ENGINEERING FEASIBILITY STUDY AND AMENDED REPORT OF WASTE DISCHARGE, SOUTH AREA LANDFILL LF-1

Yuba Sutter Disposal, Inc. Landfill, Yuba County, California

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1.0 INTRODUCTION

This report provides an Engineering Feasibility Study (EFS) and Amended Report of Waste Discharge (AROWD) for LF-1 at the Yuba Sutter Disposal, Inc. Landfill. This report was requested by the Central Valley Regional Water Quality Control Board (RWQCB) by letter dated December 6, 2011[1] with a revised submittal schedule approved by the RWQCB by letter dated February 22, 2012.[2] In addition, as requested by the RWQCB, specific information regarding post-closure operations on the landfill is provided.

1.1 Regulatory Requirements

The regulations in 27 CCR Section 20420(k)(5) outline a specific course of action for owners of solid waste disposal sites upon confirmation of "measurably significant" evidence of a release. The regulations in 27 CCR Section 20420(k)(6), specify that the EFS must include: "At a minimum, a detailed description of the corrective action measures that could be taken to achieve background concentrations for all Constituents of Concern". The regulations in 27 CCR Section 20420(k)(6) also specify that the EFS must meet the requirements of Section 20430. Generally, these requirements include:

- "The discharger shall take corrective action to remediate releases from the unit; to ensure that the discharger achieves compliance with the water standard defined in the waste discharge requirements for the site";
- "The discharger shall implement corrective action measures that ensure that COCs achieve their respective concentration limits at all monitoring points and throughout the zone affected by the release"; and
- "In conjunction with the corrective action measures, the discharger shall establish and implement a water quality monitoring program to demonstrate the effectiveness of the corrective action program".

1.2 Landfill Description

The Yuba-Sutter Disposal, Inc. (YSDI) Landfill is a 160-acre facility located in Yuba County, northeast of the City of Marysville (Figure 1). The landfill is comprised of three areas: the South Area (LF-1), the Peach Orchard (LF-2), and the North Area (LF-3) (Figure 2). Area LF-1 ceased accepting waste in 1984 and was closed in accordance with the regulations that existed at that time. The final cover for LF-2 was completed in 1995. Area LF-3 ceased accepting waste in 1996, and the final cover was completed in October 1997. In addition, the YSDA landfill (not associated with the YSDI facility) is located adjacent to the southwest boundary of LF-1; there is no separation of refuse between the two sites, restricting monitoring along that boundary.

1.3 Landfill Groundwater Monitoring System

The landfill has 14 groundwater monitoring wells (Figure 2):

- three background wells (MW-5, MW-6, and MW-7),
- two detection monitoring wells (MW-9 and MW-13),
- three LF-3 corrective action wells (MW-8, MW-11, and MW-12), and
- five LF-1/LF-2 corrective action wells (MW-1, MW-2, MW-3, MW-4, and MW-10).
- one new monitoring well (MW-15), which was installed in April 2012

[1] RWQCB, December 6, 2011, Request for Report of Waste Discharge, Yuba-Sutter Disposal, Inc. Landfill, Yuba County.

[2] RWQCB, February 22, 2012, Request for Extension to Amended Report of Waste Discharge and Engineering Feasibility Study for the Yuba Sutter Disposal, Inc., Yuba County.

1.4 Site Hydrogeology

The YSDI Landfill is typically underlain by three geologic units:

- an upper sand layer,
- a middle clay/silt layer, and
- a deeper sequence of interbedded clay, silt, sand, and gravel.

These sediments are flat-lying, deposited by alluvial processes. Groundwater has been found in the deeper interbedded sequence, underlying the clay/silt layer, which acts as a confining layer to the underlying water-bearing sediments. The uppermost sand layers within the interbedded sequence have water seasonally. The deeper sands are saturated and confined. The sand and gravel layers are lenticular to sheet-like in shape. The sand layers are interconnected either locally or on a regional scale. Geologic sections showing the monitoring well screen and sand pack intervals, geologic units, first encountered groundwater, static groundwater, and approximate base of the landfill are presented on Figures 3 and 4.

The water-bearing zone monitored by each groundwater monitoring well underlies the confining clay/silt layer and consists of sand and silty to clayey sands and gravels. The saturated sands occur at an elevation below approximately 55 feet, MSL, and the initial groundwater encountered in the boring for each well subsequently rose under piezometric head approximately 5 to 10 feet following well installation.

1.5 LF-1/LF-2 Groundwater Impacts

There are five corrective action monitoring wells located adjacent to LF-1 and LF-2 (MW-1, MW-2, MW-3, MW-4, and MW-10) and one new monitoring well (MW-15), which was installed in April 2012.[3] Currently, there are only two VOCs detected at a concentration above the method reporting limit, 1,4-dichlorbenzene in wells MW-2 and MW-10, and chlorobenzene in well MW-2 (Table 1). Other VOCs are detected at trace, estimated concentrations. Note that the chlorobenzene concentrations are below their respective drinking water maximum contaminant level (MCL Title 22 California Code of Regulations): 1,4-dichlorobenzene, MCL of 5.0 µg/L; 1,2-dichlorobenzene, MCL of 600 µg/L; and chlorobenzene, MCL of 70 µg/L.

New well MW-15 was sampled for the landfill's constituent of concern list on May 9, 2012. The analytical results are included in Table 1. The groundwater analytical results from well MW-15 were similar to the results from nearby well MW-1; chloride, alkalinity, TDS, TOC, and dissolved metals are equivalent. Three VOCs were detected at trace concentrations in the initial sample from well MW-15, 1,4-dichlorobenzene (0.21 µg/L), acetone (7.5 µg/L), and methyl ethyl-ketone (MEK) (5.5 µg/L). The well was re-sampled for VOCs on June 12, 2012 and 1,4-dichlorobenzene was the only VOC detected (0.16 and 0.18 µg/L); the acetone and MEK detections were not confirmed. The 1,4-dichlorobenzene concentration in well MW-15 is similar to the concentration in well MW-1.

Of the inorganic water quality parameters, there are concentration limit exceedances in the corrective action wells for specific conductance (SC), alkalinity, chloride, and total dissolved solids (TDS). Note that SC and TDS are directly correlative and alkalinity is a substantial portion of SC and TDS at the site. Recent constituent of concern (COC) monitoring results indicate that total organic carbon (TOC), dissolved barium, dissolved iron, and dissolved manganese are above concentration limits in the corrective action wells. In addition, three metals are present at higher concentrations in the corrective action wells (arsenic, selenium, and nickel), while other metals have lower concentrations in the corrective action wells (chromium and vanadium).

[3] Golder Associates Inc., June 29, 2012, *Installation of Monitoring Well MW-15, Recology Yuba Sutter, Yuba County, California.*

As discussed in the July 2011 *Monitoring System Evaluation and Corrective Action Effectiveness* report, the quality of groundwater downgradient of LF-2 has improved and there is no need to implement additional corrective actions at LF-2.

Based on the rate of concentration decline, two of the VOCs (cis-1,2-dichloroethene and vinyl chloride) detected in groundwater downgradient of LF-1 will fall below the method detection limit within the next two to three years. The remaining VOCs (1,4-dichlorobenzene, 1,2-dichlorobenzene, and chlorobenzene) are declining, but appear to fluctuate dependant on the amount of annual rainfall. Inorganic parameters also correlate with changes in annual rainfall.

1.6 Landfill Gas at LF-1

Perimeter landfill gas extraction wells were installed in 1998 to address landfill gas migration that was observed in perimeter gas probes installed along the northwestern, Highway 20 side of LF-1 (GP-6, GP-7, and GP-8). The 22 extraction wells run along the northwestern edge of LF-1 and are connected to the LFG flare.

A field investigation was performed in June 2012 to determine if there was landfill gas within the southern portion of LF-1. For this investigation, nine locations within LF-1 were sampled for subsurface landfill gas concentrations using a hand-driven soil vapor probe (Figure 5). The sample locations were restricted to the unpaved portions of LF-1. The vapor probes were driven to depths of 2 to 5 feet below ground surface (depending on the density of the soil). Field measurements of methane, carbon dioxide, and oxygen were obtained using a Landtec GEM 2000 Portable Gas Analyzer.

The field landfill gas measurements are shown on Figure 5 and are compiled in the table below.

Field Landfill Gas Measurements in LF-1

Sample Location	Methane %	Carbon Dioxide %	Oxygen %
1	6.5	7.8	11.3
2	1.3	3.5	16.9
3	47.9	20.3	0.3
4	19.7	16.6	4.4
5	0	2.7	17.4
6	0	0.8	19.7
7	0	1.7	19.3
8	26.7	16.1	6.2
9	0	0.5	19.5

Relatively high methane concentrations were measured at three locations; adjacent to the YSDA landfill (#3, 47.9%), on the west side of the transfer station (#4, 19.7%), and along the drainage near the northeast corner of LF-1 (#8, 26.7%). Because of the proximity of location #3 to the YSDA landfill, it is uncertain which landfill is the source of gas at that location. Four of the sample locations had no methane.

Four new perimeter landfill gas monitoring probes (GP-12, GP-13, GP-14, and GP-15) were installed in May 2012 along the southeastern boundary of LF-1 and LF-2, between the landfill and the Yuba River.[4] On June 1, 2012, one of the new probes, GP-14 (both shallow and deep probes), was found to contain methane (15.7 % in GP-14s and 10.0 % in GP-14d). No methane was measured in the other three

[4] Golder Associates Inc., June 29, 2012, *Installation of Additional Perimeter Landfill Gas Monitoring Probes GP-12 through GP-15, Recology Yuba Sutter, Yuba County, California.*

probes. The methane detection in GP-14 was confirmed on June 6, 2012 (11.9% and 8%) and a sample was obtained on June 20, 2012 and submitted to the analytical laboratory for VOC quantification.

Seven VOCs were detected in the sample obtained from GP-14s, as shown on the following table. The detected VOCs are typical constituents in landfill gas.

VOCs Detected in GP-14s

Detected VOCs (June 20, 2012)	Concentration	Units
Hexane	50	ppbv
cis-1,2-Dichloroethene	85	ppbv
Cyclohexane	88	ppbv
Benzene	91	ppbv
Vinyl chloride	150	ppbv
Dichlorodifluoromethane (Freon 12)	220	ppbv
1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon 114)	240	ppbv

Notes: All other VOCs were not detected.

1.7 Potential Sources of Groundwater Impact

Overall, the changes in groundwater chemistry in the corrective action wells appear to be from two potential sources: leachate and/or landfill gas. The alkalinity increases are indicative of landfill gas, while the chloride concentrations point toward leachate as a source. Whichever is the dominant source, the data indicate that infiltration into the landfill during wetter years could be the cause of the increased leachate or increased landfill gas influence on groundwater, and the resulting increases in inorganic constituents. Therefore, corrective actions should be directed toward reducing the potential for water entering the landfill.

A corrective action evaluation was prepared in 1993 and concluded that placement of final cover over LF-2 would be an effective corrective action.[5] As shown in the July 2011 evaluation, groundwater quality downgradient of LF-2 has improved and additional corrective actions at LF-2 were not recommended.

2.0 ENGINEERING FEASIBILITY STUDY FOR A CORRECTIVE ACTION PROGRAM

Based on the monitoring results and the July 2011 *Monitoring System Evaluation and Corrective Action Effectiveness* report, the infiltration of water into LF-1 has been identified as the potential source of the VOCs and inorganic compounds detected in groundwater downgradient of LF-1. The EFS is intended to provide an evaluation of the effectiveness and feasibility of corrective action alternatives to reduce the infiltration into the landfill. An overview of the corrective action goals, corrective action alternatives, and a comparative analysis of the alternatives are provided in the following sections.

2.1 Corrective Action Goals

The goals for a corrective action plan are to remediate releases from the landfill and to achieve compliance with the WQPS (Section 20430, Title 27, CCR). Title 27 states that *corrective action measures shall be implemented that ensure that COCs achieve their respective concentration limits at all monitoring points and throughout the zone affected by the release.*

[5] EMCON Associates, *Amendment to Report of Waste Discharge, Yuba-Sutter Disposal, Inc. Landfill*, August 1993.

For evaluation purposes, the constituents of concern are 1,4-dichlorobenzene, bicarbonate alkalinity, and chloride in groundwater, and methane in the vadose zone. The concentration limits for VOCs are the respective method detection limits (MDLs) of each compound. The current concentration limit for bicarbonate alkalinity is 198 mg/L and 19 mg/l for chloride.

2.2 Corrective Action Alternatives

Several corrective action alternatives have been evaluated for LF-1. Some of these alternatives were presented in the July 2011 *Monitoring System Evaluation and Corrective Action Effectiveness* report, and are evaluated further in this report. These alternatives were selected to provide a range of remedial effectiveness and cost. The following alternatives are evaluated: groundwater extraction with re-use or treatment, reduction of water infiltration into the landfill, additional landfill gas extraction, leachate extraction, and monitored natural attenuation.

These alternatives are briefly discussed below. A table presenting the alternatives and evaluation points is included (Table 2).

2.2.1 Groundwater Extraction

Groundwater could be removed via extraction well(s) or a groundwater collection trench. The well(s) or trench would be placed along the landfill boundary. The number of wells necessary would be determined based on the hydraulic properties of the water-bearing zone and the amount of water necessary to attain capture. Because the impact is relatively shallow, the depth is within reach of conventional trenching technology.

The impacted groundwater may be treated through discharge to an established wastewater treatment plant or construction of an on-site treatment plant. Possible treatment options would likely need to be a combination of processes to reduce the VOC concentrations and inorganic compound concentrations. Treatment options include: carbon adsorption or sparging, reverse osmosis, and/or ion exchange. Following treatment, the water would be used in site operations, discharged under permit to the sanitary sewer, or discharged under a National Pollution Discharge Elimination System (NPDES) permit.

Groundwater extraction, treatment and/or discharge are relatively expensive, and the local wastewater treatment plant may not be able to handle the increased volume. In addition, groundwater extraction deals with the downgradient impact but does not address or reduce the source of the impact.

2.2.2 Reduction of Water Infiltration into the Landfill

Water can enter the landfill through rainfall infiltrating the cover materials or through leakage of the subsurface storm drain system. Much of the LF-1 surface is covered by hard surfaces, such as building, pavement, or hard-packed base rock. The combination of these hard surfaces and the clay soil cover that was placed in 1988 likely are effective at restricting rainfall infiltration into the landfill. There may be areas with cracked and damaged pavement that could preferentially allow surface water runoff to enter the subsurface. Areas with damaged pavement could be identified and repaired and a future maintenance program instituted to ensure that the pavement surfaces are periodically inspected and repaired as needed.

There are extensive storm drains and sanitary sewer lines that were constructed below grade on LF-1 and if these drain lines leak, they could contribute water into the landfill. The below grade pipelines, especially the piping connections, could be surveyed using visual inspections, video camera technology, or leak detection methods. If the pipelines are found to be leaking, then repairs can be made. A future inspection and maintenance program can be instituted to ensure that the below grade pipelines are periodically inspected and repaired as needed.

2.2.3 Additional Landfill Gas Extraction

Landfill gas is present in LF-1 and was detected in perimeter landfill gas probe GP-14. Landfill gas extraction along the northwestern perimeter of LF-1 has been successful at preventing off-site migration along that side of LF-1. If a release involves landfill gas, then Title 27 requires that the corrective actions should include the design, installation, and operation of landfill-gas control and monitoring systems.

Landfill gas extraction in the southeastern portion of LF-1 could reduce the potential for landfill gas to migrate away from the landfill and impact groundwater. The LFG extraction system could include installing landfill gas extraction wells or installing a landfill gas collection trench with discharge through the existing flare. Because landfill gas was detected in the bar hole punches only on the eastern side of LF-1 and there is landfill gas migration to GP-14, the LFG extraction wells or trench would be a targeted system to control LFG near monitoring well MW-2 and perimeter gas probe GP-14 and would be installed between the MRF and the LF-1 fence line.

2.2.4 Leachate Extraction

There are no leachate extraction wells within LF-1. The size of LF-1 and the structures and activities on LF-1 make installation and operation of a leachate extraction system difficult. LF-1 covers approximately 42 acres and assuming leachate wells would be spaced approximately 200 feet apart, approximately 35 leachate wells would be required. In addition, saturated refuse was not encountered in the perimeter landfill gas extraction well borings located along the western perimeter of LF-1. So, it is unlikely that extensive refuse saturation exists in LF-1 that would allow for efficient leachate removal. Reducing the potential for water infiltration into the landfill and therefore reducing leachate generation would be a more effective corrective action. If sufficient leachate was encountered in the potential landfill gas extraction wells and/or trench, then leachate removal could be considered at those locations.

2.2.5 Monitored Natural Attenuation

This alternative assumes that natural attenuation will be sufficient to mitigate the groundwater impacts. Natural attenuation is most effective when source removal has occurred. Because the concentrations of bicarbonate alkalinity (and resulting TDS and EC), chloride, 1,4-dichlorobenzene, 1,2-dichlorobenzene, and chlorobenzene in LF-1 corrective action wells are declining overall natural attenuation is potentially a viable alternative. However, in the absence of additional source control (e.g., landfill gas extraction, reduction of infiltration, etc.), the amount of time to reach cleanup may be unacceptable for this alternative.

The July 2011 *Monitoring System Evaluation and Corrective Action Effectiveness* report concluded that concentrations of cis-1,2-dichloroethene will be below the method detection limit (approximately 0.1 µg/l) within the next two to three years. Vinyl chloride concentrations are already mostly below the method detection limit. Monitored natural attenuation is a viable alternative for these compounds.

All of the detected VOC concentrations are below their respective drinking water maximum contaminant level (MCL Title 22 California Code of Regulations) or Environmental Screening Level[6] (ESL): 1,4-dichlorobenzene, MCL of 5.0 µg/L; 1,2-dichlorobenzene, ESL of 10 µg/L; and chlorobenzene, ESL of 25 µg/L. In addition, the chloride and sulfate concentrations in the corrective action wells are below their respective Secondary MCL (Table 1). Several wells have TDS concentrations higher than the Secondary MCL and bicarbonate alkalinity is the major constituent contributing to the elevated TDS concentrations. Only two of the detected metals (iron and manganese) are above their respective Secondary MCL and these MCLs are not health based, but are selected for esthetic reasons.

[6] Table F-2a. Surface Water Screening Levels Fresh Water Habitats, which are the lowest of ceiling value, drinking water goal, aquatic habitat goal, and bioaccumulation goal. In:California Regional Water Quality Control Board, San Francisco Region, *Screening for Environmental Concerns at Sites*, Interim Final - November 2007 (Revised May 2008).

Because there are no groundwater receptors downgradient of the landfill due to the proximity of the Yuba River (which acts as a groundwater divide) and no impacts have been detected in the surface water samples obtained from the Yuba River (landfill sampling location SW-2), monitored natural attenuation is potentially an appropriate option.

2.3 Evaluation Criteria

Each of the corrective action alternatives is evaluated based on criteria provided in 40 CFR 258.56 and 258.57. These criteria include: protection of human health and environment, attainment of water quality protection standard (WQPS), performance and reliability, source control, implementability, time required to implement alternative, cost, and institutional requirements. This evaluation is presented in Table 2.

As shown on Table 2 and as discussed above, reducing infiltration and landfill gas extraction are the most effective source control measures. Source control does not immediately clean up groundwater, but because the current impacts are minimal, source control is a practical approach to cleaning up groundwater in the long term. Groundwater extraction is overall the most effective at remediating the impacted groundwater, but if source control is not implemented, groundwater extraction would likely need to be maintained in the long term.

Leachate extraction is the least viable alternative due to high cost, low reliability, and low implementability (Table 2). Monitored natural attenuation doesn't directly address either groundwater cleanup or source control, but the minimal impacts, lack of downgradient receptors, and the low cost may make this a viable alternative.

3.0 RECOMMENDED CORRECTIVE ACTIONS

Because the groundwater impacts are relatively minor and landfill gas has been detected in one of the new perimeter landfill gas monitoring probes, the source control alternatives are considered to be the most effective means of controlling the landfill releases from LF-1. A phased approach to corrective action should be implemented:

1. Design and construct landfill gas extraction for the southeastern side of LF-1 between the MRF and perimeter LFG monitoring probe GP-14.
2. Evaluate the integrity of the subsurface pipelines in LF-1.
3. Evaluate the integrity of the paved surfaces constructed on LF-1.
4. Based on the pipeline and paved surface evaluations, prioritize repairs to provide the greatest potential to reduce infiltration into LF-1.

3.1 Corrective Action Implementation Schedule

The landfill gas extraction system design should be implemented immediately to reduce the migration of landfill gas from the landfill. The landfill gas remediation plan is due to the Local Enforcement Agency within 60 days of methane detection in GP-14 (due August 5, 2012).

The evaluation of the integrity of the subsurface pipelines and paved surfaces can be performed likely within two to three months. Plans to make repairs, if needed would be prepared and contracted with appropriate construction companies. If possible, repairs could be implemented prior to the onset of the 2012-2013 rainy season. Depending on the required repairs, some repairs may need to be scheduled for a later date.

4.0 CORRECTIVE ACTION MONITORING PROGRAM

A corrective action monitoring program should be implemented to monitor the effectiveness of the corrective action and provide a means to determine whether additional actions are necessary. The corrective action monitoring program will consist of adding the new monitoring well MW-15 to the LF-1 corrective action monitoring program (as outlined in the table below) and incorporating the new perimeter landfill gas probes GP-14 and GP-15.

LF-1 Corrective Action Monitoring Program

Sample Location	Monitoring Parameters	Frequency	Evaluation Methods
Corrective Action Wells	Routine Parameters – field parameters, TDS, chloride, sulfate, nitrate, VOCs, Ca, Mg, Na, K, bicarbonate alkalinity	Quarterly	Trend analysis and eventual comparison to concentration limits
MW-1			
MW-2			
MW-10			
MW-15			
Perimeter LFG Probe	Field measurement of methane, carbon dioxide, oxygen	Quarterly	Comparison to regulatory standards
GP-14			

Notes – consistent with current monitoring program, corrective action wells will be monitored for COCs every five years.

The progress of the corrective actions will be reported in the semi-annual monitoring reports and evaluated at least annually. Should the corrective action monitoring program show that the constituents of concern are below WQPS for at least one year, then recommendations for returning the monitoring wells to detection monitoring will be made.

5.0 FACILITY DESCRIPTION FOR UPDATED ROWD

The RWQCB requested in their December 6, 2011 letter[7] that this report include (1) a complete description of the facility and the current post-closure land uses, (2) a complete description of the landfill gas (LFG) system, and (3) a complete description of the LFG and groundwater monitoring systems. In addition, the permitting section of the RWQCB requested by letter dated May 17, 2012[8] that this report include specific detailed information on the composting facility and its potential impacts to surface and groundwater. As stated in the May 17, 2012 letter, the RWQCB staff *"is concerned that the landfill cover below the composting operation is inadequate in preventing leachate from that operation from percolating through landfill waste in LF-1 WMU and degrading underlying groundwater quality"*. The following sections provide the information requested by the RWQCB.

5.1 Facility Description and Current Post-closure Land Uses

Much of the facility description is taken from the WDR R5-2003-0093, with additional information provided. The landfill consists of three landfill areas (1) LF-1 South Area Landfill, (2) LF-2 Peach Orchard Landfill, and (3) LF-3 North Area Landfill. Located between LF-2 and LF-3 is an undeveloped area referred to as the former hog farm. The hog farm area is not within the permitted landfill boundary and no landfill activities occur on the former hog farm area.

5.1.1 LF-1 South Area Landfill

LF-1 covers about 42 acres in the south and west central area of the facility. Wastes were placed in this unlined area from 1967 through 1984 after which it was closed in accordance with regulations that existed at the time. Most of this area has since been covered by building structures and paved parking, and is graded to drain toward an on-site storm water collection and removal system. There is no leachate collection and removal system (LCRS).

[7] RWQCB, December 6, 2011, *Request for Report of Waste Discharge, Yuba Sutter Disposal, Inc. Landfill, Yuba County.*

[8] RWQCB, May 17, 2012, *Request for Updated Report of Waste Discharge (ROWD): Waste Discharge Requirements Order R5-2003-0093 (WDR Order): Recology Yuba-Sutter Disposal, Inc. (Discharger): Yuba-Sutter Disposal, Inc. Landfill (YSDI Landfill): Yuba County (County).*

The northwest boundary of LF-1 has 22 LFG extraction wells that are connected to the LFG flare (Figure 2). The extraction wells were installed in 1998 and some of the wells have dual completion depths (boring logs are included in Appendix A). The wells range in depth from 24 to 31 feet.

Constructed on top of LF-1 are the following (see Figure 2):

- A 10,000 square foot, two-story office building for RYS (constructed in approximately1990), located near the site entrance gate.
- A 47,000 sq ft materials recovery facility (MRF) is located near the southeastern landfill boundary. The MRF has a single stream waste/recyclables sorting line, bailers, a construction and demolition (C&D) sorting line, waste transfer station, recyclables buy-back center, load out docks for recyclables, scale, and break room and office space.
- A 14,000 sq ft truck maintenance building is located along the northwestern landfill boundary. The area east of the building is used for truck parking.
- The southeastern portion of the truck parking area has a truck fueling area and truck wash. Fuel tank storage is above ground.
- A 6,500 sq ft metal building is located between the office building and MRF and is used as a metal shop.
- A 9,000 sq ft metal storage building is located along the landfill boundary between LF-1 and the adjacent YSDA landfill.
- A scrap metals recycling area is located at the southeast corner of the landfill.
- A 15.8 acre compost area is located northeast of the truck maintenance building.

5.1.2 LF-2 Peach Orchard Landfill

LF-2 covers about 25 acres in the central area of the facility. This landfill was constructed with a clay liner and a small portion of the total area has a gravel blanket LCRS that drains toward an interior sump. Wastes were accepted in this area from 1984 through 1988. A final cover system, consisting of two feet of foundation soil, a one foot thick low-permeable soil layer with permeability of 1×10^{-6} cm/sec or less, and a one foot thick vegetative layer was constructed in 1995.

LF-2 has 21 LFG extraction wells connected to the LFG flare (Figure 2). The extraction wells were installed in 1998 and range in depth from 20 to 52 feet (boring logs are included in Appendix A).

No facilities or other activities occur on LF-2.

5.1.3 LF-3 North Area Landfill

The LF-3 landfill covers about 38 acres in the north and east central area of the facility. This area accepted waste between 1988 and 1996. Phases I and II were constructed in 1989 and are lined with a single 60-mil high density polyethylene (HDPE) geomembrane on a prepared subgrade. Phase III was constructed with a composite liner system consisting of a one foot thick low-permeability soil layer with 1×10^{-6} cm/sec permeability or less overlain by a 60-mil HDPE flexible membrane liner and LCRS, followed by a one foot operations layer. Phase IV was constructed with a composite liner system consisting of a two foot thick low-permeability soil layer with a permeability of 1×10^{-7} cm/sec or less overlain by a 60-mil HDPE flexible membrane liner and LCRS, followed by a one foot operations layer. Leachate is extracted from four sumps (S-2, S-3, S-4, and S-5) via submersible pumps and transported by tanker truck to the City of Marysville Wastewater Treatment Plant for disposal.

An engineered alternative for closure of the top deck, consists of the following (from bottom to top): compacted soil subgrade; arterial gas collection piping system with 1-½ inch drain gravel; 6-inch gas collection sand layer; geosynthetic clay liner (GCL) with 40-mil HDPE textured geomembrane backing; 7

oz/sy geotextile cushion fabric; and 1 foot vegetative soil cover. The side slope sections consist of the following: compacted soil subgrade; 6-inch gas collection sand layer; 40-mil textured HDPE geomembrane; 7 oz/sy geotextile cushion fabric along the toe of the slope; 1 ½ inch drain gravel placed at the toe of the slope; geocomposite drain net; and 1 foot thick vegetative soil cover. The RWQCB approved this engineered alternative in WDR Order No. 97-250.

15 LFG extraction wells were installed in LF-3 in 2010. These wells are connected to the LFG flare. No other activities occur on LF-3.

5.2 Landfill Gas (LFG) System Description

The landfill gas extraction system is connected to 58 active extraction wells, the four LF-3 leachate sumps, four trenches in LF-3, and six of the cover liner vents (formerly passive) in LF-3, which are connected to an enclosed flare (recent flow rate of approximately 340 scfm). The gas system layouts are shown on Figure 2. The flare is located north east of the compost area at the northeast corner of LF-1. There are four landfill gas condensate sumps on the LF-3 LFG system and five condensate sumps on the LF-2 LFG system.

5.3 LFG and Groundwater Monitoring Systems Description

The perimeter landfill gas monitoring system consists of 15 probe locations (see Figure 2), 5 of which are dual completion probes (GP-1, GP-2, GP-12, GP-13, and GP-14). LFG probe boring logs are included in Appendix A. Probes GP-1 and GP-2 were installed in 1994, probes GP-3 through GP-11 were installed in 1996, and probes GP-12 through GP-15 were installed in May 2012. The perimeter landfill gas probes are monitored quarterly to meet the requirements of Title 27, Sections 20917 to 20939.

As specified in MRP No. R5-2003-0093, and subsequent site reports (i.e. EMP, EFS) the LF-3 groundwater monitoring network consists of three background wells (MW-5, MW-6, and MW-7), two detection monitoring wells (MW-9, MW-13), and three corrective action wells (MW-8, MW-11, and MW-12). Five corrective action wells are associated with LF-1 and LF-2 (MW-1, MW-2, MW-3, MW-4, and MW-10). One new monitoring well (MW-15) was installed near the southeast corner of LF-1. Monitoring well locations are shown on Figure 2.

Background and detection wells are sampled semiannually for general water quality parameters and VOCs. The corrective action wells are sampled quarterly for VOCs and semiannually for general parameters.

Surface water is sampled semiannually at three downstream locations (SW-2, SW-3, and SW-4) and one upstream location (SW-5). Figure 2 shows the locations of the four current surface water monitoring locations.

Leachate is sampled semiannually for general water quality parameters and VOCs at four LF-3 sump locations (S-2 through S-5). In addition to routine monitoring parameters, water samples from all on-site monitoring locations are analyzed for the five year COCs. The last five-year COC monitoring event was conducted in fourth quarter 2011.

5.4 Composting Facility and Potential Impacts to Surface and Groundwater

An investigation was conducted in 2001[9] to evaluate the following at the compost area:

- Characterize the subsurface conditions of the material directly below the proposed compost area.

[9] Golder Associates Inc., May 18, 2001, *Results of Field and Engineering Study, Proposed Compost Area, Marysville, California*.

- Evaluate the permeability of the upper portion of the compost pad and assess the ability of the surface materials to impede subsurface migration of liquids into the landfill.
- Review drainage controls relative to potential impacts to surface water.

The 2001 Golder report was transmitted by Norcal Waste Systems to the RWQCB by letter dated May 18, 2001. A copy of the 2001 report is included in Appendix B. The area covered by the 2001 investigation extended from the north end of LF-1 to the southwestern corner of LF-2 (see Figure 1 of the report in Appendix B).

The report concluded that the northeastern portion of the compost area had low-permeability surface soil (Class 2 aggregate) that allowed for minimal infiltration. The southwestern portion of the proposed compost area had higher permeability surface soils that could allow more infiltration. Recommendations were made to construct the proposed southwestern portion of the compost pad with a low-permeability surface, replacing the existing crushed concrete aggregate with a minimum of 6-inches of properly compacted silty/clayey aggregate (Class 2 or Class 3 with at least 15 percent fines).

According to RYS personnel, prior to moving composting operations to that area, the southwestern portion of the compost pad was constructed to the recommended specifications in 2004. Then in 2007, the area to the east was constructed to the same specifications.

TABLES

Table 1
Groundwater Analytical Results
Yuba Sutter Disposal Landfill

		LF-1					LF-2		LF-3			Detection		Background				
Sample Designation		MW-10	MW-15		MW-1	MW-2	MW-3	MW-4	MW-8	MW-11	MW-12	MW-9	MW-13	MW-5	MW-6	MW-7	*Conc. Limit*	ESL/*MCL* [1]
Sampling Date		12/16/11	05/09/12	06/12/12	12/15/11	12/15/11	12/16/11	12/15/11	12/16/11	12/15/11	12/15/11	12/16/11	12/15/11	12/16/11	12/16/11	12/16/11		
Field Parameters	*Unit*																	
pH	std. units	6.23	6.40	6.63	6.32	6.39	6.49	6.71	6.56	6.70	6.63	6.77	6.74	6.42	6.84	6.71	*6.4 - 8.0*	-
Specific Conductance	µmhos/cm	370	740	651	712	1395	738	330	821	571	778	316	369	531	350	480	*509*	-
Temperature	°C	18.5	21.2	20.7	17.8	19.5	17.3	16.2	19.1	18.1	18.8	18.1	19.7	17.2	17.9	18.7	-	-
Turbidity	NTU	2	239	19	78	86	2	9	2	181	218	2	12	1	1	1	-	-
General Water Quality Parameters																		
Alkalinity, bicarbonate	mg/l	150	330	-	310	460	190	130	430	300	360	150	130	180	130	180	*198*	-
Alkalinity, carbonate	mg/l	<4.1	<4.1	-	<4.1	<8.2	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1	*NE*	-
Chloride	mg/l	15	30	-	30	150	100	3.7	8.4	7.7	7.1	3.0	6.2	15	9.3	14	*19*	*250*
Nitrate/Nitrite as N	mg/l	0.66	0.079	-	0.11	0.32	0.095 t	0.19	1.2	0.061 t	0.24	0.42	3.0	1.1	0.53	1.3	*1.8*	*10*
Sulfate	mg/l	8.8	15	-	21	0.25 t	26	<0.12	21	12	48	8.4	29	67	27	44	*61*	*250*
Total Dissolved Solids	mg/l	220	480	-	450	800	570	170	510	410	510	220	280	370	250	340	*385*	*500*
Calcium, dissolved	mg/l	29	59	-	60	95	71	22	74	64	66	25	27	46	24	41	*NR*	-
Potassium, dissolved	mg/l	1.8	6.8	-	2.8	15	2.0	1.5	0.96 t	0.58 t	0.8 t	0.85 t	0.64 t	1.6	1.2	1.2	*NR*	-
Magnesium, dissolved	mg/l	18	40	-	40	71	30	9.9	46	34	49	17	19	35	17	30	*NR*	-
Sodium, dissolved	mg/l	9.6	36	-	30	56	12	5.7	22	18	29	18	22	13	21	14	*NR*	-
Volatile Organic Compounds by EPA Method 8260B																		
Acetone	µg/l	<4.6	7.5 t	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	*ND*	1500
Methyl ethyl-ketone	µg/l	<2.5	5.5 t	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	*ND*	4200
Chlorobenzene	µg/l	<0.093	<0.093	-	0.31 t	**1.1**	0.17 t	<0.093	<0.093	<0.093	<0.093	<0.093	<0.093	<0.093	<0.093	<0.093	*ND*	25
Ethylbenzene	µg/l	<0.098	<0.098	-	<0.098	<0.098	0.1 t	<0.098	<0.098	<0.098	<0.098	<0.098	<0.098	<0.098	<0.098	<0.098	*ND*	30
Methyl t-butyl ether	µg/l	<0.11	<0.11	-	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	0.65	<0.11	<0.11	<0.11	<0.11	<0.11	*ND*	5
1,2,4-Trimethylbenzene	µg/l	<0.12	<0.12	-	<0.12	<0.12	0.12 t	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	*ND*	100 (TPH)
1,2-Dichlorobenzene	µg/l	<0.072	<0.072	-	<0.072	0.31 t	<0.072	<0.072	<0.072	<0.072	<0.072	<0.072	<0.072	<0.072	<0.072	<0.072	*ND*	10
1,4-Dichlorobenzene	µg/l	**1.1**	0.21 t	0.16t/0.18t	0.18 t	**2.8**	0.16 t	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	<0.062	*ND*	5
cis-1,2-Dichloroethene	µg/l	<0.085	<0.085	-	0.12 t	0.24 t	0.1 t	<0.085	<0.085	<0.085	<0.085	<0.085	<0.085	<0.085	<0.085	<0.085	*ND*	6
Naphthalene	µg/l	<0.36	<0.36	-	<0.36	0.44 t	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	*ND*	17
p/m Xylenes	µg/l	<0.28	<0.28	-	<0.28	<0.28	**0.5**	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	<0.28	*ND*	20
o-Xylene	µg/l	<0.082	<0.082	-	<0.082	0.11 t	0.17 t	<0.082	<0.082	<0.082	<0.082	<0.082	<0.082	<0.082	<0.082	<0.082	*ND*	20
Toluene	µg/l	<0.093	<0.093	-	<0.093	<0.093	0.93	<0.093	<0.093	<0.093	<0.093	<0.093	<0.093	<0.093	<0.093	<0.093	*ND*	40
Total Xylenes	µg/l	<0.36	<0.36	-	<0.36	<0.36	0.67 t	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	*ND*	20
All other compounds below method detection limits.																		
Constituents of Concern																		
Cyanide, Total	mg/l	<0.0016	<0.0016	-	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	*ND*	5.2
Sulfide	mg/l	<0.050	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	*0.37*	-
Total Organic Carbon	mg/l	1.8	6.7	-	3.0	15	9.8	6.9	0.48	2.8	1.4	0.38	0.52	0.76	0.45	0.60	*1.8*	-

Notes on page 2

Table 1
Groundwater Analytical Results
Yuba Sutter Disposal Landfill

		LF-1					LF-2		LF-3			Detection		Background				
Sample Designation		MW-10	MW-15		MW-1	MW-2	MW-3	MW-4	MW-8	MW-11	MW-12	MW-9	MW-13	MW-5	MW-6	MW-7	*Conc. Limit*	ESL/*MCL* [1]
Sampling Date		12/16/11	05/09/12	06/12/12	12/15/11	12/15/11	12/16/11	12/15/11	12/16/11	12/15/11	12/15/11	12/16/11	12/15/11	12/16/11	12/16/11	12/16/11		
Dissolved Metals																		
Aluminum	mg/l	<0.026	<0.026	-	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	*0.14*	*0.2*
Antimony	mg/l	<0.000087	0.00013	-	<0.000087	<0.000087	<0.000087	<0.000087	<0.000087	<0.000087	<0.000087	<0.000087	<0.000087	<0.000087	<0.000087	<0.000087	*ND*	0.006
Arsenic	mg/l	0.0074	0.013	-	0.0019 t	0.023	0.019	0.014	0.0024	0.0018 t	0.0020	0.0018 t	0.0019 t	0.0020	0.0027	0.0015 t	*NE*	0.00014
Barium	mg/l	0.065	0.10	-	0.15	0.28	0.11	0.12	0.070	0.085	0.10	0.026	0.046	0.039	0.021	0.031	*0.047*	1.0
Beryllium	mg/l	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	*ND*	0.0027
Cadmium	mg/l	<0.00007	<0.00007	-	<0.00007	<0.00007	<0.00007	<0.00007	<0.00007	<0.00007	<0.00007	<0.00007	<0.00007	<0.00007	<0.00007	<0.00007	*NE*	0.00025
Chromium	mg/l	<0.0010	<0.0010	-	<0.0010	0.0015 t	<0.0010	<0.0010	0.0014 t	<0.0010	0.0024 t	0.0028 t	0.0046 t	0.003 t	0.0037 t	0.0018 t	*0.008*	0.05
Cobalt	mg/l	<0.0050	ND	-	<0.0050	<0.0050	0.059	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	*ND*	0.003
Copper	mg/l	<0.0023	<0.0023	-	<0.0023	<0.0023	<0.0023	<0.0023	<0.0023	<0.0023	<0.0023	<0.0023	<0.0023	<0.0023	<0.0023	<0.0023	*NE*	0.009
Iron	mg/l	12	2.8	-	5.6	**35**	11	18	<0.0050	<0.0050	<0.0050	0.12	<0.0050	0.0054 t	0.0054 t	<0.0050	*0.33*	*0.3*
Lead	mg/l	<0.00016	<0.00016	-	<0.00016	<0.00016	<0.00016	<0.00016	<0.00016	<0.00016	<0.00016	<0.00016	<0.00016	<0.00016	<0.00016	<0.00016	*0.036*	0.0025
Manganese	mg/l	1.7	2.2	-	2.3	4.5	3.8	1.2	0.020	0.16	<0.0010	0.002 t	<0.0010	<0.0010	<0.0010	<0.0010	*0.045*	*0.05*
Mercury	mg/l	<0.00003	<0.00003	-	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	*ND*	0.000025
Nickel	mg/l	0.0011 t	0.011	-	0.0028	0.0074	0.0097	0.0027	0.0024	0.0043	0.0022	0.00049 t	0.001 t	0.001 t	0.0004 t	0.00094 t	*NE*	0.052
Selenium	mg/l	0.00034 t	<0.00052	-	0.00051 t	0.0035	0.0019 t	<0.00023	<0.00023	<0.00023	<0.00023	<0.00023	<0.00023	<0.00023	<0.00023	<0.00023	*ND*	0.005
Silver	mg/l	<0.0011	<0.0011	-	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011	*ND*	0.00034
Thallium	mg/l	<0.000046	0.00079	-	<0.000046	<0.000046	0.00048 t	<0.000046	<0.000046	<0.000046	<0.000046	<0.000046	<0.000046	<0.000046	<0.000046	<0.000046	*ND*	0.002
Tin	mg/l	<0.0050	<0.0050	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	*ND*	-
Vanadium	mg/l	0.014	0.002	-	<0.0010	<0.0010	<0.0010	0.0017 t	0.014	0.0086 t	0.011	0.012	0.011	0.0092 t	0.012	0.010	*0.024*	0.015
Zinc	mg/l	<0.0059	<0.0059	-	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	*0.027*	0.12
Semi-Volatile Organic Compounds by EPA Method 8270C																		
Diethyl Phthalate	µg/l	<0.33	<0.33	-	0.49 t	<0.33	0.72 t	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	*ND*	-
All other compounds below method reporting limit.																		
Organophosphorus Pesticides by EPA Method 8141A	µg/l	NR	ND	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	*ND*	-
All compounds below method reporting limit.																		
Chlorinated Herbicides by EPA Method 8151A	µg/l	ND	ND	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	*ND*	-
All compounds below method reporting limit.																		

mg/l - milligrams per liter (parts per million)
µmhos/cm - micromhos per centimeter at 25 °C
NTU - Nephelometric Turbidity Units
µg/l - micrograms per liter (parts per billion)
j - trace concentration between the reporting limit and detection limit; result is an estimate.
Secondary CA MCL in *italics*
result above concentration limit

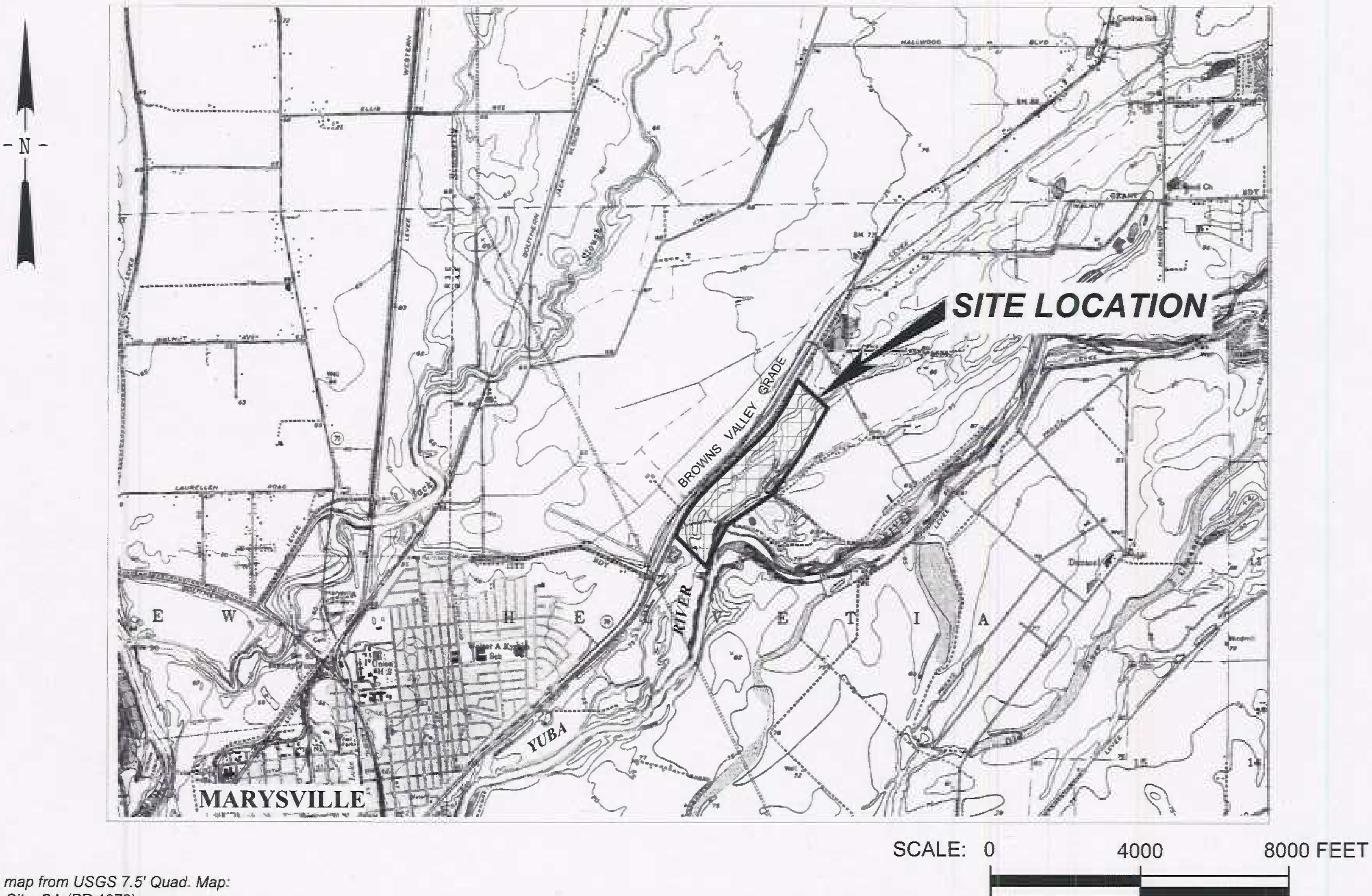
1. Lowest of ceiling value, drinking water goal, aquatic habitat goal, and bioaccumulation goal.
Table F-2a. Surface Water Screening Levels Fresh Water Habitats
Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater
Prepared by: California Regional Water Quality Control Board
INTERIM FINAL - November 2007 (Revised May 2008)

Table 2
LF-1 Corrective Action Alternatives Evaluation
Recology Yuba Sutter

Corrective Action Alternative	Protection of human health and environment	Attainment of water quality protection standard	Performance and reliability	Source control	Implementability	Time	Cost
Groundwater Extraction	1	1	2	3	3	3	2
Infiltration Reduction - Cover	2	2	1	1	1	2	2
Infiltration Reduction - Storm Drains	2	2	1	1	1	2	2
Landfill Gas Extraction	2	2	1	1	1	2	2
Leachate Extraction	2	2	1	1	3	3	3
Monitored Natural Attenuation	3	3	1	3	1	3	1

Qualitative evaluation standards:
1 - Very effective, easily implemented/operated, short time, low cost
2 - Moderately effective, more difficult to implement/operate, longer time, moderate cost
3 - Not very effective, difficult to implement/operate, longest time frame, highest cost

FIGURES



Base map from USGS 7.5' Quad. Map:
Yuba City, CA (PR 1973).

Golder Associates

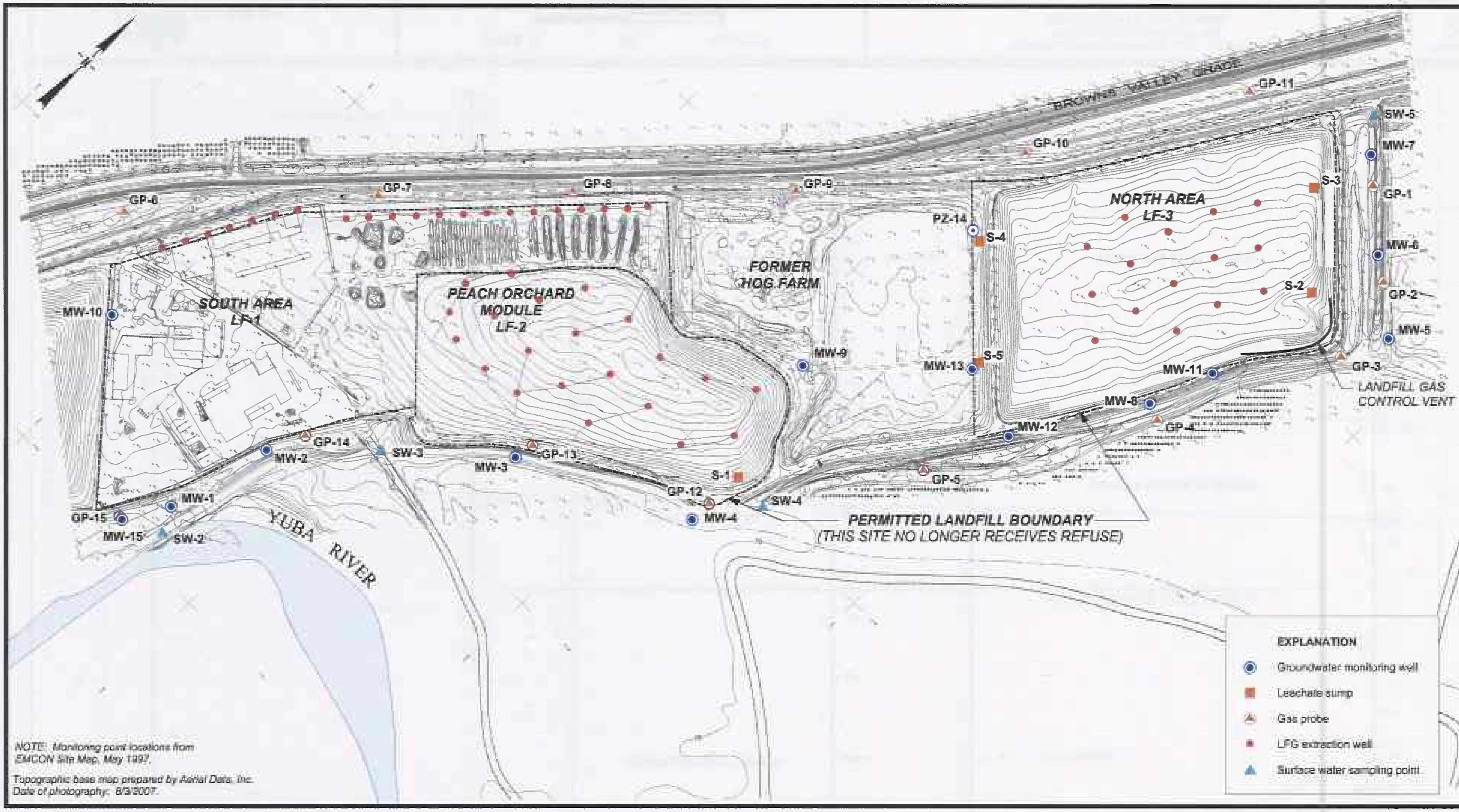
YUBA SUTTER DISPOSAL INC. LANDFILL
YUBA SUTTER DISPOSAL COMPANY
YUBA COUNTY, CALIFORNIA

SITE LOCATION

FIGURE 1

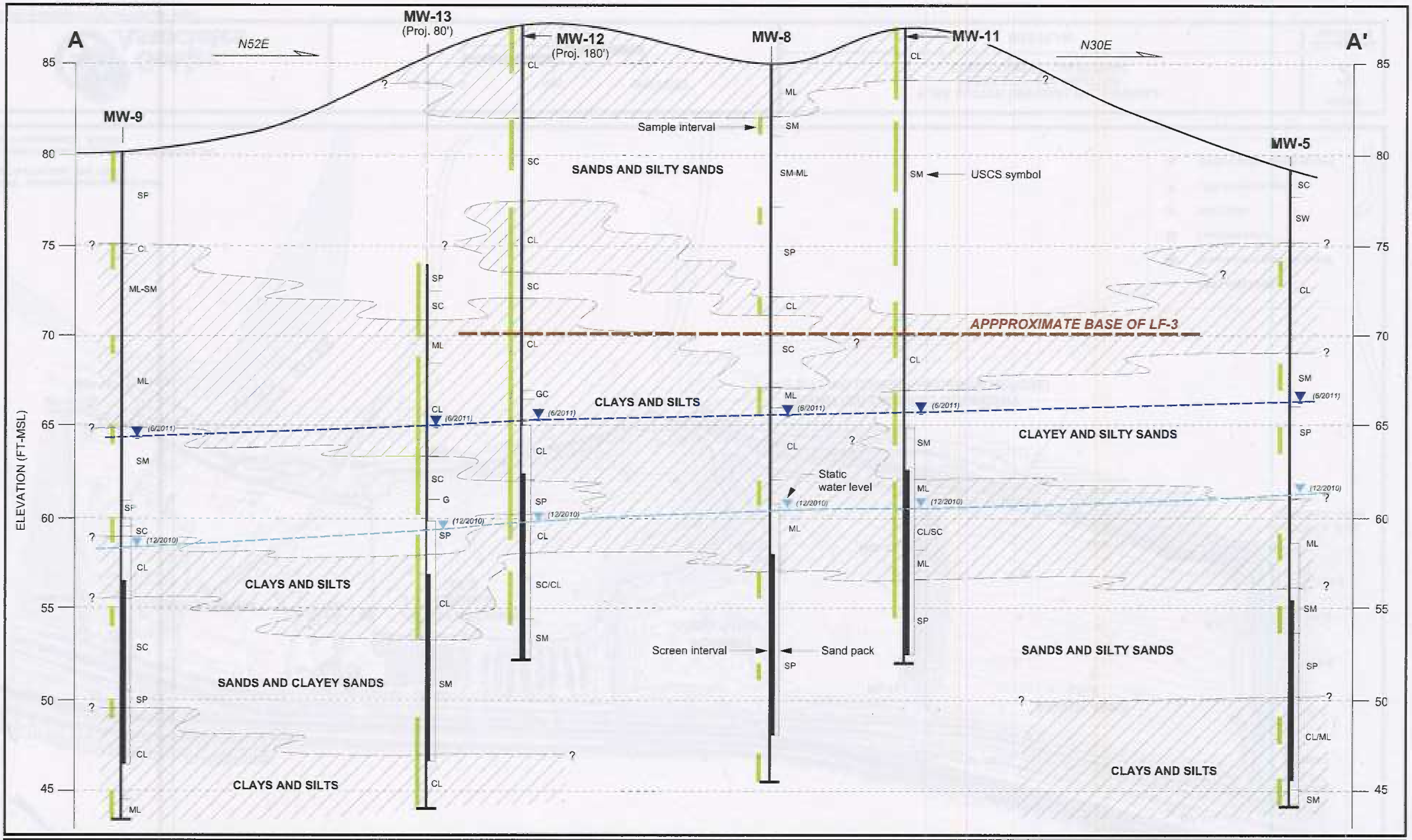
PROJECT NO. 053-7442-08

G:\053-7442-08\FIGURES\SITELOC.DSF 7/24/08



Golder Associates	SCALE: 0 — 400 — 800 FEET	YUBA SUTTER DISPOSAL INC. LANDFILL RECOLOGY YUBA-SUTTER YUBA COUNTY, CALIFORNIA SITE PLAN	FIGURE 2 PROJECT NO. 053-7442-12

G:\053-7442-12\FIGURES\SITE PLAN_2007 TOPO.DSF 6/28/12



Golder Associates

SCALE: 0 200 400 FEET (HORIZONTAL)

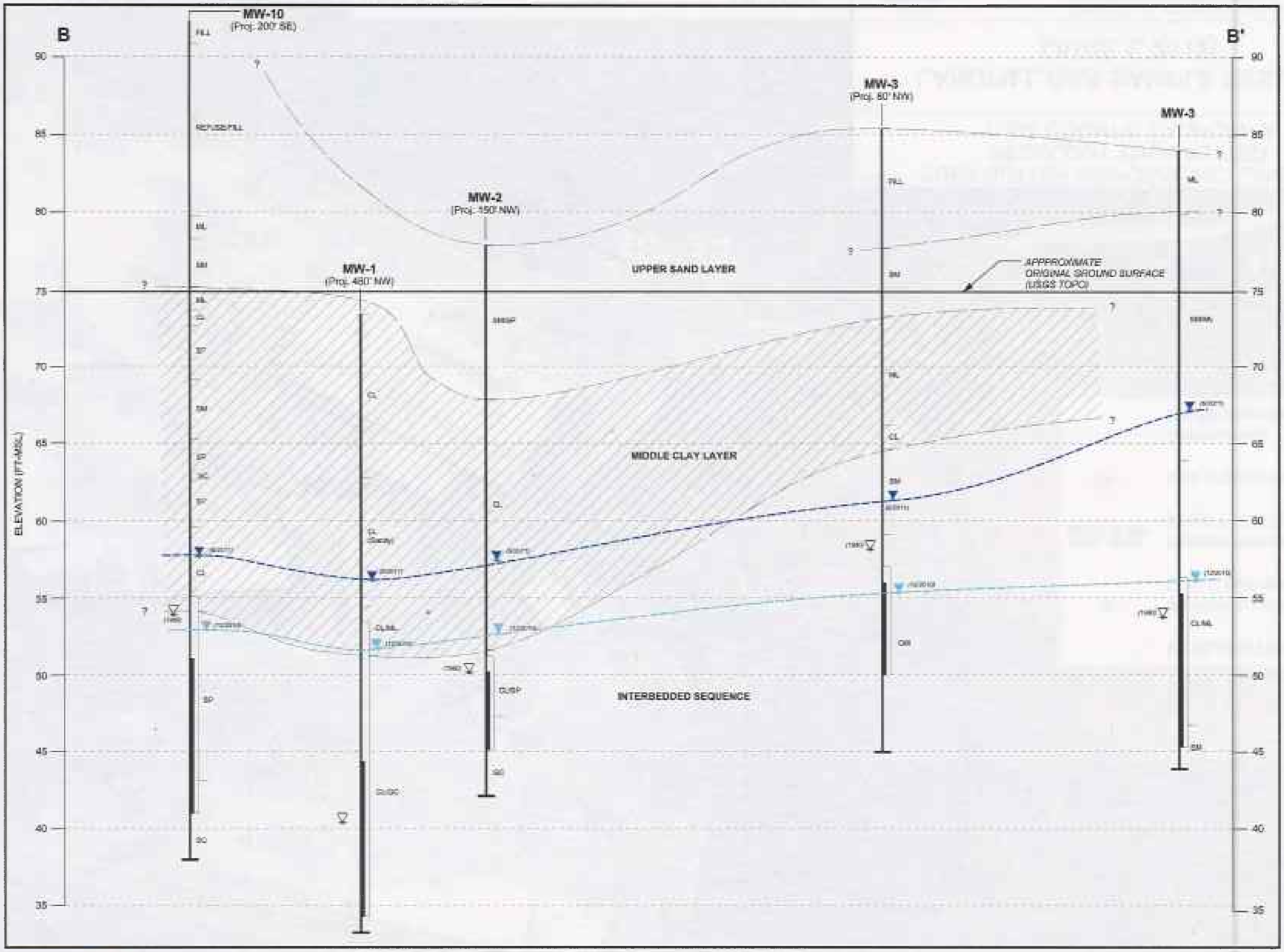
YUBA SUTTER DISPOSAL INC. LANDFILL
RECOLOGY YUBA-SUTTER
YUBA COUNTY, CALIFORNIA

GEOLOGIC CROSS SECTION A-A'

FIGURE 3

PROJECT NO. 053-7442-11

G:\053-7442-11\FIGURES\XSECAA.DSF 7/22/11



SCALE: 0 200 400 FEET

(HORIZONTAL)

YUBA SUTTER DISPOSAL INC. LANDFILL
RECOLOGY YUBA-SUTTER
YUBA COUNTY, CALIFORNIA

GEOLOGIC CROSS SECTION B-B'

FIGURE 4

PROJECT NO. 053-7442-11

Golder Associates

PROJECT YUBA SUTTER DISPOSAL INC. LANDFILL
RECOLOGY YUBA-SUTTER
YUBA COUNTY, CALIFORNIA

TITLE

LANDFILL GAS SAMPLE RESULTS (JUNE 1, 2012)

Golder Associates
Sunnyvale, California

PROJECT NO. 053-7442-121			FILE NO.	
DESIGN	KHJ	6/27/12	SCALE AS SHOWN	REV. 0
CADD	KMM	6/27/12	5	
CHECK	KHJ	6/27/12		
REVIEW	KHJ	6/27/12		

G:\103-97238\FIGURES\PESCADERO\GW CONTOURS.DSF 12/21/10

APPENDIX B

MAY 2001 COMPOST AREA INVESTIGATION REPORT

Golder Associates Inc.

198 Cirby Way, Suite 105
Roseville, CA USA 95678
Telephone (916) 786-2424
Fax (916) 786-2434

Golder Associates

May 18, 2001

013-7223

Norcal Waste Systems
160 Pacific Avenue, Suite 200
San Francisco, CA 94111

Attention: Mr. Paul Sherman

**RE: RESULTS OF FIELD AND ENGINEERING STUDY
PROPOSED YSDI COMPOST AREA
MARYSVILLE, CALIFORNIA**

Dear Mr. Sherman:

Golder Associates Inc. (Golder) is pleased to submit the results of our field study and engineering evaluation of the proposed compost area the YSDI Landfill. This work was completed in accordance with our proposal dated January 24, 2001.

1. BACKGROUND

The YSDI Landfill suspended composting operations earlier this year in response to the Central Valley Regional Water Quality Control Board's (CVRWQCB's) letter dated November 6, 2000. The CVRWQCB stated that insufficient information was provided to find that the composting operations satisfied the requirements of Resolution No. 96-031, and therefore, YSDI was requested to suspend composting operations.

Resolution 96-031 requires submittal of a Report of Waste Discharge (ROWD) that addresses site specific information regarding the operations and site conditions. YSDI has previously submitted a ROWD dated October 2000. The CVRWQCB found that the ROWD did not adequately describe the thickness and permeability of the soil underneath the compost area (Resolution 96-031, Condition H). Furthermore, Resolution 96-031 requires a description of how the operation will impede the migration of liquid phase constituents to ground or surface water (Condition E).

This report addresses the additional information that was not included in the previous ROWD submittals. The primary objectives of our study included the following:

- Characterize the subsurface conditions of the material directly below the proposed compost area.

- Evaluate the permeability of the upper portion of the compost pad and estimate the proportion of liquids that are transmitted laterally along the surface of the pad in comparison to the volume of liquids that migrate vertically. This evaluation is used to assess the ability of the surface materials to impede subsurface migration of liquids into the landfill.

- Review drainage controls and the surface water sampling program relative to potential impacts to surface water.

The area proposed for the composting operations is located on a portion of the South Area Landfill as shown in Figure 1. The proposed composting area addressed in this report includes the area of previous composting activity and the area immediately to the southwest, which currently is used to store disposal bins (Figure 1). YSDI proposes to relocate the existing disposal bin storage area about 500 feet to the southwest to increase the area available for composting. The total proposed composting area measures approximately 1,000 feet by 250 feet in plan and covers an area of approximately 6 acres.

The following sections describe our investigation and evaluation of the proposed composting area.

2. SUBSURFACE CONDITIONS

The compost area is located on the northern end of the South Area Landfill and immediately northwest of the Peach Orchard Landfill as shown in Figure 1. The surface of the proposed compost area slopes approximately 3 to 3.5 percent to the northwest. Groundwater monitoring by Conor Pacific (1999) indicates that groundwater is at a depth of approximately 30 to 40 feet below the proposed compost area and flows in a westerly to southwesterly direction.

The South Area Landfill is an unlined Class III Landfill that was closed in approximately 1984 by capping the wastes with a minimum 2-foot thick soil in accordance with regulations at that time. In recent years, YSDI has placed an aggregate material over portions of the northeastern end of the landfill to provide a working surface to allow equipment access for the previous composting operations and the current disposal bin storage area.

A subsurface investigation was completed to characterize the materials below the proposed compost area. The investigation included the excavation of three test pits that penetrated the landfill cover, and the excavation of three shallow test pits (one to two feet deep) to delineate the location of two types of aggregate materials that were encountered. The investigation also included two field infiltration tests using a 12-inch diameter, sealed, single infiltrometer (SSRI) to measure field infiltration rates and to estimate the permeability of the near surface materials. Additional testing included field density and moisture content tests, and selected laboratory tests to aid in the classification and evaluation of the materials encountered.

2.1 Test Pits

Three test pits (TP1 through TP-3) were excavated to depths sufficient to penetrate soil cover of the landfill. Three additional test pits (TP-4 through TP-6) were excavated to delineate the boundary between two types of aggregate materials that were placed over the landfill surface. Figure 1 shows the location of the test pits. Appendix A includes photographs and summary logs of the test pits.

Test pits TP-1 and TP-2 were located in the area of previous composting activity and fully penetrated the cover. In general these tests pits encountered approximately 6 to 8-inches of a compact to dense Class 2 aggregate subbase consisting of a silty, clayey sand and gravel. Underlying the aggregate base, the test pits encountered a firm to stiff, 18-inch to 42-inch thick silty clay overlying an 8-to 36-inch thick, compact sand. Refuse was encountered beneath the sand at a total depth of about 5 feet in both TP-1 and TP-2.

TP-3 was excavated southwest of the existing disposal bins and encountered 16-inches of loose to compact sand and gravel, which we understand is a recycled concrete aggregate. The sand and gravel was underlain by 38-inches of firm to stiff, silty clay. Refuse was encountered at a total depth of 4.5 feet.

In our discussions with site personnel, it is believed that YSDI imported an aggregate material similar to a Class 2 aggregate subbase (Caltrans Standard Specifications) to provide a working surface in the area where the previous composting activities were located (Figure 1). Beginning several years ago, YSDI began accepting crushed, recycled concrete aggregate in-place of the Class 2 aggregate subbase, and also has accepted crushed, recycled concrete debris that is several inches to several feet in diameter. Starting at about the boundary between the disposal bin storage area and the previous composting area, YSDI began constructing a working surface by spreading the crushed, recycled, concrete aggregate in 12-inch thick lifts. In some locations, the larger concrete debris (up to 24-inches in diameter) was first placed in 6 to 24-inch thick lifts and then surfaced with the crushed, recycled, concrete aggregate. Three shallow test pits (TP-4, 5, and 6) were excavated to a depth of 12 to 24 inches to confirm the boundary between the Class 2 aggregate subbase material and the recycled concrete aggregate. The Class 2 aggregate subbase was approximately one to two inches thick in the test pits excavated near this boundary.

2.2 Sealed, Single-Ring Infiltration Tests

Golder completed two sealed, single-ring infiltrometer (SSRI) tests on March 2 and March 3, 2001 to measure field infiltration rates on the upper surface of the previous composting area. As indicated in Section 2.1, this area is surfaced with a Class 2 aggregate subbase. The location of the SSRI tests is shown in Figure 1.

The SSRI consisted of a 12-inch diameter, sealed, single-ring, which is suitable for materials with field permeabilities in the range of $1x10^{-4}$ to $1x10^{-7}$ cm/s. For this project, the ring was excavated to a depth of approximately 6-inches below the ground surface and then set in-place. Powdered bentonite was placed in the annulus between the soil and the inner and outer sides of the ring to prevent leakage along the ring's surface. The area of the inner ring that was used to calculate the infiltration rate was based only the portion of the intact soil within the ring (i.e. the area with the bentonite seal was excluded). Appendix B shows photographs of the test apparatus and installation.

Table 1 summarizes the measured infiltration rate, the hydraulic gradient, and the calculated permeability for each test.

TABLE 1
SSRI TEST RESULTS

Test	Infiltration Rate (cm/s)	H (cm)	D (cm)	i	Calculated Permeability (cm/s)
SSRI-1	2.7×10^{-5}	121.9	2.5	49.8	5.5×10^{-7}
SSRI-2	1.5×10^{-5}	136.3	2.5	55.5	2.7×10^{-7}

The hydraulic gradient (i) was calculated as follows:

$$i = (H+D)/D$$

where

H = Height of water above the ground surface (head)
D = Depth of the wetting front.

Soil suction was conservatively ignored in computing the hydraulic gradient. At the completion of each test, the ring was removed and the depth of the wetting front was measured. For both tests, the depth of the wetting front appeared to be only a fraction of an inch. In calculating the hydraulic gradient, a one-inch (2.54 cm) wetting front depth was conservatively used.

2.3. Laboratory and Field Moisture-Density Testing

Selected laboratory and field moisture-density testing was completed to aid in the characterization and evaluation of the subsurface materials. The results of the laboratory tests are summarized in Table 2 and included the following tests:

- Grain-size Distribution (ASTM D 422/D 1140)
- Modified Proctor Moisture-Density Relationship (ASTM D 1557)
- Atterberg Limits (ASTM D 4318)

TABLE 2
LABORATORY TEST RESULTS

Material	Proctor Moisture-Density		Atterberg Limits		Grain-Size Distribution Percent Finer		
	Max Density	Opt. Wtr Content	PI	LL	¾-in	No. 4	No. 200
Class 2 Subbase	137 pcf	8.2%			100	59	19
Recycled Concrete					95	53	1
Silty Clay			12	28	100	97	57

Nuclear moisture-density tests were completed along the surface of the previous composting area. The results of the field density testing are summarized in Table 3.

TABLE 3
FIELD DENSITY TEST RESULTS

Test Location	Density		Moisture Content (%)
	Dry Density (pcf)	Relative Compaction	
SSRI-1a	121.9	89.0	12.2
SSRI-1b	124.9	91.1	11.4
SSRI-2a	127.5	93.1	9.8
SSRI-2b	130.1	95.0	9.3

As indicated above, the Class 2 aggregate subbase has a measured relative compaction ranging from 89 percent to 95 percent. The measured moisture content of the subbase ranged from about 9 to 12 percent.

2.4 Summary of Subsurface Conditions

Based on the results of our test pit observations and field and laboratory testing, the proposed composting area has an aggregate working surface underlain by a silty clay that was observed to range from 1.5 to 3.0 feet in thickness. The total thickness of soil over refuse was observed to be 4.5 to 5 feet in thickness. Additional observations are summarized below.

- The area of previous composting activity is surfaced with an aggregate material that is similar to a Class 2 aggregate subbase with a significant fines content of about 19 percent. This relatively high fines content allows the material to be tightly compacted to achieve a relatively low-permeability as indicated by the SSRI tests. Large-scale (12-inch diameter) field permeability values of 2×10^{-7} cm/s to 5×10^{-7} cm/s were measured. This low-permeability is supported by field observations of surface water run-off following a period of significant rainfall (Photograph 1, Appendix B).

- Despite significant rainfall that occurred during the month of February and just prior to our field investigation, the soils immediately below the upper surface of the Class 2 aggregate subbase (depth of 2 to 6 inches) were relatively dry with moisture contents in the range of 9 to 12 percent. This further supports the measured low permeabilities.
- The area currently used for disposal bin storage is surfaced with a crushed concrete aggregate that is predominately comprised of sand and gravel sized particles. The fines content of this material is relatively low (less than 2 percent). The resulting permeability of this aggregate is expected to be several orders of magnitude greater than the Class 2 aggregate subbase.
- The aggregate surfacing in the proposed compost area is underlain by a 1.5-to 3-foot thick silty clay. This soil has low-plasticity as indicated by the measured Plastic Index (PI) of 12. Although a permeability test was not performed on this material, based on our experience with similar soils, we would expect it to exhibit low permeability characteristics and to help impede subsurface migration of liquids.

3. IMPEDANCE OF LIQUID MIGRATION

Generally the compost piles are somewhat dry and water must be added to increase the moisture to aid in the decomposition. Therefore, the compost has some moisture absorption capacity. However, the potential exists for the generation of excess liquids, particularly during wet winter conditions, which may accumulate on the surface of the compost pad. The following discussion presents engineering evaluations regarding the ability of the compost pad surface to impede the majority of the vertical migration of liquids within a compost pile as required by Resolution 96-061. The liquids impedance was evaluated using two different approaches. The first approach examines the collection efficiency, which is defined at the ratio liquids removed laterally along the along the compost pad surface to the total volume of liquids. The second approach uses the computer program HELP (Hydrologic Evaluation of Landfill Performance) to compare relative quantities of liquids that may infiltrate through the compost pad surface.

3.1 Collection Efficiency

The impedance of liquid migration was evaluated by comparing the quantity of liquid flowing laterally along the surface (Q_L) to the quantity of liquid infiltrating through the surface (Q_I). Q_L is calculated as follows:

$Q_L = (k_l) \times (i_h) \times (H) \times (w)$

where:

k_l = permeability of the compost material
i_h = hydraulic gradient along the pad (equal to the surface slope of 0.03 ft/ft)
H = height of water flowing above the compost pad
w = unit width

The compost materials stockpiled during our site visits appeared to be relatively porous and permeable with a field permeability that was estimated to be comparable to a clean gravel, which commonly have permeabilities in the range of 1 to 5 cm/s. For the purpose of this evaluation, the permeability of the compost material (k_l) was assumed to be 1 cm/s. Examples of the stockpiled material are shown in the background within the some of the photographs included in Appendix B (e.g. Photographs 1 and 2).

Q_I is calculated as follows:

$Q_I = (k_2) \times (i_v) \times (L_{avg}) \times (w)$

where:

k_2 = vertical permeability of the compost pad surface
i_v = vertical gradient of 1.0 (gradient approaches unity as the depth of the wetting front increases)
L_{avg} = average length of the flow path
w = unit width

The liquids collection efficiency is defined as the ratio of the volume of liquids that are collected along the surface of the pad to the volume of total liquids and is calculated as follows:

$\text{Efficiency} = Q_L/(Q_L + Q_I)$

The calculated efficiency is dependent upon the depth of the liquids flowing across the compost pad surface. Generally the greater the flow depth, the greater the collection efficiency. Figure 2 provides a graph of the collection efficiency for flow depths ranging from 0.1 cm to 2.0 cm. As shown in Figure 2, the collection efficiency is around 75% at very small flow depths and quickly increases to more than 90 percent at flow depths greater than 0.6 cm.

Because the volume of free liquids within the compost piles is expected to be relatively small, the depth of liquids flowing over the compost pad is expected to be at the lower end of the range presented in Figure 2. This corresponds to collection efficiencies on the order of 75 percent to 90 percent. Therefore, the analysis indicates that the portion of the composting area underlain by the Class 2 aggregate subbase is able to control and laterally transmit the majority of the liquids collected on the compost pad surface.

A similar evaluation was completed for the crushed recycled concrete material. Based on the grain-size distribution for this material, we expect permeabilities in the approximate range of 1 x 10^{-2} to 1x 10^{-3} cm/s in a loose to moderately compacted condition. Under a relatively high compactive effort, it may be possible to reduce the permeability by one or two orders of magnitude. Even if a permeability of 1 x 10^{-5} cm/s were achieved, the resulting collection efficiency ranges from 15 percent for a flow depth (H) of 0.1 cm to 30 percent for a flow depth of 0.6 cm. Therefore, a significant portion of the compost liquids would be expected infiltrate down to the underlying clay cover.

Liquids infiltrating through the concrete aggregate may be perched on the clay cover and then flow laterally within the concrete aggregate. However, the resulting collection efficiency of this interface is calculated to be between 30 to 50 percent depending on the permeabilities assumed for the concrete aggregate and the underlying clay cover. Therefore, areas underlain by the concrete aggregate are not efficient in impeding the vertical migration of liquids through the compost pad surface.

3.2 HELP Modeling

The HELP model (v. 3.07) was used to simulate water balance for the compost pad and the existing soil cover system in order to compare the relative quantity of liquids that may infiltrate into the underlying waste. For this study, the HELP model was used to compare the relative infiltration performance of various cover systems. Specifically, the following three soil profiles were modeled:

Profile 1) Existing Soil Cover:

- 2 feet of silty clay - assigned a HELP soil texture value of 26 with a corresponding permeability of 2 x 10^{-6} cm/s. This upper layer was modeled with a good vegetative cover.

- 2 feet of sand - assigned a HELP soil texture value of 3 with a corresponding permeability of 3 x 10^{-3} cm/s

Profile 2) Compost Pad Surface (no compost stockpile):

- 6 inches low-permeability soil (aggregate subbase) - assigned a HELP soil texture value of 29 with a corresponding permeability of 7 x 10^{-7} cm/s. This upper layer was modeled with no vegetative cover.

- 2 feet of silty clay - assigned a HELP soil texture value of 26 with a corresponding permeability of 2 x 10^{-6} cm/s.

- 2 feet of sand - assigned a HELP soil texture value of 3 with a corresponding permeability of 3×10^{-3} cm/s

Profile 3) Compost Pad Surface with Compost Stockpile:

- 10 feet of stockpiled compost material - assigned a HELP soil texture value of 18 with a corresponding permeability of 1×10^{-3} cm/s. This soil texture compares to high porosity refuse material. This layer was modeled with no vegetative cover. The lower six inches was modeled as lateral drainage layer with a permeability of 1 cm/s.
- 6 inches low-permeability soil (aggregate subbase) - assigned a HELP soil texture value of 29 with a corresponding permeability of 7×10^{-7} cm/s.
- 2 feet of silty clay - assigned a HELP soil texture value of 26 with a corresponding permeability of 2×10^{-6} cm/s.
- 2 feet of sand - assigned a HELP soil texture value of 3 with a corresponding permeability of 3×10^{-3} cm/s

All three profiles were assumed to directly overlay refuse. In addition, the upper surface was assumed to slope at 3%.

The model first initialized the moisture content of each layer and then simulated daily water balance using actual rainfall data for Marysville from 1992 to 1996. Average monthly evapotranspiration and temperature data were based on the HELP model's evapotranspiration and temperature database for the Sacramento area.

The HELP model results are summarized in Table 4 below. Summary output is provided in Appendix C.

TABLE 4
SUMMARY HELP MODEL RESULTS

Year	Annual Precip. (inches)	Infiltration through cover profiles (inches)		
		Existing Soil Cover Profile 1	Compost Pad (no stockpile) Profile 2	Compost Pad with stockpile Profile 3
1992	30.65	3.7	0.1	2.4
1993	28.35	4.4	0.9	2.2
1994	18.93	2.2	0.3	1.5
1995	32.46	5.1	1.0	2.5
1996	41.56	4.6	0.4	2.9

As indicated in Table 4, the quantity of infiltration predicted for the compost pad is less than the existing soil cover system (Profile 1). In areas without compost materials

(Profile 2), the compost pad surface significantly reduces the predicted amount of infiltration in comparison to the existing soil cover. For areas with compost materials (Profile 3), the resulting predicted infiltration is about 35 to 50 percent less than that for the existing soil cover. Furthermore, the model results for Profile 3 may over predict the quantity of infiltration because the model used a moisture initialization routine to establish an "equilibrium" moisture content at the beginning of the simulation. In reality, the compost stockpiles are located on the compost pad for limited period of time (up to two months). Each stockpile is initially relatively dry and has a potentially large degree of moisture absorption capacity that is not reflected in the model simulations. In either case, the infiltration performance of the compost pad with a low-permeability aggregate surface is better than the existing soil cover.

4. SURFACE WATER MONITORING AND CONTROL

Surface water is managed at the YSDI Landfill Facility using Best Management Practices as described in the Storm Water Pollution Prevention Program (SWPPP). A copy of the SWPPP is included in Appendix D-1.

To evaluate whether site operations are impacting surface water, the site implements a Surface Water Monitoring Program in compliance with NPDES General Permit No. CAS000001. A copy of the SWMP is included in Appendix D-2.

Surface water run-off from the proposed compost pad area occurs as sheet flow to the northwest, where it is collected in a perimeter drainage ditch. The drainage ditch then flows to the northeast to the Hog Farm which is a topographic low-point that forms a detention basin (Figure 3). As indicated in Figure 3, surface water in the Hog Farm area flows in southeasterly direction. When water levels increase to a sufficient elevation, water is discharged through a culvert towards the Feather River to the southeast. Surface water discharge from the Hog Farm is sampled at SW-3 (Figure 3) for analytical testing.

A summary of the surface water analytical test results from 1993 through 2000 is included in Appendix D-3. Based on this testing summary, the water quality at SW-3 does not appear to be impacted as result of composting operations that occurred in 1999 and 2000. The site will continue to sample and test surface water, which will enable YSDI to determine whether the composting operations have any impacts on surface water quality.

5. CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our investigation and engineering analyses, we have developed the following conclusions and recommendations:

- The proposed composting area is located on the South Area Landfill, which was closed around 1984. The landfill was closed with a minimum 2-foot soil cover. At the location where test pits were excavated, the soil cover overlying refuse was more than 4 feet thick. The soil cover includes a clay layer that was observed to be between 1.5 and 3 feet thick.

- The northeastern portion of this proposed composting area was used previously for composting activities and is surfaced with a silty to clayey aggregate that appears to be a Class 2 aggregate subbase. This material exhibits a low-permeability and is able to laterally transmit the majority of liquids (75 to 90 percent) across the compost pad surface.

- The southwestern portion of the proposed composting area is currently used as a disposal bin storage area and is surfaced with a crushed, recycled concrete aggregate that is classified as a sand and gravel. Based on the grain-size distribution, this material is expected to have a significantly higher permeability and higher infiltration rate than the Class 2 aggregate subbase. This material is not recommended for use as the final surfacing for the compost area due to its anticipated low liquid collection efficiency.

- If the compost pad is adequately surface with a low-permeability, Class 2 aggregate subbase material, the resulting predicted infiltration into the underlying waste materials is less than the existing final soil cover.

- In developing a composting area with a low-permeability surface, we recommend covering or replacing the crushed, recycled concrete aggregate with a minimum of 6-inches of silty/clayey aggregate material to provide a firm working surface. The aggregate material should be a 1.5-inch minus Class 2 or Class 3 aggregate subbase with at least 15 percent fines in accordance with Caltrans Standard Specifications. The aggregate sub-base should be compacted to a minimum 90 percent relative compaction at a moisture content 1 to 4 percent above the optimum water content (ASTM D 1557). We recommend obtaining a sample of the proposed aggregate material for our examination and testing to verify it has the appropriate low-permeability characteristics prior to hauling and placement.

6. USE OF THIS REPORT

This report has been prepared for the exclusive use of Norcal and Yuba-Sutter Disposal Inc. for specific application to the composting project. Golder Associates Inc. is not responsible for unauthorized use or reuse of this information. The subsurface conditions may vary from those described in this report between exploration locations and with time. The engineering evaluations presented in this report have been completed in accordance with current engineering practice in the State of California.

7. CLOSURE

We appreciate the opportunity to assist YSDI on this project. If you need additional information, please do not hesitate to contact us.

Yours very truly,

GOLDER ASSOCIATES INC.

Kenneth G. Haskell, P.E.
Associate

Figures

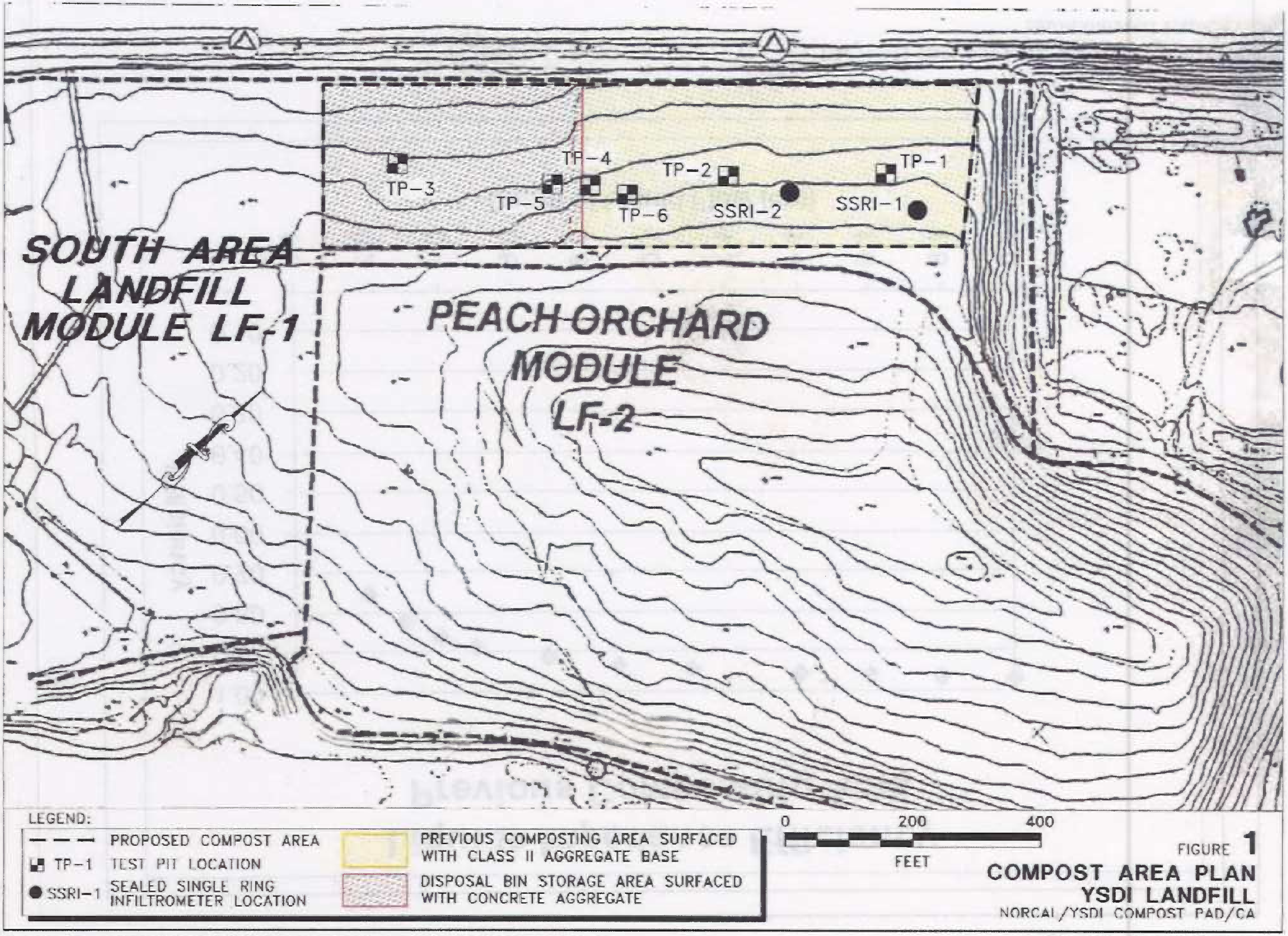


FIGURE 1

COMPOST AREA PLAN
YSDI LANDFILL
NORCAL/YSDI COMPOST PAD/CA

DWG ID: PBowers | C:\PEB\PROJECTS\0317223\Dwgs\YSDI-plan.dwg | 4-11-1 9:26 | xrf: NONE

Golder Associates

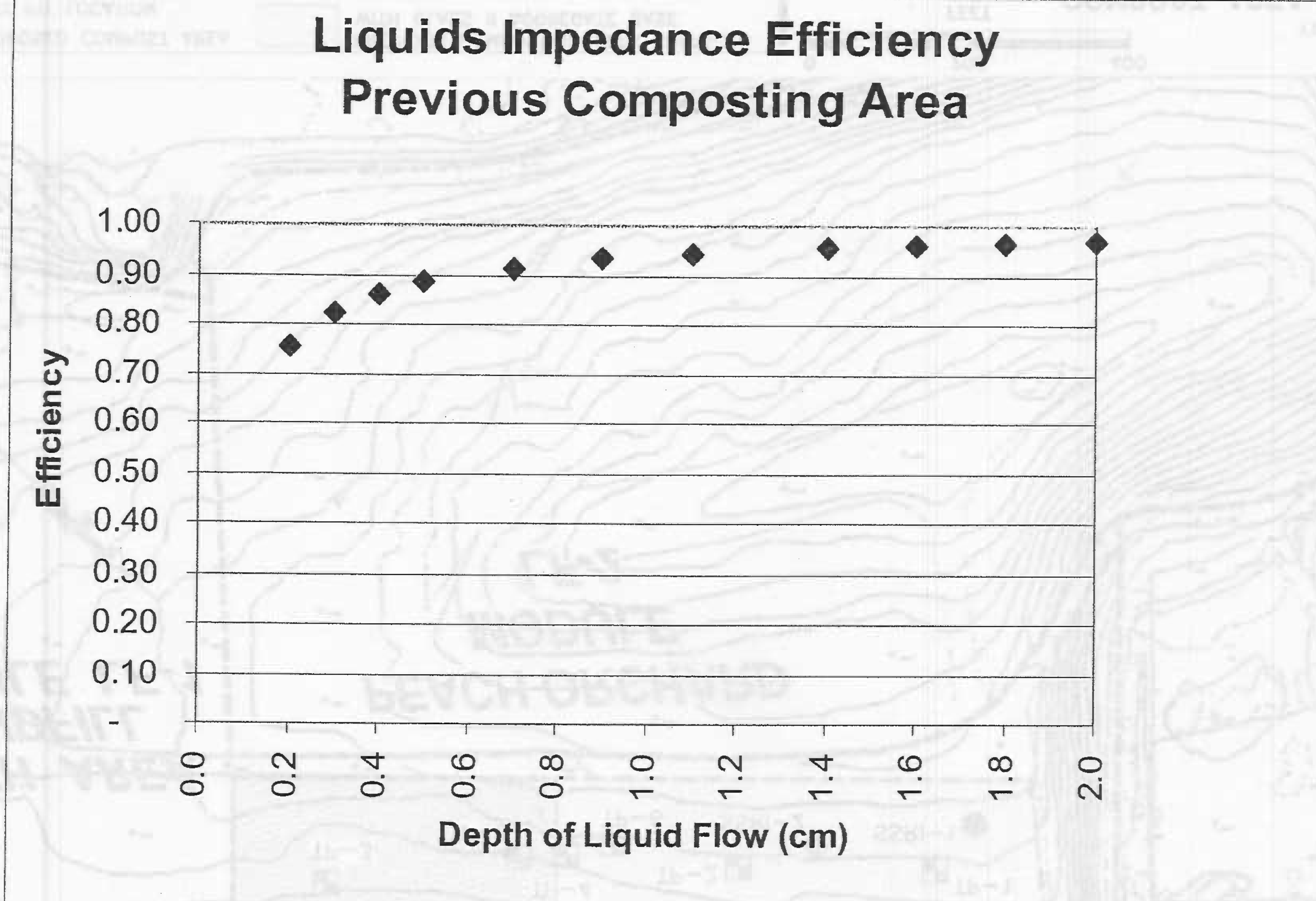


FIGURE 2

LIQUID IMPEDANCE EFFICIENCY

YSDI/COMPOST PAD/CA

PROJECT NO: [illegible]223 DWG.: Figure 2.ppt DRAWN BY: KGH CHECK BY: DATE: 4/16/01

Golder Associat[illegible]nc.

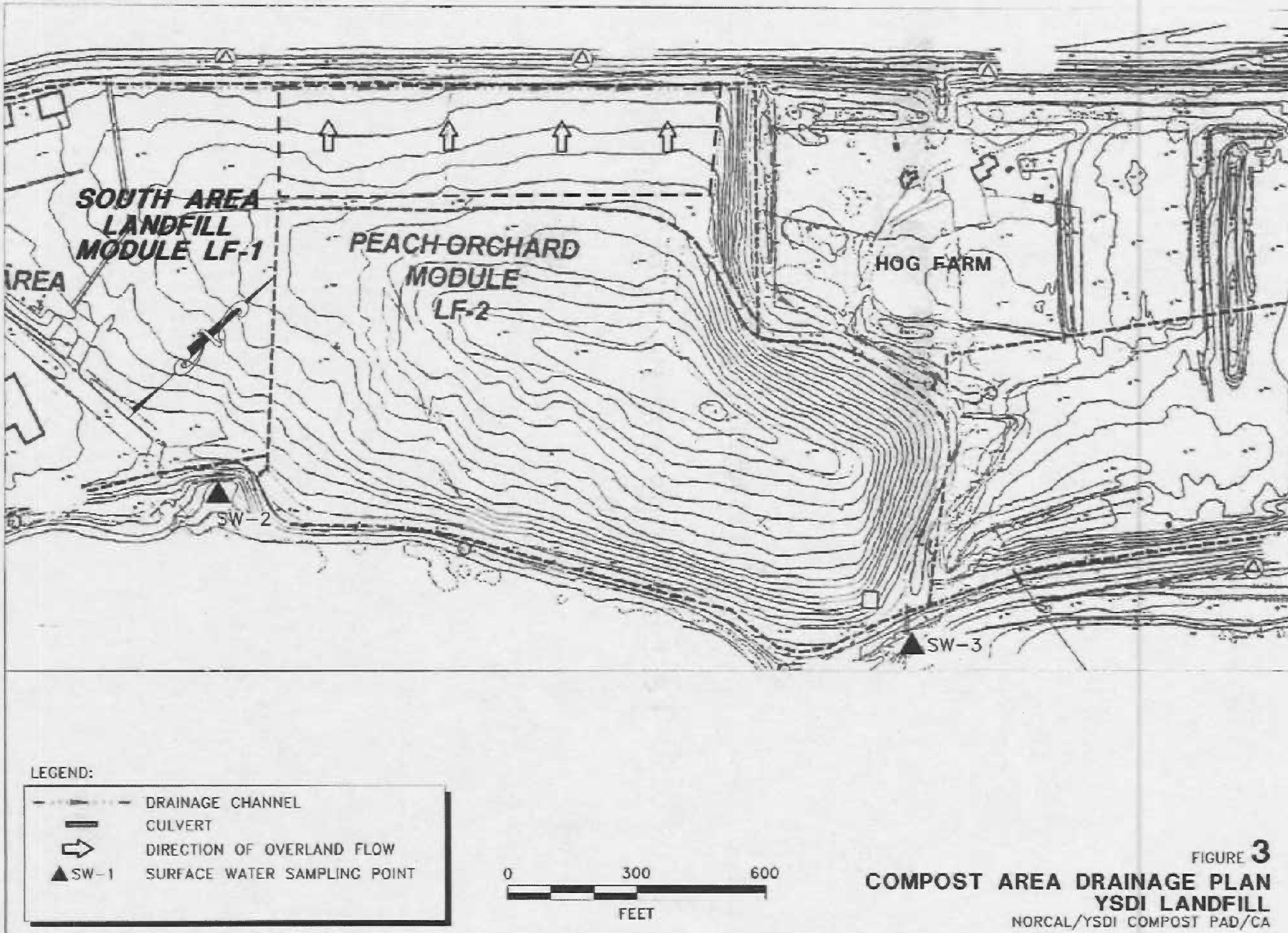


FIGURE 3
COMPOST AREA DRAINAGE PLAN
YSDI LANDFILL
NORCAL/YSDI COMPOST PAD/CA

DWG ID: PBowers | C:\PEB\PROJECTS\0317225\Dwgs\YSDI-plan.dwg | 4-11-1 9:26 | xrf: NONE

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Appendix A

Test Pit Logs and Photographs

Photo 1: Test Pit TP-1 – Note Class II Aggregate Base overlying clay.

Photo 2: Test Pit TP-2 – Note Class II Aggregate Base overlying clay.

Photo 3: Test Pit 3 – Note recycled concrete overlying clay.

Photo 4: Recycled concrete material placed over the Disposal Bin Storage Area.

Appendix B

SSRI Photographs

Photo 1: Surface water runoff from compost area following a period of heavy rain.

Photo 2: Excavation for SSRI test. Note relatively dry appearance of the excavated soils.

Photo 3: Installation and test set-up for SSRI-I.

Photo 4: SSRI test apparatus.

Photo 5: Installation and test set-up for SSRI-2.

Photo 6: View of inner ring at completion of test and removal of water.

Photo 7: Excavation of SSRI at completion of test.

Photo 8: Field density testing us a nuclear density gauge.

Appendix C

Summary HELP Runs

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******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**             HELP MODEL VERSION 3.07   (1 NOVEMBER 1997)                  **
**              DEVELOPED BY ENVIRONMENTAL LABORATORY                       **
**                USAE WATERWAYS EXPERIMENT STATION                         **
**         FOR USEPA RISK REDUCTION ENGINEERING LABORATORY                  **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:      P:\HELPMO~1\HELP3\DATA4.D4
TEMPERATURE DATA FILE:        P:\HELPMO~1\HELP3\DATA7.D7
SOLAR RADIATION DATA FILE:    P:\HELPMO~1\HELP3\DATA13.D13
EVAPOTRANSPIRATION DATA:      P:\HELPMO~1\HELP3\DATA11.D11
SOIL AND DESIGN DATA FILE:    P:\HELPMO~1\HELP3\DATA10.D10
OUTPUT DATA FILE:             P:\HELPMO~1\HELP3\YSDI1.OUT


TIME:    2: 8      DATE:    5/12/2001


******************************************************************************

    TITLE:  YSDI COMPOST PAD - EXISTING SOIL COVER        Profile 1

******************************************************************************


    NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
           COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                 LAYER  1
                                 --------

                      TYPE 1 - VERTICAL PERCOLATION LAYER
                        MATERIAL TEXTURE NUMBER  26
        THICKNESS                    =   24.00   INCHES
        POROSITY                     =    0.4450 VOL/VOL
        FIELD CAPACITY               =    0.3930 VOL/VOL
        WILTING POINT                =    0.2770 VOL/VOL
        INITIAL SOIL WATER CONTENT   =    0.4336 VOL/VOL
        EFFECTIVE SAT. HYD. COND.    =  0.190000003000E-05 CM/SEC
```

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 3

THICKNESS	=	24.00 INCHES
POROSITY	=	0.4570 VOL/VOL
FIELD CAPACITY	=	0.0830 VOL/VOL
WILTING POINT	=	0.0330 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1403 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.310000009000E-02 CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #26 WITH A FAIR STAND OF GRASS, A SURFACE SLOPE OF 3.% AND A SLOPE LENGTH OF 150. FEET.

SCS RUNOFF CURVE NUMBER	=	90.60	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	10.406	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	10.680	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	6.648	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	13.773	INCHES
TOTAL INITIAL WATER	=	13.773	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
MARYSVILLE CALIFORNIA

STATION LATITUDE	=	38.40 DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00
START OF GROWING SEASON (JULIAN DATE)	=	73
END OF GROWING SEASON (JULIAN DATE)	=	319
EVAPORATIVE ZONE DEPTH	=	24.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	8.10 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	77.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	60.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	55.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	73.00 %

NOTE: PRECIPITATION DATA FOR MARYSVILLE CALIFORNIA

WAS ENTERED BY THE USER.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR SACRAMENTO CALIFORNIA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
45.30	50.30	53.20	58.20	64.90	71.20
75.60	74.70	71.70	63.90	53.00	45.60

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR SACRAMENTO CALIFORNIA
AND STATION LATITUDE = 38.40 DEGREES

****

ANNUAL TOTALS FOR YEAR 1992

	INCHES	CU. FEET	PERCENT
PRECIPITATION	30.65	111259.516	100.00
RUNOFF	11.587	42060.828	37.80
EVAPOTRANSPIRATION	15.331	55650.527	50.02
PERC./LEAKAGE THROUGH LAYER 2	3.721273	13508.222	12.14
CHANGE IN WATER STORAGE	0.011	39.908	0.04
SOIL WATER AT START OF YEAR	13.773	49997.527	
SOIL WATER AT END OF YEAR	13.784	50037.434	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.029	0.00

****

****

ANNUAL TOTALS FOR YEAR 1993

	INCHES	CU. FEET	PERCENT

PRECIPITATION	28.35	102910.516	100.00
RUNOFF	13.350	48462.230	47.09
EVAPOTRANSPIRATION	11.691	42437.457	41.24
PERC./LEAKAGE THROUGH LAYER 2	4.394811	15953.164	15.50
CHANGE IN WATER STORAGE	-1.086	-3942.369	-3.83
SOIL WATER AT START OF YEAR	13.784	50037.434	
SOIL WATER AT END OF YEAR	12.698	46095.066	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.033	0.00

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ANNUAL TOTALS FOR YEAR 1994

	INCHES	CU. FEET	PERCENT
PRECIPITATION	18.93	68715.906	100.00
RUNOFF	5.632	20445.689	29.75
EVAPOTRANSPIRATION	9.737	35346.570	51.44
PERC./LEAKAGE THROUGH LAYER 2	2.221503	8064.057	11.74
CHANGE IN WATER STORAGE	1.339	4859.603	7.07
SOIL WATER AT START OF YEAR	12.698	46095.066	
SOIL WATER AT END OF YEAR	14.037	50954.668	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.014	0.00

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ANNUAL TOTALS FOR YEAR 1995

	INCHES	CU. FEET	PERCENT
PRECIPITATION	32.46	117829.828	100.00
RUNOFF	16.745	60783.805	51.59
EVAPOTRANSPIRATION	11.805	42852.148	36.37
PERC./LEAKAGE THROUGH LAYER 2	5.107499	18540.221	15.73
CHANGE IN WATER STORAGE	-1.197	-4346.379	-3.69
SOIL WATER AT START OF YEAR	14.037	50954.668	
SOIL WATER AT END OF YEAR	12.840	46608.289	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.029	0.00

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ANNUAL TOTALS FOR YEAR 1996

	INCHES	CU. FEET	PERCENT
PRECIPITATION	41.56	150862.844	100.00
RUNOFF	16.016	58137.723	38.54
EVAPOTRANSPIRATION	18.687	67833.219	44.96
PERC./LEAKAGE THROUGH LAYER 2	4.620782	16773.437	11.12
CHANGE IN WATER STORAGE	2.236	8118.425	5.38
SOIL WATER AT START OF YEAR	12.840	46608.289	
SOIL WATER AT END OF YEAR	15.076	54726.715	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.038	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1992 THROUGH 1996

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	6.10	4.78	3.81	2.13	1.62	0.58
	1.27	1.27	0.01	1.15	2.53	5.13
STD. DEVIATIONS	4.17	2.94	3.72	1.45	1.42	0.71
	2.84	2.84	0.01	0.94	2.47	1.50
RUNOFF						
TOTALS	3.833	2.476	1.624	0.436	0.385	0.066
	0.276	0.297	0.000	0.146	0.882	2.246
STD. DEVIATIONS	3.499	1.854	2.588	0.592	0.547	0.136
	0.617	0.664	0.000	0.271	0.959	0.850
EVAPOTRANSPIRATION						
TOTALS	1.147	1.668	2.073	1.562	1.393	0.761
	1.015	1.022	0.445	0.258	0.861	1.245
STD. DEVIATIONS	0.137	0.292	0.460	0.769	0.787	0.575
	1.579	1.210	0.509	0.103	0.803	0.213
PERCOLATION/LEAKAGE THROUGH LAYER 2						
TOTALS	0.5521	0.7822	0.8744	0.5786	0.2952	0.2070
	0.1465	0.1032	0.0729	0.0611	0.0548	0.2851
STD. DEVIATIONS	0.5074	0.4318	0.2466	0.2591	0.1022	0.1045
	0.0649	0.0313	0.0125	0.0074	0.0141	0.5340

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1992 THROUGH 1996

	INCHES		CU. FEET	PERCENT
PRECIPITATION	30.39	(8.134)	110315.7	100.00
RUNOFF	12.666	(4.4431)	45978.05	41.679
EVAPOTRANSPIRATION	13.450	(3.5548)	48823.99	44.258
PERCOLATION/LEAKAGE THROUGH	4.01317	(1.11889)	14567.820	13.20557

LAYER 2

CHANGE IN WATER STORAGE	0.261	(1.5056)	945.84	0.857

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PEAK DAILY VALUES FOR YEARS 1992 THROUGH 1996

	(INCHES)	(CU. FT.)
PRECIPITATION	3.20	11616.000
RUNOFF	3.117	11315.1826
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.094082	341.51608
SNOW WATER	2.12	7696.5508
MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4450	
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.3076	

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FINAL WATER STORAGE AT END OF YEAR 1996

LAYER	(INCHES)	(VOL/VOL)
1	10.5507	0.4396
2	4.5255	0.1886
SNOW WATER	0.000	

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**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**            FOR USEPA RISK REDUCTION ENGINEERING LABORATORY               **
**                                                                          **
**                                                                          **
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PRECIPITATION DATA FILE:       P:\HELPMO~1\HELP3\DATA4.D4
TEMPERATURE DATA FILE:         P:\HELPMO~1\HELP3\DATA7.D7
SOLAR RADIATION DATA FILE:     P:\HELPMO~1\HELP3\DATA13.D13
EVAPOTRANSPIRATION DATA:       P:\HELPMO~1\HELP3\DATA11.D11
SOIL AND DESIGN DATA FILE:     P:\HELPMO~1\HELP3\YSDI210.D10
OUTPUT DATA FILE:              P:\HELPMO~1\HELP3\YSDI12.OUT
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TIME:    2:29      DATE:    5/12/2001
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     TITLE:  YSDI - Compost Pad Surface          Profile 2

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.
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                             LAYER  1
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                  TYPE 1 - VERTICAL PERCOLATION LAYER
                     MATERIAL TEXTURE NUMBER  29
        THICKNESS                  =      6.00   INCHES
        POROSITY                   =      0.4510 VOL/VOL
        FIELD CAPACITY             =      0.4190 VOL/VOL
        WILTING POINT              =      0.3320 VOL/VOL
        INITIAL SOIL WATER CONTENT =      0.4483 VOL/VOL
        EFFECTIVE SAT. HYD. COND.  =    0.680000028000E-06 CM/SEC
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                             LAYER  2
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TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 26

THICKNESS	=	24.00 INCHES
POROSITY	=	0.4450 VOL/VOL
FIELD CAPACITY	=	0.3930 VOL/VOL
WILTING POINT	=	0.2770 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4010 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.190000003000E-05 CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 3

THICKNESS	=	24.00 INCHES
POROSITY	=	0.4570 VOL/VOL
FIELD CAPACITY	=	0.0830 VOL/VOL
WILTING POINT	=	0.0330 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0937 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.310000009000E-02 CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #29 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 3.% AND A SLOPE LENGTH OF 150. FEET.

SCS RUNOFF CURVE NUMBER	=	96.90	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	9.953	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	10.716	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	6.978	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	14.561	INCHES
TOTAL INITIAL WATER	=	14.561	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM MARYSVILLE CALIFORNIA

STATION LATITUDE	=	38.40 DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00
START OF GROWING SEASON (JULIAN DATE)	=	73
END OF GROWING SEASON (JULIAN DATE)	=	319
EVAPORATIVE ZONE DEPTH	=	24.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	8.10 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	77.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	60.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	55.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	73.00 %

NOTE: PRECIPITATION DATA FOR MARYSVILLE CALIFORNIA WAS ENTERED BY THE USER.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR SACRAMENTO CALIFORNIA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
45.30	50.30	53.20	58.20	64.90	71.20
75.60	74.70	71.70	63.90	53.00	45.60

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR SACRAMENTO CALIFORNIA AND STATION LATITUDE = 38.40 DEGREES

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ANNUAL TOTALS FOR YEAR 1992

	INCHES	CU. FEET	PERCENT
PRECIPITATION	30.65	111259.516	100.00
RUNOFF	18.224	66154.461	59.46
EVAPOTRANSPIRATION	12.013	43605.582	39.19
PERC./LEAKAGE THROUGH LAYER 3	0.103850	376.976	0.34
CHANGE IN WATER STORAGE	0.309	1122.497	1.01
SOIL WATER AT START OF YEAR	14.561	52857.191	
SOIL WATER AT END OF YEAR	14.870	53979.687	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00

SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.003	0.00

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ANNUAL TOTALS FOR YEAR 1993

	INCHES	CU. FEET	PERCENT
PRECIPITATION	28.35	102910.516	100.00
RUNOFF	18.590	67482.016	65.57
EVAPOTRANSPIRATION	9.385	34068.160	33.10
PERC./LEAKAGE THROUGH LAYER 3	0.888169	3224.055	3.13
CHANGE IN WATER STORAGE	-0.513	-1863.698	-1.81
SOIL WATER AT START OF YEAR	14.870	53979.687	
SOIL WATER AT END OF YEAR	14.357	52115.992	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.021	0.00

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ANNUAL TOTALS FOR YEAR 1994

	INCHES	CU. FEET	PERCENT
PRECIPITATION	18.93	68715.906	100.00
RUNOFF	9.898	35930.137	52.29
EVAPOTRANSPIRATION	8.182	29700.086	43.22
PERC./LEAKAGE THROUGH LAYER 3	0.303696	1102.415	1.60
CHANGE IN WATER STORAGE	0.546	1983.290	2.89
SOIL WATER AT START OF YEAR	14.357	52115.992	
SOIL WATER AT END OF YEAR	14.903	54099.281	

SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.021	0.00

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ANNUAL TOTALS FOR YEAR 1995

	INCHES	CU. FEET	PERCENT
PRECIPITATION	32.46	117829.828	100.00
RUNOFF	22.753	82592.914	70.10
EVAPOTRANSPIRATION	8.965	32544.031	27.62
PERC./LEAKAGE THROUGH LAYER 3	0.973493	3533.780	3.00
CHANGE IN WATER STORAGE	-0.232	-840.894	-0.71
SOIL WATER AT START OF YEAR	14.903	54099.281	
SOIL WATER AT END OF YEAR	14.672	53258.387	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.005	0.00

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ANNUAL TOTALS FOR YEAR 1996

	INCHES	CU. FEET	PERCENT
PRECIPITATION	41.56	150862.844	100.00
RUNOFF	25.179	91399.414	60.58
EVAPOTRANSPIRATION	15.394	55880.352	37.04
PERC./LEAKAGE THROUGH LAYER 3	0.425303	1543.849	1.02
CHANGE IN WATER STORAGE	0.562	2039.203	1.35

SOIL WATER AT START OF YEAR	14.672	53258.387	
SOIL WATER AT END OF YEAR	15.233	55297.590	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.030	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1992 THROUGH 1996

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	6.10	4.78	3.81	2.13	1.62	0.58
	1.27	1.27	0.01	1.15	2.53	5.13
STD. DEVIATIONS	4.17	2.94	3.72	1.45	1.42	0.71
	2.84	2.84	0.01	0.94	2.47	1.50
RUNOFF						
TOTALS	4.638	3.243	2.324	1.013	0.885	0.222
	0.698	0.660	0.000	0.456	1.499	3.293
STD. DEVIATIONS	3.852	2.207	2.974	1.006	0.845	0.377
	1.560	1.475	0.000	0.531	1.514	1.099
EVAPOTRANSPIRATION						
TOTALS	1.120	1.651	1.872	1.139	0.813	0.396
	0.599	0.710	0.346	0.214	0.740	1.188
STD. DEVIATIONS	0.128	0.291	0.531	0.526	0.539	0.214
	0.825	0.809	0.344	0.078	0.777	0.209
PERCOLATION/LEAKAGE THROUGH LAYER 3						
TOTALS	0.0247	0.0181	0.0356	0.0751	0.0783	0.0659
	0.0554	0.0441	0.0389	0.0380	0.0333	0.0316
STD. DEVIATIONS	0.0135	0.0123	0.0334	0.0920	0.0814	0.0543
	0.0449	0.0290	0.0177	0.0138	0.0104	0.0081

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1992 THROUGH 1996

	INCHES		CU. FEET	PERCENT
PRECIPITATION	30.39	(8.134)	110315.7	100.00
RUNOFF	18.929	(5.8278)	68711.79	62.286
EVAPOTRANSPIRATION	10.788	(2.9495)	39159.64	35.498
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.53890	(0.37695)	1956.215	1.77329
CHANGE IN WATER STORAGE	0.134	(0.4839)	488.08	0.442

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PEAK DAILY VALUES FOR YEARS 1992 THROUGH 1996

	(INCHES)	(CU. FT.)
PRECIPITATION	3.20	11616.000
RUNOFF	3.114	11304.3057
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.010946	39.73448
SNOW WATER	2.12	7696.5508
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.4387
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.3331

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FINAL WATER STORAGE AT END OF YEAR 1996

LAYER	(INCHES)	(VOL/VOL)
1	2.6902	0.4484
2	9.9050	0.4127
3	2.6382	0.1099
SNOW WATER	0.000	

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**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**             HELP MODEL VERSION 3.07   (1 NOVEMBER 1997)                  **
**              DEVELOPED BY ENVIRONMENTAL LABORATORY                       **
**                 USAE WATERWAYS EXPERIMENT STATION                        **
**          FOR USEPA RISK REDUCTION ENGINEERING LABORATORY                 **
**                                                                          **
**                                                                          **
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PRECIPITATION DATA FILE:      P:\HELPMO~1\HELP3\DATA4.D4
TEMPERATURE DATA FILE:        P:\HELPMO~1\HELP3\DATA7.D7
SOLAR RADIATION DATA FILE:    P:\HELPMO~1\HELP3\DATA13.D13
EVAPOTRANSPIRATION DATA:      P:\HELPMO~1\HELP3\DATA11.D11
SOIL AND DESIGN DATA FILE:    P:\HELPMO~1\HELP3\YSDI410.D10
OUTPUT DATA FILE:             P:\HELPMO~1\HELP3\YSDI4.OUT


TIME:  23:44     DATE:  5/14/2001


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    TITLE:  YSDI Compost Pad - Compost Stockpile

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    NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
           COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                   LAYER  1
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                     TYPE 1 - VERTICAL PERCOLATION LAYER
                        MATERIAL TEXTURE NUMBER  18
         THICKNESS                 =    120.00    INCHES
         POROSITY                  =      0.6710 VOL/VOL
         FIELD CAPACITY            =      0.2920 VOL/VOL
         WILTING POINT             =      0.0770 VOL/VOL
         INITIAL SOIL WATER CONTENT =     0.3092 VOL/VOL
         EFFECTIVE SAT. HYD. COND.  =  0.100000005000E-02 CM/SEC
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Profile 3

LAYER 2

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	6.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2978	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	1.00000000000	CM/SEC
SLOPE	=	3.00	PERCENT
DRAINAGE LENGTH	=	150.0	FEET

LAYER 3

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 29

THICKNESS	=	6.00	INCHES
POROSITY	=	0.4510	VOL/VOL
FIELD CAPACITY	=	0.4190	VOL/VOL
WILTING POINT	=	0.3320	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4510	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.680000028000E-06	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 26

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4450	VOL/VOL
FIELD CAPACITY	=	0.3930	VOL/VOL
WILTING POINT	=	0.2770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4029	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.190000003000E-05	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 3

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4570	VOL/VOL
FIELD CAPACITY	=	0.0830	VOL/VOL
WILTING POINT	=	0.0330	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1162	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.310000009000E-02	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #18 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 30.% AND A SLOPE LENGTH OF 25. FEET.

SCS RUNOFF CURVE NUMBER	=	0.00	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	8.025	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	16.104	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.848	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	54.057	INCHES
TOTAL INITIAL WATER	=	54.057	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM MARYSVILLE CALIFORNIA

STATION LATITUDE	=	38.40	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	73	
END OF GROWING SEASON (JULIAN DATE)	=	319	
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.10	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	77.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	60.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	55.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	73.00	%

NOTE: PRECIPITATION DATA FOR MARYSVILLE CALIFORNIA WAS ENTERED BY THE USER.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR SACRAMENTO CALIFORNIA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
45.30	50.30	53.20	58.20	64.90	71.20

75.60	74.70	71.70	63.90	53.00	45.60

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR SACRAMENTO CALIFORNIA
AND STATION LATITUDE = 38.40 DEGREES

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ANNUAL TOTALS FOR YEAR 1992

	INCHES	CU. FEET	PERCENT
PRECIPITATION	30.65	111259.516	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	17.829	64721.016	58.17
DRAINAGE COLLECTED FROM LAYER 2	10.3408	37537.270	33.74
PERC./LEAKAGE THROUGH LAYER 3	2.381509	8644.879	7.77
AVG. HEAD ON TOP OF LAYER 3	0.0249		
PERC./LEAKAGE THROUGH LAYER 5	2.360600	8568.979	7.70
CHANGE IN WATER STORAGE	0.119	432.245	0.39
SOIL WATER AT START OF YEAR	54.057	196225.750	
SOIL WATER AT END OF YEAR	54.176	196657.984	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.004	0.00

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ANNUAL TOTALS FOR YEAR 1993

	INCHES	CU. FEET	PERCENT
PRECIPITATION	28.35	102910.516	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.753	53555.078	52.04

DRAINAGE COLLECTED FROM LAYER 2	13.8950	50438.941	49.01
PERC./LEAKAGE THROUGH LAYER 3	2.224943	8076.543	7.85
AVG. HEAD ON TOP OF LAYER 3	0.0343		
PERC./LEAKAGE THROUGH LAYER 5	2.364015	8581.375	8.34
CHANGE IN WATER STORAGE	-2.663	-9664.897	-9.39
SOIL WATER AT START OF YEAR	54.176	196657.984	
SOIL WATER AT END OF YEAR	51.513	186993.094	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.019	0.00

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ANNUAL TOTALS FOR YEAR 1994

	INCHES	CU. FEET	PERCENT
PRECIPITATION	18.93	68715.906	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	11.912	43239.668	62.93
DRAINAGE COLLECTED FROM LAYER 2	3.1477	11426.231	16.63
PERC./LEAKAGE THROUGH LAYER 3	1.521804	5524.150	8.04
AVG. HEAD ON TOP OF LAYER 3	0.0079		
PERC./LEAKAGE THROUGH LAYER 5	1.457395	5290.343	7.70
CHANGE IN WATER STORAGE	2.413	8759.668	12.75
SOIL WATER AT START OF YEAR	51.513	186993.094	
SOIL WATER AT END OF YEAR	53.926	195752.766	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.004	0.00

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ANNUAL TOTALS FOR YEAR 1995

	INCHES	CU. FEET	PERCENT
PRECIPITATION	32.46	117829.828	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.777	53641.281	45.52
DRAINAGE COLLECTED FROM LAYER 2	17.1908	62402.742	52.96
PERC./LEAKAGE THROUGH LAYER 3	2.535369	9203.390	7.81
AVG. HEAD ON TOP OF LAYER 3	0.0426		
PERC./LEAKAGE THROUGH LAYER 5	2.652970	9630.280	8.17
CHANGE IN WATER STORAGE	-2.161	-7844.524	-6.66
SOIL WATER AT START OF YEAR	53.926	195752.766	
SOIL WATER AT END OF YEAR	51.765	187908.234	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.047	0.00

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ANNUAL TOTALS FOR YEAR 1996

	INCHES	CU. FEET	PERCENT
PRECIPITATION	41.56	150862.844	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	23.166	84092.578	55.74
DRAINAGE COLLECTED FROM LAYER 2	10.6630	38706.730	25.66
PERC./LEAKAGE THROUGH LAYER 3	2.941067	10676.071	7.08
AVG. HEAD ON TOP OF LAYER 3	0.0261		

PERC./LEAKAGE THROUGH LAYER 5	1.904676	6913.975	4.58
CHANGE IN WATER STORAGE	5.826	21149.516	14.02
SOIL WATER AT START OF YEAR	51.765	187908.234	
SOIL WATER AT END OF YEAR	57.592	209057.750	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.042	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1992 THROUGH 1996

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	6.10	4.78	3.81	2.13	1.62	0.58
	1.27	1.27	0.01	1.15	2.53	5.13
STD. DEVIATIONS	4.17	2.94	3.72	1.45	1.42	0.71
	2.84	2.84	0.01	0.94	2.47	1.50
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	1.237	1.817	2.657	2.458	1.788	1.060
	1.080	1.214	0.738	0.364	0.850	1.225
STD. DEVIATIONS	0.203	0.053	0.371	1.369	1.123	0.714
	1.316	1.160	0.882	0.134	0.802	0.183
LATERAL DRAINAGE COLLECTED FROM LAYER 2						
TOTALS	2.4814	3.1086	2.9464	1.3345	0.0643	0.0368
	0.0015	0.0093	0.0716	0.0000	0.1701	0.8231
STD. DEVIATIONS	2.2189	1.9968	1.5916	1.9588	0.0963	0.0592
	0.0033	0.0151	0.1601	0.0000	0.3597	0.8292

PERCOLATION/LEAKAGE THROUGH LAYER 3

TOTALS	0.4790	0.5068	0.5725	0.3072	0.0531	0.0166
	0.0025	0.0130	0.0356	0.0000	0.0961	0.2386
STD. DEVIATIONS	0.1717	0.1061	0.1797	0.2635	0.0507	0.0171
	0.0056	0.0179	0.0796	0.0000	0.1880	0.1582

PERCOLATION/LEAKAGE THROUGH LAYER 5

TOTALS	0.0459	0.0351	0.0614	0.3668	0.5288	0.3947
	0.2519	0.1578	0.1053	0.0748	0.0661	0.0594
STD. DEVIATIONS	0.0080	0.0035	0.0495	0.2279	0.0812	0.1120
	0.0667	0.0418	0.0218	0.0142	0.0116	0.0155

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 3

AVERAGES	0.0709	0.0973	0.0840	0.0394	0.0020	0.0012
	0.0000	0.0003	0.0022	0.0000	0.0051	0.0237
STD. DEVIATIONS	0.0631	0.0634	0.0453	0.0576	0.0028	0.0018
	0.0001	0.0005	0.0048	0.0000	0.0107	0.0236

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1992 THROUGH 1996

	INCHES		CU. FEET	PERCENT
PRECIPITATION	30.39	(8.134)	110315.7	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	16.488	(4.2800)	59849.93	54.253
LATERAL DRAINAGE COLLECTED FROM LAYER 2	11.04749	(5.21782)	40102.383	36.35238
PERCOLATION/LEAKAGE THROUGH LAYER 3	2.32094	(0.52010)	8425.007	7.63718
AVERAGE HEAD ON TOP OF LAYER 3	0.027	(0.013)		
PERCOLATION/LEAKAGE THROUGH LAYER 5	2.14793	(0.46984)	7796.991	7.06789

CHANGE IN WATER STORAGE	0.707	(3.5015)	2566.40	2.326

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PEAK DAILY VALUES FOR YEARS 1992 THROUGH 1996

	(INCHES)	(CU. FT.)
PRECIPITATION	3.20	11616.000
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 2	0.46935	1703.73364
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.024728	89.76103
AVERAGE HEAD ON TOP OF LAYER 3	0.414	
MAXIMUM HEAD ON TOP OF LAYER 3	0.787	
LOCATION OF MAXIMUM HEAD IN LAYER 2 (DISTANCE FROM DRAIN)	7.3 FEET	
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.040647	147.54932
SNOW WATER	2.12	7696.5508
MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4692	
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1148	

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 1996

LAYER	(INCHES)	(VOL/VOL)
1	39.7805	0.3315
2	1.7818	0.2970
3	2.7060	0.4510
4	10.0878	0.4203
5	3.2356	0.1348
SNOW WATER	0.000	

Appendix D-1

Stormwater Pollution Prevention Program

STORM WATER POLLUTION PREVENTION PLAN

Yuba-Sutter Disposal, Inc.
3001 North Levee Road
Marysville, California 95901

September 1997

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted, is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: ______________________ Title: General Manager

PLAN PREPARATION

This plan was prepared by Phil Graham, Regional Compliance Manager, Yuba-Sutter Disposal, Inc.

Signature: ______________________

AMENDMENTS

Date: 5-15-00 By: ______________________

Date: ______________________ By: ______________________

Date: ______________________ By: ______________________

TABLE OF CONTENTS

1.0 BACKGROUND

This SWPPP was developed by Yuba-Sutter Disposal, Inc. to comply with the State Water Resources Control Board National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000001 for discharges of storm water associated with industrial activities (see Appendix A). This SWPPP was written in accordance with Section A of the Waste Discharge Requirements (Water Quality Order No. 97-03-DWQ) and is designed to comply with Best Available Technologies/Best Control Technologies (BAT/BCT). It will be made available, upon request, to any representative of the Regional Water Quality Control Board or local enforcement agency.

This SWPPP will be amended whenever there is a change in construction, operation, or maintenance which may lead to the discharge of significant quantities of pollutants to surface water, groundwater, or the local agency's storm drain systems. The SWPPP will also be amended within 90 days if, after review by the RWQCB or local agency, it is found to be in violation of any conditions of the NPDES General Permit, or has not achieved the general objective of controlling pollutants in storm water discharges.

1.1 Facility Description

Yuba-Sutter Disposal, Inc. is located at 3001 North Levee Road, in Marysville, California and occupies 103 acres. The facility's operations include the maintenance of a Closed Sanitary Landfill, A vehicle and equipment maintenance shop and a refuse collection, transfer and recycling facility. The facility operates under SIC codes 4953 (Landfills and Land Application Sites), 5093 (Scrap Recycling Facilities) and 4212 (Land Transportation Facilities that Have Vehicle Maintenance vehicle and Equipment Maintenance Shops and/or Equipment Cleaning Operations). The company collects refuse and recyclables for off-site processing and disposal. Site operations include vehicle maintenance, repair, and fueling, refuse bin repair and storage, and temporary storage of waste oil generated by public program. The locations of these operations are shown on Figure 1. Impervious areas (i.e., buildings, pavement) occupy approximately 20 percent of the total property.

A site map showing the storm water control structures, existing buildings, materials storage, vehicle maintenance/repair and parking areas, storm water discharge points, and paved and unpaved portions of the site is illustrated in Figure 1.

2.0 POTENTIAL POLLUTANT SOURCES

The following sections describe the industrial activities performed at the facility and the potential pollutants associated with that activity.

2.1 Industrial Processes

Industrial processes include refuse collection, scrap metal processing, vehicle maintenance, repair, washing, fueling, and parking. Refuse bin cleaning, repair and storage also occur. Potential pollutants associated with these activities are oil and grease, diesel, some metals, and suspended solids.

2.2 Material Handling and Storage Areas

A 10,000 and a 2,500 gallon aboveground storage tank (AST) containing diesel, are located outside for vehicle fueling. Seven other AST's ranging from 250 to 500 gallons in capacity containing new lubricating oils and used motor oils and fluids are located under roof. Other chemicals associated with vehicle maintenance are stored in the shop. Potential pollutants include diesel, oil, and grease. Some recyclable materials such as tin, plastic, concrete and metal are stored outside for subsequent pick up and recycling.

2.3 Dust and Particulate Generating Activities

Dust or particulates can be generated by the refuse transfer operations. This operation is performed under roof so that contact with storm water is minimal. Fugitive dusts and materials that are not contained under roof are pick up by employees or a vacuum /sweeper truck .

2.4 Significant Spills and Leaks

No spills or leaks of significant quantities of materials have occurred at this site.

2.5 Non-Storm Water Discharges

Non-storm water discharges do not occur at this site.

2.6 Soil Erosion

Soil erosion can occur at the closed landfill. Erosion is controlled by maintaining a vegetative cover on the landfill cover surface, maintaining all drainage ditches and berms and periodic inspection of the waste management units.

3.0 ASSESSMENT OF POTENTIAL POLLUTANT SOURCES

Areas of the facility which are likely potential sources of storm water pollutants are the fuel dispensing facility, the vehicle parking areas and the scrap metal recycling yard. All other potential source areas are indoors or drain into the oil/water clarifier which is evacuated on a periodic basis.

Pollutants likely to be present in storm water discharges are oil, grease, and suspended solids from vehicle parking and some metals from metal recycling operations. Structural and non-structural BMPs effectively eliminate the possibility of diesel from being a potential pollutant source.

4.0 STORM WATER BEST MANAGEMENT PRACTICES

The following sections describe the storm water best management practices (BMPs) utilized at the site. These BMPs reduce the contact of storm water discharges with pollutants associated with the sources described in Section 2. Existing BMPs may be revised and new BMPs may be added if necessary. BMPs are divided into Structural and Non-Structural BMPs.

4.1 Structural BMPs

- All tanks have secondary containment designed to hold at least 110 percent of the contents of the tank.
- The vehicle and bin wash areas are sloped to contain the wash water and channel it into the oil/water separator.
- The shop and associated hazardous materials storage areas are located indoors.
- The closed landfill is capped and lined to eliminate storm water contact with buried refuse.

4.2 Non-Structural BMPs

- **Good Housekeeping-** All areas of the facility are inspected and cleaned on a regular basis. The transfer facility area is cleaned frequently with a street sweeper. Minor spills and leaks are cleaned immediately using absorbent materials located at the spill response stations. Vehicles are washed frequently and refuse bins are cleaned before stored on site.
- **Preventative Maintenance-** Storm drain catch basins and berms are regularly inspected. Vehicles are also routinely inspected to reduce the amount of fluid leaks.
- **Spill Response-** Spill response stations are located in strategic positions throughout the facility. All spills are immediately cleaned and the materials are properly disposed of. A Spill Prevention Control and Countermeasure Plan (SPCC) is implemented and maintained for the facility which includes a weekly inspection of the fuel dispensing systems. Daily inspections of the waste oil tanks are also performed and documented.
- **Material Handling and Storage-** Handling of materials that are potential storm water pollutants is performed indoors whenever possible.
- **Employee Training-** All employees are trained in BMPs and other applicable sections

of the SWPPP. Employees responsible for inspections, visual observations, and sampling are also periodically trained.

- **Inspections-** Inspections conducted at the site are described in the Storm Water Monitoring Program and SPCC. In addition, personnel perform periodic inspections of other potential pollutant sources.
- **Record keeping-** Records of all inspections, visual observations, spills, corrective actions, and monitoring results are kept on file for at least five years.
- **Quality Assurance-** The storm water pollution prevention team, including the general manager, are responsible for the implementation and maintenance of all elements of the SWPPP and Storm Water Monitoring Program.

5.0 ANNUAL COMPREHENSIVE SITE COMPLIANCE EVALUATION

The Annual Comprehensive Site Compliance Evaluation (Evaluation) is conducted in each reporting period (July 1 - June 30) within 8-16 months of each other. Following the Evaluation, the SWPPP will be revised, if necessary, and the revisions will be implemented within 90 days of the Evaluation. The Evaluation will include the following:

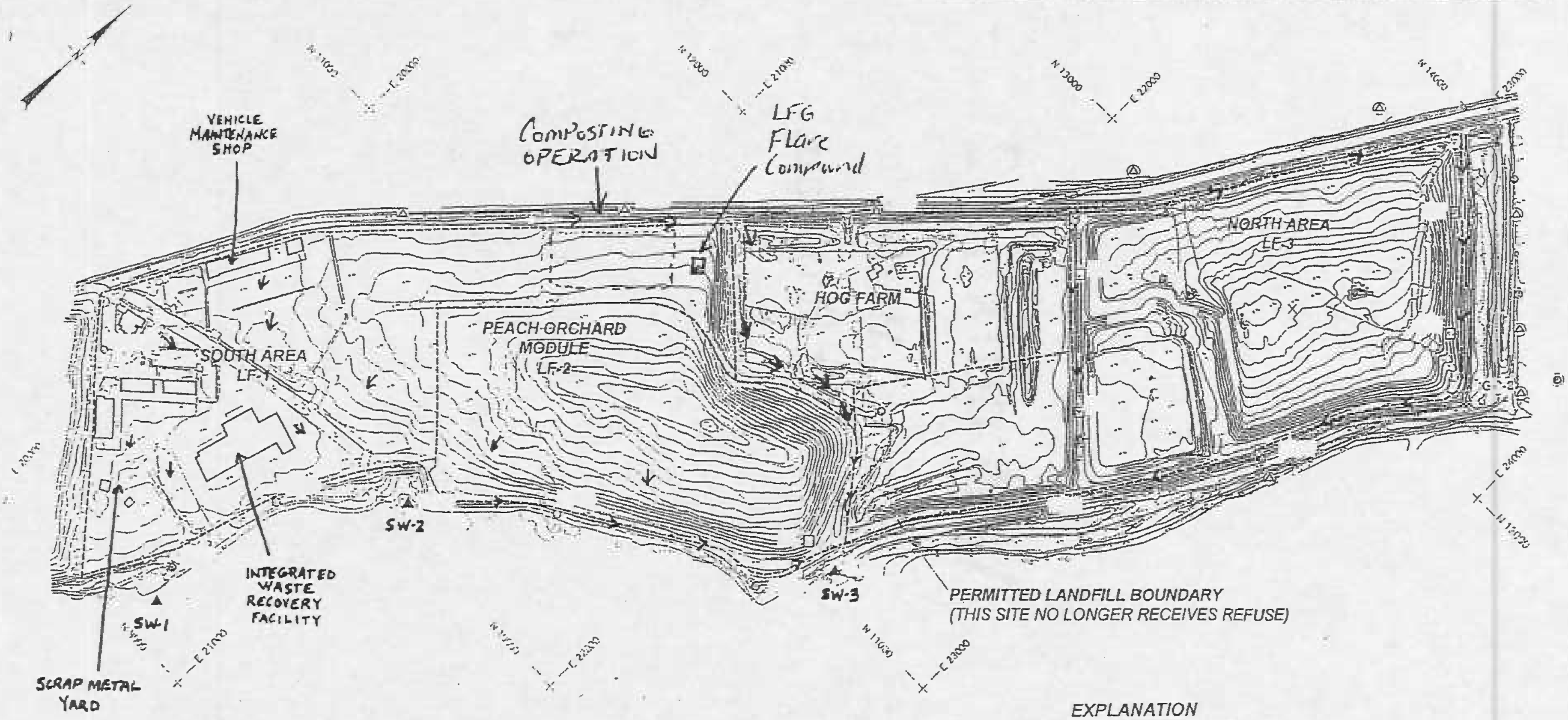
- A review of all visual observation records, inspection records, and sampling and analysis results.
- A visual inspection of all potential pollutant sources
- A review and evaluation of all BMPs to determine whether the BMPs are adequate, properly implemented and maintained, or whether additional BMPs are needed.
- A report including the name of person performing the inspection, date, necessary SWPPP revisions and implementation schedule, and a certification that the site is in compliance with the General Permit.

6.0 STORM WATER POLLUTION PREVENTION PERSONNEL

The storm water pollution prevention team is responsible for assisting the facility manager in implementing all elements of the SWPPP. The Compliance Manager is responsible for developing and revising the SWPPP, training all personnel in the requirements of the SWPPP, and conducting all monitoring described in the Storm Water Monitoring Program. The Operations Manager is responsible for implementation of the SWPPP, including all Best Management Practices (BMP).

Name	Position
Bryan Clarkson	Compliance Manager
David Rodriguez	Hazardous Materials/Compliance Specialist
~~Dave Vaughn~~ TERRY BENTLEY	Operations Manager
Doug Sloan	General Manager

FIGURE 1



EXPLANATION

- Groundwater Monitoring Well
- Leachate Sump
- Gas Probe
- ▲ Surface Water Sampling Point

nographic base map prepared by Aerial Data, Inc., 990 Klamath
ne, Suite 18, Yuba City, California 95993 (916) 673-5000.

NOTE: Monitoring point locations from EMCON Site Map, May 1997.

LWSD\FIGURES\BASEMAP.DSF 2/27/98

EINARSON FOWLER & WATSON

SCALE: 0 400 800 FEET

YUBA SUTTER DISPOSAL INC. LANDFILL
YUBA SUTTER DISPOSAL COMPANY
YUBA COUNTY, CALIFORNIA

TOPOGRAPHY MAP/SITE PLAN/SAMPLE LOCATION MAP

FIGURE 1

PROJECT NO. YSD102

Appendix D-2

Surface Water Monitoring Program

STORM WATER MONITORING PROGRAM

State Water Resources Control Board
Water Quality Order No. 97-03-DWQ
National Pollutant Discharge Elimination System
General Permit No. CAS000001

Waste Discharge Requirements
for
Dischargers of Storm Water Associated with Industrial Activities

Yuba Sutter Disposal Inc.
3001 North Levee Road
Marysville, California 95901

February 1998

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, submitted, is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

General Managers Signature: [signature] Date: 5/21/98

PLAN PREPARATION

This plan was prepared by: Phil Graham, Environmental Compliance Program Manager

Signature: [signature] Date: 5/21/98

The date of each amendment to this Plan and the person responsible are listed below.

Date: ______________ by: ____________________________

Date: ______________ by: ____________________________

Date: ______________ by: ____________________________

STORM WATER MONITORING PROGRAM

1.0 Background

This monitoring program (Program) was developed in accordance with Section B of the State Water Resource's Control Board's Water Quality Order No 97-03-DW. The objectives of this Program are to:

1) ensure that storm water discharges and authorized non-storm water discharges are in compliance with discharge prohibitions, effluent limitations and receiving water limitations
2) ensure practices to reduce or prevent pollutants in storm water and authorized non-storm water discharges are evaluated and revised to meet changing conditions
3) monitor the quality of storm water discharges and measure the effectiveness of best management practices (BMP's) in removing pollutants in storm water discharges and authorized non-storm water discharges
4) aid in the implementation and revision of the SWPPP

BMP's and additional storm water management practices can be found in the companies Storm Water Pollution Prevention Plan (SWPPP).

This company is subject to these monitoring requirements because it's primary business is:

[X] a landfill or open dump that receives industrial waste (SIC Code # 4953)
[X] a recycling facility, metal scrap yard, glass/cardboard recycling yard, salvage yard (SIC Code # 5093)
[X] a transportation facility (SIC Code # 4212)

This company is a subsidiary of Norcal Waste Systems, Inc. (Norcal). Norcal's Environmental Compliance Program (NECP) is responsible for the development and periodic evaluation of this Monitoring Program.

2.0 Monitoring Program

Various monitoring procedures, as described in the permit, include: visual observations for unauthorized non-storm water discharges during both the wet and dry seasons, and storm water sampling during the first storm event and at least one other storm event (October 1 - May 30). Visual observations and collection of samples are only to be conducted during scheduled facility operating hours, or within two hours following operating hours.

[Estimates or calculations of the volume of water flow at each discharge point, may be required by your local Enforcement agency (LEA). Check with your LEA.]

2.1 Non-storm Water Visual Observations

On a quarterly basis the facilities storm water drainage areas and authorized non-storm water discharges will be observed for the presence of unauthorized non-storm water discharges. Quarterly visual observations shall be conducted in each of the following periods: January - March, April - June, July - September, October - December. Visual observations shall be conducted within 6 - 18 weeks of each other. Observations shall be performed during daylight hours within scheduled facility operating hours on days with no storm water discharges. Visual observations shall record the presence of any discoloration, stains, odors, floating materials, etc., as well as the source of any discharge. Records shall be maintained of the visual observation dates, locations observed, observations, and response taken to eliminate unauthorized non-storm water discharges and to reduce or prevent pollutants from contacting non-storm water discharges. The SWPPP will be revised as needed based on these observations.

2.2 Storm Water Discharge Visual Observations

During the wet season (October 1 - May 30), visual observations shall be conducted during one storm water event per month during the first hour of discharge during daylight hours. Storm events must be preceded by at least 3 working days of dry weather. These observations will be made at all locations where storm water is discharged. The operator shall inspect for the presence of floating or suspended material, oil and grease, discoloration, turbidity, odor, and the source of the pollutants. Records shall be kept of the observation dates, locations, observations, and response taken to reduce or prevent pollutants in storm water discharges.

3.0 Sampling and Analysis

Samples shall be collected during the first hour of discharge from the first storm event of the wet season (October 1 - May 30) and at least one other storm event in the wet season. Samples shall be collected at all discharge locations. Storm events must be preceded by at least 3 days of dry weather. Sample collection is only required for storm water discharges that occur during scheduled facility operating hours.

Samples shall be analyzed for the following:

Total Suspended Solids (TSS)
Specific Conductance
pH
Oil and Grease

Additional analytical parameters are required according to the facilities Standard Industrial Classification (SIC) code as specified in Table D of the General Permit. The additional analytical parameters to be tested are specified below according to the SIC code for the facility (see section 1.0 of this plan):

SIC # 4953 - Landfills and Land Application Sites

Iron (Fe)

SIC # 5093 - Scrap Recycling Facilities

Lead (Pb)
Aluminum (Al)
Copper (Cu)
Zinc (Zn)
Chemical Oxygen Demand (COD)

SIC # 4212 - Motor Freight Transportation and Warehousing

(No additional analytical parameters)

4.0 Sample Collection

Samples will be collected from all locations where storm water is discharged, unless it is established and documented in this program that discharges from separate points are substantially identical. A site map located in the appendices includes storm drainage areas and discharge points. Storm water is discharged at 3 locations (SW-1, SW-2 and SW-3) at the Yuba- Sutter Disposal Facility. The SWPPP contains a detailed site map showing drainage courses, structures, and areas of operation, etc.

5.0 Visual Observation and Sample Collection Exemptions

An operator is not required to perform visual observations or collect samples if dangerous conditions, such as flooding, electrical storms, etc. exist. Sampling and observations are also not required if a storm event begins after scheduled working hours or is not preceded by 3 working days of dry weather. An explanation of why sampling or observations could not be performed must be included in the annual report.

Visual observations may be conducted after the first hour of a storm event if the operator determines that the monitoring objectives will be better satisfied. An explanation of why the observations were not performed during the first hour of the storm event must be included in the annual report.

6.0 Sampling and Analysis Exemptions and Reduction

A facility may qualify for a certificate of exemption from the sampling and analysis requirements of the general permit by submitting the appropriate documents with an explanation of the reason for the exemption. To qualify for this exemption the operator must certify that all unauthorized non-storm water discharges have been eliminated or that operational activities are not exposed to storm water. A more detailed description of the requirements for exemption are given in the general permit.

The sampling and analysis requirements may be reduced if:

1) a least 6 sampling and analysis events have been conducted
2) all unauthorized non-storm water discharges have been eliminated or permitted
3) all provisions of the permit have been satisfactorily implemented over the past 2 years
4) the facilities storm water discharges do not contain significant quantities of pollutants, and
5) condition 2, 3, and 4 above are expected to remain in effect for a minimum of one year after filing the certification

7.0 Records

Records of all storm water monitoring information and copies of all reports (including the annual reports) required by the general permit shall be retained for a period of at least 5 years. These records shall include:

1) the date, place and time of site inspections, sampling, visual observations, and/or measurements
2) the individuals who performed the site inspections, sampling, visual observations, and/or measurements
3) flow measurements or estimates (if required)
4) the date and approximate time of measurement
5) the individuals who performed the measurements
6) analytical results, method detection limits, and the analytical method used
7) quality assurance/quality control records and results
8) non-storm water discharge inspections and visual observations and storm water discharge visual observation records
9) visual observation and sample collection exception records
10) calibration and maintenance records of on-site measurement instruments used
11) sampling and analysis exemption and reduction certifications and supporting documentation

12) records of any corrective actions and follow-up activities that resulted from the visual observations

8.0 Annual Report

A report must be submitted to the Executive Officer of the Regional Water Quality Control Board and the Local Enforcement Agency (if requested) by July 1 of each year. The annual report shall include the following:

1) a summary of the visual observations and sampling results
2) an evaluation of the visual observations and analytical results
3) laboratory analytical reports
4) the Annual Comprehensive Site Compliance Evaluation Report (required by the SWPPP)
5) an explanation of why any required activities were not implemented

Monthly Storm Water Discharge
Visual Observation Form

Date/Time:________________ Storm Water Discharge Point(s):____________

Facility:____________________ SIC Code(s):______________

Visual Observations During the Wet Season (Oct 1 -May 30):

Yes No 1. Was a storm water discharge observed during this month's observation? (If no, provide an explanation. If yes, state whether or not a storm water sample was collected.)________________________________

Yes No 2. Was this visual observation conducted during the first hour of a storm water discharge at the storm water discharge location(s)? (If no, provide an explanation.)

Yes No 3. Was this month's visual observation conducted during daylight hours that was preceded by at least three (3) days of no storm water discharge and that occurred during scheduled facility operating hours (i.e. business hours)? (If no, provide an explanation.)________________________________

Yes No 4. Was there any floating or suspended material, oil and grease, discolorations, turbidity, odor, and/or any pollutants associated with or contacting the storm water discharge? (If no, you have completed your observation. If yes, describe the source of pollutants and go to question 5.)________________

Yes No 5. Was the facility's SWPPP revised to prevent or reduce the presence of pollutants observed in the storm water discharge during this observation? (If no, provide an explanation.)________________________________

Inspector's Signature:________________________________ Title:______________

Quarterly Non-Storm Water Discharge
Visual Observation Form

Date/Time: ____________

Facility: ____________ SIC Code(s): ____________

Visual Observations:

Yes No 1. Was this quarter's (i.e., January-March, April-June, July-September, October-December) non-storm water discharge visual observation performed during scheduled facility operating hours (i.e. business hours)?

Yes No 2. Was there a storm water discharge at the discharge point(s)? (If yes, the inspector will discontinue their observation until a later time when there is no storm water discharge at the discharge point(s) [see General Permit].)

Yes No 3a. Was there an unauthorized non storm water discharge observed at any of the drainage points and/or storm water discharge point(s)? (If yes, please identify the source(s).) ____________

Yes No 3b. Were there any discolorations, stains, odors, floating materials, oil and grease etc. associated with or near the drainage point(s) and/or storm water discharge point(s)? (If no, you have completed your observation. If yes, describe the source(s) and go to question 3c.) ____________

Yes No 3c. Have response measures been implemented to eliminate pollutants and/or the unauthorized non-storm water discharge(s). (If yes, explain what those measures are and go to question 4. If no, explain why response measures have not been implemented and go to question 4.) ____________

Yes No 4. Was the facility's SWPPP revised to prevent or reduce pollutants and/or unauthorized non-storm water discharge(s) identified during this visual observation? (Explain.) ____________

Inspector's Signature: ____________ Title: ____________

Annual Comprehensive Site Compliance Evaluation Checklist

Site ______________________________

Date ______________ Name of Evaluator ______________________________

The annual Comprehensive Site Evaluation must be conducted in each reporting period (July 1-June 30) and is to be submitted with the annual Storm Water Monitoring Report by July 1 of each year. Evaluations must be conducted within 8 - 16 months of each other. The SWPPP should be revised, as appropriate, and the revisions implemented within 90 days of the evaluation.

- ☐ Review all visual observation records, inspection records and sampling and analysis results
- ☐ Visual inspection of all potential pollutant sources for evidence of, or the potential for, pollutants entering the drainage system
- ☐ A determination of whether the BMP's are adequate, properly implemented and maintained, or whether additional BMP's are needed.
- ☐ A visual inspection of the equipment needed to implement the SWPPP, such as spill response equipment

Necessary revisions to SWPPP

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Schedule for implementing revisions to the SWPPP

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I certify that the facility named above and it's operator are in compliance with the General Industrial Storm Water Permit.

Name: ______________________ Signature: ______________________

Title: ______________________

Appendix D-3

Summary of Water Analytical Tests

Table 1
Summary of Analytical Results: Sample Point SW-3
Yuba-Sutter Disposal Inc.

	Date	pH	Specific Conductance	Total Suspended Solids	Oil and Grease	Aluminum	Copper	Iron	Lead	Zinc	Chemical Oxygen Demand
SW-3	11/30/1993	7.39	120	270	ND						
	11/10/1994	6.75	45	1420	ND						
	4/7/1995	7.09	210	40	ND						
	1/26/1993	7.16	140	170	0.7						
	4/2/1996	7.59	150	23	ND						
	12/11/1996	7.41	220	160	0.8						
	11/14/1997	7.03	87	ND	ND						
	3/25/1998	6.33	180	24	ND	0.84	ND	1.3	ND	0.04	39
	11/23/1998	7.44	451	37	ND	1.95	0.0127	2.58	ND	0.0162	175
	4/5/1999	7.26	289	ND	ND	0.188	ND	0.927	ND	0.0065	33.2
	11/19/1999	6.98	112	240	11.4	- -	- -	10.4	- -	- -	- -
	4/17/2000	7.37	190	58	ND	- -	- -	1.96	- -	- -	- -