

FINAL DRAFT

Gas Investigation Workplan for the Newport Terrace Landfill/Condominium City of Newport Beach, Orange County



March 7, 2001

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SWIS # 30-CR-0127

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1. Introduction

The California Integrated Waste Management Board (CIWMB) Closed, Illegal and Abandoned Site (CIA) program investigates solid waste disposal sites and provides site data and documentation to quantify requirements for both enforcement and potential clean-up activities by the CIWMB Solid Waste Cleanup Program (AB 2136). Depending on the types of wastes at the site, landfill gas sampling may be necessary to determine gas concentrations and lateral gas migration for the purpose of scoping enforcement and remediation work or referral to the local Air Quality Management District (AQMD).

Typically, landfill gas constituents contain, by volume, 38-58% Methane gas, 0.2-1% Oxygen, 2-10% Nitrogen, 30-48% Carbon Dioxide, 0-1% Hydrogen and <1% Non-methane Organic Carbons (NMOCs). A landfill gas characterization study performed by the CIWMB, indicated that the most common NMOCs for landfill gas include: Benzene, Ethyl benzene, Toluene, Vinyl Chloride, Dichloromethane, Trichloroethylene, 1,2, -cis-Dichloroethylene and Tetrachloroethylene.

The Newport Terrace Landfill, also known as Newport City Dump #1, was owned and operated by the City of Newport Beach between 1953 and 1967. The site is located northeast of the intersection of West 19th Street and Balboa Boulevard in Newport Beach. The landfill was developed from filling a small canyon northeast from the wetlands of the Santa Ana River Basin. To the west of the site is Talbert Regional Park and to the east is the Canyon Park. Over the past 50 years, the area west and southwest of the site has been used as an operating oilfield. Besides construction and demolition debris, this landfill also accepted domestic waste including paper, cardboard, metal, glass and yard trimmings. In 1972, the site was closed in accordance with the Regional Water Quality Control Board's requirements at that time. A gas ventilation system was installed along the property boundary as part of the closure activities.

During or after site closure, the property was sold and an apartment complex was built along the southeast and northwest sides of the landfill. The existing apartment units are reportedly constructed on native soil adjacent to the waste fill but there is also a report claiming that the developer removed refuse under the proposed dwelling units and installed a gas barrier to prevent gas migration into the units. A gas extraction system was installed about 15 years ago to control subsurface gas migration. This system consists of a series of collection wells, below-grade header pipes and extraction blower stations. According to the site's Environmental & Civil Consultant, Bryan A. Stirrat and Associates (BAS), the system is not functioning at the designed efficiencies due to potential blocks or leaks in the header lines. These blockages or leaks are most likely caused by either condensate collecting in sections of the pipe or line damage from differential settlement. None of the structures adjacent to the landfill are equipped with gas alarm/gas detection systems. It is unknown if landfill gas levels exceed the 1.25% in concentration for all structures (interior).

Statutory authority for investigating solid waste disposal sites is in California Public Resources Code (PRC) Section 45013, et seq.

1.1. Site Location and Description

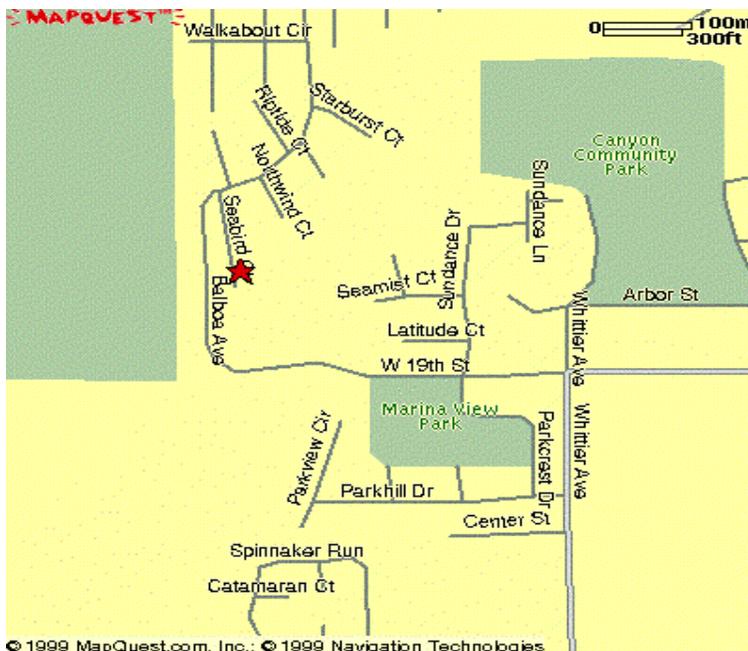
The site is located approximately 1 mile northwest of the City of Newport Beach, northeast of the intersection of 19th Street and Balboa Blvd. The owner of the site is the Newport Terrace Homeowners Association C/O Villageway, P.O, Box 4708, Irvine, CA 92716.

The site is located in Township 65, Range 10 West, Section 17, ¼ Section SW1/4 of the SE ¼, San Bernardino Baseline and Meridian. The area to be investigated is provided at Figure 3 (Page 15). The site map was prepared by BAS.

Figure 1. Area Map of the Newport Terrace Landfill



Figure 2. Site Map



1.2. Project Background

The Remediation, Closure & Technical Services (RCTS) Branch, was requested by the Orange County Local Enforcement Agency (LEA) to perform gas sampling and analysis at the Newport Terrace Landfill to determine appropriate remedial measures necessary to protect public health and safety and the environment.

1.3. Project Purpose

The objective of the investigation is to obtain gas concentration and flow data from locations near existing gas extraction wells and map “hot spots” for the purpose of resizing the gas collection well field. Also, data will be collected on the horizontal and vertical extent of waste near structures (where gas collection branches run between adjacent structures). The gas concentration and waste extent data will be mapped on a scaled topographic drawing which will be used to size a new gas well field (if necessary) and also determine the requirements for blower size (to check adequacy of current blowers) and flaring (depending on the gas stream flow and quality). After determining gas control system requirements, a cost estimate will be prepared and recommendations for implementation will be provided. In addition, a multi-point continuous gas monitoring system will be installed adjacent to foundations of structures near “hot spot” areas found to contain high-concentrations of landfill gas and monitored for a period of 1-year to document the levels of gas beneath structures and determine if a threat to public health and safety exists, specifically to the condominium residents.

1.4. Responsible Agency

The CIWMB will be responsible for preparing the gas sampling plan, performing the sampling, reviewing the sample report, and providing the sampling report to the LEA and City of Newport Beach for further action. CIWMB will also prepare a site investigation report and place both the sampling report and site investigation report in CIWMB files and update the site’s Solid Waste Information System (SWIS) database.

1.5. Project Organization

The gas investigation workplan and report preparation will be conducted by CIWMB’s CIA Section Staff. The CIA Section Senior Engineer, Mr. Glenn K. Young, P.E. will oversee preparation of the gas investigation workplan (which includes sampling and analysis plan), conducting gas sampling and analysis activities and preparation of the draft and final gas investigation report. The CIWMB’s Health and Safety Section will be responsible for preparing a site specific health and safety plan and monitor onsite health and safety issues. As lead on the project, Mr. Young may be reached at (916) 341-6696. The CIWMB will use its own gas sampling equipment and obtain Tedlar Bags or Summa Canisters, labels, chain-of-custody forms and shipping containers from its environmental laboratory services contractor, ExcelChem, Inc.

CIWMB will be responsible for determining gas sampling locations, mapping sampling locations, sample packaging, shipping, and analysis, and producing a gas sampling and analysis report. BAS will provide Geoprobe direct push equipment that will be used to access subsurface locations for gas sampling. BAS will also provide a project engineer or geologist to log

Geoprobe sample cores and provide data log and field notes to the CIWMB project engineer. The sampling containers and laboratory analysis for the soil samples will be through CIWMB Contract IWM-C9037 with ExcelChem Environmental Laboratories, Inc. located in Roseville, CA. BAS will purchase and install a multi-point continuous gas monitoring system (with data acquisition) as specified in this gas investigation workplan. Monitoring data from this system will be downloaded monthly by BAS and provided to the Newport Terrace Homeowners Association, the LEA and CIWMB.

1.6. Previous Investigations

The Newport Terrace Landfill has been investigated and enforcement actions taken by the Orange County LEA. The Newport Terrace Condominium Homeowners has retained the services of Bryan A. Stirrat (BAS) and Associates a Civil and Environmental Engineering Consulting firm. BAS has performed gas investigations and gas monitoring for the site.

A BAS gas monitoring report submitted on June 8, 1998 indicated that the 5% gas rule was exceeded for several gas monitoring probes which included P-1 (6%), P-8 (25.6%), P-21 (66.6%), P-26 (6.2%), P-30 (31.2%), P-31 (4.9%), P-32 (38.5%), P-33 (48%) and NT-2 (17.8%). BAS also concluded, that based on the analytical profile of gas samples, that the gas is from landfill sources and not swamp gas from the adjacent oil fields.

The LEA prepared a closed, illegal and abandoned site identification form on August 9, 1991. In summary, the investigation concluded that the disposal area is 15 acres. The site was operated by the City of Newport from 1953 to 1967. The site was closed by the RWQCB in 1972 (under Resolution No. 60-27, dated March 1, 1960). The RWQCB conducted a Water SWAT (Solid Waste Assessment Test) and it was assigned a Rank 14. Waste landfilled at the site included, paper, cardboard, glass, plastics, metal and garden cuttings.

Based on a site map prepared BAS for the Newport Terrace Homeowners Association (Figure 3) the limits of waste have been located with respect to the existing condominiums. The investigation by the LEA noted that the developer "removed" waste areas before constructing the condominiums. The map prepared by BAS will be used to assist in determining locations for gas sampling.

CIWMB staff conducted a field visit on 6 December 2000, along with BAS. The following observations were noted:

- a) Only 9 of 55 extraction wells were accessible for maintenance or monitoring;
- b) 9 of 33 gas monitoring probes exceeded the 5% gas concentration regulatory threshold;
- c) Gas concentrations in extraction wells No.'s 50 and 56 were in excess of 60% by volume and hydrogen sulfide (H₂S) levels exceeded 1,000 ppm. (H₂S "rotten egg" odors were evident during sampling).
- d) No differential settlement was noted near the foundations of the condominiums or paved driveways and carports around the structures. The condominiums foundations appeared to be slab-on-grade construction. Single enclosed carports for each residence were constructed on concrete slab foundations. Differential settlement was noted on an asphalt driveway that crossed the park; a basketball court constructed in the landfill area

appeared to be sloped at 3%. The landfill area was overgrown with landscape shrubs, trees and groundcover. Engineered drainage in the landfill area was not evident.

- e) Gas concentrations exceeded regulatory thresholds P-31, P-32 and P-33 (>5%) adjacent to structures located in the Newport Terrace condominiums.
- f) The entire site is landscaped and irrigated; ponded water was noted at the base of a slope adjacent to Balboa Blvd. and 19th Street. Water levels were observed by BAS at 10 feet in some of the gas monitoring probes and extraction wells indicating either a high water table or perched water. An observation by BAS was that gas concentrations in the 70-80% range might be due to carbon dioxide being “scrubbed” out of the landfill gas by contact with subsurface water.
- g) The majority of areas surrounding the condominium structures are paved and landscaped, which would make an intrusive investigation difficult (boring vs. trenching would be preferable).
- h) The gas blower system was upgraded two years ago with new blowers rated at 100-200 SCFM @ 30 in. W.C.; condensate knockout vessels were also installed. The system at the time of the visit was operating at 100 SCFM @ 30 inches W.C.; gas concentration at the inlet was 0.1% and gas stream temperature was 61.7 F (ambient). Furthermore, no condensate has been collected since the condensate vessels were installed.

2. Project Objective

2.1. Data Collection

A topographic map will be prepared by BAS and a sampling grid will be established by BAS and the CIWMB Project Engineer to determine the locations where gas samples will be taken. Suggested gas sampling locations are provided on Figure 4. BAS will perform a site survey and locate gas sampling locations using marked surveying laths. BAS will provide Geoprobe Direct Push equipment that will be used to: 1) provide subsurface access for gas sampling, and 2) obtain data to determine the horizontal and vertical extent of waste at the site. Gas sampling will be conducted using both field screening equipment, a Gas Detection instrument (GMI, capable of measuring methane, carbon dioxide, oxygen, hydrogen sulfide and organic vapor up to 1,000 ppm) and gas sampling containers (Summa Canisters and Tedlar Bags) provided by CIWMB's Environmental Laboratory Accreditation Program (ELAP)-certified laboratory contractor. Field screening equipment will be conducted in accordance with the gas sampling and analysis plan and sample collection and analysis conducted in accordance with EPA technical order 15 (TO-15). The CIWMB will use regulatory limits established by both 27 CCR Section 20917 and local Air Quality Management District (AQMD) rules.

2.2. Project Tasks

A Phase I Investigation will be conducted to obtain the following information and data, prior to finalizing objectives for the gas sampling and analysis plan:

- a) Historical Aerial Photograph research to determine the areal (horizontal) extent of the landfill and location of landfill with respect to on-site structures, e.g. condominium development aerials, aerials from well-field development CALTRANS aerials for the Pacific Highway 1, County Aerials for county-maintained roads or streets.
- b) As-built drawings or construction plans for the Newport Terrace Condominiums, specifically construction details for the foundation, typical penetration details, and specifications for barrier membrane material and placement.
- c) As-built drawings for site utility systems such as gas, electric, sewage, water, cable TV, storm drains, etc. (county planning offices).
- d) As-built drawings or construction plans for the gas control system to include extraction well schedule, extraction and monitoring well typical details, flare station configuration, header and extraction well layout map, etc.
- e) Copy of operating permits issued by applicable agencies (AQMD).
- f) Copies of Operating Manuals or Instructions for the blower system.
- g) Copy of Waste Discharge Requirements (WDRs) issued by the RWQCB, including data and information from groundwater monitoring activities.

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- h) Property Title and Deed search to obtain Assessor Parcel Number, Parcel Map prior to and after development, and property owner.

Gas sampling locations will include gas monitoring probes, gas extraction wells (or locations near gas extraction wells), utility vaults, subfloors, crawl spaces and utility penetrations. The locations to be monitored are shown on Figure 4. Since landfill gas production typically follows a temporal cycle (normally associated with local hydrologic conditions), up to 12 months of data collection may be required to determine peak gas production characteristics. If a one time-sampling event is performed, it will be performed in the March to May time frame. Most areas will be screened using the GMI. If gas concentrations exceed 5% or 50,000 ppm, a gas sample will be obtained using either a Tedlar Bag or Summa Canister.

Collected samples will be analyzed for typical landfill gas constituents such as methane, carbon dioxide, nitrogen and hydrogen sulfide. Trace gases (also referred to as Non-methane organic compounds NMOC) will be analyzed for a suite of Volatile Organic Compounds including trichloroethylene, perchloroethylene, dichloromethane, tetrachloroethane, benzene, toluene, xylene and ethyl benzene.

Sample collection and analysis procedures for landfill gas will follow TO-15 requirements as outlined in this gas sampling and analysis plan. Analysis for all gas samples will be performed by CIWMB's contract laboratory, ExcelChem.

A non-intrusive investigation, e.g. electromagnetic survey (EM) or ground penetrating radar (GPR) survey, may need to be performed to located underground structures or define waste fill areas in comparison to native areas. A map showing anomalies and interpretations will be produced from this investigation and included in the final site investigation report.

An intrusive investigation, e.g. trenching or borings, may be performed, if adequate maps defining the landfill horizontal extents cannot be found. The results of this intrusive investigation will be used to determine if waste reconfiguration is necessary to eliminate pathways between the landfill and above and below ground structures. If it is found that structures are constructed over waste fill areas, foundations will be assessed for differential settlement to determine if potential foundation breaches exist which could damage membrane liners installed to prevent gas migration. Prior to trenching or boring, BAS will contact Underground Service Alert (USA) to conduct a utility survey and mark all potential below-grade utilities. A map showing trench locations and trench logs will be included with the final site investigation report.

Upon receipt of laboratory analysis reports for collected samples, CIWMB will compile and correlate gas constituent data and prepared a report summarizing the results. CIWMB will also provide a comparison of the results to regulatory thresholds and provide recommendations for remedial measures required to obtain compliance with applicable regulations.

2.3. Expected Data

Landfill gas constituent concentration data obtained during this investigation will be evaluated to determine if additional sampling is necessary. Additional sampling may be performed if it is found that specific constituent levels exceed regulatory thresholds specified by 27 CCR Section

20925, e.g. 1.25% in structures of 5% in perimeter monitoring probes. Based on information known about the site the following is expected:

- a) Average landfill gas production within the fill area ranges from 25-65%.
- b) Landfill gas constituents include methane, carbon dioxide, nitrogen, hydrogen sulfide and trace VOCs (VC, TCE, PCE, BTEX)
- c) Gas monitoring probes exceed 5% regulatory limit requiring corrective action
- d) Several extraction wells are inoperable due to blocked headers and buried well-heads (46 of 55 or inaccessible for monitoring)
- e) Some extraction wells are functional and are pulling a vacuum
- f) Blower station is operational but requires calibration and maintenance
- g) Structures may be constructed on top of waste (direct conduits between landfill and structures)
- h) Subsurface utilities and structures may provide potential migration paths to structures

3. Gas Sampling Plan

This gas sampling plan is intended to document the procedural and analytical requirements for this and any subsequent sampling events performed to collect gas samples and to characterize areas exceeding regulatory thresholds. This plan was compiled after reviewing the US Environmental Protection Agency's, Region 9, guidance document "Instructions for the One-time Sampling Event Sampling and Analysis Plan" dated March 1998.

3.1. Sampling Methodology

Discrete gas sampling will be performed at locations where gas screening indicates the presence of landfill gas, i.e. percent indications. Sampling locations will be predetermined based on available site information and data, although authoritative sampling may be performed and authoritative sampling locations documented in the final sampling and analysis plans (SAP) report. Gas sampling will initially be conducted using locations provided in Figure 3. The authoritative protocol allows the investigator the flexibility to move sampling locations, as necessary, to accommodate unforeseen field conditions. The following outline describes the proposed sampling:

- Gas sampling at monitoring probes. A total of 33 gas monitoring probes will be screened using the GMI per Figure 3. Probes exceeding 1% gas will be connected to a pneumatic sampling pump and Tedlar Bag and a sample collected for laboratory analysis.
- Gas sampling at header/branch connections. Each branch will be sampled to determine gas concentrations from each "area of extraction". If an "area of extraction" is found to contain insignificant concentrations of gas, e.g. <5%, extraction wells in that branch will not be tested. If gas concentration in a branch exceeds 5%, each extraction well in that branch will be tested. This testing will be performed using a Gas Detection Instrument only (GMI).
- Gas sampling at extraction wells. A Magnahelic gauge will be placed on the extraction well sampling port and a pressure measurement taken. A total of 55 gas extraction wells will be screened per figure 3. Probes exceeding 25% gas will be connected to a Summa Canister (and Tedlar Bag and pneumatic sampling pump if well is under vacuum) and a gas sample will be obtained.
- Gas sampling of utility corridors. Utility corridors identified by Underground Service Alert will be screened using the GMI. If greater than 5000 ppm is detected, a sample will be taken using a pneumatic sampling pump and Tedlar Bag. A Total of 3 samples are planned.
- Gas sampling of enclosed structures or utility penetrations in foundations. Confined spaces will be screened using a GMI. Concentrations in confined spaces exceeding 5000 pm will be sampled using a Tedlar bag and pneumatic sampling pump.

Each sample will be collected using decontaminated sampling equipment, Tedlar Bags and Summa Canisters. CIWMB will provide Magnahelic gauges, GMI and clean Tedlar Bags. ExcelChem will provide uncontaminated Summa Canisters (provided under vacuum).

3.2. Gas Sampling Equipment

The following equipment and supplies will be necessary to perform the sampling

- GMI Gas Detection Instrument
- Tedlar Bags
- Summa Canisters
- Bar-Hole Punch
- Temperature Gage
- Pressure Gage (Magnahelic Gage)
- Pneumatic Air Sampling Pump
- Digital Camera w/Floppy Disks
- Level C health and safety equipment (Tyvex, tape, respirator with HEPA filter)
- Decontamination equipment (2-½ gallon sprayer, non-phosphate detergent, disposable brush, paper towels, cotton towels, polyethylene sheeting)
- Gas monitoring data log sheet
- First aid kit
- Chain of custody forms and seals
- Mailing labels and markers
- Cooler and ice or blue ice
- Packing and duct tape
- Tool Kit (screwdriver, wrench, pliers)
- Laptop computer (download data)

3.3. Gas Sampling Procedures

Gas samples will be collected using pneumatic air pumps, GMI, Tedlar Bags and Summa Canisters. All sampling equipment and containers will be decontaminated prior to use. Samples will be taken from gas monitoring probe sampling cocks or Tygon Tubing, Extraction Well sampling ports or confined spaces. All sampling locations will be screened with a GMI before obtaining sampling for analysis.

After each sample is collected it will be labeled, logged on the chain-of-custody document, sealed, and stored in an ice chest that is cooled to 4 degrees Fahrenheit.

At the completion of sampling activities, CIWMB staff will deliver the selected samples to a State of California certified ELAP accredited laboratory for analyses using strict chain-of-custody protocols.

Sampling and analysis procedures to the Gas Investigation

- a. USA will clearly mark all subsurface utilities with survey markers/lathes or paint (orange or yellow)
- b. BAS will survey in sampling location points in accordance with the Gas Investigation Work plan, and consider marked utility corridors. Sampling locations will be marked with Survey Laths painted red or blue.
- c. 50 direct push samples will be performed at the site
- d. All sampling locations will be screened for fix gases (methane, CO₂, CO, O₂, H₂S) using the Gas Surveyor 422 instrument. Gas instrument reading will be recorded and documented.

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- e. If sample exceeds 20% methane by volume, but contains less than 10 ppm H₂S, a summa canister will be used to collect a gas sample for fixed gas and T.O. 15 analysis.
 - f. If sample exceeds 20% methane by volume, but contains greater than 10 ppm H₂S, a Tedlar bag will be used to collect a gas sample for fixed gas and T.O. 15 analysis.
 - g. All direct push locations will be screened for gas using the gas instrument, and a registered geologist will log all direct push cores. All direct push locations will be a minimum of 20 feet in depth, except where waste exceeds the 20 foot depth. The direct push logs will be used to determine cap and waste thickness.
 - h. For locations where waste is encountered, up to 15 samples of waste/soil material will be taken and analyzed for CAM 17 metals, TPH, BTEX, PCBs, Pesticides, Semi volatiles and flammability, reactivity, corrosivity and ignitability.
 - i. Project engineer will ensure that 10 Summa Canisters and 10 Tedlar bags are available at the beginning of each day (this assumes that 10 direct push locations will be sampled per day). ExcelChem will provide 20 Summa Canisters and 10 Tedlar bags to BAS prior to the start of the job. ExcelChem will need 3-days notice to deliver Summa Canisters or Tedlar bags to the site.

3.4. Gas Sample Locations

Although sampling locations are proposed in Figure 3, exact gas sampling locations will be determined in the field based on gas screening using a GMI. Locations where gas samples are obtained will be recorded in the field logbook and annotated on a site map. The map will be provided in the final sample report.

3.5. Decontamination Procedures

All equipment that comes into contact with landfill gas will be decontaminated in a predesignated area. Decontamination will consist of operating the sampling equipment with nitrogen or ambient air for 2 minutes to purge residual gas.

3.6. Gas Sample Containers and Preservation

Decontaminated Summa Canisters and Tedlar Bags will be supplied by the laboratory and will not require decontamination before sample collection. No preservative will be added to the containers.

3.7. Disposal of Residual Materials

In the process of collecting gas samples at the Newport Terrace Landfill, the CIWMB sampling team will generate different types of potentially contaminated investigation-derived waste (IDW) that may include:

- Used personal protective equipment (PPE)
- Disposable sampling equipment

The U.S. EPA's National Contingency Plan requires management of IDW generated during sampling comply with all applicable or relevant and appropriate requirements to the extent practicable. Used PPE and disposable equipment will be double bagged and placed in municipal refuse dumpster. Any PPE and disposable equipment that is to be disposed of which can still be used will be rendered inoperable before disposal

If hazardous or radioactive material are found during sampling screening activities, appropriate level of notification and response procedures will be implemented in accordance with the Site Specific Health and Safety Plan.

3.8. Analytes of Concern

Analytes of concern at this site for Landfill Gas are Methane, Carbon Dioxide, Nitrogen, Hydrogen Sulfide and Trace Gases such as Vinyl Chloride, TCE, PCE, BTEX, etc. (Section 1).

3.9. Analytical Procedures

Each sample will be screened for percent combustible gas (calibrated to methane) using a GMI. Samples will be analyzed using Method TO-15, Total Organics Gas Analyses.

3.10. Anticipated Cost

Based on discussions with ExcelChem Analytical Laboratory the following sampling costs are presented:

EPA METHOD	PARAMETER	UNIT COST	# SAMPLES	COST
TO-15	Total Organics	\$140	50	\$7000
			Total	\$7000

3.11. Field Quality Control

One field duplicate sample will be collected simultaneously with a standard sample from the same source under identical conditions into a separate sample container. The duplicated

sample is treated independently of its counterpart in order to assess laboratory performance through comparison of the results.

The duplicate samples will be collected at a random location that demonstrates elevated levels of gas based on field screening results.

3.12. Laboratory Quality Control

The analytical laboratory will perform Quality Control (QC). The QC will include project specific QC, method blank results, laboratory control spike, and matrix spike results.

1. Project Specific QC – No project specific QC has been requested by the CIWMB
2. Method Blank Results – A method blank is a laboratory-generated sample that assesses the degree to which laboratory operations and procedures cause false-positive analytical results for the CIWMB samples. The method blank results associated with the samples will be included with the analytical results.
3. Laboratory Control Spike – A Laboratory Control Spike (LCS) is a sample that is spiked with known analyte concentrations, and analyzed at approximately 10 percent of the sample load in order to establish method-specific control limits. The LCS results associate with CIWMB samples will be attached on the LCS and LCS Duplicated Analysis Report.
4. Matrix Spike Results – A matrix spike is a sample that is spiked with known analyte concentrations and analyzed at approximately 10 percent of the sample load in order to establish method-specific control limits. The matrix spike results associated with CIWMB samples will be attached on the Matrix Spike and Matrix Spike Duplicate Analysis Report.
5. Accuracy – Accuracy will be measured by percent recovery as defined by:

$$\% \text{ recovery} = \frac{(\text{measured concentration}) \times 100}{(\text{actual concentration})}$$

4. Documenting and Reporting

4.1. Field Notes

A field logbook will be used to document the vital project and sample information. At a minimum, the following sample information will be recorded:

- Sample location and description
- Site or sample area sketch showing sample location and measured distances
- Sampler's name(s)
- Date and time of sample collection
- Designation of sample as composite or discrete
- Type of sample (gas)
- Type of sampling equipment used
- Field instrument reading, if applicable
- Field observations and details related to analysis or integrity of samples (e.g., weather conditions, noticeable odors, colors, etc.)
- Preliminary sample descriptions
- Sample preservation
- Sample identification numbers and explanatory code
- Name of recipient laboratory

In addition to the sampling information, the following specific information will also be recorded in the logbook:

- Team members and their responsibilities
- Time of arrival and departure
- Deviations from the sampling plan
- Level of health and safety protection

4.2. Photographs

Photographs will be taken at the sampling location and at surrounding areas. The photographs will verify information entered in the field logbook. Each photograph taken will be written in the logbook with the approximate time, date, and location.

4.3. Labeling

All samples collected will be labeled in a clear and precise way for proper identification for tracking in the laboratory. Each sample will reference the sample date, the type of sample and the sample point identification as shown on the pin flag.

4.4. Chain-of-Custody

A chain-of-custody record will accompany all sample shipments. Shipped samples will have a custody seal placed across the lid of each sample container. All custody seals will be signed and dated.

4.5. Packaging and Shipment

All sample containers will be placed in a strong-outside shipping container and will have the drain plug sealed, if applicable, to prevent melted ice from leaking out of the cooler. If ice is used to cool the samples, the ice will be packed in a double "Ziploc" bag. Special care will be provided to secure and prevent damage to the sample containers.

4.6. Reporting

Once the analytical results are received and evaluated, CIWMB will prepare a sampling report describing the nature of the waste and discuss the analytical results. The CIWMB anticipates submitting the sampling report to the LEA and Newport Terrace Condominiums within 30 days after receipt of the analytical results.

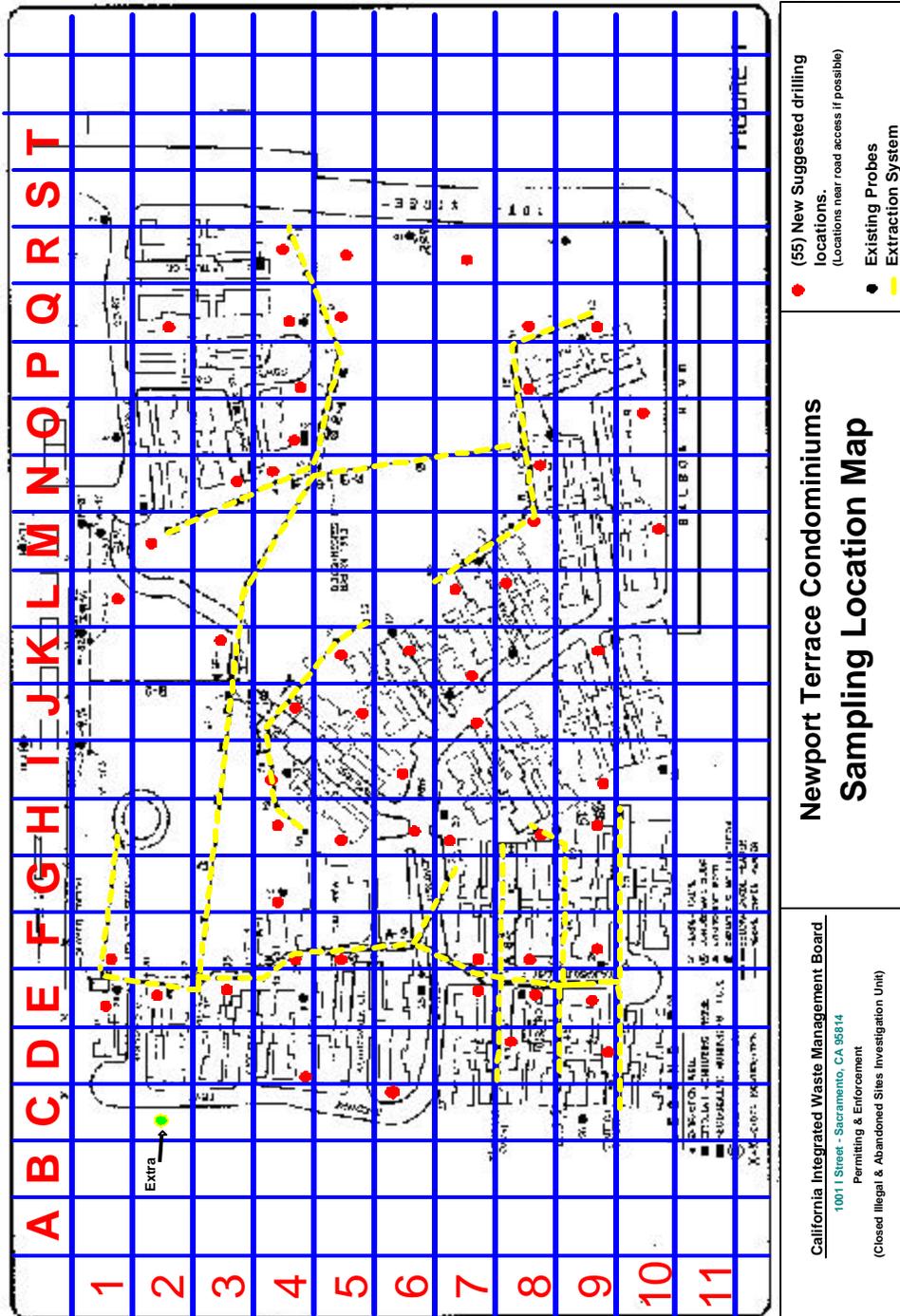


FIGURE 3. Newport Terrace Landfill Sampling Location Map