PROFESSIONAL SERVICES AGREEMENT WITH TETRA TECH BAS, INC. FOR NEWPORT TERRACE LANDFILL GAS CONTROL SYSTEM OPERATIONS AND MAINTENANCE SERVICES

THIS PROFESSIONAL SERVICES AGREEMENT ("Agreement") is made and entered into as of this 23rd day of June, 2026 ("Effective Date"), by and between the CITY OF NEWPORT BEACH, a California municipal corporation and charter city ("City"), and TETRA TECH BAS, INC., a California corporation ("Consultant"), whose address is 3475 East Foothill Blvd, Pasadena, CA 91107, and is made with reference to the following:

RECITALS

A. City is a municipal corporation duly organized and validly existing under the laws of the State of California with the power to carry on its business as it is now being conducted under the statutes of the State of California and the Charter of City.

B. City desires to engage Consultant to provide Newport Terrace Landfill gas control system operations and maintenance services ("Project").

C. Consultant possesses the skill, experience, ability, background, certification and knowledge to provide the professional services described in this Agreement.

D. City has solicited and received a proposal from Consultant, has reviewed the previous experience and evaluated the expertise of Consultant, and desires to retain Consultant to render professional services under the terms and conditions set forth in this Agreement.

NOW, THEREFORE, it is mutually agreed by and between the undersigned parties as follows:

1. TERM

The term of this Agreement shall commence on the Effective Date, and shall terminate on June 30, 2029, unless terminated earlier as set forth herein. The City shall have the option to renew this Agreement upon written notice to Consultant for up to two (2) additional one (1) year terms, upon the same terms and conditions set forth herein, with each additional term commencing upon the expiration of the immediately preceding term.

2. SERVICES TO BE PERFORMED

Consultant shall diligently perform all the services described in the Scope of Services attached hereto as Exhibit A and incorporated herein by reference ("Services" or "Work"). City may elect to delete certain Services within the Scope of Services at its sole discretion.

3. TIME OF PERFORMANCE

3.1 Time is of the essence in the performance of Services under this Agreement and Consultant shall perform the Services in accordance with the schedule included in Exhibit A. In the absence of a specific schedule, the Services shall be performed to completion in a diligent and timely manner. The failure by Consultant to strictly adhere to the schedule set forth in Exhibit A, if any, or perform the Services in a diligent and timely manner may result in termination of this Agreement by City.

3.2 Notwithstanding the foregoing, Consultant shall not be responsible for delays due to causes beyond Consultant's reasonable control. However, in the case of any such delay in the Services to be provided for the Project, each party hereby agrees to provide notice within two (2) calendar days of the occurrence causing the delay to the other party so that all delays can be addressed.

3.3 Consultant shall submit all requests for extensions of time for performance in writing to the Project Administrator as defined herein not later than ten (10) calendar days after the start of the condition that purportedly causes a delay. The Project Administrator shall review all such requests and may grant reasonable time extensions for unforeseeable delays that are beyond Consultant's control.

3.4 For all time periods not specifically set forth herein, Consultant shall respond in the most expedient and appropriate manner under the circumstances, by hand-delivery or mail.

4. COMPENSATION TO CONSULTANT

4.1 City shall pay Consultant for the Services on a time and expense not-to-exceed basis in accordance with the provisions of this Section and the Schedule of Billing Rates attached hereto as Exhibit B and incorporated herein by reference. Consultant's compensation for all Work performed in accordance with this Agreement, including the initial term and all additional terms, and all reimbursable items and subconsultant fees, shall not exceed **Five Hundred Thousand Dollars and 00/100 ($500,000.00),** without prior written authorization from City. No billing rate changes shall be made during the term of this Agreement without the prior written approval of City.

4.2 Consultant shall submit monthly invoices to City describing the Work performed the preceding month. Consultant's bills shall include the name of the person who performed the Work, a brief description of the Services performed and/or the specific task in the Scope of Services to which it relates, the date the Services were performed, the number of hours spent on all Work billed on an hourly basis, and a description of any reimbursable expenditures. City shall pay Consultant no later than thirty (30) calendar days after approval of the monthly invoice by City staff.

4.3 City shall reimburse Consultant only for those costs or expenses specifically identified in Exhibit B to this Agreement or specifically approved in writing in advance by City.

4.4 Consultant shall not receive any compensation for Extra Work performed without the prior written authorization of City. As used herein, "Extra Work" means any Work that is determined by City to be necessary for the proper completion of the Project, but which is not included within the Scope of Services and which the parties did not reasonably anticipate would be necessary at the execution of this Agreement. Compensation for any authorized Extra Work shall be paid in accordance with the Schedule of Billing Rates as set forth in Exhibit B.

5. PROJECT MANAGER

5.1 Consultant shall designate a Project Manager, who shall coordinate all phases of the Project. This Project Manager shall be available to City at all reasonable times during the Agreement term. Consultant has designated Sami Ayass, P.E. to be its Project Manager. Consultant shall not remove or reassign the Project Manager or any personnel listed in Exhibit A or assign any new or replacement personnel to the Project without the prior written consent of City. City's approval shall not be unreasonably withheld with respect to the removal or assignment of non-key personnel.

5.2 Consultant, at the sole discretion of City, shall remove from the Project any of its personnel assigned to the performance of Services upon written request of City. Consultant warrants that it will continuously furnish the necessary personnel to complete the Project on a timely basis as contemplated by this Agreement.

5.3 If Consultant is performing inspection services for City, the Project Manager and any other assigned staff shall be equipped with a cellular phone to communicate with City staff. The Project Manager's cellular phone number shall be provided to City.

6. ADMINISTRATION

This Agreement will be administered by the Utilities. City's Utilities Director or designee shall be the Project Administrator and shall have the authority to act for City under this Agreement. The Project Administrator shall represent City in all matters pertaining to the Services to be rendered pursuant to this Agreement.

7. CITY'S RESPONSIBILITIES

To assist Consultant in the execution of its responsibilities under this Agreement, City agrees to provide access to and upon request of Consultant, one copy of all existing relevant information on file at City. City will provide all such materials in a timely manner so as not to cause delays in Consultant's Work schedule.

8. STANDARD OF CARE

8.1 All of the Services shall be performed by Consultant or under Consultant's supervision. Consultant represents that it possesses the professional and technical personnel required to perform the Services required by this Agreement, and that it will perform all Services in a manner commensurate with community professional standards and with the ordinary degree of skill and care that would be used by other reasonably competent practitioners of the same discipline under similar circumstances. All Services

shall be performed by qualified and experienced personnel who are not employed by City. By delivery of completed Work, Consultant certifies that the Work conforms to the requirements of this Agreement, all applicable federal, state and local laws, and legally recognized professional standards.

8.2 Consultant represents and warrants to City that it has, shall obtain, and shall keep in full force and effect during the term hereof, at its sole cost and expense, all licenses, permits, qualifications, insurance and approvals of whatsoever nature that is legally required of Consultant to practice its profession. Consultant shall maintain a City of Newport Beach business license during the term of this Agreement.

8.3 Consultant shall not be responsible for delay, nor shall Consultant be responsible for damages or be in default or deemed to be in default by reason of strikes, lockouts, accidents, acts of God, or the failure of City to furnish timely information or to approve or disapprove Consultant's Work promptly, or delay or faulty performance by City, contractors, or governmental agencies.

9. HOLD HARMLESS

9.1 To the fullest extent permitted by law, Consultant shall indemnify, defend and hold harmless City, its City Council, boards and commissions, officers, agents, volunteers, employees and any person or entity owning or otherwise in legal control of the property upon which Consultant performs the Project and/or Services contemplated by this Agreement (collectively, the "Indemnified Parties") from and against any and all claims (including, without limitation, claims for bodily injury, death or damage to property), demands, obligations, damages, actions, causes of action, suits, losses, judgments, fines, penalties, liabilities, costs and expenses (including, without limitation, attorneys' fees, disbursements and court costs) of every kind and nature whatsoever (individually, a Claim; collectively, "Claims"), which may arise from or in any manner relate (directly or indirectly) to any breach of the terms and conditions of this Agreement, any Work performed or Services provided under this Agreement including, without limitation, defects in workmanship or materials or Consultant's presence or activities conducted on the Project (including the negligent, reckless, and/or willful acts, errors and/or omissions of Consultant, its principals, officers, agents, employees, vendors, suppliers, consultants, subcontractors, anyone employed directly or indirectly by any of them or for whose acts they may be liable, or any or all of them).

9.2 Notwithstanding the foregoing, nothing herein shall be construed to require Consultant to indemnify the Indemnified Parties from any Claim arising from the sole negligence or willful misconduct of the Indemnified Parties. Nothing in this indemnity shall be construed as authorizing any award of attorneys' fees in any action on or to enforce the terms of this Agreement. This indemnity shall apply to all claims and liability regardless of whether any insurance policies are applicable. The policy limits do not act as a limitation upon the amount of indemnification to be provided by Consultant.

10. INDEPENDENT CONTRACTOR

It is understood that City retains Consultant on an independent contractor basis and Consultant is not an agent or employee of City. The manner and means of conducting the Work are under the control of Consultant, except to the extent they are limited by statute, rule or regulation and the expressed terms of this Agreement. No civil service status or other right of employment shall accrue to Consultant or its employees. Nothing in this Agreement shall be deemed to constitute approval for Consultant or any of Consultant's employees or agents, to be the agents or employees of City. Consultant shall have the responsibility for and control over the means of performing the Work, provided that Consultant is in compliance with the terms of this Agreement. Anything in this Agreement that may appear to give City the right to direct Consultant as to the details of the performance of the Work or to exercise a measure of control over Consultant shall mean only that Consultant shall follow the desires of City with respect to the results of the Services.

11. COOPERATION

Consultant agrees to work closely and cooperate fully with City's designated Project Administrator and any other agencies that may have jurisdiction or interest in the Work to be performed. City agrees to cooperate with the Consultant on the Project.

12. CITY POLICY

Consultant shall discuss and review all matters relating to policy and Project direction with City's Project Administrator in advance of all critical decision points in order to ensure the Project proceeds in a manner consistent with City goals and policies.

13. PROGRESS

Consultant is responsible for keeping the Project Administrator informed on a regular basis regarding the status and progress of the Project, activities performed and planned, and any meetings that have been scheduled or are desired.

14. INSURANCE

Without limiting Consultant's indemnification of City, and prior to commencement of Work, Consultant shall obtain, provide and maintain at its own expense during the term of this Agreement or for other periods as specified in this Agreement, policies of insurance of the type, amounts, terms and conditions described in the Insurance Requirements attached hereto as Exhibit C, and incorporated herein by reference.

15. PROHIBITION AGAINST ASSIGNMENTS AND TRANSFERS

Except as specifically authorized under this Agreement, the Services to be provided under this Agreement shall not be assigned, transferred contracted or subcontracted out without the prior written approval of City. Any of the following shall be construed as an assignment: The sale, assignment, transfer or other disposition of any

of the issued and outstanding capital stock of Consultant, or of the interest of any general partner or joint venturer or syndicate member or cotenant if Consultant is a partnership or joint-venture or syndicate or co-tenancy, which shall result in changing the control of Consultant. Control means fifty percent (50%) or more of the voting power or twenty-five percent (25%) or more of the assets of the corporation, partnership or joint-venture.

16. SUBCONTRACTING

The subcontractors authorized by City, if any, to perform Work on this Project are identified in Exhibit A. Consultant shall be fully responsible to City for all acts and omissions of any subcontractor. Nothing in this Agreement shall create any contractual relationship between City and any subcontractor nor shall it create any obligation on the part of City to pay or to see to the payment of any monies due to any such subcontractor other than as otherwise required by law. City is an intended beneficiary of any Work performed by the subcontractor for purposes of establishing a duty of care between the subcontractor and City. Except as specifically authorized herein, the Services to be provided under this Agreement shall not be otherwise assigned, transferred, contracted or subcontracted out without the prior written approval of City.

17. OWNERSHIP OF DOCUMENTS

17.1 Each and every report, draft, map, record, plan, document and other writing produced, including but not limited to, websites, blogs, social media accounts and applications (hereinafter "Documents"), prepared or caused to be prepared by Consultant, its officers, employees, agents and subcontractors, in the course of implementing this Agreement, shall become the exclusive property of City, and City shall have the sole right to use such materials in its discretion without further compensation to Consultant or any other party. Additionally, all material posted in cyberspace by Consultant, its officers, employees, agents and subcontractors, in the course of implementing this Agreement, shall become the exclusive property of City, and City shall have the sole right to use such materials in its discretion without further compensation to Consultant or any other party. Consultant shall, at Consultant's expense, provide such Documents, including all logins and password information to City upon prior written request.

17.2 Documents, including drawings and specifications, prepared by Consultant pursuant to this Agreement are not intended or represented to be suitable for reuse by City or others on any other project. Any use of completed Documents for other projects and any use of incomplete Documents without specific written authorization from Consultant will be at City's sole risk and without liability to Consultant. Further, any and all liability arising out of changes made to Consultant's deliverables under this Agreement by City or persons other than Consultant is waived against Consultant, and City assumes full responsibility for such changes unless City has given Consultant prior notice and has received from Consultant written consent for such changes.

17.3 All written documents shall be transmitted to City in formats compatible with Microsoft Office and/or viewable with Adobe Acrobat.

18. CONFIDENTIALITY

All Documents, including drafts, preliminary drawings or plans, notes and communications that result from the Services in this Agreement, shall be kept confidential unless City expressly authorizes in writing the release of information.

19. INTELLECTUAL PROPERTY INDEMNITY

Consultant shall defend and indemnify City, its agents, officers, representatives and employees against any and all liability, including costs, for infringement or alleged infringement of any United States' letters patent, trademark, or copyright, including costs, contained in Consultant's Documents provided under this Agreement.

20. RECORDS

Consultant shall keep records and invoices in connection with the Services to be performed under this Agreement. Consultant shall maintain complete and accurate records with respect to the costs incurred under this Agreement and any Services, expenditures and disbursements charged to City, for a minimum period of three (3) years, or for any longer period required by law, from the date of final payment to Consultant under this Agreement. All such records and invoices shall be clearly identifiable. Consultant shall allow a representative of City to examine, audit and make transcripts or copies of such records and invoices during regular business hours. Consultant shall allow inspection of all Work, data, Documents, proceedings and activities related to the Agreement for a period of three (3) years from the date of final payment to Consultant under this Agreement.

21. WITHHOLDINGS

City may withhold payment to Consultant of any disputed sums until satisfaction of the dispute with respect to such payment. Such withholding shall not be deemed to constitute a failure to pay according to the terms of this Agreement. Consultant shall not discontinue Work as a result of such withholding. Consultant shall have an immediate right to appeal to the City Manager or designee with respect to such disputed sums. Consultant shall be entitled to receive interest on any withheld sums at the rate of return that City earned on its investments during the time period, from the date of withholding of any amounts found to have been improperly withheld.

22. ERRORS AND OMISSIONS

In the event of errors or omissions that are due to the negligence or professional inexperience of Consultant which result in expense to City greater than what would have resulted if there were not errors or omissions in the Work accomplished by Consultant, the additional design, construction and/or restoration expense shall be borne by Consultant. Nothing in this Section is intended to limit City's rights under the law or any other sections of this Agreement.

23. CITY'S RIGHT TO EMPLOY OTHER CONSULTANTS

City reserves the right to employ other Consultants in connection with the Project.

24. CONFLICTS OF INTEREST

24.1 Consultant or its employees may be subject to the provisions of the California Political Reform Act of 1974 (the "Act") and/or Government Code §§ 1090 et seq., which (1) require such persons to disclose any financial interest that may foreseeably be materially affected by the Work performed under this Agreement, and (2) prohibit such persons from making, or participating in making, decisions that will foreseeably financially affect such interest.

24.2 If subject to the Act and/or Government Code §§ 1090 et seq., Consultant shall conform to all requirements therein. Failure to do so constitutes a material breach and is grounds for immediate termination of this Agreement by City. Consultant shall indemnify and hold harmless City for any and all claims for damages resulting from Consultant's violation of this Section.

25. NOTICES

25.1 All notices, demands, requests or approvals, including any change in mailing address, to be given under the terms of this Agreement shall be given in writing, and conclusively shall be deemed served when delivered personally, or on the third business day after the deposit thereof in the United States mail, postage prepaid, first-class mail, addressed as hereinafter provided.

25.2 All notices, demands, requests or approvals from Consultant to City shall be addressed to City at:

Attn: Utilities Director
Utilities Department
City of Newport Beach
100 Civic Center Drive
Newport Beach, CA 92660

25.3 All notices, demands, requests or approvals from City to Consultant shall be addressed to Consultant at:

Attn: Paul Stout
Tetra Tech BAS, Inc.
3475 East Foothill Blvd
Pasadena, CA 91107

26. CLAIMS

26.1 Unless a shorter time is specified elsewhere in this Agreement, before making its final request for payment under this Agreement, Consultant shall submit to

City, in writing, all claims for compensation under or arising out of this Agreement. Consultant's acceptance of the final payment shall constitute a waiver of all claims for compensation under or arising out of this Agreement except those previously made in writing and identified by Consultant in writing as unsettled at the time of its final request for payment. Consultant and City expressly agree that in addition to any claims filing requirements set forth in the Agreement, Consultant shall be required to file any claim Consultant may have against City in strict conformance with the Government Claims Act (Government Code sections 900 et seq.).

26.2 To the extent that Consultant's claim is a "Claim" as defined in Public Contract Code section 9204 or any successor statute thereto, the Parties agree to follow the dispute resolution process set forth therein. Any part of such "Claim" remaining in dispute after completion of the dispute resolution process provided for in Public Contract Code section 9204 or any successor statute thereto shall be subject to the Government Claims Act requirements requiring Consultant to file a claim in strict conformance with the Government Claims Act. To the extent that Contractor/Consultant's claim is not a "Claim" as defined in Public Contract Code section 9204 or any successor statute thereto, Consultant shall be required to file such claim with the City in strict conformance with the Government Claims Act (Government Code sections 900 et seq.).

27. TERMINATION

27.1 In the event that either party fails or refuses to perform any of the provisions of this Agreement at the time and in the manner required, that party shall be deemed in default in the performance of this Agreement. If such default is not cured within a period of two (2) calendar days, or if more than two (2) calendar days are reasonably required to cure the default and the defaulting party fails to give adequate assurance of due performance within two (2) calendar days after receipt of written notice of default, specifying the nature of such default and the steps necessary to cure such default, and thereafter diligently take steps to cure the default, the non-defaulting party may terminate the Agreement forthwith by giving to the defaulting party written notice thereof.

27.2 Notwithstanding the above provisions, City shall have the right, at its sole and absolute discretion and without cause, of terminating this Agreement at any time by giving no less than seven (7) calendar days' prior written notice to Consultant. In the event of termination under this Section, City shall pay Consultant for Services satisfactorily performed and costs incurred up to the effective date of termination for which Consultant has not been previously paid. On the effective date of termination, Consultant shall deliver to City all reports, Documents and other information developed or accumulated in the performance of this Agreement, whether in draft or final form.

28. PREVAILING WAGES

28.1 Pursuant to the applicable provisions of the Labor Code of the State of California, not less than the general prevailing rate of per diem wages including legal holidays and overtime Work for each craft or type of workman needed to execute the Work contemplated under the Agreement shall be paid to all workmen employed on the

Work to be done according to the Agreement by the Consultant and any subcontractor. In accordance with the California Labor Code (Sections 1770 et seq.), the Director of Industrial Relations has ascertained the general prevailing rate of per diem wages in the locality in which the Work is to be performed for each craft, classification, or type of workman or mechanic needed to execute the Agreement. A copy of said determination is available by calling the prevailing wage hotline number (415) 703-4774, and requesting one from the Department of Industrial Relations. The Consultant is required to obtain the wage determinations from the Department of Industrial Relations and post at the job site the prevailing rate or per diem wages. It shall be the obligation of the Consultant or any subcontractor under him/her to comply with all State of California labor laws, rules and regulations and the parties agree that the City shall not be liable for any violation thereof.

28.2 Unless otherwise exempt by law, Consultant warrants that no contractor or subcontractor was listed on the bid proposal for the Services that it is not currently registered and qualified to perform public work. Consultant further warrants that it is currently registered and qualified to perform "public work" pursuant to California Labor Code section 1725.5 or any successor statute thereto and that no contractor or subcontractor will engage in the performance of the Services unless currently registered and qualified to perform public work.

29. STANDARD PROVISIONS

29.1 Recitals. City and Consultant acknowledge that the above Recitals are true and correct and are hereby incorporated by reference into this Agreement.

29.2 Compliance with all Laws. Consultant shall, at its own cost and expense, comply with all statutes, ordinances, regulations and requirements of all governmental entities, including federal, state, county or municipal, whether now in force or hereinafter enacted. In addition, all Work prepared by Consultant shall conform to applicable City, county, state and federal laws, rules, regulations and permit requirements and be subject to approval of the Project Administrator and City.

29.3 Waiver. A waiver by either party of any breach, of any term, covenant or condition contained herein shall not be deemed to be a waiver of any subsequent breach of the same or any other term, covenant or condition contained herein, whether of the same or a different character.

29.4 Integrated Contract. This Agreement represents the full and complete understanding of every kind or nature whatsoever between the parties hereto, and all preliminary negotiations and agreements of whatsoever kind or nature are merged herein. No verbal agreement or implied covenant shall be held to vary the provisions herein.

29.5 Conflicts or Inconsistencies. In the event there are any conflicts or inconsistencies between this Agreement and the Scope of Services or any other attachments attached hereto, the terms of this Agreement shall govern.

29.6 Interpretation. The terms of this Agreement shall be construed in accordance with the meaning of the language used and shall not be construed for or

against either party by reason of the authorship of the Agreement or any other rule of construction which might otherwise apply.

29.7 Amendments. This Agreement may be modified or amended only by a written document executed by both Consultant and City and approved as to form by the City Attorney.

29.8 Severability. If any term or portion of this Agreement is held to be invalid, illegal, or otherwise unenforceable by a court of competent jurisdiction, the remaining provisions of this Agreement shall continue in full force and effect.

29.9 Controlling Law and Venue. The laws of the State of California shall govern this Agreement and all matters relating to it and any action brought relating to this Agreement shall be adjudicated in a court of competent jurisdiction in the County of Orange, State of California.

29.10 Equal Opportunity Employment. Consultant represents that it is an equal opportunity employer and it shall not discriminate against any subcontractor, employee or applicant for employment because race, religious creed, color, national origin, ancestry, physical handicap, medical condition, marital status, sex, sexual orientation, age or any other impermissible basis under law.

29.11 No Attorneys' Fees. In the event of any dispute or legal action arising under this Agreement, the prevailing party shall not be entitled to attorneys' fees.

29.12 Counterparts. This Agreement may be executed in two (2) or more counterparts, each of which shall be deemed an original and all of which together shall constitute one (1) and the same instrument.

[SIGNATURES ON NEXT PAGE]

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed on the dates written below.

APPROVED AS TO FORM:
CITY ATTORNEY'S OFFICE
Date: Jun 10, 2026

By: Jose Montoya
Jose Montoya (Jun 10, 2026 12:50:37 PDT)
Aaron C. Harp
City Attorney

ATTEST:
Date:_____

By:_____
Lena Shumway
City Clerk

CITY OF NEWPORT BEACH,
a California municipal corporation
Date:_____

By:_____
Lauren Kleiman
Mayor

CONSULTANT: Tetra Tech BAS, Inc., a California corporation
Date:_____

By:_____
Christine Arbogast
Chief Executive Officer

Date:_____

By:_____
Jeffrey Williams
Vice President/Chief Financial Officer

[END OF SIGNATURES]

Attachments: Exhibit A – Scope of Services
Exhibit B – Schedule of Billing Rates
Exhibit C – Insurance Requirements

EXHIBIT A
SCOPE OF SERVICES

At the City's discretion, the Consultant shall provide the following services for the operation, monitor, inspection, and maintenance of the closed landfill gas (LFG) control system at the Newport Terrace Condominium complex

Minimum Qualifications:

1. At least five (5) years of experience in providing professional monitoring, inspection, and maintenance services of a closed landfill gas control system.
2. Have qualified personnel who have prerequisite knowledge and experience.
3. Meet the insurance requirements detailed in the Agreement
4. Consultant shall maintain a City of Newport Beach business license during the term of the Agreement.

Project Description:

A. General Nature of the Work

The work involves environmental monitoring under the requirements of various regulations, preparing regulatory reports, as well as maintenance of system equipment as described in more detail below and in the attached Operation and Maintenance (O&M) Manual.

The primary objective of operation of the Newport Terrace LFG control system is to maintain methane concentrations of no more than five (5) percent in soil at the Site's boundary. A secondary objective of the LFG control system is to reduce emissions of non-methane organic compounds (NMOCs) of the collected LFG to less than 20 parts per million by volume (ppmv) (measured as hexane at 3% oxygen), or 98% destruction, thereby protecting air quality, pursuant to the systems Permits to Operate (Permits from the South Coast Air Quality Management District (SCAQMD). The LFG control system is to be operated in accordance with all provisions of the Permits and Title 27 regulations, under the jurisdiction of the Local Enforcement Agency (LEA), the Orange County Environmental Health Division.

In addition, it is the desire of the City and Newport Condominium Association (NCA) that the system be operated with minimal impact on the residents of the NCA condominiums, with respect to the potential for odor release or other nuisances, noise generation, etc.

In accordance with Site's approved SCAQMD Rule 1150.1 Compliance Plan, there are requirements for surface emissions monitoring.

Listed below are work items expected to be necessary on a routine (periodic) basis. There may be need for additional, non-routine services which may or may not be assigned to the Consultant(s) selected under this procurement.

B. Location of Project Site

The former landfill (Newport City Dump No.1 aka Newport Terrace Closed Landfill) is located at the corner of Balboa Boulevard and 19th Street in the City of Newport Beach (Site). The landfill is located under what is now the NCA Condominium complex.

C. Project Schedule/ Time of Performance

As directed and delegated by City Project Manager, Consultant shall be able to perform their assigned scope of services duties no later than July 1, 2026.

D. Working Hours

Normally scheduled work hours will be from 7:00 AM to 4:30 PM Monday through Thursday and 7:00 AM to 3:30 PM on Fridays. The selected Consultant shall provide a list of primary and secondary or alternate contact persons that the City would be able to contact during outside normal working hours to address problems, issues, or emergencies related to operations of the gas control system. Information should include the name and phone number of those assigned to the contract that are able to respond within two (2) hours of the City's initial contact and be on-site within four (4) hours, if necessary.

E. Description of Work Items

Items # 1 through 7 include the individual task items that may be assigned to complete all operation, monitoring, and maintenance work in accordance with the attached Operations and Maintenance (O&M) Manual. In Exhibit B, Schedule of Billing Rates, the lump sum prices shall include full compensation for furnishing the labor, materials, tools, and equipment to complete all components of the work.

ITEM # 1 ROUTINE MONITORING AND (AIR) SAMPLING SERVICES

Monitoring Pursuant to Regulations and as described in the O&M Manual (See attached O&M Manual for the LFG System)

On a Monthly Basis, the Consultant may be assigned and shall perform the following:

Monitor Approximately 20 extraction wells for:

- Methane
- Carbon Dioxide
- Oxygen
- Balance Gas
- Static Pressure
- Temperature
- System Pressure

Monitor H_2S wells (Extraction Well Nos. 12, 13, 13S, 14, 15 and 15S) for:

- H_2S, as well as the parameters listed above for all wells

Monitor Approximately 80 monitoring probes in 40 monitoring wells for:

- Methane
- Carbon Dioxide
- Oxygen
- Balance Gas
- Static Pressure

Monitor landfill gas treatment system inlet and exhaust for:

- Methane
- Carbon Dioxide
- Oxygen
- Balance Gas
- Static Pressure
- Temperature

Monitor Sula-treat System exhaust for:

- Sulfur compounds as H_2S

Sample and analyze carbon absorber inlet and outlet:

- Sample using a method conforming to CARB Method 422 or equivalent
- Analyze using EPA Method TO14 or other SCAQMD approved method for:
    - Volatile Organic Compounds (Total Gaseous Non-Methane Organics)
    - Speciate for Rule 1150.1 toxic air contaminants

  Note: Costs for laboratory analyses are to be listed separately in the Cost File Proposal Quotation Form

Monitor carbon absorber outlet for:

- Total non-methane hydrocarbons using an organic vapor analyzer equipped with a photo ionization detector or other approved method
- Chloroform
- Vinyl Chloride
- Hydrogen Sulfide
- Total Non-Methane Organic Compounds

On a Quarterly Basis, the Consultant may be assigned and shall perform the following:

Obtain laboratory analyses of a gas sample from a monitoring probe of:

- Toxic Air Contaminants (TAC) from the probe with the highest concentration during any one of the monthly monitoring events during the quarter.
- Total Organic Compounds (TOCs) – if during the monthly monitoring events the TOC concentration measured with a Flame Ionization Device or approved alternative instrument exceeds 5% by volume in any of the probes, a single sample from the probe with the highest concentration.

<u>Additional Monitoring and Inspection Parameters</u>

On a Monthly Basis, the Consultant may be assigned and shall perform the following:

- **Monitor four (4) condensate sumps**
    - Check counters at each location to ensure pumps are operating properly
    - Inspect condition

- **Treatment System**
  - Check air compressor to ensure it is working properly
  - Check oil and blow-down valve to ensure they are working properly
- **Switch Blowers – alternate operation to extend life**
- **Download flow meter (Yokogawa) data**

A more complete description of monitoring and as-needed maintenance activities is presented in Section 6 of the O&M Manual and summarized in Tables 6a and 6b of that document. The equipment which will require periodic inspection and maintenance include, but is not limited to, the air compressor (for the pneumatic condensate system); blowers; flame arrestor; moisture separator; electrical controls; gauges and sampling ports; piping, valves, and fittings (extraction wells, monitoring wells/probes); the carbon absorption and sulfa-treat units; the automated flow meter; and the automated sumps.

The operator is responsible for the equipment being in working order and for the general condition of the physical facilities of the system.

On a Quarterly Basis, the Consultant may be assigned and shall perform the following

- Calibrate methane and H_2S sensors (general monitors) in blower station

Reporting

Monthly Basis

- Prepare a report of all monitoring activities and submit report to the City of Newport Beach Project Manager, NCA liaison/Board President, and the Orange County Health Care Agency (the LEA)

Quarterly Basis

- Prepare the Rule 1150.1 monitoring report and submit it to the SCAQMD within 45 days of the end of the quarter.

The Consultant will be expected to make appropriate adjustments to the applied vacuum on the wellfield and at individual wells to accomplish the operating objectives and optimize the life of equipment.

The Consultant will be required to prepare a Health and Safety Plan (HASP) to cover all work performed under this contract. All work is to be performed in a manner which conforms to appropriate industry standards for quality control. Monitoring and laboratory work shall be performed pursuant to procedures and documentation of quality control as may be required by the relevant regulatory agencies (e.g., SCAQMD, CIWMB).

Note: the cost for routine services described above, including quarterly services and reporting, are to be included in the annual lump sum cost for this item.

ITEM # 2 LABORATORY ANALYSES

Costs for laboratory analyses (e.g. Rule 1150.1 TACs) are listed separately in Exhibit B – Schedule of Billing Rates. It is expected that the number and frequency of laboratory analyses will change during the time period of the contract.

ITEM # 3 LANDFILL GAS SOURCE TEST

Under the terms of the SCAQMD Permit to Operate, the Consultant is to perform (or subcontract for) the annual source test. This requires testing inlet and outlet gas for: methane, TGNMOs, Rule 1150.1 TACs, total sulfur, moisture content, temperature, flow rate, and oxygen.

ITEMS #4 & #5 CARBON AND SULFA-TREAT CHANGE-OUT

The activated carbon treatment and Sulfa-Treat media will need to be replaced from time to time pursuant to requirements of the SCAQMD Permits. The Exhibit B – Schedule of Billing Rates includes a unit cost for each of these events.

ITEM # 6 NON-ROUTINE AND EMERGENCY SERVICES

The Consultant shall perform repairs and modifications to the system as may become required for prudent system operation. Such work will be compensated on a time-and-materials (T&M) basis in accordance with a rate schedule to be approved by the City. Consultant's rate schedule is attached to the Exhibit B – Schedule of Billing Rates for T&M services. Consultant's rate schedule shall include employee and/or position and equipment hourly rate for normal and off hours (overtime). (Please note that City policy does not reimburse Consultant mileage.)

Where possible, the Consultant will be asked to submit a description of non-routine work and an estimate of its costs to the City, as far in advance as practical, and obtain the City's approval prior to proceeding with the work. The City may, at its discretion, but in consultation with Consultant(s), elect to perform some work with its own staff or consultants.

Emergency repair – from time to time it will be necessary for the Consultant to respond to problems at the Site without advance City approval ("call-outs"). These activities will also be compensated on a T&M basis. The Consultant shall notify the City immediately in case of such an event.

ITEM # 7 ENGINEERING SERVICES

At the discretion of the City Project Manager, Consultant may be assigned to provide additional professional services for design and construction of system repair projects, assistance with regulatory reporting and permitting, capital improvement planning and other services as required to maintain the system.

Such work will be compensated on a time-and-materials (T&M) basis in accordance with the rate schedule to be approved by the City. Consultant's rate schedule shall include employee and equipment hourly rate for normal and off hours. (Note that City policy does not reimburse Consultant mileage.)

F. Safety Requirements

The Consultant shall be solely and completely responsible for conditions of the job-site, including safety of all persons (including Consultant's employees and sub-Consultants) and property during performance of the work. The Consultant shall fully comply with all State, Federal and other laws, rules, regulations, and orders relating to the safety of the public and workers.

The principal components of LFG are methane and carbon dioxide; other gases which may be found in lesser amounts are hydrogen sulfide, organic acids and gases, and nitrogen. Hydrogen sulfide is HIGHLY TOXIC; the other acidic gases and organic vapors should also be treated as toxic and hazardous. In concentrations of 5 to 15 percent by volume in air, methane may explode when ignited by a spark or other ignition source. In addition, LFG can displace oxygen in confined spaces. Confined spaces within which oxygen levels are below 19 percent by volume should not be entered.

The attached Operations and Maintenance Manual does not contain a Health and Safety Plan (HASP), nor does it contain lock-out, tagout procedures. The LFG system operator needs to develop a site-specific HASP (including lock-out, tagout procedures) based on analysis of the existing site conditions.

G. Inspection and Approval

All work and materials required shall be subject to inspection and approval of the City Project Manager or representative designee.

ATTACHMENTS

The following pages contain attachments relevant to this project:

A. Operations and Maintenance Manual

B. Site Map

SCS ENGINEERS

Newport Terrace Landfill

Operation and Maintenance Manual Landfill Gas Control System

Prepared for:

City of Newport Beach

Utilities Department
3300 Newport Boulevard
P.O. Box 1768
Newport Beach, CA 92658-8915

and

Newport Condominium Association

Action Community Management
29B Technology Drive, Suite 100
Irvine, CA 92618

Prepared by:

SCS ENGINEERS
3900 Kilroy Airport Way
Suite 100
Long Beach, CA 90806-6816
(562) 426-9544

File No. 01201221.08
March 13, 2009

Revised by:

City of Newport Beach
November 8, 2011

Newport Terrace Landfill

Operation and Maintenance Manual
Landfill Gas Control System

Prepared for:

City of Newport Beach
Utilities Department
3300 Newport Boulevard
P.O. Box 1768
Newport Beach, CA 92658-8915

and

Newport Condominium Association
Action Community Management
29B Technology Drive, Suite 100
Irvine, CA 92618

Prepared by:

SCS ENGINEERS
3900 Kilroy Airport Way
Suite 100
Long Beach, CA 90806-6816
(562) 426-9544

File No. 01201221.08
March 13, 2009

Revised by:

City of Newport Beach
November 8, 2011

Table of Contents

List of Figures

List of Tables

Appendices

1 INTRODUCTION

1.1 OPERATION AND MAINTENANCE MANUAL OBJECTIVES

The City of Newport Beach (City) has entered into an agreement with Newport Condominium Association, Inc. (NCA) to operate and maintain the LFG collection and control system at the Newport Terrace Landfill.

The purpose of this manual is to familiarize the reader with and to provide step-by-step instructions for the operation, maintenance, and monitoring of the Landfill Gas (LFG) control system at the Newport Terrace site.

It is recommended that qualified, experienced professionals operate, maintain, and monitor the system, especially if LFG is detected at or outside the property boundary or if the system is modified significantly. It is further recommended that this manual be updated periodically to reflect the current operating conditions, such as for a change in operation, when extensive reconstruction or modifications have been made, when maintenance or monitoring events provide new information, changes in regulations, or other important events occur that may affect the monitoring regime. At a minimum, the manual should be reviewed annually to determine if modifications are needed.

1.2 APPLICABLE PERMITS AND REGULATIONS

The LFG system at Newport Terrace operates under the following permits issued by the **South Coast Air Quality Management District (AQMD)**:

1.2.1 No. F85011, Issued November 6, 2006 (Appendix C)

This "Permit to Construct/Operate" principally addresses the LFG treatment (carbon adsorption and system, setting requirements for operation, monitoring and reporting). A summary of requirements follows.

- LFG flow through the treatment system shall not exceed 375 standard cubic feet per minute (scfm).
- Concentration of total non-methane organic compounds (TNMOC) in inlet gas (before treatment) shall not exceed 250 parts per million by volume (ppmv) measured as hexane.
- Concentration of TNMOC after treatment shall not exceed 20 ppmv measured as hexane at 3 percent oxygen, or shall be reduced by at least 98 percent by weight (relative to inlet concentration).
- Annual source test required (see Item #10 in Permit, **Appendix C**).
- Monthly sampling of inlet and treated gas for volatile organic compounds (methane and TNMOC) and Toxic Air Contaminants (TACs).

- Monthly sampling of Sulfa-Treat system exhaust for sulfur compounds (as hydrogen sulfide).

- Emissions at the treatment exhaust shall not exceed the following concentrations:

  - Chloroform 0.10 ppmv
  - Vinyl Chloride 0.17 ppmv
  - Hydrogen Sulfide 0.1 ppmv

- If TNMOC concentration at the outlet of the primary (lead) adsorber exceeds 20 ppmv, the carbon in the primary adsorber shall be replaced or the vessels rotated (see Item #16 in Permit).

1.2.2 No. F85012, Issued November 2, 2006 (Appendix D)

This "Permit to Construct/Operate" principally addresses the LFG collection. It sets conditions for the construction/installation of extraction wells and collection piping, principally to prevent nuisances and air quality impacts during underground construction (drilling and trenching). The Permit allows for a control system of up to 75 vertical extraction wells (the newly installed system has 15). The future construction of additional wells (if needed for additional control and/or replacement of failed wells) would need to conform to this Permit.

1.2.3 Rule 1150.1 Compliance Plan, Issued December 17, 1999 (Appendix G)

AQMD Rule 1150.1 addresses surface emissions and lateral (subsurface) migration of LFG. All of the surface emissions monitoring requirements contained in Rule 1150.1 have been waived by the AQMD for the Newport Terrace site (see **Appendix G**). Monthly perimeter probe monitoring is required, which is duplicative of requirements under CCR Title 27 (see next section).

However, the Rule 1150.1 Plan does add these requirements to the routine probe monitoring:

- Obtain laboratory analyses of a gas sample from a monitoring probe:

  - Toxic air contaminants (TAC) from the probe with the highest concentration during any one of the monthly monitoring events during the quarter.

  - Total Organic Compounds (TOCs) – if the TOC concentration measured with a Flame Ionization Device or approved alternative instrument exceeds 5 percent by volume in any of the probes, a single sample from the probe with the highest concentration (from the monthly monitoring events during the quarter).

1.2.4 California Code of Regulations (CCR), Title 27

These regulations govern subsurface lateral gas migration, and are administered by the local enforcement agency (LEA), in this case the Orange County Environmental Health.

Conformance requires monthly monitoring and reporting of perimeter gas migration probes. Methane concentrations in the probes may not exceed 5 percent by volume.

1.3 SITE LOCATION AND PHYSICAL DESCRIPTION

The Newport Terrace Landfill (Newport Terrace) is located at corner of Balboa Boulevard and 19th Street in the City of Newport Beach, CA (see **Figure 1**). The site contains the Newport Terrace Condominium complex that consists of 62 residential buildings containing between two to eight condominium units each, parking garages and ancillary buildings. All units are residential use and many families live in them. It is assumed that most are owner-occupied; however, some are rental units. The condominium complex was constructed at the site in 1972; prior to that, it was vacant land partially used for aggregate mining and land-filling (until 1967).

A portion of the condominium complex overlies an inactive municipal solid waste (MSW) landfill, operated in the 1960's and 1970's. The landfill actually has two distinct areas: (1) the main landfill, and (2) the "rubble fill," which received principally inert waste. The areas are delineated on **Figure 2**. An LFG system was installed in landfill areas in the early 1980's to protect the surrounding residential improvements.

A substantial reconstruction/replacement of the LFG system was initiated in September 2007 and completed in May 2008. The new system consists of 15 gas extraction wells, associated underground collection piping, four pneumatic condensate traps, and an indoor treatment facility consisting of blowers, hydrogen sulfide removal and carbon adsorption equipment. The system also contains cross-connections to allow extraction from portions of the previously existing gas control system. In addition, about 40 gas migration monitoring wells (including about 80 probes) exist at the site. A complete set of as-built drawings of the reconstructed LFG system is contained in Appendix A.

The new system was constructed pursuant to corrective action ordered by the Orange County Local Enforcement Agency (LEA), the California Integrated Waste Management Board (CIWMB), and permits from the South Coast Air Quality Management District (SCAQMD)

.

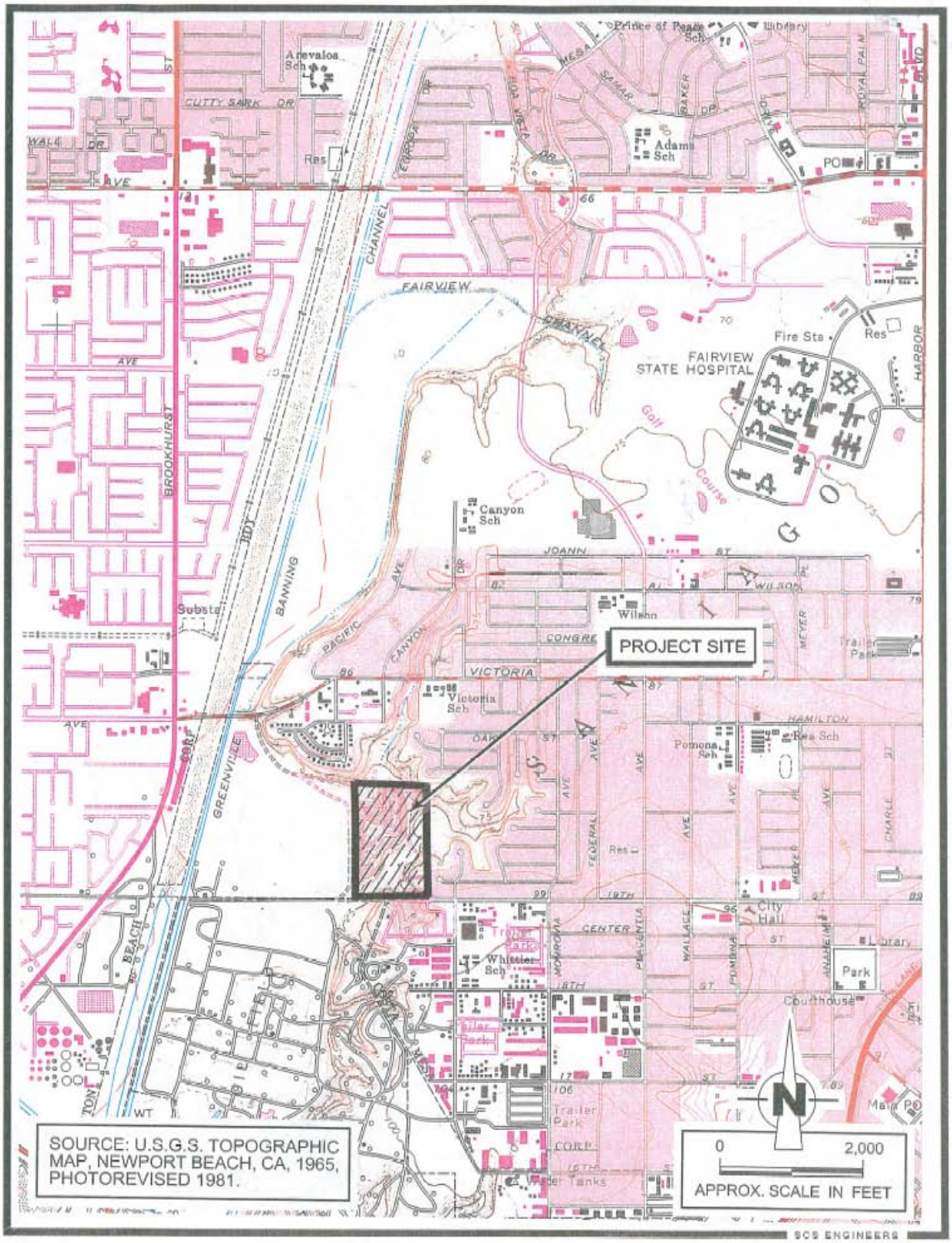

Figure 1. Project Site Location.

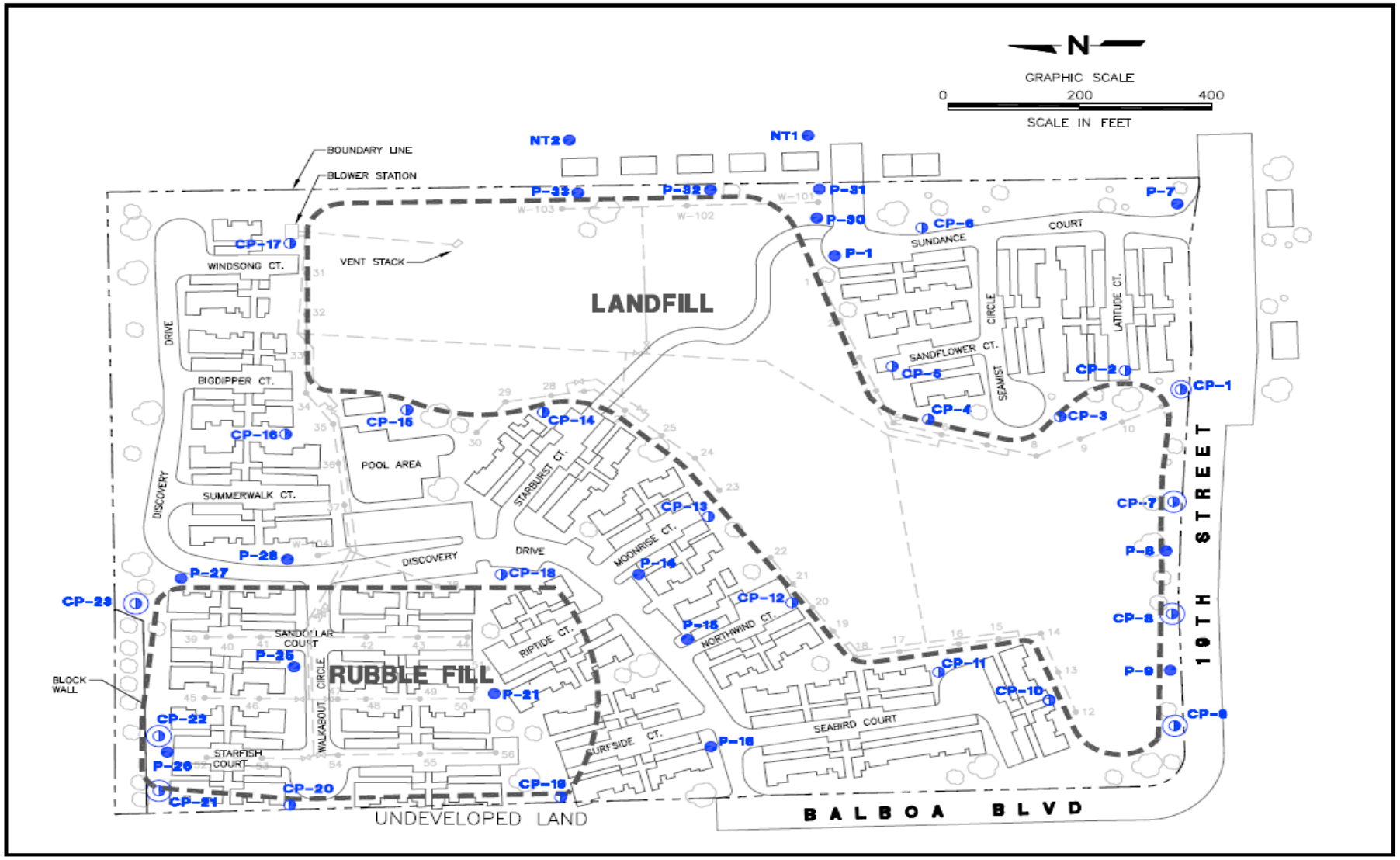

Figure 2. Probe Locations and Outline of Fill Areas.

1.4 SITE OWNER/OPERATOR

The City of Newport Beach both owns and operates the LFG control system, although the NCA owns the property. The contact person for the City is:

George Murdoch
City of Newport Beach
Municipal Operations Department
3300 Newport Boulevard
P.O. Box 1768
Newport Beach, CA 92658-8915
(949) 644-3011

1.5 LANDFILL GAS HAZARDS

LFG is produced as part of the decomposition processes that occur following the burial of organic refuse materials. LFG contains methane which is a flammable gas – if exposed to an ignition source, methane is explosive at concentrations between 5 and 15 percent v/v, the so-called lower and upper explosive limits (LEL and UEL). An LFG mixture is flammable at higher methane concentrations.

Production of LFG can create pressure within the landfill which acts as a driving force, pushing LFG into surrounding soils, which can result in off-site subsurface movement (migration). The placement of cover soil or other means of capping (i.e., pavement or landscaping) over the landfill site or adjacent areas reduces free venting of LFG to the atmosphere and promotes lateral LFG migration toward off-site locations.

Methane migrating through soils from landfill sites may pose a safety threat if it is allowed to infiltrate into an enclosed space, and is ignited by a spark or other ignition source. Methane can accumulate in buildings above the ground surface, particularly in wall spaces.

The distance and speed of LFG migration are functions of the rate of gas generation, characteristics of the landfill cover (which regulates internal pressure buildup), the elevation of groundwater, and the permeability of adjacent soils. The composition of the waste and the availability of moisture are the principle factors determining the amount of LFG generated. Construction debris with low organic content produces a small volume of gas, whereas municipal wastes with a high organic content can produce substantial volumes of LFG. The age of the landfill also affects the rate of gas generation. Decomposition of refuse, and the resulting gas generation, will slow over time as the organic fraction of the waste is consumed. It has been observed that significant gas production and the potential for a migration problem may proceed for 20 to 50 years after the placement of refuse in the landfill site.

The LFG system at Newport Terrace was installed to control potential off-site subsurface migration.

As generated, LFG is primarily composed of 45 to 60 percent methane and 40 to 55 percent carbon dioxide. In older landfills, such as Newport Terrace, the LFG is often naturally diluted

with nitrogen and oxygen due to air intrusion into the waste mass. LFG also includes small amounts of ammonia, sulfides, hydrogen, carbon monoxide, and non-methane organic compounds (NMOCs) such as trichloroethylene, benzene, and vinyl chloride. **Table 1** lists typical landfill gases, their percent by volume, and their characteristics.

NMOCs consist of hazardous air pollutants (HAPs) and volatile organic compounds (VOCs), which can react with sunlight to form ground-level ozone (smog) if uncontrolled. Some of the NMOCs also are odorous. Rule 1150.1 identifies a list of specific Toxic Air Contaminants (TACs) which must be sampled for within collected and treated gas, as well as at probes (see Section 1.2.1 and 1.2.3).

Table 1. Typical Landfill Gas Components

Component	Percent by Volume	Characteristics
Methane	45–60	Methane is a naturally occurring gas. It is colorless odorless, and can be explosive. Landfills are the single largest source of U.S. man-made methane emissions.
Carbon Dioxide	40–55	Carbon dioxide is naturally found at small concentrations in the atmosphere (0.03%). It is colorless, odorless, and slightly acidic.
Nitrogen	2–5	Nitrogen comprises approximately 79% of the atmosphere. It is odorless, tasteless, and colorless.
Oxygen	0.1–1	Oxygen comprises approximately 21% of the atmosphere. It is odorless, tasteless, and colorless.
Ammonia	0.1–1	Ammonia is a colorless gas with a pungent odor.
Non-Methane Organic Compounds (NMOCs)	0.01–0.6	NMOCs are organic compounds (i.e., compounds that contain carbon). (Methane is an organic compound but is not considered an NMOC.) NMOCs may occur naturally or be formed by synthetic chemical processes. NMOCs most commonly found in landfills include acrylonitrile, benzene, 1,1-dichloroethane, 1,2-cis dichloroethylene, dichloromethane, carbonyl sulfide, ethyl-benzene, hexane, methyl ethyl ketone, tetrachloroethylene, toluene, trichloroethylene, vinyl chloride, and xylenes.
Hydrogen Sulfide	0–1	Hydrogen sulfide and other sulfur compounds (e.g., dimethyl sulfide, mercaptans) are commonly found in landfills that give the landfill gas mixture its rotten-egg smell. Sulfides can cause unpleasant odors even at very low concentrations.

Table 1. Typical Landfill Gas Components

Component	Percent by Volume	Characteristics
Hydrogen	0–0.2	Hydrogen is an odorless, colorless gas.
Carbon Monoxide	0–0.2	Carbon monoxide is an odorless, colorless gas.

Source: Tchobangolous, Theisen, and Vigil 1993; EPA 1995.

1.5.1 Landfill Gas Levels at Newport Terrace

At Newport Terrace, with the installation of the new vertical wells and collection piping, the concentration of methane in the collected gas is averaging **about 4 to 5 percent**. (Before the 2007-08 modification of the system, the gas collected usually contained methane concentrations under 1.0 percent by volume, because (a) the collection piping had deteriorated over the years, allowing air intrusion; and (b) the original trench collectors were very shallow, and the system was located at the margins of refuse burial, possibly in native soil.)

At Newport Terrace, based on monitoring performed since start-up of the new system, total NMOCs have been detected in the area of 40 ppmv (after carbon adsorption the concentrations have been reduced to under 10 ppmv). TACs in the collected gas have been consistently been detected at the levels (parts per billion, ppbv) shown in **Table 2**.

Table 2. Non-Methane Organic Compounds Detected at Newport Terrace

Compound	Average Level Detected (ppbv)
Benzene	10.0
Chlorobenzene	2.0
Dichlorobenzenes	15.0
Dichloromethane	1.5
Perchloroethylene	3.0
Toluene	50.0
Tricholorothene	3.0
Chloroform	10.0
Vinyl Chloride	5.0
m+p xylenes	90.0
o-xylene	30.0

After treatment, all levels decline to single-digit ppbv or non-detectable, with the exception of Vinyl Chloride, which remains at the 5.0 ppbv level, but well below the AQMD permit standard of 170 ppbv (0.17 ppmv). Hydrogen sulfide has not been detected in significant amounts.

Title 27 of the California Code of Regulations (27 CCR), Section 20917, requires all municipal solid waste landfill operators to ensure that the concentration of methane gas generated from their landfill does not exceed 1.25 percent (by volume in air) in all on-site enclosed structures, excluding LFG control structures, nor 5 percent (by volume in air) in soils at the property boundary.

Further, air quality regulations have been adopted which limit the amount of LFG that can be released into the atmosphere. SCAQMD Rule 1150.1 supports Title 27 by requiring subsurface monitoring, but also addresses surface emissions monitoring (although Newport Terrace is largely exempt due to its age.)

2 DESCRIPTION OF LFG CONTROL SYSTEM

2.1 SYSTEM OBJECTIVES AND GENERAL DESCRIPTION

The primary objective of the Newport Terrace LFG system is to maintain methane concentrations of no more than 5 percent at the property boundary. The secondary objective of the system is to reduce emissions of non-methane organic compounds (NMOCs) of the collected LFG to less than 20 parts per million by volume (ppmv) (measured as hexane at 3 percent oxygen) or 98 percent destruction, thereby protecting air quality. The reduction of NMOC emissions is accomplished via the newly installed carbon adsorption units.

These objectives meet the goals of regulations which govern the site, primarily those summarized below:

- **California Code of Regulations (CCR) Title 27, Section 20917 et seq.** This code requires the site owner to monitor for the presence or movement of subsurface LFG toward off-site locations. The monitoring is typically accomplished through installation of probes at the property boundary. This code also requires the owner to maintain a methane concentration of 5 percent or less at the property boundary and a methane concentration of 25 percent or less within on-site structures.

  The Local Enforcement Agency (LEA) administers the above regulation for the state. The LEA for the Newport Terrace site is the:

  Orange County Health Care Agency
  Environmental Health Division
  1241 East Dyer Road, Suite 120
  Santa Ana, CA 92705
  (714) 433-6000

- **South Coast Air Quality Management District (AQMD) Rule 1150.1 Compliance Plan.** The Newport Terrace site applied for a Rule 1150.1 Compliance Plan (Application #355993) which was approved on December 17, 1999. This plan describes compliance procedures for control of gaseous emissions from municipal solid waste landfills. The plan may be referenced in **Appendix G**.

  South Coast Air Quality Management District
  21865 Copley Drive
  Diamond Bar, CA 91765
  (909) 396-2000

The Newport Terrace LFG Control System consists of three major components:

- **Monitoring Probes.** Thirty-nine multi-depth monitoring wells, three containing three nested probes and the rest containing two probes, have been installed around the site boundary. (Note: These probes were all in place prior to the 2007-08 system upgrade.)

- **Extraction Wells.** Seventeen vertical extraction wells have been installed at the landfill. Fifteen of the extraction wells were constructed in 2008 and two shallow extractions wells were constructed in 2011. The previously installed horizontal collectors are connected to the new system, and can be utilized in conjunction with the new wells, although their condition is not known.

- **Blower Station.** A blower station is located in the Northwest corner and contains blower equipment, activated carbon adsorption units, a Sulfatreat system, and condensate separation equipment, all installed as part of the 2007-08 construction.

Record drawings for the system installed in 2008 are attached in **Appendix A**.

2.2 MONITORING PROBES

Monitoring probes are located outside of refuse around the site perimeter. (These probes were part of the original LFG system and pre-date the 2008 construction). All the probes are multi-depth and contain casings which are capable of providing readings for different subsurface zones. Five of the probes contain three casings. The data that is known about the probes, including depth where available, is listed in **Table 3**. Probe locations are shown on **Figure 2**.

Table 3. Monitoring Probe Data

Probe	Material	Depth (ft)	Notes
CP-01A	1/2 PVC	8.51	
CP-01B	1/2 PVC	25.3	
CP-01C		40.23	PVC
CP-02A	Tubing		
CP-02B	Tubing		
CP-03A	Tubing		
CP-03B	Tubing		
CP-04A	Tubing		
CP-05A	Tubing		
CP-05B	Tubing		

Table 3. Monitoring Probe Data

Probe	Material	Depth (ft)	Notes
CP-06A	Tubing		Vault cover broken, not marked
CP-06B	Tubing		Vault cover broken, not marked
CP-07A	¾ PVC	9.31	
CP-07B	¾ PVC	25.25	
CP-07C	¾ PVC	40.26	
CP-08A	¾ PVC	10.23	
CP-08B	¾ PVC	25.26	
CP-08C	¾ PVC	39.92	
CP-09A	¾ PVC		
CP-09B	¾ PVC	21.2	
CP-09C	¾ PVC	38.95	
CP-10A	Tubing		
CP-10B	Tubing		
CP-11A	Tubing		
CP-11B	Tubing		
CP-12A	-		
CP-12B	-		
CP-13A	Tubing		
CP-13B	Tubing		
CP-14A	Tubing		
CP-14B	Tubing		
CP-15A	Tubing		No Valves
CP-16A	Tubing		
CP-16B	Tubing		
CP-17A	Tubing		
CP-17B	Tubing		
CP-18A	1/2 PVC	15	
CP-18B	1/2 PVC	23	

Table 3. Monitoring Probe Data

Probe	Material	Depth (ft)	Notes
CP-19A	Tubing		
CP-19B	Tubing		
CP-20A	Tubing		
CP-20B	Tubing		
CP-21A	3/4 PVC		
CP-21B	3/4 PVC		
CP-22A	-		
CP-22B	-		
CP-23A	1/2 PVC		
CP-23B	1/2 PVC		
CP-23C	1/2 PVC		
CP-1C	Tubing		
CP-4B	Tubing		
CP-7C	3/4 PVC		
CP-8C	3/4 PVC		
CP-9C	3/4 PVC		
P-1A	Tubing		
P-1B	Tubing		
P-7A	Tubing		
P-7B	Tubing		
P-8A	Tubing		
P-8B	Tubing		
P-9A	Tubing		
P-9B	Tubing		
P-14A	Tubing		
P-14B	Tubing		
P-15A	Tubing		
P-15B	Tubing		

Table 3. Monitoring Probe Data

Probe	Material	Depth (ft)	Notes
P-16A	Tubing		
P-16B	Tubing		
P-21A	Tubing		
P-21B	Tubing		
P-25A	Tubing		
P-25B	Tubing		
P-27A	Tubing		Plugged
P-26A	Tubing		
P-26B	Tubing		
P-27B	Tubing		
P-28A	Tubing		
P-28B	Tubing		Water Blocked
P-30A		5	
P-30B		15	
P-31A	3/4 PVC	5	
P-31B	3/4 PVC	15	
P-32A	3/4 PVC	5	
P-32B	3/4 PVC	15	
P-33A	1/2 PVC	5	
P-33B	1/2 PVC	15	

2.3 EXTRACTION WELLS

The vertical extraction wells (EW) numbers 1, 2, 3, 4, and 5 are located within the refuse footprint (boring logs confirm intercepting refuse). EW 6 through 11 are in soils outside the perimeter of refuse placement. EW 12, 13, 14 and 15 were completed in the rubble fill area. The wells depths are shown in **Table 4**, and each contains a casing perforated in the lower 1/3 zone, approximately (see boring logs, **Appendix B**).

Table 4. Extraction Well Casing Depths

Well No.	Depth (ft)
EW-1	30
EW-2	30
EW-3	20
EW-4	29
EW-5	29
EW-6	29
EW-7	29
EW-8	29
EW-9	29
EW-10	29
EW-11	29
EW-12	29
EW-13	20
EW-13S	12
EW-14	23
EW-15	20
EW-15S	12

With the exception of EW-13S and EW-15S, the remaining extraction well casings are made of 3-inch-diameter solid Schedule 80 PVC pipe, with the bottom third made of 3-inch-diameter slotted Schedule 80 PVC pipe (a detail is shown in the system drawings, **Appendix A**). The casings for extraction wells EW-13S and EW-15S are made of 4-inch-diameter solid Schedule 40 PVC pipe, with the bottom 4 feet made of 4-inch-diameter slotted Schedule 40 PVC pipe. The well casing is installed straight and plumb in the center of the borehole. Wells EW-13S and EW-15S have 8-inch diameter boreholes; wells EW-12 through EW-15 have 12-inch boreholes; and, remaining wells have 18-inch diameter boreholes. The annular space surrounding the slotted well casing is filled with specified filter pack consisting of clean gravel backfill 1 foot above the top of the slotted casing. The gravel backfill is then covered with a 1-foot layer of clean soil, followed by a 3-foot bentonite plug. The casing is backfilled with soil up to 4 feet 6 inches below ground surface, and an additional 2-foot bentonite plug is then placed. The well is

completed by installing a valve box with concrete surround and a gravel base. A control valve and monitoring tubing with labcock valves are also installed with a valve box.

2.4 BLOWER STATION

The blower station is located within a building with locking doors. Four blowers, a moisture separating tank, two activated carbon adsorber units, a sulfatreat system, and electrical controls are located within the blower station. Highlights of the major blower station components are given below.

2.4.1 Moisture Separating Tank

The first equipment LFG reaches in the station is the moisture separator (knockout) vessel. The LFG is introduced into the knockout near the midpoint and exhausted at the top. While rising through the tank, condensate and particulates are removed from the gas stream through a filter (demister). This condensate drains from the knockout bottom to a pipe and flows by gravity to the condensate sump (CS-1).

2.4.2 Blowers

Four blowers are installed in the station. There are two CP404M H_2S blowers and two CP808 LFG blowers. Information on the blowers is provided below.

Motor Model Numbers:

H_2S blowers:
Rotron; Saugerties, NY 12477
CP-404FQ58MLR - 1.0 hp
115/230 V, 60 Hz, 1 Phase
107 cfm capacity each

Type: Sealed Regenerative w/Explosion-Proof Motor

LFG Blower #1:
Airtech; Englewood, NJ 07631
3BA1630 - 5 hp
208-230/460 V, 60 Hz, 3 Phase
225 cfm capacity

VFD
Direct Drives & Controls,
Orange, CA 92865
Hitachi X200-075LFU2 - 10 hp
230 V input Single Phase/
230 V output 3 Phase

LFG Blower #2:
Rotron; Saugerties, NY 12477
CP-808FX5MWLR - 5.5 hp
230 V, 60 Hz, 1 Phase
300 cfm capacity

2.4.3 Activated Carbon Adsorption Units

Two skid mounted activated carbon adsorption units (vessels), installed in series, are located within the blower station, each containing 2,000 lbs of material. The carbon is R 4X8 series granular activated carbon (GAC) from Baker Filtration. The purpose of the activated carbon is

to remove the non-methane organic compounds (NMOCs) of the LFG by adsorption. A sampling port is provided at the exhaust side of each unit to monitor the carbon performance. Upon detection of unacceptable levels of NMOCs at the first vessel exhaust which is specified in the AQMD permit as 20 ppm as hexane (see **Appendix D**), the material is considered exhausted and the unit contents must be removed and reloaded with fresh (regenerated) GAC.

The LFG passes through each adsorption unit in series, and the units are intended to operate as a primary unit and secondary unit. When carbon in the primary becomes "saturated," i.e., can no longer adsorb NMOCs, "breakthrough" will be detected and the secondary unit becomes the principal adsorber.

At that point, fresh carbon should be ordered for the primary unit; and after it has been replaced, the flow should be reversed (using the available valves), so that the secondary unit becomes the primary. (For example, if the system is running with gas flowing from Vessel A to Vessel B, when the gas exiting Vessel A exceeds 20 ppm NMOCs, replacement carbon should be ordered and put into Vessel A, then the system should be reversed such that the gas flows from Vessel B to Vessel A.) The LFG control system must be shut down during unloading and reloading of carbon.

2.4.4 Sulfatreat System

One skid mounted sulfur absorber is located within the blower station, containing 2,000 lbs of material ("Sulfatreat"). The purpose of the Sulfatreat system is to remove the sulfur compounds of the LFG collected in header line "B". A sampling port is provided at the exhaust and intake sides to monitor the Sulfatreat performance. The discharge of the Sulfatreat system is into the carbon adsorption units. Upon detection of unacceptable levels of sulfur measured as H_2S at the Sulfatreat exhaust ("breakthrough") which is specified in the AQMD permit – a maximum of 0.1 ppmv sulfur at the exhaust of the carbon system (see **Appendix D**) – the material is considered exhausted and the unit contents must be removed and reloaded with fresh Sulfatreat material.

The LFG control system serving Line B is shut down during unloading and reloading of Sulfatreat material in the unit.

2.5 SITE SECURITY

The blower facility is contained within a lockable building – keys are maintained by the city staff and its contractors. The building doors are connected to an alarm system – entry sends a signal to the city Utilities Department. Authorized personnel are issued two keys – one to enter the building and a second to suppress the alarm.

The operations contractor is be responsible for ensuring appropriate signage is placed on the exterior of the blower facility (e.g. "Keep Out").

Well control valves, monitoring probes, condensate sumps are contained in valve/utility boxes as illustrated on the as-builts (see **Appendix A**), and require a lifting tool and wrench to access.

3 LFG CONDENSATE HANDLING SYSTEM

3.1 LFG CONDENSATE

LFG condensate is a liquid which develops as LFG cools while flowing in the collection system. It is mostly water but contains some dissolved organics and often is acidic (due to carbon dioxide in the LFG). LFG condensate must be removed from the collection piping system or it could collect in low points and cause gas flow blockage. Condensate shall be disposed of as hazardous waste unless otherwise determined by laboratory tests.

3.2 GAS CONDENSATE HANDLING SYSTEM DESCRIPTION

Condensate collection facilities are shown on Sheets 3 (location) and 5 (details) of the system drawings (**Appendix A**). To collect and remove LFG condensate, four sumps (CS-1 through -4) are incorporated into the collection header (Line A), and a moisture knockout is located in the blower station. The sumps are pneumatic in operation – air is supplied from a compressor in the blower station and via HDPE pipes in the collection header trenches. When the liquid level in the sump reaches a certain point, a float-control valve activates the air supply to the pneumatic pump, and liquid is pumped back into the header to continue flowing downhill to the next sump/low point, where the process is repeated.

At the downhill end of the header system (past EW 11), the liquid is pumped out of the last trap to a discharge line which runs north into an existing city sewer manhole in the condominium development in Seabird Court.

For Line B, condensate is allowed to drain back into EW 14.

In the blower station, all gas travels through the condensate knockouts (one each for Line A and B). The condensate flows by gravity to CS-1 where it is pumped into the header to ultimately flow to the city sewer.

3.3 HANDLING LFG CONDENSATE

LFG condensate may contain many trace chemicals and be highly biologically active. Appropriate protective gloves and splash protection equipment should always be employed when working with LFG condensate. Operating personnel should always avoid direct skin contact.

4 SYSTEM OPERATION

4.1 OPERATIONAL CRITERIA

The Newport Terrace LFG Control System operational criteria are based on the system design, regulatory requirements, and past experience with other LFG extraction systems. The criteria summarized below follow the AQMD Permit to Construct/Operate (PTO) (see **Appendices C and D**):

- Methane concentration shall be maintained at less than 5 percent by volume at all perimeter probes.
- The concentration of total NMOCs at the final outlet of the carbon adsorption units shall not exceed 20 ppmv or achieve 98 percent destruction removal efficiency.
- The sulfur concentration, measured as H_2S at the final outlet of the carbon adsorption unit shall be below 0.1 ppmv.

A more extensive discussion of permitting requirements is presented in Section 1.2.

4.2 SYSTEM START-UP

The system requires start up upon power shutdown, carbon adsorption unit replacement, blower maintenance, or other operation interruption.

Only qualified, experienced staff is recommended as operators to start the system using the following guidelines:

1. Check for alarms before entering blower house.
2. Check the system instrumentation for malfunctions (Yokogawa recorder, Kurz flowmeter, Raco autodialer, General Monitors gas detectors), which are indicated by trouble-lights on the control panel.
3. Check air compressor pressure (normal operating pressure is 100 psig).
4. Confirm main gas inlet valve HV-1 is open.
5. Confirm inlet and outlet valves (HV-2 and 3 or HV-4 and 5) are open for the selected blower.
6. Confirm valves for the Carbon vessels are set correctly (for V-1 primary and V-2 secondary, valve position is as follows: HV-6, 9, 10, and 13 open; valves HV-7, 8, 11, and 12 closed).
7. Confirm hydrogen sulfide gas inlet valve HV-14 is open.

8. Confirm inlet and outlet valves (HV-15 and 16 or HV-17 and 18) are open for the selected Sulfatreat blower.

9. Confirm Sulfatreat outlet valve HV-19 is open.

10. Select Blower No. 1 or Blower No. 2 for the methane system and select Blower No. 3 or Blower No. 4 for the hydrogen sulfide system. (Note: Use hours meters on blowers to balance long-term usage.)

11. Turn the blower control selector switches to "AUTO."

12. Confirm that selected blowers are operating.

13. Confirm that operating parameters are within acceptable limits. For the initially installed equipment, the following should apply:

    - Main system – vacuum maximum 60 inches; flow between 200 scfm and 300 scfm (maximum under SCAQMD Permit).

    - H_2S system – vacuum maximum 45 inches; flow between 40 to 80 scfm.

    - Inlet gas temperature maximum below 140ºF.

Use the following procedure to shutdown the treatment system:

14. Turn blowers I through 4 to the "OFF" position.

15. Close inlet valves HV-1 and HV-14.

4.3 SYSTEM SHUTDOWN

It will be necessary to periodically shut the system down for repair or service. Use the following procedure to shutdown the treatment system:

1. Turn blowers 1 through 4 to the "OFF" position (on control panels).

2. Close inlet valves HV-1 and HV-14.

3. Additional steps may be required for extensive maintenance or repair activities.

4.4 OPERATION SCHEDULE

The blower station is equipped with a timer for an automatic start up and shutdown to allow the system to operate a minimal amount of hours while still preventing methane concentrations above 5 percent at the perimeter.

The operating schedule (as of October 2008) is 10 hours per day, 7 days per week. It may be possible over time to reduce these hours to minimize operating costs and system wear, while meeting regulatory performance goals. Iteratively, the system flow should be reduced while watching probe methane concentrations – until monitoring data suggest that further reductions in operating times could result in methane exceeding the 5 percent limit.

Changes to the operating schedule should be discussed with and approved by city staff.

4.5 REMOTE MONITORING BY CITY

Remote monitoring of the on-site alarm systems within the equipment building will be handled by the Utilities Department. Such monitoring will be accomplished by wireless means with a telephone land-line connection as backup. Information relative to power outage, blower failure, gas detection, and unauthorized building entry is transmitted to the city's SCADA system on a real-time basis which is continuously monitored.

Operation and maintenance of remote monitoring equipment are the responsibility of the Utilities Department. Operation and maintenance of the on-site alarm system within the equipment building are the responsibility of the O&M contractor.

The O&M contractor shall provide contact information to the Utilities Department so that alarms detected by the remote monitoring can be relayed to the O&M contractor for response on a "24/7" basis. The contact information must be kept current during the O&M contract term.

5 SYSTEM MONITORING

5.1 MONITORING CRITERIA

Routine monitoring is scheduled at the Newport Terrace LFG Control System to check its conformance with the regulatory criteria and permits described in Section 3 of this report, as follows:

- Methane concentration shall be maintained at less than 5 percent by volume at all perimeter probes.
- The concentration of total NMOCs at the final outlet of the carbon units shall not exceed 20 ppmv or achieve 98 percent destruction removal efficiency.
- Sulfur concentration measured as H_2S at the final outlet of the carbon adsorption system shall not exceed 0.1 ppm.

In addition, monitoring is performed to keep the system running at its optimum efficiency. Experienced, qualified LFG technical staff is recommended to perform the monitoring tasks.

5.2 MONITORING EQUIPMENT

Monitoring techniques described in this manual involve commonly used battery-operated instruments which have proven to be easy to use and provide reliable results. The following monitoring equipment is needed to perform recommended monitoring. Alternative equipment may be utilized if it can provide suitable, dependable data.

5.2.1 Combustible Gas Monitoring Instrument

For monitoring methane at the extraction wells, monitoring probes, and the blower station, a portable combustible gas analyzer is necessary. At a minimum, the gas analyzer must be capable of measuring methane in percent by volume and percent LEL. Instruments are available which measure methane as well as oxygen, carbon dioxide, pressure, vacuum, and temperature, but these are more expensive. Measurement of carbon monoxide and temperature may be considered optional and warranted under special conditions, such as suspicion of subsurface combustion. Gas instruments are to be calibrated in accordance with the manufacturer's procedures and schedules.

There are numerous portable gas instruments available. However, the preferred instrument is the Landtec GEM-2000. This instrument is recommended and detects methane, oxygen, carbon dioxide, and nitrogen, as well as static pressure and flow rate.

5.2.2 Photo Ionization Detector (PID)

A PID is recommended (referred to as an organic vapor analyzer in the SCAQMD Permit to Operate) to measure the emission at the carbon adsorption unit exhaust. A PID measures all organic components in the gas stream, except methane.

Either of the following instruments may be considered appropriate for this site:

Thermo Electron TVA 1000B Vapor Analyzer
www.thermo.com

MiniRAE 2000
RAESales@raesystems.com

5.2.3 Hydrogen Sulfide Measurement

Dräger tubes or H_2S detectors are used to measure the sulfur emissions as H_2S. A bag sample needs to be taken from the outlet of the Sulfatreat system for testing for H_2S. A Dräger tube or other instrument is used to determine if the sulfur emissions are above 0.2 ppmv. A bag sample can be taken using a sampling box. SCS recommends taking bag samples to measure the sulfur emissions at the rubble fill wells (EW-12, EW-13, EW-14, and EW-15).

5.2.4 Pressure/Vacuum Gauges

Portable pressure/vacuum gauges are required for field measurements at the extraction wells and monitoring probes. Appropriate, permanent gauges are installed on-line at the blower station piping. (Note: The GEM 2000 allows direct reading of static and differential pressures and so can service this purpose.) The ranges of pressure/vacuum typically encountered at sites such as Newport Terrace would be from 0 to 30 inches-water column. Magnehelics or a digital manometer may also be used for pressure measurements.

5.2.5 Miscellaneous

Tedlar bags will be required for LFG samples taken at the carbon adsorption unit inlets and emission sample at the outlet of the final carbon adsorption unit. Tedlar bag and Drager Tube that can measure down to 0.2 ppmv H_2S or equivalent equipment is necessary to measure the inlet and exhaust of the Sulfatreat system. Gas samples from the inlet are analyzed for VOCs and speciated for Toxic Air Contaminants (TACs, as defined in SCAQMD Rule 1150.1) and the gas samples from the exhaust of the carbon system are analyzed for chloroform, vinyl chloride, and hydrogen sulfide in the laboratory in accordance with the AQMD permit.

5.3 MONITORING PROCEDURES

Monitoring procedures include visual inspection, meter reading, and testing with field instruments. Monitoring results should be recorded directly into the instrument (if capable) or onto an inspection form (**Appendix E**).

The system is monitored for the following items:

	Subject	Method
Methane Inlet System		
Inlet separator	Differential pressure, in H_2O	Gauge reading
Inlet gas temperature	Temperature, °F	Gauge reading
Inlet gas pressure	Pressure, in H_2O	Gauge reading
Blower discharge temperature	Temperature, °F	Gauge reading
H_2S Inlet System		
Inlet Separator	Differential pressure, in H_2O	Gauge reading
Sulfatreat discharge temperature	Temperature, °F	Gauge reading
Sulfatreat discharge pressure	Pressure, in H_2O	Gauge reading
Blower discharge pressure	Pressure, in H_2O	Gauge reading
Instrumentation - Operating System		
Gas flowrate	Flowrate, SCFM	Kurz meter
Total gas flow	Volume, SCF	Kurz meter
Major gases (CH_4, CO_2, N_2, O_2)	Percent by volume	GEM 2000 (inst. test)
H_2S concentration	ppm	Drager Tube (inst. test)
Air compressor pressure	Pressure, psi	Gauge reading
Air compressor hours	Elapsed time, hr	Gauge reading
Blowers (H-O-A)	Lead blowers	Note switch position
Blower hours (each)	Elapsed time, hr	Gauge reading
Blower Station Automated Safety Monitoring		
Percent combustibles - percent LEL - General Monitors Sensor/Alarm		
H_2S concentration- ppm H_2S - General Monitors Sensor/Alarm		
Carbon Adsorbers		
Vessel No. 1 inlet	NMOC Concentration	PID Instrument test
Vessel No. 1 outlet	NMOC Concentration	PID Instrument test
Vessel No. 2 outlet	NMOC Concentration	PID Instrument test
Sulfatreat System outlet	Sulfur Concentration (as H_2S)	Drager Tube or other inst.

Extraction Wells (each)		
	Pressure/Vacuum	Instrument test
	Temperature	Instrument test
	Methane	Instrument test
	Oxygen	Instrument test
	Carbon Dioxide	Instrument test
Monitoring Probes (each)		
	Pressure/Vacuum	Instrument test
	Methane	Instrument test
	Oxygen	Instrument test
	Carbon Dioxide	Instrument test

All instrument readings are taken at cock valve hose fittings under the procedures noted below.

5.3.1 Carbon Adsorption Units (Each)

1. Connect Tedlar bag to V-1 inlet (SP-3) and fill bag.
2. Connect PID to Tedlar bag.
3. Open sample valve and record instrument reading upon stabilization (i.e., when gauge reading holds steady for several seconds).
4. Repeat for V-1 outlet (SP-8) and V-2 outlet (SP-9).

5.3.2 Sulfatreat System

1. Connect sample box with Tedlar bag inside to Sulfatreat vessel outlet (SP-6).
2. Start sample pump and fill Tedlar bag.
3. Connect Tedlar bag to H_2S monitoring instrument to Drager tube.
4. For instrument: open sample valve and record instrument reading upon stabilization (i.e., when gauge reading holds steady for several seconds).
5. For Drager tube: break off the tip of Drager tube using the Drager tool.
6. Insert the Drager tube into the Drager pump.
7. Attach the Drager pump to the Tedlar bag.

8. Open the Tedlar bag and slowly pump the gas out of the Tedlar bag using the Drager tube, making sure the pump counter clicks over.

9. Record the number of pumps.

10. Record the reading on the Drager tube and calculate the H_2S concentration.

5.3.3 Extraction Wells (Each)

It is important to take vacuum/pressure readings before methane or other gas chemistry readings.

5.3.3.1 Pressure/Vacuum

11. Connect pressure gauge hose to the sampling port fittings on the well side of flow control valve.

12. Record instrument reading upon stabilization (i.e., when gauge reading holds steady for several seconds).

13. Repeat pressure/vacuum reading Steps 1 and 2 for sampling port on header side of gate valve.

5.3.3.2 Gas Composition

14. Follow instrument manufacturer's procedure for startup and calibration of combustible gas monitoring equipment.

15. Record instrument reading for methane, carbon dioxide, oxygen and balance gas, if included, upon stabilization (i.e., when gauge reading holds steady for several seconds).

5.3.4 Monitoring Probes (Each)

It is important to take vacuum/pressure readings before methane or other gas chemistry readings.

5.3.4.1 Pressure/Vacuum

1. Connect pressure gauge hose to shallowest cock valve hose fitting.

2. Open cock valve and record instrument reading upon stabilization (i.e., when gauge reading holds steady for several seconds). Close cock valve.

3. Repeat pressure/vacuum reading Steps 1 and 2 for all subsurface zone cock valves.

5.3.4.2 Methane Concentration

4. Follow instrument manufacturer's procedure for startup and calibration of combustible gas monitoring equipment.

5. Record instrument reading for methane, carbon dioxide, oxygen and balance gas, if included, upon stabilization.

6. Close cock valve.

7. Remove hose and instrument.

8. Repeat Steps 4 through 8 for all subsurface zone cock valves.

5.3.4.3 Methane Concentration Exceedance

When gas monitoring indicate concentrations of methane in excess of the compliance level, do some combination of the following to bring the probe back into compliance with the requirements of CCR Title 27:

1. If a probe has more than 5% methane, notify the Landfill owner and LEA within 1 business day of the monitoring event.
2. Within 7 days of the detection of exceedance verify the result by performing the following:
    - Monitor probe weekly.
    - Verify that the blower is running properly and that there are no water restrictions or air leaks in the pipe.
    - Increase and optimize landfill gas collection using the existing gas collection wells. This may require increasing the blower speed using the variable frequency drive.
    - Improve gas collection by improving Landfill surface cover to decrease air infiltration.
    - Evaluate the effects of barometric pressure.
    - Verify the probe(s) measurements.
    - Inform LEA of actions taken to control LFG by e-mail or letter.
3. If the initial verification indicates exceedance, continue monitoring on a weekly to allow the methane concentration drop to below 5% in response to the system adjustments/ optimization.
4. Within 21 days of first methane exceedance, submit to the LEA a letter workplan which describes the nature and extent of the problem, all operational actions taken, and recommended corrective actions needed to protect public health and safety and the environment. The letter should:
    - Evaluate the problem.
    - State actions taken to date.
    - Evaluate appropriate alternatives. Alternatives may include some combination of the following:
        - Install additional interior landfill gas extraction well(s)
        - Replace the blower with a larger unit.

  - Other control alternatives - the purpose of this category is to acknowledge that new technologies are continually being developed and that a new technology may be the preferred approach.

- Bar hole punch (3 foot depth) and monitor by all homes within 25 feet of probe weekly.
- An implementation schedule of the selected alternative and anticipated schedule to bring the probe into compliance.

5. After probe readings decrease to below compliance levels, continue weekly monitoring for four (4) consecutive weeks. After four (4) consecutive weeks of readings below compliance levels, the monitoring frequency may revert to monthly or as otherwise approved by the LEA.

6. If exceedances return, increase monitoring frequency to weekly and reinitiate evaluation, and implementation of control measures.

5.4 MONITORING RECORDS AND SCHEDULE

The probes are monitored monthly for TOCs (reported as methane) and lab analyzed quarterly for TACs. A Tedlar bag sample needs to be lab analyzed for TOCs quarterly. All other monitoring events happen monthly except the source test which is performed annually (see **Table 5b**).

Table 5a. Monitoring Schedule

	Monthly	Quarterly	Annually
Collect and lab analyze sample from inlet and outlet of carbon system for VOCs and TACs	x		
Monitor Sulfatreat exhaust for H_2S with Drager Tubes	x		
Monitor TNMOC concentration at each carbon adsorber outlet with PID	x		
Monitor boundary probes for TOCs (as methane) using portable instrument	x		
Collect sample(s) from boundary probe(s) for lab analysis of TACs and TOC		x	
Source Test			x

Field measurements should be recorded directly either directly into monitoring instruments that have data logging capability (e.g., GEM), or onto paper monitoring forms (see example forms, **Appendix E**). If monitoring data is recorded on the instrument, that data should be uploaded to a data management system which can be queried for trends and reporting. Original records shall be saved for a minimum of 2 years in accordance with the SCAQMD Permits and 3 years per LEA requirements. In practice however, all data should be securely stored electronically for future use, which may be assumed to be for 20 years or more.

In addition to the reporting required by regulatory agencies (LEA and SCAQMD), monitoring and maintenance data should always be sent to the City of Newport Beach and the Newport Condominium Association.

5.5 REPORTING TO REGULATORY AGENCIES

Monitoring results are required to be reported to two regulatory agencies, the solid waste local enforcement agency (LEA) within five days of monitoring event, and the South Coast Air Quality Management District.

The following table summarizes reporting requirements to the SCAQMD and LEA:

Appendix H

Instrumentation and Equipment Literature (on CD)

TABLE 5b. SUMMARY OF REGULATORY REPORTING REQUIREMENTS

Required Test Monitoring Event	Test Procedure	Frequency	Regulatory Agency	Regulatory Agency Notification	Report	Regulatory Agency Permit No. and Date
Source Test	Test Inlet gas (before Carbon Adsorbers) and Final Outlet Gas for following compounds: A. Methane B. TNMOCs C. TACs (Rule 1150.1) D. Total Sulfur (Hydrogen Sulfide) E. Moisture Content F. Temperature G. Flow Rate H. Oxygen	Annual	South Coast AQMD	1) Written Notice – 10 days prior to test. 2) Agency Approval – Prior approval to testing and analysis methods 30 days prior to testing.	Due 30 days after testing to AQMD Report the following: 1) Operational hours of carbon 2) Final outlet gas conc. 3) Calculations to demonstrate that outlet gas did not exceed 20 ppmv as measured as hexane at 3% oxygen or reduced by 98% by weight.	No. F85011 11/2/2006
Volatile Organic Compounds and Speciated Toxic Air Contaminants (TAC)	Test Inlet and Outlet of Carbon Adsorbers. Conform with CARB Method 422 or equivalent. Utilize EPA Method TO 14 or other method approved by South Coast AQMD.	Monthly	South Coast AQMD		Report the Rule 1150.1 speciated TACs	No. F85011 11/2/2006
Total Non-Methane Organic Compounds (TNMOC)	Outlet of Carbon Adsorbers (2). Use OVA or other approved instrument. Emissions at outlet shall not exceed the following: 1) Chloroform 0.10 ppmv 2) Vinyl Chloride 0.17 ppmv 3) Hydrogen Sulfide 0.1 ppmv	Monthly	South Coast AQMD			No. F85011 11/2/2006
Sulfatreat System Exhaust	Sulfur Compunds (Hydrogen Sulfide)	Monthly	South Coast AQMD			No. F85011 11/2/2006
Gas Collection Wells & Associated Piping		As Needed	South Coast AQMD	One week in advance for additional wells and associated piping.	Written with entire gas collection system drawings. Proposed well depths, pipe lengths, diameter, layouts prior to notification.	No. F85012 11/2/2006
Subsurface Refuse Boundary Probes TOC	Utilize FID - If FID readings are below 5% volume, then no Tedlar bag sample is collected.	Monthly	South Coast AQMD and LEA		Send data to LEA monthly. Data to be included in quarterly 1150.1 reports to SCAQMD.	Rule 1150.1 Compliance Plan 12/17/1999
Subsurface Refuse Boundary Probes TAC	Collect Tedlar bag sample at probe with highest TOC measured concentration during the previous 3 months. Use TO-14 Analysis Method.	Quarterly	South Coast AQMD		Analyze and report the TACs (Core Group) provided in Table 1 of Attachment A.	Rule 1150.1 Compliance Plan 12/17/1999
Records Retention		Monthly	South Coast AQMD	Maintained at Action Property Management 1) Most recent year: available within 4 hours of request. 2) 2 to 5 years old: available within 48 hours of request.		Rule 1150.1 Compliance Plan 12/17/1999

The operator (contractor) should copy the LEA on all reports sent to the SCAQMD.

In the event that any test result indicates that the regulatory agency would be agreeable to reducing the frequency of that test, the operator (contractor), with the approval of the city and the NCA, will assist the city to petition the agency for an appropriate reduction. If the reduction is granted, this manual will be immediately updated to reflect the reduction.

6 SYSTEM MAINTENANCE

6.1 MAINTENANCE CRITERIA

The purpose of a scheduled maintenance program is to provide safe and efficient operation of the system and to prevent equipment breakdowns (unscheduled maintenance). The maintenance program consists of the observation and servicing of mechanical equipment and other components.

Most of the equipment at the blower station is to be maintained according to manufacturer's criteria. This equipment includes the blowers, electrical controls, activated carbon canisters, Sulfatreat system, and moisture separating tank.

The remainder of the system components is to be maintained by field staff. These components include the header/lateral/blower station piping, cock valves, check valves, in-line meters, and valve boxes.

The safety and orderliness of the blower building, as well as the accessible wellfield facilities (well and probe vaults) are the responsibility of the system operator. This includes preventing and repairing damage from vermin.

6.2 MAINTENANCE PROCEDURES

Visual inspection is the typical maintenance procedure, as described below, to be performed outside of the manufacturer's requirements. In general, the operator should do a visual inspection each time they enter the blower building and/or open well-field or probe vaults. Signs of unusual deterioration, damage (including from animals) shall be noted on a monthly log, included in **Appendix E**, and addressed as necessary. Equipment literature, including maintenance details, are included in **Appendix H**.

6.2.1 Compressor

An Atlas Copco GX-4 air compressor provides pressurized air for the pneumatic pumps in the condensate sumps. Maintenance principally involves checking and maintaining the oil level, and cleaning air and oil filters.

However, it is important that the operator respond to signs of incipient failure (unusual wear, or sounds or smells) in order to anticipate or react quickly to equipment failure, to allow planning for equipment replacement and minimize system downtime.

6.2.2 Blowers

The manufacturer requires periodic inspection and service typically based on hours of service as measured by the elapsed time meter.

6.2.3 Flame Arrestor

The flame arrestor will require disassembly and cleaning if the differential pressure exceeds two inches water-column.

6.2.4 Moisture Separator

The moisture separator should be visually inspected for corrosion, weathering, leaks, seals, and pressure drop. An increase in pressure drop, measured at the sampling ports, one on each of the tank inlet and outlet pipes, indicates the unit is clogged and should be cleaned.

Accumulated moisture in the separator, indicated also by an increase in pressure drop across the unit, should be drained by opening the drainage valve at the base of the unit.

6.2.5 Electrical Controls

The system should be start-up tested monthly. The electrical controls should be visually inspected monthly or more frequently.

6.2.6 Gauges and Sampling Ports

Permanent station gauges and sampling ports should be visually inspected for damage, proper seating and fit, and accuracy. Gauges need to be zeroed prior to recording readings.

6.2.7 Piping, Valves, and Fittings

Piping, valves, and fittings within the station should be visually inspected for damage, corrosion, weathering, seal, and leaks.

6.2.8 Extraction Wells

Visually inspect the wells at least once a month as follows:

1. Check inside the vaults and look for damage and proper operation of the well head, later tie in (flex hose) and condensate drain.

2. Check the sampling ports and gate valve for damage, leaks, workability, and seating.

3. Check the lateral piping for damage and leaks.

4. Check the modified condensate drains for damage or leaks.

6.2.9 Monitoring Probes

Visually inspect the probes as follows:

1. Check the valve box, valve box cover, and identification tags for damage.

2. Check the cock valves for damage, leaks, workability, and seating.

6.2.10 Carbon Adsorption Units

Upon detection of "breakthrough" (exceedance of NMOCs at the carbon units' final exhaust, as measured by PID), the carbon shall be replaced and/or reactivated by an approved carbon provider as necessary. The sequence of carbon change-out is discussed in Section 2.4.3.

6.2.11 Sulfatreat System

When breakthrough of H_2S is detected (Drager Tube reading of 0.1 ppmv), the Sulfatreat media needs to be replaced, by contacting the Sulfa-treat vendor.

6.2.12 In-Line Flow Meter

The Kurz flow transmitter uses thermal conductivity to measure the rate of flow of gas passing through the pipe. The heated sensor should be removed and cleaned annually.

6.2.13 Automated Condensate Sumps

The four automated sumps should be visually inspected during routine monthly monitoring.

6.3 MAINTENANCE RECORDS AND SCHEDULE

Routine maintenance activities at the blower station should be performed weekly, monthly, quarterly or annually, as described above and summarized in **Table 6a**[1].

Monitoring forms for these maintenance activities are included in **Appendix E**.

All maintenance work should be promptly and neatly recorded and retained as a permanent record to track long-term changes or trends in the equipment performance. This record is used for planning future preventive maintenance or in diagnosing equipment breakdowns. Section 7 discusses data management.

An annual maintenance and monitoring report shall be submitted by the owner to the solid waste local enforcement agency (LEA) by March 1st of every year. Report shall include all maintenance performed on the system.

1 Monitoring Forms are included in Appendix E.

TABLE 6a. SUMMARY OF ROUTINE MAINTENANCE OF EQUIPMENT

Equipment	Model	Appendix	Warranty	Scheduled Maintenance Activity	Frequency	Thresholds
LFG system blowers	Ametek (Rotron) CP808M	App H - Section 2	One year	Visual Observation	Monthly	
H2S system blowers	Ametek (Rotron) CP404M	App H - Section 2	One year	Visual Observation	Monthly	
Rotary Screw Compressor	Atlas Capco GX-4	App H - Section 2	One year	See Table 6b below.	See Table 6b below.	
Carbon Vessels	Baker Corp. Kleen Air 2000 S	App H - Section 3	One year	None. Replace Carbon in sequence as described in Section 2.4.3 of O&M Manual	As needed	Carbon replaced when exhaust NMOCs exceed 20 ppm
Flame Arrestor	Groth Corp. No. 7628-04-11-F00	App. H Section 6	One year	Remove and inspect elements	Annually or when pressure drop exceeds thresshold	2 inches water column
In-line flow meter	Kurz 454 FT	App. H Section 7	One year	Remove sensor and clean	Annually	
Methane sensor and controls	General Monitors 480A controller; 10001-1 Sensor	App. H Section 10	One year	Calibrate with certified gas	Quarterly	
Hydrogen Sulfide sensor and controls	General Monitors 2180A conroller; 50445-1 sensor	App. H Section 8	One year	Calibrate with certified gas	Quarterly	
Condensate sumps	Real Environmental Products, AutoSump 7000; Auto Pump A4	App. H Section 09	Five year	Visual Observation	Monthly	

TABLE 6b. PREVENTATIVE MAINTENANCE SCHEDULE FOR GX4 COMPRESSOR

Maintenance Frequency - Running Hours	Operation
50	Drain the condensate from the receiver.
"	Check the oil level.
"	For Floor-mounted versions: clean the prefilter on the rear side of the compressor.
500	Clean the air filter.
"	For Full-Feature versions: check that condensate from the dryer is drained automatically.
"	For Full-Feature versions: clean the condensor of the dryer.
"	Check the belt tension.
"	For compressors with PDX filter: check the service indicator, replace the filter if necessary.
2000	Replace the air filter.
"	If Atlas Copco Roto-Inject Fluid is used, change the oil.
"	Replace the oil filter.
"	For compressors with PDX filter: replace the filter.
4000	Clean the finned surface of the oil cooler.
"	Replace the oil separator.
"	Have the safety valve tested.

7 DATA MANAGEMENT AND EVALUATION

7.1 THE DATA – COLLECTION, ASSESSMENT, AND MANAGEMENT

Much of the work of collecting and controlling LFG involves the collection, evaluation, and management of LFG data.

This process of collecting, evaluating, and managing data may be relatively simple or very complex. The level of complexity depends on the problems that a site presents, the evaluation or control objectives, resources available, and budget constraints. The process may be as simple as measuring and recording several key parameters on a reading sheet and making immediate on the spot adjustments in the field, or as detailed as performing systematic analysis using sophisticated software employing graphing or plotting data in multiple dimensions.

7.2 DATA COLLECTION

The data required by the SCAQMD Permits to Operate are as follows:

- The quantity of LFG in standard cubic feet per minute being treated by the carbon adsorbers.
- The concentration of TNMOCs at the combined inlet to the carbon adsorption system.
- The concentration of TNMOCs at the final outlet of the carbon adsorber.
- Annual source tests of the carbon adsorber system inlet and final outlet.
- VOC and TAC samples collected from the inlet and outlet of the carbon adsorbers.
- Sulfur compounds (measured as H_2S) concentration at the exhaust of the Sulfatreat system.
- Emissions at the exhaust of the carbon adsorbers sent to a lab to determine concentration of chloroform, vinyl chloride, and hydrogen sulfide.
- Test results.
- Monitoring data.
- Dates of carbon replacement.

Data is collected routinely using monitoring forms (either manual or electronic) for the blower facility, the wellfield, migration monitoring probes, onsite structures, etc. These data readings become a part of the facility operating record. A retention period of at least three years is required by the solid waste local enforcement agency (LEA).

The system operator (contractor) will retain all monitoring and maintenance records, as well as providing digital copies to the City of Newport Beach and the NCA. Contact information for the city and NCA are listed in **Appendix F**.

The city and NCA will each be responsible for archiving monitoring and maintenance records. A contractor working for the city or NCA should retain data for 10 years. The city and NCA should retain data for at least as long as the landfill and LFG system are subject to regulatory oversight (i.e., indefinitely).

8 SAFETY

The principle components of LFG are methane and carbon dioxide; other gases which may be found in lesser amounts are hydrogen sulfide, organic acids and gases, and nitrogen. Hydrogen sulfide is **HIGHLY TOXIC**; the other acidic gases and organic vapors should also be treated as toxic and hazardous.

In concentrations of 5 to 15 percent by volume in air, methane may explode when ignited by a spark or other ignition source.

In addition, LFG can displace oxygen in confined spaces. Confined spaces within which oxygen levels are below 19 percent by volume should not be entered.

This manual does not contain a Health and Safety Plan (HASP), nor does it contain lock-out, tag-out procedures. The LFG system operator needs to develop a site-specific HASP (including lock-out, tag-out procedures) based on analysis of the existing site conditions.

8.1 CONTACT INFORMATION

Appendix F lists major stakeholder and regulatory parties contact information.

9 LISTING OF PERMITS

South Coast Air Quality Management District, Permit to Construct/Operate, No. F85011, issued November 6, 2006 (Appendix C) – no specific expiration date.

South Coast Air Quality Management District, Permit to Construct/Operate, No. F85012, issued November 6, 2006 (Appendix D) – no specific expiration date.

Rule 1150.1 Compliance Plan, issued December 17, 1999 (Appendix G) – no specific expiration date. As of February 2009, an application has been submitted to the AQMD to modify the Compliance Plan to indicate the change in ownership of the site and the LFG system.

California Code of Regulations (CCR), Title 27 – this is not a specific permit, but rather the owner/operator is required to perform monthly monitoring and submit quarterly reports to the LEA.

Newport Terrace Closed Landfill Gas Control System Station

EXHIBIT B
SCHEDULE OF BILLING RATES

EXHIBIT B – SCHEDULE OF BILLING RATES

TETRA TECH BAS, INC

ITEM	ITEM DESCRIPTION	QUANTITY	COST	ANNUAL EXPENSE
1	**ROUTINE O&M SERVICE**S - Monitoring Pursuant to Regulations and as described in the O&M Manual, Other Monitoring and Sampling Parameters, and Reporting (as specified in Scope of Services Section 1-F and attached O&M Manual), exclusive of laboratory analyses.	LUMP SUM (MONTHLY)	$ 5,754.92	$ 69,059.00
2	**LABORATORY ANALSYSIS** - Provide unit cost for laboratory analyses of air/gas samples, including :			
2A	Total Gaseous Non-Methane Organics (TGNMOs) **(12/yr)**	UNIT PRICE	$ 132.25	$ 1,587.00
2B	Rule 1150.1 Toxic Air Contaminants (TACs) **(28/yr)**	UNIT PRICE	$ 402.50	$ 11,270.00
3	**LANDFILL GAS SOURCE TEST**	UNIT PRICE	$ 20,719.00	$ 20,719.00
4	**CARBON CHANGE OUT** - Provide lump sum costs for replacement of carbon adsorption media:			
4A	For a Single Vessel	UNIT PRICE	$ 8,045.00	$ 8,045.00
4B	For a Double Vessel	UNIT PRICE	$ 11,885.00	$ 11,885.00
5	**SULFA-TREAT CHANGE - OUT** -Provide unit cost for replacement of Sulfa-Treat media.	UNIT PRICE	$ 10,559.00	$ 10,559.00
6	**NON-ROUTINE SERVICES AND EMERGENCY RESPONSE -** Provide rate schedule for T&M work, including labor and equipment rates.	T&M	Attached Rate Sheet	
7	**ENGINEERING SERVICES -** Provide rate schedule for T&M work, including labor and equipment rates.	T&M	Attached Rate Sheet	

- Tetra Tech will not assume legal responsibility for hazards associated with LFG, LFG condensate, or leachate.
- Any changes to regulations applicable to the OM&M of the LFG control system would require a review of these changes and potential increased compensation for any additional scope of work requirements.
- Any stand-by time encountered by on-site Tetra Tech personnel, subcontractors, and/or equipment rental companies as a result of delays not caused by Tetra Tech will be charged to the City as T&M on a non-routine basis.
- Tetra Tech is not responsible for the compliance of the GAC treatment system during source testing.

SCHEDULE OF CHARGES

PERSONNEL	RATE
Administrative Assistant	$106
Project Clerk	$94
Project Data Analyst	$87
Office Services Clerk	$106
Project Coordinator I	$125
Project Coordinator II	$142
Project Coordinator III	$158
Senior Project Coordinator	$181
CAD Tech I	$98
CAD Tech II	$115
CAD Tech III	$135
CAD Tech IV	$156
Designer I	$175
Designer II	$190
Designer III	$210
Designer IV	$228
Staff Engineer I	$132
Staff Engineer II	$144
Staff Engineer III	$156
Project Engineer I	$166
Project Engineer II	$179
Project Engineer III	$190
Senior Engineer I	$200
Senior Engineer II	$212
Senior Engineer III	$224
Supervising Engineer I	$235
Supervising Engineer II	$246
Supervising Engineer III	$258
Division Engineer I	$280
Division Engineer II	$292
Principal Engineer	$319
Principal	$342
Senior Principal	$360
Project Manager	$188
Project Manager I	$199
Project Manager II	$228
Project Manager III	$240
Project Manager IV	$252
Project Manager V	$264
Senior Project Manager	$274
Program Director	$326
Project Advisor	$275-$375
Construction Supervisor I	$190
Construction Supervisor II	$200
Construction Supervisor III	$212
Construction Manager I	$224
Construction Manager II	$240
Senior Construction Manager	$280
Principal Construction Manager	$307
Chief of Survey Parties	$210
1-Man Survey Party with GPS	$253

PERSONNEL	RATE
Staff Env. Specialist/Scientist I	$119
Staff Env. Specialist/Scientist II	$131
Project Env. Specialist/Scientist I	$144
Project Env. Specialist/Scientist II	$164
Project Env. Specialist/Scientist III	$180
Senior Env. Specialist/Scientist I	$190
Senior Env. Specialist/Scientist II	$199
Senior Env. Specialist/Scientist III	$212
Field Data Collector	$73
Staff Planner/Permitter I	$80
Staff Planner/Permitter II	$98
Staff Planner/Permitter III	$106
Project Planner/Permitter I	$123
Project Planner/Permitter II	$135
Project Planner/Permitter III	$149
Project Planner/Permitter IV	$159
Senior Planner/Permitter I	$171
Senior Planner/Permitter II	$187
Senior Planner/Permitter III	$199
Senior Planner/Permitter IV	$220
Senior Planner/Permitter V	$239
Principal Planner/Permitter	$303
Architect I	$144
Architect II	$171
Architect III	$200
Architect IV	$229
Senior Principal Geotechnical Eng	$320
Principal Geotechnical Eng	$305
Supervising Geologist/Eng II	$270
Senior Geologist/Eng III	$240
Senior Geologist/Eng II	$225
Senior Geologist/Eng I	$215
Project Geologist/Eng III	$200
Project Geologist/Eng II	$185
Project Geologist/Eng I	$170
Staff Geologist/Eng III	$155
Staff Geologist/Eng II	$145
Staff Geologist/Eng I	$135
Senior Soils/Field Technician	$145
Soils/Field Technician	$125
Soils/Field Technician - Prevailing Wage	$158
Technician	$64
Technician I	$96
Technician II	$113
Senior Technician I	$125
Senior Technician II	$149
Senior Technician III	$162
Chief Technician	$183
Senior Operator	$185
2-Man Survey Party	$374

*Rates are Effective July 1, 2026 - June 30, 2027. Court Appearance (Expert Witness, Deposition) and Overtime Premium is 150% of Personnel Hourly Rate. *Rate for Project Advisor to be based on specialized staff required.*

IN-HOUSE EXPENSES

3% of Total Personnel Fees	
Personal Vehicle	$0.65/mile
Company Vehicle	$0.75/mile
Equipment Usage	See Attached Schedule

OTHER EXPENSES

Company and Survey Vehicles	$18/hour
Other Out-of-Pocket Expenses/Supplies/Travel	Cost + 15%
Consultants/Outside/Construction Services	Cost + 15%
Per Diem for Living Expenses	Federal +15%

Outside services performed by others and direct expenses incurred on the Client's behalf are charged an administrative fee of fifteeen (15%) to cover the cost to provide for administration, sub-consultant contract coordination and insurance. Fee to be added to the direct cost of all consultants, vendors, materials, equipment suppliers, other direct costs, and any other outside services.

EQUIPMENT RENTAL RATES

Rates are Effective July 1, 2026 - June 30, 2027

TYPE OF EQUIPMENT	DAY	WEEK	MONTH
4 Gas Range Meter CH4, H2S, CO, O2 (Sentinel 44)	$75	$225	$575
Alpha - 1 Personal Sampling Pump	$75	$200	$500
Disposable Bailer	$20/each	n/a	n/a
CO2 Calorimetric Analysis Tubes	$40	$125	$250
Downhole Camera	$75/hr	n/a	n/a
Dupont Dosimeter Mark-3 (Personal Sample Pump)	$50	$150	$300
Flow Calibrator (Gilian)	$50	$150	$300
Gas Extraction Monitor (GEM 5000 / Envision)	$145	$445	$1,330
Lung Sampler (Nutech 218)	$100	$300	$800
Mini-Ram Data Logger	$40	$125	$250
Mini-Ram Dust Meter	$50	$150	$300
Organic Vapor Analyzer (OVA128)	$125	$400	$1,000
Photo Ionization Detector (OVM580B)	$125	$400	$1,000
Sample Train (Gas Extraction Pump)	$50	$150	$300
Soil Auger/Sampler	$30	$90	$180
Sounder (Liquid Level Indicator)	$40	$125	$250
Horiba Meter	$50	$200	$400
MiniRae 3000	$75	$200	$500
GT Surveyor	$75	$200	$500
GPS Enabled SEM Leak Detection Equipment	$250	$800	$2,400
GPS Survey Equipment Services	n/a	$200	n/a
Groundwater Sampling Equipment	$30/hour	n/a	n/a
Company Vehicle	$130	$550	$1,750
Field Sampling Supplies:	100/day	n/a	n/a
LEVEL C (Per Person) Respirator with Cartridge (full or half faced), Tyvek Coveralls, Outer Gloves, Glove Liners, Neoprene Boots	$150	n/a	n/a
Sand Cone or Nuclear Density Gauge	$14/hour	n/a	n/a
Hand auger and soil sampling equipment	$70	n/a	n/a
BAT Permeameter	$250	n/a	n/a
Double Ring Infiltrometer	$250	n/a	n/a
Inclinometer data collection system	$400	n/a	n/a
Infiltration test flowmeter	$130 per day-test		
Floor level manomenter	$80	n/a	n/a
Moisture vapor emission test kit (material only)	$40/kit	n/a	n/a
Field inspection kit (camera, recorder, GPS)	$35	n/a	n/a

EXHIBIT C

INSURANCE REQUIREMENTS

1. Provision of Insurance. Without limiting Contractor's indemnification of City, and prior to commencement of Work, Contractor shall obtain, provide and maintain at its own expense during the term of this Contract, policies of insurance of the type and amounts described below and in a form satisfactory to City. Contractor agrees to provide insurance in accordance with requirements set forth here. If Contractor uses existing coverage to comply and that coverage does not meet these requirements, Contractor agrees to amend, supplement or endorse the existing coverage.

2. Acceptable Insurers. All insurance policies shall be issued by an insurance company currently authorized by the Insurance Commissioner to transact business of insurance in the State of California, with an assigned policyholders' Rating of A- (or higher) and Financial Size Category Class VII (or larger) in accordance with the latest edition of Best's Key Rating Guide, unless otherwise approved by the City's Risk Manager.

3. Coverage Requirements.

   A. Workers' Compensation Insurance. Contractor shall maintain Workers' Compensation Insurance providing statutory benefits and Employer's Liability Insurance with limits of at least one million dollars ($1,000,000) each employee for bodily injury by accident and each employee for bodily injury by disease in accordance with the laws of the State of California. In addition, Contractor shall require each subcontractor to similarly maintain Workers' Compensation Insurance and Employer's Liability Insurance in accordance with California law for all of the subcontractor's employees. The insurer issuing the Workers' Compensation insurance shall amend its policy by endorsement to waive all rights of subrogation against City, its City Council, boards and commissions, officers, agents, volunteers, employees, and any person or entity owning or otherwise in legal control of the property upon which Contractor performs the Project and/or Services contemplated by this Contract. Contractor shall submit to City, along with the certificate of insurance, a Waiver of Subrogation endorsement in favor of City, its City Council, boards and commissions, officers, agents, volunteers, employees, and any person or entity owning or otherwise in legal control of the property upon which Contractor performs the Project and/or Services contemplated by this Contract.

   B. General Liability Insurance. Contractor shall maintain commercial general liability insurance, and if necessary excess/umbrella liability insurance, with coverage at least as broad as provided by Insurance Services Office form CG 00 01, in an amount not less than two million dollars ($2,000,000) per occurrence, four million dollars ($4,000,000) general aggregate and four million dollars ($4,000,000) completed operations aggregate. The policy

shall cover liability arising from bodily injury, property damage, products-completed operations, personal and advertising injury, and liability assumed under an insured contract (including the tort liability of another assumed in a business contract).

Contractor shall submit to the City, along with a certificate of insurance, any additional insurance requirements stated in Section Four.

C. Automobile Liability Insurance. Contractor shall maintain automobile insurance at least as broad as Insurance Services Office form CA 00 01 covering bodily injury and property damage for all activities of Contractor arising out of or in connection with Work to be performed under this Contract, including coverage for any owned, hired, non-owned or rented vehicles, in an amount not less than one million dollars ($1,000,000) combined single limit for each accident.

Contractor shall submit to the City, along with a certificate of insurance, any additional insurance requirements stated in Section Four.

D. Professional Liability (Errors & Omissions) Insurance. Contractor shall maintain professional liability insurance that covers the Services to be performed in connection with this Agreement, in the minimum amount of two million dollars ($2,000,000) per claim and four million dollars ($4,000,000) in the aggregate. Any policy inception date, continuity date, or retroactive date must be before the Effective Date of this Agreement and Contractor agrees to maintain continuous coverage through a period no less than three years after completion of the Services required by this Agreement.

E. Pollution Liability Insurance. Contractor shall maintain a policy providing contractor's pollution liability ("CPL") coverage with a total limit of liability of no less than five million dollars ($5,000,000) per loss and five million dollars ($5,000,000) in the aggregate per policy period. Claims-made policies require a 10-year extended reporting period. The CPL policy shall include coverage for cleanup costs, third-party bodily injury and property damage, including loss of use of damaged property or of property that has not been physically injured or destroyed, resulting from pollution conditions caused by contracting operations. Coverage as required in this paragraph shall apply to sudden and non-sudden pollution conditions resulting from the escape or release of smoke, vapors, fumes, acids, alkalis, toxic chemicals, liquids, or gases, waste materials, or other irritants, contaminants, or pollutants. The CPL shall also provide coverage for transportation and off-Site disposal of materials. The policy shall not contain any provision or exclusion (including any so-called "insured versus insured" exclusion or "cross-liability" exclusion) the effect of which would be to prevent, bar, or otherwise preclude any insured or additional insured under the policy from making a claim which would otherwise be covered by such policy on the grounds that the claim is brought by an insured or additional insured against an insured or additional insured under the policy.

Contractor shall submit to the City, along with a certificate of insurance, any additional insurance requirements stated in Section Four.

F. Excess/Umbrella Liability Insurance. If any Excess or Umbrella Liability policies are used to meet the limits of liability required by this contract, then said policies shall be "following form" of the underlying policy coverage, terms, conditions, and provisions and shall meet all of the insurance requirements stated in this contract, including, but not limited to, the additional insured and primary & non-contributory insurance requirements stated herein. No insurance policies maintained by the City, whether primary or excess, and which also apply to a loss covered hereunder, shall be called upon to contribute to a loss until the Contractor's primary and excess/umbrella liability policies are exhausted.

Contractor shall submit to the City, along with a certificate of insurance, any additional insurance requirements stated in Section Four.

4. Other Insurance Requirements. The policies are to contain, or be endorsed to contain, the following provisions:

A. Waiver of Subrogation. All insurance coverage maintained or procured pursuant to this Contract shall be endorsed to waive subrogation against City of City, its City Council, boards and commissions, officers, agents, volunteers, employees, and any person or entity owning or otherwise in legal control of the property upon which Contractor performs the Project and/or Services contemplated by this Contract or shall specifically allow Contractor or others providing insurance evidence in compliance with these requirements to waive their right of recovery prior to a loss. Contractor hereby waives its own right of recovery against City, and shall require similar written express waivers and insurance clauses from each of its subcontractors.

B. Additional Insured Status. All liability policies including general liability, excess/umbrella liability, pollution, and automobile liability, if required, shall provide or be endorsed to provide that City, its City Council, boards and commissions, officers, agents, volunteers, employees, and any person or entity owning or otherwise in legal control of the property upon which Contractor performs the Project and/or Services contemplated by this Contract shall be included as additional insureds under such policies.

C. Primary and Non Contributory. Contractor's insurance coverage shall be primary insurance and/or the primary source of recovery with respect to City, its City Council, boards and commissions, officers, agents, volunteers, employees, and any person or entity owning or otherwise in legal control of the property upon which Contractor performs the Project and/or Services contemplated by this Contract. Any insurance or self-insurance maintained by City shall be excess of Contractor's insurance and shall not contribute

with it.

D. Notice of Cancellation. All policies shall provide City with thirty (30) calendar days' notice of cancellation or nonrenewal of coverage (except for nonpayment for which ten (10) calendar days' notice is required) for each quired coverage except Builders Risk Insurance, which shall contain an endorsement with said required notices.

E. Subcontractors. Contractor shall require and verify that all subcontractors maintain insurance meeting all the requirements stated herein. Subcontractors shall maintain commercial general liability in an amount not less than one million dollars ($1,000,000) per occurrence, two million dollars ($2,000,000) general aggregate and two million dollars ($2,000,000) completed operations aggregate.

5. Additional Agreements Between the Parties. The parties hereby agree to the following:

A. Evidence of Insurance. Contractor shall provide certificates of insurance to City as evidence of the insurance coverage required herein, along with a waiver of subrogation endorsement for workers' compensation and other endorsements as specified herein for each coverage. All of the executed documents referenced in this Contract must be returned to City within ten (10) regular City business days after the date on the "Notification of Award". Insurance certificates and endorsements must be approved by City's Risk Manager prior to commencement of performance. Current certification of insurance shall be kept on file with City at all times during the term of this Contract. The certificates and endorsements for each insurance policy shall be signed by a person authorized by that insurer to bind coverage on its behalf. At least fifteen (15) days prior to the expiration of any such policy, evidence of insurance showing that such insurance coverage has been renewed or extended shall be filed with the City. If such coverage is cancelled or reduced, Contractor shall, within ten (10) days after receipt of written notice of such cancellation or reduction of coverage, file with the City evidence of insurance showing that the required insurance has been reinstated or has been provided through another insurance company or companies. City reserves the right to require complete, certified copies of all required insurance policies, at any time.

B. City's Right to Revise Requirements. The City reserves the right at any time during the term of the Contract to change the amounts and types of insurance required by giving Contractor ninety (90) calendar days' advance written notice of such change. If such change results in substantial additional cost to Contractor, City and Contractor may renegotiate Contractor's compensation.

C. Right to Review Subcontracts. Contractor agrees that upon request, all agreements with subcontractors or others with whom Contractor enters into contracts with on behalf of City will be submitted to City for review. Failure

of City to request copies of such agreements will not impose any liability on City, or its employees. Contractor shall require and verify that all subcontractors maintain insurance meeting all the requirements stated in Section Four, including required coverage types, limits, endorsements, and notice provisions. Contractor shall ensure that City is an additional insured on insurance required from subcontractors. For CGL coverage, subcontractors shall provide coverage with a format at least as broad as CG 20 38 04 13.

D. Enforcement of Contract Provisions. Contractor acknowledges and agrees that any actual or alleged failure on the part of City to inform Contractor of non-compliance with any requirement imposes no additional obligations on City nor does it waive any rights hereunder.

E. Requirements not Limiting. Requirements of specific coverage features or limits contained in this Exhibit A are not intended as a limitation on coverage, limits or other requirements, or a waiver of any coverage normally provided by any insurance. Specific reference to a given coverage feature is for purposes of clarification only as it pertains to a given issue and is not intended by any party or insured to be all inclusive, or to the exclusion of other coverage, or a waiver of any type. If the Contractor maintains higher limits than the minimums shown above, the City requires and shall be entitled to coverage for higher limits maintained by the Contractor. Any available proceeds in excess of specified minimum limits of insurance and coverage shall be available to the City.

F. Self-Insured Retentions. Contractor agrees not to self-insure or to use any self-insured retentions on any portion of the insurance required herein and further agrees that it will not allow any indemnifying party to self-insure its obligations to City. If Contractor's existing coverage includes a self-insured retention, the self-insured retention must be declared to City. City may review options with Contractor, which may include reduction or elimination of the self-insured retention, substitution of other coverage, or other solutions. Contractor agrees to be responsible for payment of any deductibles on their policies.

G. City Remedies for Non Compliance. If Contractor or any subcontractor fails to provide and maintain insurance as required herein, then City shall have the right but not the obligation, to purchase such insurance, to terminate this Contract, or to suspend Contractor's right to proceed until proper evidence of insurance is provided. Any amounts paid by City shall, at City's sole option, be deducted from amounts payable to Contractor or reimbursed by Contractor upon demand.

H. Timely Notice of Claims. Contractor shall give City prompt and timely notice of claims made or suits instituted that arise out of or result from Contractor's performance under this Contract, and that involve or may involve coverage under any of the required liability policies. City assumes no obligation or liability by such notice, but has the right (but not the duty) to monitor the

handling of any such claim or claims if they are likely to involve City.

I. Coverage not Limited. All insurance coverage and limits provided by Contractor and available or applicable to this Contract are intended to apply to the full extent of the policies. Nothing contained in this Contract or any other agreement relating to City or its operations limits the application of such insurance coverage.

J. Coverage Renewal. Contractor will renew the coverage required here annually as long as Contractor continues to provide any Work under this or any other Contract or agreement with City. Contractor shall provide proof that policies of insurance required herein expiring during the term of this Contract have been renewed or replaced with other policies providing at least the same coverage. Proof that such coverage has been ordered shall be submitted prior to expiration. A coverage binder or letter from Contractor's insurance agent to this effect is acceptable. A certificate of insurance and/or additional insured endorsement as required in these specifications applicable to the renewing or new coverage must be provided to City with five (5) calendar days of the expiration of the coverages.

K. Maintenance of General Liability Coverage. Contractor agrees to maintain commercial general liability coverage for a period of ten (10) years after completion of the Project or to obtain coverage for completed operations liability for an equivalent period.