

**AGREEMENT TO FURNISH ECONOMIC ANALYSIS UPDATE
AND EVALUATION MONITORING PLAN FOR THE CALIFORNIA STREET LANDFILL
AMENDMENT NO. 1**

This Amendment No. 1 authorizes, 3D GeoServices, Inc., (hereinafter "Consultant") to perform services included in this Amendment and in accordance with the AGREEMENT dated the 20th day of April, 1999, for the California Street Landfill Economic Analysis Update and Evaluation Monitoring Plan.

This amendment dated June 1, 1999, makes the following changes to the AGREEMENT; all other provisions of the AGREEMENT remain in effect.

ARTICLE 1 - ENGAGEMENT OF CONSULTANT

No Changes

ARTICLE 2 - SERVICES OF CONSULTANT

- 2.1 The Scope of Work is amended to include Attachment A, to this Amendment which defines the Amended Scope of Work for Consulting services.

ARTICLE 3 - RESPONSIBILITIES OF CITY

No Changes

ARTICLE 4 - PERIOD OF SERVICE

- 4.1 The schedule for the services included in this Amendment shall be performed in accordance with the Amended Project Schedule set forth in Attachment B.

ARTICLE 5 - PAYMENTS TO THE CONSULTANT

- 5.1 The total compensation to perform work under this Amendment shall be in accordance with Attachment C, Amended Project Fee, and Attachment D, Rate Schedule.

ARTICLE 6 - INSURANCE AND INDEMNIFICATION

No changes.

ARTICLE 7 - GENERAL CONSIDERATIONS

No changes.

Evaluation Monitoring Plan and Reporting Services and
Economic Analysis Update Services
3D GeoServices, Inc.

IN WITNESS WHEREOF, duly authorized representatives of the City and Consultant have signed
in confirmation of this amended Agreement.

City of Redlands
("City")

3D GeoServices, Inc.
("Consultant")

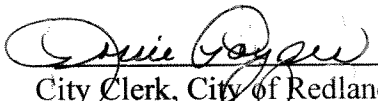
By:


WILLIAM E. CUNNINGHAM
Mayor

By:


MERCEDES MURIELLO
President

ATTEST:


City Clerk, City of Redlands

**EVALUATION MONITORING PLAN AND REPORTING SERVICES AND
ECONOMIC ANALYSIS UPDATE SERVICES
FOR THE CALIFORNIA STREET LANDFILL**

ATTACHMENT A

AMENDED SCOPE OF WORK

Attachment A - Scope of Work

3D GeoServices understands that this amended agreement is for the period April 1, 1999 through September 7, 1999, to commence upon authorization from the City of Redlands (City). The agreement will require submittal of a Demonstration Report, Release Delineation Report, and a contingency Evaluation Monitoring Plan (EMP), and reporting and economic analysis update services for submittal to the SARWQCB and the lead enforcement agency (LEA) for the California Integrated Waste Management Board (CIWMB). This attachment describes the agreement scope of work for the EMP and economic review services.

Task 1 - Economic Analysis Update - Task 1 consists of updating the 1996 landfill resource evaluation, which evaluated the costs and benefits of landfill operation and expansion, versus closure. This update will reflect current regulatory impacts, operations and maintenance costs, reporting costs, and expansion needs. This evaluation will incorporate the City's revised closure and post-closure cost estimates. The costs and benefits evaluation will be projected throughout the active life of the landfill (which includes the post-closure maintenance period) and will be given in present-value terms on an annualized basis, with the base case presentation given at the City's current tipping fee rate schedule. This task will consist of updating the database and spreadsheet numbers with current budget information, and two evaluations. Each evaluation will each contain three potential scenarios, for a total of six revisions. (No changes)

Task 2 - Economic Analysis Interface - Task 2 consists of preparing the analysis update from Task 1 for transfer to a third party consulting firm for continuing analysis. This task will specifically consist of familiarizing the firm with the budget considerations in the current model. It will also include converting the current spreadsheet program to a new format, such that the assumptions, background information, and economic data and factors, are transferred compatibly from the current analysis. (No changes)

Task 3 - SARWQCB Work Plan - Task 3 consists of preparing and submitting a work plan to the SARWQCB, in accordance with their regulatory requirements, describing the proposed aquifer test methods, field quality assurance / quality control, and data analysis methodology to be subscribed to in Task 4. Record keeping and reporting procedures will also be included in the work plan. This plan must be approved prior to proceeding with Task 4. (No changes)

Task 4 - Aquifer Testing & Data Analysis - Task 4 consists of determining the hydraulic conductivity of the aquifer below the landfill by analyzing data obtained from a 24-hour single well aquifer test performed in monitoring well B-4B.

A single well pump test will be performed on one of the site wells. A single well pump test was selected because of the limited number of wells on site and the large distances between wells.

Attachment A - Scope of Work

Although a single well pump test cannot be used to determine aquifer storativity, the results can be used to calculate the hydraulic conductivity that will be used in the contaminant transport modeling.

The pump test will be performed by lowering a submersible electric pump into the well along with a transducer connected to a data logger. Groundwater will be pumped at a rate high enough to demonstrate drawdown in the well but not so high that the water level will drop below the pump (the pump rate is identified to be about 5 to 10 gallons per minute). The pump test is expected to run continuously for 24 hours and during the test, a geologist will periodically observe the data stored on the data logger to ensure that the pump test data is useable and consistent.

Purged groundwater generated during the pump test will be placed in a 21,000 gallon Baker Tank for storage pending chemical analysis to determine whether or not the purged water be disposed of at the wastewater treatment plant. It is proposed that the City retrieve a grab sample and have it analyzed by their contract laboratory, Lee & Ro, for Appendix I VOCs (EPA Method 8260), and that the City be responsible for the disposal of the purged groundwater. Based on the extremely low levels of VOC contamination which might occur, it is proposed that the City remove the tank contents using the City's Vactor truck, and discharge the purged water into the wastewater treatment plant's influent stream in accordance with the plant's permit conditions.

The pump test data will be downloaded and calculations will be performed to determine the hydraulic conductivity of the aquifer materials. The results obtained will be used in the Fate and Transport Modeling effort. (No changes, except scheduling)

Task 5 - Landfill Gas and Groundwater Data Analysis - Task 5 consists of accessing and analyzing trends of landfill gas constituents which may be related to groundwater chemistry trends. This analysis will determine if there is any real-time correlation between groundwater chemistry and landfill gas migration, and support a conclusion for landfill gas impacts to the groundwater rather than a liquid release. This approach and analysis has been performed in the past and successfully demonstrated as such to the SARWQCB. The analysis will result in a combined landfill gas and groundwater chemistry database, with supporting graphical representation of the data in Excel format. These materials will be presented during Task 7, and will included as support documentation in the Demonstration and Delineation Assessment reports (Task 8).

Task 6 - Contaminant Transport Analysis - Task 6 consists of estimating the potential longitudinal dispersion of contaminants released from the landfill. This will be done by performing a two-stage fate and transport analysis. First, leakage from the landfill will be utilized from the previous United States Army Corps of Engineers HELP3 (Hydrologic Evaluation of Landfill Performance) computer analysis of the landfill, conducted in April of 1998. HELP3 uses representative rainfall and evapo-transpiration data to determine the quantity of leachate and rate of leakage that might be anticipated from a municipal solid waste landfill. Second, relevant source and

Attachment A - Scope of Work

hydraulic parameters will be used as input for the program MULTIMED, to estimate the concentration of chemical contaminants at progressively larger distances from the landfill.

The Environmental Protection Agency's Multimedia Exposure Assessment Model (MULTIMED) for exposure assessment simulates the movement of contaminants leaching from a landfill in both the unsaturated and saturated zones. A steady-state, one-dimensional, semi-analytical module simulates flow in the unsaturated zone. The output from this module, water saturation as a function of depth, is used as input to the unsaturated zone transport module. The latter simulates transient, one-dimensional (vertical) transport in the unsaturated zone and includes the effects of longitudinal dispersion, linear adsorption, and first-order decay. The unsaturated zone transport module calculates steady-state contaminant concentrations. Output from both unsaturated zone modules is used to couple the unsaturated zone transport module with the steady-state saturated zone transport module. The latter includes one-dimensional uniform flow, three-dimensional dispersion, linear adsorption, first-order decay, and dilution due to direct infiltration into groundwater. **(No changes, except scheduling)**

Task 7 - SARWQCB Presentation - Task 7 consists of providing one informal meeting and presentation of the **demonstration report results** to the SARWQCB.

Task 8 - Demonstration Report (DR), Release Delineation Assessment Report (RDAR), contingency Evaluation Monitoring (EMP) and Corrective Action (CAP) Plans - Task 8 consists of two reports, a **Demonstration Report**, and a **Release Assessment Delineation Report**. The reporting services will include technical writing and drafting as necessary to present the findings of Tasks 1-7, and Tasks 10-12 into a **responsible demonstration that sources other than the landfill are likely responsible for groundwater contamination in the vicinity of the CSL, and an assessment that groundwater quality impacted by these sources precludes the feasibility of off-site groundwater monitoring under an EMP for the CSL**. Additionally, the reports will present data collection and modeling results demonstrating that the low levels of contamination identified at the landfill do not present a threat to the environment or to health and safety. This task will also provide the City with responses to comments on the reports on an as-needed basis during the regulatory review and approval processes.

Task 9 - JTD Amendment #2 (Contingency) - Task 9 consists of submitting an amendment to the Joint Technical Document (JTD) summarizing any proposed changes in operations, design, or monitoring which may result from approval of elements in the **Delineation Assessment report**. This task will be accomplished by revising or adding to selected text, figures, and tables in the current JTD, and updating the JTD Indices.

Attachment A - Scope of Work

Task 10 - Crafton-Redlands & Norton Plumes Review - Task 10 consists of performing technical review of the published information available on the Crafton-Redlands and Norton groundwater contamination plumes. This review will focus on the potential relationship between these investigations (to-date), and the contamination found in the groundwater at the CSL boundary. The review will also identify any QA/QC problems, data gaps, and future phases and schedules planned for these investigations. The results of the review will be submitted as part of the Demonstration Report (Task 8).

Task 11 - Hydrogeologic Analysis - Task 11 consists of performing a hydrogeologic analysis combining the hydrogeologic data from the Crafton-Redlands and Norton groundwater plumes investigations, other published water well and monitoring well data in the vicinity of the CSL, and the hydrogeologic data collection and modeling performed in Tasks 4 and 6. The analysis will include findings resulting from an investigation into the laboratory QA/QC procedures documented for these data. The purpose of the analysis is to define the nature and extent of groundwater contamination attributable to the CSL using modeling scenarios, and to further demonstrate that the groundwater surrounding the CSL is currently contaminated by sources other than the landfill. The known extent and degree of this contamination is severe enough to over-ride the impacts from the contamination found at the landfill boundaries, and presents an unsupportable financial and legal burden upon the City, should they be required to monitor groundwater off-site, within the vicinity of the plume. The analysis will be conducted in two phases; a preliminary phase which will generate information suitable for the Demonstration Report, and a detailed analysis, which will generate findings for the Release Delineation Assessment Report (Task 8).

Task 12 - Review, Analysis and Upgrade of Laboratory QA/QC Procedures - Task 12 consists of conducting a comprehensive review and field investigation of the laboratory procedures of Lee & Ro, the laboratory which generated the CSL groundwater analytical data during the fourth quarter of 1998 and first quarter of 1999. It is believed from a review of the laboratory QA/QC data reported, that there is evidence for cross-contamination of groundwater samples resulting from laboratory practices used for storing supplies and cleaning equipment. It is also believed that it can be demonstrated that there is no feasible method for eliminating the low levels of cross-contamination found at current laboratory method detection limits. This investigation will include blind duplicate and spike samples to be collected and analyzed by separate laboratories, as well as inspections of, and interview with, the laboratories conducting the analyses.

An investigation into field practices will also be conducted, which will include accompanying City staff on the COC scan sampling round, and conveyance of duplicate trip blanks sealed in separate ice chests prior to transport from each laboratory, as well as the regular trip blanks. This investigation, and its findings, will be included as part of the Demonstration Report (Task 8).

Attachment A - Scope of Work

Deliverables - Deliverables will consist of memorandums, text, and faxed information to be provided to City staff on a time and materials basis upon request. Five tabularized printouts of the economic analyses results will be provided to the City, along with a short narrative in memo form, summarizing the updated information used in the evaluations.

A work plan detailing the proposed pump test procedures and a description of the modeling to be conducted, will be prepared and submitted to the RWQCB for approval prior to proceeding with field activities. One copy of the draft work plan and five copies of the final work plan will be provided to the City.

Meeting and presentation materials will consist of a presentation agenda, and all text and graphical representations of the data analyzed in the form of hand-outs, which will be discussed during the meeting. As many copies of these materials will be provided as necessary and/or requested by the City and the SARWQCB.

One complete draft copy each of the **Demonstration and Delineation Release reports** will be submitted to the City for review. After incorporation of the City's comments, eight bound copies, one unbound reproducible copy, and one copy of the final reports in electronic format will be submitted to the City. The **delineation report** will contain all pump test data, pump test hydraulic conductivity calculations, test results, and calculations. **The reports will include detailed excerpts from published reports on the Crafton-Redlands and Norton groundwater plumes, as well as supporting water well data which support and illustrate the degradation of downgradient groundwater quality attributable to sources other than the CSL. The report will also include the results of the MULTIMED Fate and Transport modeling with figures showing contaminant concentration gradients, flow directions, and chemical attenuation, to demonstrate any the nature and extent of any impacts to the environment and human health and safety related to the low concentrations of VOCs identified at the CSL boundary.**

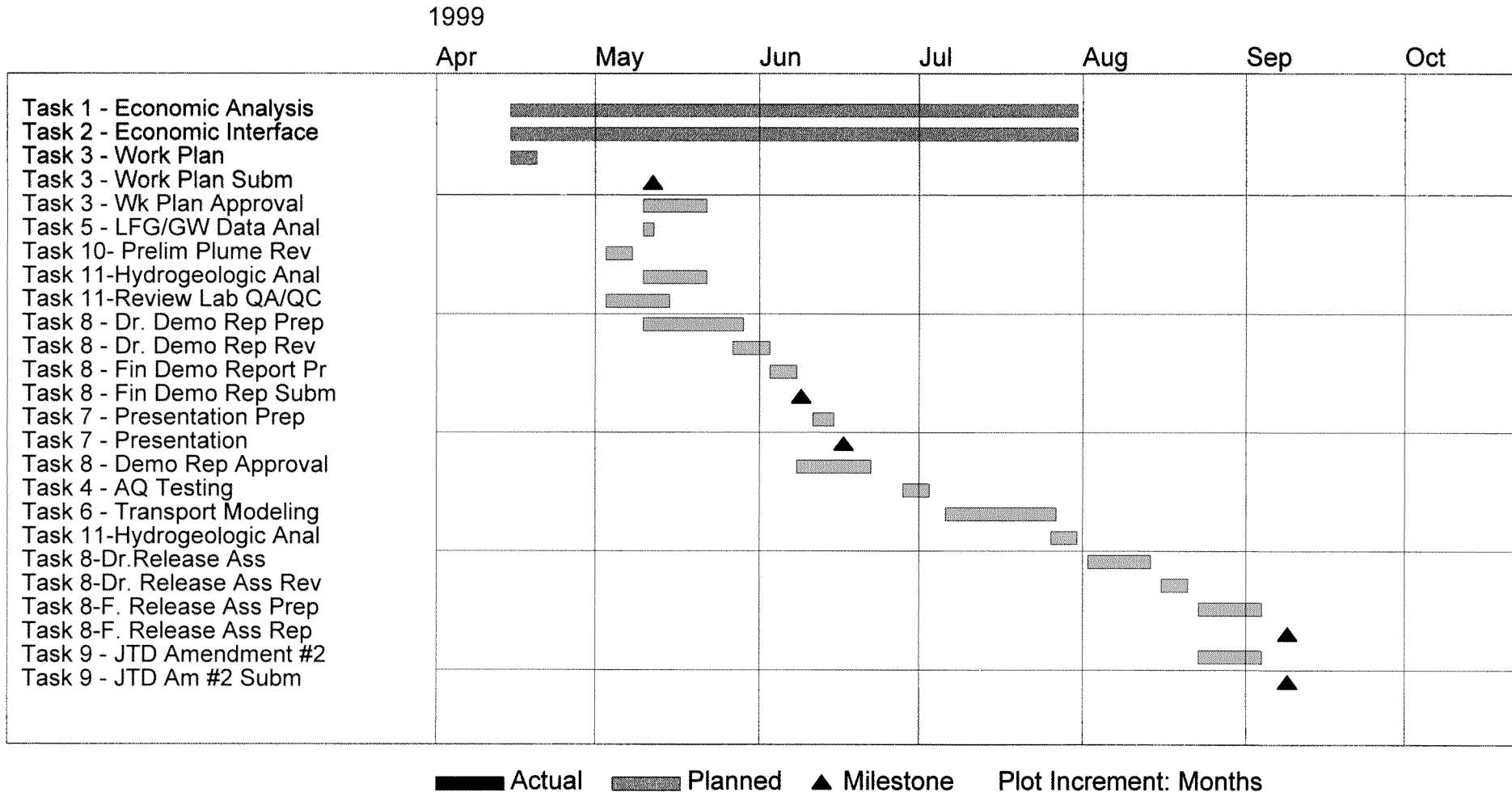
**EVALUATION MONITORING PLAN AND REPORTING SERVICES AND
ECONOMIC ANALYSIS UPDATE SERVICES
FOR THE CALIFORNIA STREET LANDFILL**

AMENDED ATTACHMENT B

PROJECT SCHEDULE

The California Street Landfill

The California Street Landfill, City of Project: EMP/Economic Analysis Services Project



**EVALUATION MONITORING PLAN AND REPORTING SERVICES AND
ECONOMIC ANALYSIS UPDATE SERVICES
FOR THE CALIFORNIA STREET LANDFILL**

ATTACHMENT C

AMENDED PROJECT FEE

Attachment C
Amended Evaluation Monitoring Plan and Reporting Services and Economic Analysis Update Services
California Street Landfill

Task Description	Mercedes Murillo-CEG (\$80/hour)		David R. Bachtel-PE (\$80/hour)		Anne Saffell (\$80/hour)		Alan Janecek-CAD (\$95/hour)		Other Direct Costs	Hours Per Task	Costs Per Task	Total Invoices	Remaining Budget
	Hours	Costs	Hours	Costs	Hours	Costs	Hours	Costs					
Task 1 - Economic Analysis Update	75.0	\$ 6,000.00	100.0	\$ 8,000.00	0.0	\$ -	0.0	\$ -	\$ -	175.0	\$ 14,000.00	\$ -	\$ 14,000.00
Task 2 - Economic Analysis Interface	100.0	\$ 8,000.00	150.0	\$ 12,000.00	0.0	\$ -	0.0	\$ -	\$ -	250.0	\$ 20,000.00	\$ -	\$ 20,000.00
Task 3 - RWQCB Work Plan	25.0	\$ 2,000.00	0.0	\$ -	0.0	\$ -	0.0	\$ -	\$ -	25.0	\$ 2,000.00	\$ -	\$ 2,000.00
Task 4 - Aquifer Testing & Data Analysis	40.0	\$ 3,200.00	0.0	\$ -	0.0	\$ -	28.0	\$ 2,660.00	\$ 700.00	68.0	\$ 6,560.00	\$ -	\$ 6,560.00
Task 5 - Landfill Gas - Groundwater Data Analysis	8.0	\$ 640.00	0.0	\$ -	0.0	\$ -	8.0	\$ 760.00	\$ -	16.0	\$ 1,400.00	\$ -	\$ 1,400.00
Task 6 - Contaminant Transport Analysis	40.0	\$ 3,200.00	0.0	\$ -	0.0	\$ -	0.0	\$ -	\$ -	40.0	\$ 3,200.00	\$ -	\$ 3,200.00
Task 7 - SARWQCB Meeting/Presentation	16.0	\$ 1,280.00	16.0	\$ 1,280.00	16.0	\$ 1,280.00	0.0	\$ -	\$ -	48.0	\$ 3,840.00	\$ -	\$ 3,840.00
Task 8 - Demonstration Report / Release Delineation Assessment Report	312.5	\$ 25,000.00	20.0	\$ 1,600.00	0.0	\$ -	0.0	\$ -	\$ -	332.5	\$ 26,600.00	\$ -	\$ 26,600.00
Task 9 - JTD Amendment #2 (Contingency)	62.5	\$ 5,000.00	0.0	\$ -	0.0	\$ -	0.0	\$ -	\$ -	62.5	\$ 5,000.00	\$ -	\$ 5,000.00
Task 10 - Review Crafton-Redlands Plume Data	40.0	\$ 3,200.00	0.0	\$ -	16.0	\$ 1,280.00	0.0	\$ -	\$ -	56.0	\$ 4,480.00	\$ -	\$ 4,480.00
Task 11 - Hydrogeologic Analysis	88.0	\$ 7,040.00	0.0	\$ -	24.0	\$ 1,920.00	0.0	\$ -	\$ -	112.0	\$ 8,960.00	\$ -	\$ 8,960.00
Task 12 - Review, Analysis, Upgrade Field & Lab QA/QC	24.0	\$ 1,920.00	0.0	\$ -	120.0	\$ 9,600.00	0.0	\$ -	\$ -	144.0	\$ 11,520.00	\$ -	\$ 11,520.00
Total	831.0	\$ 66,480.00	286.0	\$ 22,880.00	176.0	\$ 14,080.00	36.0	\$ 3,420.00	\$ 700.00	1329.0	\$ 107,560.00	\$ -	\$ 107,560.00

**EVALUATION MONITORING PLAN AND REPORTING SERVICES AND
ECONOMIC ANALYSIS UPDATE SERVICES
FOR THE CALIFORNIA STREET LANDFILL**

ATTACHMENT D

RATE SCHEDULE

Attachment D
Evaluation Monitoring Plan and Reporting Services and
Economic Analysis Update Services
Rate Schedule

Item	Rate
Professional Personnel (P.E., C.E.G., C.H.G., includes Computer Charges)	\$80.00 per hour
Alan Janecek	\$95.00 per hour
Subcontracted Professional Services, Supplies	Cost plus 15%
Miscellaneous Out of Pocket Expenses (Long distance telephone charges, special order office supplies, slide preparation, report and other presentation media, other direct costs)	Cost