not construct settling basins over any waste. Defendants shall prepare design drawings and specifications that show the location and details of each basin to be constructed. Settling basin designs must include emergency spillways or similar structures to safely convey 100% of the inflow from the Design Storm Event without failure of embankments or loss of basin capacity. Designs must include provisions that can be used to identify normal maintenance capacity and that will allow for periodic removal of sediment from the settling basins without loss of basin capacity or embankment stability.

4.1.9.2. Road Surfacing. Defendants shall ensure that all road lengths that are being used to transport runoff are protected from erosion. These roads include the road that goes easterly, traversing the south face of the Top Deck. For roads crossing the waste, Defendants shall also insure that adequate cover has been installed in compliance with the SOW. In addition, Defendants shall surface the roads with a 3-inch minimum layer of road surface course gravel. Defendants shall size road berms and drainage ditches to accommodate the Design Storm Event and be protected from erosion (i.e., riprap lined or paved). The provisions of Task 4.1.8.2 are applicable for roads that convey landfill storm water.

4.1.9.3. Black Lagoons. Defendants shall ensure that the Black Lagoon area (also known as the Western Burn Pits) shown on Attachment 1 (Site Map) is protected with adequate cover barrier and erosion control layers as specified in Tasks 4.1.3 and 4.1.4. Defendants shall also ensure this area is protected from run-off from the main landfill (drainage areas F1 and I1) and shall provide this area with appropriate surface water controls (such as berms) as specified in Task 4.1.8. The Defendants shall provide construction drawings for cover and surface water controls as specified in Task 4.1.8.7.

Task 4.1.10. Implementation of the Final Cover Corrective Measures Workplan

After EPA has approved the Final Cover Corrective Measures Workplan, Defendants shall implement this Workplan, as approved, in accordance with the approved schedule.

Task 4.2. Gas Monitoring and Corrective Action Workplan and Implementation

Defendants shall perform the following tasks as part of the gas monitoring and corrective action program as detailed in the Consent Decree and this SOW. Within one hundred and twenty (120) Days of the Effective Date, Defendants shall submit a Gas Monitoring and Corrective Action Workplan that provides for performance of all of the tasks described in this Task 4.2.

Task 4.2.1. Continued Operations

Before approval of the Gas Monitoring and Corrective Action Workplan, Defendants shall continue operation of the gas monitoring and collection system that currently exists at the Landfill until modifications, if any, are approved by EPA.

Task 4.2.2. Cover Piping

Defendants shall cover the HDPE gas recovery system pipe consistent with the requirements of Task 4.1.8.1.

Task 4.2.3. Gas Monitoring and Corrective Action Workplan

Defendants shall develop and implement a gas monitoring program and corrective actions that ensure the following standards are met:

i. the concentration of methane gas does not exceed 25 percent of the lower explosive limit for methane in facility structures;
ii. the concentration of methane gas does not exceed the lower explosive limit for methane at the facility property boundary (this will require the installation of subsurface monitoring probes as discussed below);
iii. the emission of toxic gases does not exceed risk-based levels;
iv. the surface emission of methane does not exceed 500 parts per million ("ppm");
v. corrective action measures are implemented if landfill gas levels are detected in excess of the limits identified in subparagraphs i-iv herein;
vi. the gas monitoring results are submitted quarterly to EPA; and
vii. the minimum frequency of monitoring shall be quarterly, except when additional monitoring is required under the landfill gas corrective measures procedures discussed below.

Surface emission monitoring shall be conducted as required by 40 C.F.R. Part 60, Subpart WWW, and as detailed in Section 3.4.4.2 of the Final Landfill Assessment Work Plan submitted on behalf of Defendants on 2/29/2000.

Defendants shall submit a Gas Monitoring and Corrective Action Workplan that includes completing the assessment of landfill gas data, consistent with Section 3.4.4.7 of the Final Landfill Assessment Work Plan (SCS, 2/29/2000). Based on the specifications in Section 3.4.4.7 of the Final Landfill Assessment Work Plan (SCS, 2/29/2000), Defendants shall (1) propose the number, depth, spacing, and location of subsurface monitoring probes for gas monitoring, and (2) include tasks to install the subsurface monitoring probes.

Defendants shall submit a Gas Monitoring and Corrective Action Workplan that describes the approach that will be followed if corrective measures are required. Defendants shall perform corrective measures whenever landfill gas levels exceeding the limits specified in this Task are detected. If gas levels exceeding the limits specified in this Task are detected, the Defendants shall:

(1) Immediately take all necessary steps to ensure protection of human health and notify EPA;
(2) Within seven (7) Days of detection, place in the operating record the gas levels detected and a description of the steps taken to protect human health;

(3) Within thirty (30) Days of detection develop and submit to EPA for review a plan which describes the nature and extent of the problem and the proposed remedy; and
(4) Within sixty (60) Days of detection, implement the remediation plan for the gas releases, place a copy of the plan in the operating record, and notify EPA that the plan has been implemented.

Task 4.2.4. Gas Monitoring and Corrective Action Workplan Implementation

After EPA has approved the Gas Monitoring and Collection Workplan, Defendants shall implement the Workplan, as approved, in accordance with approved schedule.

Task 4.3. Groundwater Monitoring Workplan and Implementation

Task 4.3.1. Develop a Groundwater Monitoring Workplan

Within ninety (90) Days of the Effective Date, Defendants shall submit a Groundwater Monitoring Workplan to EPA for ongoing groundwater sampling, analysis, and reporting consistent with the EPA Quality Assurance Guidance provided at http://www.epa.gov/Region9/qa/fieldsamp.html#guidance.

The Groundwater Monitoring Workplan shall require monitoring of the Landfill wells identified by depth and location in Attachment 8, supplemented by the five additional groundwater monitoring wells identified in Task 4.3.4 (which are also identified in Attachment 8). The Groundwater Monitoring Workplan shall require Defendants to evaluate groundwater elevation trends and include provisions to accommodate expected fluctuation of groundwater levels and long-term changes in the aquifer level. Defendants shall also propose criteria for determining the recovery rates, using low flow sampling procedures identified in Task 4.3.2, for the wells identified in Attachment 8 and the extent to which the wells are available for quarterly sampling or sampling at other intervals based on recovery rates. For wells determined not suitable for quarterly sampling, the Defendants shall, if technically feasible, propose redevelopment (or some other measure) to attempt to improve the groundwater yield from such wells, recognizing that in some cases wells may not recover quickly because the recovery rate is controlled by surrounding hydrogeologic conditions.

Defendants shall include in the Groundwater Monitoring Workplan all of the actions described in subtasks 4.3.2 through 4.3.9. The Additional Groundwater Monitoring Well Development Workplan required by subtask 4.3.4 may be included as an attachment to or incorporated by reference in the Groundwater Monitoring Workplan. In addition, the Groundwater Monitoring Workplan shall be consistent with the approved Final Landfill Assessment Work Plan (SCS Engineers, February 29, 2000) with respect to Data Quality

Objectives ("DQOs"), QA/QC, water level and purge protocol, sample collection procedures, preservation methods, handling and shipping, laboratory procedures and performance standards, and reporting criteria, except as modified by the requirements of this SOW. The Groundwater Monitoring Workplan will also set forth criteria for field duplicates, equipment blanks, field and trip blanks.

Task 4.3.2. Low Flow and Turbidity Reduction Sampling Procedure

In order to address low flow conditions found at the Landfill and to produce turbidity levels below 25 NTU, the Groundwater Monitoring Workplan shall specify that Defendants will follow the EPA Groundwater Quality Assurance Guidance (currently provided at: http://www.epa.gov/Region9/qa/fieldsamp.html#guidance), and the Standard Operating Procedure (SOP) for low stress (low flow/volume) sampling for monitoring wells (currently provided at: http://www.epa.gov/Region9/qa/pdfs/finalsopls1217.pdf, http://www.epa.gov/Region9/qa/pdfs/pmflowx2.pdf, and http://www.epa.gov/tio/tsp/download/lwflw2a.pdf). These low stress methods minimize drawdown from well purging and sampling, the entrainment of sediment in water samples, well recovery times, and turbidity, and allow for more representative sampling.

If Defendants take the steps referenced to above, but are still unable to achieve turbidity levels below 25 NTU, the Groundwater Monitoring Workplan shall specify that redevelopment (or some other measure) will be used to address the problem and facilitate collection of low flow samples. Redevelopment methods, if used, may include the use of surging and/or jetting combined with over pumping. Other methods of redevelopment may be proposed on a well-by-well basis.

Task 4.3.3. Water Level Gaging

The Groundwater Monitoring Plan shall provide for quarterly measurement of the groundwater levels in all existing monitoring wells and submission of the results along with the quarterly groundwater water quality monitoring reports required in Task 4.3.5. Defendants will construct potentiometric maps from each sampling event. Water-level measurement procedures shall comply with the SAP General Requirements required in Task 3.2.1 including the low-stress protocol and procedures as detailed in Task 4.3.2. Prior to approval of the Groundwater Monitoring Plan, Defendants shall continue to submit quarterly water level measurement results to EPA. In addition, fifteen (15) Days after the Effective Date, Defendants shall submit a revised potentiometric map based on the most recent data.

Task 4.3.4. Additional Groundwater Monitoring Well Development Workplan

Within forty-five (45) Days of the Effective Date, Defendants shall develop and submit to EPA an Additional Groundwater Monitoring Well Development Workplan detailing the drilling procedures to be followed for the construction of five additional groundwater monitoring wells at the locations shown on Attachment 8 (including two wells at different depths at New Well Location 17, and one well each at Locations 3, 7 and 14). At locations 3, 7 and 14 the Additional Groundwater Monitoring Well Development Workplan shall include target depth of the zones in which the wells are to be completed, boring sizes, and screen size and length. The target depths shall be determined by the information from the monthly water levels as well as all relevant geophysical and geological logging data that has been collected during prior hydrogeologic study field work at the Landfill. For locations 3, 7 and 14 the target depths are anticipated to be approximately 450 to 500 feet below ground surface ("bgs"), 250 feet bgs and 550 - 700 feet bgs, respectively. At location 17, where there are limited geophysical and geologic data available, the Workplan shall specify use of an exploratory boring to collect geologic logging and borehole geophysics data. For location 17, the Additional Groundwater Monitoring Well Development Workplan shall also specify that the target depth of zones within which the well will be completed, boring sizes, and screen size and length shall be based on data from the exploratory boring. The Workplan shall present the required information in a manner similar to previously developed workplans for locations 7, 13, and 15 (SCS 9/14/2001). The Defendants shall include a proposed schedule that presents estimated start and completion dates for each activity in the Additional Groundwater Monitoring Well Development Workplan.

The Additional Groundwater Monitoring Well Development Workplan shall specify that within sixty (60) Days of EPA's approval of that Workplan, Defendants shall mobilize and begin installation of the five additional groundwater monitoring wells as detailed in the approved Workplan.

Task 4.3.5. Groundwater Sampling, Analysis and Reporting

The Groundwater Monitoring Workplan shall specify that within sixty (60) Days of EPA approval of that Workplan, or sixty (60) Days after completion of the five additional groundwater monitoring wells identified in Task 4.3.4, whichever date is later, Defendants shall begin groundwater sampling and analysis in compliance with the approved Groundwater Monitoring Workplan. Based on the information available at this time, EPA believes that some upgradient/background monitoring wells may include: the background wells identified in Task 4.3.4 for the Muddy Creek Formation, and the Diaz well for the wells in bedrock (north of the fault) and in alluvial sediment (above bedrock) and that other wells identified in Attachment 8 could be downgradient wells; however,

Defendants may provide information and analyses challenging this assessment, if additional information obtained pursuant to the Groundwater Monitoring Workplan indicates otherwise. Following completion of the first round of sampling, Defendants shall perform quarterly sampling and analysis of the groundwater monitoring network in compliance with the approved Groundwater Monitoring Workplan.

Defendants shall analyze all groundwater samples in accordance with the approved SAP and shall analyze groundwater monitoring parameters consistent with the approved Final Landfill Assessment Work Plan (SCS Engineers, February 29, 2000) and Landfill groundwater sampling and analysis performed in 2000 to 2002, except as modified by the requirements of this SOW. Defendants shall also analyze the following additional groundwater monitoring parameters: Biological Oxygen Demand ("BOD"), total suspended solids, organic nitrogen, total phosphorous, ortho phosphorus, manganese, and total hardness as CaCO3. Defendants may include the following additional groundwater monitoring parameters: oxygen isotopes, hydrogen isotopes, and boron. Defendants shall email interim and final sampling and analysis results to EPA within fourteen (14) Days of receipt from the laboratory. Defendants will submit the final results along with a technical report that presents all pertinent data for that particular sampling event. The report will present data on water levels, purging, sampling, preservation methods, handling and shipping, and laboratory results, and interpretation of results. All groundwater reports shall contain necessary tables, graphs, charts, and figures as set forth in the approved Groundwater Monitoring Workplan.

Task 4.3.6. Groundwater Characterization Report

Within sixty (60) Days after completing nine (9) quarterly rounds of sampling and analysis, Defendants shall submit a Groundwater Characterization Report. The Groundwater Characterization Report shall:

- Provide all of the data and analyses obtained during the nine quarterly rounds of sampling and analyses, including control charts for each well and analyte;
- Characterize upgradient/background groundwater quality, including upgradient or background wells and consider the chemical conditions in the applicable regional aquifer(s) (See Leising, 2004) with respect to each groundwater monitoring parameter required to be sampled for in the approved Groundwater Monitoring Workplan;
- Characterize downgradient groundwater quality for each downgradient well with respect to each groundwater monitoring parameter required to be sampled for in the approved Groundwater Monitoring Workplan;
- Provide a comparison of the groundwater quality results between the upgradient or background monitoring wells, including consideration of each of the wells identified in Attachment 8. This discussion shall include an analysis of the

Landfill's potential to affect regional aquifer(s);

- For each well identified in Attachment 8 and for the groundwater monitoring parameters required to be sampled for in the Groundwater Monitoring Workplan, determine if there is a statistically significant increase over upgradient/background conditions established in the applicable upgradient or background well(s). This determination may consider any evidence of temporal changes in ground water quality and spatial variability of ground water quality;
- If it is determined that there is a statistically significant increase over upgradient/background conditions for any of the groundwater parameters to be sampled for in the Groundwater Monitoring Workplan, the Groundwater Characterization Report shall propose and provide a schedule to implement assessment monitoring consistent with 40 C.F.R. Part 258.55, Subpart E – Ground-Water Monitoring and Corrective Action within 90 days except as provided in 40 C.F.R. Section 258.54(c)(3);
- In accordance with 40 C.F.R. Section 258.54(c)(3), Defendants may demonstrate that a source other than the Sunrise Mountain Landfill caused the contamination or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation , or natural variation in groundwater quality. If a successful demonstration is made pursuant to 40 C.F.R. Section 258.54(c)(3), Defendants shall then continue with the existing groundwater monitoring program. If after 90 days, a successful demonstration is not made, the Defendants must initiate an assessment monitoring program as required in 40 C.F.R. section 258.55.

Task 4.3.7. Groundwater Monitoring Workplan Implementation

After EPA has approved the Groundwater Monitoring Workplan, Defendants shall implement this Workplan, as approved, in accordance with the approved schedule.

Task 4.3.8. Groundwater Protection Standards

Following nine (9) quarterly rounds of groundwater sampling and analysis pursuant to the approved Groundwater Monitoring Workplan Defendants shall propose groundwater monitoring parameters and groundwater protection standards pursuant to the procedures set forth in the approved Groundwater Monitoring Workplan. Defendants, in developing groundwater protection standards, and EPA, in approving groundwater protection standards, shall consider the following:

- the normal/background level of groundwater monitoring parameters, as determined by sampling events pursuant to Task 4.3.5;
- the temporal and spatial fluctuations in groundwater quality; and

- the conditions in the regional aquifers.

Defendants shall, at their option, propose risk-based groundwater protection standard(s) for any groundwater monitoring parameters in accordance with the criteria set forth in 40 C.F.R. Sections 258.55(i)(1)-(4) and (j)(1)-(3).

Task 4.3.9. Groundwater Corrective Action

After groundwater protection standards have been established pursuant to Task 4.3.8, within ninety (90) Days of finding that a groundwater monitoring parameter has been detected at a statistically significant level exceeding a groundwater protection standard, Defendants shall initiate an assessment of potential corrective action measures and shall select a remedy consistent with 40 C.F.R. Part 258, Subpart E. In accordance with 40 C.F.R. Section 258.55(g)(2), Defendant(s) may demonstrate that a source other than the Sunrise Mountain Landfill caused the contamination or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality**.** If a successful demonstration is made pursuant to 40 C.F.R. 258.55(g), Defendants shall then continue with the existing groundwater monitoring program. Until a successful demonstration is made, Defendants must comply with 40 C.F.R. section 258.55(g) including initiating the assessment of corrective measures.

Within 180 days of the detection of a groundwater monitoring parameter at a statistically significant level exceeding a groundwater protection standard established under Task 4.3.8., Defendants shall submit an assessment of potential corrective action measures and selection of a remedy to EPA. The assessment of potential corrective action measures and the selection of a remedy shall be consistent with 40 C.F.R. Part 258, Sections 258.56 and 258.57, and shall be subject to EPA approval. Once EPA approves the corrective action measures assessment, selection and schedule for implementation, Defendants shall implement the selected remedy in accordance with the approved schedule. Assessment, selection, and approval of the groundwater corrective action remedy and implementation schedule shall be subject to Dispute Resolution pursuant to Section X ("Dispute Resolution") of the Consent Decree.

Task 4.4 Storm Water Control Workplan and Implementation

Within one hundred and twenty (120) Days of the Effective Date, Defendants shall submit a Storm Water Control Workplan. Defendants shall include in this Workplan, at a minimum, all of the elements listed in Tasks 4.4.1 through 4.4.10, including a schedule for completion of all required Work. All design standards for storm water controls required by this SOW should be compared to those outlined in the Clark County Regional Flood Control District Hydrologic Criteria and Drainage Design Manual (CCRFCD

Manual 1999). In the event of any conflict between this SOW and the CCRFCD, the more stringent standard should be applied.

Task 4.4.1. Develop and implement a Storm Water Pollution Prevention Plan ("SWPPP")

Defendants shall develop and implement a SWPPP containing acceptable storm water control best management practices ("BMPs") consistent with this SOW.

Task 4.4.2. Complete the Storm Water Control Workplan

4.4.2.1. Changes to Controlled Flow Plan Design. Defendants shall update the proposed Controlled Flow Plan ("CFP") design and drawings dated December 17, 2003 by fully incorporating EPA comments dated March 18, 2004 (except for those comments relating to an above grade pipeline) and the requirements of this SOW. Defendants shall submit the updated CFP to EPA as part of the proposed Storm Water Control Workplan.

4.4.2.2. Eastern Ridge Drainage Channel. Defendants shall utilize a surface diversion channel roughly parallel with the eastern edge of the landfill to intercept run-on from the Eastern Ridge and convey flows to Channel No. 2 as shown in Attachment 4. This channel shall also be designed to convey the discharge from the detention basin channel as detailed in Task 4.4.2.4.5. To ensure rock debris and sediment will not compromise the channel capacity this channel must be placed away from the edge of the Eastern Ridge, as shown on Attachment 4, Concentrated Flow and Channels Map. This channel shall be designed consistent with provisions of Task 4.1.8.2 (Surface Water Control Features). Design details for the channel shall be documented on the design drawings, including the bottom grade, water surface profile, freeboard consistent with Task 4.1.8.2, and top width of design embankment. Information about the flow Froude number and the flow velocity shall be presented along with evaluations of the required freeboard. The design must specifically evaluate the channel lining proposed, including the use of any proposed gabions. The limiting deposit velocity of the channel must be able to accommodate the expected sediment flows. The results from any hydrologic and hydraulic modeling used must include information that can be used to verify the specified input conditions and quantify the numerical output. For all natural drainage ways and constructed channels that enter the channel, appropriately sized rundown inlets must be provided. A continuous access road must be designed parallel to the channel for the full length of the channel. Finally, the design for the channel shall be coordinated with the final landfill grading so that flow is conveyed to the channel in designed side inlets.

4.4.2.3. Western Ridge - Stormwater Run-Off Control. Defendants shall ensure that the Storm Water Control Workplan design includes features that control stormwater run-off

from the Western Ridge pursuant to Task 4.1.8.2. Defendants shall ensure that the SWCW includes surface water controls to capture and route stormwater from the Western Ridge under the provisions of Task 4.1.8.2. Resolution of the drainage issues associated with the localized depression which currently exists immediately north of the existing leased area landfill may be accomplished by removal of the depression through the addition of engineered fill/cover, or another equivalent control approved by EPA.

4.4.2.4. Specific Technical Comments to the Storm Water Control Workplan

4.4.2.4.1. The Channels, Inlets, Dam and Outlet Pipe as Shown on the Storm Water Control Workplan Defendants shall complete and resubmit all of the design features included in the CFP, with design criteria in conformance with provisions of Task 4.1.8.2. Some specific items to be addressed in the plan are identified in the following Tasks.

4.4.2.4.2. The Detention Basin (Flood Water Detention Dam). The design of the gravel fill embankment dam must meet the design requirements of the Nevada State Engineer in addition to the specific requirements identified herein. The design must accommodate the sediment from the single Design Storm Event plus the sediment that accumulates over time due to a series of events. The design analysis must include an evaluation of the quantity of sediment expected from the Design Storm Event, plus sediment from a series of smaller events occurring over five or more years (computed from the frequency curve for sediment yield). Provisions for visually detecting when periodic sediment removal is required must be implemented with the design. Five years of numerically averaged annual sediment accumulation, as represented by the area under the frequency curve for sediment yield, must be accommodated by the periodic sediment removal levels. Sediment from the Design Storm Event and the series of events is expected to have a substantial volume that will accumulate near the principal spillway outlet. The principal pipe outlet structure must be designed to convey the design flow even when sediment is at the pipe outlet structure. The inlet structure orifices and top grate must be designed to function with sediment in the basin and with floating debris generated from the watershed. The basin design must allow for the periodic removal of the sediment to a safe location that will not interfere with future basin operation. Provisions to identify the design finish grade during sediment excavation must be provided.

4.4.2.4.3. Geomembrane at the Detention Basin (Flood Water Detention Dam) A geomembrane as proposed in the Geotechnical Engineering and Engineering Geologic Report and Proposed Storm Water Detention Basin Report (Exponent, December 17, 2003) may be used at the upper side of the detention basin. In Exponent's design the upstream embankment is proposed to have 40% slopes and 1.0 foot of soil cover is proposed over the geomembrane. The structural stability of the geomembrane slope must be evaluated. The earth cover must have a minimum thickness of 2.0 foot and

incorporate an erosion layer to protect the geomembrane. Areas of flow concentration at the ground surface above the geomembrane will require special erosion protection. Since the geomembrane will be placed in the area with periodic sediment removal from the basin, design provisions are required to protect the geomembrane during sediment excavation. The specifications for the embankment and the soil cover shall specify how the geomembrane will be protected from puncture during initial construction and periodic maintenance. The design needs to identify any requirements for seepage protection at the base of the earth embankment, including evaluation of horizontal permeability of the underlying rock or base soil, and the horizontal permeability of the interface between the basin embankment and base rock or soil. The design must evaluate the need to extend the geomembrane into the base rock or soil, or the need for other seepage protection below the embankment. Any penetrations of the geomembrane by the emergency spillway or principal spillway need to be designed to provide seepage protection at these structures.

4.4.2.4.4. Principal Spillway Pipe and Emergency Spillway at the Detention Basin (Flood Water Detention Dam) A high-density polyethylene ("HDPE") pipe, or similar material, along with a Clark County standard inlet pipe, as proposed in Exponent, December 17, 2003, may be used as the pipe outlet structure through the earth embankment of the detention basin, subject to the following provisions. The structural capacity of the pipe must be evaluated for the expected embankment height and pipe bedding condition. Additionally, this type of pipe may be subject to significant deformation over time and the potential to create a large flow path through the embankment needs to be analyzed. An alternative material such as concrete cylinder pressure joint pipe should be considered for the principal spillway within the earth embankment. A concrete chute emergency spillway is proposed at the crest of the detention basin. An existing geologic report states that "maximum settlement from self-weight expected after construction is less than approximately 1.0 inches" (Exponent, 12/17/03). The settlement of the downstream toe of the embankment is likely to be lower than the settlement at the centerline of the embankment. Some differential settlement along the embankment profile is anticipated.

Because the emergency spillway is proposed to be continuous from the crest of the basin embankment to the toe of the embankment, provisions for differential settlement must be incorporated into the emergency spillway structure. The existing geologic report states that "maximum foundation settlement is likely to be about 3 inches" (Exponent 12/17/03). Initial settlement and long-term settlement will impact the vertical position and joint integrity of the principal spillway pipe. The expected settlement needs to be incorporated into the design of the principal spillway pipe to ensure structural integrity and to maintain a positive slope for the pipe through the embankment. Any long term settlement must be accommodated in the design by providing additional embankment height. If the area downstream of the detention basin is likely to be urbanized this would cause the detention basin to be classified as a high hazard structure. If the detention basin

is classified as a high hazard structure, the emergency spillway for a 40 foot tall high hazard structure must be designed so that the embankment does not fail during a probable maximum flood (PMF). Seepage between the emergency spillway concrete and the earth embankment must be evaluated to determine if cutoff walls are needed. The earth embankment adjacent to the emergency spillway must be protected from erosive entrance velocities and wave splash. The outlet of the emergency spillway must be evaluated for the potential formation of a scour hole that would compromise the stability of the earth embankment and the emergency spillway. An appropriately sized energy dissipation structure or armored scour protection needs to be provided at the outlet of the emergency spillway. The design of the emergency spillway for the detention basin may consider an alternate location not on the detention basin embankment.

4.4.2.4.5. The Stormwater Conveyance Downstream of the Detention Basin The conveyance downstream of the detention basin shall be an above-ground channel that meets the provisions of Task 4.1.8.2 and connects to the Eastern Ridge Drainage Channel. See Attachment 5. Design details for the channel shall be documented on the design drawings, including the bottom grade, water surface profile, freeboard consistent with Task 4.1.8.2, and top width of design embankment. Information about the flow Froude number and the flow velocity shall be presented along with evaluations of the required freeboard. The design must specifically evaluate the channel lining proposed, including the use of any proposed gabions. The limiting deposit velocity of the channel must be able to accommodate the expected sediment flows. The results from any hydrologic and hydraulic modeling used must include information that can be used to verify the specified input conditions and quantify the numerical output. For all natural drainage ways and constructed channels that enter the channel, appropriately sized rundown inlets must be provided. A continuous access road must be designed parallel to the channel for the full length of the channel. Finally, the design for the channel shall be coordinated with the final landfill grading so that flow is conveyed to the channel in designed side inlets.

4.4.2.4.6. Channels Nos. 1, 2 and 3 and the Rock-Fall Channel Design details for these channels shall be documented on the design drawings, including the bottom grade, water surface profile, freeboard, and top width of the design embankment. Information about the flow Froude number and the flow velocity needs to be presented along with evaluations of the required freeboard. The design must specifically evaluate the channel lining proposed, including the use of any proposed gabions. The limiting deposit velocity of the channels must be able to accommodate the expected sediment flows. The results from any hydrologic and hydraulic modeling used must include information that can be used to verify the specified input conditions and quantify the numerical output. At several locations, rock-fall fencing is proposed. The height and capacity of all such fencing must be indicated on the plans. The material for the fencing net must be a

durable material that can withstand the expected loading from the rock-fall areas. The design shall demonstrate that the upstream inlet/debris control fence is tall enough and strong enough to prevent large debris from entering the channel. For all natural drainage ways and constructed channels that enter these lined channels, appropriately sized rundown inlets must be provided. A continuous access road must be provided on one side of all channels, except for the rock-fall channel, where reasonable alternative access is acceptable because of the steep terrain and impracticability of vehicle access. Shot-crete erosion protection has been proposed at one side of the transition between Channel No. 3 and the rock-fall channel; the design for this transition needs to be evaluated to determine if undercutting of Channel No. 3 will occur at both sides of the rock-fall channel transition. The flow conditions in the transition area where Channels Nos. 1, 2 and 3 meet and flow into the rock-fall channel must be evaluated to determine the required channel configuration. The potential for hydraulic jump and scour conditions near station 19+00 of the rock-fall channel must be evaluated. Finally, the designs for the channels need to be coordinated with the final landfill grading so that flow is conveyed to the channels in designed side inlets.

4.4.2.4.7. Channels and embankment protection for the Construction Debris Area (Area F1) There is an existing concrete structure that protects area F1 from flow from approximately 30 acres of offsite watershed. A design analysis for this structure shall be prepared that demonstrates the existing or a modified structure can safely convey the Design Storm Event flows.

4.4.2.5. Detailed Design Package Specific to Surface Water Controls. At a minimum, Defendants shall provide a design drawing package with plan view, profile, typical section, and detail drawings of the all the features described in Task 4.4. The plans must be final plans with detail sufficient to allow all of the items to be constructed by an independent construction contractor. Defendants may combine this design package with the design package required in Task 4.1.8.8 above. Republic shall submit the proposed design required by this Task 4.4.2. in accordance with this SOW and to the appropriate Nevada State Engineer in accordance with N.A.C. Chapter 535. This submittal should also be made to Clark County or in conjunction with Clark County.

4.4.2.6. Schedule. Defendants shall submit a proposed schedule for construction to complete the Storm Water Control Workplan.

Task 4.4.3. Continue Inspections and Reports

Defendants shall continue annual, quarterly, pre-rain settlement, and post-rain storm water inspections and reports, including documentation of corrective actions taken. as long as required by the SWMP approved pursuant to Task 3.2.2.

Task 4.4.4. Surface Seeps

Defendants shall assess and characterize the probable source and potential for recurrence of any observed leachate surface seeps from the Landfill and perform repairs as appropriate. For surface seeps unrelated to leachate, such as surface drainage, Defendants shall assess the probable source, the need for repair or corrective measures, and, if warranted, perform repairs or corrective measures. Where Defendants observe surface seeps that are not clearly leachate or clearly surface drainage, Defendants shall perform testing and analysis to determine if the seep is leachate or not and shall assess the probable source, the need for repair or corrective measures, and if warranted, perform repairs or corrective measures. Defendants shall include seep assessment and documentation of corrective actions taken in quarterly and post-rain storm water inspections and reports consistent with the SWMP approved pursuant to Task 3.2.2.

Task 4.4.5. Maintain SWPPP Records

Defendants shall maintain all SWPPP records, including inspections and certifications for a minimum of three years or the time periods specified for documents relating to the Work in the Consent Decree, whichever is longer.

Task 4.4.6. Report Storm Water Discharge

Defendants shall report storm water discharges both orally and in writing, in accordance with this Task. Defendants shall report such discharges orally to both EPA and NDEP within 24 hours and provide written reports within ten (10) Days. Initial telephone reports to EPA shall be made to EPA's Alternate Project Coordinator, currently Ann Murphy at (415) 972-3640, or any replacement representative designated by EPA. Initial reports to NDEP shall be made to Jon Palm at (775) 687-6353 or to any replacement representative designated by NDEP. Written reports shall be made in compliance with Task 3.7 of this SOW.

Task 4.4.7. Costs of SWPPP Installation and Maintenance

Defendants shall submit actual SWPPP installation costs and estimated costs for annual (short-term) and 30-year (long-term) maintenance, within sixty (60) days of SWPPP certification.

Task 4.4.8. Debris Inspection and Removal

Defendants shall submit debris inspection and removal reports annually, as part of the first monthly progress report of each year. Additionally, such reports shall be

incorporated into post-rain, storm water inspections and reports as provided for in Task 4.4.3.

Task 4.4.9. Reporting on Implementation and Compliance

Defendants shall submit regular reports on implementation of the Storm Water Control Workplan as part of monthly progress reports, and certify compliance with all requirements, or report any instances of non-compliance.

Task 4.4.10. Implementation of Storm Water Control Workplan

After EPA has approved the Storm Water Control Workplan, Defendants shall implement this Workplan, as approved, in accordance with the approved schedule.

Task 4.5. Long-Term Operation and Maintenance Plan and Implementation

Within sixty (60) Days of EPA's approval of the Final Overall Project Workplan Implementation Report (see Task 3.4.3.), Defendants shall submit, for approval by EPA, a proposed Long-Term Operation and Maintenance Plan for the Landfill (LTOMP). This plan shall include, at a minimum, all of the elements listed in Tasks 4.5.1 through 4.5.9. Provisions for an independent entity to periodically inspect and document the condition of the cover system must be included. Maintenance action levels must be pre-determined and included in the LTOMP.

4.5.1. Maintaining and Monitoring Integrity of Final Cover

Defendants shall maintain and monitor the integrity and effectiveness of the final cover, including performing periodic inspections and making repairs to the cover on a specified regular schedule and as necessary to correct the effects of settlement, subsidence, ponding, cracking, and erosion. Inspection and monitoring activities must include confirmation of grades, identification of rill and gully formation, and identification of visually noticeable differential settlement and ponding. Expected maintenance activities include, as necessary, rill and gully repair, grade restoration of sheet flow areas to correct any ponding and to ensure positive drainage (the free drainage of surface flow), crack identification, and crack repair. All cover repairs shall utilize soil/soil-gravel meeting applicable specifications detailed in Task 4.1.3 for the Soil Barrier Layer and Task 4.1.4 for the Erosion Layer.

The LTOMP shall identify procedures to track differential settlement. In developing these procedures, Defendants shall (1) prepare a baseline topographic map using aerial photographic surveys or alternative surveys of the Landfill and its immediate surrounding area, including surveying monuments; (2) provide for annual aerial photographic surveys

or alternative surveys used to produce iso-settlement maps depicting the estimated total change in elevation of each portion of the Landfill's final cover relative to the baseline topographic map, and (3) document on a map of the Landfill, the approximate location and outline of any areas where differential settlement or ponding is visually obvious and where visually noticeable differential settlement or ponding has been repaired by grade restoration operations. Defendants shall implement these differential settlement tracking procedures annually for a minimum of five years. The LTOMP shall also identify procedures, where after five years the Defendants may request reduced frequency of settlement tracking or reduced aerial extent of settlement surveys for portions of the Landfill that Defendants demonstrate to be unlikely to undergo differential settlement of such magnitude as to impair either the area's containment features (e.g., final cover) or the free drainage of surface flow. The plan must detail procedures to identify surface-exposed significant cracks and provide for repair as soon as possible. Locations of repaired cracks must be documented and monitored. Cracks must be repaired by over excavating the cover soil until the crack is removed. The excavation shall be replaced in six inch lifts with soil/soil-gravel meeting the specifications detailed in Task 4.1.3 for the Soil Barrier Layer and Task 4.1.4 for the Erosion Layer.

4.5.2. Maintaining and Monitoring Storm Water Controls

Defendants shall maintain and monitor the storm water controls identified in this Appendix A. Monitoring activities must include monitoring sediment and debris accumulation in drainage control structures and detention basins, embankment and detention basin inspection, pipe inspection, and collecting meteorological data. Expected maintenance activities include, as necessary to maintain the effectiveness of the remedy, sediment removal in drainage control structures and detention basins, cleaning of the pipe downstream of the detention basin, repair of riprap and gabions at conveyance structures, and repair of the detention basin structure and appurtenances, including the embankment, emergency spillway, pipe, inlet, geomembrane and riprap.

4.5.3. Maintaining and Operating Gas Monitoring and Collection System

Defendants shall maintain and operate the gas monitoring system as detailed in the approved Gas Monitoring and Corrective Action Workplan developed pursuant to Tasks 4.2.3 and 4.2.4.

4.5.4. Maintaining and Operating the Groundwater Monitoring System

Defendants shall maintain and operate the groundwater monitoring system and perform sampling and analysis of the groundwater monitoring network following the sampling

procedure detailed in the approved Groundwater Monitoring Workplan developed pursuant to Task 4.3.

4.5.5. Long-Term Operation and Maintenance Cost Estimates and Funding

Defendants shall provide on an annual basis detailed projected cost estimates for each element of the LTOMP. Defendants shall provide financial assurance to insure the availability of funds to pay for the Long Term Operation and Maintenance costs.

4.5.6. Plan for Corrective Actions

In the event that the need for corrective action or additional corrective action is identified during the Operation & Maintenance Period, for the gas monitoring system pursuant to the criteria referenced in Task 4.2., or for groundwater pursuant to criteria referenced in Task 4.3., the Defendants shall comply with the requirements of those tasks and shall provide EPA with a detailed written estimate of the cost of such corrective actions and provide financial assurance to insure the availability of funds to pay for the corrective actions. Once EPA approves a corrective action measures remedy and a schedule for implementation, the selected remedy shall be implemented in accordance with the approved schedule. Assessment, selection and approval of corrective action measures and schedules under this section shall be subject to Dispute Resolution pursuant to Section X ("Dispute Resolution") of the Consent Decree.

4.5.7. Requests for Reduced or Suspended Groundwater Monitoring.

Following eight quarters of groundwater sampling and analysis where results have been submitted pursuant to the approved Groundwater Monitoring Workplan, or at an earlier date if approved by EPA, Defendants may request a reduction or suspension of the groundwater monitoring requirements established by the approved Groundwater Monitoring Workplan. EPA may approve a reduction or suspension of these groundwater monitoring requirements. Possible elements of a reduced groundwater monitoring system may include reduction in the number of monitoring wells, reduction in groundwater monitoring parameters, and/or changing the frequency of quarterly monitoring to semi-annual.

4.5.8. Implementation of Long-Term Operation & Maintenance Plan.

Subsequent to EPA approval of the Long-Term Operation and Maintenance Plan for the Landfill, Defendants shall conduct long-term operation and maintenance in accordance with the approved Plan for 30 years, subject to the following sentence. The length of this 30-year long-term operation and maintenance period may be: (a) decreased by EPA if Defendants demonstrate that the reduced period is sufficient to protect human health and the environment and this demonstration is approved by EPA; or (b) increased by EPA if EPA determines that the lengthened period is necessary to protect human health and the environment.

4.5.9. Placement in Operating Record

Within fifteen (15) Days after approval of the LTOMP, Defendants shall place this Plan in the Operating Record.

Table 5.1 Final Cover - Design Criteria

Design Requirements	Design Specifications
Cover Repair Methods:	
- Fill local depressions	Use same soil and construction specifications as for barrier layer soil.
- Repair significant cracks in existing cover soil prior to placement of erosion layer.	The excavation shall be replaced in six-inch lifts with soil meeting the specifications detailed in Tasks 4.1.3 and 4.1.6.
Cover Grades:	
- Top deck, Area D Slope	3% minimum slope
- All other areas	No required changes to existing grades
Cover Thickness: [for all areas including side slopes and Northeast Canyon]	
- Total thickness	3 feet minimum
- Soil barrier layer	2.5 feet minimum thickness
- Erosion layer - slopes less than 10%	6 inches minimum thickness (varies with slope, slope length, and soil gradation). See Attachments 7, 7d, 7e, and 7f.
- Erosion layer – slopes greater than or equal to 10%	Varies based on drainage area slope, slope length, and soil gradation applied. See Attachments 7, 7a, 7b, and 7c.
Cover Soil Properties:	
- Soil added to soil barrier layers	Supplemental soil as described in Section 4.1.3.
- Erosion layer - slopes less than 10%	Gravel-soil layer meeting gradations specified in Attachments 7d, 7e, and 7f.
- Erosion layer – slopes greater than or equal to 10%	Gravel-soil layer meeting gradations specified in Attachments 7a, 7b, and 7c.

Cover Construction Methods: Greater Than or Equal to 10% Erosion Layer	
- Acceptable compaction range	Performance Specification - I.E number of passes with specified equipment to achieve desired compaction. A test fill/erosion layer which will be constructed to establish the ≥ 10% erosion layer compaction performance specification.
- Lift thickness	Lift thicknesses for each drainage area will match erosion layer thicknesses detailed on Attachment 7 and subsequent construction drawings.
Cover Construction Methods: Barrier Layer Soils, less than 10% Erosion Layers, and Replacement of Excavated Cover Soils	
- Acceptable compaction range	At Least 90% of Standard Proctor
- Lift thickness	Lifts up to 1 ft thick as described in Section 4.1.6.
- Moisture content	Drier than optimum moisture conditions.

Table 5.2 Final Cover Surface Water Control Features - Design Criteria

Surface Water Control Requirements	Design Specifications
Perimeter drainage diversions/berms	Locations: all top slope areas that drain to slopes greater than or equal to 10% Capacity: runoff from Design Storm Event plus freeboard
Diversion berms	Capacity: runoff from Design Storm Event plus freeboard Spacing: according to appropriate sections of Appendix A and Attachments.
Pipe and channel inlet structures	Capacity: runoff from Design Storm Event plus freeboard
Down drains	Capacity: runoff from Design Storm Event
Road surfaces used to transport flow	Minimum 3inch thick gravel surfacing. Ditches lined with riprap or paved. Capacity: runoff from Design Storm Event
Management of gas collection pipes	Cover LF gas pipe with soil that complies with specifications in this SOW
Settling basins	Capacity: - runoff from Design Storm Event

6.0 BACKGROUND DOCUMENTS

EPA Documents - Guidances

1. **U.S. EPA, Region 9** - Quality Assurance Guidances for Field Sampling. Provided on-line at: http://www.epa.gov/Region9/qa/fieldsamp.html#guidance.

2. **U.S. EPA, Region 9** - Standard Operating Procedure for Low-Stress (Low Flow)/Minimal Drawdown Ground-Water Sample Collection. Provided on-line at: http://www.epa.gov/Region9/qa/pdfs/finalsopls1217.pdf.

3. **U.S. EPA, Region 9** - Low-Flow Purging and Sampling - An Alternative to Conventional Well Purging. Provided on-line at: http://www.epa.gov/Region9/qa/pdfs/pmflowx2.pdf.

4. **U.S. EPA, Low-Flow (Minimal Drawdown) Ground- water Sampling Procedures, EPA/540/S-95/504.** Puls, R.W. and M.J. Barcelona, 1996. Provided on-line at: http://www.epa.gov/tio/tsp/download/lwflw2a.pdf

EPA Documents – Site Specific (Chronologically)

5. **EPA Region 9 - Comments on Design Storm Report** (Basinger, January 12, 2000) - approves approach, requests additional statistical analysis.

6. **EPA Region 9 - Approval of Modified Design Storm Criteria** (Basinger, March 1, 2000) - approval to use modified 200-year 6-hour storm.

7. **EPA Region 9 - Comments on December 2003 Design Drawings and Design Report for the Controlled Flow Plan** (Basinger, March 18, 2004).

Other Government Documents (Chronologically)

8. **Design of Riprap Revetment**, US Federal Highway Administration, Hydraulic Engineering Circular No. 11 (FHWA-IP-89-016), March 1989.

9. **Interstate Technology and Regulatory Council (ITRC), December 2003.** (Published Final)Alternative Landfill Technology, Technical and Regulatory guidance.

Republic Documents (Chronologically)

10. **Design Storm Event Report** (EMCON, October 13, 1999 for DUMPCO, Inc.).

11. **Sunrise Landfill Drainage Mitigation Facilities Report**, (PBS&J, January 26, 2000), prepared on behalf of Republic DUMPCo, Inc.

12. **Statistical Analysis of Design Storm Report** (EMCON Bowers & R.Wall, February 4, 2000), prepared on behalf of Republic DUMPCo, Inc.

13. **General Waste Removal Work Plan** (SCS Engineers, February 24, 2000, prepared on behalf of Republic DUMPCo, Inc.

14. **Final Landfill Assessment Work Plan for Sunrise Mountain Landfill**, (SCS Engineers, February 29, 2000) prepared on behalf of Republic DUMPCo, Inc.

15. **Draft Storm Water Pollution Prevention Plan for Sunrise Mountain Landfill**, (EMCON/OWT June 23, 2000), Prepared on behalf of Republic DUMPCo, Inc.

16. **Drilling Plan - Sunrise Mountain Landfill Geohydrologic Drilling Program for Locations 7, 13, and 15** (SCS Engineers, September 14, 2001), prepared on behalf of Republic Services of Southern Nevada.

17. **Shallow Boring and Geotechnical Sampling Report** (SCS, November 13, 2001), prepared on behalf of Republic DUMPCo, Inc.

18. **Preliminary Groundwater Quality Report - Sunrise Landfill,** (Ground Water Solutions Inc., June 21, 2002) prepared on behalf of Republic Services of Southern Nevada.

19. **Stormwater Protection for the Sunrise Mountain Landfill, Clark County, Nevada (**Exponent, January 24, 2003) prepared on behalf of Republic Services of Southern Nevada.

20. **Cover Plan for Sunrise Mountain Landfill**, (Exponent, June 19, 2003), prepared on behalf of Republic Services of Southern Nevada.

21. **Control Flow Plan Design Drawings** (EMCON/OWT, December 17, 2003), design drawings prepared on behalf of Republic Services of Southern Nevada

22. **Geotechnical Engineering and Engineering Geologic Report Proposed Storm Water Detention Basin Report** (Exponent, December 17, 2003), updated design and site

specific background information on Controlled Flow Plan prepared on behalf of Republic Services of Southern Nevada.

Scientific/Technical Papers (by Author)

23. Abt S.R. and Johnson T.L., **Riprap Design for Overtopping Flow**, Journal of Hyd. Eng., ASCE; 117(8), p 959-972, August 1991.

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