DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT
1010 10TH Street, Suite 3400, Modesto, CA 95354
Planning Phone: (209) 525-6330 Fax: (209) 525-5911
Building Phone: (209) 525-6557 Fax: (209) 525-7759

Referral
Early Consultation

Date: **August 30, 2021**

To: **Distribution List (See Attachment A)**

From: **Teresa McDonald, Associate Planner**
Planning and Community Development

Subject: **USE PERMIT APPLICATION NO. PLN2021-0012 – WEST MAIN COMPOST**

Respond By: **September 14, 2021**

****PLEASE REVIEW REFERRAL PROCESS POLICY****

The Stanislaus County Department of Planning and Community Development is soliciting comments from responsible agencies under the Early Consultation process to determine: a) whether or not the project is subject to CEQA and b) if specific conditions should be placed upon project approval.

Therefore, please contact this office by the response date if you have any comments pertaining to the proposal. Comments made identifying potential impacts should be as specific as possible and should be based on supporting data (e.g., traffic counts, expected pollutant levels, etc.). Your comments should emphasize potential impacts in areas which your agency has expertise and/or jurisdictional responsibilities.

These comments will assist our Department in preparing a staff report to present to the Planning Commission. Those reports will contain our recommendations for approval or denial. They will also contain recommended conditions to be required should the project be approved. Therefore, please list any conditions that you wish to have included for presentation to the Commission as well as any other comments you may have. Please return all comments and/or conditions as soon as possible or no later than the response date referenced above.

Thank you for your cooperation. Please call (209) 525-6330 if you have any questions.

Applicant: **Machado and Sons, Inc.**

Project Location: **1236 W West Main Street, between S Carpenter Road and Crows Landing Road, in the Crows Landing area.**

APN: **058-003-006**

Williamson Act Contract: **1978-3106**

General Plan: **Agriculture**

Current Zoning: **A-2-40 (General Agriculture)**

Project Description: **Request to operate a composting facility on a 23.5-acre portion of a 47.82-acre parcel in the A-2-40 zoning district, with the end user being Starkey Farms, a nearby farm that produces alfalfa, corn, and almonds. The facility will receive a maximum of 140 tons of feedstock per day, which will consist of a combination of landscape residue, vegetative food material, and green waste. Up to 778 cubic yards of feedstock, 10,888 cubic yards of in-process compost (active and curing), 500 cubic yards of amendments (gypsum and micronutrients), and 300 cubic yards of finished product are expected on site at one time. The facility will operate Monday through Saturday from 7:00 am to 5:00 pm. The applicant anticipates three full time employees on one shift, one mechanic on site two days a week, and one manager on site one day a week. On site equipment, which will be portable but remain on site, will consist of a grinder, front end loader, trommel screen, and water truck. No structures are proposed as part of this request. Up to 20 incoming truck deliveries of feedstock and three outgoing truckloads of finished compost are expected per day.**

The feedstock will be separated at local municipal solid waste (MSW) haulers transfer stations consistent with CalRecycle specifications before arriving at the site. The feedstock will be delivered by 20-yard dump trucks, which will be weighed, then the feedstock loads will be dumped for inspection at the feedstock unloading zone, which is anticipated to be on engineered fill (compacted CLII AB road base). Loads that contain greater than 1% contamination, by dry weight, will be rejected. Once the feedstock has passed inspection, material unloaded, and any contaminants removed, it is fed into a grinder by a front-end loader and stockpiled for up to seven days, before being formed into eight-foot-high aerated static pile (ASP) compost piles by front-end loader, located on a 20,000 square-foot concrete slab with embedded aeration piles and nozzle assemblies. Water will be added to the piles by water truck to achieve proper moisture content. Up to 27,500 square-feet of active composting material is expected on the ASP slab at one time. Aerated static pile compost piles are constructed over a network of aeration pipes and induce airflow into the pile using an electric blower that is operated in conjunction with a pile temperature control system, cycling air into the pile. After 30 days, the piles are moved to two curing piles each approximately, 135 x 60 feet in size and eight-feet-high, located on engineered fill, for 20-30 days. Up to 20,000 square-feet of material is expected to be curing at one time. Once the curing period is complete, the finished compost is filtered via portable diesel-powered screening equipment, amendments added, loaded onto trucks, and delivered to the end user. The operator intends to utilize a water truck for dust control and to cease grinding operations when wind exceeds 20 mph. Constant temperature monitoring and an onsite water tank with pump will be utilized for fire prevention and control. Vectors are expected to be controlled by applying the best composting practices, which include appropriate carbon to nitrogen ratio, sufficient moisture content, and adequate aeration to interrupt the fly cycle. Additionally, the applicant will utilize parasitic wasps, traps, and commercial pest control services if necessary. The project proposes one new well for fire suppression water and to utilize portable restrooms for the employees. No septic systems are proposed. Other proposed improvements include a five-foot-tall berm with 3:1 slopes and a chain link fence with fabric around the perimeter of the operation. Trees are proposed along the northern perimeter line. A composite lined storm water detention basin will handle any run off and the water will be recycled and used on the ASP curing pile. The project site has access to County-maintained W West Main Street.

Full document with attachments available for viewing at:
http://www.stancounty.com/planning/pl/act-projects.shtm

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USE PERMIT APPLICATION NO. PLN2021-0012 – WEST MAIN COMPOST

Attachment A

Distribution List

X	CA DEPT OF CONSERVATION Land Resources		STAN CO ALUC
X	CA DEPT OF FISH & WILDLIFE		STAN CO ANIMAL SERVICES
	CA DEPT OF FORESTRY (CAL FIRE)	X	STAN CO BUILDING PERMITS DIVISION
	CA DEPT OF TRANSPORTATION DIST 10	X	STAN CO CEO
X	CA OPR STATE CLEARINGHOUSE		STAN CO CSA
X	CA RWQCB CENTRAL VALLEY REGION	X	STAN CO DER
	CA STATE LANDS COMMISSION	X	STAN CO ERC
	CEMETERY DISTRICT	X	STAN CO FARM BUREAU
	CENTRAL VALLEY FLOOD PROTECTION	X	STAN CO HAZARDOUS MATERIALS
	CITY OF:		STAN CO PARKS & RECREATION
	COMMUNITY SERVICES DIST:	X	STAN CO PUBLIC WORKS
X	COOPERATIVE EXTENSION		STAN CO RISK MANAGEMENT
	COUNTY OF:	X	STAN CO SHERIFF
X	DER GROUNDWATER RESOURCES DIVISION	X	STAN CO SUPERVISOR DIST 2: CHIESA
X	FIRE PROTECTION DIST: MOUNTAIN VIEW	X	STAN COUNTY COUNSEL
X	GSA: WEST TURLOCK SUBBASIN GSA		StanCOG
	HOSPITAL DIST:	X	STANISLAUS FIRE PREVENTION BUREAU
X	IRRIGATION DIST: TURLOCK	X	STANISLAUS LAFCO
X	MOSQUITO DIST: TURLOCK	X	STATE OF CA SWRCB DIVISION OF DRINKING WATER DIST. 10
X	MOUNTAIN VALLEY EMERGENCY MEDICAL SERVICES		SURROUNDING LAND OWNERS
	MUNICIPAL ADVISORY COUNCIL:	X	TELEPHONE COMPANY: AT&T
X	PACIFIC GAS & ELECTRIC		TRIBAL CONTACTS (CA Government Code §65352.3)
	POSTMASTER:		US ARMY CORPS OF ENGINEERS
	RAILROAD:	X	US FISH & WILDLIFE
X	SAN JOAQUIN VALLEY APCD		US MILITARY (SB 1462) (7 agencies)
X	SCHOOL DIST 1: TURLOCK UNIFIED	X	USDA NRCS
X	SCHOOL DIST 2: CHATOM UNION		WATER DIST:
	WORKFORCE DEVELOPMENT	X	CALRECYCLE
X	STAN CO AG COMMISSIONER		
	TUOLUMNE RIVER TRUST		

STANISLAUS COUNTY
CEQA REFERRAL RESPONSE FORM

TO: **Stanislaus County Planning & Community Development**
1010 10th Street, Suite 3400
Modesto, CA 95354

FROM: ______________________________

SUBJECT: **USE PERMIT APPLICATION NO. PLN2021-0012 – WEST MAIN COMPOST**

Based on this agency's particular field(s) of expertise, it is our position the above described project:

______ Will not have a significant effect on the environment.
______ May have a significant effect on the environment.
______ No Comments.

Listed below are specific impacts which support our determination (e.g., traffic general, carrying capacity, soil types, air quality, etc.) – (attach additional sheet if necessary)

1.
2.
3.
4.

Listed below are possible mitigation measures for the above-listed impacts: *PLEASE BE SURE TO INCLUDE WHEN THE MITIGATION OR CONDITION NEEDS TO BE IMPLEMENTED (PRIOR TO RECORDING A MAP, PRIOR TO ISSUANCE OF A BUILDING PERMIT, ETC.):*

1.
2.
3.
4.

In addition, our agency has the following comments (attach additional sheets if necessary).

____

____

Response prepared by:

____
Name Title Date

WEST MAIN COMPOST

UP PLN2021-0012

AREA MAP

LEGEND

- 🟥 Project Site
- 🟩 Sphere of Influence
- ▨ City
- — Road
- — River

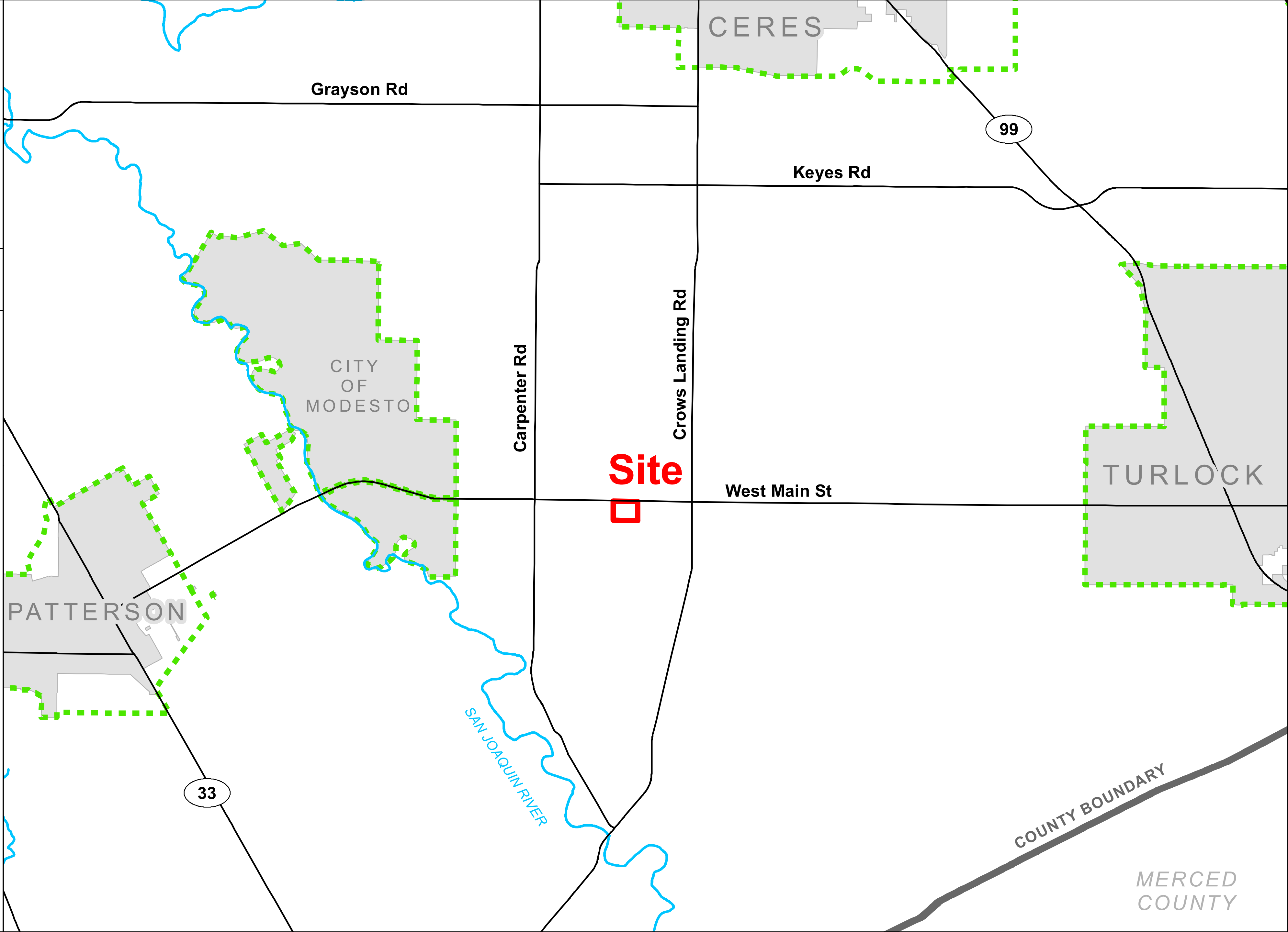
N

0 2mi

0 2km

Source: Planning Department GIS

Date: 4/21/2021



WEST MAIN COMPOST

UP PLN2021-0012

GENERAL PLAN MAP

LEGEND

🟥 Project Site

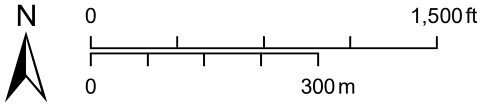
☐ Parcel

— Road

┬┬┬ Canal

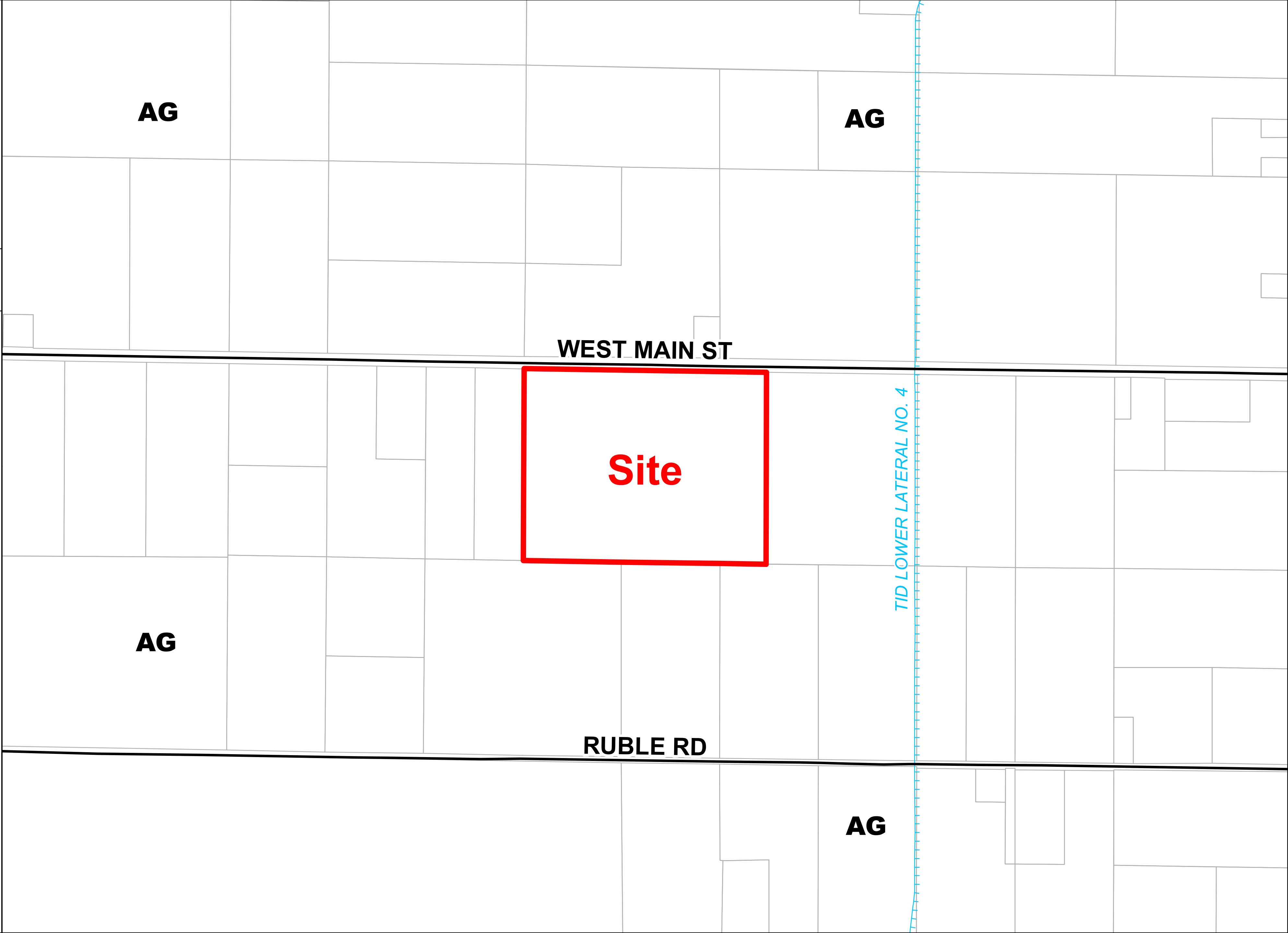
General Plan

☐ Agriculture



Source: Planning Department GIS

Date: 4/21/2021



WEST MAIN COMPOST

UP
PLN2021-0012

ZONING MAP

LEGEND

🟥 Project Site

☐ Parcel

— Road

Canal

Zoning Designation

🟩 General Agriculture 40 Acre

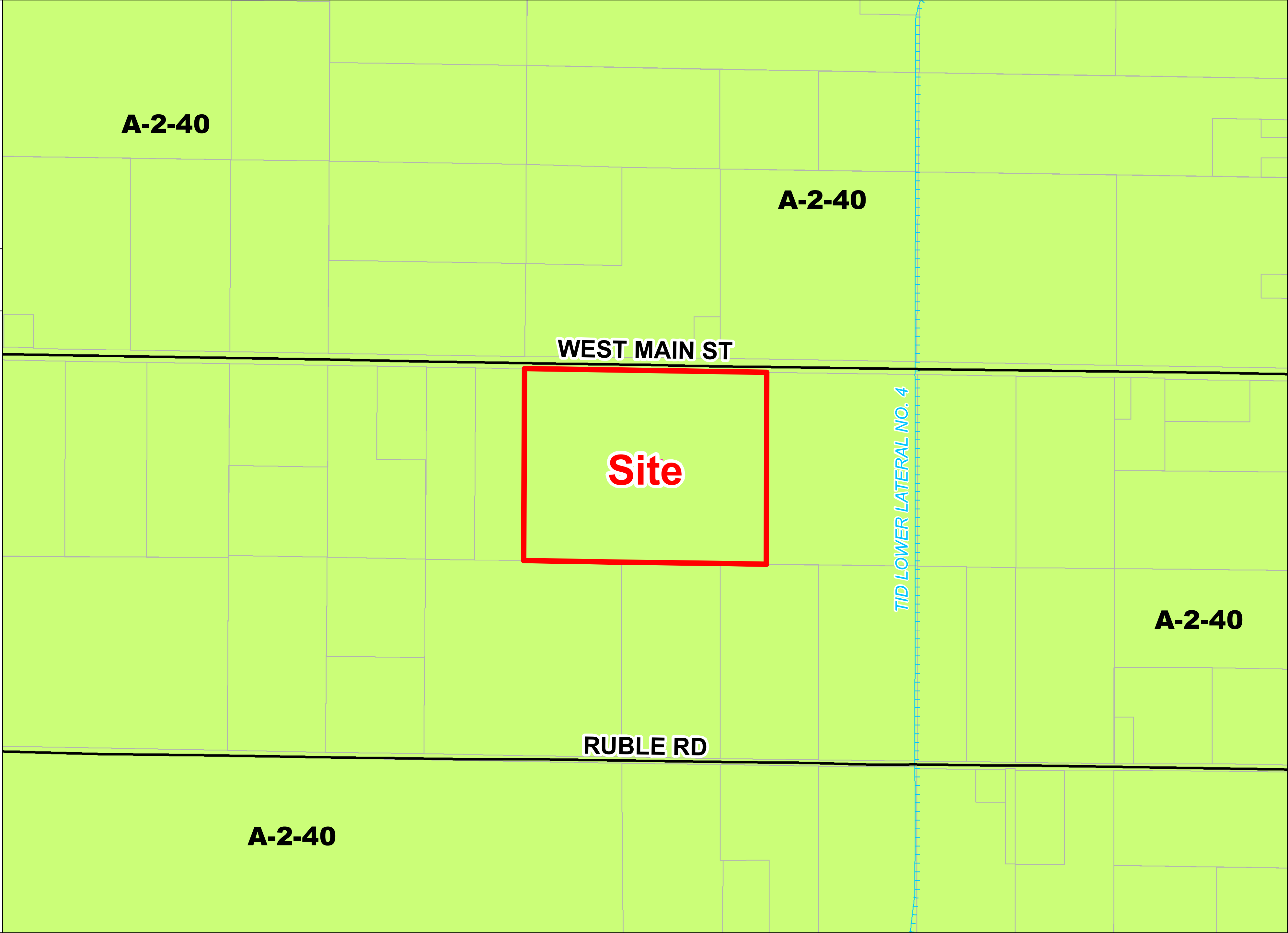
N

0 1,500 ft

0 300 m

Source: Planning Department GIS

Date: 4/21/2021



WEST MAIN COMPOST

UP
PLN2021-0012

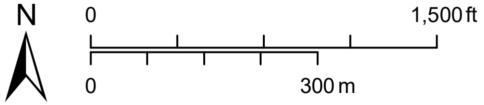
2017 AERIAL AREA MAP

LEGEND

▭ Project Site

— Road

┬┬┬ Canal



Source: Planning Department GIS

Date: 4/21/2021

WEST MAIN COMPOST

UP PLN2021-0012

2017 AERIAL SITE MAP

LEGEND

🟥	Project Site
—	Road
┬┬┬┬	Canal

Source: Planning Department GIS

Date: 4/21/2021

WEST MAIN COMPOST

UP
PLN2021-0012

ACREAGE MAP

LEGEND

🟥	Project Site
#	Parcel/Acres
—	Road
┬┬┬┬	Canal

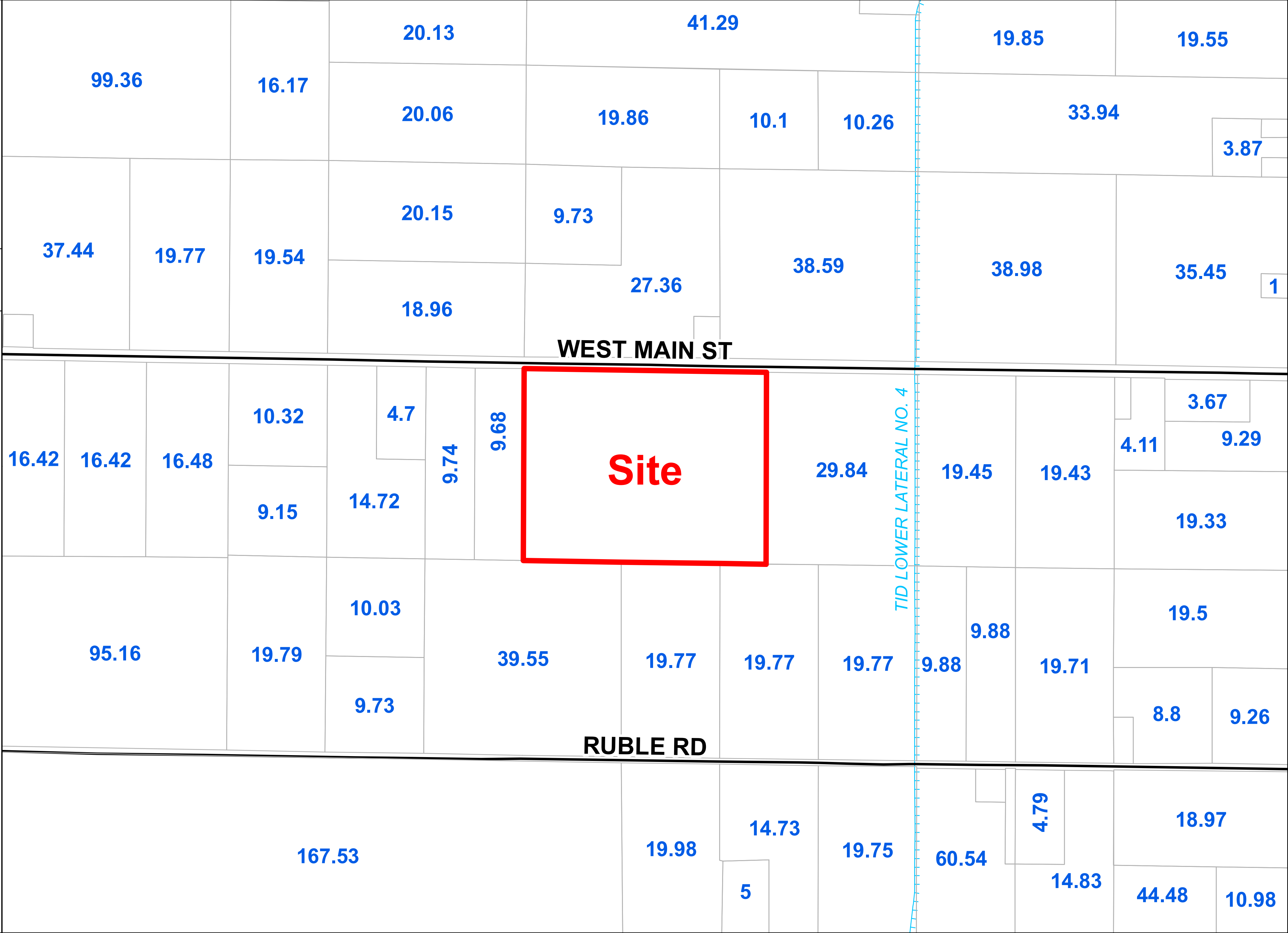
N

0 1,500 ft

0 300 m

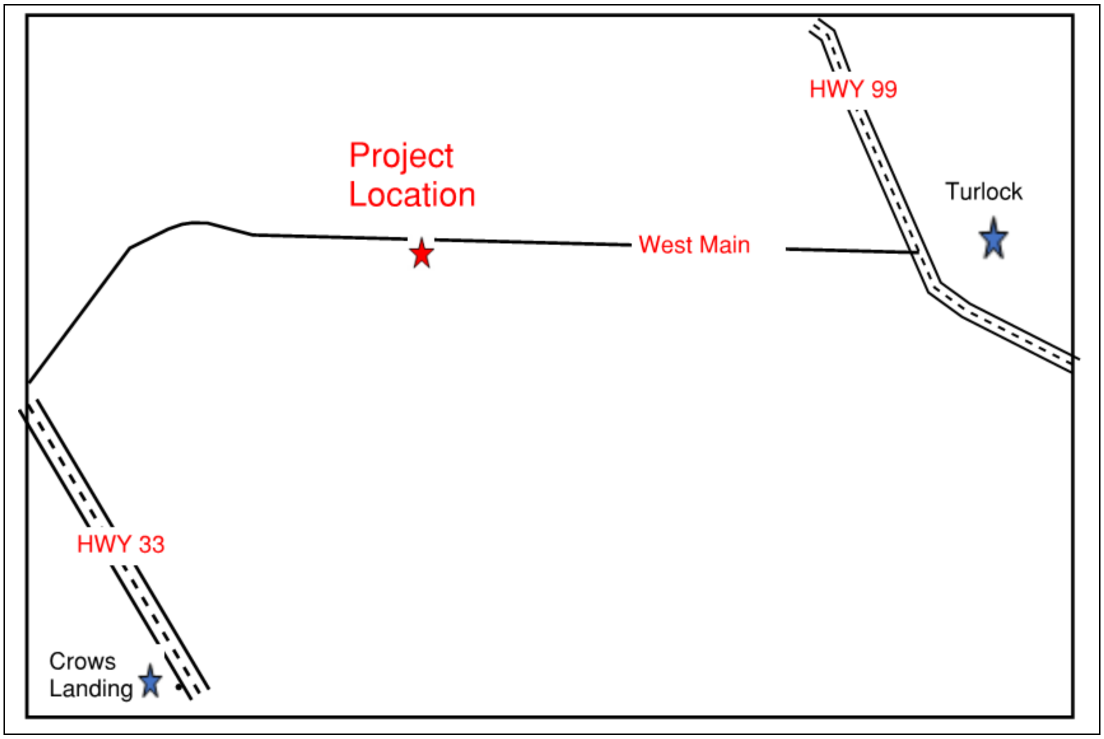
Source: Planning Department GIS

Date: 4/21/2021

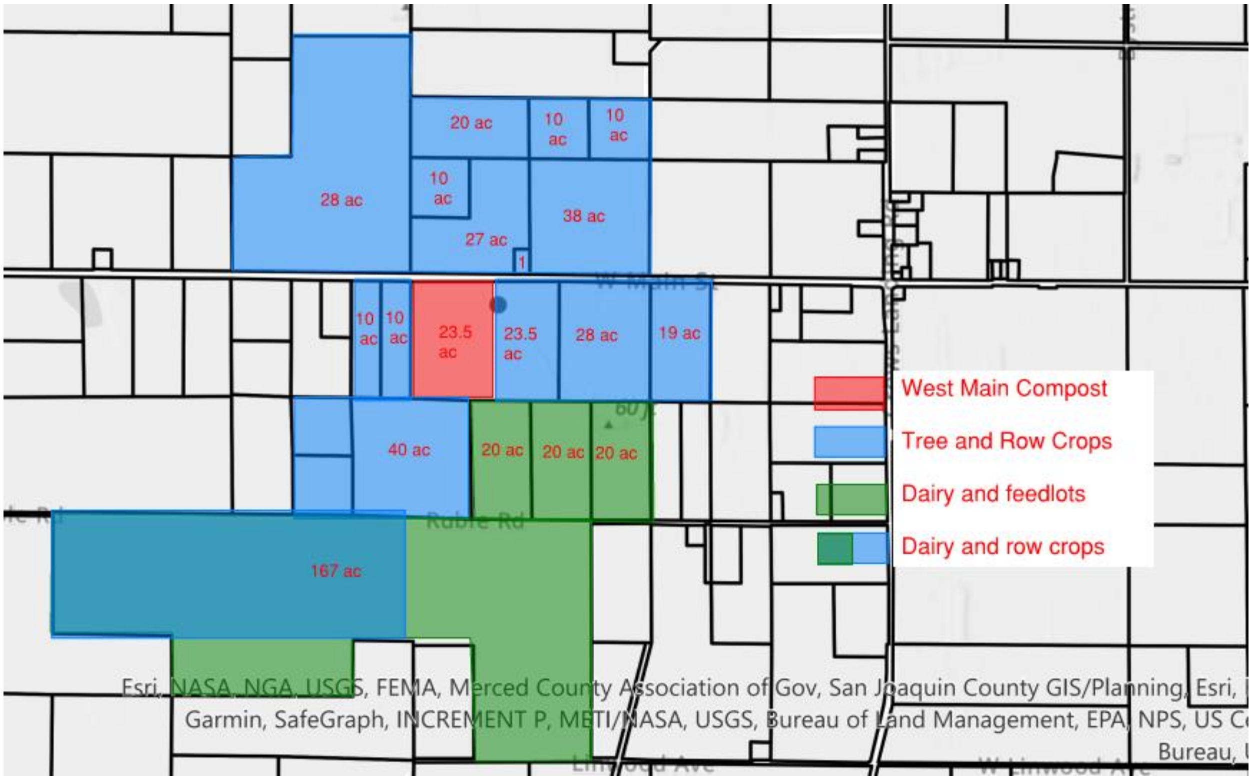


Appendix A - Site Details

Project Location 1236 west Main Crows Landing, CA

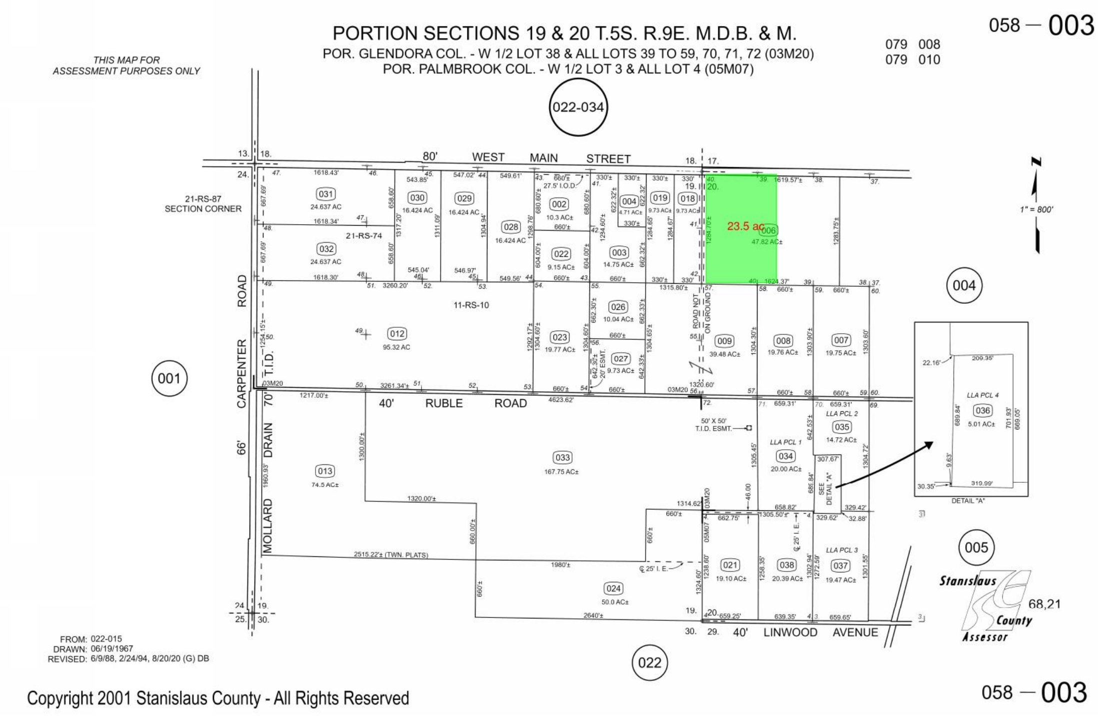


Adjoining Land Uses

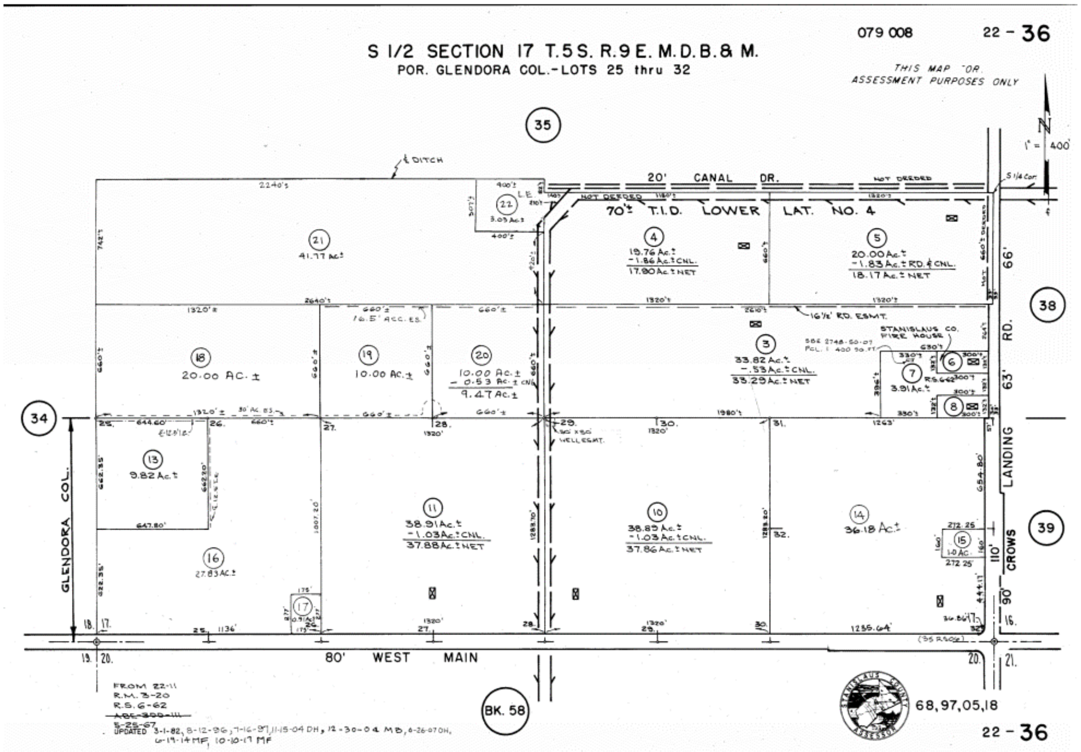


Esri, NASA, NGA, USGS, FEMA, Merced County Association of Gov, San Joaquin County GIS/Planning, Esri,
Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US C
Bureau,

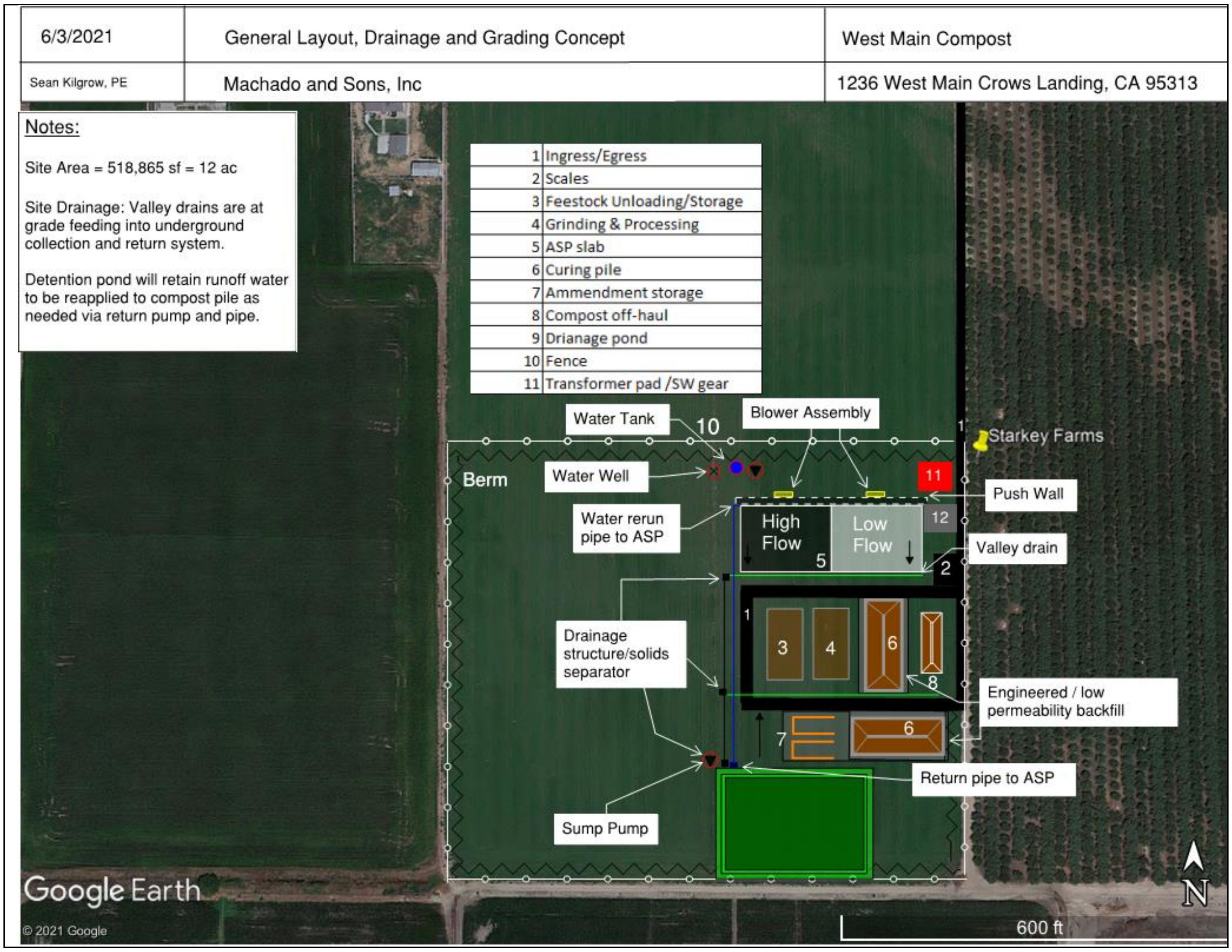
Assessor’s Parcel Map



Adjoining Parcel Maps



Conceptual Site design



6/3/2021	General Layout, Drainage and Grading Concept	West Main Compost
Sean Kilgrow, PE	Machado and Sons, Inc	1236 West Main Crows Landing, CA 95313

Notes:

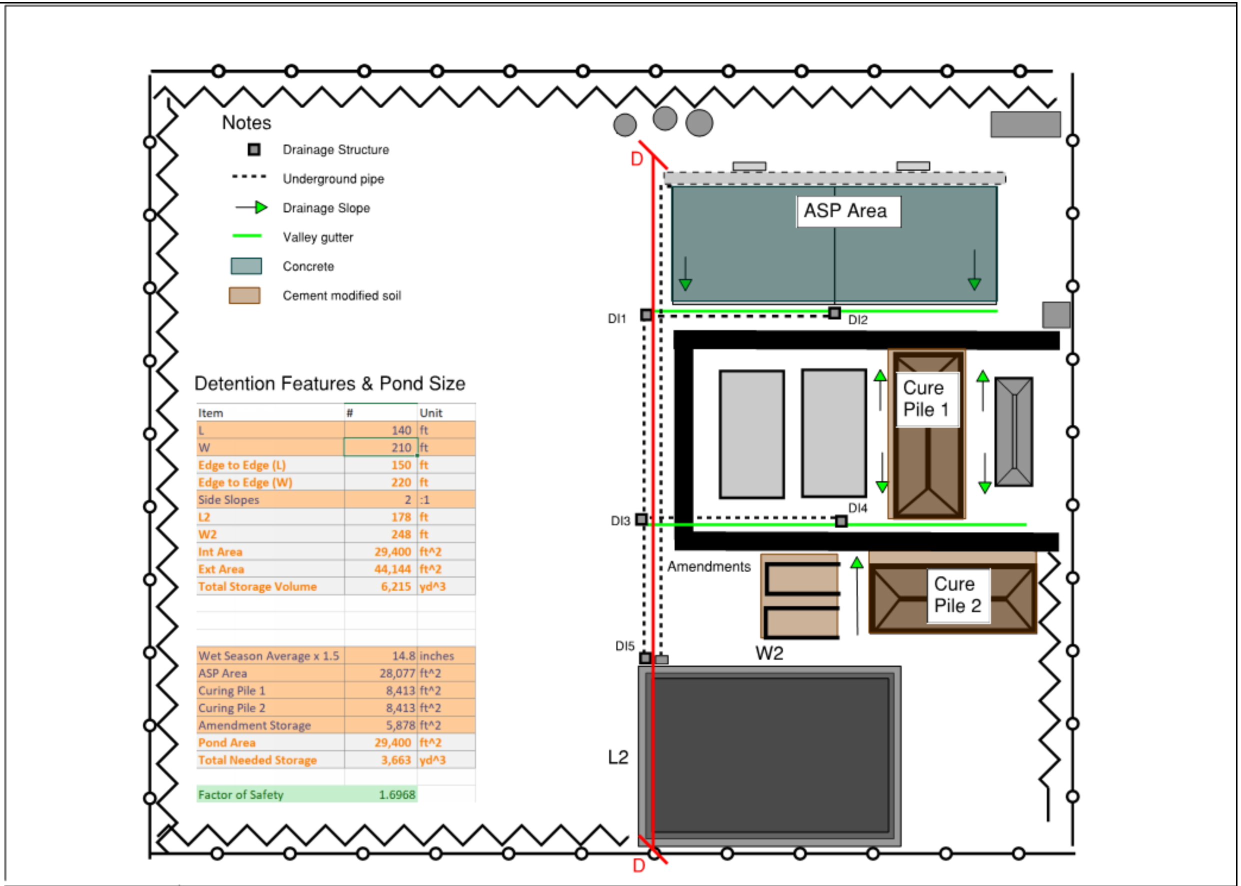
Site Area = 518,865 sf = 12 ac

Site Drainage: Valley drains are at grade feeding into underground collection and return system.

Detention pond will retain runoff water to be reapplied to compost pile as needed via return pump and pipe.

1	Ingress/Egress
2	Scales
3	Feestock Unloading/Storage
4	Grinding & Processing
5	ASP slab
6	Curing pile
7	Ammendment storage
8	Compost off-haul
9	Drianage pond
10	Fence
11	Transformer pad /SW gear

Conceptual Drainage Plan



Detention Features & Pond Size

Item	#	Unit
L	140	ft
W	210	ft
Edge to Edge (L)	150	ft
Edge to Edge (W)	220	ft
Side Slopes	2	:1
L2	178	ft
W2	248	ft
Int Area	29,400	ft^2
Ext Area	44,144	ft^2
Total Storage Volume	6,215	yd^3
Wet Season Average x 1.5	14.8	inches
ASP Area	28,077	ft^2
Curing Pile 1	8,413	ft^2
Curing Pile 2	8,413	ft^2
Amendment Storage	5,878	ft^2
Pond Area	29,400	ft^2
Total Needed Storage	3,663	yd^3
Factor of Safety	1.6968	

	Concept Drainage Plan	West Main Compost
Sean Kilgrow, PE	Machado and Sons, Inc	6/3/2021

Stanislaus County

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Form Available Online: http://www.stancounty.com/planning/applications.shtm

APPLICATION QUESTIONNAIRE

Please Check all applicable boxes
APPLICATION FOR:
Staff is available to assist you with determining which applications are necessary

- ☐ General Plan Amendment
- ☐ Rezone
- ☒ Use Permit
- ☐ Variance
- ☐ Historic Site Permit
- ☐ Subdivision Map
- ☐ Parcel Map
- ☐ Exception
- ☐ Williamson Act Cancellation
- ☐ Other ________

PLANNING STAFF USE ONLY:
Application No(s): UP PLN 2021-0012
Date: 2/10/21
S 20 T 5 R 9
GP Designation: Agriculture
Zoning: A-2-40
Fee: $4,761.00
Receipt No. ________
Received By: KA
Notes: ________

In order for your application to be considered COMPLETE, please answer all applicable questions on the following pages, and provide all applicable information listed on the checklist on pages i – v. Under State law, upon receipt of this application, staff has 30 days to determine if the application is complete. We typically do not take the full 30 days. It may be necessary for you to provide additional information and/or meet with staff to discuss the application. Pre-application meetings are not required, but are highly recommended. An incomplete application will be placed on hold until all the necessary information is provided to the satisfaction of the requesting agency. An application will not be accepted without all the information identified on the checklist.

Please contact staff at (209) 525-6330 to discuss any questions you may have. Staff will attempt to help you in any way we can.

PROJECT INFORMATION

PROJECT DESCRIPTION: (Describe the project in detail, including physical features of the site, proposed improvements, proposed uses or business, operating hours, number of employees, anticipated customers, etc. – Attach additional sheets as necessary)

Please note: A detailed project description is essential to the reviewing process of this request. In order to approve a project, the Planning Commission or the Board of Supervisors must decide whether there is enough information available to be able to make very specific statements about the project. These statements are called "Findings". It is your responsibility as an applicant to provide enough information about the proposed project, so that staff can recommend that the Commission or the Board make the required Findings. Specific project Findings are shown on pages 17 – 19 and can be used as a guide for preparing your project description. (If you are applying for a Variance or Exception, please contact staff to discuss special requirements).

See attached West Main Compost project narrative.

PROJECT SITE INFORMATION

Complete and accurate information saves time and is vital to project review and assessment. Please complete each section entirely. If a question is not applicable to your project, please indicated this to show that each question has been carefully considered. Contact the Planning & Community Development Department Staff, 1010 10th Street – 3rd Floor, (209) 525-6330, if you have any questions. Pre-application meetings are highly recommended.

ASSESSOR'S PARCEL NUMBER(S): **Book** 058 **Page** 003 **Parcel** 006

Additional parcel numbers: ______

Project Site Address or Physical Location: 1236 West Main Crows Landing, CA

Property Area: Acres: 47.82 or Square feet: ______

Current and Previous Land Use: (Explain existing and previous land use(s) of site for the last ten years)

General agriculture

List any known previous projects approved for this site, such as a Use Permit, Parcel Map, etc.: (Please identify project name, type of project, and date of approval)

______

Existing General Plan & Zoning: general agriculture

Proposed General Plan & Zoning: ______
(if applicable)

ADJACENT LAND USE: (Describe adjacent land uses within 1,320 feet (1/4 mile) and/or two parcels in each direction of the project site)

East: See attached area parcel map

West: ______

North: ______

South: ______

WILLIAMSON ACT CONTRACT:

Yes ☒ **No** ☐ Is the property currently under a Williamson Act Contract?

Contract Number: 1977-3106

If yes, has a Notice of Non-Renewal been filed?

Date Filed: ______

Yes ☐ **No** ☒ Do you propose to cancel any portion of the Contract?

Yes ☐ **No** ☒ Are there any agriculture, conservation, open space or similar easements affecting the use of the project site. (Such easements do not include Williamson Act Contracts)

If yes, please list and provide a recorded copy: ______________________

____

SITE CHARACTERISTICS: (Check one or more) Flat ☒ Rolling ☐ Steep ☐

VEGETATION: What kind of plants are growing on your property? (Check one or more)

Field crops ☒ Orchard ☐ Pasture/Grassland ☐ Scattered trees ☐

Shrubs ☐ Woodland ☐ River/Riparian ☐ Other ☐

Explain Other: ______________________

Yes ☐ **No** ☒ Do you plan to remove any trees? (If yes, please show location of trees planned for removal on plot plan and provide information regarding transplanting or replanting.)

GRADING:

Yes ☒ **No** ☐ Do you plan to do any grading? (If yes, please indicate how many cubic yards and acres to be disturbed. Please show areas to be graded on plot plan.) *Approximately 5,000 cy*

____

STREAMS, LAKES, & PONDS:

Yes ☐ **No** ☒ Are there any streams, lakes, ponds or other watercourses on the property? (If yes, please show on plot plan)

Yes ☒ **No** ☐ Will the project change any drainage patterns? (If yes, please explain – provide additional sheet if needed) *See attached drainage concept.*

____

Yes ☐ **No** ☒ Are there any gullies or areas of soil erosion? (If yes, please show on plot plan)

Yes ☒ **No** ☐ Do you plan to grade, disturb, or in any way change swales, drainages, ditches, gullies, ponds, low lying areas, seeps, springs, streams, creeks, river banks, or other area on the site that carries or holds water for any amount of time during the year? (If yes, please show areas to be graded on plot plan)

Please note: If the answer above is yes, you may be required to obtain authorization from other agencies such as the Corps of Engineers or California Department of Fish and Game.

STRUCTURES:

Yes ☐ **No** ☒ Are there structures on the site? (If yes, please show on plot plan. Show a relationship to property lines and other features of the site.

Yes ☐ **No** ☒ Will structures be moved or demolished? (If yes, indicate on plot plan.)

Yes ☐ **No** ☒ Do you plan to build new structures? (If yes, show location and size on plot plan.)

Yes ☐ **No** ☒ Are there buildings of possible Historical significance? (If yes, please explain and show location and size on plot plan.) ______

PROJECT SITE COVERAGE:

Existing Building Coverage:	0 Sq. Ft.	Landscaped Area:	0 Sq. Ft.
Proposed Building Coverage:	0 Sq. Ft.	Paved Surface Area:	11000 Sq. Ft.

BUILDING CHARACTERISTICS:

Size of new structure(s) or building addition(s) in gross sq. ft.: (Provide additional sheets if necessary) ______

Number of floors for each building: ______

Building height in feet (measured from ground to highest point): (Provide additional sheets if necessary) ______

Height of other appurtenances, excluding buildings, measured from ground to highest point (i.e., antennas, mechanical equipment, light poles, etc.): (Provide additional sheets if necessary) ______

Proposed surface material for parking area: (Provide information addressing dust control measures if non-asphalt/concrete material to be used) ______

UTILITIES AND IRRIGATION FACILITIES:

Yes ☐ **No** ☒ Are there existing public or private utilities on the site? Includes telephone, power, water, etc. (If yes, show location and size on plot plan)

Who provides, or will provide the following services to the property?

Electrical:	PG&E	Sewer*:	NA
Telephone:	NA	Gas/Propane:	PG&E
Water**:	NA	Irrigation:	TID

***Please Note: A "will serve" letter is required if the sewer service will be provided by City, Sanitary District, Community Services District, etc.**

****Please Note: A "will serve" letter is required if the water source is a City, Irrigation District, Water District, etc., and the water purveyor may be required to provide verification through an Urban Water Management Plan that an adequate water supply exists to service your proposed development.**

Will any special or unique sewage wastes be generated by this development other than that normally associated with resident or employee restrooms? Industrial, chemical, manufacturing, animal wastes? (Please describe:)

____

____

____

Please Note: Should any waste be generated by the proposed project other than that normally associated with a single family residence, it is likely that Waste Discharge Requirements will be required by the Regional Water Quality Control Board. Detailed descriptions of quantities, quality, treatment, and disposal may be required.

Yes ☐ **No** ☒ Are there existing irrigation, telephone, or power company easements on the property? (If yes, show location and size on plot plan.)

Yes ☐ **No** ☒ Do the existing utilities, including irrigation facilities, need to be moved? (If yes, show location and size on plot plan.)

Yes ☐ **No** ☒ Does the project require extension of utilities? (If yes, show location and size on plot plan.)

AFFORDABLE HOUSING/SENIOR:

Yes ☐ **No** ☐ Will the project include affordable or senior housing provisions? (If yes, please explain)

RESIDENTIAL PROJECTS: (Please complete if applicable – Attach additional sheets if necessary)

Total No. Lots:__________ Total Dwelling Units:__________ Total Acreage:__________

Net Density per Acre: __________ Gross Density per Acre: __________

(complete if applicable)	Single Family	Two Family Duplex	Multi-Family Apartments	Multi-Family Condominium/ Townhouse
Number of Units:				
Acreage:				

COMMERCIAL, INDUSTRIAL, MANUFACTURING, RETAIL, USE PERMIT, OR OTHER PROJECTS: (Please complete if applicable – Attach additional sheets if necessary)

Square footage of each existing or proposed building(s): ______________________________

____

Type of use(s): ______________________________

____

Days and hours of operation: *Monday - Saturday 7:00 am to 5:00 pm*

Seasonal operation (i.e., packing shed, huller, etc.) months and hours of operation: *12 month a year operation.*

Occupancy/capacity of building:

Number of employees: (Maximum Shift): *4* (Minimum Shift): *3*

Estimated number of daily customers/visitors on site at peak time: *20*

Other occupants:

Estimated number of truck deliveries/loadings per day: *15*

Estimated hours of truck deliveries/loadings per day: *7:00 am - 5:00 pm*

Estimated percentage of traffic to be generated by trucks: *80*

Estimated number of railroad deliveries/loadings per day:

Square footage of:

Office area:

Warehouse area:

Sales area:

Storage area:

Loading area:

Manufacturing area:

Other: (explain type of area)

Yes ☐ **No** ☒ Will the proposed use involve toxic or hazardous materials or waste? (Please explain)

ROAD AND ACCESS INFORMATION:

What County road(s) will provide the project's main access? (Please show all existing and proposed driveways on the plot plan)

See attached site plan.

Yes ☐ **No** ☒ Are there private or public road or access easements on the property now? (If yes, show location and size on plot plan)

Yes ☒ **No** ☐ Do you require a private road or easement to access the property? (If yes, show location and size on plot plan)

Yes ☒ **No** ☐ Do you require security gates and fencing on the access? (If yes, show location and size on plot plan)

Please Note: Parcels that do not front on a County-maintained road or require special access may require approval of an Exception to the Subdivision Ordinance. Please contact staff to determine if an exception is needed and to discuss the necessary Findings.

STORM DRAINAGE:

How will your project handle storm water runoff? (Check one) ☒ Drainage Basin ☐ Direct Discharge ☒ Overland

☐ Other: (please explain) ______

If direct discharge is proposed, what specific waterway are you proposing to discharge to? ______

Please Note: If direct discharge is proposed, you will be required to obtain a NPDES permit from the Regional Water Quality Control Board, and must provide evidence that you have contacted them regarding this proposal with your application.

EROSION CONTROL:

If you plan on grading any portion of the site, please provide a description of erosion control measures you propose to implement.

SWPPP provisions and berms shown on site plan.

Please note: You may be required to obtain an NPDES Storm Water Permit from the Regional Water Quality Control Board and prepare a Storm Water Pollution Prevention Plan.

ADDITIONAL INFORMATION:

Please use this space to provide any other information you feel is appropriate for the County to consider during review of your application. (Attach extra sheets if necessary)

See attached project narrative.

Project Description

West Main Compost Facility

July 2021

Prepared by:

MACHADO & SONS CONSTRUCTION, INC.
1000 South Kilroy Road
Turlock, CA 95380

Contents

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Project Description

The following describes a proposed composting operation to be operated by Machado & Sons Construction on a site in Stanislaus County. The project is located on 23.5 acres of a 48-acre parcel at 1236 South Main Ave, Crows Landing, California. The facility will ultimately receive a maximum of 140 tons per day of landscape residue, vegetative food material, and green waste. Title 14 composting regulations (Title 14, California Code of Regulations, Chapter 3.1.) describe a tiered permitting structure for composting facilities and set forth design and operating standards for these facilities.

FACILITY NAME: West Main Compost Facility

MAILING ADDRESS:
1000 South Kilroy Road,
Turlock, CA 95358

PHYSICAL ADDRESS:
1236 West Main
Crows Landing, CA

LANDOWNER:
Dave & Cindy Starkey
1643 W Tuolumne Rd Ceres, CA 95307

ASSESSOR'S PARCEL NUMBER: 058-003-006

OPERATOR:
Machado and Sons, Inc.
Sean Kilgrow, P.E.
1000 South Kilroy Road
Turlock, CA 93589
(O) (209) 632-3963
(M) (916) 206-4342
skilgrow@machadoandsons.com

REGULATORY CONTACTS:
CalRecycle (LEA for Stanislaus County)
1001 I Street
Sacramento, CA 95814
916-341-6772

Project Overview

The West Main Compost Facility is being proposed in coordination with local organic waste managers to comply with SB 1383/AB 1826 and serve the local agricultural compost market. The facility will receive source-separated green waste from local municipal waste haulers.

This facility will operate in conjunction with Starkey Farms, and other local farms, for off-take of the compost material which is consistent with the agricultural use of the property which is currently zoned general agriculture. There will be no concentration of other businesses or facilities added due to this use other that what is shown on the site plan. It is expected that there will be four full time employees at the facility complying with the employee limitation of the number of full-time, year-round employees involved in the operation. All maintenance and material management tasks will be completed during normal working hours.

This operation will provide the local farms access to the high-quality compost that the aerated static pile (ASP) system will generate. Moreover, this compost facility will enable the local jurisdictions and other organic waste generators to comply with the ambitious recycling mandate of SB 1383. This facility will not accept any organic waste that contains greater that 1% contamination by dry weight. Our feedstock will be green and vegetative food waste from local MSW haulers.

Surrounding Land Use

The property is zoned agricultural and the surrounding land use is dominated by developed agricultural uses. Uses are a combination of relatively small dairy farms, row crop and orchard growers. The nearest residence is at 1512 West Main St, Crows Landing.

Williamson Act

The Williamson Act number for the site is Williamson Act #:1977-3106. We are anticipating that no cancellation of the Williamson Act will be necessary for this project because the compost will be used for an agriculture purpose.

Days and Hours of Operation

The facility will operate Monday through Saturday from 7:00 am to 5:00 pm. Working ours may shift or expand due to process demands caused by seasonal fluctuations per LEA approval.

Site Description

The project is located on 23.5 acres of a 48-acre parcel at 1236 West main Ave. Crows Landing, California. The parcel generally slopes to the southwest away from West Main and further to the Tuolumne river. See ROWD report in Attachment G for site, groundwater, soil, geologic and climate related information.

Permits and Approvals

The following permits and approvals govern the design and operation of the facility:

1. Conditional Use Permit, Stanislaus County

2. Mitigated Negative Declaration, Stanislaus County

3. Registration Permit CalRecycle (SWIS # pending)

4. Technical Report, Central Valley Regional Water Quality Control Board

5. Authority to Construct/Permit to Operate San Joaquin Valley Air Pollution Control District

6 Stanislaus County Non-Disposal Facility Element

Site Capacity

Title 14 regulations describe a Registration tier for this type of facility and limit all on-site materials to 12,500 cubic yards at any one time. The on-site volumes have been estimated as follows using the following assumptions:

1. Max volume of feedstock delivered to site is 140 t/dy, 6 dy/wk
2. Max feedstock processing time is 72 hours
3. Feedstock & compost average bulk density = 40 lb/ft3
4. Feedstock retention time ~= 30 days
5. Compost cure time ~= 20 days
6. Compost amendments: wood grindings, gypsum

Table 1 Estimated Site Capacity

<table>
<tr><td colspan="5">Assumptions</td></tr>
<tr><td>Max daily feedstock =
140 t/dy</td><td colspan="2">Deliveries 6 days per week,
24 dy/mo</td><td colspan="2">Feedstock average density =
40 lb/cf</td></tr>
<tr><td colspan="5">Onsite Volume</td></tr>
<tr><td>Bulk Feedstock (3-dy retention)</td><td>Active Compost (4-week retention)</td><td>Curing Piles (3-week retention)</td><td>Additives</td><td>Finished compost</td></tr>
<tr><td>420 t = 778 cy</td><td>3,360 t = 6,222 cy</td><td>2,250 t = 4,666 cy</td><td>500 cy</td><td>300 cy</td></tr>
<tr><td colspan="5">Total material onsite: = 12,466 cy</td></tr>
</table>

Table 2 Feedstock Type and Daily Volume

Feedstock	**TPD average**	**TPD max**
Green Material	120	140

Feedstock delivery

The feedstock that we will process originates from the local MSW haulers. The facility will ultimately receive up to twenty delivery trucks per day. All loads entering the facility shall undergo load inspection by our trained load checkers. No loads will be accepted without a load check onsite.

To increase the probability that the material will remain within CalRecycle specifications for plastic or other contaminates the following procedure will be implemented.

- The incoming green waste will be delivered from the MSW source. Our goal is to receive the waste in accordance with the CalRecycle >1% by volume specification. To start the operation, we will be running the CalRecycle contamination test frequently to confirm contamination levels based on the following methodology – https://www.calrecycle.ca.gov/lea/regs/implement/fimguidance
- The contract with the MSW hauler will specify that the Green material will be sorted at the transfer station to the CalRecycle specification. Upon delivery our crews will inspect every load that enters the facility prior to preparing the green waste for composting. We will either accept the load, perform additional sorting/separation, or reject the load. In the beginning we expect that our crews will need to perform some additional sorting but our long-term goal is to work with the MSW haulers to deliver compliant waste.

The facility will keep records of training and load checks performed to meet the requirements set out by the LEA. The feedstock will be shredded to – 4” and mixed to the proper C:N ratio before being hauled to the ASP active compost piles. All feedstock will be processed within 72 hours of receipt to avoid any odor or vector issues. Carbon sources and bulking agents, such as wood chips, will be stored in concrete block bins as shown on the site plan.

If the facility is unable to process the incoming feedstock within the 72-hour time limitation the plan is to divert the material to other compost facilities in the area (Recology or Modesto Compost).

Other Traffic

In addition to the 20 feedstock deliveries per day, the facility will have 3 full time employees, 2 weekly mechanic visits, and weekly visits from management. We do not plan to sell to the public at this time; therefore, we expect no public traffic at the facility. We do anticipate utilizing the delivery trucks to haul the compost to customers. The maximum total daily traffic flow will be 20 vehicles. Average traffic flow will be 15 vehicles. Parking and portable toilet facilities will be available for all drivers and employees.

ASP Process

Aerated static pile compost piles are constructed over a network of aeration pipes and induce airflow into the pile using an electric blower that is operated in conjunction with a pile temperature control system that cycles air into the pile. The piles are moved once to introduce addition oxygen during the first 30 days, a period referred to as the active phase of composting. We can adjust the airflow to manage the pile temperatures and optimize the biology of the composting process.

A study funded by the San Joaquin Valley Air Pollution Control District resulted in the following findings:

> *“The comparison of emissions from the 22-day active composting phase between the ASP and standard windrows demonstrated emissions reductions by the ASP of 99% for total non-methane, non- ethane VOCs, 70% for ammonia (average of field and lab), 88% for nitrous oxide, and 13% for methane. The overall reduction for CO2 equivalents was nearly 65%. Diesel use in pile construction and active-phase management was 87% less for the ASP system, with commensurate reductions in criteria pollutant emissions associated with diesel fuel combustion. Water used during the composting process was reduced by 20%, and land necessary for active-phase composting is calculated to be reduced by 55.5%.”*

Aeration is vital to our process. Aeration maintains aerobic conditions in the pile and optimizes the biology of the composting process and pile temperatures to within a desired range. Moreover, APS reduces offensive odors and expedites the rate of composting. When managed properly this technique resolves odor impacts, controls vector problems reducing nuisance issues and neighbor complaints. The operation will use less fuel per ton of compost produced than windrow composting, but more importantly reduce the volume of VOCs and CH_4 released into the atmosphere.

Table 3 – Emissions Reductions

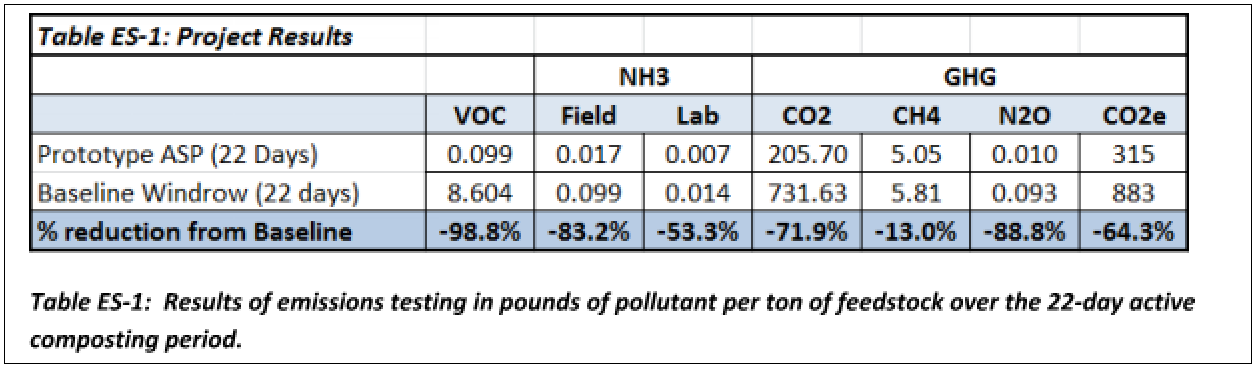


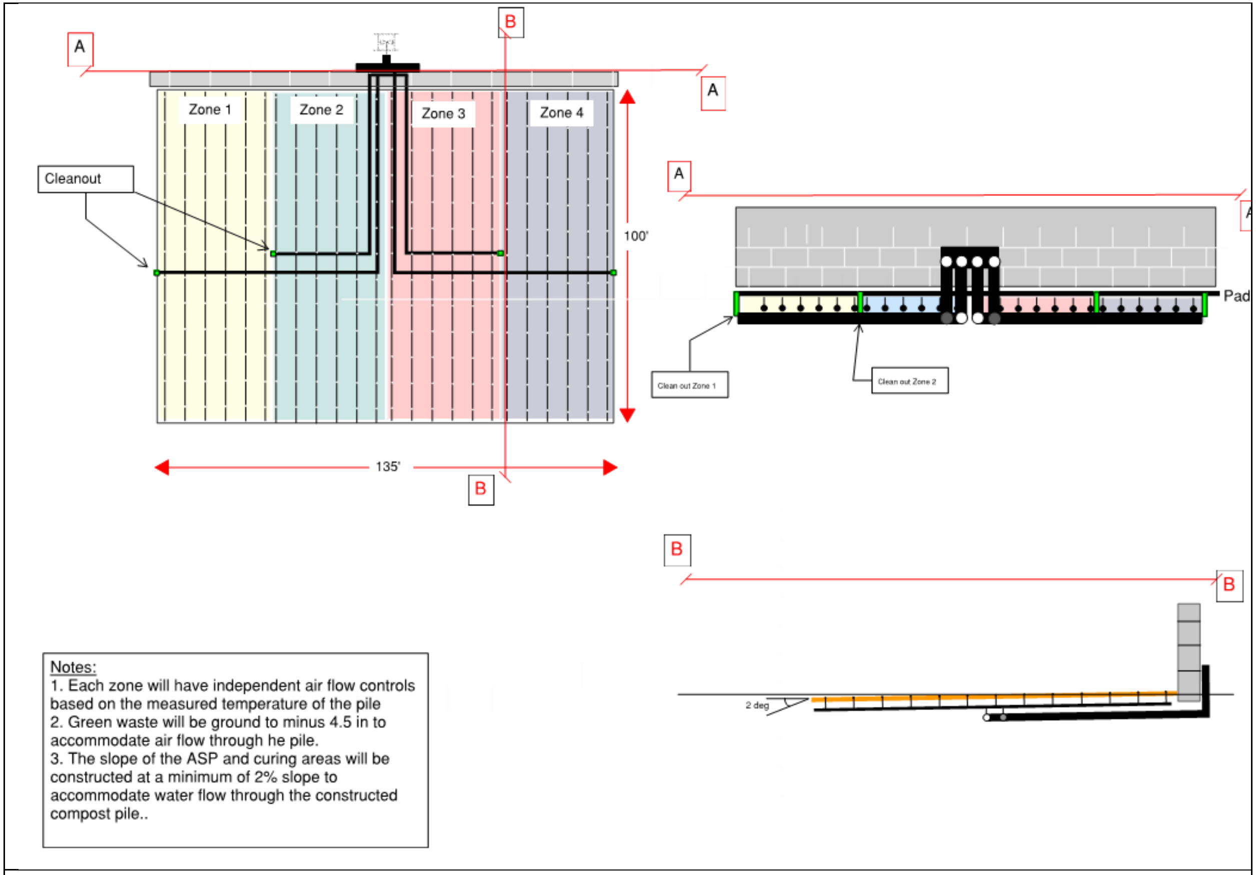
Table ES-1: Project Results							
		NH_3		GHG			
	VOC	**Field**	**Lab**	**CO_2**	**CH_4**	**N_2O**	**CO_2e**
Prototype ASP (22 Days)	0.099	0.017	0.007	205.70	5.05	0.010	315
Baseline Windrow (22 days)	8.604	0.099	0.014	731.63	5.81	0.093	883
% reduction from Baseline	**-98.8%**	**-83.2%**	**-53.3%**	**-71.9%**	**-13.0%**	**-88.8%**	**-64.3%**

Table ES-1: Results of emissions testing in pounds of pollutant per ton of feedstock over the 22-day active composting period.

The ASP composting technique reduces the footprint of the active compost pad. Typically, this approach significantly reduces the operational footprint from standard windrow compost. In this case, we plan to have a 100' x 200' ASP concrete slab with embedded aeration piles and nozzle assemblies as shown here.

Figure 1 – ASP Details

1	Ingress/Egress
2	Scales
3	Feestock Unloading/Storage
4	Grinding & Processing
5	ASP slab
6	Curing pile
7	Ammendment storage
8	Compost off-haul
9	Drianage pond
10	Fence
11	Transformer pad /SW gear



Notes:
1. Each zone will have independent air flow controls based on the measured temperature of the pile
2. Green waste will be ground to minus 4.5 in to accommodate air flow through he pile.
3. The slope of the ASP and curing areas will be constructed at a minimum of 2% slope to accommodate water flow through the constructed compost pile..

ASP Layout and Piping

Amendment

There are plans to mix soil amendment to the finished compost to create commercial soil products. The current amendment recipe calls for gypsum as an additive. There will be no more than 500 cy stored onsite at any given time.

Odor impact minimization

The facility will be required to have and maintain a written Odor Impact Minimization Plan (Please see Appendix B). The primary means of odor mitigation are the receipt of relatively benign feedstocks, in small quantities, away from a large volume of sensitive receptors. In addition, the facility will utilize an aerated composting system using a “compost biofilter” to reduce VOC and odor emissions.

Compost Biofilter:

The biofilter consists of a 1’ layer of unscreened compost covering the entire ASP pile. This filter has active microorganisms that reside in the layer and absorb, treat, or block the VOCs and other gases from escaping the pile. Ammonia gets absorb as nitrogen that is sequestered chemically in the pile. The net result is a mild organic order that is not strong or offensive. Odor only become an issue when the anaerobic bacterial population inside the pile grows in a low oxygen environment and begins to consumption of the nutrients releasing H2S gas. This can only happen with improper design or operation resulting in insufficient oxygen filtering through the pile.

The biofilter also acts as an insulative barrier helping with moisture losses during hot summer temperatures. The piles will start out at 60-65% water content and will lose some of that moisture over the retention time.

The biofilter acts as vector barrier to flies, insects, rodents and birds. Any animal or insect curious or attracted to the pile will find the biofilter difficult to penetrate and if penetrated the active compost is hot. Once the compost reaches the curing pile the large majority of the consumable nutrients are gone reducing insect and rodent interest.

Noise Control

There will be processing machinery, hauling equipment and trucking. To control noise, deliveries and processing work will only be allowed during normal working hours 7:00 AM – 5:00 PM Monday to Saturday. We also plan to construct a berm surrounding the site and plant trees on the North end of the property.

Stormwater Discharge and Drainage

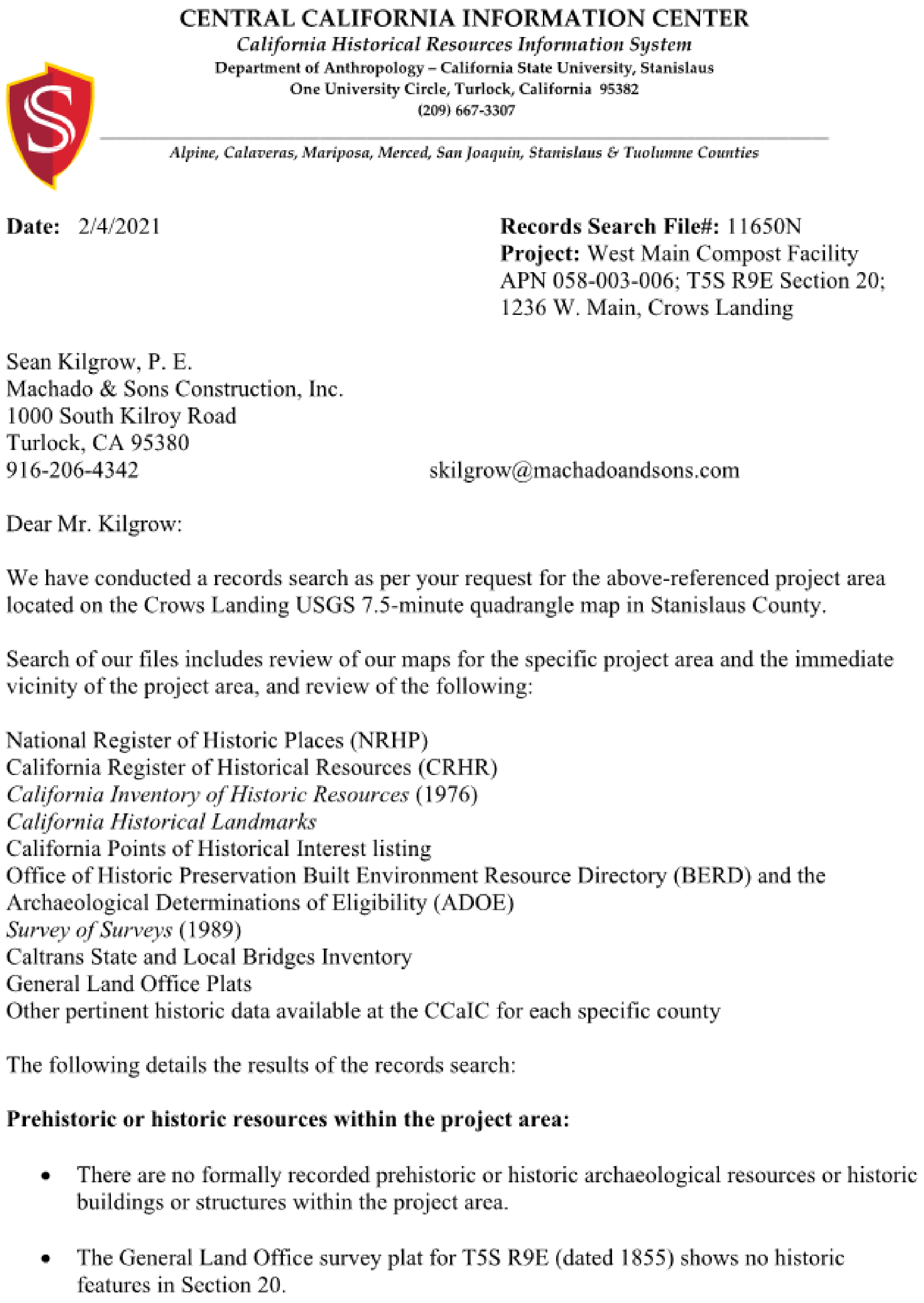
The facility will be applying for coverage under the *State Water Resources Control Board Order WQ 2015-0121-DWG General Waste Discharge Requirements for Composting Operations*. We are proceeding under the assumption that this will be a Tier I facility as described in the General Waste Discharge Requirements for Composting Operations, see Appendix C. The facility will also comply with the National Pollutant Discharge Elimination System via the creation and implementation of a Stormwater Pollution Prevention Plan.

Self-Monitoring

We will submit the required reports to the EA or other appropriate authority monthly. Specifically, we will actively need to show SB 1383 compliance and plan to collect the following information:

1. The types and quantities (in tons) of organic waste entering the facility per day.
2. The number and types of delivery vehicles in and out of the facility per day.
3. The number and weight of non-compliant loads.
4. Recording of any special occurrences, such as fires, explosions, earthquakes, significant injuries, accidents or property damage, and all measures taken to address the incident.
5. Recording of any complaints and all measures taken to address the incident.

Appendix C – California Historical Resource record search



CENTRAL CALIFORNIA INFORMATION CENTER
California Historical Resources Information System
Department of Anthropology – California State University, Stanislaus
One University Circle, Turlock, California 95382
(209) 667-3307

Alpine, Calaveras, Mariposa, Merced, San Joaquin, Stanislaus & Tuolumne Counties

Date: 2/4/2021

Records Search File#: 11650N
Project: West Main Compost Facility
APN 058-003-006; T5S R9E Section 20;
1236 W. Main, Crows Landing

Sean Kilgrow, P. E.
Machado & Sons Construction, Inc.
1000 South Kilroy Road
Turlock, CA 95380
916-206-4342 skilgrow@machadoandsons.com

Dear Mr. Kilgrow:

We have conducted a records search as per your request for the above-referenced project area located on the Crows Landing USGS 7.5-minute quadrangle map in Stanislaus County.

Search of our files includes review of our maps for the specific project area and the immediate vicinity of the project area, and review of the following:

National Register of Historic Places (NRHP)
California Register of Historical Resources (CRHR)
California Inventory of Historic Resources (1976)
California Historical Landmarks
California Points of Historical Interest listing
Office of Historic Preservation Built Environment Resource Directory (BERD) and the Archaeological Determinations of Eligibility (ADOE)
Survey of Surveys (1989)
Caltrans State and Local Bridges Inventory
General Land Office Plats
Other pertinent historic data available at the CCaIC for each specific county

The following details the results of the records search:

Prehistoric or historic resources within the project area:

- There are no formally recorded prehistoric or historic archaeological resources or historic buildings or structures within the project area.

- The General Land Office survey plat for T5S R9E (dated 1855) shows no historic features in Section 20.

- The Official Map of the County of Stanislaus, California (1906) shows William Wood et al. as the landowner/s at that time.

- The Crows Landing USGS map (edition of 1916) shows West Main Street and an access road in the NW ¼ of Section 20, T5S R9E. The 1952 edition shows two buildings in the NW ¼ of Section 20—we have no further information on file regarding this possible historic buildings that would be 70 years in age (or older).

Prehistoric or historic resources within the immediate vicinity of the project area: There are no formally recorded prehistoric or historic archaeological resources within the immediate vicinity of the project area, but we must caution you that Native American prehistoric remains have been found in subsurface context (below the plow zone) in similar environs within Stanislaus County and the Crows Landing area.

Resources that are known to have value to local cultural groups: None has been formally reported to the Information Center.

Previous investigations within the project area: None has been formally reported to the Information Center.

Recommendations/Comments: Based on existing data in our files the project area has a moderate sensitivity for the possible discovery of historical resources, including both prehistoric and historic archaeological remains.

Please be advised that a historical resource is defined as a building, structure, object, prehistoric or historic archaeological site, or district possessing physical evidence of human activities over 45 years old. Since the project area has not been subject to previous investigations, there may be unidentified features involved in your project that are 45 years or older and considered as historical resources requiring further study and evaluation by a qualified professional of the appropriate discipline.

If the current project does not include ground disturbance, further study for archaeological resources is not recommended at this time. If ground disturbance is considered a part of the current project, we recommend further review for the possibility of identifying prehistoric or historic-era archaeological resources.

If the proposed project contains buildings or structures that meet the minimum age requirement (45 years in age or older) it is recommended that the resource/s be assessed by a professional familiar with architecture and history of the county. Review of the available historic building/structure data has included only those sources listed above and should not be considered comprehensive.

If at any time you might require the services of a qualified professional the Statewide Referral List for Historical Resources Consultants is posted for your use on the internet at http://chrisinfo.org

If archaeological resources are encountered during project-related activities, work should be temporarily halted in the vicinity of the discovered materials and workers should avoid altering the materials and their context until a qualified professional archaeologist has evaluated the situation and provided appropriate recommendations. Project personnel should not collect cultural resources.

If human remains are discovered, California Health and Safety Code Section 7050.5 requires you to protect the discovery and notify the county coroner, who will determine if the find is Native American. If the remains are recognized as Native American, the coroner shall then notify the Native American Heritage Commission (NAHC). California Public Resources Code Section 5097.98 authorizes the NAHC to appoint a Most Likely Descendant (MLD) who will make recommendations for the treatment of the discovery.

Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the State Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the CHRIS Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

The California Office of Historic Preservation (OHP) contracts with the California Historical Resources Information System's (CHRIS) regional Information Centers (ICs) to maintain information in the CHRIS inventory and make it available to local, state, and federal agencies, cultural resource professionals, Native American tribes, researchers, and the public. Recommendations made by IC coordinators or their staff regarding the interpretation and application of this information are advisory only. Such recommendations do not necessarily represent the evaluation or opinion of the State Historic Preservation Officer in carrying out the OHP's regulatory authority under federal and state law.

We thank you for contacting this office regarding historical resource preservation. Please let us know when we can be of further service. Please sign and return the attached **Access Agreement Short Form.**

Note: Billing will be transmitted separately via email from the Financial Services office

($150.00), payable within 60 days of receipt of the invoice.

If you wish to include payment by Credit Card, you must wait to receive the official invoice from Financial Services so that you can reference the CMP # (Invoice Number), and then contact the link below:

https://commerce.cashnet.com/ANTHROPOLOGY

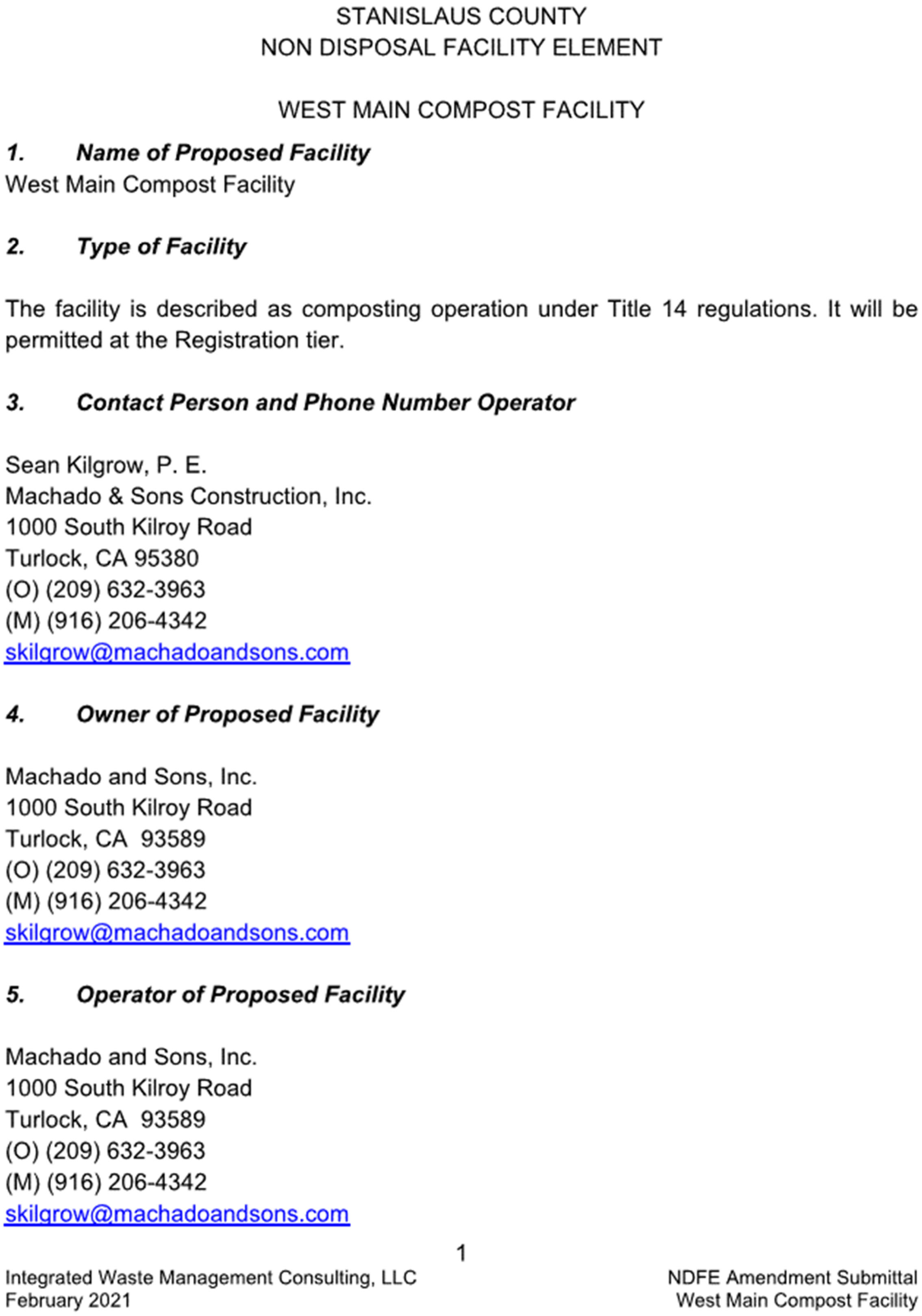
Sincerely,

E. A. Greathouse

E. A. Greathouse, Coordinator
Central California Information Center
California Historical Resources Information System

Copy of invoice to Laurie Marroquin, Financial Services (lamarroquin@csustan.edu)

Appendix D – Non-Disposal Facility Element



STANISLAUS COUNTY
NON DISPOSAL FACILITY ELEMENT

WEST MAIN COMPOST FACILITY

1. Name of Proposed Facility

West Main Compost Facility

2. Type of Facility

The facility is described as composting operation under Title 14 regulations. It will be permitted at the Registration tier.

3. Contact Person and Phone Number Operator

Sean Kilgrow, P. E.
Machado & Sons Construction, Inc.
1000 South Kilroy Road
Turlock, CA 95380
(O) (209) 632-3963
(M) (916) 206-4342
skilgrow@machadoandsons.com

4. Owner of Proposed Facility

Machado and Sons, Inc.
1000 South Kilroy Road
Turlock, CA 93589
(O) (209) 632-3963
(M) (916) 206-4342
skilgrow@machadoandsons.com

5. Operator of Proposed Facility

Machado and Sons, Inc.
1000 South Kilroy Road
Turlock, CA 93589
(O) (209) 632-3963
(M) (916) 206-4342
skilgrow@machadoandsons.com

6. Address of Proposed Facility

1236 West Main
Crows Landing, CA 95313

7. Proposed Facility Capacity

The facility is being permitted to receive up to a maximum of 150 tons per day (120 tons of compost feedstock and up to 30 tons per day of amendments).

8. Anticipated Diversion Rate for the Proposed Facility

The Facility will receive only source-separated materials that can be processed into compost, mulch, soil amendments, or similar uses; and therefore will have a minimum diversion rate of 90%.

7. Jurisdictions to be Served by Proposed Facility

The facility is located in unincorporated Stanislaus County and will serve the surrounding jurisdictions of Crows Landing, Patterson, Turlock, and the unincorporated county.

8. Description of General Area (Zoning Designation)

The property is zoned agricultural and the surrounding land use is dominated by developed agricultural uses. Uses are a combination of relatively small dairy farms, row crop, and orchard growers.

Appendix E – Odor Minimization Plan

ODOR IMPACT MINIMIZATION PLAN

West Main Composting Facility

February 2021

Submitted to:
CalRecycle Enforcement Agency
Waste Permitting, Compliance and Mitigation Division
as LEA for Stanislaus County

Prepared by:
Integrated Waste Management Consulting, LLC
50 E. Scenic Avenue, Point Richmond, CA 94801

- D R A F T -

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Appendices

-DRAFT-

ODOR IMPACT MINIMIZATION PLAN
West Main Compost Facility

Title 14 regulations Title 14, CCR Section 17863.4 require that all compostable material handling operations and facilities prepare and maintain a site-specific Odor Impact Minimization Plan (OIMP). The following OIMP has been developed to assist the West Main Compost Facility in complying with these regulations.

Project Name:	West Main Composting Facility
Facility Address:	1236 West Main Crows Landing, CA 95313
Landowner:	Dave & Cindy Starkey 1643 W Tuolumne Rd Ceres, CA 95307
Operator	Machado and Sons, Inc. Sean Kilgrow, P.E. 1000 South Kilroy Road Turlock, CA 93589 (O) (209) 632-3963 (M) (916) 206-4342 skilgrow@machadoandsons.com
Regulatory Contacts:	CalRecycle Enforcement Agency Waste Permitting, Compliance and Mitigation Division as LEA for Stanislaus County 1001 I Street Sacramento, CA 95814

The following provides specific information on compliance with §17863.4 (b) – (d). The text from Title 14 is presented in italics followed by the Facility's proposed method of compliance.

(b) Odor impact minimization plans shall provide guidance to on-site personnel by describing, at a minimum, the following items. If the operator will not be implementing any of these procedures, the plan shall explain why it is not necessary.

ODOR MONITORING PROTOCOL

> *(1) an odor monitoring protocol which describes the proximity of possible odor receptors and a method for assessing odor impacts at the locations of the possible odor receptors; and*

The closest receptors will be facility staff and management who will be on-site daily monitoring the status of the facility. The site is surrounded by agricultural fields interspersed with ranch houses of low density. The closest residence is across W. Main Street and a second residence is just to the East (also across W. Main.). There is a large dairy just to the south of the site which probably dominates the odor shed in the region. The primary means of odor mitigation are the receipt of relatively benign feedstocks, in small quantities, away from a large volume of sensitive receptors. In addition, the facility will utilize an aerated composting system using a "compost biofilter" to reduce VOC and odor emissions.

Each day the operator will evaluate on-site odors and evaluate planned operations for potential release of objectionable odors. Operational practices will be implemented to minimize the release of objectionable odors These include good composting practice as described in the Report of Composting Site Information (appropriate C:N ratio, sufficient moisture content, adequate aeration and/or turning, etc.) to minimize production and persistence of odors; good housekeeping measures (like clearing spilled materials between compost piles, eliminating areas where water could pond, and maintaining reasonably sized stockpiles of feedstock and finished compost).

If the operator detects an objectionable on-site odor, they will follow the following protocol:

1. Investigate and determine the likely source of the odor.

2. Determine if on-site management practice could remedy the problem and immediately take steps to remedy the situation. An example of possible sources and likely management actions is shown in Table 1.

3. Determine whether or not the odor is travelling beyond the site by patrolling the site perimeter and noting existing wind conditions.

4. Determine whether or not the odor event is significant enough to warrant contacting the adjacent neighbors and/or- the LEA.

5. Log the odor source/cause and any corrective actions taken in the Site Operations Log.

DESCRIPTION OF METEOROLOGICAL CONDITIONS

(2) a description of meteorological conditions effecting migration of odors and/or transport of odor causing material off-site. Seasonal variations affect wind velocity and direction shall also be described; and

The weather in the project area typically is hot, arid and clear in the summer, winter is short, cold, wet, and partly cloudy. The predominant average hourly wind direction in the project area varies significantly throughout the year. The wind is most often from the West, for roughly 11 months of the year. The wind is most often from the North, from December to January. However local fluctuations can occur. The closest residents are to the West and North, so most of the time the wind will be blowing in the direction of the least-close residents. However still conditions can also lead to odor transport. Operators will monitor weather conditions and attempt to time material-disturbing activities to coincide with favorable conditions.

COMPLAINT RESPONSE PROTOCOL

(3) a complaint response protocol; and

Facility management will use the following protocol in responding to citizen complaints.

Response to Citizen Complaints

It is expected that the majority of complaints will be received, not by the operator, but by the LEA. If the facility receives a complaint (either from the original complainant, from the LEA or the Air District) they will follow the following protocol:

1. The Operator will go to the location of the complaint to verify that the compost facility is indeed the source of the odor.
2. The Operator will document the complaint(s) in the Site Operations Log.
3. The Operator will assess the complaint and the nature of the source of the odor complaint and will make a recommendation to the owner within 24 hours of receiving the complaint or 48 hours should the citizen complaint be received weekends or holidays.

4. The Operator will implement one or more of the management practices described in Table 1.
5. The Operator will contact the complainant within a reasonable time frame to assess the original problem and result after each compliant.
6. Results and actions will be documented in the Site Operations Log, which serves as the Facility's permanent record.

DESIGN CONSIDERATIONS FOR MINIMIZING ODORS

(4) a description of design considerations and/or projected ranges of optimal operation to be employed in minimizing odor, including method and degree of aeration, moisture content of materials, feedstock characteristics, airborne emission production, process water distribution, pad and site drainage and permeability, equipment reliability, personnel training, weather event impacts, utility service interruptions, and site specific concerns; and

The most significant design consideration was the siting of the facility at a regional landfill, far from most sensitive receptors.

Method and Degree of Aeration. The facility will use an positive aerated static pile system of composting. Aerated static pile compost piles are constructed over a network of aeration pipes and induce airflow into the pile using an electric blower that is operated in conjunction with a pile temperature control system that cycles air into the pile. The piles are not turned during the first 30 days, a period referred to as the active phase of composting. Airflow will be adjusted to manage the pile temperatures and optimize the biology of the composting process. The system will include placement of a “compost cap” on top of each pile to absorb odors (and VOCs). Aeration rates will be developed to maximize aerobic decomposition, which is expected to also reduce VOC and odor production.

Moisture Content. The facility strives to maintain its compost piles between 40 and 60 percent moisture during the initial and active phase of composting. Aerated static piles tend to evaporate significant water which can be difficult to replace. The facility will develop a system to replace lost water using sprinklers or a water truck.

Feedstock Characteristics. The facility plans to receive up to 80 tons per day of non-contaminated soil and other waste containing landscape residue, vegetative food material, and green waste.

Airborne Emissions Production. The facility minimizes airborne emissions by minimizing dust-producing activities, regular watering of roads and avoiding unnecessary material handling. Aerated static pile facilities are not turned, eliminating one of the most significant material-handling activities on-site.

Process Water Distribution. Process water is added using a water truck.

Pad and Site Drainage and Permeability. The native site soil has been graded to provide positive drainage. Depressions and standing water are filled and covered with absorbent materials (like wood chips).

Equipment Reliability. Most of the key processing equipment (loaders, the grinder) is diesel-powered and portable. Minor equipment breakdowns are managed by Machado & Sons mechanics and typically are corrected within two days. In the event of severe mechanical failure, similar processing equipment can be rented from nearby facilities. Machado & Sons maintains good relationships with equipment vendors who can provide back up and temporary equipment on very short notice. Power failures do not present a significant risk, since most processing equipment is diesel powered. Key employees are issued radios or cellular phones for mobile communications.

Personnel Training. Facility management provides regular training to new and existing employees.

Weather Event Impacts. The most significant weather event impact affecting odors would be a prolonged inversion condition. During these conditions, Machado & Sons will minimize unnecessary material handling like screening and/or grinding. Under severe conditions regular material handling activities may be curtailed until winds decrease.

Utility Service Interruptions. As described above, most of the key processing equipment (loaders, the grinder) is diesel-powered and portable. Power outages would not significantly affect the composting facility.

Table 1

Sources of Odor and Possible Management Techniques

Source of Odor	Possible cause/Assessment	Management approach
Feedstock Receiving	Putrescible material (like green material or vegetative food material) sitting too long prior to being processed or mixed Material arrives with odors	Expedite material processing Increase operating shifts Reduce incoming throughput First in, first out processing Reduce size of material stockpiles Create discreet stockpiles with greater surface to volume ratio Consider blanketing odiferous materials with a one foot layer of woody overs (water lightly to reduce odor releases) Consider refusing acceptance of the material. Consider finding an off-site use for the material (i.e., deliver to nearby composting facilities)
Material Processing (Screening)	Screening volatizes particles	Reduce screening activity during stagnant air conditions Reduce screening activity when wind is in direction of nearby receptors Mist water or neutralizer at dust generation points
Material Handling (Composting	Material handling releases odorous gases, anaerobic conditions can form odorous compounds. Ammonia odor (high nitrogen level). Sulfur odor (anaerobic conditions). Varying odors in pile Odors generated after turning Excessive temperature.	Reduce handling activities during stagnant air conditions. Create ASP piles which are sufficiently blended. Turn regularly to re-establish porosity. Maintain adequate moisture in compost piles. Avoid over-watering initial mix or in-process piles. Increase surface to volume ratios of active piles. Increase aeration frequency, check temperatures, check pH, increase porosity, and/or add bulking agent. Measure oxygen/CO^2 content regularly to determine oxygen levels. Make piles on a one-foot bed of screened overs to increase air flow.

Table 1
Sources of Odor and Possible Management Techniques (Cont.)

Aisles	Storm water allowed to pond Uncomposted material in aisles	Absorb ponded water with wood chips/other absorbent, fill pothole. Clean aisles of spilled material (particularly at the end of each day). Remove and replace woody overs and spilled material from unpaved areas on a regular basis. Apply water and/or neutralizer to reduce dust during dry conditions.
Curing piles	Excessive temperatures	Decrease pile size (height), increase ASP residence time prior to moving to curing
Material Handling	Material handling releases odorous gases.	Reduce handling during stagnant air conditions. First-in, first-out processing
Material Processing (Screening)	Screening volatizes particles and releases odorous gases	Reduce screening activity during stagnant air conditions Reduce screening activity when wind is in direction of nearby receptors Mist water or neutralizer at dust generation points

OPERATING PROCEDURES TO MINIMIZE ODOR

(5) a description of operating and design procedures for minimizing odor, including aeration, moisture management, feedstock quality, drainage controls, pad maintenance, wastewater pond controls, storage practices (e.g., storage time and pile geometry), contingency plans (i.e., equipment, water, power, and personnel) weather impacts, biofiltration, and tarping.

Machado & Sons operates its compost facility to manage all odor-producing areas of the facility so as to minimize the development of conditions that could lead to off-site odor problems. Major processing steps include:

Aisles between piles. Aisles between piles can be sources of odor if raw, uncomposted material is left for excessive amounts of time without being exposed to the high temperatures of composting. The facility will practice good housekeeping methods which include regular patrolling of aisles to clean any spilled materials. Aisles can also be a source of odor if storm water or process water is allowed to pond in potholes or other pad depressions. Any standing water that is discovered will be absorbed with chipped material (or other absorbent) and the depression will be filled with pad material (typically dirt or clay).

Compost piles. Odors emanating from the ASP system typically indicate problems in the initial mixing, pile porosity and/or moisture content of the pile. Machado & Sons strives to manage its compost with appropriate carbon to nitrogen level, assure adequate initial mixing and maintain adequate moisture within the compost piles. Any odors detected from the compost piles will be corrected using the techniques described in Table 1.

Curing piles. Curing piles have the potential to create odors if material that is not stable is moved to curing too soon, or if the pile is made too high (above 12 feet). Machado & Sons plans to only cure compost that has undergone thorough decomposition and is ready for curing. All curing piles at or below 12 feet in height.

Aeration. The facility uses a third-party Aerated Static Pile system. Aeration rates will be controlled via temperature feedback and operator experience. Positive aeration, combined with a compost cap is expected to significantly minimize odors and/or VOCs.

Moisture Management. In ASP composting, moisture is particularly important in the initial pile-building phase. Additional moisture will be added via water truck or sprinkler system to offset evaporated moisture.

Feedstock Quality. Compost feedstocks are all source-separated and are delivered promptly to the facility (they are not allowed to sit and generate odors prior to arriving at the facility).

Most of the feedstocks do not arrive with odor issues. Any particularly odiferous loads will be covered with chipped organic material to reduce odors.

Drainage Controls. The West Main Compost Facility site is in the process of complying with the SWRCB General Order. Drainage will be managed according to the Technical Report submitted to the RWQCB. Additional BMPs will be implemented if the drainage areas are identified as a significant odor source.

Pad Maintenance. Machado & Sons regularly scrapes the pad in order to minimize ponding. Standing water is absorbed using chipped green waste or other absorbent.

Wastewater Pond Controls. As described above, Machado & Sons is in the process of complying with the SWRCB General Order. The retention pond will be managed according to the Technical Report submitted to the RWQCB. Additional BMPs will be implemented if the retention pond (or other drainage areas) are identified as a significant odor source.

Storage Practices. Materials that could generate odor during storage include incoming green waste material and vegetative food materials. All incoming compost feedstocks are processed and placed in the ASP system within 7 days of receipt.

Contingency Plans. There are two nearby composting facilities (Recology and City of Modesto), who could manage feedstock loads during a prolonged odor issue at the site.

Weather Impacts. Operations are curtailed during periods of heavy rain and high winds. To date, specific weather impacts have not been identified as contributing to off-site odors.

Biofiltration. The facility will utilize a "compost cap" consisting of processed green material (or finished compost) to reduce odors from the tops of the ASP piles. This has proven to be very effective at reducing odors and VOCs.

Tarping. The facility does not currently use any tarps for the purposes of odor control.

PLAN REVISION

> *(c) The odor impact minimization plan shall be revised to reflect any changes, and a copy shall be provided to the enforcement agency, within 30 days of those changes.*

A copy of the Odor Impact Minimization Plan will be kept at the facility office/trailer. The OIMP will be revised within 30 days to reflect significant changes to operations that affect the OIMP.

- D R A F T -

Appendix A

TITLE 14 REGULATIONS REGARDING OIMPs

Title 14 Regulations regarding Odor Impact Minimization Plans follows this page.

- DRAFT -

COMPOSTABLE MATERIALS HANDLING OPERATIONS AND FACILITIES REGULATORY REQUIREMENTS

Chapter 3.1 Compostable Materials Handling Operations and Facilities Regulatory Requirements

Article 1. General

Section 17863.4. Odor Impact Minimization Plan.

(a) All compostable material handling operations and facilities shall prepare, implement and maintain a site-specific odor impact minimization plan. A complete plan shall be submitted to the EA with the EA Notification or permit application.

(b) Odor impact minimization plans shall provide guidance to on-site operation personnel by describing, at a minimum, the following items. If the operator will not be implementing any of these procedures, the plan shall explain why it is not necessary.

(1) an odor monitoring and data collection protocol for on-site odor sources, which describes the proximity of possible odor receptors and a method for assessing odor impacts at the locations of the possible odor receptors; and,

(2) a description of meteorological conditions effecting migration of odors and/or transport of odor-causing material off-site. Seasonal variations that effect wind velocity and direction shall also be described; and,

(3) a complaint response and recordkeeping protocol; and,

(4) a description of design considerations and/or projected ranges of optimal operation to be employed in minimizing odor, including method and degree of aeration, moisture content of materials, feedstock characteristics, airborne emission production, process water distribution, pad and site drainage and permeability, equipment reliability, personnel training, weather event impacts, utility service interruptions, and site specific concerns as applicable; and,

(5) a description of operating procedures for minimizing odor, including aeration, moisture management, feedstock quality, drainage controls, pad maintenance, wastewater pond controls, storage practices (e.g., storage time and pile geometry), contingency plans (i.e., equipment, water, power, and personnel), biofiltration, and tarping as applicable.

(c) The odor impact minimization plan shall be revised to reflect any changes, and a copy shall be provided to the EA, within 30 days of those changes.

(d) The odor impact minimization plans shall be reviewed annually by the operator to determine if any revisions are necessary.

(e) The odor impact minimization plan shall be used by the EA to determine whether or not the operation or facility is following the procedures established by the operator. If the EA determines that the odor impact minimization plan is not being followed, the EA may issue a Notice and Order (pursuant to section 18304) to require the operator to either comply with the odor impact minimization plan or to revise it.

(f) If the odor impact minimization plan is being followed, and the EA determines, in a manner consistent with section 18302(d), that odor impacts are still occurring, the EA shall direct the operator to prepare and implement an Odor Best Management Practice Feasibility Report (Report) as specified in section 17863.4.1. The EA shall consider the results of the Report prior to issuing a Notice and Order (pursuant to section 18304) requiring the operator to take additional reasonable and feasible measures to minimize odors unless:.

(1) the EA has evidence that a specific and immediate action would reduce the odor impacts;

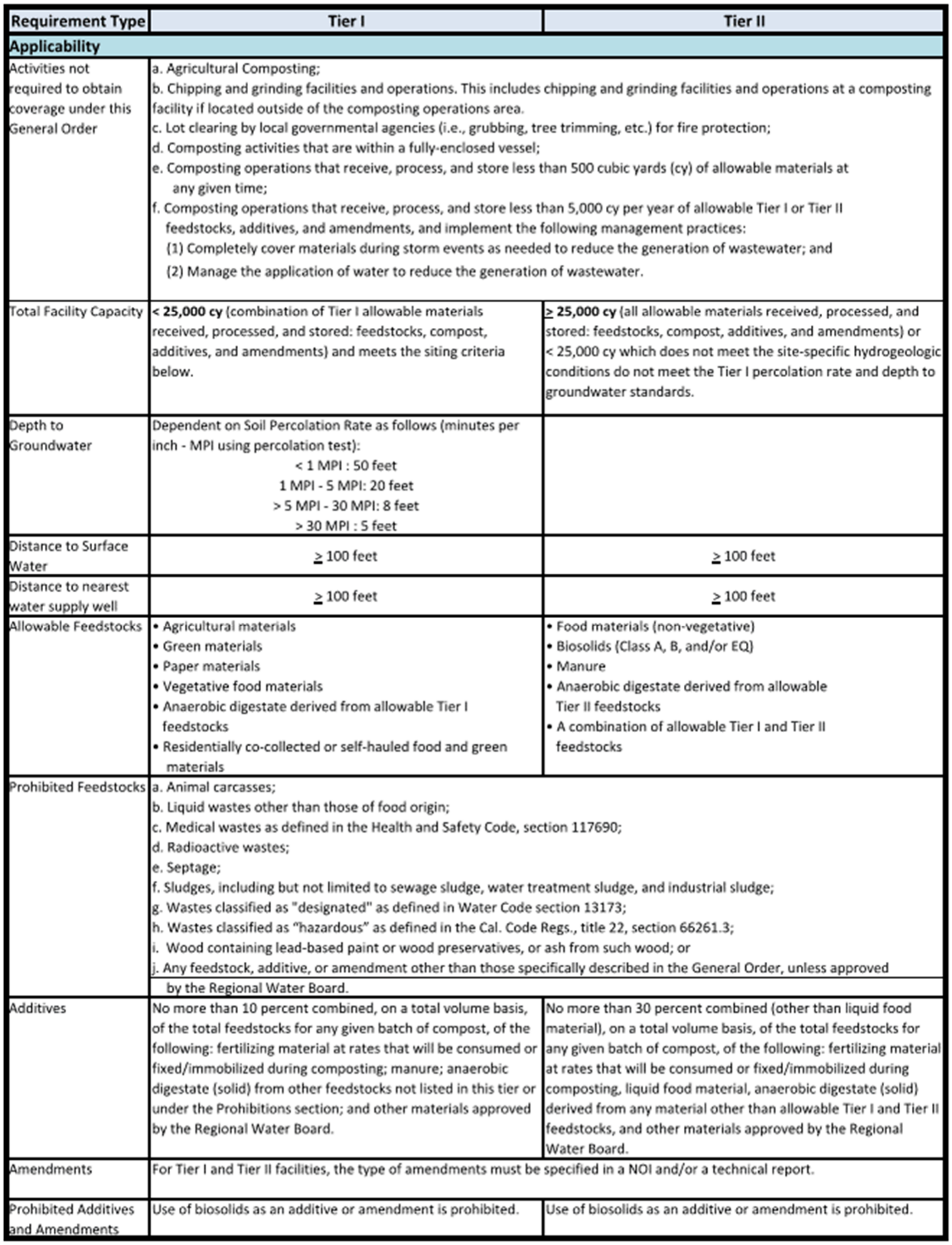
(2) there is an imminent threat to public health and safety and the environment; or

(3) a nuisance has occurred.

Note:

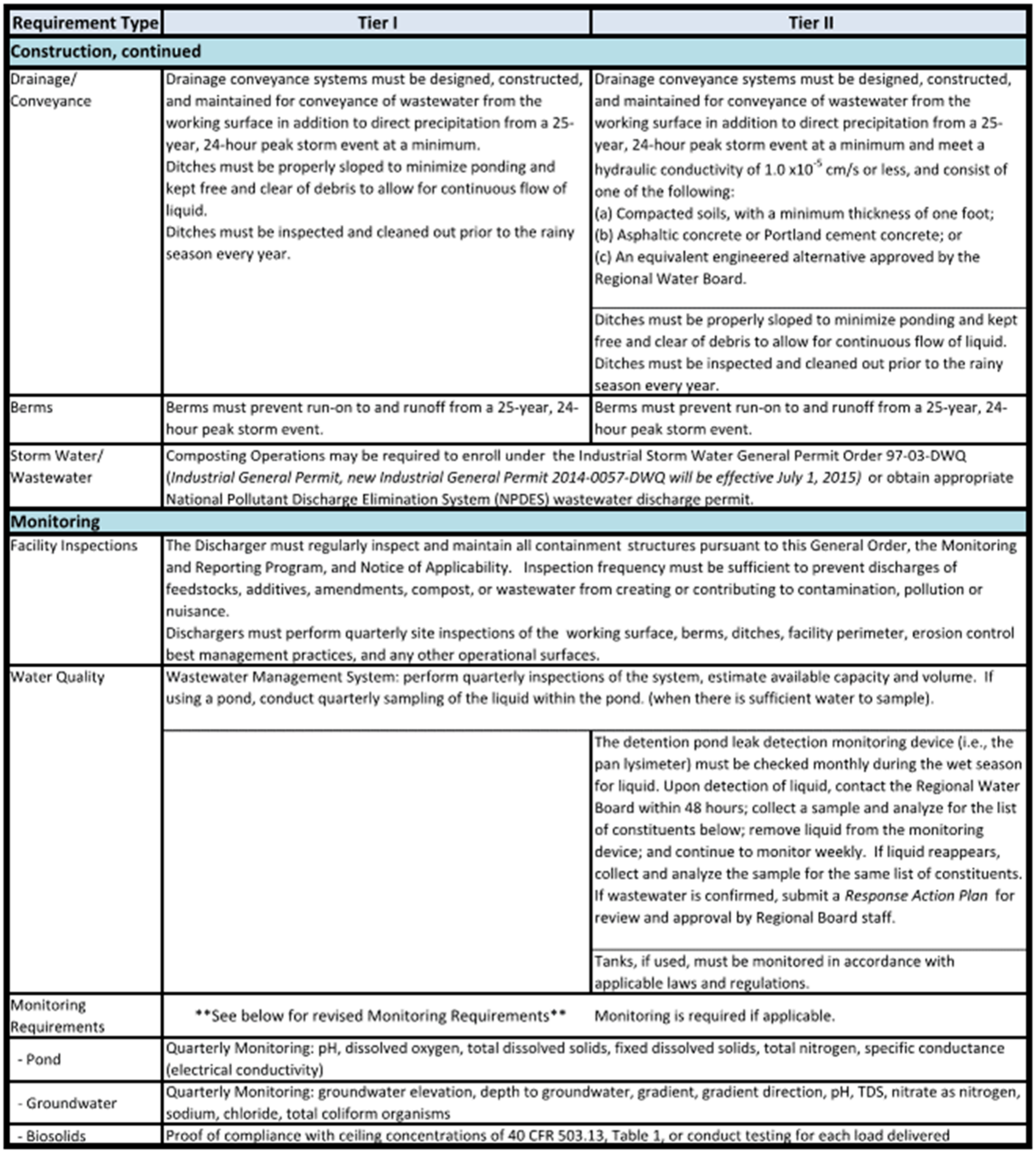
Authority cited: Sections 40502, 43020, 43021 and 43209.1, Public Resources Code. Reference: Sections 43020, 43201 and 43209.1, Public Resources Code.

Appendix F - General Waste Discharge Requirements for Composting Operations

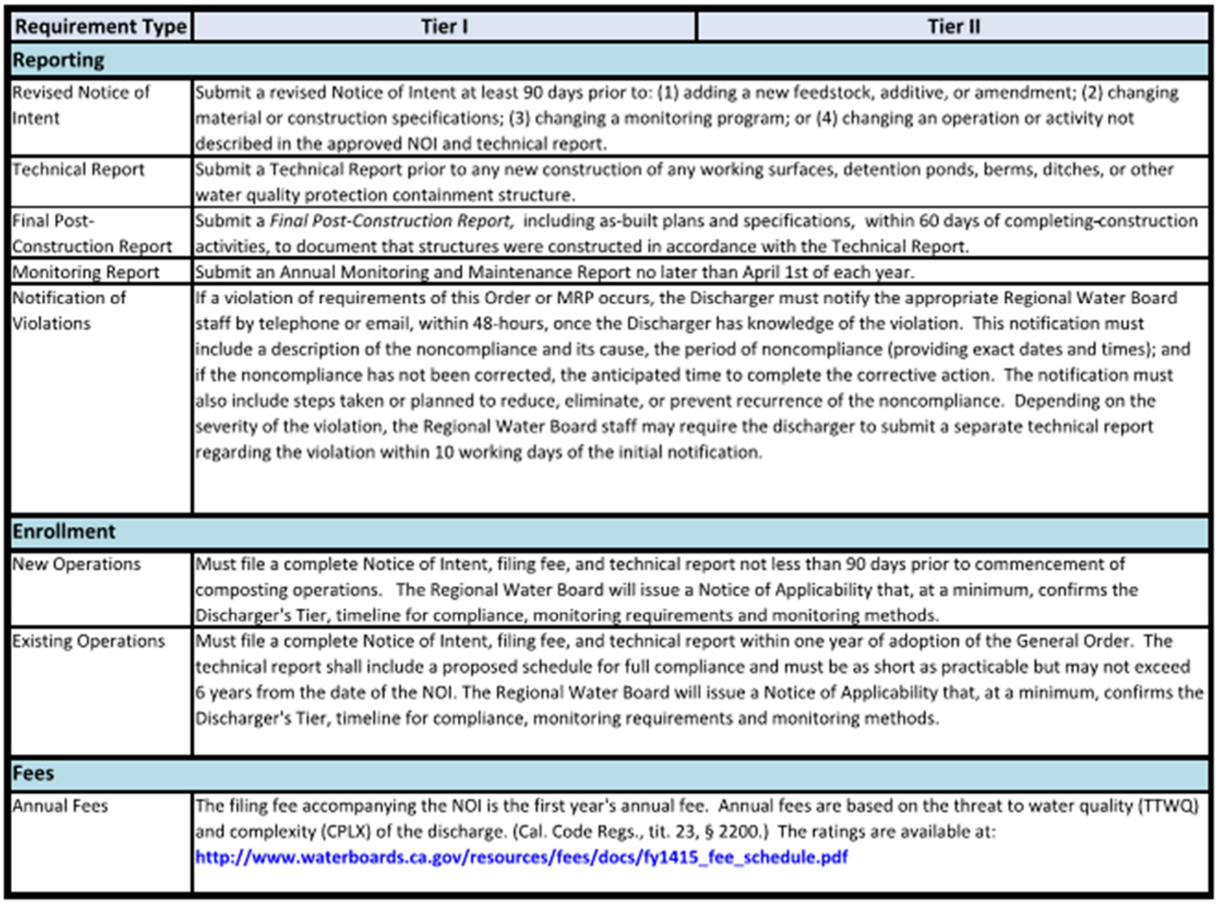


Requirement Type	Tier I	Tier II
Applicability		
Activities not required to obtain coverage under this General Order	a. Agricultural Composting; b. Chipping and grinding facilities and operations. This includes chipping and grinding facilities and operations at a composting facility if located outside of the composting operations area. c. Lot clearing by local governmental agencies (i.e., grubbing, tree trimming, etc.) for fire protection; d. Composting activities that are within a fully-enclosed vessel; e. Composting operations that receive, process, and store less than 500 cubic yards (cy) of allowable materials at any given time; f. Composting operations that receive, process, and store less than 5,000 cy per year of allowable Tier I or Tier II feedstocks, additives, and amendments, and implement the following management practices: (1) Completely cover materials during storm events as needed to reduce the generation of wastewater; and (2) Manage the application of water to reduce the generation of wastewater.	
Total Facility Capacity	**< 25,000 cy** (combination of Tier I allowable materials received, processed, and stored: feedstocks, compost, additives, and amendments) and meets the siting criteria below.	**≥ 25,000 cy** (all allowable materials received, processed, and stored: feedstocks, compost, additives, and amendments) or < 25,000 cy which does not meet the site-specific hydrogeologic conditions do not meet the Tier I percolation rate and depth to groundwater standards.
Depth to Groundwater	Dependent on Soil Percolation Rate as follows (minutes per inch - MPI using percolation test): < 1 MPI : 50 feet 1 MPI - 5 MPI: 20 feet > 5 MPI - 30 MPI: 8 feet > 30 MPI : 5 feet	
Distance to Surface Water	≥ 100 feet	≥ 100 feet
Distance to nearest water supply well	≥ 100 feet	≥ 100 feet
Allowable Feedstocks	• Agricultural materials • Green materials • Paper materials • Vegetative food materials • Anaerobic digestate derived from allowable Tier I feedstocks • Residentially co-collected or self-hauled food and green materials	• Food materials (non-vegetative) • Biosolids (Class A, B, and/or EQ) • Manure • Anaerobic digestate derived from allowable Tier II feedstocks • A combination of allowable Tier I and Tier II feedstocks
Prohibited Feedstocks	a. Animal carcasses; b. Liquid wastes other than those of food origin; c. Medical wastes as defined in the Health and Safety Code, section 117690; d. Radioactive wastes; e. Septage; f. Sludges, including but not limited to sewage sludge, water treatment sludge, and industrial sludge; g. Wastes classified as "designated" as defined in Water Code section 13173; h. Wastes classified as "hazardous" as defined in the Cal. Code Regs., title 22, section 66261.3; i. Wood containing lead-based paint or wood preservatives, or ash from such wood; or j. Any feedstock, additive, or amendment other than those specifically described in the General Order, unless approved by the Regional Water Board.	
Additives	No more than 10 percent combined, on a total volume basis, of the total feedstocks for any given batch of compost, of the following: fertilizing material at rates that will be consumed or fixed/immobilized during composting; manure; anaerobic digestate (solid) from other feedstocks not listed in this tier or under the Prohibitions section; and other materials approved by the Regional Water Board.	No more than 30 percent combined (other than liquid food material), on a total volume basis, of the total feedstocks for any given batch of compost, of the following: fertilizing material at rates that will be consumed or fixed/immobilized during composting, liquid food material, anaerobic digestate (solid) derived from any material other than allowable Tier I and Tier II feedstocks, and other materials approved by the Regional Water Board.
Amendments	For Tier I and Tier II facilities, the type of amendments must be specified in a NOI and/or a technical report.	
Prohibited Additives and Amendments	Use of biosolids as an additive or amendment is prohibited.	Use of biosolids as an additive or amendment is prohibited.

Requirement Type	Tier I	Tier II
Construction		
Pads	Surfaces must be capable of preventing degradation of waters of the state. Such structures are designed, constructed, operated, and maintained to: (1) facilitate drainage and minimize ponding by sloping or crowning pads to reduce infiltration; (2) reliably transmit any free liquid to a containment structure; and (3) prevent conditions that could lead to contamination, pollution, or nuisance.	
	Control and manage all run-on, runoff, and precipitation from all areas used for receiving, processing, or storage, under conditions of a 25-year, 24-hour peak storm event. Protect areas from inundation by surface flows associated with a 25-year, 24-hour peak storm event.	
		Working surfaces must be capable of resisting damage from movement of operating equipment and weight of piles, have a hydraulic conductivity of 1.0×10^{-5} cm/s or less, and consist of one of the following: (a) Compacted soils, with a minimum thickness of one foot; (b) Asphaltic concrete or Portland cement concrete; or (c) An equivalent engineered alternative approved by the Regional Water Board. In lieu of meeting the hydraulic conductivity requirement prescribed above, the applicant may propose to implement a groundwater protection monitoring program. If this choice is selected, the applicant must submit a Groundwater Protection Monitoring Program Plan in the Technical Report with the Notice of Intent.
Wastewater Handling System (e.g. pond, tanks)	Applicant must submit for approval a W*ater and Wastewater Management Plan* that describes how the wastewater will be managed to prevent discharge. The plan must describe the design, operations, and maintenance of the systems, including water balance calculations and assumptions.	Applicant must submit for approval a W*ater and Wastewater Management Plan* that describes how the wastewater will be managed to prevent discharge. The plan must describe the design, operations, and maintenance of the systems, including water balance calculations and assumptions.
	Detention ponds, if used, must be designed, constructed, and maintained to prevent conditions contributing to, causing, or threatening to cause contamination, pollution, or nuisance, and must be capable of containing, without overflow or overtopping (taking into consideration the crest of wind-driven waves and water reused in the composting operation), all wastewater from the working surfaces in addition to precipitation that falls into the detention pond from a 25-year, 24-hour peak storm event at a minimum, or equivalent alternative approved by the Regional Water Board.	Detention ponds, if used, must be designed, constructed, and maintained to prevent conditions contributing to, causing, or threatening to cause contamination, pollution, or nuisance, and must be capable of containing, without overflow or overtopping (taking into consideration the crest of wind-driven waves and water reused in the composting operation), all wastewater from the working surfaces in addition to precipitation that falls into the detention pond from a 25-year, 24-hour peak storm event at a minimum, or equivalent alternative approved by the Regional Water Board.
		Detention pond liners must meet a hydraulic conductivity of 1.0×10^{-6} cm/s or less and include of one of the following: (a) A liner system consisting of a 40-mil synthetic geomembrane (60-mil if high-density polyethylene) underlain by either one foot of compacted clay, or a geosynthetic clay liner installed over a prepared base; (b) A liner system that includes Portland cement concrete underlain by a 40-mil synthetic geomembrane (60-mil if high-density polyethylene); or (c) An equivalent engineered alternative approved by the Regional Water Board.
		Detention ponds must be designed and constructed with a pan lysimeter monitoring device under the lowest point of the pond or equivalent alternative approved by the Regional Water Board. In addition, ponds must be designed and operated to maintain a dissolved oxygen concentration of at least 1.0 mg/L to prevent anaerobic conditions. Tanks, if used (i.e. above or underground), must be designed, operated, maintained and monitored in accordance with applicable laws and regulations.

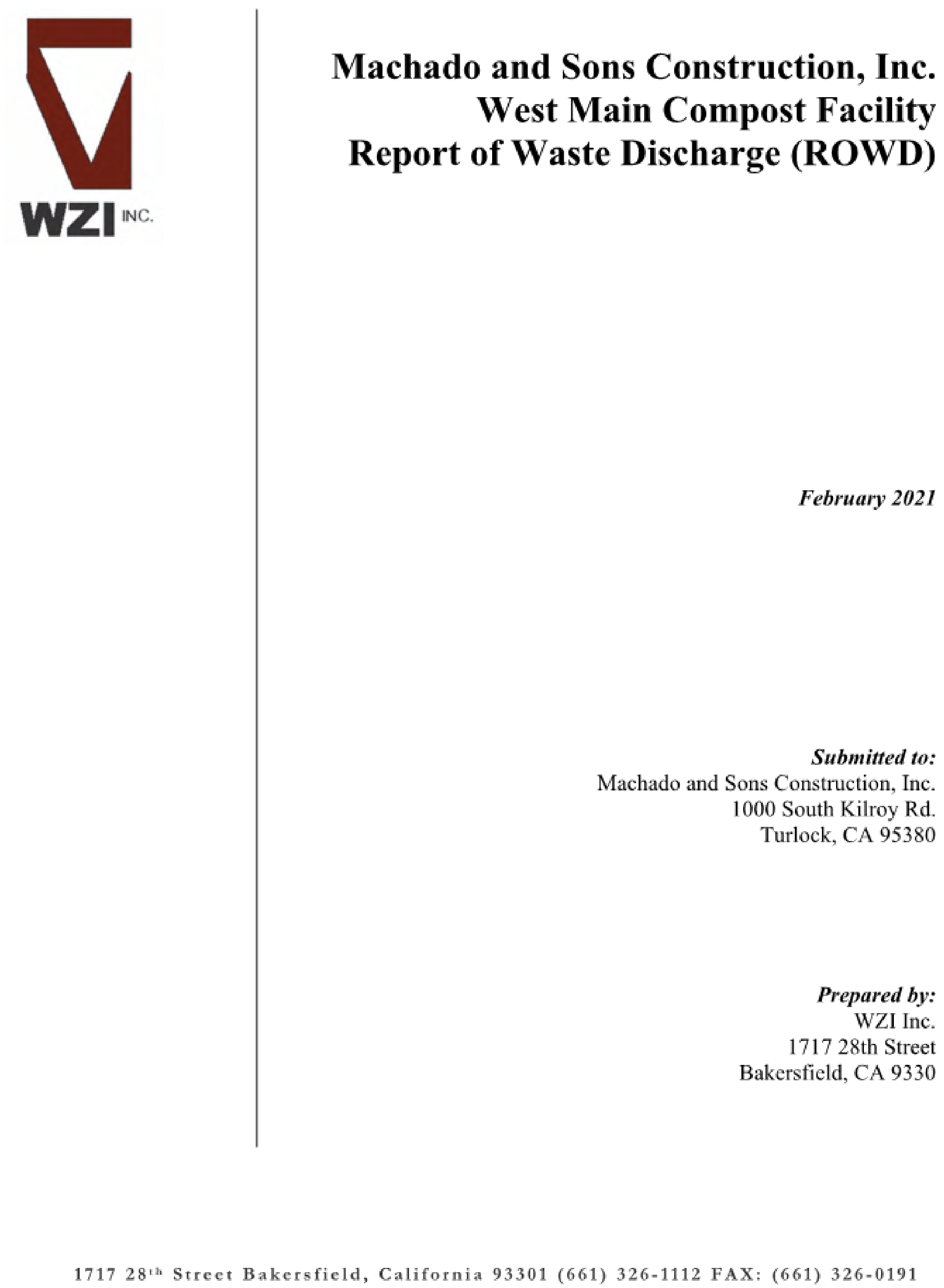


Requirement Type	Tier I	Tier II
Construction, continued		
Drainage/ Conveyance	Drainage conveyance systems must be designed, constructed, and maintained for conveyance of wastewater from the working surface in addition to direct precipitation from a 25-year, 24-hour peak storm event at a minimum. Ditches must be properly sloped to minimize ponding and kept free and clear of debris to allow for continuous flow of liquid. Ditches must be inspected and cleaned out prior to the rainy season every year.	Drainage conveyance systems must be designed, constructed, and maintained for conveyance of wastewater from the working surface in addition to direct precipitation from a 25-year, 24-hour peak storm event at a minimum and meet a hydraulic conductivity of $1.0 x10^{-5}$ cm/s or less, and consist of one of the following: (a) Compacted soils, with a minimum thickness of one foot; (b) Asphaltic concrete or Portland cement concrete; or (c) An equivalent engineered alternative approved by the Regional Water Board. Ditches must be properly sloped to minimize ponding and kept free and clear of debris to allow for continuous flow of liquid. Ditches must be inspected and cleaned out prior to the rainy season every year.
Berms	Berms must prevent run-on to and runoff from a 25-year, 24-hour peak storm event.	Berms must prevent run-on to and runoff from a 25-year, 24-hour peak storm event.
Storm Water/ Wastewater	Composting Operations may be required to enroll under the Industrial Storm Water General Permit Order 97-03-DWQ (*Industrial General Permit, new Industrial General Permit 2014-0057-DWQ will be effective July 1, 2015)* or obtain appropriate National Pollutant Discharge Elimination System (NPDES) wastewater discharge permit.	
Monitoring		
Facility Inspections	The Discharger must regularly inspect and maintain all containment structures pursuant to this General Order, the Monitoring and Reporting Program, and Notice of Applicability. Inspection frequency must be sufficient to prevent discharges of feedstocks, additives, amendments, compost, or wastewater from creating or contributing to contamination, pollution or nuisance. Dischargers must perform quarterly site inspections of the working surface, berms, ditches, facility perimeter, erosion control best management practices, and any other operational surfaces.	
Water Quality	Wastewater Management System: perform quarterly inspections of the system, estimate available capacity and volume. If using a pond, conduct quarterly sampling of the liquid within the pond. (when there is sufficient water to sample).	
		The detention pond leak detection monitoring device (i.e., the pan lysimeter) must be checked monthly during the wet season for liquid. Upon detection of liquid, contact the Regional Water Board within 48 hours; collect a sample and analyze for the list of constituents below; remove liquid from the monitoring device; and continue to monitor weekly. If liquid reappears, collect and analyze the sample for the same list of constituents. If wastewater is confirmed, submit a *Response Action Plan* for review and approval by Regional Board staff. Tanks, if used, must be monitored in accordance with applicable laws and regulations.
Monitoring Requirements	**See below for revised Monitoring Requirements**	Monitoring is required if applicable.
- Pond	Quarterly Monitoring: pH, dissolved oxygen, total dissolved solids, fixed dissolved solids, total nitrogen, specific conductance (electrical conductivity)	
- Groundwater	Quarterly Monitoring: groundwater elevation, depth to groundwater, gradient, gradient direction, pH, TDS, nitrate as nitrogen, sodium, chloride, total coliform organisms	
- Biosolids	Proof of compliance with ceiling concentrations of 40 CFR 503.13, Table 1, or conduct testing for each load delivered	



Requirement Type	Tier I	Tier II
Reporting		
Revised Notice of Intent	Submit a revised Notice of Intent at least 90 days prior to: (1) adding a new feedstock, additive, or amendment; (2) changing material or construction specifications; (3) changing a monitoring program; or (4) changing an operation or activity not described in the approved NOI and technical report.	
Technical Report	Submit a Technical Report prior to any new construction of any working surfaces, detention ponds, berms, ditches, or other water quality protection containment structure.	
Final Post-Construction Report	Submit a *Final Post-Construction Report,* including as-built plans and specifications, within 60 days of completing-construction activities, to document that structures were constructed in accordance with the Technical Report.	
Monitoring Report	Submit an Annual Monitoring and Maintenance Report no later than April 1st of each year.	
Notification of Violations	If a violation of requirements of this Order or MRP occurs, the Discharger must notify the appropriate Regional Water Board staff by telephone or email, within 48-hours, once the Discharger has knowledge of the violation. This notification must include a description of the noncompliance and its cause, the period of noncompliance (providing exact dates and times); and if the noncompliance has not been corrected, the anticipated time to complete the corrective action. The notification must also include steps taken or planned to reduce, eliminate, or prevent recurrence of the noncompliance. Depending on the severity of the violation, the Regional Water Board staff may require the discharger to submit a separate technical report regarding the violation within 10 working days of the initial notification.	
Enrollment		
New Operations	Must file a complete Notice of Intent, filing fee, and technical report not less than 90 days prior to commencement of composting operations. The Regional Water Board will issue a Notice of Applicability that, at a minimum, confirms the Discharger's Tier, timeline for compliance, monitoring requirements and monitoring methods.	
Existing Operations	Must file a complete Notice of Intent, filing fee, and technical report within one year of adoption of the General Order. The technical report shall include a proposed schedule for full compliance and must be as short as practicable but may not exceed 6 years from the date of the NOI. The Regional Water Board will issue a Notice of Applicability that, at a minimum, confirms the Discharger's Tier, timeline for compliance, monitoring requirements and monitoring methods.	
Fees		
Annual Fees	The filing fee accompanying the NOI is the first year's annual fee. Annual fees are based on the threat to water quality (TTWQ) and complexity (CPLX) of the discharge. (Cal. Code Regs., tit. 23, § 2200.) The ratings are available at: **http://www.waterboards.ca.gov/resources/fees/docs/fy1415_fee_schedule.pdf**	

Appendix G - Report of Waste Discharge



Machado and Sons Construction, Inc.
West Main Compost Facility
Report of Waste Discharge (ROWD)

February 2021

Submitted to:
Machado and Sons Construction, Inc.
1000 South Kilroy Rd.
Turlock, CA 95380

Prepared by:
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Bakersfield, CA 9330

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EXHIBITS

APPENDICES

I. Executive Summary

Machado and Sons Construction, Inc. (Machado and Sons) is requesting a Stanislaus County use permit for the purposes of Aerated Static Pile composting (ASP) in an agriculturally-zoned parcel of land approximately 9-miles west of the City of Turlock. Machado and Sons is proposing to build the West Main Compost Facility in coordination with local organic waste managers and will receive up to 140 tons per day of landscape residue, vegetative food material, non-contaminated soil, and green waste Tier I feedstock. This Report of Waste Discharge applies to the land where ASP composting will be conducted. The proposed facility location is described in **Table 1** and shown in **Exhibit 1, Facility Location Map**.

Table 1: Facility Location

Address	1236 West Main Ave. Crows Landing, CA 95313
S / T / R	Section 20, T5S, R9E, MDB&M
Latitude	Latitude: 37.492004
Longitude	Longitude: -121.011339

This Report of Waste Discharge (ROWD) will apply to the facility location.

II. Introduction & Background

The West Main Compost Facility will be located in Stanislaus County approximately 9 miles west of the City of Turlock. It will be operated by Machado and Sons in conjunction with Starkey Farms, and other local farms, for offtake of agricultural compost material, which is consistent with the agricultural use of the property dictated by its current zoning designation. The facility will only receive Tier I feedstock as defined by the California State Water Resources Control Board and the Central Valley Regional Water Quality Control Board (State Water Resources Control Board, 2015).

The facility will enable local organic waste generators to comply with the SB 1383 recycling mandate. All of the organic waste that will be processed at the facility will be grown or processed in Stanislaus County and will consist of separated organics from municipal waste, produce processing waste, and local farm crop residue. The operation will provide local farms with access to the high-quality compost generated by the ASP system. All organic waste entering the facility will be subject to inspection to ensure that no waste containing greater than 1% contamination by dry-weight is accepted. It is expected that the facility will be operated by four full-time employees.

Aerial imagery shows that the land on which the facility is proposed to be constructed has been used exclusively for agricultural purposes. The surrounding land has also been used exclusively for agriculture.

This Report of Waste Discharge (ROWD) will apply to the facility location.

III. Facility Description

The West Main Compost Facility will be located at 1236 West Main Avenue, Crows Landing, CA 95313 in Section 20, T5S, R9E, MDB&M (**Exhibit 1, Facility Location Map**). The facility will encompass approximately 23 acres of a 49-acre parcel and the volume of onsite material will not exceed 12,500 cubic yards at any given time, as specified by Title 14 regulations. **Table 2** includes a breakdown of the maximum expected volumes of different materials that will be delivered to the facility and stored onsite.

Table 2: Onsite Material Volumes

<table>
<tr><th colspan="6">Assumptions</th></tr>
<tr><th colspan="2">Max daily feedstock</th><th colspan="2">Deliveries</th><th colspan="2">Feedstock average density</th></tr>
<tr><td colspan="2">140 tons per day MAX
120 tons per day AVERAGE</td><td colspan="2">6 days per week,
24 days per month</td><td colspan="2">40 lb. per cu. ft.</td></tr>
<tr><th colspan="6">Onsite Volume</th></tr>
<tr><th>Bulk Feedstock (3-day retention)</th><th>Active Compost (4-week retention)</th><th colspan="2">Curing Piles (3-week retention)</th><th>Additives</th><th>Finished compost</th></tr>
<tr><td>420 tons = 778 cu. yd.</td><td>3,360 tons = 6,222 cu. yd.</td><td colspan="2">2,250 tons = 4,666 cu. yd.</td><td>500 cu. yd.</td><td>300 cu. yd.</td></tr>
<tr><td colspan="6">Total maximum material onsite = **12,466 cu. yd.**</td></tr>
</table>

The West Main Compost Facility will consist of a parking area, scales, a feedstock unloading zone, a grinding slab and grinding equipment storage area, an ASP slab, a curing pile, amendment storage, a compost off-haul area, and a drainage pond. A facility layout diagram is included as **Exhibit 2, Site Plan Map**.

The surface parcel where the facility will be located and composting will occur is listed in **Table 3** below.

Table 3: Compost Facility Parcel Location

Facility Name	Address	Zip	Latitude	Longitude	County Parcel Number	Zoning
West Main Compost Facility	1236 West Main Avenue, Crows Landing, CA	95380	37.492004	-121.011339	058-003-006	A-2

The facility will be constructed on land zoned as "A-2" or General Agriculture. A zoning map for the facility and the surrounding property can be seen in **Exhibit 3, Zoning Map.** The land use specified by the Stanislaus County General Plan is shown in **Exhibit 4, General Plan Map**.

Topographically, the West Main Compost Facility site will sit at approximately 60 feet above mean sea level. In the area of the proposed facility, the valley generally slopes from slightly higher elevations in the northeast to lower elevations in the southwest, as shown in **Exhibit 5, Topographic Map**.

The proposed site for the facility is surrounded by extensive farmland. As a result, there are numerous water supply wells. All of the domestic, industrial, and irrigation wells near the proposed facility location are shown in **Exhibit 6, Water Well Location Map**. The records for these wells are included in **Appendix 1, Water Well Records**.

There are several rural residential buildings located close to the proposed facility site. Two are located directly to the west of the proposed facility location at distances of approximately 50 feet and 400 feet. Another residence is located approximately 360 feet northeast of the proposed location. The site is also surrounded by several dairies which are located at distances of approximately 0.15 miles, 0.2 miles, and 0.18 miles to the north, west, and east, respectively.

IV. Aerated Static Pile Compost Process

Feedstock

The facility will only accept Tier I feedstock that originates from local farms, municipal waste haulers, and PG&E excavated soil containing less than 1% contamination by dry weight. The Tier I feedstock will be delivered daily by up to twenty 20-yard dump trucks. All Tier I feedstock will be accepted at the weigh station and dumped for inspection at the feedstock unloading zone to ensure it meets facility standards. Trained load checkers will perform inspections on all loads that enter the facility and reject feedstock that does not meet the standards. No loads will be accepted without an inspection. The facility will maintain records of training and load checks performed. **Table 4** shows the expected feedstock amounts that will be onsite on a daily basis.

Table 4: Feedstock Type and Daily Volume

Feedstock	Average Tons Per Day	Max Tons Per Day
Green Material	120	140
Amendments	30	50

Once the Tier I feedstock has passed inspection, it will be shredded to a size of approximately 2.5 inches and mixed to the proper C:N (carbon:nitrogen) ratio before being hauled to the ASP active compost pile. Feedstock will be processed within 72 hours of receipt in order to avoid odor and/or vector issues. Carbon sources and bulking agents, such as wood chips and soil amendments, will be stored in concrete block bins onsite.

ASP Process

Aerated Static Pile compost piles are constructed over a network of aeration pipes and induce airflow into the pile using an electric blower that is operated in conjunction with a pile temperature control system that cycles air into the pile. The piles are not turned during the first 30 days, a period referred to as the active phase of composting. Airflow to the piles can be adjusted to manage the pile temperatures and optimize the biology of the composting process.

A 2013 study titled "Greenwaste Compost Site Emissions Reductions from Solar-powered Aeration and Biofilter Layer" was funded by the San Joaquin Valley Air Pollution Control District and resulted in the following findings:

> "The comparison of emissions from the 22-day active composting phase between the eASP and standard windrows demonstrated emissions reductions by the eASP of 99% for total non-methane, non- ethane VOCs, 70% for ammonia (average of field and lab), 88%

> for nitrous oxide, and 13% for methane. The overall reduction for CO2 equivalents was nearly 65%. Diesel use in pile construction and active-phase management was 87% less for the eASP system, with commensurate reductions in criteria pollutant emissions associated with diesel fuel combustion. Water used during the composting process was reduced by 20%, and land necessary for active-phase composting is calculated to be reduced by 55.5%."

The study has been included as **Appendix 2, Compost VOC Emissions Report**.

Table ES-1 from the study shows the reduction in VOCs (volatile organic compounds), NH3, and GHG in ASP composting versus windrow composting:

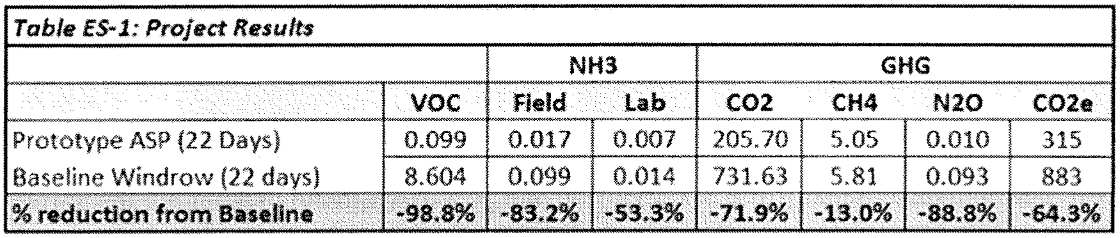


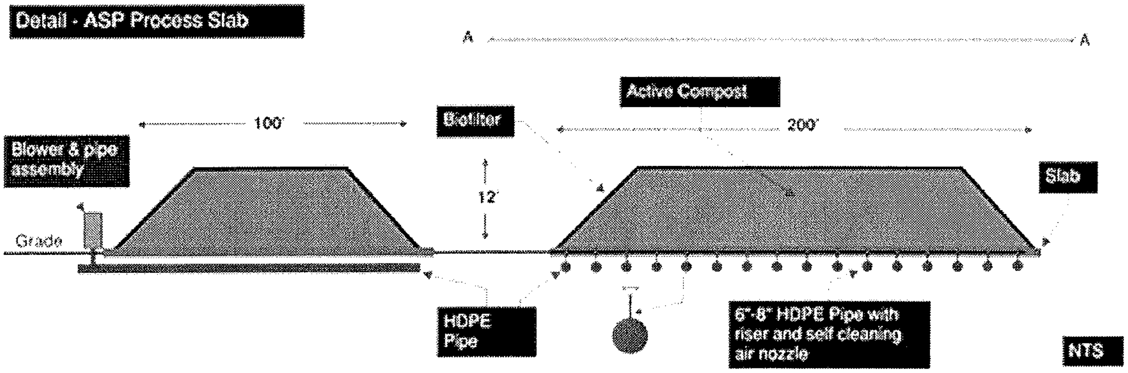
Table ES-1: Project Results

		NH3		GHG			
	VOC	Field	Lab	CO2	CH4	N2O	CO2e
Prototype ASP (22 Days)	0.099	0.017	0.007	205.70	5.05	0.010	315
Baseline Windrow (22 days)	8.604	0.099	0.014	731.63	5.81	0.093	883
% reduction from Baseline	**-98.8%**	**-83.2%**	**-53.3%**	**-71.9%**	**-13.0%**	**-88.8%**	**-64.3%**

Table ES-1: Results of emissions testing in pounds of pollutant per ton of feedstock over the 22-day active composting period.

Aeration will be vital to the composting process at the West Main Compost Facility. It maintains aerobic conditions without turning the pile, optimizes the biology of the composting process, and manages pile temperatures to within a desired range to optimize the process. Moreover, ASP reduces offensive odors and expedites the rate of composting. When managed properly, this technique resolves odor impacts and controls vector problems which reduces nuisance issues and neighbor complaints. The operation will use less fuel per ton of compost produced than windrow composting, but more importantly reduces the amounts of VOCs and other harmful gases released into the atmosphere.

The ASP composting technique reduces the footprint of the active compost pad. Typically, this approach can significantly reduce the operational footprint when compared to standard windrow composting. The West Main Compost Facility plans to have one active ASP compost pile, located on a slab measuring 200' x 100' x 12' (LxWxH) as shown below. There will be one curing pile that will measure 200' x 100' x 12'.



The aeration plenum layer is a clean wood chip layer that extends around the perforated aeration pipes. This acts as a filter to distribute the air flow evenly and to keep the pipes free of debris and clogging. The active compost pile will be composed of a gradation of mixed organics ranging from 25:1 to 35:1 C:N ratio.

Compost Additives

Additives used in composting at the West Main Compost Facility will consist of bentonite, gypsum, diatomaceous earth, and non-hazardous soil. Onsite volume of these materials will not exceed 500 cubic yards at any given time.

V. Odor, Vector, and Noise Control

Odor

The facility will be required to have and maintain a written Odor Impact Minimization Plan. The primary means of odor mitigation will be the receipt of relatively benign feedstocks. Odor and vector impacts will be further minimized by the biofilter layer in the ASP piles. The biofilter is a 1-inch layer of unscreened compost that covers the entire ASP pile. It has active microorganisms within it which absorb, treat, and block VOCs and other gases from escaping the pile. Ammonia is sequestered chemically in the pile. The net result is an inoffensive mild organic odor which only becomes an issue if the anaerobic bacterial population inside the pile grows and begins consuming nutrients and releasing H2S (hydrogen sulfide) gas. The anaerobic bacteria in question would only thrive in a low oxygen environment resulting from improper ASP pile design or operation causing insufficient oxygen filtration through the pile.

The biofilter layer also acts as an insulative barrier and minimizes moisture losses during hot summer temperatures. The ASP piles start out with 60-65% water content and lose some of that moisture during the retention time.

Vector

The biofilter acts as a vector barrier to flies, insects, rodents, and birds. Any animal or insect curious or attracted to the pile will find the biofilter layer is difficult to penetrate and, if penetrated, the active compost is hot. Once the compost reaches the curing pile a large majority of the consumable nutrients are gone, reducing animal and insect interest.

Noise

There will be processing machinery, hauling equipment, and trucking noises emanating from the facility. To control noise, deliveries and processing work will only be allowed during the normal working hours of 6:30 a.m. to 4:00 p.m. Monday to Saturday. Machado and Sons also intends to further reduce the facility's noise impact by constructing a berm around the site and planting trees along the north end of the property.

VI. Site Drainage

Machado and Sons will submit for approval a Water and Wastewater Management Plan describing how wastewater will be managed at the West Main Compost Facility. The plan will include descriptions of the design, operation, and maintenance of the system.

Wastewater

The West Main Compost Facility Wastewater Handling System will be built to comply with the specifications required by the General Waste Discharge Requirements for Composting Operations set forth by the State Water Resources Control Board. Machado and Sons will construct a drainage conveyance system to direct all wastewater runoff to a drainage pond located at the southwestern corner of the property. After collection, wastewater will be reapplied to the compost pile.

Stormwater

Machado and Sons will create and implement a Stormwater Pollution Prevent Plan at the West Main Compost Facility in order to comply with the requirements of the National Pollutant Discharge Elimination System (NPDES). Berms will be erected around the facility to prevent run-on and runoff in the event of a 25-year, 24-hour peak storm event. A schematic for onsite drainage is included as **Exhibit 7, Facility Drainage Concept Map**.

VII. Facility Monitoring

The West Main Compost Facility will perform regularly scheduled inspections and maintenance on all containment structures in order to prevent discharges of feedstocks, additives, amendments, compost, or wastewater from creating, or contributing, to contamination, pollution, or nuisance. Quarterly inspections will be required for all working surfaces, berms, ditches, etc. The facility will also comply with any applicable monitoring required for the drainage pond, groundwater, and biosolids.

VIII. Climatology

The San Joaquin Valley lies in the central region of the State of California; it is bounded to the east by the Sierra Nevada Mountain Range, to the west by the Coast Ranges and to the south by the Tehachapi Mountains. The proposed project site is located in the southwest portion of the San Joaquin Valley.

The climate of the northern San Joaquin Valley is classified as a hot Mediterranean type, and is characterized by hot summers, mild winters, and moderate amounts of precipitation. The major climatic controls in the San Joaquin Valley Air Basin are the surrounding mountains and the Pacific High-pressure system over the ocean. The Great Basin High pressure system to the east also affects the valley, primarily during winter months. These influences result in distinct seasonal weather characteristics.

The Pacific High is a semi–permanent, subtropical, high-pressure system located off the Pacific Coast. The Pacific High tends to migrate seasonally. During the summer, it moves northward and dominates the regional climate. This high produces persistent temperature inversions and a predominantly northwest airflow. Clear skies, high temperature, low humidity, and relatively good air circulation characterize this season. The Pacific High blocks migrating extra-tropical storms, therefore very little precipitation occurs in the summer months. Occasionally, tropical air moves into the area and thunderstorms may occur over the adjacent mountains.

As the Pacific High shifts southward during the fall, its dominance is diminished in the San Joaquin Valley. During this transition period, the storm belt and zone of strong westerlies also shifts southward, into California. Three weather regimes generally prevail during winter: (1) storm periods which are usually characterized by cloudiness, precipitation, and shifting, gusty winds; (2) clear weather associated with either a buildup of pressure through the interior of California following these storms or the influence of a well–developed Great Basin High pressure system; and (3) persistent fog or stratus clouds and temperature inversions associated with a weak influence of the Great Basin High trapping a layer of cool, moist air in the San Joaquin Valley. Thus sky, temperature, and humidity conditions are much more variable during winter. Air movement is also variable, with stagnant conditions occurring more frequently than during summer.

Radiative cooling at night, especially during clear conditions, results in a distinct down slope drainage flow. Thus, the mountains provide a distinct diurnal wind pattern of generally northerly winds during the day and a westerly drainage flow at night.

Diurnal wind regimes markedly affect the horizontal transport of air in the project area. During the summer, northeast winds dominate the daytime regime. These winds, generated by the Pacific High offshore, are enhanced by the San Joaquin Valley orientation and by the thermal low that develops in the central valley during this season. In response to this thermal low, air moves inland through passes in the coastal ranges, principally the Carquinez Strait near San Francisco, and flows to the south in the San Joaquin Valley as an up–valley northwesterly wind. This general northwest flow in the San Joaquin Valley is expressed locally as a more northeasterly wind under the influence of local terrain.

Dominant nighttime wind directions during summer are markedly different from those of the daytime. Winds with a northerly component have a low frequency of occurrence at night. The high frequency of west to southwest winds at night is due primarily to down slope drainage flow.

During the winter months, northerly to northeasterly winds remain dominant in the daytime. However, winds are more variable than during summer, due in part to: (1) the southward migration of the Pacific High and resultant storm passages; (2) the absence of a strong thermal trough; and (3) the varied influence of the Great Basin High. As in summer, winds during winter nights are predominantly from the west to southwest and are associated with drainage flow. Wind speeds are generally higher in summer than in winter in the project area. Calm conditions occur most often in winter but are relatively infrequent during either season.

The mountains to the east, south and west essentially block the region from transport of very cold air from the mid–continent in winter, and the relatively cool, marine air from the Pacific Ocean during summer. Transport of marine air through the Carquinez Strait during summer has a moderating effect on northern portions of the San Joaquin Valley, but this effect is not great in the southern portion of the valley. In this area, temperature regimes are influenced primarily by topography, the higher elevations generally experiencing cooler temperatures.

About 90 percent of the precipitation in the San Joaquin Valley occurs from November through April, generally in association with storms that move eastward from the Pacific Ocean during this period. Precipitation is low because the mountains to the west and south produce a rain shadow effect by intercepting prefrontal, moisture–laden west and south winds. The southern San Joaquin Valley receives precipitation primarily from cold, unstable, northwesterly flow that usually follows a frontal passage. **Table 5** presents climate data representative of the project area.

Table 5: Representative Temperature and Precipitation Data: Modesto, California[1]

Month	Average Daily Temperature (°F)		Average Rainfall (in)
	Low	High	
January	40	55	2.61
February	43	63	2.38
March	46	69	2.04
April	49	75	0.97
May	55	83	0.63
June	60	90	0.12
July	62	94	0.00
August	62	94	0.02
September	59	89	0.26
October	53	79	0.68
November	45	65	1.36
December	40	56	2.04
Annual	51	76	13.11

FEMA Floodplain

The area in which the West Main Compost Facility will be built is designated as Zone X (**Exhibit 8, FEMA Flood Hazard Map**), an area of minimal flood hazard, by FEMA. Thus, a 100-year, 24-hour Isohyetal Map was not prepared due to insufficient data available.

Evapotranspiration

Evapotranspiration (ET) is the combination of transpiration (precipitation loss to the atmosphere through plant surfaces) and evaporation. In agricultural operations, accurate estimates of evapotranspiration are often needed for irrigation schedules, system design, and other matters relating to water.

Temperatures, humidity, wind speeds, soil parameters and plant factors all affect ET. While ET can be accurately measured using lysimeters and other similar equipment, estimating ET (utilizing analytical and empirical equations) is far more common because measurement methods are often expensive and time consuming.

Formulating an equation for ET is difficult as there are so many factors to include. It is complicated to formulate an equation that can produce estimates of ET under so many different sets of conditions; therefore, the idea of reference crop evapotranspiration (ETo) was developed by researchers. Reference ET is the ET rate of a reference crop expressed in inches or millimeters.

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[1] US Climate Data Historical Average – Modesto, CA

The California Irrigation Management Information System (CIMIS), governed by the State of California Department of Water Resources, has created a Reference Evapotranspiration Map (**Exhibit 9, Reference Evapotranspiration Map**) for California, dividing the state up into different zones. The West Main Compost Facility site falls into Zone 14 which is described as: Mid-Central Valley, Southern Sierra Nevada, Tehachapi & High Desert Mountains, high summer sunshine and wind in some locations. Zone 14 Average Evapotranspiration, by month, is shown on **Table 6**:

Table 6: Zone 14 Monthly Average Reference Evapotranspiration

Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
14	1.55	2.24	3.72	5.10	6.82	7.80	8.68	7.75	5.70	4.03	2.10	1.55	57.0

Values given are in inches/month
Source: DWR, California Irrigation Management Information System (CIMIS)

CIMIS also provides more local evapotranspiration data using weather stations located throughout the state. The data from the Modesto CIMIS weather station can be found in **Table 7**.

Table 7: Modesto Monthly Average Evapotranspiration

Stn Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
Modesto	1.12	1.95	3.63	5.27	6.96	7.93	7.99	6.93	5.14	3.46	1.74	1.12	53.24

Values given are in inches/month
Source: DWR, California Irrigation Management Information System (CIMIS)

Wind Rose

The appropriate wind rose diagram is included as **Exhibit 10, Wind Rose Diagram**. This wind rose diagram is a visual depiction of wind patterns at a particular site. This diagram depicts winds blowing from a direction to the weather station. Meteorological data obtained from Modesto, CA, shows wind speeds, direction and frequency. Winds originate predominantly from the west with a greater frequency of higher winds than from any other direction. Winds out of the northeast also make up a large portion of wind frequency in the area but at lower wind-speeds.

IX. Soil Characteristics

According to the United States Department of Agriculture, Natural Resources Conservation Service (NRCS), surficial soils present at the area of the West Main Compost Facility include the classifications presented in **Table 8** below. A soils map depicting the soil types present at the site and the surrounding areas is included as **Exhibit 11, Soil Type Map**.

Table 8: West Main Compost Facility Soil Types

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
DwA	Dinuba sandy loam, slightly saline-alkali, 0 to 1 percent slopes	6.8	29.3%
HkbA	Hilmar loamy sand, slightly saline-alkali, 0 to 1 percent slopes	16.4	70.7%
Totals for Area of Interest		**23.2**	**100.0%**

Hilmar loamy sand is present over approximately 70% of the West Main Compost Facility. The soil type is somewhat excessively drained and is derived from sandy and silty alluvium sourced from granite. Dinuba sandy loam is present over the remainder of the property. The soil type is moderately well drained and is typically derived from alluvium that is sourced from granite (NRCS, 2020). The full NRCS soil report is included as **Appendix 3, NRCS Soil Report**.

Percolation tests will be conducted at the site. Pending the result of the percolation tests, it is anticipated that the percolation rate for the soils at the facility will not exceed the maximum Minutes Per Inch (mpi) rate for the measured groundwater depth at the site (State Water Resources Control Board, 2015)

X. Groundwater Characteristics

Groundwater in the area of the site occurs in unconfined and confined aquifers within the Quaternary Age alluvial sediments. Depth-to-groundwater and groundwater surface elevation data were obtained from the California Department of Water Resources. The depth to groundwater in the area of the subject property is approximately 25 feet below ground surface **Exhibit 12, Depth to Groundwater-Unconfined Aquifer**). The groundwater surface elevation is approximately 42 feet above mean sea level (**Exhibit 13, Groundwater Surface Elevation**) (DWR, 2020).

The regional groundwater flow gradient is mapped as flowing generally to the southwest based upon the groundwater surface elevation map (DWR, 2020). Local groundwater gradients and direction of flow may vary due to local groundwater recharge from unlined irrigation canals or pumping from agricultural water supply wells.

XI. Geology/Stratigraphy

The project site is located in the northern area of the San Joaquin Valley within the Great Valley Geomorphic Province of California. The Great Valley Geomorphic Provence of the San Joaquin Valley consists of a thick accumulation of marine and nonmarine clastic rocks of Jurassic to early Pliocene age which were deposited in a forearc basin located between the Franciscan subduction complex to the west and the Sierran magmatic arc to the east (Bartow and Nilsen, 1990). Younger Quaternary-age alluvial deposits overlie the Great Valley sequence rocks.

The site is immediately underlain by several hundred feet of Quaternary-age alluvial deposits consisting of non-marine sands, silts, and clays and approximately 3,000 feet of non-marine continental beds of varicolored sand, clay, and gravel of the Pliocene-to-Miocene age Mehrten and Valley Springs Formations. The Mehrten and Valley Springs Formations are unconformably underlain by over 10,000 feet of predominantly Cretaceous-age marine sands and shales of the Moreno and Panoche Formations which are underlain by crystalline basement rocks of Jurrasic age (Bartow and Nilsen, 1990). Surface geologic units in the area of the site are depicted on **Exhibit 14, Geologic Map**.

XII. Contacts

Name of Facility/ Operator	West Main Compost Facility – Machado and Sons Construction, Inc.
Phone Numbers	(916) 206-4342
Current Operations	Composting Facility
Primary Contact - Facility	Sean Kilgrow
Correspondence Contact	Sean Kilgrow 1000 South Kilroy Road Turlock, CA 95380

XIII. References

Bartow, J. A. and Nilsen, T. H., 1990, *Review of the Great Valley Sequence, Eastern Diablo Range and Northern San Joaquin Valley, Central, California*, in Structure, Stratigraphy and Hydrocarbon Occurrences of the San Joaquin Basin, California, Pacific Section Society of Economic Paleontologists and Mineralogists.

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Natural Resources Conservation Service (NRCS), 2020, *Web Soil Survey,* https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx, accessed December 2020.

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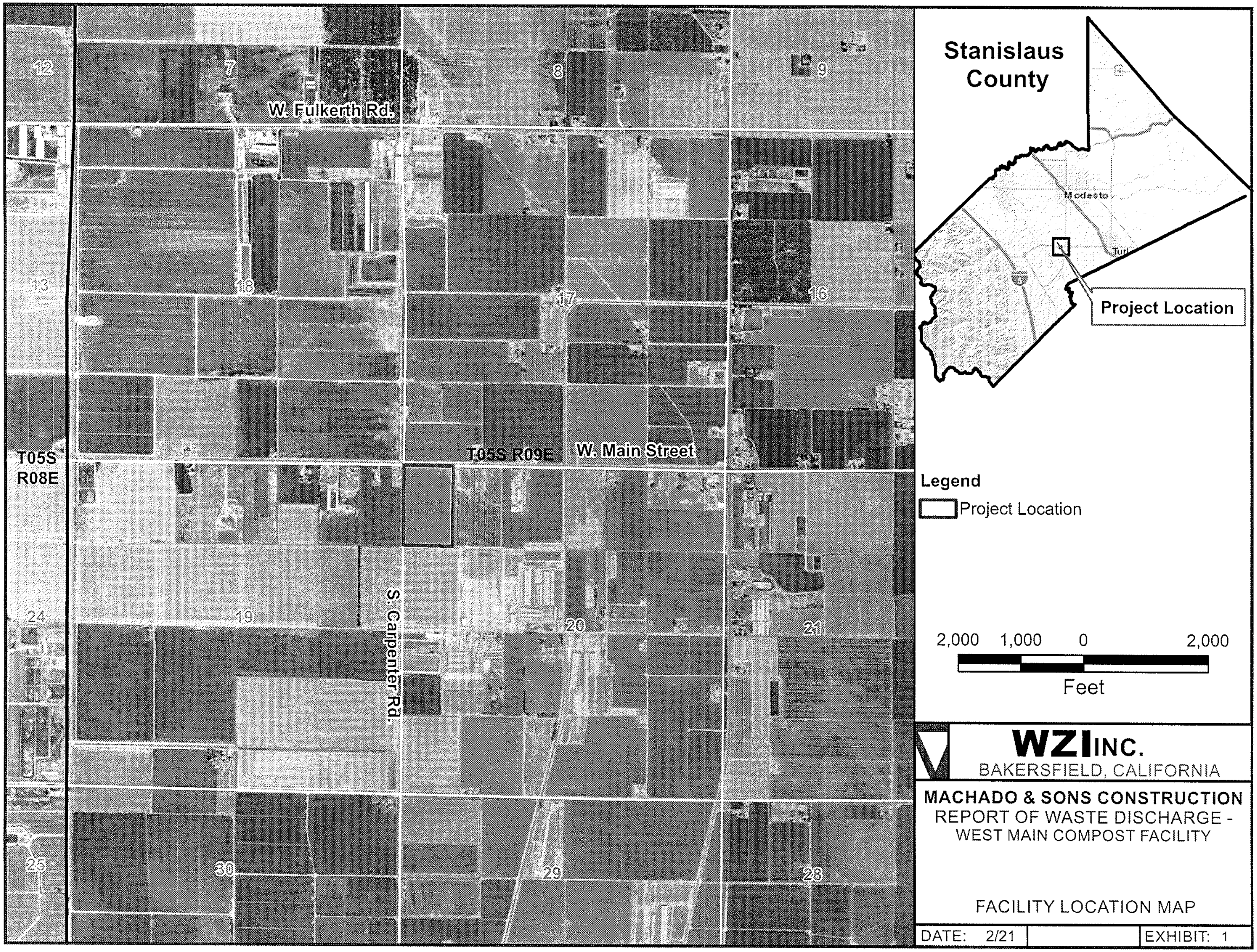


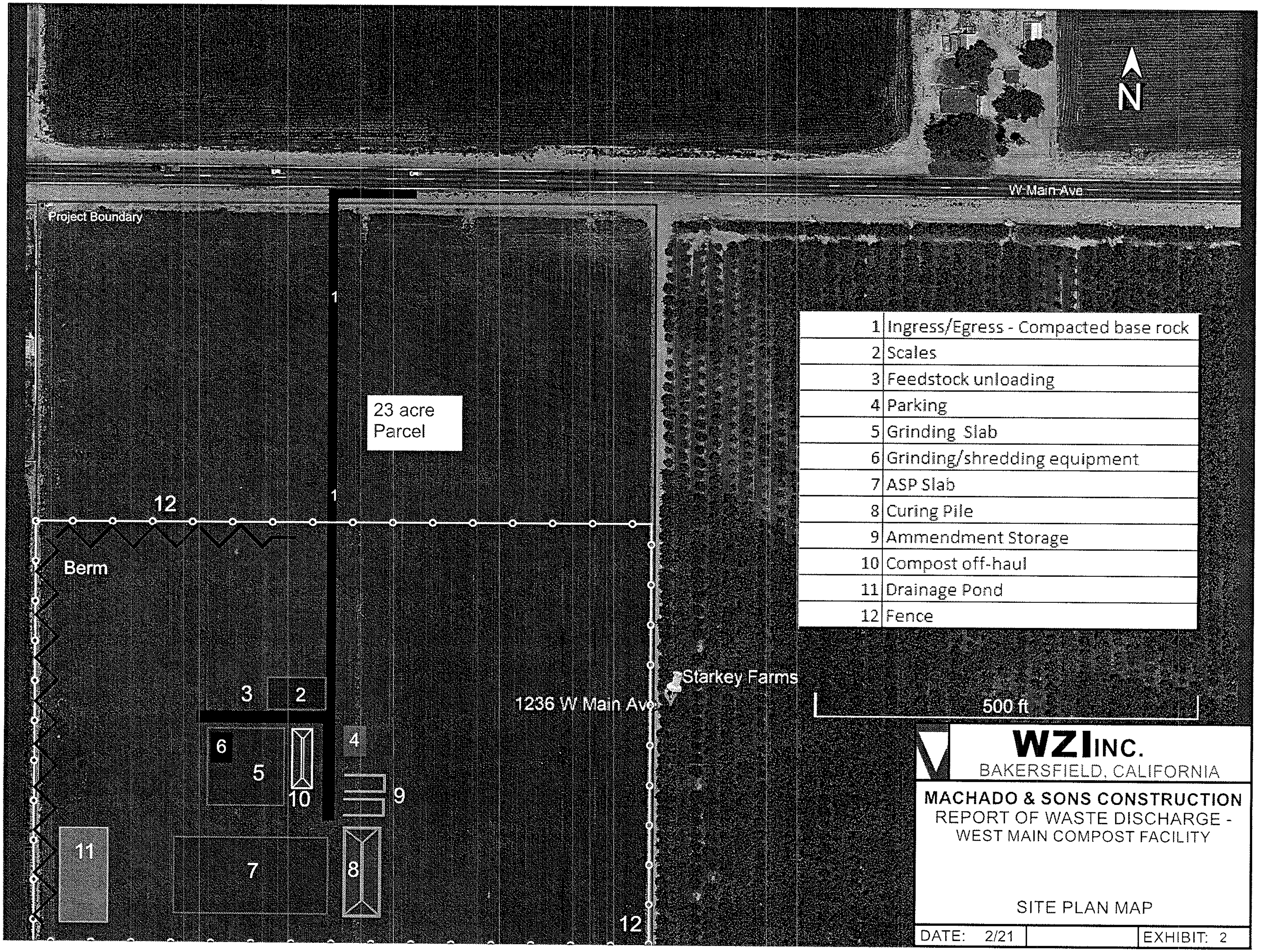
WZI INC.
BAKERSFIELD, CALIFORNIA

MACHADO & SONS CONSTRUCTION
REPORT OF WASTE DISCHARGE -
WEST MAIN COMPOST FACILITY

FACILITY LOCATION MAP

DATE: 2/21

EXHIBIT: 1



1	Ingress/Egress - Compacted base rock
2	Scales
3	Feedstock unloading
4	Parking
5	Grinding Slab
6	Grinding/shredding equipment
7	ASP Slab
8	Curing Pile
9	Ammendment Storage
10	Compost off-haul
11	Drainage Pond
12	Fence

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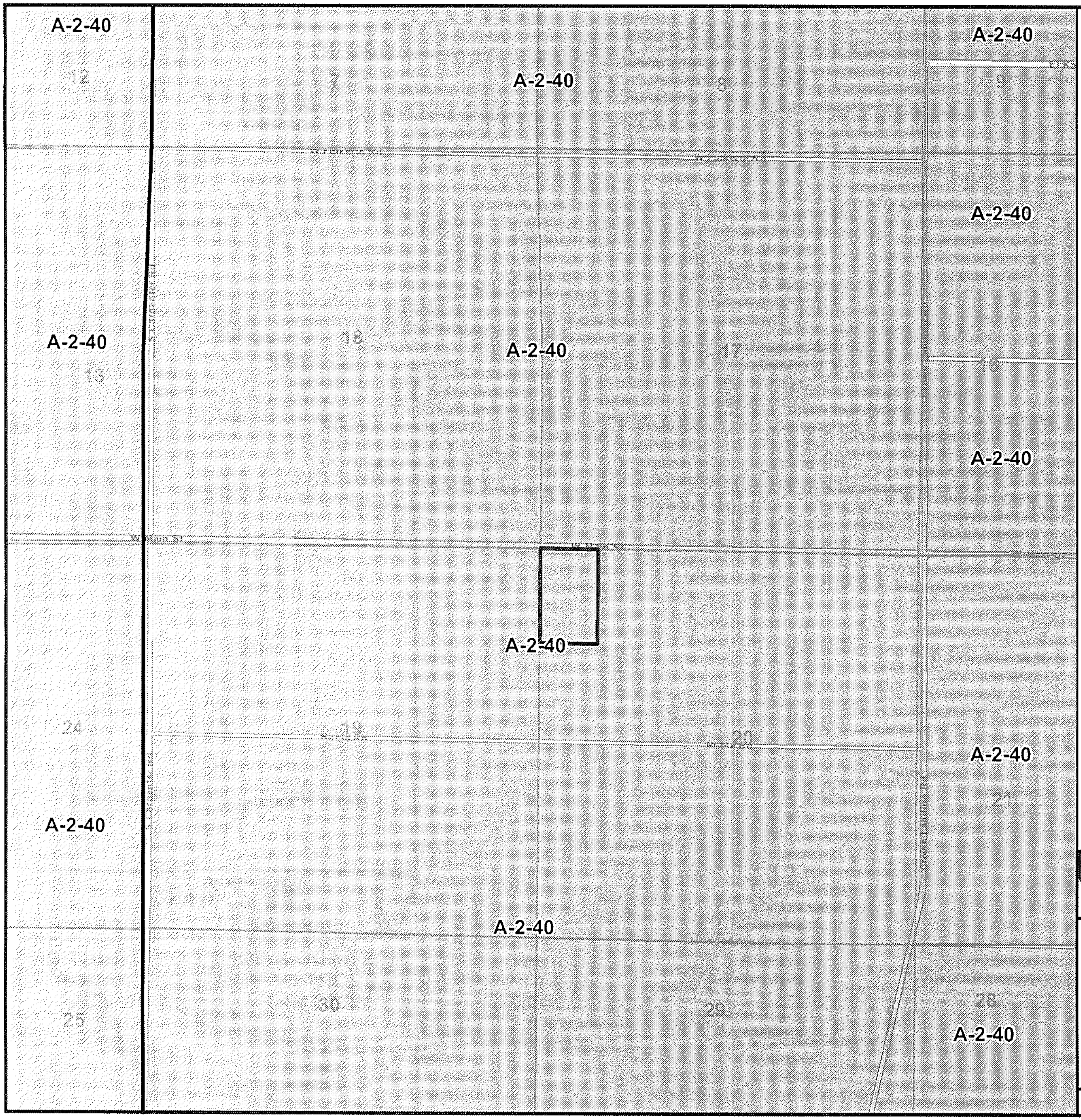
BAKERSFIELD, CALIFORNIA

MACHADO & SONS CONSTRUCTION
REPORT OF WASTE DISCHARGE -
WEST MAIN COMPOST FACILITY

SITE PLAN MAP

DATE: 2/21

EXHIBIT: 2



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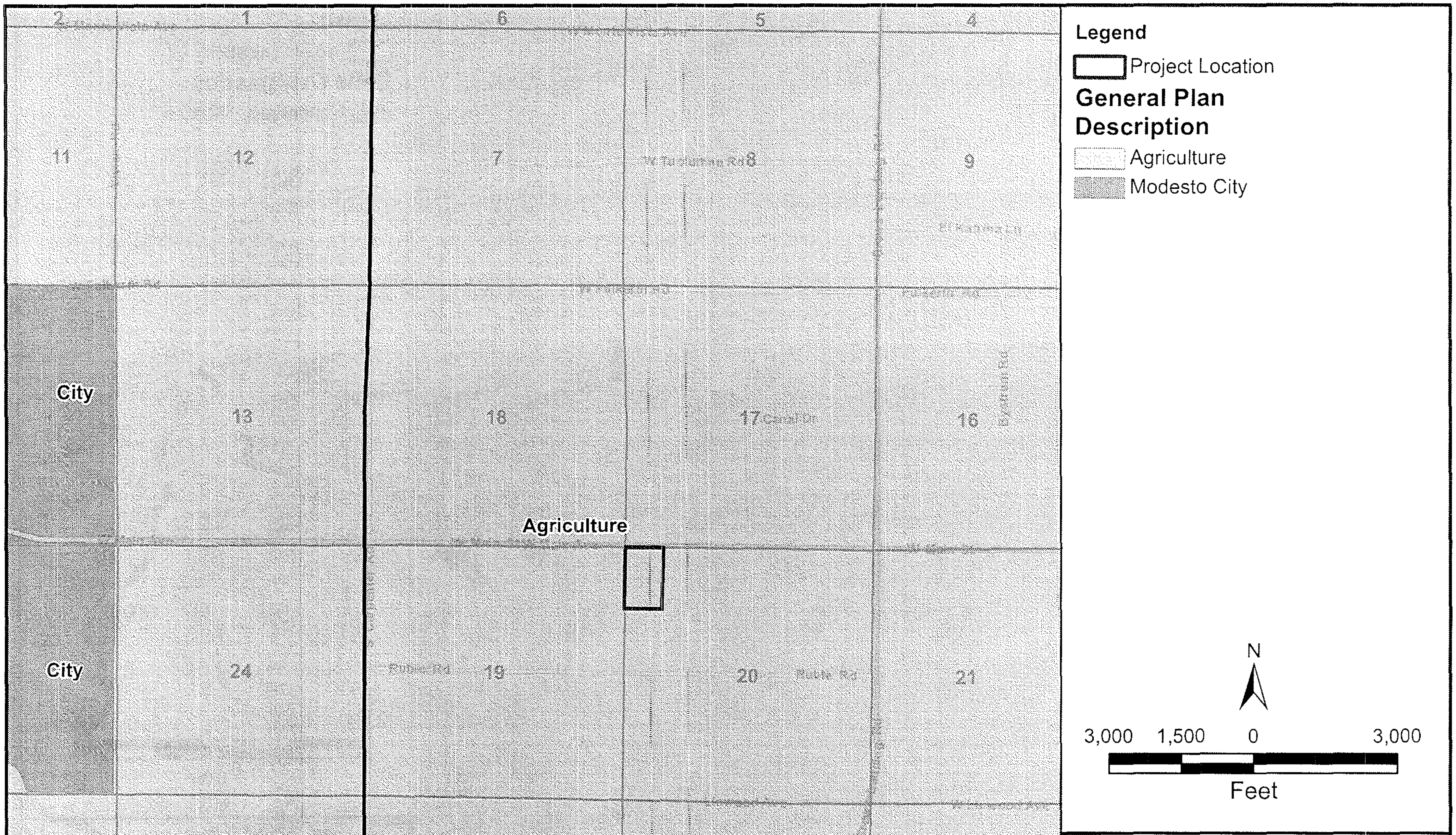
BAKERSFIELD, CALIFORNIA

MACHADO & SONS CONSTRUCTION
REPORT OF WASTE DISCHARGE -
WEST MAIN COMPOST FACILITY

ZONING MAP

DATE: 2/21		EXHIBIT: 3



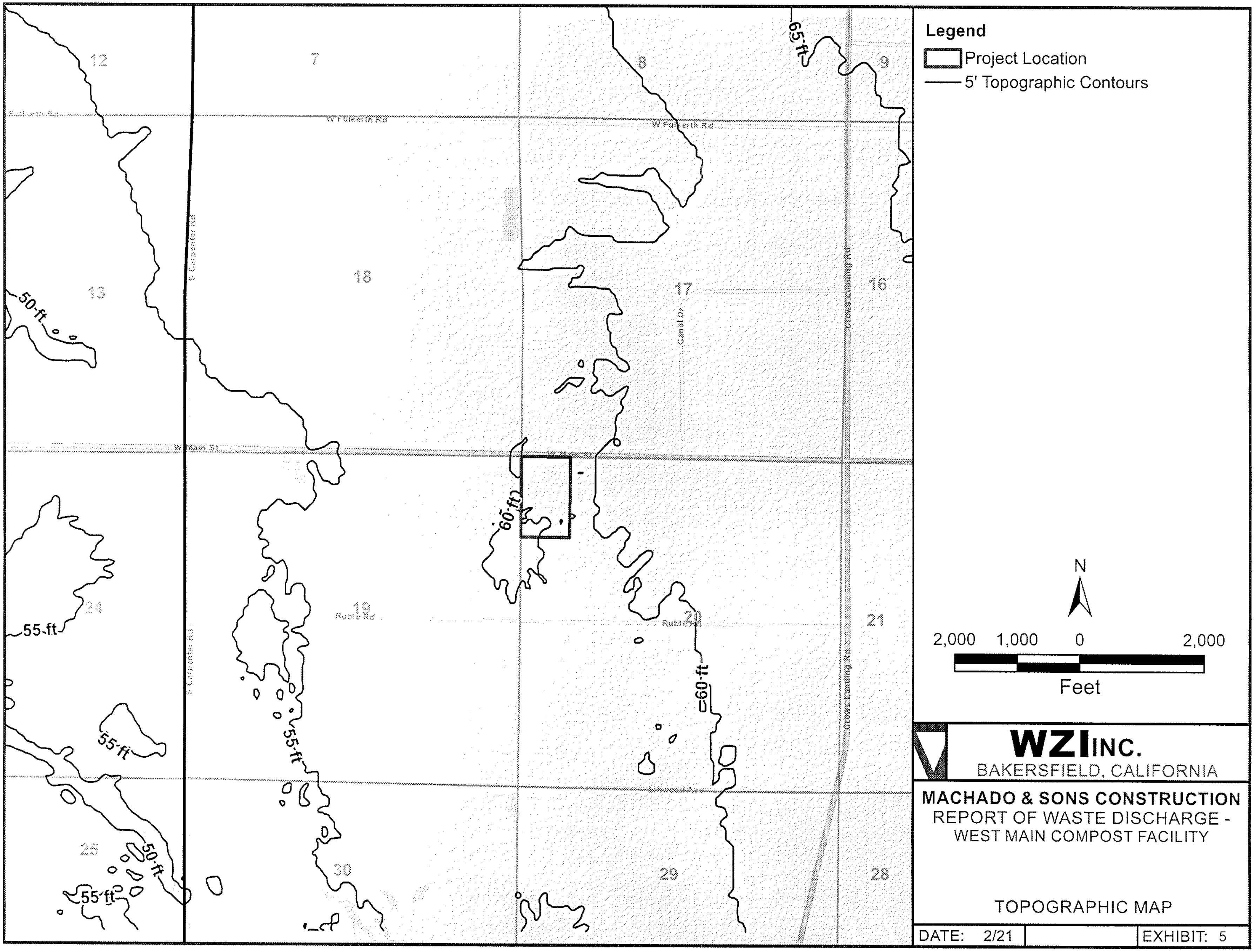
WZI INC.
BAKERSFIELD, CALIFORNIA

MACHADO & SONS CONSTRUCTION
REPORT OF WASTE DISCHARGE -
WEST MAIN COMPOST FACILITY

GENERAL PLAN MAP

DATE: 2/21

EXHIBIT: 4



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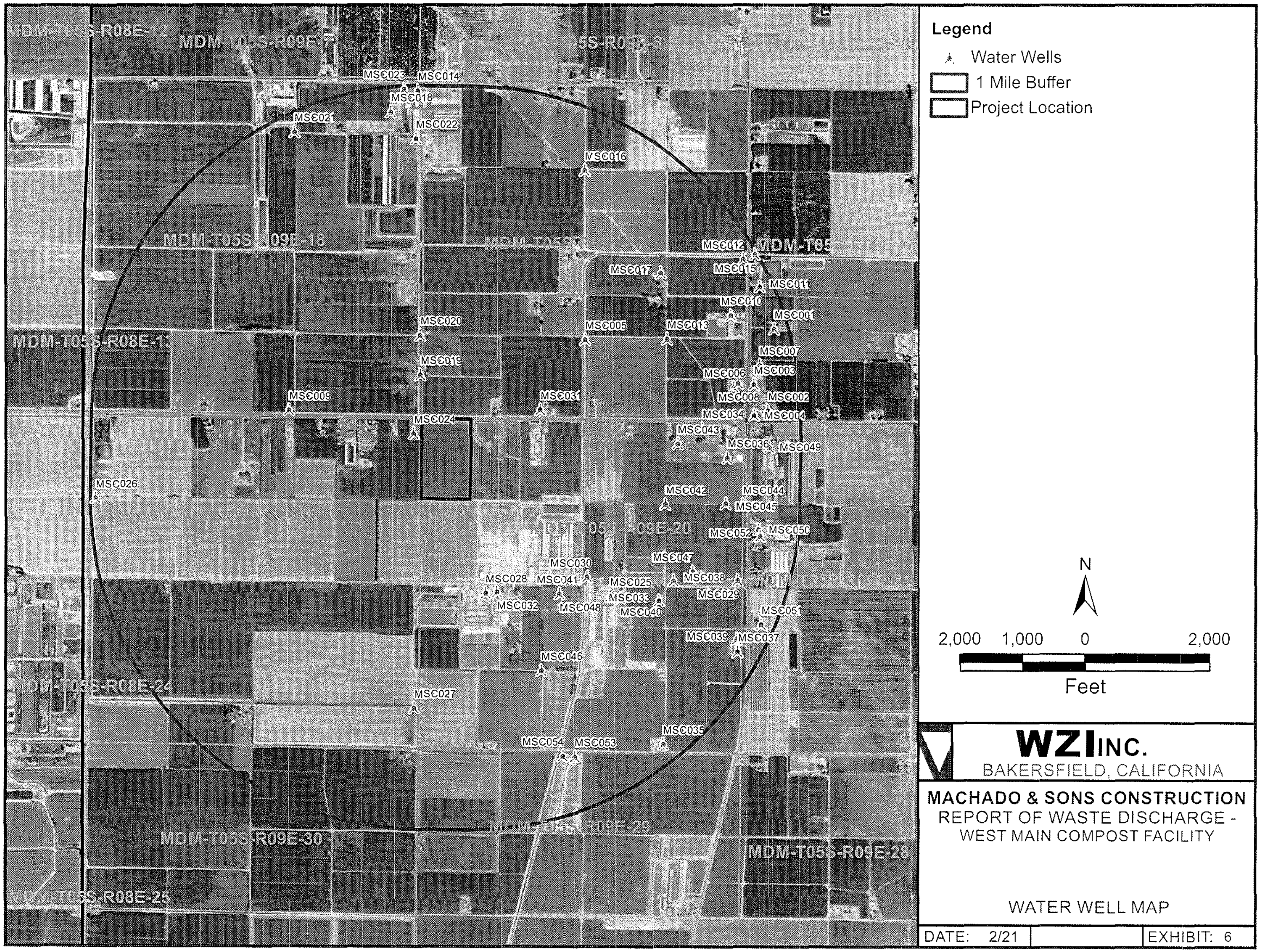
MACHADO & SONS CONSTRUCTION
REPORT OF WASTE DISCHARGE -
WEST MAIN COMPOST FACILITY

TOPOGRAPHIC MAP

DATE: 2/21

EXHIBIT: 5



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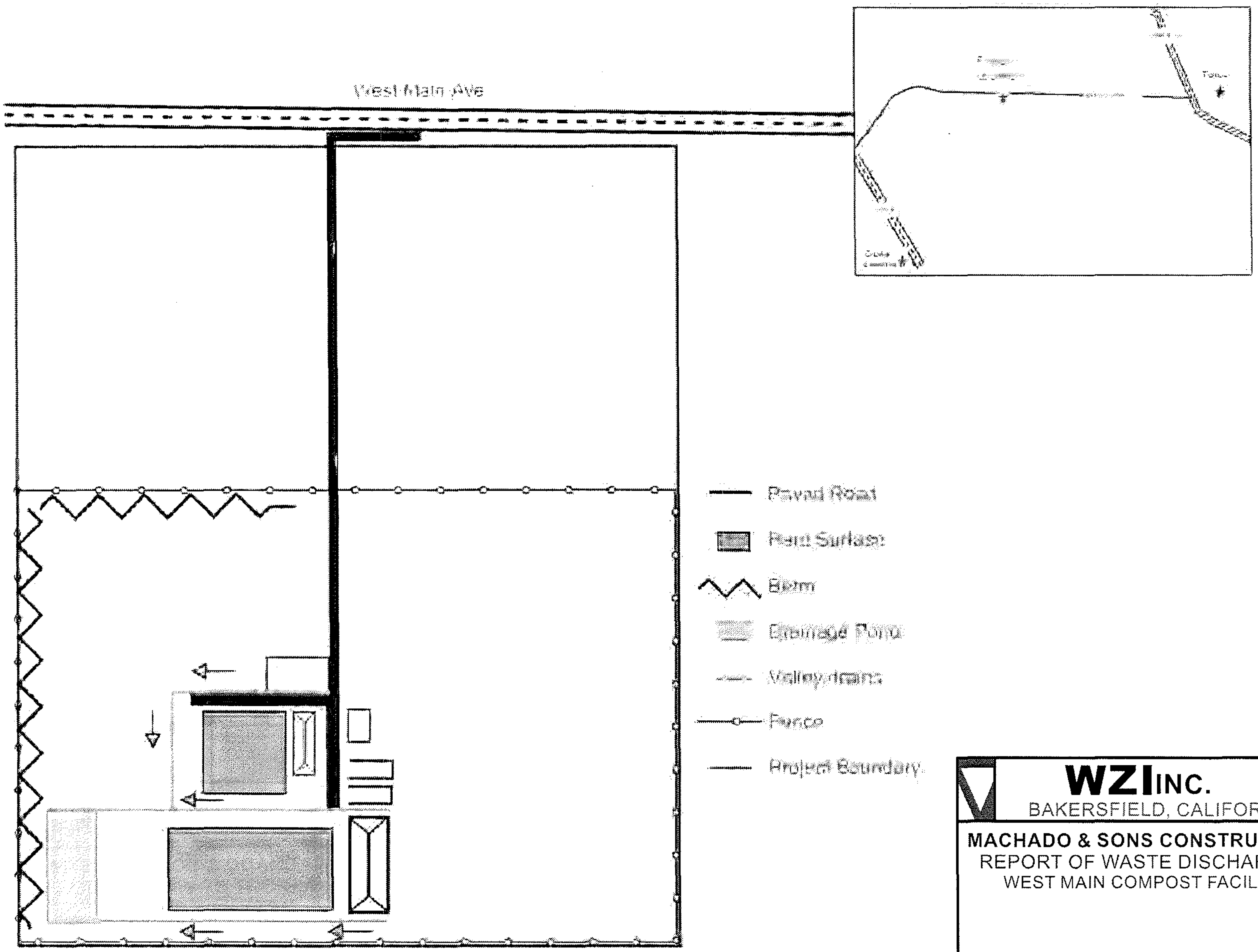
MACHADO & SONS CONSTRUCTION
REPORT OF WASTE DISCHARGE -
WEST MAIN COMPOST FACILITY

WATER WELL MAP

DATE: 2/21

EXHIBIT: 6



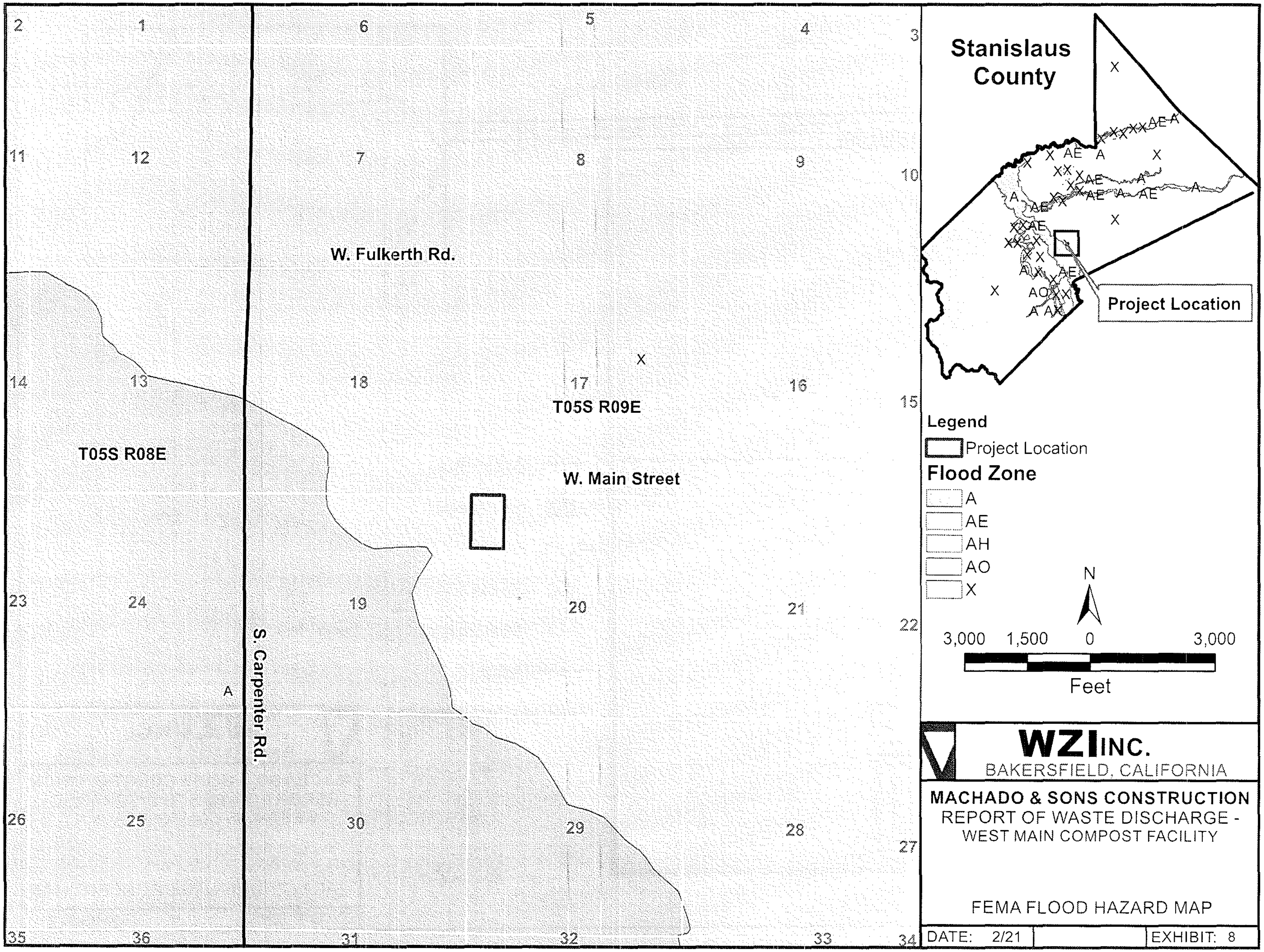
WZI INC.
BAKERSFIELD, CALIFORNIA

MACHADO & SONS CONSTRUCTION
REPORT OF WASTE DISCHARGE -
WEST MAIN COMPOST FACILITY

FACILITY DRAINAGE CONCEPT MAP

DATE: 2/21

EXHIBIT: 7



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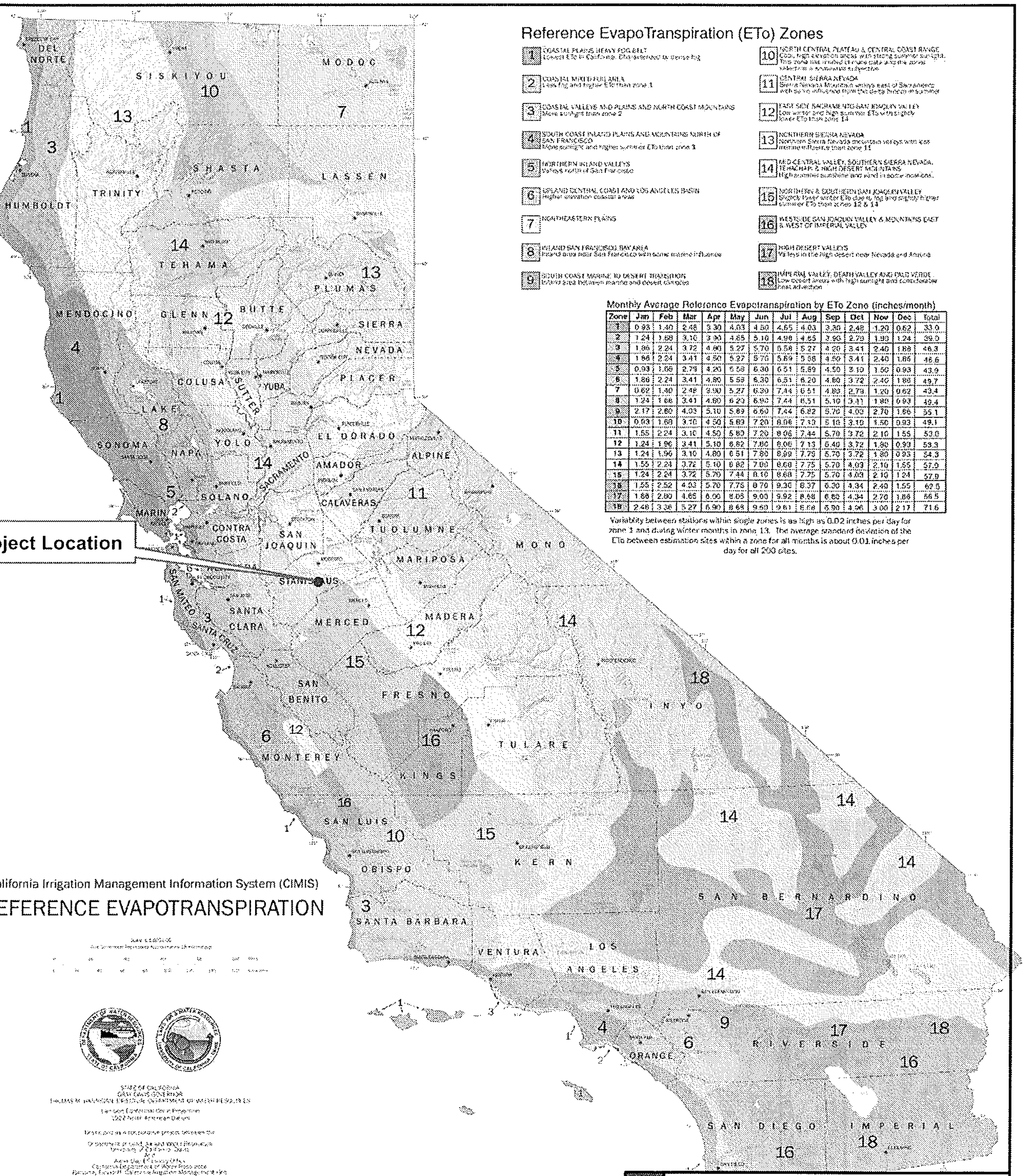
MACHADO & SONS CONSTRUCTION
REPORT OF WASTE DISCHARGE -
WEST MAIN COMPOST FACILITY

FEMA FLOOD HAZARD MAP

DATE: 2/21 EXHIBIT: 8



Reference EvapoTranspiration (ETo) Zones

1	COASTAL PLAINS HEAVY FOG BELT Lowest ETo in California. Characterized by dense fog
2	COASTAL MIXED FOG AREA Less fog and higher ETo than zone 1
3	COASTAL VALLEYS AND PLAINS AND NORTH COAST MOUNTAINS More sunlight than zone 2
4	SOUTH COAST INLAND PLAINS AND MOUNTAINS NORTH OF SAN FRANCISCO More sunlight and higher summer ETo than zone 3
5	NORTHERN INLAND VALLEYS Valleys north of San Francisco
6	UPLAND CENTRAL COAST AND LOS ANGELES BASIN Higher elevation coastal areas
7	NORTHEASTERN PLAINS
8	INLAND SAN FRANCISCO BAY AREA Inland area near San Francisco with some marine influence
9	SOUTH COAST MARINE TO DESERT TRANSITION Inland area between marine and desert climates
10	NORTH CENTRAL PLATEAU & CENTRAL COAST RANGE Cool, high elevation areas with strong summer sunlight. This zone has limited climate data and the zones selection is somewhat subjective.
11	CENTRAL SIERRA NEVADA Sierra Nevada Mountain valleys east of Sacramento with some influence from the delta breeze in summer
12	EAST SIDE SACRAMENTO-SAN JOAQUIN VALLEY Low winter and high summer ETo with slightly lower ETo than zone 14
13	NORTHERN SIERRA NEVADA Northern Sierra Nevada mountain valleys with less marine influence than zone 11
14	MID-CENTRAL VALLEY, SOUTHERN SIERRA NEVADA, TEHACHAPI & HIGH DESERT MOUNTAINS High summer sunshine and wind in some locations.
15	NORTHERN & SOUTHERN SAN JOAQUIN VALLEY Slightly lower winter ETo due to fog and slightly higher summer ETo than zones 12 & 14
16	WESTSIDE SAN JOAQUIN VALLEY & MOUNTAINS EAST & WEST OF IMPERIAL VALLEY
17	HIGH DESERT VALLEYS Valleys in the high desert near Nevada and Arizona
18	IMPERIAL VALLEY, DEATH VALLEY AND PALO VERDE Low desert areas with high sunlight and considerable heat advection

Monthly Average Reference Evapotranspiration by ETo Zone (inches/month)

Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1	0.93	1.40	2.48	3.30	4.03	4.50	4.65	4.03	3.30	2.48	1.20	0.62	33.0
2	1.24	1.68	3.10	3.90	4.65	5.10	4.96	4.65	3.90	2.79	1.80	1.24	39.0
3	1.86	2.24	3.72	4.80	5.27	5.70	5.58	5.27	4.20	3.41	2.40	1.86	46.3
4	1.86	2.24	3.41	4.50	5.27	5.70	5.89	5.58	4.50	3.41	2.40	1.86	46.6
5	0.93	1.68	2.79	4.20	5.58	6.30	6.51	5.89	4.50	3.10	1.50	0.93	43.9
6	1.86	2.24	3.41	4.80	5.58	6.30	6.51	6.20	4.80	3.72	2.40	1.86	49.7
7	0.62	1.40	2.48	3.90	5.27	6.30	7.44	6.51	4.80	2.79	1.20	0.62	43.4
8	1.24	1.68	3.41	4.80	6.20	6.90	7.44	6.51	5.10	3.41	1.80	0.93	49.4
9	2.17	2.80	4.03	5.10	5.89	6.60	7.44	6.82	5.70	4.03	2.70	1.86	55.1
10	0.93	1.68	3.10	4.50	5.89	7.20	8.06	7.13	5.10	3.10	1.50	0.93	49.1
11	1.55	2.24	3.10	4.50	5.89	7.20	8.06	7.44	5.70	3.72	2.10	1.55	53.0
12	1.24	1.96	3.41	5.10	6.82	7.80	8.06	7.13	5.40	3.72	1.80	0.93	53.3
13	1.24	1.96	3.10	4.80	6.51	7.80	8.99	7.75	5.70	3.72	1.80	0.93	54.3
14	1.55	2.24	3.72	5.10	6.82	7.80	8.68	7.75	5.70	4.03	2.10	1.55	57.0
15	1.24	2.24	3.72	5.70	7.44	8.10	8.68	7.75	5.70	4.03	2.10	1.24	57.9
16	1.55	2.52	4.03	5.70	7.75	8.70	9.30	8.37	6.30	4.34	2.40	1.55	62.5
17	1.86	2.80	4.65	6.00	8.06	9.00	9.92	8.68	6.60	4.34	2.70	1.86	66.5
18	2.48	3.36	5.27	6.90	8.68	9.60	9.61	8.68	6.90	4.96	3.00	2.17	71.6

Variability between stations within single zones is as high as 0.02 inches per day for zone 3 and during winter months in zone 13. The average standard deviation of the ETo between estimation sites within a zone for all months is about 0.01 inches per day for all 200 sites.

California Irrigation Management Information System (CIMIS)

REFERENCE EVAPOTRANSPIRATION

STATE OF CALIFORNIA
GRAY DAVIS GOVERNOR
THOMAS M. HANNIGAN DIRECTOR DEPARTMENT OF WATER RESOURCES

Lambert Conformal Conic Projection
1927 North American Datum

Developed as a cooperative project between the

Department of Land, Air and Water Resources
University of California, Davis
and
Water Use Efficiency Office
California Department of Water Resources
[illegible] California Irrigation Management [illegible]

Map Prepared by David W. Jones 1999
Data developed by Richard L. Snyder, Simon Eching and Hossna Gomez MacPherson
Background Data from Teale and USGS Sources

WZI INC.
BAKERSFIELD, CALIFORNIA

MACHADO & SONS CONSTRUCTION
REPORT OF WASTE DISCHARGE -
WEST MAIN COMPOST FACILITY

REFERENCE
EVAPOTRANSPIRATION MAP

DATE: 2/21
EXHIBIT: 9

WIND ROSE PLOT:

Modesto CA. Station# 23258
Years: 2013-2017

DISPLAY:

Wind Speed
Direction (blowing from)

DATA PERIOD:

Start Date: 1/1/2013 - 00:00
End Date: 12/31/2017 - 23:59

CALM WINDS:

2.26%

AVG. WIND SPEED:

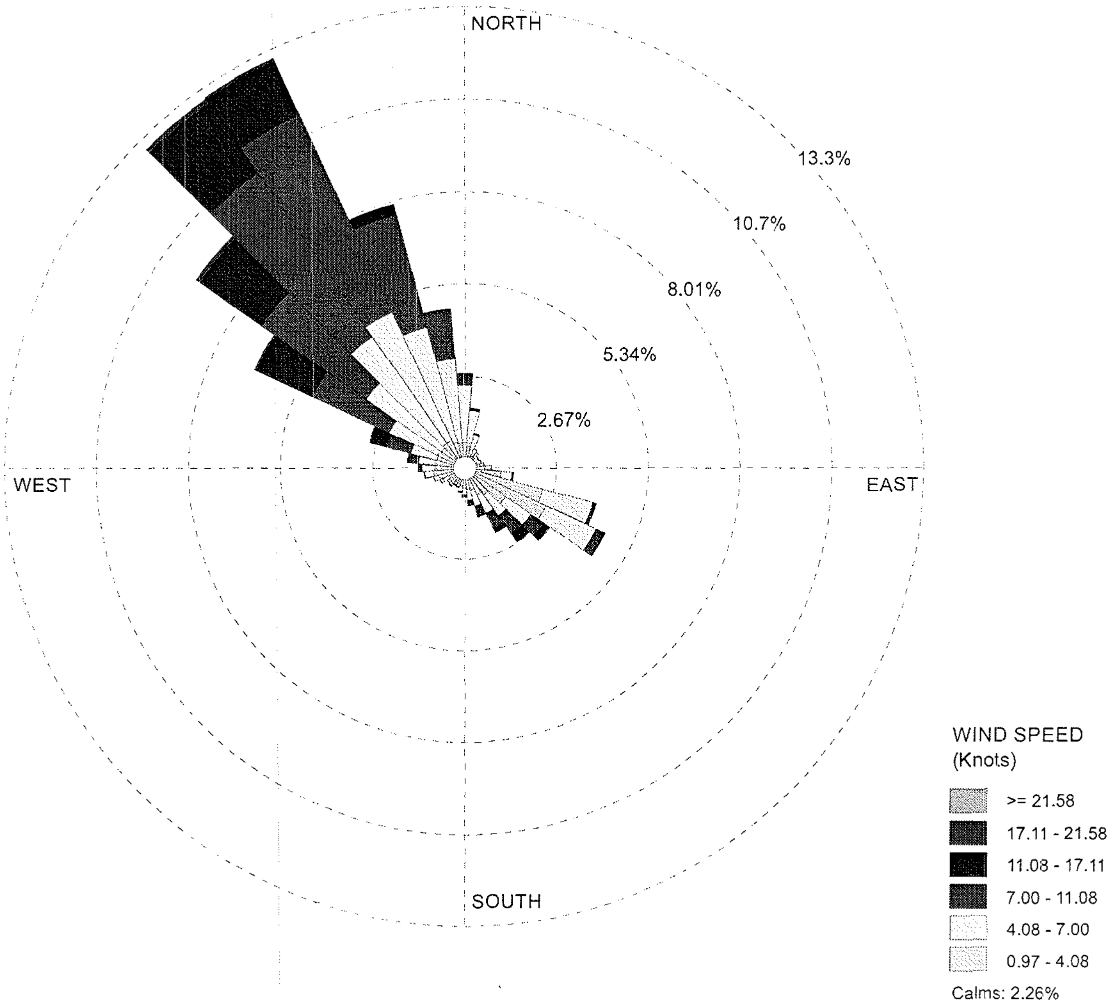
6.28 Knots

TOTAL COUNT:

43582 hrs.

DATE:

12/16/2020



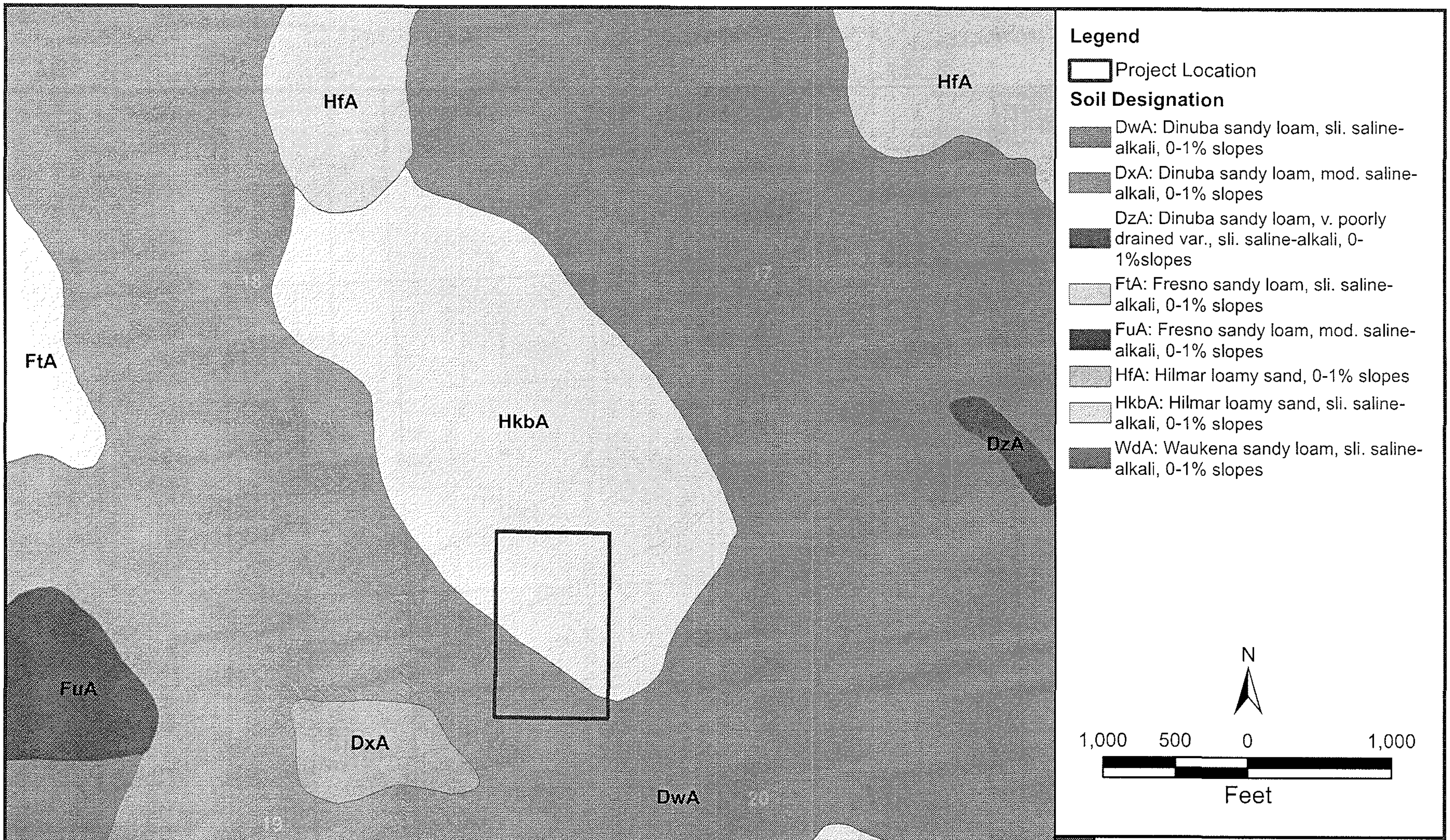
WZI INC.
BAKERSFIELD, CALIFORNIA

MACHADO & SONS CONSTRUCTION
REPORT OF WASTE DISCHARGE -
CARPENTER COMPOST FACILITY

WIND ROSE DIAGRAM

DATE: 2/21

EXHIBIT: 10



WZI INC.
BAKERSFIELD, CALIFORNIA

MACHADO & SONS CONSTRUCTION
REPORT OF WASTE DISCHARGE -
WEST MAIN COMPOST FACILITY

SOIL TYPE MAP

DATE: 2/21 EXHIBIT: 11

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

WZI INC.
BAKERSFIELD, CALIFORNIA

MACHADO & SONS CONSTRUCTION
REPORT OF WASTE DISCHARGE -
WEST MAIN COMPOST FACILITY

DEPTH TO GROUNDWATER -
UNCONFINED AQUIFER

DATE: 2/21
EXHIBIT: 12

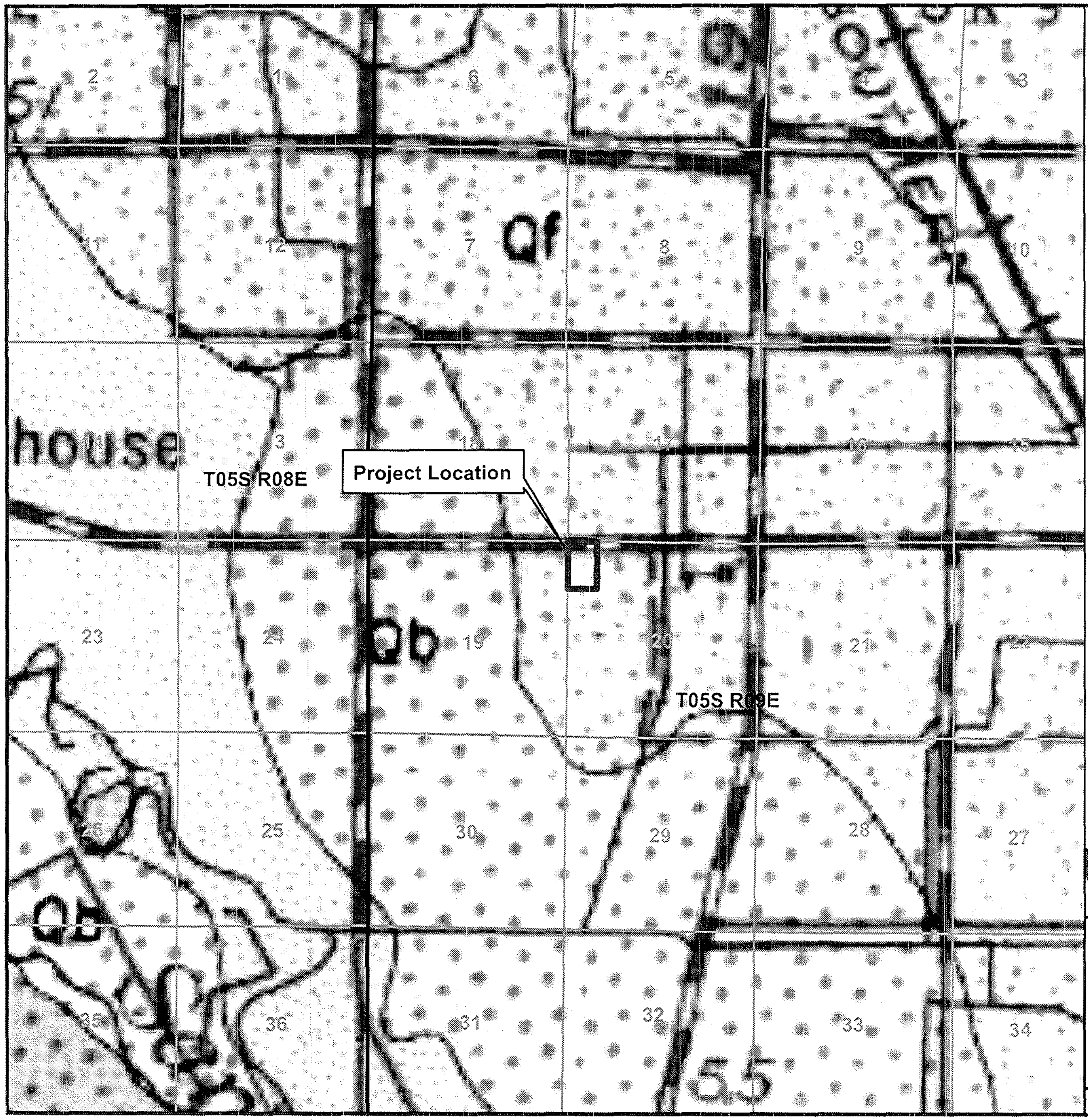
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

WZI INC.
BAKERSFIELD, CALIFORNIA

MACHADO & SONS CONSTRUCTION
REPORT OF WASTE DISCHARGE -
WEST MAIN COMPOST FACILITY

GROUNDWATER SURFACE
ELEVATION

DATE: 2/21
EXHIBIT: 13



WZI INC.
BAKERSFIELD, CALIFORNIA

MACHADO & SONS CONSTRUCTION
REPORT OF WASTE DISCHARGE -
WEST MAIN COMPOST FACILITY

GEOLOGIC MAP

DATE: 2/21		EXHIBIT: 14

Appendix 1

Water Well Table

Map_Number	Well #	APN	Permit#	DWR_#	TWN	RNGE	SEC	Name	Total_Depth_(feet)	Compl_Depth_(feet)	Depth_of_Static_Water_(feet)	Screen_Interval_1_(feet)	Screen_Interval_2_(feet)	Screen_Interval_3_(feet)	Purpose	Surface_Seal	Date_Completed	Location	Latitude	Longitude
MSC001	1		98-173	706224	5S	9E	16	5S9E16	184	165	17	145-165			Domestic	0-90	10/13/1998	9716 Crowslanding Road	37.497056°	-120.993155°
MSC002					5S	9E	16	5S9E16	72	72					Domestic				37.493485°	-120.993477°
MSC003			17-220	WCR2018-007332	5S	9E	16	5S9E16	200	200		60-80	100-140		Domestic	0-20	7/6/2018	9912 N Crowslanding Road	37.494641°	-120.994249°
MSC004		022 035-005	12-133	E0159997	5S	9E	16	5S9E16	222	200	24	180-200			Public		9/20/2012	9952 Crowslanding Road	37.493272°	-120.994236°
MSC005				33803	5S	9E	17	5S9E17	435	435	7	100-150	255-305	355-365	Irrigation		5/16/1977		37.496555°	-121.003576°
MSC006				98949	5S	9E	17	5S9E17	113	60	14	52-60			Domestic		6/20/1974	9907 Crowslanding Road	37.494495°	37.494495°
MSC007				548744	5S	9E	16	5S9E16	140	133	17	113-133			Domestic	0-50	8/20/1994	9900 Crowslanding Road	37.495471°	-120.993943°
MSC008	Dicks Bar 1		02-1266	792133	5S	9E	17	5S9E17	175	136	20	116-136			Public	0-100	8/29/2002	9907 Crowslanding Road	37.494680°	-120.995140°
MSC009			07-103	966552	5S	9E	18	5S9E18	145	135	17	115-135			Domestic	0-42	6/19/2007	1343 W. Main St.	37.493427°	-121.019863°
MSC010			12-25	E0148642	5S	9E	17	5S9E17	280	220	18	200-220			Public	0-54	3/15/2012	9633 Crowslanding Road	37.497651°	-120.995535°
MSC011			12-77	E0152683	5S	9E	15	5S9E16	150	140	12	0-56			Domestic	0-56	5/21/2012	9467 Crowslanding Road	37.498897°	-120.993966°
MSC012	94602		15-19	e0269738	5S	9E	17	5S9E17	205	210	20	130-210			Irrigation	0-20	2/10/2015		37.500109°	-120.994860°
MSC013					5S	9E	17	5S9E17	130	130					Irrigation		12/1/1925		37.496585°	-120.999051°
MSC014				41137	5S	9E	18	5S9E18	60	60	16				Domestic		12/2/1958		37.507359°	-121.012902°
MSC015				73880	5S	9E	16	5S9E16	130	130	21				Domestic		8/9/1962		37.500325°	-120.994219°
MSC016			84-259	153752	5S	9E	17	5S9E17	135	135	16	115-135			Domestic		12/14/1984		37.503941°	-121.003652°
MSC017			86-265	164313	5S	9E	17	5S9E17	170	124	7	104-124			Domestic		10/9/1986		37.499485°	-120.999406°
MSC018			16 268	WCR2018-007656	5S	9E	18	5S9E18	200	200	10	80-100	120-200		Irrigation	0-30	1/31/2018	1500 Fulkerth	37.506425°	-121.014365°
MSC019			13-364	E0205786	5S	9E	18	5S9E18	200	130		50-130			Irrigation	0-20	3/28/2014	1501 W Main Avenue	37.494986°	-121.012659°
MSC020		7036018	14-571	E0317377	5S	9E	18	5S9E18	360	360	4	240-360			Irrigation	0-20	3/31/2015	1501 W. Main Avenue	37.496710°	-121.012689°
MSC021	2		02-136	815357	5S	9E	18	5S9E18	200	140	13	60-80	130-145		Dairy	0-50	6/14/2002	1866 West Fulkerth Road	37.505541°	-121.019650°
MSC022	1		98-210	813223	5S	9E	18	5S9E18	122	122	12	70-120				0-50	1/4/1999	1500 Fulkerth	37.505287°	-121.012972°
MSC023			5242	247057	5S	9E	18	5S9E18	220	152	8	92-152			Domestic	0-50	12/29/1982		37.507415°	-121.013658°
MSC024				96269	5S	9E	19	5S9E19	232	180		160-180			Domestic	0-60	8/19/1980		37.492415°	-121.013003°
MSC025				158899	5S	9E	20	5S9E20	143	107	28	97-107			Domestic	0-80	8/26/1976		37.485310°	-121.002120°
MSC026				247078	5S	9E	19	5S9E19	205	205					Test Well				37.489508°	-121.030475°
MSC027				495296	5S	9E	19	5S9E19	202	185	26	65-75	125-185		Irrigation	0-20	3/1/1994		37.480375°	-121.012887°
MSC028			1873	24612	5S	9E	20	5S9E20	114	68	15	58-68			Domestic	0-20	5/24/1977		37.485433°	-121.009003°
MSC029				29554	5S	9E	20	5S9E20	80	80	10				Domestic		10/5/1967		37.486049°	-120.995077°
MSC030				38881	5S	9E	20	5S9E20	64	64	15				Domestic				37.486150°	-121.005445°
MSC031				146832	5S	9E	17	5S9E17	120	117	24	105-117			Domestic			707 West Main	37.493488°	-121.006042°
MSC032				219653	5S	9E	20	5S9E20	127	84					Domestic		9/12/1982		37.485489°	-121.008385°
MSC033				242850	5S	9E	20	5S9E20	156	150		130-150			Domestic	0-20	5/16/1984		37.485136°	-120.999438°
MSC034			5193	243201	5S	9E	20	5S9E20	113	104	16	84-104			Domestic	0-20	9/7/1982		37.492695°	-120.997062°
MSC035				243987	5S	9E	20	5S9E20	115	100	8	800-100			Domestic	0-20			37.478864°	-120.999138°
MSC036			89-398	376966	5S	9F	20	5S9E20	162	130		110-130			Public	0-90	1/3/1990		37.491405°	-120.995701°
MSC037			98 109	700185	5S	9E	20	5S9E20	115	108	17	88-108			Domestic	0-33	7/22/1998		37.482924°	-120.995060°
MSC038	1		02 055	749718	5S	9E	20	5S9E20	160	140	32	130-148			Domestic	0-24	4/4/2002		37.486009°	-120.998619°
MSC039	95307		03-300	803431	5S	9F	20	5S9E20	125	120	14	100-120			Domestic	0-40	11/28/2003	10625 Crowslanding Road	37.483473°	-120.995113°
MSC040	1		99-014	811812	5S	9F	20	5S9E20	128	115	12	95-115			Domestic	0-42	1/30/1999	600 Ruble Rd	37.485242°	-121.001571°
MSC041	Mosier 1		02 180	815385	5S	9E	20	5S9E20	120	105	16	85-105			Domestic	0-20	9/6/2002	731 Ruble Road	37.486162°	-121.003382°
MSC042	Ruble	58004012	12 152	E0159994	5S	9E	20	5S9E20	175	144	30	94-144			Irrigation	0-50	8/31/2012	525 Ruble Road	37.489364°	-120.999097°
MSC043			14-246	23838	5S	9E	20	5S9E20										330 West Main	37.492023°	-120.998442°
MSC044				66834	5S	9E	20	5S9E20	280	255	40	80-255			Irrigation		5/21/1961		37.489369°	-120.994817°
MSC045				66836	5S	9E	20	5S9E20	270	225	40	40-145			Irrigation		7/13/1961		37.489403°	-120.995765°
MSC046			89 67	287357	5S	9E	20	5S9E20	310	300	30	100-180	260-300		Irrigation	0-20	4/11/1989		37.482053°	-121.005886°
MSC047			89-205	304019	5S	9E	20	5S9E20	172	145		125-145			Domestic	0-50	5/22/1989		37.486418°	-120.997554°
MSC048			94-179	547542	5S	9E	20	5S9E20	157	112	18	92-112			Domestic	0-64	8/11/1994		37.485417°	-121.004921°
MSC049				73890	5S	9E	21	5S9E21	163	163	12				Domestic		10/3/1962		37.491876°	-120.993397°
MSC050	MENDES		03-202	803774	5S	9E	21	5S9E21	155	107	22	87-107			Domestic	0-26	7/24/2003		37.488278°	-120.993972°
MSC051			05-069		5S	9E	21	5S9E21							Domestic		4/21/2005	10562 Crowslanding Road	37.484124°	-120.993767°
MSC052			07-135	1097589	5S	9E	21	5S9E21	180	140	20	100-140			Domestic	0-52	8/3/2007	10338 Crowslanding Road	37.487991°	-120.993879°
MSC053			85-99	173129	5S	9E	29	5S9E29	166	125	15	100-125			Domestic	0-60	5/17/1985	806 W. Linwood	37.478289°	-121.004016°
MSC054			85-99	700184	5S	9E	29	5S9E29	180	180	18	160-180			Domestic	0-82	7/25/1998	836 W. Linwood	37.478334°	-121.004677°

Water Well
Completion Reports

05S9E Section 16

#706224
055/09E-16 M
MSC001

WATER WELL DRILLERS REPORT

Page 1 of 1
Owner's Well No. 1
Date Work Began 10/12/98 , Ended 10/13/98
Local Permit Agency STANISLAUS COUNTY
Permit No. 98-173 Permit Date 10/12/98

GEOLOGIC LOG

Orientation VERTICAL
Depth to First Water 17

From	To	Description
0	8	SAND
8	17	CLAY
17	21	SAND
21	36	CLAY/SAND STREAKS
36	46	BLUE CLAY
46	53	TAN CLAY
53	56	SAND
56	69	CLAY
69	80	SAND/CLAY STREAKS
80	90	CLAY
90	94	SAND
94	101	CLAY
101	104	SAND
104	110	CLAY
110	115	SAND/CLAY STREAKS
115	119	CLAY
119	136	SAND
136	146	WHITE CLAY
146	153	SAND
153	160	CLAY
160	164	SAND
164	170	CLAY
170	184	BLUE CLAY

WELL OWNER

WELL LOCATION

9716 CROWS LANDING RD
CROWS LANDING
STAN

APN Book Page Parcel
Township Range Section
Latitude DegMinSec Longitude DegMinSec

ACTIVITY & PLANNED USE(S)

Activity: NEW WELL

Water Supply
☒ Domestic
☐ Public
☐ Irrigation
☐ Industrial

☐ Monitoring
☐ Test Well
☐ Cathodic Prot.
☐ Heat Exchange
☐ Direct Push

☐ Injection
☐ Vapor Extr.
☐ Sparging
☐ Remediation
☐ Other

Drilling
Method ROTARY Fluid MUD

WATER LEVEL & YIELD OF COMPLETED WELL

Depth of Date
Static Water Level 17 (Ft.) Measured 10/13/98
Estimated Yield (GPM) & Test Type
(May not be representative of a well's long-term yield.)
Test Length (Hrs.) Total Drawdown ____ (Ft.)
Depth of Boring 184 (Ft.) Depth of Completed Well 165 (Ft.)

Depth From Surface		Bore Hole Dia.	CASING(S)					Depth From Surface		ANNULAR MATERIAL	
Ft.	to Ft.	(in.)	Type	Material/ Grade	Internal Diameter (in.)	Gauge or Wall Thickness	Slot Size if Any (in.)	Ft.	to Ft.	Type	Filter Pa (type/siz
0	145	13	BLANK	PVC	8	160		0	90	BENTONITE	
145	165	13	SCREEN	PVC	8	160	.062	90	165		6X12

Attachments
☐ Geologic Log
☐ Well Const. Diag
☐ Geophysical Log
☐ Soil/Water Anal.
☐

CALWATER DRILLING CO., INC.

300 S. Kilroy Turlock CA 95380
Report Date 12/10/98 C 57 License No. 434218

MSC02

ORIGINAL
File Original, Duplicate and Triplicate with the
DIVISION OF WATER RESOURCES
P. O. BOX 1079
SACRAMENTO 5, CALIFORNIA

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

DIVISION OF WATER RESOURCES

5/9-16N1

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code) (CONT.)

SHEET 1

5S 9E 16N1

Do Not Fill In
State Well No. 5S/9E-16N1
Other Well No.
Region 5

(1) **Driller:**
Name Gust Olson
Address 309 Cahill
Turlock, Calif.
License No. Classification

Owner:
Name
Address

(2) **Proposed use or uses** *(check)*:
Domestic ☒
Irrigation ☐
Domestic and Irrigation ☐
Other
Municipal ☐
Industrial ☐
Test well ☐

(3) **Equipment used** *(check)*:
Rotary ☐
Cable ☒
Dug well ☐
Other

(4) **Type of work** *(check)*:
New well ☒
Reconditioning of well ☐
Deepening existing well ☐

(5) **Well log:**
Total depth of well 72 ft.

Give details of formations penetrated, such as silt, peat, muck, sand, gravel, clay, shale, sandstone, hardpan, rock. Include size of gravel (diameter) and sand (fine, medium, coarse), color of material, structure (loose, packed, cemented, soft, hard, brittle).

Depth From Ground Surface

ft.	to	1 ft.	soil
"	"	26 "	clay
"	"	5 "	fine sand
"	"	10 "	sand and clay
"	"	6 "	coarse sand
"	"	10 "	sand and clay
"	"	4 "	soft clay
"	"	10 "	hard clay
"	"	"	water sand

[illegible]
Section 7075.1, Water Code

If additional space is required, continue on DWR Form No. 246—Supplement, and attach to respective report copies.

(6) **Casing left in well:**

1-7

LENGTH FT.	DIAMETER INCHES	SINGLE, DOUBLE, WELDED, OTHER	LBS. PER FOOT OR GAGE OF CASING	SEATING BELOW GROUND SURFACE, FT.
62	7	single welded	14	
			.075	

Type and size of shoe or well ring 1-1 Welded joints—☒ Yes ☐ No
7 inch collar

D.W.R. FORM No. 248

REGIONAL WATER POLLUTION CONTROL BOARD COPY

33011 1-53 40M DUP SPO

State of California

Well Completion Report

Form DWR 188 Complete 10/16/2018
WCR2018-007332

MSC003

Owner's Well Number ______ Date Work Began 04/30/2018 Date Work Ended 07/06/2018

Local Permit Agency Stanislaus County Department of Environmental Resources

Secondary Permit Agency ______ Permit Number 17-220 Permit Date 11/09/2018

Well Owner (must remain confidential pursuant to Water Code 13752)

Name XXXXXXXXXXXXXXXXXXXX

Mailing Address XXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXX

City XXXXXXXXXXXXXXXXXXXX State XX Zip XXXXX

Planned Use and Activity

Activity New Well

Planned Use Water Supply Domestic

Well Location

Address 9912 N Crows Landing RD

City Crows Landing Zip 95313 County Stanislaus

Latitude ______ N Longitude ______ W

Deg. Min. Sec. Deg. Min. Sec.

Dec. Lat. 37.4946270 Dec. Long. -120.9942680

Vertical Datum ______ Horizontal Datum WGS84

Location Accuracy ______ Location Determination Method GPS

APN 002-039-020

Township 05 S

Range 09 E

Section 16

Baseline Meridian Mount Diablo

Ground Surface Elevation ______

Elevation Accuracy ______

Elevation Determination Method ______

Borehole Information

Orientation Vertical Specify ______

Drilling Method Direct Rotary Drilling Fluid Bentonite

Total Depth of Boring 200 Feet

Total Depth of Completed Well 200 Feet

Water Level and Yield of Completed Well

Depth to first water ______ (Feet below surface)

Depth to Static Water Level ______ (Feet) Date Measured ______

Estimated Yield* ______ (GPM) Test Type ______

Test Length ______ (Hours) Total Drawdown ______ (feet)

*May not be representative of a well's long term yield.

Geologic Log - Free Form

Depth from Surface Feet to Feet		Description
0	20	Clay w/sand
20	40	Hard clay
40	55	Clay
55	60	Clay w/sand
60	80	Hard clay
80	120	Clay w/sand
120	140	Clay w/coarse sand
140	160	Hard clay
160	180	Clay
180	200	Clay w/sand

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	60	Blank	PVC	OD: 8.625 in. | SDR: 21 | Thickness: 0.410 in.	0.41	8.625			
1	60	80	Screen	PVC	OD: 8.625 in. | SDR: 21 | Thickness: 0.410 in.	0.41	8.625	Bridge Slot	0.032	
1	80	100	Blank	PVC	OD: 8.625 in. | SDR: 21 | Thickness: 0.410 in.	0.41	8.625			
1	100	140	Screen	PVC	OD: 8.625 in. | SDR: 21 | Thickness: 0.410 in.	0.41	8.625	Bridge Slot	0.032	
1	140	200	Blank	PVC	OD: 8.625 in. | SDR: 21 | Thickness: 0.410 in.	0.41	8.625			

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	50	Bentonite	Other Bentonite		18 0/0
0	200	Filter Pack	8 x 16		

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	200	10.63

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name AARON'S WELL DRILLING INC
Person, Firm or Corporation

3800 SWANSON ROAD DENAIR CA 95316
Address City State Zip

Signed *electronic signature received* 08/29/2018 1010560
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

N W
Latitude Deg/Min/Sec Longitude Deg/Min/Sec

TRS:

APN:

ORIGINAL
File with DWR
Page 1 of 2

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. E0159997

DWR USE ONLY — DO NOT FILL IN
05S09E16
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. CROWSLANDING
Date Work Began 9/18/2012, Ended 9/20/2012
Local Permit Agency STANISLAUS CO DER
Permit No. 12-133 Permit Date 8/2/2012

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD ROTARY FLUID MUD

DEPTH FROM SURFACE Ft	to Ft	DESCRIPTION *Describe material, grain, size, color, etc.*
0	3	SAND
3	10	HARD PAN
10	15	SAND
15	17	CLAY
17	18	SAND
18	28	CLAY SAND ST
28	30	SAND
30	32	CLAY
32	37	SAND
37	41	CLAY SAND ST
41	55	SAND ST CLAY
55	56	SAND
56	62	CLAY
62	65	SAND
65	71	CLAY
71	77	SAND CLAY ST
77	80	CLAY
80	88	SAND ST
88	92	CLAY
92	98	SAND C
98	107	CLAY
107	109	SAND
109	112	CLAY
112	114	SAND
114	117	CLAY
117	118	SAND
118	120	CLAY
120	123	SAND FC
123	124	CLAY
124	125	SAND FC

TOTAL DEPTH OF BORING 222 (Feet)
TOTAL DEPTH OF COMPLETED WELL 200 (Feet)

WELL OWNER

MSC004

CITY STATE ZIP

WELL LOCATION

Address 9952 CROWSLANDING RD
City CROWSLANDING CA
County STANISLAUS
APN Book 022 Page 035 Parcel 005
Township ___ Range ___ Section ___
Latitude ___ DEG. MIN. SEC. ___ DEG. MIN SEC

LOCATION SKETCH

NORTH
WEST
EAST
SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

✓ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
___ Domestic ✓ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 24 (Ft.) & DATE MEASURED ___
ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft	to Ft	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	180	14.5	✓				PLASTIC	6"	SDR21	
180	200	14.5		✓			PLASTIC	6"	SDR21	.043

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft	to Ft	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	134		✓		
134	200		✓		8X16 GRAVEL

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analysis
___ Other
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME CALWATER DRILLING CO., INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
300 S. Kilroy Rd. Turlock CA 95380
ADDRESS CITY STATE ZIP
Signed ___ 10/02/12 434218
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 548744

Page ____ of ____

Owner's Well No. ____

Date Work Began 8/19/94, Ended 8/20/94

Local Permit Agency ____

Permit No. 94-191 Permit Date ____

DWR USE ONLY — DO NOT FILL IN

5/9-17 STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ___ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	6	Soil
6	14	Clay
14	25	Sand
25	45	Clay & Sand streaks
45	56	Sand
56	100	Clay & Shale
100	102	Sand
102	112	Clay & Shale
112	114	Sand
114	120	Clay
120	131	Sand
131	140	Clay

UNCONFINED

TOTAL DEPTH OF BORING 140 (Feet)

TOTAL DEPTH OF COMPLETED WELL 133 (Feet)

WELL OWNER

WSC007

WELL LOCATION

Address [redacted] 9900 Crows Landing Rd.

City Crows Landing

County Stanislaus

APN Book ____ Page ____ Parcel ____

or Township ____ Range ____ Section ____

or Latitude ____ NORTH DEG. MIN. SEC. Longitude ____ WEST DEG MIN. SEC.

LOCATION SKETCH

NORTH

WEST

EAST

SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

X Domestic

___ Public

___ Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD Rotary FLUID ____

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL 17 (Ft.) & DATE MEASURED ____

ESTIMATED YIELD* ____ (GPM) & TEST TYPE ____

TEST LENGTH ____ (Hrs.) TOTAL DRAWDOWN ____ (Ft.)

** May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	113	12	X	X			PVC	6	160	
113	133			X						.045

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	50		X		
50	133			X	Gravel

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other ____

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME MASELLIS DRILLING, INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

119 ALBERS RD. MODESTO, CA 95357
ADDRESS CITY STATE ZIP

Signed [redacted]
WELL DRILLER/AUTHORIZED REPRESENTATIVE

8/24/94 DATE SIGNED

668622 C-57 LICENSE NUMBER

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR
Page 1 of 1

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. E0152683

DWR USE ONLY — DO NOT FILL IN
05S09E17
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. CROWSLANDING
Date Work Began 5/18/2012, Ended 5/21/2012
Local Permit Agency STANISLAUS CO DER
Permit No. 12-77 Permit Date 5/11/2012

GEOLOGIC LOG

ORIENTATION (✓) [✓ VERTICAL] ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD ROTARY FLUID MUD

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain, size, color, etc.*
0	2	SAND
2	7	CLAY
7	10	SAND
10	12	CLAY
12	14	SAND
14	17	CLAY
17	21	SAND, CLAY STREAKS
21	38	CLAY, SAND STREAKS BROIWN/BLUE
38	44	SAND
44	64	CLAY
64	74	SAND
74	87	CLAY
87	90	VERY FINE SAND
90	95	CLAY
95	97	SAND
97	108	CLAY
108	109	SAND
109	111	CLAY
111	113	FINE COARSE SAND
113	116	CLAY
116	132	FINE COARSE SAND
132	135	CLAY
135	138	SAND
138	150	CLAY BROW TO BLUE

TOTAL DEPTH OF BORING 150 (Feet)
TOTAL DEPTH OF COMPLETED WELL 140 (Feet)

WELL OWNER

MSC11

CITY STATE ZIP

WELL LOCATION

Address 9467 CROWSLANDING ROAD
City CROWSLANDING CA
County STANISLAUS
APN Book ___ Page ___ Parcel ___
Township ___ Range ___ Section ___
Latitude ___ DEG. MIN. SEC. Longitude ___ DEG. MIN. SEC.

LOCATION SKETCH

NORTH
WEST EAST
COPY OF PERMIT ATTACHED
SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

[✓ NEW WELL]
MODIFICATION/REPAIR
Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
[✓ Domestic] ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

1

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 12 (Ft.) & DATE MEASURED 5/21/2012
ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	120	10 5/8"	✓				PLASTIC	6"	SDR26	
120	140	10 5/8"		✓			PLASTIC	6"	SDR26	.043

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	56		✓		
56	140				8X16 GRAVEL

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analysis
___ Other
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME CALWATER DRILLING CO. INC
(PERSON [redacted]
300 S. Kilroy [redacted] rlock CA 95380
ADDRESS CITY STATE ZIP
Signed WELL [redacted] 06/08/12 434218
DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

LOCATION NOT CHECKED

5/9- 17

ORIGINAL
File Original, Duplicate and Triplicate with the
REGIONAL WATER POLLUTION
CONTROL BOARD No.
(Insert appropriate number)

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

Do Not Fill In
№ 73880
State Well No.
Other Well No.

(1) OWNER:
Name
Address

(2) LOCATION OF WELL:
County Stanislaus Owner's number, if any—
R. F. D. or Street No.
past Mt View school and across the canal
to the first durt road the turn right.

(3) TYPE OF WORK (*check*):
New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (*check*):
Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☐
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:
SINGLE ☐ DOUBLE ☐
From ft. to 70 ft. 6 Diam. 12 Gage of Wall

If gravel packed
Diameter of Bore from ft. to ft.

Type and size of shoe or well ring
Size of gravel:
Describe joint

(7) PERFORATIONS:
Type of perforator used
Size of perforations in., length, by in.
From ft. to ft. Perf. per row Rows per ft.

(8) CONSTRUCTION:
Was a surface sanitary seal provided? ☐ Yes ☐ No To what depth ft.
Were any strata sealed against pollution? ☐ Yes ☐ No If yes, note depth of strata
From ft. to ft.
Method of Sealing

(9) WATER LEVELS:
Depth at which water was first found 21 ft. ft.
Standing level before perforating ft.
Standing level after perforating ft.

(10) WELL TESTS:
Was a pump test made? ☐ Yes ☐ No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.
Temperature of water Was a chemical analysis made? ☐ Yes ☐ No
Was electric log made of well? ☐ Yes ☐ No

(11) WELL LOG:

MSC015

Total depth 130 ft. Depth of completed well 130 ft.

Formation: *Describe by color, character, size of material, and structure.*

0	ft. to	4	ft.	top soil
4	"	6	"	hard pan
6	"	14	"	coarse sand
14	"	33	"	sand
33	"	35	"	soft clay
35	"	54	"	sand
54	"	68	"	fine sand
68	"	80	"	clay and soft clay
80	"	106	"	sand brown
106	"	107	"	Hard packed dand
107	"	112	"	brown med. sand
112	"	115	"	Hard gray clay
115	"	117	"	soft clay
117	"	122	"	soft clay
122	"	126	"	soft clay and sand
126	"	130	"	sand

Work started Aug. 3, 19 . Completed Aug. 9 1962

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Olson Plumbing and Well Drilling
(Person, firm, or corporation) (Typed or printed)
Address 1015 No. 99 highway
Turlock, Calif.

[SIGNED] [redacted]
Well Driller
License No. 110637 Dated Sept. 23, 1962

05S9E Section 17

WSC005

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER [illegible]
WATER WELL DRILLE[illegible]

Do not fill in

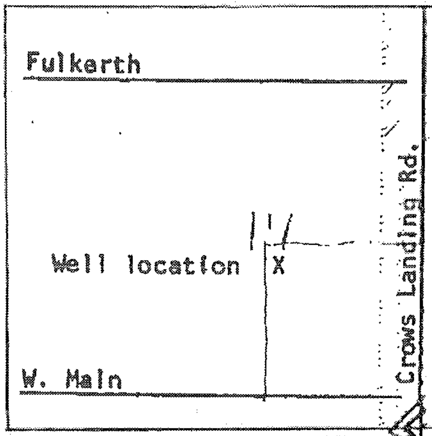
No. 33803

Notice of Intent No.
Local Permit No. or Date Impr. Dist. 1288 [illegible]

State Well No. 5/9-17Q2
Other Well No. 5-0455-7

(1) O
Address
City

(2) LOCATION OF WELL (See instructions):
County Stanislaus Owner's Well Number W 1509
Well address if different from above
Township 5S Range 9E Section SE¼ sec 17Q1
Distance from cities, roads, railroads, fences, etc. 1/4 mile N.W. of the intersection of W Main and Crows Landing Rd.



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic
Irrigation ☒
Industrial ☐
Test Well ☐
Stock
Municipal
Other ☐

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size Pea
Diameter of bore 28"
Packed from 0 to 435 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS: Moss Louvres
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	100	1[illegible]	1/4	100	150	10" 3/32
150	255		"	255	305	12"
305	355	12	3/16	355	[illegible]	12"
405	435	"	"	405	430	12"

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☐ No ☒ If yes, to depth ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion 7 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? FELCO
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test 25 ft. At end of test 74 ft
Discharge 2500 gal/min after 2 hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 435 ft. Depth of completed well 435 ft.

from ft. to ft.	Formation (Describe by color, character, size or material)
0 - 8	Top soil
8 - 19	Gray clay
19 - 20	Coarse sand
20 - 22	Brown sandy clay
22 - 30	Coarse sand
30 - 33	Gray clay
33 - 49	Blue sticky clay
49 - 51	Brittle sandy clay
51 - 52	Clay
52 - 54	Coarse sand
[illegible] - 96	Brown clay
96 - 98	Coarse sand
98 - 103	[illegible] clay
103 - 104	Sand
104 - 114	[illegible] gray clay
114 - 116	Coarse sand
116 - 12[illegible]	Hard [illegible] clay
123 - [illegible]	Coarse sand
[illegible] - 19[illegible]	[illegible]
[illegible] - 268	Blue clay
[illegible] - 273	Loose sand
273 - 277	Blue clay
277 - 27[illegible]	Coarse sand
27[illegible] - [illegible]	Coarse sand w/layers of clay
[illegible]	Coarse sand
[illegible]	Gray clay
[illegible] - 316	Blue clay
[illegible]	[illegible] sand w/ layers clay
[illegible]	[illegible]
331 - [illegible]	Sand
[illegible]	Brown clay
358 - 373	[illegible] and gravel
373 - 3[illegible]	Sandy clay
38[illegible] - 3[illegible]	Sand
3[illegible] - [illegible]	Clay
40[illegible] - 422	Gravel and sand
422 - 435	[illegible] clay

Work started [illegible] 19[illegible] Completed 5/16 1977

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge [redacted]
SIGNED
NAME F.E. Luhdorff Co./Division of Layne-Western
(Person, firm, or corporation) (Typed or printed)
Address P.O. Box 1326
City Woodland Zip 95659
License No. 334205 Date of this report 8-22-77

COMPOSITE

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 42818-950 7-76 60M QUAD OSP

Composite ([illegible])

5/9-17

MSC006

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do Not Fill In

№ 98949

State Well No.

Other Well No.

(1) OWNER:

Name

Address

(2) LOCATION OF WELL:

County Stanislaus Owner's number, if any

Township, Range, and Section T5S R9E

Distance from cities, roads, railroads, etc. 9907 CrowsLanding Rd. - 1/8 mi North of West Main Ave.

(3) TYPE OF WORK (check):

New Well ☒ Deepening ☐ Reconditioning ☐ Destroying ☐

If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☒
Cable ☐
Other ☐

(6) CASING INSTALLED:

STEEL X OTHER:
SINGLE ☒ DOUBLE ☐

From ft.	To ft.	Diam.	Gage or Wall	If gravel packed: Diameter of Bore	From ft.	To ft.
0	60	6-5/8	10	11	30	60

Size of shoe or well ring:

Size of gravel: pea

Describe joint welded

(7) PERFORATIONS OR SCREEN:

Type of perforation or name of screen slot

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
52	60			1/8 x 3"

(8) CONSTRUCTION:

Was a surface sanitary seal provided? Yes ☒ No ☐ To what depth 25 ft.

Were any strata sealed against pollution? Yes ☐ No ☐ If yes, note depth of strata

From ft. to ft.

From ft. to ft.

Method of sealing Bentonite

(9) WATER LEVELS:

Depth at which water was first found, if known ft.

Standing level before perforating, if known ft.

Standing level after perforating and developing 14 ft.

(10) WELL TESTS:

Was pump test made? Yes ☐ No ☒ If yes, by whom?

Yield: gal./min. with ft. drawdown after hrs.

Temperature of water Was a chemical analysis made? Yes ☐ No ☒

Was electric log made of well? Yes ☐ No ☒ If yes, attach copy

(11) WELL LOG: Co. Permit #457

UNCONFIRMED

Total depth 113 ft. Depth of completed well 60 ft.

Formation: *Describe by color, character, size of material, and structure*

ft. to ft.	
0-2	Sand
2-3	Clay
3-7	Sand
7-15	Clay
15-23	Sand
23-52	Clay
52-60	Sand
60-80	Clay & Shale
80-81	Sand
81-90	Clay
90-97	Sand
97-113	Clay & Shale

Work started 6-7 19 74. Completed 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Hennings Bros. Drilling Co., Inc.
(Person, firm, or corporation) *(Typed or printed)*

Address 2500 W. Rumbel Rd.
Modesto, Calif., 95350

[SIGNED] [redacted]
(Well Driller)

License No. 290813 Dated 6-20, 19 74

SKETCH LOCATION OF WELL ON REVERSE SIDE

DWR 188 (REV. 9-68)

25179-950 9-68 50M TRIP ΔD OSP

ORIGINAL
File with DWR
Page 1 of 1

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. **792133**

DWR USE ONLY — DO NOT FILL IN

05S/09E-17
STATE WELL NO./STATION NO.

LATITUDE ___ LONGITUDE ___

APN/TRS/OTHER ___

Owner's Well No. DICKS BAR 1

Date Work Began 8/28/2002, Ended 8/29/2002

Local Permit Agency STANISLAUS CTY DER

Permit No. 02-1266 Permit Date 8/13/2002

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD ROTARY FLUID MUD

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain, size, color, etc.*
0	15	CLAY & SAND STREAKS
15	30	SAND
30	54	CLAY SOME BLUE
54	55	SAND
55	95	CLAY
95	100	SAND
100	115	CLAY
115	123	SAND
123	130	CLAY
130	135	SAND
135	160	CLAY
160	172	SAND, FINE BLUE
172	175	CLAY BLUE

TOTAL DEPTH OF BORING 175 (Feet)

TOTAL DEPTH OF COMPLETED WELL 136 (Feet)

WELL OWNER

MSC 008

WELL LOCATION

Address 9907 CROWSLANDING RD.

City CROWSLANDING CA 95313

County Stanislaus

APN Book ___ Page ___ Parcel ___

Township ___ Range ___ Section ___

Latitude ___ DEG. MIN. SEC. Longitude ___ DEG. MIN. SEC.

LOCATION SKETCH

NORTH

WEST

EAST

SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

✓ NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
___ Domestic ✓ Public
___ Irrigation ___ Industrial

MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 20 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 18 (Ft.) & DATE MEASURED 8/29/2002

ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	116	11	✓				PLASTIC	6	SDR 26	
116	136	11		✓			PLASTIC	6	SDR 26	.058

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	100		✓		
100	136				8X16

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analysis
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME CALWATER DRILLING CO., INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

300 S. Kilroy Rd. Turlock CA 95380
ADDRESS CITY STATE ZIP

Signed [redacted] 11/03/02 434218
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

Page 1 of 2

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. E0148642

DWR USE ONLY — DO NOT FILL IN

05J09E17

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

Owner's Well No. CROWSLANDING

Date Work Began 3/7/2012, Ended 3/15/2012

Local Permit Agency STANISLAUS CO DER

Permit No. 12-25 Permit Date 2/15/2012

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD ROTARY FLUID MUD

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain, size, color, etc.*
0	6	SAND
6	18	CLAY
18	25	SAND
25	30	CLAY
30	35	SAND
35	55	BLUE CLAY
55	58	SAND
58	72	BROWN CLAY
72	84	SAND
84	95	CLAY, SAND STREAKS
95	102	SAND
102	110	CLAY, SAND STREAKS
110	114	SAND
114	120	CLAY
120	124	FINE SAND
124	132	CLAY
132	138	SAND
138	142	CLAY
142	152	COARSE SAND
152	158	CLAY
158	160	SAND-BLOW
160	165	BLUE CLAY
165	170	BLACK BLOW SAND
170	207	BLUE CLAY
207	212	POSSIBLE SAND
212	214	CLAY
214	217	POSSIBLE SAND
217	235	BLUE CLAY
235	238	VERY FINE WHITE BLOW SAND
238	240	BLUE CLAY

TOTAL DEPTH OF BORING 280 (Feet)

TOTAL DEPTH OF COMPLETED WELL 220 (Feet)

WELL OWNER

MSC010

CITY STATE ZIP

WELL LOCATION

Address 9633 CROWSLANDING ROAD

City CROWSLANDING CA

County STANISLAUS

APN Book ___ Page ___ Parcel ___

Township ___ Range ___ Section ___

Latitude ___ DEG. MIN. SEC. ___ DEG. MIN. SEC.

LOCATION SKETCH

NORTH

WEST

EAST

COPY OF PERMIT ATTACHED

SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

✓ NEW WELL

MODIFICATION/REPAIR
- ___ Deepen
- ___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
- ___ Domestic ✓ Public
- ___ Irrigation ___ Industrial

MONITORING ___

TEST WELL ___

CATHODIC PROTECTION ___

HEAT EXCHANGE ___

DIRECT PUSH ___

INJECTION ___

VAPOR EXTRACTION ___

SPARGING ___

REMEDIATION ___

OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 18 (Ft.) & DATE MEASURED 3/15/2012

ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	200	12 1/4"	✓				PLASTIC	6"	SDR26	
200	220	12 1/2"		✓			PLASTIC	6"	SDR26	.043

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	54		✓		
54	220				8X16 GRAVEL

ATTACHMENTS (✓)

- ___ Geologic Log
- ___ Well Construction Diagram
- ___ Geophysical Log(s)
- ___ Soil/Water Chemical Analysis
- ___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME CALWATER DRILLING CO., INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

300 S. K [redacted] Turlock CA 95380
ADDRESS CITY STATE ZIP

Signed ___ 04/19/12 434218
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

Page 1 of 1

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. e0269738

1/2

DWR USE ONLY — DO NOT FILL IN

05S/09E-17

STATE WELL NO./ STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

Owner's Well No. 94602

Date Work Began 3/16/2015, Ended 2/10/2015

Local Permit Agency Environmental Resources

Permit No. 15-19 Permit Date 2/10/2015

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD ROTARY FLUID Mud

DEPTH FROM SURFACE Ft	to Ft	DESCRIPTION *Describe material, grain, size, color, etc.*
0	4	Top Soil
4	6	Sand
6	23	Clay
23	45	Sand
45	58	Blue Clay
58	61	Sand
61	67	Brown Clay
67	72	Sand
72	91	Clay
91	137	Sand
137	139	Clay
139	205	Sand

TOTAL DEPTH OF BORING 205 (Feet)

TOTAL DEPTH OF COMPLETED WELL 210 (Feet)

WELL OWNER

MSC012

WELL LOCATION

Address Crowslanding Rd

City Corwslanding CA

County Stanislaus

APN Book ___ Page ___ Parcel ___

Township ___ Range ___ Section ___

Latitude ___ DEG. MIN. SEC. Longitude ___ DEG. MIN. SEC.

LOCATION SKETCH

NORTH

WEST EAST

SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

✓ NEW WELL

MODIFICATION/REPAIR
Deepen
Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
___ Domestic ___ Public
✓ Irrigation ___ Industrial

MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 20 (Ft.) & DATE MEASURED 5/22/2015

ESTIMATED YIELD * ___ (GPM) & TEST TYPE

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN (Ft.)

May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	130	24	✓				STEEL	16	1/4	
130	210			✓						.050

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	20	✓			
20	210			✓	GRAVEL

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analysis
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME MASELLIS DRILLING INC
(PE [redacted] R PRINTED)

ADDRESS CITY STATE ZIP

Signed WELL DRILLER/AUTHORIZED REPRESENTATIVE 06/04/15 DATE SIGNED C-57 LICENSE NUMBER

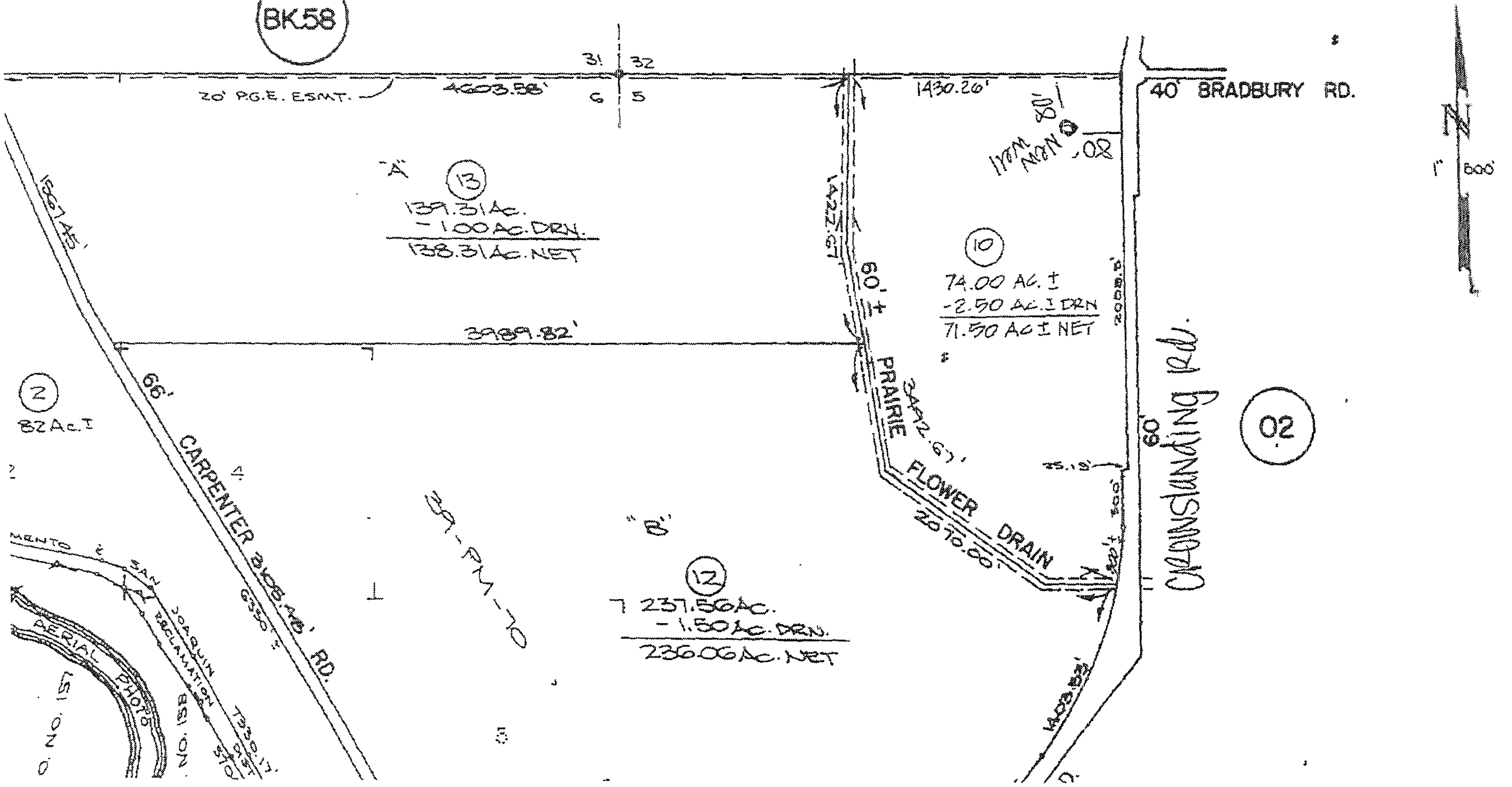
DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

SECTIONS 5,6,7 & 8 T.6S. R.9E. M.D.B.& M.

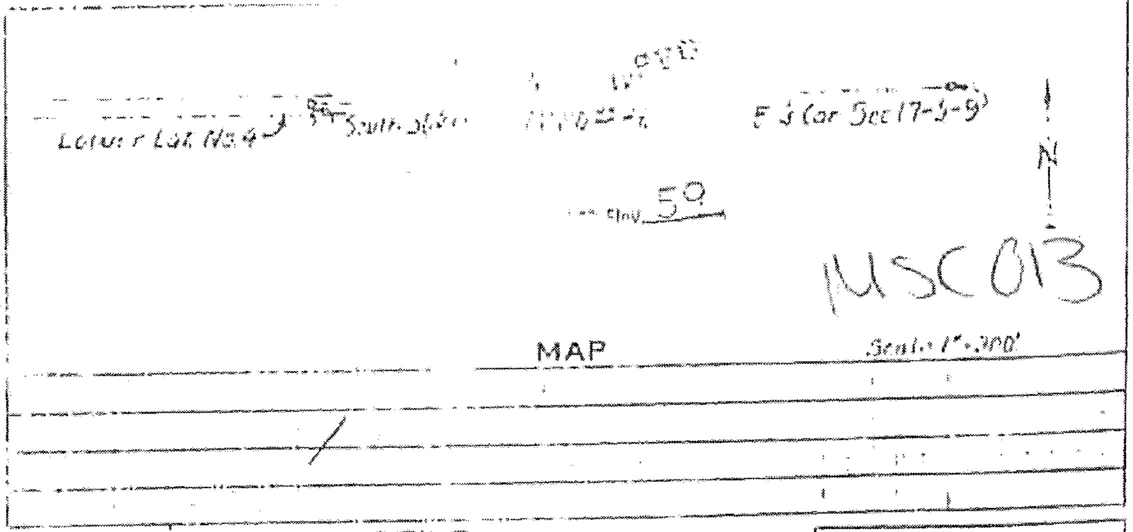
083 013
083 037

57-01



5/9-17J1 (G5)

DRAINAGE WELL NO. 60.



1MSC013

SERGI RANCH

LOCATION Sec. 17-5-9. In NE¼ of SE¼.

DRILLED BY: T.I.D. 130' deep

DATE: Dec 1925.

No pipe line.

REMARKS: New well drilled by T.I.D. 12' SW of old well March 1933. Same log 144' deep.

71' of 15" M.I. Casing

Tested with air pump 1400 gpm 35' drawdn

1250 33

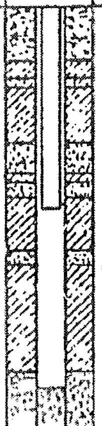
1140 32.6

1000 30

CONFIDENTIAL
Water Code Sec. 13752

	50	100	200
G			
S	5	11	
F			
[illegible]	12		
C	25	32	
	140	50	

LOG



Casing	Depth	Type of Soil		
	10	Soil	12	Cp
72' of 14" Hart.	20	Clay	6	C
	30	Sand	5	S
	40	Clay	11	C
	50	Sand	10	S
	60	Clay Sand	3 6	C S
	70	Clay	11	C
	80	Sand	4	S
	90			
	100	Clay	30	C
	110			
	120			
	130	Sand		
	140			
	150			
	160			
	170			
	180			
	190			
	200			
	210			
	220			
	230			
	240			
	250			
	260			
	270			
	280			
	290			
	300			

11SC0116

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in
No. 153752
State Well No. 5/9-17
Other Well No.

Notice of Intent No.
Local Permit No. or Date 84-259

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752

UNCONFINED

(1) OWNER: Name
Address
City

(2) LOCATION OF WELL (See instructions):
County Stanislaus Owner's Well Number
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc. ¼ Mi. South of Fulkerth Rd. west side

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size Sand & Gravel
Diameter of bore 13"
Packed from 50 to 135 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	135	8	160	115	135	Screen

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing Bentonite

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion 16 ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☒ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 135 ft. Depth of completed well 135 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	2	Sandy Soil
2	5	Hard Pan
5	15	Clay
15	19	Sand
19	20	Clay
20	25	Sand
25	45	Clay
45	53	Sand
53	65	Clay
65	78	Sand
78	115	Clay & Shale
115	128	Sand
128	135	Shale

Work started Dec. 14 19 84 Completed 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED [redacted]
(Well Driller)

NAME HENNINGS BROS. DRILLING CO., INC.
(Person, firm, or corporation) (Typed or printed)
Address 3525 PELANDALE AVE.
City MODESTO, CA Zip 95356
License No. 290818 Date of this report DEC. 19, 1984

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

MSC017

ORIGINAL

File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 164313

State Well No. 5/9-17

Other Well No.

Notice of Intent No.

Local Permit No. or Date 86-265

(1) OWNER: Name

Address

City

(2) LOCATION OF WELL (See instructions):

County Stanislaus Owner's Well Number

Well address if different from above

Township Range Section

Distance from cities, roads, railroads, fences, etc. ¼ MI. West of Crows Landing Rd. south side

WELL LOCATION SKETCH

(3) TYPE OF WORK:

New Well ☒ Deepening ☐

Reconstruction ☐

Reconditioning ☐

Horizontal Well ☐

Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE

Domestic ☐

Irrigation ☐

Industrial ☐

Test Well ☐

Stock ☐

Municipal ☐

Other ☐

(5) EQUIPMENT:

Rotary ☒ Reverse ☐

Cable ☐ Air ☐

Other ☐ Bucket ☐

(6) GRAVEL PACK:

Yes ☒ No ☐ Size Sand & Gravel

Diameter of bore 11"

Packed from 35 to 124 ft.

(7) CASING INSTALLED:

Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:

Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	124	6	160	104	124	Screen

(9) WELL SEAL:

Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 35 ft.

Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.

Method of sealing Bentonite

(10) WATER LEVELS:

Depth of first water, if known ft.

Standing level after well completion 7 ft.

(11) WELL TESTS:

Was well test made? Yes ☐ No ☒ If yes, by whom?

Type of test Pump ☐ Bailer ☐ Air lift ☐

Depth to water at start of test ft. At end of test ft

Discharge gal/min after hours Water temperature

Chemical analysis made? Yes ☐ No ☒ If yes, by whom?

Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG:

Total depth 170 ft. Depth of completed well 124 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	3	Sandy Soil
3	4	Hard Pan
4	18	Clay
18	25	Sand
25	53	Clay
53	57	Sand
57	110	Clay
110	120	Fine Sand
120	135	Clay
135	144	Fine Sand
144	170	Clay

UNCONFINED

Work started Oct. 9 1986 Completed 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED [redacted]
(Well Driller)

NAME HENNINGS BROS. DRILLING CO., INC.
(Person, firm, or corporation) (Typed or printed)

Address 3525 PELANDALE AVE.

City MODESTO, CA Zip 95356

License No. 290813 Date of this report OCT. 22, 1986

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752

05S9E Section 18

ORIGINAL
File with DWR

Page 1 of 1

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. **0966552**

DWR USE ONLY — DO NOT FILL IN 1/2

05S/09E-17

STATE WELL NO./ STATION NO.

LATITUDE | LONGITUDE

APN/TRS/OTHER

Owner's Well No. 95380

Date Work Began 6/6/2007, Ended 6/19/2007

Local Permit Agency Environmental Resources

Permit No. 07-103 Permit Date 5/30/2007

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD ROTARY FLUID Mud

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain, size, color, etc.*
0	3	Top Soil
3	10	Clay
10	15	Sand
15	24	Clay
24	30	Sand
30	61	Clay
61	63	Sand
63	102	Clay
102	110	Sand
110	121	Clay
121	130	Sand
130	145	Clay

TOTAL DEPTH OF BORING 145 (Feet)

TOTAL DEPTH OF COMPLETED WELL 135 (Feet)

WELL OWNER

MSC090

WELL LOCATION

Address 1343 W. Main St.

City Crowslanding CA

County Stanislaus

APN Book ___ Page ___ Parcel ___

Township ___ Range ___ Section ___

Latitude ___ DEG. MIN. SEC. Longitude ___ DEG. MIN. SEC.

LOCATION SKETCH

NORTH

WEST

EAST

SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

✓ NEW WELL

MODIFICATION/REPAIR
- ___ Deepen
- ___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
- ✓ Domestic ___ Public
- ___ Irrigation ___ Industrial

MONITORING ___

TEST WELL ___

CATHODIC PROTECTION ___

HEAT EXCHANGE ___

DIRECT PUSH ___

INJECTION ___

VAPOR EXTRACTION ___

SPARGING ___

REMEDIATION ___

OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

1

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 17 (Ft.) & DATE MEASURED 6/7/2007

ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	115	12	✓				PLASTIC	6	160	
115	135			✓						.045

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	42		✓		
42	135			✓	GRAVEL

ATTACHMENTS (✓)

- ___ Geologic Log
- ___ Well Construction Diagram
- ___ Geophysical Log(s)
- ___ Soil/Water Chemical Analysis
- ___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME MASELLIS DRILLING INC.
(PERSON, FIRM OR CORPORATION) (TYPED OR PRINTED)

119 Albers Rd. [redacted] Modesto CA 95357
ADDRESS CITY STATE ZIP

Signed ___ 06/19/07 668622
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File Original, Duplicate and Triplicate with the
REGIONAL WATER POLLUTION
CONTROL BOARD No. 5
(Insert appropriate number)

5/9-17

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

MSC G14

LOCATION NOT CHECKED

Do Not Fill In

№ 41137

State Well No.
Other Well No. 5S/9E-17

(1) OWNER:

Name
Address

(2) LOCATION OF WELL:

County Stanislaus Owner's number, if any—
R. F. D. or Street No.
Near N. E. Corner of Sec. 17
T. 9 E., T. 5 S.

(3) TYPE OF WORK (*check*):

New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (*check*):

Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☐
Cable ☒
Dug Well ☐

(6) CASING INSTALLED:

SINGLE ☒ DOUBLE ☐

From ft.	to ft.	Diam.	Gage of Wall
0	56	7"	12

If gravel packed

Diameter of Bore	from ft.	to ft.

Type and size of shoe or well ring 7"x4x½
Size of gravel:
Describe joint Welded

(7) PERFORATIONS:

Type of perforator used None
Size of perforations in., length, by in.

From ft.	to ft.	Perf. per row	Rows per ft.

(8) CONSTRUCTION:

Was a surface sanitary seal provided? ☐ Yes ☐ No To what depth ft.
Were any strata sealed against pollution? ☐ Yes ☐ No If yes, note depth of strata
From ft. to ft.
Method of Sealing

(9) WATER LEVELS:

Depth at which water was first found 16 ft.
Standing level before perforating ft.
Standing level after perforating ft.

(10) WELL TESTS:

Was a pump test made? ☐ Yes ☐ No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.
Temperature of water Was a chemical analysis made? ☐ Yes ☐ No
Was electric log made of well? ☐ Yes ☐ No

(11) WELL LOG:

Total depth 60 ft. Depth of completed well 60 ft.
Formation: Describe by color, character, size of material, and structure.

ft. to	ft.	
0	4	Top Soil
4	8	Hard Pan
8	16	Clay
16	32	Sand
32	36	Clay
36	52	Sand
52	60	Clay
60		Sand

CONFIDENTIAL
Section 7076.1, Water Code

Work started 12/1/58 19 , Completed 12/2/58 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Osterberg & Carroll
(Person, firm, or corporation) (Typed or printed)
Address 2537 River Road
Modesto, California

[SIGNED] [redacted]
Well Driller

License No. 87245 Dated ✓ 19

DWR FORM NO. 248 (REV. 3-54)

State of California

Well Completion Report

Form DWR 188 Auto-Completed 11/5/2018
WCR2018-007565

MSC018

Owner's Well Number Date Work Began 01/17/2018 Date Work Ended 01/31/2018

Local Permit Agency Stanislaus County Department of Environmental Resources

Secondary Permit Agency Permit Number 16-268 Permit Date 10/28/2016

Well Owner (must remain confidential pursuant to Water Code 13752)

Name XXXXXXXXXXXXXXXXXXX

Mailing Address XXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXX

City XXXXXXXXXXXXXXXXXXX State XX Zip XXXXX

Planned Use and Activity

Activity New Well

Planned Use Water Supply Irrigation - Agriculture

Well Location

Address 1500 fulkerth

City crows landing Zip 95313 County Stanislaus

Latitude Deg. Min. Sec. N Longitude Deg. Min. Sec. W

Dec. Lat. 37.5062654 Dec. Long. -121.0142309

Vertical Datum Horizontal Datum WGS84

Location Accuracy Location Determination Method

APN 022033005

Township 05 S

Range 09 E

Section 18

Baseline Meridian Mount Diablo

Ground Surface Elevation

Elevation Accuracy

Elevation Determination Method

Borehole Information

Orientation Vertical Specify

Drilling Method Direct Rotary Drilling Fluid Bentonite

Total Depth of Boring 200 Feet

Total Depth of Completed Well 200 Feet

Water Level and Yield of Completed Well

Depth to first water 12 (Feet below surface)

Depth to Static Water Level 10 (Feet) Date Measured 01/31/2018

Estimated Yield* 500 (GPM) Test Type Air Lift

Test Length 2 (Hours) Total Drawdown (feet)

*May not be representative of a well's long term yield.

Geologic Log - Free Form

Depth from Surface Feet to Feet		Description
0	60	fine sand
60	120	fine/coarse sand and clay
120	190	coarse sand
190	200	blue clay

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description
1	0	80	Blank	PVC	OD: 16.000 in. | SDR: 17 | Thickness: 0.941 in.	0.941	16			
1	80	100	Screen	PVC	OD: 16.000 in. | SDR: 17 | Thickness: 0.941 in.	0.941	16	Milled Slots	0.05	
1	100	120	Blank	PVC	OD: 16.000 in. | SDR: 17 | Thickness: 0.941 in.	0.941	16			
1	120	200	Screen	PVC	OD: 16.000 in. | SDR: 17 | Thickness: 0.941 in.	0.941	16	Milled Slots	0.05	

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description
0	30	Cement	10.3 Sack Mix		
30	200	Filter Pack	Other Gravel Pack	5/16	gravel

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	200	25

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name M & M WELL DRILLING
Person, Firm or Corporation

4981 SHADOW HILLS SOUTH EAST — TURNER — OR — 97392
Address — City — State — Zip

Signed *electronic signature received* — 09/05/2018 — 947562
C-57 Licensed Water Well Contractor — Date Signed — C-57 License Number

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

N — Latitude Deg/Min/Sec

W — Longitude Deg/Min/Sec

TRS:

APN:

ORIGINAL
File with DWR

Page 1 of 1

Owner's Well No. MAIN

Date Work Began 3/27/2014, Ended 3/28/2014

Local Permit Agency STANISLAUS CO DER

Permit No. 13-364 Permit Date 4/1/2014

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. **E0205786**

DWR USE ONLY --- DO NOT FILL IN

0 5 S 0 9 E 1 8

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD ROTARY FLUID MUD

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain, size, color, etc.*
0	2	TOP SOIL
2	4	CLAY
4	10	SAND
10	12	CLAY
12	20	SAND
20	30	CLAY BROWN
30	49	BLUE CLAY
49	56	SAND
56	58	CLAY BROWN
58	72	SAND
72	82	BROWN CLAY
82	98	SAND COARSE
98	110	CLAY BROWN
110	114	SAND
114	118	CLAY BROWN
118	125	SAND
125	137	CLAY BROWN
137	144	FINE SAND
144	180	BROWN CLAY
180	200	BLUE CLAY

TOTAL DEPTH OF BORING 200 (Feet)

TOTAL DEPTH OF COMPLETED WELL 130 (Feet)

WELL OWNER

NSC019

WELL LOCATION

Address 1501 W MAIN AVE

City CROWSLANDING CA

County STANISLAUS

APN Book 022 Page 034 Parcel 005

Township 05 S Range 09 E Section 18

Latitude ___ DEG. MIN. SEC. Longitude ___ DEG. MIN. SEC.

LOCATION SKETCH

NORTH

WEST EAST

SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

✓ NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
___ Domestic ___ Public
✓ Irrigation ___ Industrial

MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___

ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	50	24"	✓				PLASTIC	16"	SDR21	
50	130	24"		✓			PLASTIC	16"	SDR21	.050

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	20	✓			
20	130				BIRDS EYE

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analysis
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME CALWATER DRILLING CO., INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

300 S. Kilroy Rd [redacted] CA 95380
ADDRESS STATE ZIP

Signed WELL DRILLER/AUTHORIZED REPRESENTATIVE 04/04/14 DATE SIGNED 434218 C-57 LICENSE NUMBER

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0317377

Page 1 of 1

Owner's Well Number

Date Work Began 03/16/2015 Date Work Ended 3/31/2015

Local Permit Agency Stanislaus County Dept of Environmental Resources

Permit Number 14-571 Permit Date 11/26/14

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

NSC 020

Geologic Log

Orientation ● Vertical ○ Horizontal ○ Angle Specify

Drilling Method Direct Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
0	3	Top Soil
3	5	Sand
5	20	Clay
20	100	Sand/Clay
100	151	Sand/Layers of Clay
151	192	Sticky Clay
192	360	Sand/Clay

Total Depth of Boring 360 Feet

Total Depth of Completed Well 360 Feet

Well Location

Address 1501 W. Main Ave (West Side of Crows Landing)

City Crows Landing County Stanislaus

Latitude Deg Min. Sec N Longitude Deg Min. Sec W

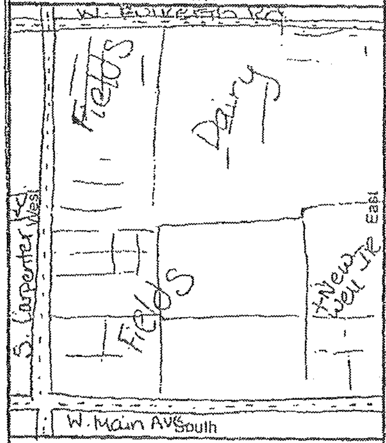
Datum Dec. Lat. Dec. Long.

APN Book 002 Page 036 Parcel 018

Township Range Section

Location Sketch

(Sketch must be drawn by hand after form is printed.)



Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

● New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

● Water Supply
☐ Domestic ☐ Public
☑ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured 03/31/2015

Estimated Yield * (GPM) Test Type Air Lift

Test Length 4.0 (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size If Any (Inches)
0	240	25	Blank	PVC	.941	16		
240	360	25	Screen	PVC	.941	16	Milled Slots	0.050

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	20	Bentonite	Quick Grout
20	360	Filter Pack	3/8" Pea Gravel

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name M&M Well Drilling-Mike Merritt
Person, Firm or Corporation

4981 Shadow Hills Dr. SE Turner OR 97392
Address City State Zip

Signed [redacted] 7/26/2016 947562
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR
Page 1 of 1

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. **815357**

DWR USE ONLY — DO NOT FILL IN

055/09E-18

STATE WELL NO / STATION NO

LATITUDE LONGITUDE

APN/TRS/OTHER

Owner's Well No. 2
Date Work Began 06/12/02, Ended 06/14/02
Local Permit Agency STANISLAUS COUNTY DER
Permit No. 02-136 Permit Date 06/10/02

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD ROTARY FLUID MUD

DEPTH FROM SURFACE Ft	to Ft	DESCRIPTION *Describe material, grain, size, color, etc.*
0	2	SOIL
2	4	BLUE CLAY
4	10	SAND
10	14	GRAY CLAY
14	20	RED CLAY
20	25	SAND
25	30	RED CLAY
30	40	BLUE CLAY
40	63	SAND
63	65	GRAY CLAY
65	77	SAND
77	100	GRAY CLAY
100	135	RED CLAY
135	140	SAND
140	180	GRAY CLAY
180	200	BLUE CLAY

TOTAL DEPTH OF BORING 200 (Feet)
TOTAL DEPTH OF COMPLETED WELL 145 (Feet)

WELL OWNER

USC 021

Address 1866 WEST FULKERTH ROAD
City CROWS LANDING CA 95313
County Stanislaus
APN Book ___ Page ___ Parcel ___
Township ___ Range ___ Section ___
Latitude ___ DEG. MIN SEC. Longitude ___ DEG MIN SEC

LOCATION SKETCH

NORTH
WEST
EAST
SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

✓ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG

PLANNED USES (✓)

WATER SUPPLY
___ Domestic ___ Public
___ Irrigation ___ Industria
MONITORING
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ✓
DAIRY

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 13 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 13 (Ft.) & DATE MEASURED 06/14/02
ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft	to Ft	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	60	16	✓				PLASTIC	8	SDR26	
60	80	16		✓			PLASTIC	8	SDR26	.070
80	130	16	✓				PLASTIC	8	SDR26	
130	145	16		✓			PLASTIC	8	SDR26	.070

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	50		✓		
50	145				6 x 16

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analysis
___ Other ___
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief
NAME CALWATER DRILLING CO., INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
300 S. Kilroy Rd. Turlock CA 95380
ADDRESS CITY STATE ZIP
Signed [redacted] 08/01/02 434218
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 11-97 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

#813223

055/09E

WATER WELL DRILLERS REPORT

Page 1 of 2
Owner's Well No. 1
Date Work Began 12/04/98 , Ended 01/04/99
Local Permit Agency STANISLAUS COUNTY
Permit No. 98-210 Permit Date 12/23/98

GEOLOGIC LOG

Orientation VERTICAL
Depth to First Water 12

From	To	Description
0	3	VERY FINE SAND
3	5	HARD PAN
5	17	VERY FINE SAND
17	27	CLAY STREAKS/SAND
27	37	CLAY
37	40	VERY FINE TO COARSE SAND
40	42	BLUE CLAY
42	47	VERY FINE TO COARSE SAND
47	50	CLAY
50	52	SAND
52	57	CLAY
57	59	VERY FINE TO COARSE SAND
59	73	CLAY/SAND STREAKS
73	75	VERY FINE SAND
75	78	CLAY
78	81	SAND
81	84	CLAY
84	85	SAND
85	86	CLAY
86	89	SAND
89	95	CLAY
95	100	FINE SAND
100	101	CLAY
101	102	FINE SAND
102	104	CLAY
104	108	FINE SAND
108	113	CLAY
113	114	SAND
114	118	CLAY
118	122	RED SAND

WELL OWNER

MSC022

WELL LOCATION

1500 FULKERTH RD
CROWS LANDING
STAN

APN Book Page Parcel
Township Range Section
Latitude Longitude
DegMinSec DegMinSec

ACTIVITY & PLANNED USE(S)

Activity: NEW WELL

Water Supply	[ ] Monitoring	[ ] Injection
[ ] Domestic	[ ] Test Well	[ ] Vapor Extr.
[ ] Public	[ ] Cathodic Prot.	[ ] Sparging
[ ] Irrigation	[ ] Heat Exchange	[ ] Remediation
[ ] Industrial	[ ] Direct Push	[ ] Other

Drilling
Method ROTARY Fluid WATER

WATER LEVEL & YIELD OF COMPLETED WELL

Depth of Date
Static Water Level 12 (Ft.) Measured 01/04/99
Estimated Yield (GPM) & Test Type
(May not be representative of a well's long-term yield.)
Test Length (Hrs.) Total Drawdown ____ (Ft.)
Depth of Boring 187 (Ft.) Depth of Completed Well 120 (Ft.)

Depth From Surface		Bore Hole Dia. (in.)	CASING(S)					Depth From Surface		ANNULAR MATERIAL	
Ft.	to Ft.		Type	Material/ Grade	Internal Diameter (in.)	Gauge or Wall Thickness	Slot Size if Any (in.)	Ft.	to Ft.	Type	Filter Pa (type/siz
0	70	20	BLANK	PVC	10	160		0	50	BENTONITE	
70	120	20	SCREEN	PVC	10	160	.062	50	120		6X12

Attachments
[ ] Geologic Log
[ ] Well Const. Diag
[ ] Geophysical Log
[ ] Soil/Water Anal.
[ ]

CALWATER DRILLING CO., INC.

300 S. Kilroy Turlock CA 95380
Report Date 02/22/99 C 57 License No. 434218

WATER WELL DRILLERS REPORT

Page 2 of 2
Owner's Well No. 1
Date Work Began 12/04/98 , Ended 01/04/99
Local Permit Agency STANISLAUS COUNTY
Permit No. 98-210 Permit Date 12/23/98

GEOLOGIC LOG

Orientation VERTICAL
Depth to First Water 12

From	To	Description
122	126	CLAY
126	128	RED SAND
128	137	CLAY/SAND STREAKS
137	138	SAND
138	140	CLAY
140	144	SAND
144	187	BROWN CLAY

WELL OWNER

WELL LOCATION

1500 FULKERTH RD
CROWS LANDING
STAN

APN Book Page Parcel
Township Range Section
Latitude DegMinSec Longitude DegMinSec

ACTIVITY & PLANNED USE(S)

Activity: NEW WELL

Water Supply	[ ] Monitoring	[ ] Injection
[ ] Domestic	[ ] Test Well	[ ] Vapor Extr.
[ ] Public	[ ] Cathodic Prot.	[ ] Sparging
[ ] Irrigation	[ ] Heat Exchange	[ ] Remediation
[ ] Industrial	[ ] Direct Push	[ ] Other

Drilling
Method ROTARY Fluid WATER

WATER LEVEL & YIELD OF COMPLETED WELL

Depth of Date
Static Water Level 12 (Ft.) Measured 01/04/99
Estimated Yield (GPM) & Test Type
(May not be representative of a well's long-term yield.)
Test Length (Hrs.) Total Drawdown ____ (Ft.)
Depth of Boring 187 (Ft.) Depth of Completed Well 120 (Ft.)

Depth From Surface Ft.	to Ft.	Bore Hole Dia. (in.)	CASING(S) Type	Material/ Grade	Internal Diameter (in.)	Gauge or Wall Thickness	Slot Size if Any (in.)	Depth From Surface Ft.	to Ft.	ANNULAR MATERIAL Type	Filter Pa (type/siz
0	70	20	BLANK	PVC	10	160		0	50	BENTONITE	
70	120	20	SCREEN	PVC	10	160	.062	50	120		6X12

Attachments
[ ] Geologic Log
[ ] Well Const. Diag
[ ] Geophysical Log
[ ] Soil/Water Anal.
[ ]

CALWATER DRILLING CO., INC.

300 S. Kilroy Turlock CA 95380
Report Date 02/22/99 C 57 License No. 434218

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

MSC023

Do not fill in
No. 247057
State Well No. 5/9-18
Other Well No.

Notice of Intent No.
Local Permit No. or Date 5242

CONFIDENTIAL NOT FOR PUBLIC USE WATER CODE SEC. 13752

UNCONFINED

[redacted]

(1) OWNER: Name
Address
City

(2) LOCATION OF WELL (See instructions):
County Stanislaus Owner's Well Number
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc. W. Fulkerth Rd.- 1 mile east of Carpenter Rd., south side

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☒
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK: Sand & gravel
Yes ☒ No ☐ Size
Diameter of bore 13"
Packed from 50 to 152 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	152	8	160	92	152	screen

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing Bentonite

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion 8 ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☒ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG. Total depth 220 ft. Depth of completed well 152 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	9	Clay
9	15	Sand
15	18	Sand Clay
18	28	Sand
28	45	Clay
45	55	Sand
55	93	Clay & shale
93	98	Sand
98	108	Clay & shale
108	111	Sand
111	120	Clay
120	123	Fine sand
123	128	Shale
128	134	Sand
134	140	Shale
140	145	Sand-fine
145	210	Shale & clay
210	220	Blue clay

Work started 12-29 1982 Completed 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED [redacted]
(Well Driller)

NAME Hennings Bros. Drilling Co., Inc.
(Person, firm, or corporation) (Typed or printed)
Address 3525 Pelandale Ave.
City Modesto, Ca. Zip 95356
License No. 290813 Date of this report 1-17-83

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

05S9E Section 19

MSC024

ORIGINAL

File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 096269

State Well No. 5/9-19

Other Well No. /

Notice of Intent No.

Local Permit No. or Date

(1

Ad

Cit

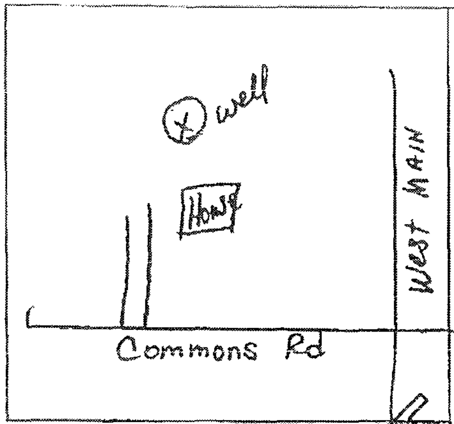
(2) LOCATION OF WELL (See instructions):

County Stanislaus Owner's Well Number

Well address if different from above

Township Range Section

Distance from cities, roads, railroads, fences, etc.



WELL LOCATION SKETCH

(3) TYPE OF WORK:

New Well ☑ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:

Domestic ☑
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:

Rotary ☑ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:

Yes ☑ No ☐ Size [illegible]

Diameter of bore

Packed from 120 to 180 ft.

(7) CASING INSTALLED:

Steel ☐ Plastic ☑ Concrete ☐

(8) PERFORATIONS:

Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	180	6	160PRC	160	180	.018"

(9) WELL SEAL:

Was surface sanitary seal provided? Yes ☑ No ☐ If yes, to depth 60 ft.

Were strata sealed against pollution? Yes ☑ No ☐ Interval ft.

Method of sealing Bentonite

(10) WATER LEVELS:

Depth of first water, if known ft.

Standing level after well completion ft.

(11) WELL TESTS:

Was well test made? Yes ☐ No ☑ If yes, by whom?

Type of test Pump ☐ Bailer ☐ Air lift ☐

Depth to water at start of test ft. At end of test ft

Discharge gal/min after hours Water temperature

Chemical analysis made? Yes ☐ No ☑ If yes, by whom?

Was electric log made? Yes ☐ No ☑ If yes, attach copy to this report

(12) WELL LOG: Total depth 232 ft. Depth of completed well 180 ft.

from ft. to ft. Formation (Describe by color, character, size or material)

0	2	Top Soil
2	17	Clay
17	23	Sand & Clay
23	35	S
35	48	C
48	55	S
55	94	C
94	95	S
95	98	C
98	106	S
106	111	C
111	113	S
113	115	C
115	130	[illegible]
130	152	C
152	168	Blue S
168	183	"
183	206	[illegible]
206	216	S
216	224	C
224	228	S
228	232	

CONFIDENTIAL

NOT FOR PUBLIC USE

WATER CODE SEC. 13752

UNCONFINED

Work started 8/18 19 80 Completed 8/19 19 80

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge a[redacted]

SIGNED (Well Driller)

NAME [redacted] (Person, firm, or corporation) (Typed or printed)

Address

City Zip

License No. 321252 Date of this report 8/22/80

DWR 188 (REV 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

MSC 0260

Do not fill in

No. 247078

State Well No. 5/9-19

Other Well No.

Notice of Intent No.

Local Permit No. or Date

(1) OWNER: Nam

Address

City

Zip

(2) LOCATION OF WELL (See instructions):

County Stanislaus

Owner's Well Number

Well address if different from above

Township Range Section

Distance from cities, roads, railroads, fences, etc. Carpenter Rd.- South of West Main

WELL LOCATION SKETCH

(3) TYPE OF WORK:

New Well ☒ Deepening ☐

Reconstruction ☐

Reconditioning ☐

Horizontal Well ☐

Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:

Domestic ☐

Irrigation ☐

Industrial ☐

Test Well Hole ☒

Stock ☐

Municipal ☐

Other ☐

(5) EQUIPMENT:

Rotary ☐ Reverse ☐

Cable ☐ Air ☐

Other ☐ Bucket ☐

(6) GRAVEL PACK:

Yes ☐ No ☒ Size

Diameter of bore

Packed from to ft.

(7) CASING INSTALLED:

Steel ☐ Plastic ☐ Concrete ☐

(8) PERFORATIONS:

Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size

(9) WELL SEAL:

Was surface sanitary seal provided? Yes ☐ No ☐ If yes, to depth ft.

Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.

Method of sealing

(10) WATER LEVELS:

Depth of first water, if known ft.

Standing level after well completion ft.

(11) WELL TESTS:

Was well test made? Yes ☐ No ☐ If yes, by whom?

Type of test Pump ☐ Bailer ☐ Air lift ☐

Depth to water at start of test ft. At end of test ft

Discharge gal/min after hours Water temperature

Chemical analyses made? Yes ☐ No ☐ If yes, by whom?

Was electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 205 ft. Depth of completed well ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	10	Clay
10	12	Sand
12	17	Clay
17	25	Sand
25	74	Blue sand
74	78	Clay
78	111	Blue sand-fine
111	120	Blue clay
120	169	Sand-fine
169	170	Clay
170	172	Blue sand
172	188	Blue clay
188	189	Fine sand
189	195	Blue clay
195	199	Fine sand
199	205	Blue clay

Work started 2-11 1983 Completed 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED (Well Driller)

NAME Hennings Bros. Drilling Co.,Inc.
(Person, firm, or corporation) (Typed or printed)

Address 3525 Pelandale Ave.

City Modesto, Ca. Zip 95356

License No. 290813 Date of this report 2-17-83

CONFIDENTIAL

NOT FOR PUBLIC USE

WATER CODE SEC. 13752

UNCONFINED

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED. USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

5/9-19

Page 1 of 1

Owner's Well No.

Date Work Began ______ , Ended March, 1994

Local Permit Agency Stanislaus Co. Dept. of Env. Resources

Permit No. 94-64 Permit Date 3-11-94

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 495296

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ______ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	7	Clay
7	14	Sand
14	24	Clay w/sand
24	51	Sand w/clay streaks
51	66	Shale & Clay
66	74	Coarse brown sand
74	97	Clay & shale
97	100	Sand
100	112	Clay & shale
112	117	Sand w/clay
117	125	Clay & shale
125	132	Coarse brown sand
132	136	Sand w/red clay
136	145	Gray & red clay
145	154	Sand w/some clay
154	172	Gray clay
172	180	Coarse brown sand
180	185	Fine blue sand w/clay
185	202	Blue clay w/fine blue sand

UNCONFINED

TOTAL DEPTH OF BORING 202 (Feet)

TOTAL DEPTH OF COMPLETED WELL 185 (Feet)

WELL OWNER

Name MSC 0 [illegible] 27

Mailing

CITY STATE ZIP

WELL LOCATION

Address Same

City

County Stanislaus

APN Book ______ Page ______ Parcel ______

or Township ______ Range ______ Section ______

or Latitude ___ DEG. ___ MIN. ___ SEC. NORTH Longitude ___ DEG. ___ MIN. ___ SEC. WEST

LOCATION SKETCH

NORTH

WEST

EAST

SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

___ Domestic

___ Public

X Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD Mud rotary FLUID Water

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL 26 (Ft.) & DATE MEASURED 3-25-94

ESTIMATED YIELD* ______ (GPM) & TEST TYPE ______

TEST LENGTH ______ (Hrs.) TOTAL DRAWDOWN ______ (Ft.)

* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL/GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	65	14"	X				PVC	8"	160	
65	75	"		X			"	"	"	.062
75	125	"	X				"	"	"	
125	185	"		X			"	"	"	.062

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	20		X		
20	185				4X12 sand

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other ______

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Calwater Drilling Co., Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

300 S. Kilroy Turlock, CA. 95380
ADDRESS CITY STATE ZIP

Signed [redacted] ,Bkkpr. 3-31-94 434218
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

05S9E Section 20

5/9-19 MSC025

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do Not Fill In

№ 158899

State Well No.

Other Well No.

(1) OWNER:

Name

Address

(2) LOCATION OF WELL:

County Stanislaus Owner's number, if any

Township, Range, and Section T5S R9E

Distance from cities, roads, railroads, etc. Ruble Rd. ½mi. West of Crowslanding Rd.

(3) TYPE OF WORK (*check*):

New Well ☒ Deepening ☐ Reconditioning ☐ Destroying ☐

If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (*check*):

Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☒
Cable ☐
Other ☐

(6) CASING INSTALLED:

STEEL: SINGLE ☐ DOUBLE ☐ OTHER: plastic

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	From ft.	To ft.
				If gravel packed		
0	107	6	160W	11	67	107

Size of shoe or well ring:

Size of gravel: pea

Describe joint glued

(7) PERFORATIONS OR SCREEN:

Type of perforation or name of screen hand cut

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
97	107			

(8) CONSTRUCTION:

Was a surface sanitary seal provided? Yes ☒ No ☐ To what depth 80 ft.

Were any strata sealed against pollution? Yes ☐ No ☐ If yes, note depth of strata

From ft. to ft.

From ft. to ft.

Method of sealing Cement

(9) WATER LEVELS:

Depth at which water was first found, if known ft.

Standing level before perforating, if known ft.

Standing level after perforating and developing 28 ft.

(10) WELL TESTS:

Was pump test made? Yes ☐ No ☒ If yes, by whom?

Yield: gal./min. with ft. drawdown after hrs.

Temperature of water Was a chemical analysis made? Yes ☐ No ☒

Was electric log made of well? Yes ☐ No ☒ If yes, attach copy

(11) WELL LOG: Permit #1347

Total depth 143 ft. Depth of completed well 107 ft.

Formation: *Describe by color, character, size of material, and structure*

ft. to ft.	
0-4	Top soil
4-15	Sand
15-20	Clay
20-26	Sand
26-30	Clay
30-33	Sand
33-54	Clay
54-66	Sand
66-71	Clay
71-73	Sand
73-78	Clay
78-80	Sand
80-95	Clay
95-103	Sand
103-108	Clay
108-110	Sand
110-113	Clay
113-115	Sand
115-123	Clay
123-126	Sand
126-130	Clay
130-135	Sand
135-143	Clay

UNCONFINED

Work started 8-24 1976, Completed 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Hennings Bros. Drilling Co., Inc.
(Person, firm, or corporation) (Typed or printed)

Address 2500 W. Rumble Rd.
Modesto, Calif. 95350

[SIGNED] [redacted]
(Well Driller)

License No. 290813 Dated 9-24, 1976

SKETCH LOCATION OF WELL ON REVERSE SIDE

5-73 80M TRIP OSP

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

MSC028

Do not fill in

No. 24612

State Well No. 5/9-20
Other Well No.

Notice of Intent No.
Local Permit No. or Date 1873

CONFIDENTIAL NOT FOR PUBLIC USE WATER CODE SEC. 13752

(1) O

Address
City

(2) LOCATION OF WELL (See instructions):

County Sta nislaus Owner's Well Number
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc. On Ruble Rd. west of Crows Landing Rd. ¼ mile south of West Main.

WELL LOCATION SKETCH

(3) TYPE OF WORK:

New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:

Domestic ☒
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:

Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:

Yes ☒ No ☐ Size birds eye
Diameter of bore 10
Packed from 38 to 68 ft.

(7) CASING INSTALLED:

Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:

Type of perforation or size of screen hand cut

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	68	[illegible]	160W	58	68	

(9) WELL SEAL:

Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 20 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing Bentonite

(10) WATER LEVELS:

Depth of first water, if known ft.
Standing level after well completion 15 ft.

(11) WELL TESTS:

Was well test made? Yes ☐ No ☒ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG:

Total depth 114 ft. Depth of completed well 68 ft.

from ft. to ft.	Formation (Describe by color, character, size or material)
0- 4	Sandy soil
4- 8	Shale
8- 18	Shale & sand
18- 29	Clay
29- 40	Sand
40- 54	Blue clay
54- 62	Sand
62- 94	Clay
94-101	Clay & sand
101-108	Sand
108-114	Coarse sand

UNCONFINED

Work started 5-24 1977 Completed 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED [redacted]
(Well Driller)

NAME Hennings Bros. Drilling Co., Inc.
(Person, firm, or corporation) (Typed or printed)
Address 3525 Pelandale Ave.
City Modesto, CA. Zip 95350
License No. 290813 Date of this report 8-1-77

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 43818-950 7-76 50M QUAD OSP

5/9-20 MSC078

ORIGINAL
File with DWR

WATER WELL DRILLERS REPORT

(Sections 7079, 7080, 7081, 7082, Water Code)

THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

Do Not Fill In

Nº 29554

State Well No.

Other Well No. 5S/9E-20

(1) OWNER:

Name

Address

(2) LOCATION OF WELL:

County Stanislaus Owner's number, if any

Township, Range, and Section

Distance from cities, roads, railroads, etc.

1/2 mile So. West main on Crows Landing west side of Road.

(3) TYPE OF WORK (check):

New Well ☒ Deepening ☐ Reconditioning ☐ Destroying ☐

If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☐
Cable ☒
Other ☐

(6) CASING INSTALLED:

STEEL: OTHER:
SINGLE ☒ DOUBLE ☐

If gravel packed

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	From ft.	To ft.
0	50	6 5/8	12			

Size of shoe or well ring: Size of gravel:

Describe joint

(7) PERFORATIONS OR SCREEN:

Type of perforation or name of screen

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.

(8) CONSTRUCTION:

Was a surface sanitary seal provided? Yes ☐ No ☐ To what depth ft.

Were any strata sealed against pollution? Yes ☐ No ☐ If yes, note depth of strata

From ft. to ft.

From ft. to ft.

Method of sealing

(9) WATER LEVELS:

Depth at which water was first found, if known 10 ft.

Standing level before perforating, if known ft.

Standing level after perforating and developing ft.

(10) WELL TESTS:

Was pump test made? Yes ☐ No ☐ If yes, by whom?

Yield: gal./min. with ft. drawdown after hrs.

Temperature of water Was a chemical analysis made? Yes ☐ No ☐

Was electric log made of well? Yes ☐ No ☐ If yes, attach copy

(11) WELL LOG:

Total depth 80 ft. Depth of completed well ft.

Formation: *Describe by color, character, size of material, and structure*

ft. to ft.	
0-15.	Top soil.
15-42	Brown Sand.
42-60	Clay
60-80	gray sand.

CONFIDENTIAL
Water Code Sec. 7030

Work started 4/29 1967. Completed 10/5 1967.

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Olson's Plumbing & Heating
(Person, firm, or corporation) (Typed or printed)

Address 1015 No. 99 Hwy.
Turlock, Calif.

[SIGNED]
(Well Driller)

License No. 110637 Dated 10/19/67, 19

SKETCH LOCATION OF WELL ON REVERSE SIDE

DWR 188 (REV. 9-65)

86391-060 10-63 50M TRIP ① △ OSP

5/9-20

DUPLICATE
File Original, Duplicate and Triplicate with the
REGIONAL WATER POLLUTION
CONTROL BOARD No.________
(Insert appropriate number)

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

646

LOCATION NOT CHECKED

Do Not Fill In
Nº 38881

State Well No.________
Other Well No. 5S/7E-30

M5(030)

(1) OWNER:

Name
Address

(2) LOCATION OF WELL:

County Stanislaus Owner's number, if any—
R. F. D. or Street No. Ruble Road, Turlock, California

(3) TYPE OF WORK (*check*):

New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (*check*):

Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☐
Cable ☒
Dug Well ☐

(6) CASING INSTALLED:

SINGLE ☒ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall
	40	6"	

If gravel packed

Diameter of Bore	from ft.	to ft.

Type and size of shoe or well ring
Size of gravel:
Describe joint

(7) PERFORATIONS:

Type of perforator used
Size of perforations in., length, by in.

From ft.	to ft.	Perf. per row	Rows per ft.

(8) CONSTRUCTION:

Was a surface sanitary seal provided? ☐ Yes ☐ No To what depth ft.
Were any strata sealed against pollution? ☐ Yes ☐ No If yes, note depth of strata
From ft. to ft.
Method of Sealing

(9) WATER LEVELS:

Depth at which water was first found 15 ft.
Standing level before perforating ft.
Standing level after perforating ft.

(10) WELL TESTS:

Was a pump test made? ☐ Yes ☐ No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.
Temperature of water Was a chemical analysis made? ☐ Yes ☐ No
Was electric log made of well? ☐ Yes ☐ No

(11) WELL LOG:

Total depth 64 ft. Depth of completed well 64 ft.

Formation: Describe by color, character, size of material, and structure.

ft.	to ft.		
0	3	5a	top soil
3	16	25	sand
16	36	1	soft clay & sand
36	60	3	blue clay
60	64	25	sand

CONFIDENTIAL
Section 7076.1 Water Code

Work started 19 Completed 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME OLSON'S PLUMBING & WELL DRILLING
(Person, firm, or corporation) (Typed or printed)
Address 1015 NO. 99 HIGHWAY, TURLOCK

[Signed] [redacted]
Well Driller

License No. 110637 Dated January 16, 1958

DWR FORM No. 240 (REV. 3-54)

5/9 - 20

IUS(031

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do Not Fill In

№ 146832

State Well No.

Other Well No.

(1) OWNER:

Name

Address

(2) LOCATION OF WELL:

County Stanislaus Owner's number, if any

Township, Range, and Section T5S R9E

Distance from cities, roads, railroads, etc. 707 West Main-¼mi West of CrowsLanding Rd.

(3) TYPE OF WORK (check):

New Well ☒ Deepening ☐ Reconditioning ☐ Destroying ☐

If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☒ Industrial ☐ Municipal ☐

Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☒

Cable ☐

Other ☐

(6) CASING INSTALLED:

STEEL: SINGLE ☐ DOUBLE ☐ OTHER: plastic

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	If gravel packed From ft.	To ft.
0	117	6	160w	11	90	117

Size of shoe or well ring: Size of gravel: pea

Describe joint glued

(7) PERFORATIONS OR SCREEN:

Type of perforation or name of screen hand cut

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
105	117			

(8) CONSTRUCTION:

Was a surface sanitary seal provided? Yes ☒ No ☐ To what depth 20 ft.

Were any strata sealed against pollution? Yes ☐ No ☐ If yes, note depth of strata

From ft. to ft.

From ft. to ft.

Method of sealing Bentonite

(9) WATER LEVELS:

Depth at which water was first found, if known ft.

Standing level before perforating, if known ft.

Standing level after perforating and developing 24 ft.

(10) WELL TESTS:

Was pump test made? Yes ☐ No ☒ If yes, by whom?

Yield: gal./min. with ft. drawdown after hrs.

Temperature of water Was a chemical analysis made? Yes ☐ No ☒

Was electric log made of well? Yes ☐ No ☒ If yes, attach copy

(11) WELL LOG: Unconfirmed Permit #1025

Total depth 120 ft. Depth of completed well 117 ft.

Formation: *Describe by color, character, size of material, and structure*

ft. to ft.	
0-5	Top soil
5-13	Clay & shale
13-15	Sand
15-30	Clay & shale
30-36	Sand
36-37	Blue clay
37-43	Blue sand
43-50	Blue clay
50-51	Clay
51-55	Sand
55-66	Clay
66-75	Sand
75-105	Clay
105-114	Sand
114-120	Clay

Work started 8-18 1975, Completed 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Hennings Bros. Drilling Co., Inc.
(Person, firm, or corporation) (Typed or printed)

Address 2500 W. Rumble Rd.
Modesto, Calif. 95350

[SIGNED] [redacted]
(Well Driller)

License No. 290813 Dated 9-18, 1975

SKETCH LOCATION OF WELL ON REVERSE SIDE

DWR 188 (REV. 9-68)

16-73 80M TRIP ⓘ OSP

ORIGINAL
File with DWR

Notice of Intent No.
Local Permit No. or Date

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

USC032

Do not fill in
No. 219653
State Well No. 5S/9-20
Other Well No.

(1) O
Address
City

(2) LOCATION OF WELL (See instructions):
County Owner's Well Number
Well address if different from above 1100 Ruble Rd:
Township Crows Landing Ca: Stanislaus Cty.
Distance from cities, roads, railroads, fences, etc.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☐ Size
Diameter of bore
Packed from to ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☐ No ☐ If yes, to depth ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing Bentonite

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 127 ft. Depth of completed well 84 ft.
from ft. 0 to 127 Formation (Describe by color, character, size or material)

0	-	6	Clay
6	-	15	Sand
15	-	35	Clay
35	-	37	Fine Blue Sand
37	-	41	Blue Clay
41	-	73	Clay
73	-	80	Sand
80	-	97	Clay
97	-	105	Sand w/Clay Strata
105	-	127	Clay

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752
UNCONFINED

Work started 19 Completed 9/13 1988

WE[redacted] this report is true to the best of my know

SIGN Bkkpr:
(Well Driller)

NAME Calwater Drilling Co., inc:
(Typed or printed)
Address 300 So. Kilroy Rd:
City Turlock, California 95380
License No. 431218 Date of this report 9/26

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

Notice of Intent No.
Local Permit No. or Date

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

MSC033

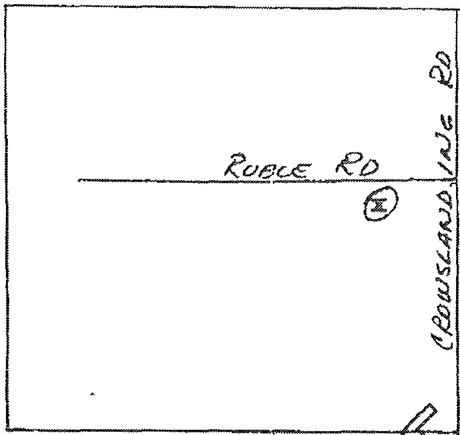
Do not fill in

No. 242850

State Well No. 5/9-20
Other Well No.

(1) OW
Address
City

(2) LOCATION OF WELL (See instructions):
County Stan. Owner's Well Number
Well address if different from above 1/4 Mi. E. of 624 Ruble
Township 5S Range 9E Section 20
Distance from cities, roads, railroads, fences, etc.



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☒
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size Roof
Diameter of bore 12
Packed from 80 to 150 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	150	6	PVC160	130	150	saw

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 20 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☑ No ☐ If yes, by whom? us
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test ft. At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 156 ft. Depth of completed well 150 ft.

from ft.	to	ft.	Formation (Describe by color, character, size or material)
0	-	4	topsoil
4	-	8	hardpan
8	-	17	sand
17	-	19	clay
19	-	22	sand
22	-	29	clay
29	-	33	sand
33	-	37	clay
37	-	39	sand
39	-	55	clay (blue)
55	-	78	clay (brn.)
78	-	94	Sand (Set)
94	-	130	clay
130	-	144	sand
144	-	146	clay
146	-	148	sand (set)
148	-	156+	clay

Work started 5/15 1984 Completed 5/16 1984

WELL DRILLER'S STATEMENT:
This [redacted] true to the best of my kno
Sig
(Well Driller)
NAME OSTERBERG & STEWART, INC.
(Person, firm, or corporation) (Typed or printed)
Address 2523 River Rd.
City Modesto, Ca. Zip 95351
License No. 446670 Date of this report 5/16/84

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752

UNCONFINED

MSC034

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in
No. 243201
State Well No. 5/9-20
Other Well No.

Notice of Intent No.
Local Permit No. or Date 5193

CONFIDENTIAL

NOT FOR PUBLIC USE
WATER CODE SEC. 13752

UNCONFINED

(1) OWNI

Address
City
Zip

(2) LOCATION OF WELL (See instructions):

County Stanislaus Owner's Well Number
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc. West Main - 600' West of Crows Landing - south side

WELL LOCATION SKETCH

(3) TYPE OF WORK:

New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:

Domestic
Irrigation ☐
Industrial ☐
Test Well ☐
Stock
Municipal ☐
Other ☐

(5) EQUIPMENT:

Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:

Yes ☒ No ☐ Size Roofing Gravel
Diameter of bore 11"
Packed from 20 to 104 ft.

(7) CASING INSTALLED:

Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:

Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage of Wall	From ft.	To ft.	Slot size
0	104	6	160	84	104	screen

(9) WELL SEAL:

Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 20 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ft.
Method of sealing bentonite

(10) WATER LEVELS:

Depth of first water, if known ft.
Standing level after well completion 16' ft.

(11) WELL TESTS:

Was well test made? Yes ☐ No ☒ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG:

Total depth 113 ft. Depth of completed well 104 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	3	topsoil
3	6	hardpan
6	15	sand
15	17	clay
17	22	sand
22	27	clay
27	35	sand & clay streaks
35	45	clay
45	47	sand
47	63	clay
63	67	sand
67	83	clay
83	85	fine sand
85	92	clay
92	98	sand
98	113	clay

Work started 9-7-82 19 Completed 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED [redacted]
(Well Driller)

NAME Hennings Bros. Drilling Co., Inc.
(Person, firm or corporation) (Typed or printed)
Address 3525 Pelandale Ave.
City Modesto, 95356
License No. 290813 Date of this report 20-82

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

MSC035

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in
No. 243987
State Well No. 5/9-20
Other Well No.

Notice of Intent No.
Local Permit No. or Date 5452

(1) OWNER: Name
Address
City

(2) LOCATION OF WELL (See instructions):
County Stanislaus Owner's Well Number
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc. 1 Mi. South of WestMan
west side

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☒
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size Sand
Diameter of bore 1 ft
Packed from 20 to 100 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	100	6	160	80	100	Screen

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 20 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing Bentonite

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion 8 ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☒ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 115 ft. Depth of completed well 100 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	5	Top Soil
5	10	Clay
10	40	Sand
40	90	Blue Sand
90	95	Blue Clay
95	115	Blue Sand
115		Clay

Work started Nov. 1 1983 Completed 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED [redacted]
(Well Driller)

NAME HENNINGS BROS. DRILLING CO., INC.
(Person, firm, or corporation) (Typed or printed)
Address 3525 PELANDALE AVE.
City MODESTO, CA Zip 95356
License No. 290813 Date of this report Nov. 7, 1983

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752

UNCONFINED

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

MSC036

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 326966

Notice of Intent No.
Local Permit No. or Date 89-398

State Well No. 5/9-20
Other Well No.

(1) OWNER:
Name
Address
City

(2) LOCATION OF WELL (See instructions):
County Stanislaus Owner's Well Number
Well address if different from above
Township Crows Landing, Ca. Range Section
Distance from cities, roads, railroads, fences, etc.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic Public ☒
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☐
Other ☒
(Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☒ Size 6-12 Sand
Diameter of bore 13"
Packed from 90 to 130 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	130	8"	160 PVC	110	130	

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 90 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing Bentonite

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG:
Total depth 162 ft. Completed depth 130 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	4	Sand
4	8	Clay
8	17	Sand
17	58	Clay
58	61	Sand
61	89	Clay
89	92	Sand
92	95	Clay
95	100	Sand
100	113	Clay
113	115	Sand
115	117	Clay
117	123	Sand
123	128	Clay andsand streaks
128	162	Clay

CONFIDENTIAL

NOT FOR PUBLIC USE

WATER CODE SEC. 13752

UNCONFINED

Work started 19 Completed 1-3 19 90

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed [redacted], Bkkpr.
(Well Driller)

NAME Calwater Drilling Co., Inc.
(Person, firm, or corporation) (Typed or printed)
Address 300 S. Kilroy
City Turlock, Ca. ZIP 95380
License No. 321252 Date of this report 1-16-90

DWR 188 (REV. 12-86)

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

86 96355

ORIGINAL
File with DWR
Page 1 of 1
Owner's Well No. 1
Date Work Began 07/21/98, Ended 07/22/98
Local Permit Agency
Permit No. 98-109 Permit Date

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 700185

DWR USE ONLY — DO NOT FILL IN
55/9E-20
STATE WELL NO./STATION NO.
LATITUDE
LONGITUDE
APN/TRS/OTHER

MSC037

GEOLOGIC LOG

ORIENTATION (✓) ___ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD ___ FLUID ___

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	2	Soil
2	10	clay
10	13	Sand
13	18	Clay
18	22	Sand
22	50	Clay
50	58	Sand
58	80	Clay
80	81	Sand
81	83	Clay
83	86	Sand
86	95	Clay
95	108	Sand
108	115	Clay

TOTAL DEPTH OF BORING 115 (Feet)
TOTAL DEPTH OF COMPLETED WELL 108 (Feet)

WELL LOCATION

Address 10625 Crowslanding Rd.
City Crowslanding
County Stanislaus
APN Book ___ Page ___ Parcel ___
Township ___ Range ___ Section ___
Latitude ___ NORTH DEG. MIN. SEC. Longitude ___ WEST DEG. MIN. SEC.

LOCATION SKETCH

NORTH
WEST
EAST
SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

PLANNED USES (✓)

WATER SUPPLY
X Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 17 (Ft.) & DATE MEASURED ___
ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
* *May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	88	12	X				PLASTIC	6	160	
88	108			X						.045

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	33		X		
33	108			X	GRAVEL

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME MASELLIS DRILLING, INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

119 Albers Rd. Modesto CA 95357
ADDRESS CITY STATE ZIP

Signed [redacted]
WELL DRILLER/AUTHORIZED REPRESENTATIVE
07/29/98 DATE SIGNED
668622 C-57 LICENSE NUMBER

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR
Page 1 of 1
Owner's Well No. 1
Date Work Began 04/03/02, Ended 04/04/02
Local Permit Agency Stanislaus Co DER
Permit No. 02-055 Permit Date 03/11/02

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 749718

DWR USE ONLY — DO NOT FILL IN
5S/9E-20
STATE WELL NO./STATION NO.
LATITUDE
LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD ROTARY FLUID MUD

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION Describe material, grain, size, color, etc.
0	3	sand
3	8	clay
8	10	sand
10	15	clay
15	25	coarse sand
25	34	blue clay
34	47	fine blue sand
47	53	firm clay
53	63	gray clay
63	72	very fine blow sand/coarse
72	97	clay/very fine sand streaks
97	103	very fine blow sand
103	105	clay
105	108	blow sand/clay streaks
108	137	clay/blow sand streaks
137	144	very fine-coarse sand
144	160	clay

TOTAL DEPTH OF BORING 160 (Feet)
TOTAL DEPTH OF COMPLETED WELL 148 (Feet)

WELL OWNER

MSC038

WELL LOCATION

Address 337A Ruble Rd
City Crows Landing CA 95313
County Stanislaus
APN Book ___ Page ___ Parcel ___
Township ___ Range ___ Section ___
Latitude ___ DEG. MIN. SEC. ___ DEG. MIN. SEC.

LOCATION SKETCH

NORTH
WEST
EAST
SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

✓ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
✓ Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

1

DEPTH TO FIRST WATER 30 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 32 (Ft.) & DATE MEASURED 04/04/02
ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
* *May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	130	10.65	✓				PLASTIC	6	160	
130	148	10.65		✓			PLASTIC	6	160	.050

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	24		✓		
24	148				8x16

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analysis
___ Other ___
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME CALWATER DRILLING CO., INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
300 S. Kilroy Rd Turlock CA 95380
ADDRESS CITY STATE ZIP
Signed [redacted] 04/18/02 434218
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR
Page 1 of 1

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 803431

1/2

DWR USE ONLY — DO NOT FILL IN
055/09E-20
STATE WELL NO./STATION NO.
LATITUDE
LONGITUDE
APN/TRS/OTHER

Owner's Well No. 95307
Date Work Began 11/26/2003, Ended 11/28/2003
Local Permit Agency Environmental Resources
Permit No. 03-300 Permit Date 11/20/2003

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD ROTARY FLUID Mud

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain, size, color, etc.*
0	3	Top Soil
3	5	Sand
5	15	Clay
15	25	Sand
25	35	Clay
35	44	Sand
44	68	Clay
68	70	Sand
70	103	Clay
103	105	Sand
105	110	Clay
110	113	Sand
113	125	Clay

TOTAL DEPTH OF BORING 125 (Feet)
TOTAL DEPTH OF COMPLETED WELL 120 (Feet)

WELL OWNER

14SC039

WELL LOCATION

Address 10625 Crowslanding Rd.
City Crowslanding CA
County Stanislaus
APN Book ___ Page ___ Parcel ___
Township ___ Range ___ Section ___
Latitude ___ DEG. MIN. SEC. Longitude ___ DEG. MIN. SEC.

LOCATION SKETCH

NORTH
WEST
EAST
SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

- ✓ NEW WELL
- MODIFICATION/REPAIR
  - ___ Deepen
  - ___ Other (Specify)
- ___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
- ✓ Domestic ___ Public
- ___ Irrigation ___ Industrial
- MONITORING ___
- TEST WELL ___
- CATHODIC PROTECTION ___
- HEAT EXCHANGE ___
- DIRECT PUSH ___
- INJECTION ___
- VAPOR EXTRACTION ___
- SPARGING ___
- REMEDIATION ___
- OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE 1
DEPTH OF STATIC WATER LEVEL 14 (Ft.) & DATE MEASURED 11/28/2003
ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	100	12	✓				PLASTIC	6	160	
100	120			✓						.045

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	40		✓		
40	120			✓	GRAVEL

ATTACHMENTS (✓)

- ___ Geologic Log
- ___ Well Construction Diagram
- ___ Geophysical Log(s)
- ___ Soil/Water Chemical Analysis
- ___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME MASELLIS DRILLING, INC.
(PERSON, FIR [redacted]
119 Albers Rd. Modesto CA 95357
ADDRESS CITY STATE ZIP
Signed WELL DRILL 12/03/03 668622
DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDE RED FORM

ORIGINAL
File with DWR

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 811812

DWR USE ONLY — DO NOT FILL IN

05S/09E-29

STATE WELL NO./STATION NO

LATITUDE

LONGITUDE

APN/TRS/OTHER

Page 1 of 1

Owner's Well No. 1

Date Work Began 01/29/99 , Ended 01/30/99

Local Permit Agency

Permit No. 99-014 Permit Date

MSC040

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD ROTARY FLUID MUD

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION Describe material, grain size, color, etc.
0	7	Soil
7	20	Clay
20	28	Sand
28	50	Clay
50	60	SAnd
60	102	Clay
102	105	Sand
105	110	Clay
110	112	Sand
112	128	Clay

TOTAL DEPTH OF BORING 128 (Feet)

TOTAL DEPTH OF COMPLETED WELL 115 (Feet)

WELL LOCATION

Address 600 Ruble Rd.

City Crowslanding

County Stanislaus

APN Book ______ Page ______ Parcel ______

Township ______ Range ______ Section ______

Latitude ___ DEG. ___ MIN. ___ SEC. NORTH Longitude ___ DEG. ___ MIN. ___ SEC. WEST

LOCATION SKETCH

NORTH

WEST

EAST

SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR
- ___ Deepen
- ___ Other (Specify)

___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

PLANNED USES (✓)

WATER SUPPLY DOMESTIC
- ___ Domestic ___ Public
- ___ Irrigation ___ Industrial

MONITORING ___

TEST WELL ___

CATHODIC PROTECTION ___

HEAT EXCHANGE ___

DIRECT PUSH ___

INJECTION ___

VAPOR EXTRACTION ___

SPARGING ___

REMEDIATION ___

OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ______ (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 12 (Ft.) & DATE MEASURED ______

ESTIMATED YIELD * ______ (GPM) & TEST TYPE ______

TEST LENGTH ______ (Hrs.) TOTAL DRAWDOWN ______ (Ft.)

* *May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	95	12	X				PLASTIC	6	160	
95	115			X						.045

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	42		X		
42	115			X	GRAVEL

ATTACHMENTS (✓)

- ___ Geologic Log
- ___ Well Construction Diagram
- ___ Geophysical Log(s)
- ___ Soil/Water Chemical Analyses
- ___ Other ______

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME MASELLIS DRILLING, INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

119 Albers Rd Modesto CA 95357
ADDRESS CITY STATE ZIP

Signed [redacted] 01/29/99 668622
DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 11-97 IF ADDITIONAL SPACE [redacted] Y NUMBERED FORM

ORIGINAL
File with DWR
Page 1 of 1

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 815385

DWR USE ONLY — DO NOT FILL IN
05S/09E1-20
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. MOSIER 1
Date Work Began 07/05/02, Ended 09/06/02
Local Permit Agency STANISLAUS CTY DER
Permit No. 02-180 Permit Date 09/04/02

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD ROTARY FLUID MUD

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain, size, color, etc.*
0	16	SAND, ROOTS
16	17	CLAY
17	21	SAND
21	30	CLAY BROWN
30	50	CLAY BLUE
50	56	CLAY BROWN, SAND STREAKS
56	67	SAND
67	79	CLAY, SAND STREAKS
79	87	CLAY
87	103	SAND, CLAY STREAKS VERY FINE
103	120	CLAY

TOTAL DEPTH OF BORING 120 (Feet)
TOTAL DEPTH OF COMPLETED WELL 105 (Feet)

WELL OWNER

USCH 1

WELL LOCATION

Address 731 RUBLE ROAD
City CROWS LANDING CA 95313
County Stanislaus
APN Book ___ Page ___ Parcel ___
Township ___ Range ___ Section ___
Latitude ___ DEG. MIN. SEC. Longitude ___ DEG. MIN. SEC.

LOCATION SKETCH

NORTH
WEST
EAST
SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

✓ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
✓ Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY)

WATER LEVEL & YIELD OF COMPLETED WELL

1

DEPTH TO FIRST WATER 16 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 16 (Ft.) & DATE MEASURED 09/06/02
ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	85	12	✓				PLASTIC	6	SDR26	
85	105	12		✓			PLASTIC	6	SDR26	.050

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	24		✓		
24	105				8 x 16

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analysis
___ Other
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME CALWATER DRILLING CO., INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
300 S. Kilroy Rd. Turlock CA 95380
ADDRESS [redacted] CITY STATE ZIP
Signed WELL DRILLER/AUTHORIZED REPRESENTATIVE 09/19/02 DATE SIGNED 434218 C-57 LICENSE NUMBER

DWR 188 REV. 11-97

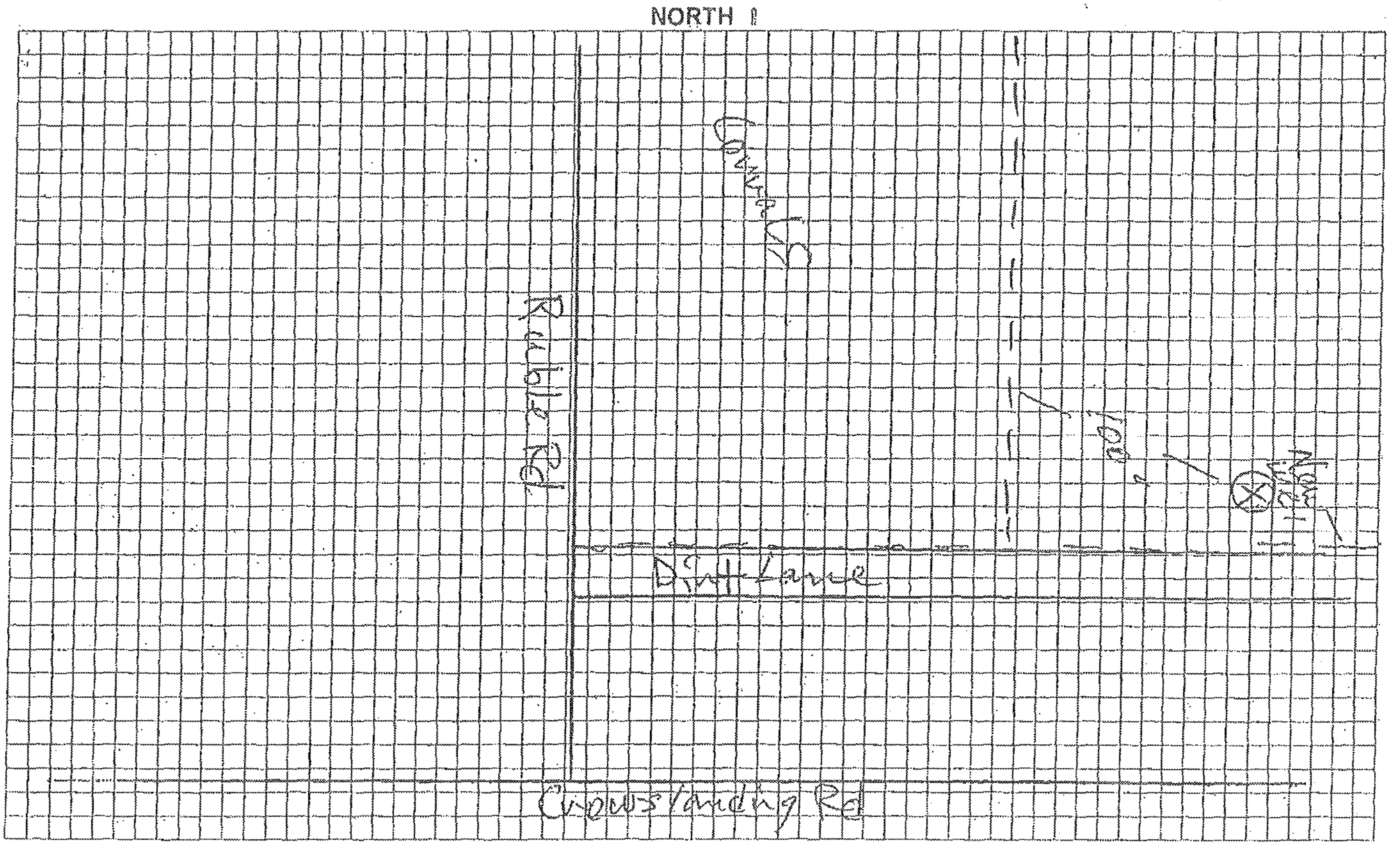
IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

PLOT PLAN

(Indicate Distances in Feet)

053/098-20 ½

1. Name of street and distance from nearest cross roads to well site.
2. Outline of the property, easements.
3. Outlines and locations of all existing and proposed structures, including covered areas such as patios, driveways, and walks.
4. Location of house sewer outlet, public sewer, sewage disposal system, or proposed sewage disposal system, proposed expansion of sewage disposal system, industrial waste pond, or any other possible source of contamination.
5. Location of other wells within radius of 300 feet on the property or adjoining property.
6. Location of sewage disposal system on adjoining property or within a radius of 100 ft. (private well) 150 ft. (public well).



Written description of well location (if not visible from road):

I HEREBY CERTIFY THAT I HAVE PREPARED THIS APPLICATION AND THAT THE WORK WILL BE DONE IN ACCORDANCE WITH THE PROVISIONS OF THE LAWS OF THE STATE OF CALIFORNIA, THE ORDINANCES OF THE COUNTY OF STANISLAUS AND THE RULES AND REGULATIONS OF THE STANISLAUS COUNTY DEPARTMENT OF ENVIRONMENTAL RESOURCES (DER). DER WILL BE CONTACTED FOR INSPECTION OF ANNULAR SEAL INSTALLATION, AND AFTER WELL WORK HAS BEEN COMPLETED.

1. All existing wells within a 300 foot radius of the proposed new well(s) on the property or adjoining property have been located and so indicated.
2. Proposed well(s) will be located at least 50-100 feet from any sewage disposal system on property or adjoining property. Public well requires a distance of 100-150 feet from disposal system (100 ft. septic tank and leach lines, 150 ft. pits).
3. Submit d, as notice of well work completion.

SIGNED: ____________________ DATE: 7-27-12

(OWNER OR AUTHORIZED REPRESENTATIVE)

ORIGINAL
File with DWR
Page 1 of 1

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. E0159994

DWR USE ONLY — DO NOT FILL IN
0 5 S 0 9 E 2 0
STATE WELL NO./ STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. RUBLE
Date Work Began 8/30/2012, Ended 8/31/2012
Local Permit Agency STANISLAUS CO DER
Permit No. 12-152 Permit Date 8/21/2012

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD ROTARY FLUID MUD

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain, size, color, etc.*
0	5	TOP SOIL
5	6	HARD PAN
6	21	SAND SMALL CLAY STREAKS
21	34	CLAY & SAND
34	45	CLAY BROWN
45	53	BLUE CLAY
53	55	SAND
55	60	SHALE BROWN
60	73	COARSE SAND
73	90	CLAY & SHALE BROWN
90	92	SAND
92	102	CLAY BROWN

TOTAL DEPTH OF BORING 175 (Feet)
TOTAL DEPTH OF COMPLETED WELL 144 (Feet)

WELL OWNER

MSE 042

WELL LOCATION

Address 525 RUBLE RD
City CROWSLANDING CA
County STANISLAUS
APN Book 058 Page 004 Parcel 012
Township ___ Range ___ Section ___
Latitude ___ DEG. MIN. SEC. Longitude ___ DEG. MIN. SEC.

LOCATION SKETCH

NORTH
WEST
EAST
SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

✓ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
___ Domestic ___ Public
✓ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 30 (Ft.) & DATE MEASURED 8/31/2012
ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	94	18"	✓				PLASTIC	10"	SDR26	
94	144	18"		✓			PLASTIC	10"	SDR26	.045

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	50		✓		
50	144				6 X 12 GRAVE

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analysis
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME CALWATER DRILLING CO., INC.
(PERS [redacted]
300 S. Ki Turlock CA 95380
ADDRESS CITY STATE ZIP
Signed WELL DRILLER/AUTHORIZED REPRESENTATIVE 09/20/12 DATE SIGNED 434218 C-57 LICENSE NUMBER

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Stanislaus County
Striving to be the Best

2/2

DEPARTMENT OF ENVIRONMENTAL RESOURCES
3800 Cornucopia Way, Suite C, Modesto, CA 95358-9492
Phone: 209.525.6700 • Fax: 209.525.6774
www.stancounty.com

Permit No. 20 14 - 246 NSC044 Chk#61909

R# 23838

APPLICATION FOR WELL CONSTRUCTION OR DESTRUCTION

THIS PERMIT EXPIRES 1 YEAR FROM DATE ISSUED

Application is hereby made to the Stanislaus County Department of Environmental Resources (D.E.R.) for a permit to construct and/or destroy the work herein described. PLEASE NOTIFY THIS DEPARTMENT (USING PERMIT # AND D.W.R. WELL DRILLERS REPORT) WHEN WELL WORK IS COMPLETED.

Job Address/Location: 330 W. west main City: Crowslanding

Distance & Direction from the Nearest Cross Streets: 1/4 W. of crowslanding

Property Owner's Name:

Water Agency: ☐ Yes ☑ No Water Agency Name:

Address: City/State:

Contractor's Name: CalWater Drilling Co Inc License #: 434218 Phone: 667-7932

Type of Work: ☑ New Well ☐ Destruction ☐ Other

If a new well, give number of new wells to be installed on property or in close proximity now or within 6 months 1

Intended Use: ☐ Industrial ☑ Domestic/Private ☐ Domestic/Public ☐ Irrigation ☐ Cathodic Protection ☐ Geothermal Heat Exchange ☐ Agricultural ☐ Other

Conveyance: Will water from this well be relocated from parcel of origin? ☐ Yes ☑ No

Will water from this well be relocated to out-of-county? ☐ Yes* ☑ No

*Provide water agency authorization

Existing Well Present: ☑ Yes ☐ No **Status:** ☑ Active ☐ To be destroyed ☐ Inactive

Community Service District: ☑ N/A ☐ Within C.S.D. of

Distance to Nearest:
Septic tank 100+ Disposal Field 105+ Seepage Pit N/A Dry Well N/A
Pit Privy N/A Animal Enclosure Other Well 1. 110'
Dairy Lagoons N/A Dwellings 41' Property Lines 148'

Construction Specifications: ☑ Drilled ☐ Cable Tool ☑ Gravel Pack ☐ Rotary ☐ Other
Diameter of Excavation 12 1/4 Diameter of Well Casing 6" Gauge of Casing SDR 26
Estimated GPM 35 Estimated Finished Well Depth 170'
Sealing Material Bentonite Grout Manufacturer WYOBEN Grout name Groutwell
Proposed Depth of Grout Seal 50' Proposed # of bags 7
Seal Method: ☐ Free Fall ☑ Tremie Hose (Force) ☐ Tremie Hose (Gravity)

Destruction Specifications:
Diameter of Well Casing Proposed Depth of Grouting
Sealing Material Grout Manufacturer Grout name
Seal Method: ☐ Free Fall ☐ Tremie Hose (Force) ☐ Tremie Hose (Gravity)
Describe method if different than minimum state standards:

5-1-14
ENTERED

ORIGINAL
File Original, Duplicate and Triplicate with the
REGIONAL WATER POLLUTION
CONTROL BOARD No.
(Insert appropriate number)

~~519~~- 20

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

519- 20

LOCATION NOT CHECKE

Do Not Fill In

№ 66834

State Well No.
Other Well No. 5/9-[illegible]

(1) OWNER:

Name
Address

USC044

(2) LOCATION OF WELL:

County ; Owner's number, if any—
R. F. D. or Street No.
See other side.

(3) TYPE OF WORK (check):

New Well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☒ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☒
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:

SINGLE ☒ DOUBLE ☐

From 0 ft. to 255 ft. 16 Diam. 1/4" Gage of Wall

If gravel packed
Diameter of Bore 24" from ft. 0-255 ft.

Type and size of shoe or well ring — — — — —
Size of gravel: 3/4" rock
Describe joint Welded collar

(7) PERFORATIONS:

Type of perforator used Mill perforator, (slots)
Size of perforations 3/16" in., length, by 2 1/2" in.
From 80 ft. to 255 ft. 8 Perf. per row 3 Rows per ft.

(8) CONSTRUCTION:

Was a surface sanitary seal provided? ☐ Yes ☒ No To what depth ft.
Were any strata sealed against pollution? ☐ Yes ☒ No If yes, note depth of strata
From ft. to ft.
Method of Sealing

(9) WATER LEVELS:

Depth at which water was first found 40 ft.
Standing level before perforating 40 ft.
Standing level after perforating 40 ft.

(10) WELL TESTS:

Was a pump test made? ☒ Yes ☐ No If yes, by whom?
Yield: 2,450 gal./min. with 50 ft. draw down after 4-5 hrs.
Temperature of water 70 Was a chemical analysis made? ☐ Yes ☒ No
Was electric log made of well? ☐ Yes ☒ No

(11) WELL LOG:

Total depth 280 ft. Depth of completed well 255 ft.

Formation: Describe by color, character, size of material, and structure.

0 ft. to	30 ft.	Sand
30 "	40 "	Sand & clay streaks
40 "	46 "	Clay
46 "	59 "	Sand
59 "	70 "	Sand & clay
70 "	83 "	Sand
83 "	87 "	Clay
87 "	100 "	Sand
100 "	106 "	Sand
106 "	116 "	Sand & clay
116 "	130 "	Sand
130 "	134 "	Clay
134 "	160 "	Sand
160 "	175 "	Sand
175 "	182 "	Clay
182 "	191 "	Sand
191 "	200 "	Sand & clay
200 "	206 "	Clay
206 "	219 "	Sand
219 "	245 "	Sand
245 "	249 "	Blue clay
249 "	274 "	Blue clay
274 "	280 "	Sand & clay

Work started 5/8 19 61. Completed 5/21 19 61.

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Howk Well & Equipment Co.
(Person, firm, or corporation) (Typed or printed)
Address P.O. Box 248
Crows Landing, California

[SIGNED] [redacted]
Well Driller
License No. 195628 Dated 8/2 19 61

5/9-20

LOCATION NOT CHECKED

ORIGINAL
File Original, Duplicate and Triplicate with the
REGIONAL WATER POLLUTION
CONTROL BOARD No.
(Insert appropriate number)

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

Do Not Fill In
№ 66836
State Well No.
Other Well No. 5/9-20

(1) O

Name
Address MSC045

(2) LOCATION OF WELL:

County Owner's number, if any—
R. F. D. or Street No.

See other side.

(3) TYPE OF WORK (check):

New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☒ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☒
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:

SINGLE ☒ DOUBLE ☐

From 0 ft. to 180 ft. 18 in. 1/4" Gage of Wall

If gravel packed

Diameter of Bore 30" from ft. 0-225 to ft.

Type and size of shoe or well ring —————

Size of gravel: 3/4" rock

Describe joint Welded collar

(7) PERFORATIONS:

Type of perforator used Mill perforator (slots)

Size of perforations 3/16" in., length, by 2 1/2" in.

From 40 ft. to 145 ft. 8 Perf. per row 3 Rows per ft.

(8) CONSTRUCTION:

Was a surface sanitary seal provided? ☐ Yes ☒ No To what depth ft.

Were any strata sealed against pollution? ☐ Yes ☒ No If yes, note depth of strata

From ft. to ft.

Method of Sealing

(9) WATER LEVELS:

Depth at which water was first found 40 ft.
Standing level before perforating 40 ft.
Standing level after perforating 40 ft.

(10) WELL TESTS:

Was a pump test made? ☒ Yes ☐ No If yes, by whom? Same

Yield: 3,400 gal./min. with 35 ft. draw down after 4-5 hrs.

Temperature of water Was a chemical analysis made? ☐ Yes ☒ No

Was electric log made of well? ☐ Yes ☒ No

(11) WELL LOG:

Total depth 270 ft. Depth of completed well 225 ft.

Formation: *Describe by color, character, size of material, and structure.*

0 ft. to	40 ft.	Sand
40	69	Sand
69	74	Sand
74	83	Clay
83	100	Sand
100	105	Sand
105	109	Clay
109	117	Sand
117	130	Clay
130	160	Sand & small gravel stks.
160	178	Sand
178	190	Coarse sand
190	216	Coarse sand
216	236	Blue clay
236	249	Sand
249	269	Clay
269	270	Sand

Work started 6/27 1961. Completed 7/13 1961

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Howk Well & Equipment Co.
(Person, firm, or corporation) (Typed or printed)

Address P.O. Box 248
Crows Landing, California

[SIGNED] [redacted]
Well Driller

License No. 195628 Dated 8/4, 1961

MSC044

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 287357

State Well No 5/9-20
Other Well No.

Notice of Intent No.
Local Permit No. or Date 89-67

(1) OWNER:
Name
Address
City

(2) LOCATION OF WELL (See instructions):
County Stanislaus Owner's Well Number
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc. ½ mi. South of ~~West Main~~ west side

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☒
Industrial ☐
Test Well ☐
Municipal ☐
Other ☒
(Describe)

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size roofing
Diameter of bore 26"
Packed from 0 to 300 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	300	16	¼"	100	180	Screen
				260	300	Screen

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 20 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing 30"x20' CAN CEMENTED IN

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion 30 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? HENNINGS
Type of test Pump ☒ Bailer ☐ Air lift ☐
SEE ATTACHED
Depth to water at start of test ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG:
Total depth 310 ft. Completed depth 300 ft.
from ft. to ft. Formation (Describe by color, character, size or material)

0	-3	Top Soil
3	-9	Clay
9	-18	Sand
18	-24	Clay
24	-52	Blue Sand
52	-53	Blue Clay
53	-68	Sand
68	-80	Clay
80	-83	Sand
83	-89	Clay
89	-111	Sand
111	-115	Clay
115	-123	Blue Sand-fine
123	-128	Blue Clay
128	-153	Fine Blue Sand
153	-163	Clay
163	-166	Sand
166	-230	Clay
230	-286	Blue Clay
286	-291	Blue Sand
281	-310	Clay

CONFIDENTIAL

NOT FOR PUBLIC USE
WATER CODE SEC. 13752

COMPOSITE

Work started Mar. 31 19 89 Completed Apr. 11 19 89

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed [redacted]
(Well Driller)
NAME HENNINGS BROS. DRILLING CO., INC.
(Person, firm, or corporation) (Typed or printed)
Address 3525 PELANDALE AVE.
City MODESTO, CA ZIP 95356
License No. 290813 Date of this report MAY 15, 1989

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 86 96355

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

MSC(047)

Do not fill in

No. 304019

State Well No. 5/9-20
Other Well No.

Notice of Intent No.
Local Permit No. or Date 89-205

(1) OWNER:
Name
Address
City

(2) LOCATION OF WELL (See instructions):
County Stanislaus Ca. Owner's Well Number
Well address if different from above
Township Crows Landing Range Section
Distance from cities, roads, railroads, fences, etc.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic Priv. ☒
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☐
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary XX Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 6-12 sand
Diameter of bore 12"
Packed from 50 to 145 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic XX Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	145	6"	160
			PVC

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size
125	145	

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing Bentonite

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG:
Total depth 172 ft. Completed depth 145 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	21	Sand
21	48	Clay
48	50	Sand
50	86	Clay
86	89	Sand
89	134	Clay
134	140	Sand
140	172	Clay

CONFIDENTIAL

NOT FOR PUBLIC USE
WATER CODE SEC. 13752

UNCONFINED

Work started 19 Completed 5-22 19 89

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed [redacted]
(Well Driller)

NAME Calwater Drilling Co., Inc.
(Person, firm, or corporation) (Typed or printed)
Address 300 S. Kilroy
City Turlock, Ca. ZIP 95380
License No. 321252 Date of this report 5-25-89

DWR 188 (REV. 12-86)

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

86 96355

ORIGINAL
File with DWR
Page 1 of 1
Owner's Well No.
Date Work Began 8/11/94, Ended 8/11/94
Local Permit Agency Stanislaus Co. Dept. of Env. Resources
Permit No. 94-179 Permit Date 8/10/94

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 547542

DWR USE ONLY — DO NOT FILL IN
05S/09E-24Q
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	3	Top soil sand
3	6	Brown clay
6	8	Hard pan
8	17	Clay
17	24	Sand
24	36	Clay
36	56	Blue clay
56	95	Brown clay
95	97	Sand
97	104	Clay
104	107	Sand
107	157	Clay & shale streaks

TOTAL DEPTH OF BORING 157 (Feet)
TOTAL DEPTH OF COMPLETED WELL 112 (Feet)

WELL OWNER

Name
Mailing
MSC 048
CITY STATE ZIP

WELL LOCATION

Address Same
City
County Stanislaus
APN Book ___ Page ___ Parcel ___
or
Township ___ Range ___ Section ___
or
Latitude ___ DEG. MIN. SEC. NORTH Longitude ___ DEG. MIN. SEC. WEST

LOCATION SKETCH

NORTH
WEST
EAST
SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (*Describe Procedures and Materials Under "GEOLOGIC LOG"*)

PLANNED USE(S) (✓)

___ MONITORING
WATER SUPPLY
X Domestic
___ Public
___ Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
___ OTHER (Specify)

DRILLING METHOD Mud rotary FLUID Water

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL 18 (Ft.) & DATE MEASURED 8/19/94
ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
** May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL/GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	92	14"	X				PVC	8"	160	
92	112	"		X			"	"	"	.062

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	64		X		
64	112				4X12 sand

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME Calwater Drilling Co., Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
300 S. Kilroy Turlock, CA. 95380
ADDRESS CITY STATE ZIP
Signed [redacted] 8/23/94 434218
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 7-90 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

05S9E Section 21

USC049

5/9 - 21

ORIGINAL
File Original, Duplicate and Triplicate with the
REGIONAL WATER POLLUTION
CONTROL BOARD No.______
(Insert appropriate number)

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

Do Not Fill In
№ 73890
State Well No.______
Other Well No. 25/12-31

(1) OWNER:

Name
Address

(2) LOCATION OF WELL:

County Stanislaus Owner's number, if any—
R. F. D. or Street No.
Left off W. Main on crowslanding Highway
First house on the left.

(3) TYPE OF WORK (*check*):

New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (*check*):

Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☐
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:

SINGLE ☐ DOUBLE ☐

From	ft. to	ft.	Diam.	Gage or Wall
	150	6	12	

If gravel packed

Diameter of Bore	from ft.	to ft.

Type and size of shoe or well ring
Size of gravel:
Describe joint

(7) PERFORATIONS:

Type of perforator used
Size of perforations in., length, by in.

From	ft. to	ft.	Perf. per row	Rows per ft.

(8) CONSTRUCTION:

Was a surface sanitary seal provided? ☐ Yes ☐ No To what depth ft.
Were any strata sealed against pollution? ☐ Yes ☐ No If yes, note depth of strata
From ft. to ft.
Method of Sealing

(9) WATER LEVELS:

Depth at which water was first found 12 ft.
Standing level before perforating ft.
Standing level after perforating ft.

(10) WELL TESTS:

Was a pump test made? ☐ Yes ☐ No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.
Temperature of water Was a chemical analysis made? ☐ Yes ☐ No
Was electric log made of well? ☐ Yes ☐ No

(11) WELL LOG:

Total depth 163 ft. Depth of completed well 163 ft.

Formation: Describe by color, character, size of material, and structure.

ft. to	ft.	
0	6	top soil
6	19	Coarse sand
19	33	Med fine sand
33	35	Sand and soft blue clay
35	46	Soft clay and fine sand
46	53	fine sand
53	56	Med clay
56	70	Softer clay 1st landing
70	74	sand
74	108	sand
108	110	clay and sand
110	146	sand
146	158	clay
158	163	brown sand

Work started Sept. 23 19 . Completed Oct. 3, 1962

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Olsons Plumbing and Well Drilling
(Person, firm, or corporation) (Typed or printed)
Address 1015 N. 99
Turlock Calif.

[SIGNED] [redacted]
Well Driller

License No. 110637 Dated Feb. 5, 1963

ORIGINAL
File with DWR
Page 1 of 1

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 803774

DWR USE ONLY — DO NOT FILL IN
05S/09E-21
STATE WELL NO./ STATION NO.
LATITUDE
LONGITUDE
APN/TRS/OTHER

Owner's Well No. MENDES
Date Work Began 8/5/2003, Ended 8/7/2003
Local Permit Agency STANISLAUS CTY DER
Permit No. 03-202 Permit Date 7/24/2003

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD ROTARY FLUID MUD

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain, size, color, etc.*
0	25	SAND
25	30	CLAY, GRAY
30	40	CLAY, BLUE
40	62	CLAY, BROWN
62	70	SAND
70	94	CLAY, GRAY
94	100	SAND
100	107	CLAY & SAND
107	123	CLAY, GRAY
123	125	SAND
125	140	CLAY, RED
140	155	CLAY, GRAY

TOTAL DEPTH OF BORING 155 (Feet)
TOTAL DEPTH OF COMPLETED WELL 107 (Feet)

WELL OWNER

USC050

Address 10336 CROWS LANDING ROAD
City CROWS LANDINGQ CA 95313
County Stanislaus
APN Book ___ Page ___ Parcel ___
Township ___ Range ___ Section ___
Latitude ___ DEG. MIN. SEC. ___ DEG. MIN. SEC.

LOCATION SKETCH

NORTH
WEST
EAST
SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

✓ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
✓ Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING
TEST WELL
CATHODIC PROTECTION
HEAT EXCHANGE
DIRECT PUSH
INJECTION
VAPOR EXTRACTION
SPARGING
REMEDIATION
OTHER (SPECIFY)

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 22 (Ft.) BELOW SURFACE 1
DEPTH OF STATIC WATER LEVEL 22 (Ft.) & DATE MEASURED 8/7/2003
ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	87	10	✓				PLASTIC	6	SDR26	NONE
87	107	10		✓			PLASTIC	6	SDR26	.060

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	26		✓		
26	107				8 x 16

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analysis
___ Other ___
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME CALWATER DRILLING CO., INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
300 S. Kilroy Rd [redacted] Turlock CA 95380
ADDRESS CITY STATE ZIP
Signed WELL DRILLER/AUTHORIZED REPRESENTATIVE 08/12/03 DATE SIGNED 434218 C-57 LICENSE NUMBER

DWR 188 REV. 11-97
IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

MS(05) 055/09E-21 2/2

Lat: ____
Long: ____
T.____ R.____ Sec.____
¼ Sec. ____
Quad. ____
A.P.N. ____

STANISLAUS COUNTY
DEPARTMENT OF ENVIRONMENTAL RESOURCES
3800 CORNUCOPIA WAY, SUITE C, MODESTO, CA 95358-9492
(209) 525-6700

Permit No. 05-069
Date Issued 4-21-05

CK# 40932 CJ
Rec# 4887

APPLICATION FOR WELL CONSTRUCTION OR DESTRUCTION

THIS PERMIT EXPIRES 1 YEAR FROM DATE ISSUED

Application is hereby made to the Stanislaus County Department of Environmental Resources (D.E.R.) for a permit to construct and/or destroy the work herein described. PLEASE NOTIFY THIS DEPARTMENT (USING PERMIT # AND D.W.R. WELL DRILLERS REPORT) WHEN WELL WORK IS COMPLETED.

JOB ADDRESS/LOCATION 10562 CROWS LANDING RD City CROW LANDING
Distance & Direction from Nearest Cross Streets 1/2 MI. SOUTH OF WEST MAIN ON EAST SIDE

Contractor's Name CALWATER DRILLING, INC License # 434210 Phone 667-7932

TYPE OF WORK: (Check one) NEW WELL ☑ DEEPEN ☐ RECONDITION ☐ DESTRUCTION ☐
OTHER ☐ ____

DISTANCE TO NEAREST:
SEPTIC TANK 100FT SEWER LINES — PIT PRIVY —
OTHER WELL — SEWAGE DISPOSAL FIELD 100FT SEEPAGE PIT —
DRY WELL — OTHER ____
ANIMAL ENCLOSURE —

INTENDED USE
- ☐ Industrial
- ☐ Domestic / Private
- ☐ Domestic / Public
- ☐ Irrigation
- ☐ Cathodic protection
- ☑ Other DAIRY

TYPE OF WELL
- ☐ Cable Tool
- ☐ Drilled
- ☑ Gravel Pack
- ☑ Rotary
- ☐ Other ____

CONSTRUCTION / DESTRUCTION SPECIFICATIONS
Dia. of Well Excavation 12 1/4 IN
Dia. of Well Casing 8 IN
Gauge of Casing PVC SDR 26
Depth Conductor Casing —
Depth of Grout Seal 30FT
Type of Grout BENTONITE # Bags 9
Grout Manufacturer WYO BEN
Grout Name GROUT WELL

Well Destruction: Describe method if different than minimum state standards: ____

Existing well present? [✓ YES] NO Status: Active ☐ To Be Destroyed ☑ Inactive ☐

D.E.R. USE ONLY
Permit Issued by: [redacted] Date: 4/21/05
Permit Denied by: ____ Date: ____ (See Attached)
Grout Seal Inspected by: ____ Date: ____
Final Inspection by: ____ Date: ____

PLOT CARD ON FILE

OK per rAein

ORIGINAL-Office COPY-Contractor Y-Applicant

ORIGINAL
File with DWR

Page 1 of 2

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 1097589

DWR USE ONLY — DO NOT FILL IN

0 5 S / 0 9 E - 2 1 | STATE WELL NO./ STATION NO.

LATITUDE | LONGITUDE

APN/TRS/OTHER

Owner's Well No. CROWSLANDING

Date Work Began 8/2/2007, Ended 8/3/2007

Local Permit Agency STANISLAUS CO DER

Permit No. 07-135 Permit Date 7/10/2007

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD ROTARY FLUID MUD

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION Describe material, grain, size, color, etc.
0	13	SAND
13	17	CLAY
17	19	SAND
19	22	CLAY
22	29	SAND
29	33	CLAY
33	40	SAND STREAKS/CLAY-BLUE
40	43	SAND
43	63	CLAY-BROWN/SAND STREAKS
63	66	SAND
66	68	CLAY
68	70	SAND
70	82	CLAY
82	84	SAND
84	89	CLAY
89	91	SAND
91	95	CLAY
95	96	SAND
96	98	CLAY
98	100	SAND
100	110	CLAY/SAND STREAKS
110	116	SAND
116	118	CLAY
118	119	SAND
119	120	CLAY
120	124	SAND
124	134	CLAY/SAND STREAKS
134	135	SAND
135	138	CLAY
138	139	SAND

TOTAL DEPTH OF BORING 180 (Feet)

TOTAL DEPTH OF COMPLETED WELL 140 (Feet)

WELL OWNER

MSC052

CITY STATE ZIP

WELL LOCATION

Address 10338 CROWSLANDING ROAD

City CROWSLANDING CA 95313

County STANISLAUS

APN Book ___ Page ___ Parcel ___

Township ___ Range ___ Section ___

Latitude ___ DEG. MIN. SEC. Longitude ___ DEG. MIN. SEC.

LOCATION SKETCH

NORTH

WEST

EAST

SOUTH

COPY OF PERMIT ATTACHED

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

✓ NEW WELL

MODIFICATION/REPAIR
- ___ Deepen
- ___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
- ✓ Domestic ___ Public
- ___ Irrigation ___ Industrial

MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

1

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 20 (Ft.) & DATE MEASURED 8/3/07

ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	100	12 1/4	✓				PLASTIC	8	SDR26	
100	140	12 1/4		✓			PLASTIC	8	SDR26	.050

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	52		✓		
52	140				8X16 GRAVEL

ATTACHMENTS (✓)

- ___ Geologic Log
- ___ Well Construction Diagram
- ___ Geophysical Log(s)
- ___ Soil/Water Chemical Analysis
- ___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME CALWATER DRILLING CO., INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

300 S. Kilroy Rd. Turlock CA 95380
ADDRESS CITY STATE ZIP

Signed [redacted] 08/24/07 434218
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

05S9E Section 29

MSC053

ORIGINAL
File with DWR

Notice of Intent No.
Local Permit No. or Date 85-99

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in
No. 173129
State Well No. 5/9-29
Other Well No.

(1
Add
City

(2) LOCATION OF WELL (See instructions):

County Stanislaus Owner's Well Number
Well address if different from above 806 W. Linwood
Township Turlock Range Section
Distance from cities, roads, railroads, fences, etc. ½ Mi. West of Crows Landing Rd. south side

WELL LOCATION SKETCH

(3) TYPE OF WORK:

New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:

Domestic ☒
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:

Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:

Yes ☒ No ☐ Size Sand & Gravel
Diameter of bore 11"
Packed from 60 to 125 ft.

(7) CASING INSTALLED:

Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS:

Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	125	6	160	100	125	Screen

(9) WELL SEAL:

Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 60 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing Bentonite

(10) WATER LEVELS:

Depth of first water, if known ft.
Standing level after well completion 15 ft.

(11) WELL TESTS:

Was well test made? Yes ☐ No ☒ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG:

Total depth 166 ft. Depth of completed well 125 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	-5	Top Soil
5	-20	Clay & Shale
20	-27	Sand
27	-50	Clay
50	-60	Sand
60	-70	Clay
70	-75	Sand
75	-81	Clay
81	-85	Sand
85	-100	Clay
100	-106	Fine Sand
106	-115	Clay
115	-118	Sand
118	-160	Shale & Clay
160	-166	Sand

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752

UNCONFINED

Work started May 17 1985 Completed 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED [redacted]
(Well Driller)

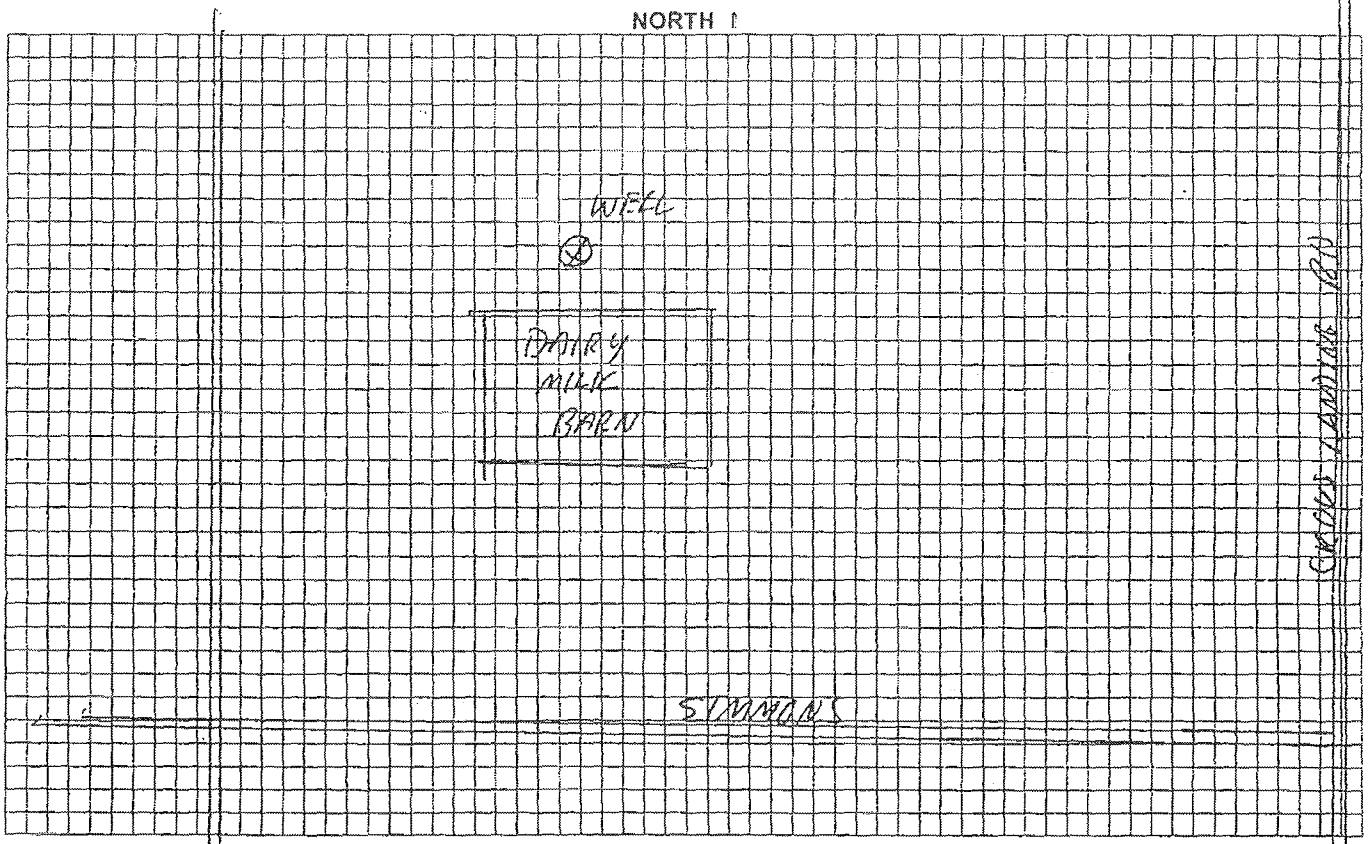
NAME HENNINGS BROS. DRILLING CO., INC.
(Person, firm, or corporation) (Typed or printed)
Address 3525 PELANDALE AVE.
City MODESTO, CA Zip 95356
License No. 290813 Date of this report MAY 31 1985

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

055/09E-29 2/2

PLOT PLAN
(Indicate Distances in Feet)

1. Name of street and distance from nearest cross roads to well site.
2. Outline of the property, easements.
3. Outlines and locations of all existing and proposed structures, including covered areas such as patios, driveways, and walks.
4. Location of house sewer outlet, public sewer, sewage disposal system, or proposed sewage disposal system, proposed expansion of sewage disposal system, industrial waste pond, or any other possible source of contamination.
5. Location of other wells within radius of 300 feet on the property or adjoining property.
6. Location of sewage disposal system on adjoining property or within a radius of 100 ft. (private well) 150 ft. (public well).



Written description of well location (if not visible from road):

I HEREBY CERTIFY THAT I HAVE PREPARED THIS APPLICATION AND THAT THE WORK WILL BE DONE IN ACCORDANCE WITH THE PROVISIONS OF THE LAWS OF THE STATE OF CALIFORNIA, THE ORDINANCES OF THE COUNTY OF STANISLAUS AND THE RULES AND REGULATIONS OF THE STANISLAUS COUNTY DEPARTMENT OF ENVIRONMENTAL RESOURCES (DER). DER WILL BE CONTACTED FOR INSPECTION OF ANNULAR SEAL INSTALLATION, AND AFTER WELL WORK HAS BEEN COMPLETED.

1. All existing wells within a 300 foot radius of the proposed new well(s) on the property or adjoining property have been located and so indicated.
2. Proposed well(s) will be located at least 50-100 feet from any sewage disposal system on property or adjoining property. Public well requires a distance of 100-150 feet from disposal system (100 ft. septic tank and leach lines, 150 ft. pits).
3. Submit w iotice of well work completion.

SIGNED: (;ENTATIVE) DATE: 1/9/01

F:\DATA\EHFORMS\Water\app for well const-destruct.wpd

ORIGINAL
File with DWR
Page 1 of 1
Owner's Well No. 1
Date Work Began 07/24/98, Ended 07/25/98
Local Permit Agency
Permit No. 98-110 Permit Date

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 700184

DWR USE ONLY — DO NOT FILL IN
5S/9E-29
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ___ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD ___ FLUID ___

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	4	Soil
4	16	Clay
16	18	Sand
18	24	Clay
24	31	Sand
31	48	Clay
48	58	Sand
58	89	Clay
89	94	Fine Sand
94	115	Clay
115	119	Coarse Sand
119	146	Clay
146	151	Fair Sand
151	157	Clay
157	162	Sand
162	172	Clay & Sand Streaks
172	180	Sand

TOTAL DEPTH OF BORING 180 (Feet)
TOTAL DEPTH OF COMPLETED WELL 180 (Feet)

WELL OWNER

MSC054

WELL LOCATION

Address 836 W. Linwood
City Crowslanding
County Stanislaus
APN Book ___ Page ___ Parcel ___
Township ___ Range ___ Section ___
Latitude ___ NORTH DEG. MIN. SEC. Longitude ___ WEST DEG. MIN. SEC.

LOCATION SKETCH

NORTH
WEST
EAST
SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

PLANNED USES (✓)

WATER SUPPLY
X Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 18 (Ft.) & DATE MEASURED ___
ESTIMATED YIELD * ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	160	14	X				PLASTIC	8	160	
160	180			X						.045

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	82		X		
82	180			X	GRAVEL

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME MASELLIS DRILLING, INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

119 Albers Rd. Modesto CA 95357
ADDRESS CITY STATE ZIP

Signed [redacted]
WELL DRILLER/AUTHORIZED REPRESENTATIVE
07/29/98 DATE SIGNED
668622 C-57 LICENSE NUMBER

DWR 188 REV. 11-97
IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Greenwaste Compost Site Emissions Reductions from Solar-powered Aeration and Biofilter Layer

Report from the contract team

5/14/2013

Funded by and prepared for the San Joaquin Valley Technology Advancement Program

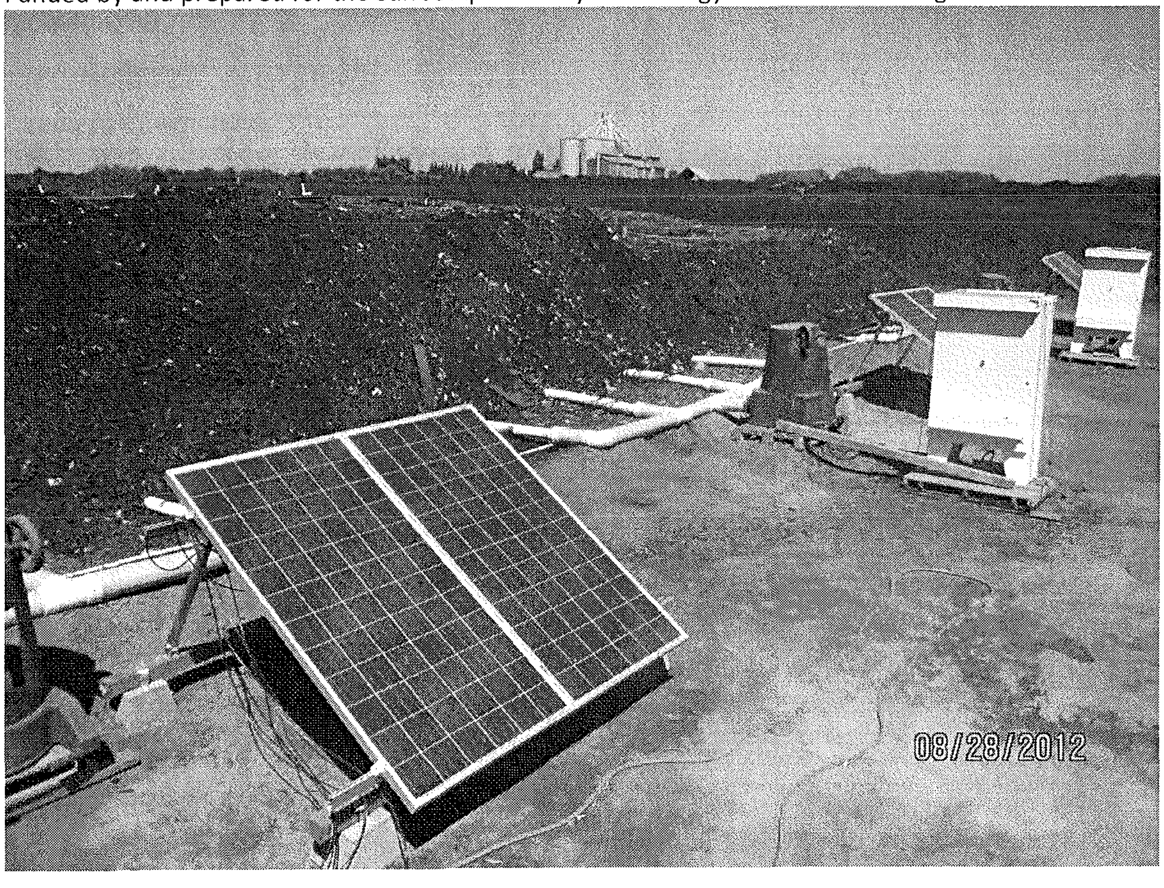


Table of Contents

Abstract

This project was proposed as a technology development and testing project to evaluate an innovative extended aerated static pile (eASP) compost system design at commercial scale. The purpose was to determine whether the innovative design could produce compost of acceptable quality while reducing air emissions. The eASP was compared to standard windrow composting conducted at the same facility using the same feedstock. The eASP was tested in a single selected configuration; therefore, the results of this project do not establish optimal operational parameters, such as blower speeds or water application rates, but results are sufficient to establish proof of concept.

A prototype commercial-scale Aerated Static Pile (ASP) compost system was built using electric conveyors in place of diesel trucks and loaders. Three ASPs were built abutting each other to create an extended design which we define as an eASP. The eASP piles were deeper and wider than a typical windrow, were placed on a foundation of aeration tubing and chipped material, and were capped with a 1-foot-thick layer of finished, unscreened compost acting as a biofilter layer or "compost cap." The three static piles of the eASP were aerated using power provided by an on-site photovoltaic array. The intent of this design was to take advantage of emissions reductions previously demonstrated by biofilters and ASPs with a design footprint more similar to existing windrow methods.

Windrows of identical greenwaste feedstock and of industry typical dimensions were created nearby with a loader and turned with a diesel-powered mechanical turner, which is the normal method of composting in much of the United States. No biofilter caps were applied to the windrow, as that is not the normal practice at this facility, nor is it required by air district regulation.

A series of three ASP zones and three windrows were built approximately one week apart. This allowed the in-the-field measurement period to be shorter while still collecting measurements representative of the full 22 day active composting period. Emissions of VOCs, ammonia and greenhouse gases from both sets of piles were sampled using the USEPA-approved flux chamber method, as modified for composting emissions by the South Coast Air Quality Management District. Emissions reductions from reduced diesel use were calculated by using the estimated time necessary to accomplish standard tasks, multiplied by the allowable tailpipe emissions for equipment normally found at commercial scale composting sites, such as trucks and loaders.

The comparison of emissions from the 22-day active composting phase between the eASP and standard windrows demonstrated emissions reductions by the eASP of 99% for total non-methane, non-ethane VOCs, 70% for ammonia (average of field and lab), 88% for nitrous oxide, and 13% for methane. The overall reduction for CO2 equivalents was nearly 65%. Diesel use in pile construction and active-phase management was 87% less for the eASP system, with commensurate reductions in criteria pollutant emissions associated with diesel fuel combustion. Water used during the composting process was reduced by 20%, and land necessary for active-phase composting is calculated to be reduced by 55.5%.

Samples of finished compost at 30 days of composting from the eASP and standard windrows were sent to an accredited laboratory for industry-standard testing. Maturity and stability of the eASP materials were equal to or better than their windrow counterparts.

Acknowledgements

This project was funded by the San Joaquin Valley Air Pollution Control District under Agreement C-15636 and consisted of the following team:

- Ross Badertscher, SJVUAPCD, grant manager
- Kevin Barnes, City of Bakersfield, conveyorization and diesel/water use calculations
- Tom Card, consultant, emissions calculations
- David Crohn, UC Riverside, science advisor
- John Jones, Harvest Power, compost site manager
- Robert Horowitz, CalRecycle: principal study author
- Peter Moon, O2 Compost, eASP design and solar array specification
- Dan Noble, Association of Compost Producers: project manager
- Chuck Schmidt, consultant: emissions study design and sampling

Special thanks to Brian Stalker, Elena Yates and Janelle Auyeung: CalRecycle; Paul Sellew, Wayne Davis, Antonio Cardenas, Samuel Villalobos, Alex Rivera, Velente Rivera: Harvest Power; Harold Ruppert and Derrick Santos, O2 Compost, and the City of Bakersfield.

Required Statement

The statements and conclusions in this report are those of the Contractor and not necessarily those of the San Joaquin Valley Air Pollution Control District or its employees. The mention of commercial products, their source, or their use in connection with material reported herein is not to be construed as actual or implied endorsement of such products.

Executive Summary

A prototype extended Aerated Static Pile (eASP) composting process was assembled and operated to test both ability to produce quality compost and to quantify air emissions. EASP differ from ASP only in that consecutive zones are laid alongside each other along the long axis. The eASP utilized ambient air blown into the pile from the bottom; the blowers were powered by photovoltaic panels and associated batteries. The eASP had a biofiltration layer added to the surface as an air pollution control measure. A series of compost windrows were built concurrent with the eASP using the same feedstock. The air emissions from the eASP were compared to the on-site measured air emissions of the current industry-standard windrow composting method.

Emissions were measured using the standard methods and techniques used for San Joaquin Valley Air Pollution Control District (SJVAPCD) regulatory compliance. This includes the use of the USEPA flux

chamber as modified under South Coast Air Quality Management District (SCAQMD) Rule 1133, and analysis using SCAQMD Method 25.3 and 207.1. In addition to these traditional methods, nitrous oxide (N2O) was measured using NIOSH 6600 and organic species were measured using USEPA TO-15.

Table ES-1 provides a summary of the emissions using the emission factor of pounds of pollutant emitted per ton of compost mix in the pile or windrow over the 22-day active composting period, as specified by SJVUAPCD Rule 4566. VOC reductions of 98.8% were achieved when compared to the control windrows. Reductions in ammonia emissions were 83% using tubes in the field, and 53% from the laboratory, when the eASP was compared to the control windrows. Reductions in emissions of greenhouse gases ranged from 13% for methane up to nearly 89% for N2O for the eASP system when compared to the controls.

Table ES-1: Project Results

		NH3		GHG			
	VOC	**Field**	**Lab**	**CO2**	**CH4**	**N2O**	**CO2e**
Prototype ASP (22 Days)	0.099	0.017	0.007	205.70	5.05	0.010	315
Baseline Windrow (22 days)	8.604	0.099	0.014	731.63	5.81	0.093	883
% reduction from Baseline	**-98.8%**	**-83.2%**	**-53.3%**	**-71.9%**	**-13.0%**	**-88.8%**	**-64.3%**

Table ES-1: Results of emissions testing in pounds of pollutant per ton of feedstock over the 22-day active composting period.

To normalize the analysis of windrow (on-site control) emissions being higher than expected, project results were also compared to adopted emissions factors from the SJVUAPCD and the SCAQMD.

Table ES-2 Comparison to SCAQMD and SJVUAPCD VOC Emissions Factor

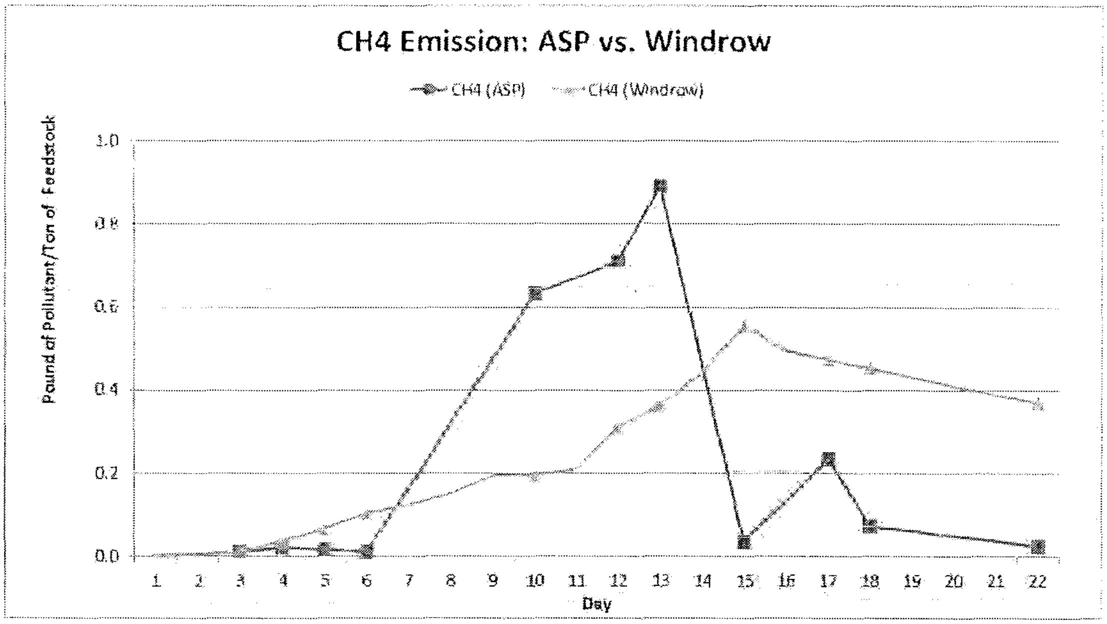
	Prototype ASP 22 days	SJVUAPCD 22 days	SCAQMD life cycle
Emissions Factor	0.10	5.14	3.76
% Reduction		***-98.1%***	***-97.4%***

Table ES-2: VOC emissions reductions from 22-day active composting in pounds of pollutant per ton of materials using eASP system compared to emissions factors adopted by SJVUAPCD and SCAQMD.

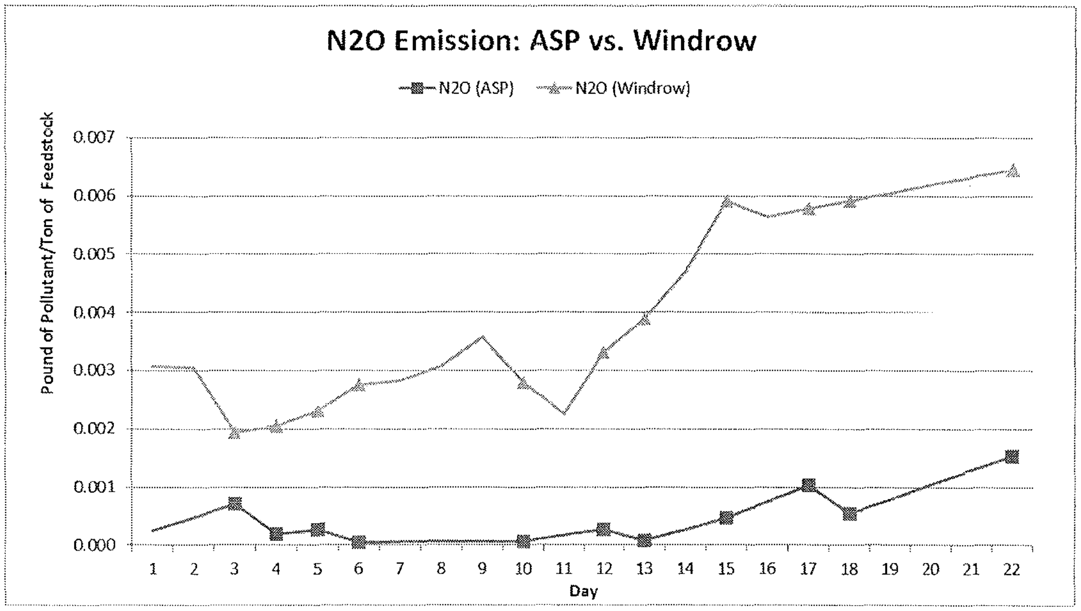
As with any composting emissions test, sampling opportunities seem limited when compared to the vast size of the composting piles and the time necessary to complete the composting process. A total of 92 samples were taken, including 84 samples and 8 quality control blanks. Sampling during the composting cycle ranged from day 3-to-day 23 for the eASP and day 2-to-day 29 for control windrows. For the eASP, pre-planned sampling locations were demarcated on top of all three zones to ensure those locations were neither walked upon nor perforated with the temperature probe. Because each sampling event takes approximately two hours, and the eASP blowers were set to operate two minutes out of every 20, eASP sampling included multiple blower-on and blower-off cycle conditions.

An additional sample was taken of a 63-day-old windrow. It was later revealed that this windrow contained a significant amount of food waste. Those data are reported in the appendices.

22-day emissions were graphed to look for differences in air emission for key target species over the composting cycle. Total non-methane non-ethane organic carbon emissions for the control windrows followed established trends; an initial spike followed by rapid decline. The eASP emissions line is nearly flat. Methane emissions from both the eASP and the windrow are greatest toward the middle of the active compost period, while N20 emissions from both piles tend to increase toward the end.



Graph ES-1: Time-series comparison of methane (CH4) emissions between the eASP and control windrows. Methane is an important greenhouse gas with a climate warming potential no less than 21 times greater than carbon dioxide.



Graph ES-2: Time-series comparison of nitrous oxide (N2O) emissions between the eASP and control windrows. Nitrous oxide is an important greenhouse gas with a climate warming potential no less than 298 times greater than carbon dioxide.

Total emissions and emissions per ton of feedstock were also calculated for 30-day and 60-day cycles. 60-day results for the eASP are necessarily extrapolated beyond day 23. 30-day totals require much less extrapolation. A complete accounting for all emissions testing is reported in Appendices A and B. In general, the longer calculation periods show greater benefits from using the eASP, particularly with regard to methane; VOC reduction benefits are virtually unchanged. These calculations and graphs are available in Appendix A.

Reductions in diesel use were calculated for pile construction and management during the active phase. For windrows this includes mechanized turning, but the eASP was not turned for the first 30 days. The overall reduction in diesel use was 87%. A commensurate 87% reduction in criteria pollutants from diesel emissions was also calculated. These data and calculations are discussed further in the body of the report as well as in Appendix C.

Water use reductions were also calculated. The initial watering of ASP feedstock and 30-days of timed sprinkling of the eASPs used approximately 20 percent less water than the traditional windrows, which were watered by a 4,000-gallon watering truck with a sprayer on the back. For a theoretical 100,000 ton per year facility, this would save about one million gallons of water per year, with commensurate GHG reductions from eliminating the water truck fuel use. These calculations are discussed in the body of the report.

EASP piles can be built wider and taller than windrows, which can be no larger than the largest windrow turning machine on site. This gives the piles a smaller surface area, potentially reducing both evaporation and emissions. Larger piles can also reduce the amount of land needed for a composting operation, thereby reducing costs to purchase land or to build working pads. For active composting, we calculate the EASP system can accommodate approximately 3,552 tons of material per acre, while a typical windrow system would handle around 1,580 tons per acre, an advantage of 55% for the eASP.

Introduction

The San Joaquin Valley (SJV) is an extreme non-attainment area for ground-level ozone, according to the United States Clean Air Act 8-hour ozone standard. Air quality officials in the SJV must reduce ozone precursors such as Volatile Organic Compounds (VOCs) and oxides of Nitrogen (NOx) as expeditiously as practical, as technologically feasible, and as economically reasonable. The SJV is home to numerous commercial-scale composting facilities that process urban organic wastes, including several that handle more than 100,000 tons of feedstock per year and one that handles more than 500,000 tons annually. Two large facilities import compostable feedstock from other air basins, including Los Angeles to the south and the San Francisco Bay Area, to the northwest. Because the SJV contains extensive agricultural operations, a local market exists for the finished compost products. The finished compost products are applied to farm fields generally less than 25 miles from the composting site, providing a source of nutrients and organic matter for SJV farmers and nourishing some of the most productive farmland on Earth.

During the natural process of organic degradation, compost piles emit VOCs. The SJV has a large inventory of man-made and natural VOCs and a much smaller inventory of NOx emissions. Ozone production in the SJV is considered "NOx limited" because of the lesser amount of NOx. Internal combustion engines, including heavy duty diesel engines, are the SJV's primary source of NOx. When mixed with VOCs, NOx forms ground level ozone, particularly in the presence of the strong sunlight which blankets the SJV more than 300 days a year.

To facilitate a regional approach to air pollution problems, seven California Counties and part of an eighth county joined to form the San Joaquin Valley Unified Air Pollution Control District (the District), which covers more than 25,000 square miles from Stockton to Bakersfield. In 2011, the District adopted Rule 4566, which seeks to reduce emissions from commercial composting facilities. Existing composting facilities in the SJV were required to adopt a series of Best Management Practices which are scaled based on a facility's annual throughput.

Because it is an extreme non-attainment area for ozone, any new facility in the SJV emitting more than 10 tons of VOC per year is classified as a Major Stationary Source. Using the SJV's life-cycle composting emissions factor of 5.71 pounds of VOCs per ton of composting feedstock, a facility handling less than 4,000 tons per year would be considered a Major Stationary Source. Per Title 1 of the Federal Clean Air Act, all new major sources must go through New Source Review in order to be permitted to operate. This means that all new composting facilities in the SJV must implement Best Available Control Technologies (BACT) that reduce VOC emissions from materials handling and the composting process. BACT specifications for new compost facilities have not yet been determined. The impact of New Source Review has been to stifle the growth of new composting facilities in the SJV, as the current cost of VOC reduction systems exceeds the ability to recoup those costs through tipping fees and finished product sales. Composting facilities cannot raise tipping fees without losing feedstock to lower-cost alternatives, such as landfilling or direct land application.

In 2011, the California Legislature passed AB 341 (Chapter 476, statutes of 2011), which requires the State to achieve a 75% solid waste recycling, composting and reuse rate by 2020. The California Department of Resources Recycling and Recovery (CalRecycle) is charged with coordinating efforts to reach that goal. According to CalRecycle, organic materials--in particular food--comprise up to 50% of the remaining disposed waste stream. Therefore, the 75% goal will not be attainable without more composting facilities.

Large facilities in the SJV and around North America manage materials in windrows: long, narrow piles that can be as much as 20 feet wide, 8 feet tall, and hundreds or even more than 1000 feet long. Windrows are turned using a specialized machine called a windrow turner, which straddles the pile; the exact height and width of the windrows are determined by the size of the turning machine. All windrow turning machines are powered by diesel engines, with 450-600 horsepower being typical engine sizes for moderate to large machines. Generally, piles are built using diesel trucks and bucket loaders.

According to California regulation (14 CCR, Section 17868.3), compost piles must reach a temperature of 131 degrees Fahrenheit in order to reduce pathogens. Windrows must maintain that temperature for

15 days, during which the pile must be turned at least five times in order to ensure all materials in the windrow reach temperature. Static piles with an insulation layer at least 6 inches thick only need to attain that temperature for three days. Although attainment of pathogen destruction may occur any time during the composting process, it typically occurs early in the cycle, to ensure feedstocks have sufficient energy to meet the temperatures requirement. Most operators report turning piles 8-10 times during a complete compost process of between 60 to 90 days. Previous research indicates that the vast majority of composting emissions occur during the first three weeks of the composting process, hence the focus on "active phase" composting in Rule 4566 and in this research project. Per Rule 4566, several SJV compost facilities are required to put a fresh blanket of finished compost on top of a windrow following all turns during the first 22 days. Compost caps are effective on windrows, but applying so many caps is both labor and diesel intensive.

The Technology Advancement Program

The TAP program is administered by the San Joaquin Valleywide Air Pollution Study Agency (the Study Agency), which was "formed to commission and administer scientifically sound air quality studies to improve understanding of the contributing factors and conditions that result in poor air quality in our local area and in the surrounding areas of central California and to develop technical tools for use by decision makers to guide the development of policies, procedures, plans, rules and regulations necessary to fulfill the state and federal air quality mandates." The Study Agency is a Joint Powers Authority with its fiscal authority vested in a governing board.

In 2011 the Study Agency put out a Request for Proposals for the Technology Advancement Program with the objective to "demonstrate new and innovative emission reduction technologies that have the potential for broad applicability in the San Joaquin Valley." A portion of the available funding comes from collaboration with the USEPA's Clean Air Technology Initiative.

Specifically, the RFP sought "projects that demonstrate bold, innovative, and creative new emission reduction technologies" in three areas, renewable energy, waste solutions and mobile sources. The accepted proposal met all three criteria in the following ways:

- Focus Area I: Renewable Energy—This demonstration project proposed to overcome the barrier to utilizing renewable energy by installing solar energy/storage systems to power air blower motors to be used to aerate static compost piles, and to maintain aeration throughout the high-emissions active-composting phase.
- Focus Area II: Waste Solutions—Project used technology which had not been operationally demonstrated on a commercial scale, to minimize VOC and GHG emissions from existing compost production systems and processes. This technology was non-proprietary and created with components which should be available to any compost operator, thereby reducing costs of emissions reductions.
- Focus Area III: Mobile Sources—Project demonstrated the replacement of large diesel-powered compost loaders with electric powered conveyors, and demonstrated replacing diesel-powered

composting windrow turners with solar powered air blowers to reduce particulate matter and NOX emissions from those sources on compost operations in the San Joaquin Valley.

This project included construction of three abutted aerated static piles, each with its own aeration manifold and photovoltaic powered blower. This type of ASP System is referred to as an Extended Aerated Static Pile (eASP). In addition to the expected air emissions benefits and reducing the use of diesel power during the composting process, three key benefits of this approach include: 1) smaller foot-print and therefore a greater production capacity for a given compost pad; 2) reduced exposure to the elements; and 3) improved retention of process heat.

Project Components

Conveyorization of the construction of the eASP

Construction of windrows or static compost piles is traditionally done with diesel truck and loaders.

We built the eASP using electric-powered conveyors. The heart of the system was an electric-powered potato piler. Pilers are used for placing harvested potatoes into storage sheds. This potato piler had the ability to move the terminal end of the conveyor left and right up to 57 feet, as well as up and down approximately 27 feet. The terminal end of the piler also telescopes up to 18 feet. These maneuvers are accomplished using a remote joystick, much like a video game. This adaptability allows for the anchoring of one end of the piler, and connection to intermediate conveyors, while constructing a pile which was up to 35 feet wide and as much as 10 feet tall. It also allows for the feedstock to be switched after the base pile is formed, to allow for application of the one-foot-thick pseudo-biofilter compost cap made from finished, unscreened compost atop the entire surface of the previously constructed pile.

The potato piler is on wheels, and the spacing of those wheels allows for the pile to be set up within the aeration piping for the pile, and wheeled backward when needed, along with the rest of the electric conveyor train. The 90-foot-long eASP zones were constructed in three stages of about 30' each, then the conveyor train was rolled backward and the process of constructing the pile and placing the cap layer began anew.

The potato piler used in this experiment (Double L Manufacturing, Model 811) was smaller than some models used in the potato industry. The belt width was 30 inches and the rated capacity was 225 tons per hour. A commercial composting set up would likely use the largest available model, with a belt width of 42 inches. If the methodology described in this report were widely adopted, manufacturers of potato pilers might be persuaded to create composting-specific machines, which might feature larger wheels, wider belts, higher throughputs, and built in water sprayers at the terminus to ensure materials are properly moistened during pile construction. The smaller device was the only unit available locally for rent, because potatoes are not an important crop in the SJV. Larger devices would have needed to be shipped down from potato growing regions, and shipped back in time for the fall harvest, an added expense and constraint.

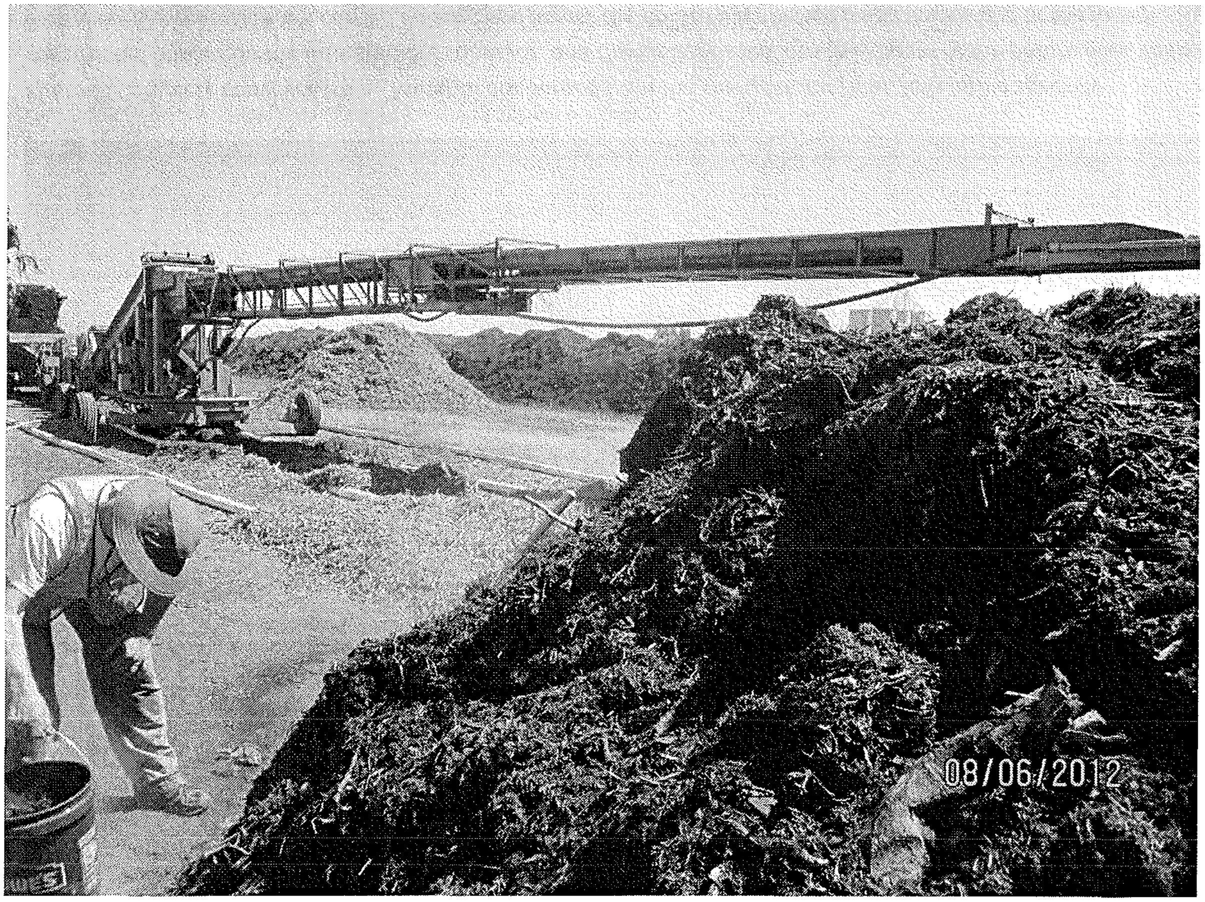


Photo 1: Potato piler at or near full extension. Pile under construction in foreground. Plenum material and aeration pipes are partially visible.

One problem encountered early on was the ability to match the output of the grinder with the capacity of the conveyance system. In a professionally engineered system, these would be balanced. In this case, the conveyors and potato piler were smaller than optimal. In addition, the existing on-site grinder at the Tulare compost site was designed for high-volume throughput, and the output was not variable. It was clear that the available grinder would overwhelm the conveyors. Because larger conveyors and pilers were not available, a decision was made to rent a slow-speed, variable output shredder. Although the shredder was able to keep a steady stream of materials on the conveyors, volume was slower than ideal, and eASP construction took most of the day.

At 446 horsepower, the shredder has an engine half as large as the typical grinders found at large composting sites. This particular unit, the Komptech Crambo 5000, was certified ARB Tier 4. The variable output solved the problem of matching grinder output to conveyance. Although there are emissions savings from moving to a smaller horsepower engine, those are beyond the purview of this project. This would be a moot point in an operation that uses electric powered grinders.

Grinders are essential equipment at compost operations, and it was not a goal of this project to replace the grinder. The same slow-speed shredder was used to prepare the feedstock for both the eASP and the windrows. Any composting operation that receives raw feedstock will still need to grind their materials. Electric grinders are becoming more commonplace, as greater emission reductions are needed

Conveyors and the potato piler can run off whatever voltage is available on site. 480 volt AC power is the most efficient and commonly used in potato storage and at compost facilities that have electrified their grinders. In this case, the conveyors were run off a diesel-powered generator. In a permanent setup, conveyors and pilers would be run off of the electric grid. The generator was equipped with a meter to measure electricity usage.

Also rented was an excavator to feed the shredder. This could also have been accomplished with loaders. Although the excavator is a large piece of equipment, its engine is generally smaller than those found in loaders. This is because loaders drive to and fro, while excavators can stay in one place and swing only their boom. Again, there must be a means to move materials into the grinder/shredder. It was not a focus of this project to calculate emissions reductions from using an excavator for this purpose, but it was an opportunity to model an optimum equipment configuration.

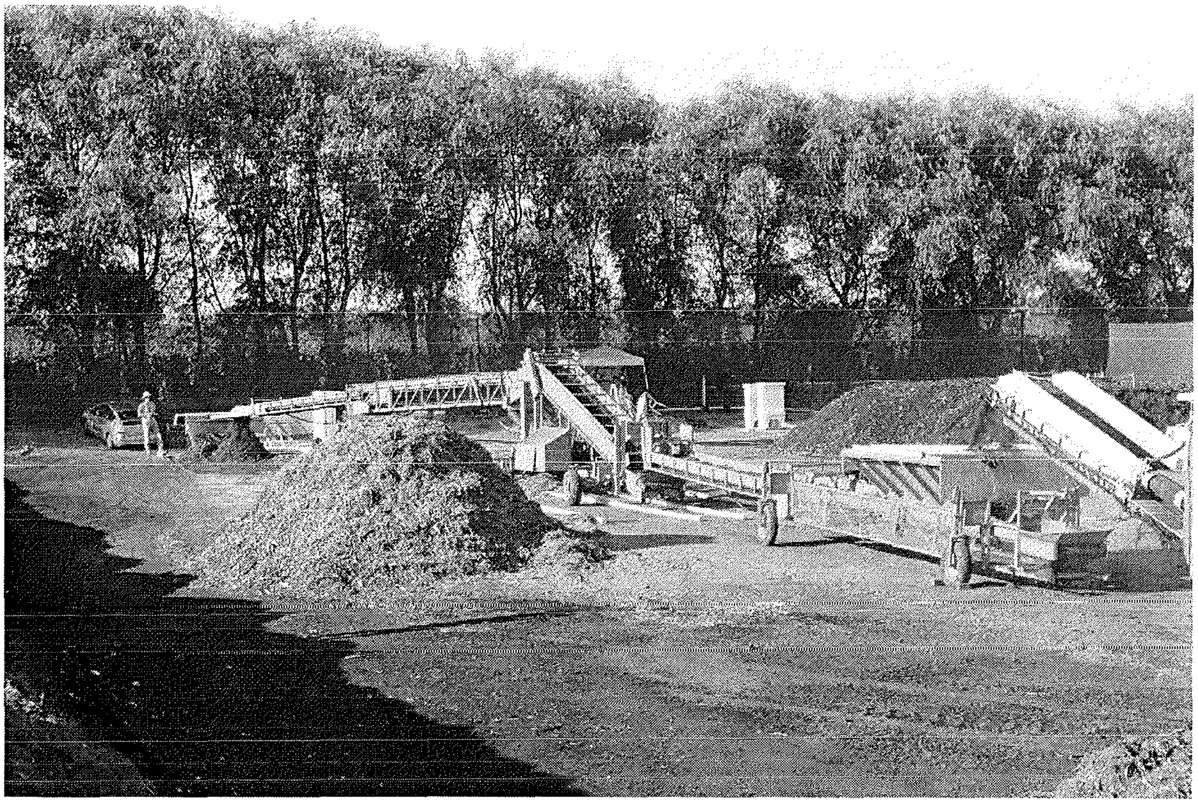


Photo 2: Complete conveyor train. Material discharged from the shredder, far right, falls into a specially constructed hopper on the intermediate conveyor, and then is deposited into the hopper of the potato piler, center. From here the materials are carried upward and across the potato piler before being discharged at the far left,

where the piler is being operated by joystick. This is the very early morning of the first pile build. Plenum materials in foreground.

Moisture management

Moisture management was another key challenge identified early in the process. Because the eASP would not be disturbed for the entire 22-day active compost phase, there would be no way to deliver moisture into the core of the pile. Due to the action of the aeration system, as well as the hot and dry summer SJV climate, water would be needed to prevent the drying out of the eASP, which could slow the compost process or potentially lead to excessive heat buildup and fire.

An early idea to embed drip tape within the pile, just above the aeration pipes, was deemed unfeasible. Instead, a two-pronged approach was taken. The first phase was to wet all feedstocks during the eASP build. This was accomplished by the addition of a moisture system to the discharge of the potato piler. The system consisted of two 1 ¼" nozzles attached to a 1 ½"inch diameter water hose. The resulting system sprayed water at both sides of the feedstock discharge chute. The water was pumped out of the back of the on-site, 4,000-gallon water truck. In a real production scenario, the water truck would be eliminated by plumbing a flexible water supply to the piler conveyor.

Photo 3: Water sprayer system wetting composting feedstock as they are discharged from the potato piler.

The second half of the moisture solution was to design a series of sprinklers which would be placed on top of the eASP and run off a timer. One irrigation "sled" was used for every 30' of eASP length. Because of the time of year and the excessively hot conditions, the sprinklers were run on a cycle of an average of six minutes per cycle, six times per day.-The sprinklers were successful in keeping the top of the eASP moist. Because the aeration system tends to blow the water back up to the top, it was not clear how deep the water penetrated; however, field investigations indicated the water was seeping down more than two feet.

Rain gauges were used on the top of the eASP zones to measure the amount of water delivered, and as the basis for adjustment. The water delivered ranged from 1-5" per day, depending on location and timing of the irrigation system. Over and under-watering was a challenge in this project. An average of approximately 3" per day would likely be ideal, depending on the moisture content of the original feedstock and ambient conditions.

In this project, the combination of feedstock which were not uniformly wet, and occasional over-watering, caused the pile to weep water at the lower end. A French drain was constructed to capture that water and re-introduce it to the piles. A run off capture system should be an integral part of any eASP composting system.

Despite the potential that the eASPs were over-watered, actual water use for the eASP was nearly 17% less than a comparable windrow system per cubic yard of feedstock. Potential reasons for this include a lower ratio of surface area to pile volume, and the lack of turning, which tends to cause a visible spike in evaporation.

Table One - Windrow Turning Method

(Water applied to normal 2,962 cubic yard windrows in Bakersfield) Note: Windrows are watered within 3 hours prior to turning to achieve ball test for moisture per air district rule 4566.	Gallons per Water Truck Load	# Loads per Watering Event*	Gallons per Event	# of Events per Pile	Gallons per Pile	Gallons per Cubic Yard
1. Hydrate newly formed windrow with water truck	4,000	4	16,000	1	16,000	5
2. Hydrate windrow prior to 6 turnings (5 in 15 days PFRP and 1 @ day 22)	4,000	3	12,000	6	72,000	24
Total for 22 day active phase:					**88,000**	**30**

*averaged for seasonal variation

Table Two - Extended Aerated Static Pile Method

(Water applied to each 506 cubic yard pile in Tulare) Note: Item 2 (compost cover water) could be reduced since there was significant extra water runoff during pilot program.	Gallons per Minute Flow	Minutes per Watering Event*	Gallons per Event	# of Events per Pile	Gallons per Pile	Gallons per Cubic Yard
1. Hydrate incoming feedstock with 1 1/4" fire hose as pile is built	35	240	8,400	1	8,400	17
2. Moisten compost cover with 3 lawn sprinklers 6x/day till day 22	11	6	66	63	4,158	8
Total for 22 day active phase:					**12,558**	**25**

*averaged for seasonal variation

Table 1: Comparison of water use between eASP and traditional windrow method as modified by SJVUAPCD Rule 4566.

At 2 cubic yards per ton, a 100,000 ton-per-year facility would save a minimum of 1 million gallons of water annually using the eASP system. Using the ARB estimate of 1.5 thousand tons of CO2 equivalents (MTCO2e) for every acre foot of water saved in California, the potential GHG savings is slightly more than 4.5 MTCO2e per 100,000 tons of feedstock. These savings are probably underestimated at compost facilities, where water tends to be delivered via 400-500 hp, 4,000-gallon diesel water trucks. The savings rise, both in terms of water and GHG, when one considers the inefficiencies inherent in the water truck system, including water loss when filling the truck and water running off the sides of the windrows. The water at this composting site, and many others, is pumped from a well. GHG equivalents are generally higher for groundwater than the statewide average; however, this depends on the depth and flow of the well. If the well is powered by a diesel pump, criteria pollutants are reduced when less water is used.

The water use reductions provided in Table 1 are provided as an Excel Spreadsheet in Appendix H.

Photo 4: Irrigation sleds wetting top of prototype eASP. Note- test areas cordoned off for air emissions sampling.

Feedstock

Feedstock for this project consisted of municipally sourced greenwaste from the Visalia-Tulare area. Effort was made to get the freshest possible greenwaste feedstock for the project. The feedstock used arrived at the facility the day before the pile-building events. After the materials were tipped, they were spread out and handpicked for large trash or hazardous materials, then brought to the grinding area. The same protocol is used for all feedstock at this site.

During pile construction, the team from O2 Compost measured bulk density and water-holding pore space using bucket tests which are standard in the composting business. Moisture percentage of the feedstock was measured using a simple postage scale and an electric heat gun to dry the materials. The materials are weighed wet, and then are dried and weighed until the sample weight stabilizes. The process takes more than one hour to complete. Composite grab samples were taken for each zone constructed, and sent to a laboratory to measure carbon-to-nitrogen ratio on a dry and wet basis.

The overall parameters of the starting feedstock mix for the three zones are as follows.

eASP FEEDSTOCK SUMMARY

	Bulk Density wet	Free Air Space (FAS)	Moisture content	C/N
Zone 1 - Composite #1	828 lbs/cy	40.4%	45%	25.9
Zone 1 - Composite #2	822 lbs/cy	51.0%	50%	16.3
Zone 2 - North End	1004 lbs/cy	41.5%	46%	17.6
Zone 2 - South End				19.5
Zone 3 - North End	980 lbs/cy	44.20%		20.5
Zone 3 - South End				26.6

Table 2: Parameters for the starting eASP compost feedstock.

Laboratory tests for the initial C:N measurements are available in Appendix F.

Aeration System

Each of the three ASP zones had its own blower, manifold and pipes. The aeration piping was standard 4" drain pipes, such as can be purchased at any hardware store. These white PVC pipes come in standard 10' sections and are flanged on one end so they may easily be attached. There are two kinds of pipes, perforated and not perforated. Each aeration line starts and finishes with 10 feet of non-perforated pipe, so air does not leak out from the sides of the piles. In between were seven sections of perforated pipe, with the holes pointed down. Each pipe section is tacked to the ones before and after using one screw, to ensure they are not pulled apart during pile construction. The aeration pipes were buried in a plenum of coarse-ground wood chips approximately 1 foot deep. The use of chips ensures the air coming out of the perforated pipes is not blocked by dense material compacted by the weight of the pile

The standard manifold for each ASP branches off to four 90' long aeration pipes, each five feet apart. The manifold was constructed of 6" diameter PVC sewer pipe, again, standard at most large hardware stores. These pipes are green and are also sold in 10' sections. For this project, the pipes were cut with a hand saw to construct the manifold. Standard T and elbow connections were used to assemble the pieces, and were tapped together using a rubber mallet. The 6" sewer pipe was stepped down to the 4" sewer pipe using standard connectors. The blower was connected to the manifold using a rubber fitting, which was purchased from the blower vendor.

With every Aerated Static Pile (ASP) Compost System, a key design objective is to provide uniform airflow across the base of the pile (side to side and end to end). The aeration zone is located beneath the core of the pile and consists of perforated pipe overlain by a layer of coarse woody material (referred to as the "plenum layer"). As the ASP System is constructed, the aeration zone is sealed on all sides by the overlying mix of materials to prevent short-circuiting of airflow to the atmosphere.

When the aeration blower turns on, the plenum layer pressurizes; the air first flows laterally across the base of the pile and then vertically up through the compost mix. By controlling the frequency and duration of airflow, the operator is able to maintain aerobic conditions throughout the pile and optimize the biology of the composting process.

For this project, each zone was aerated using independent solar powered blowers. Each system included a pair of photovoltaic panels, charge controller, inverter, batteries, and a 1.5 hp 3-phase blower).

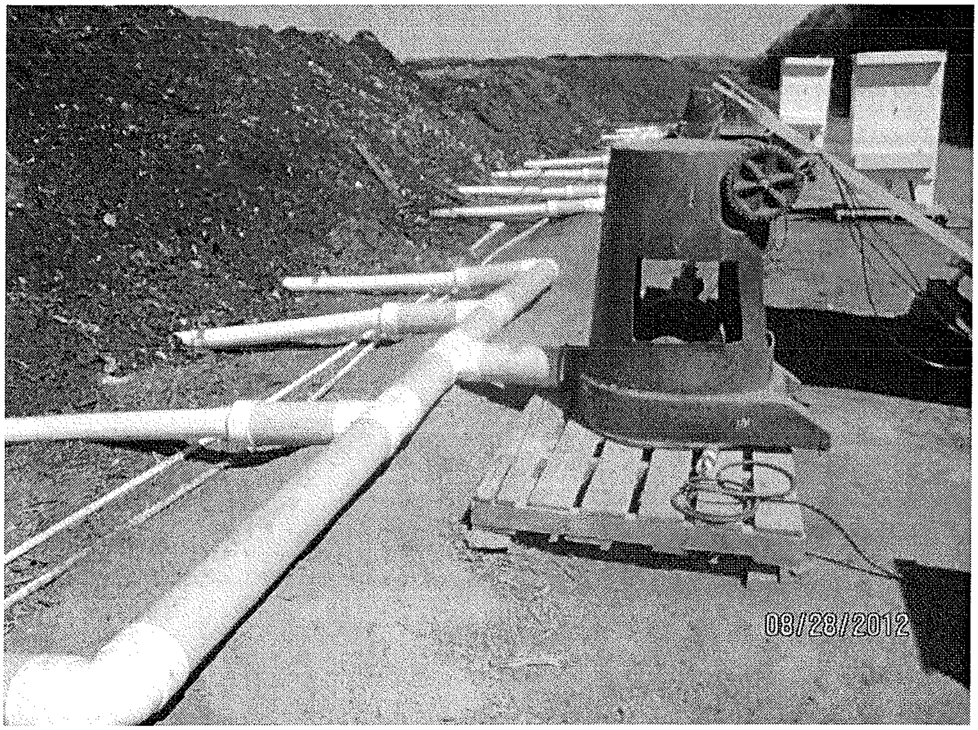


Photo 5: Completed aeration manifold showing 6" pipes, connectors and step down to 4" pipes. The blower is protected inside the modified trash container.

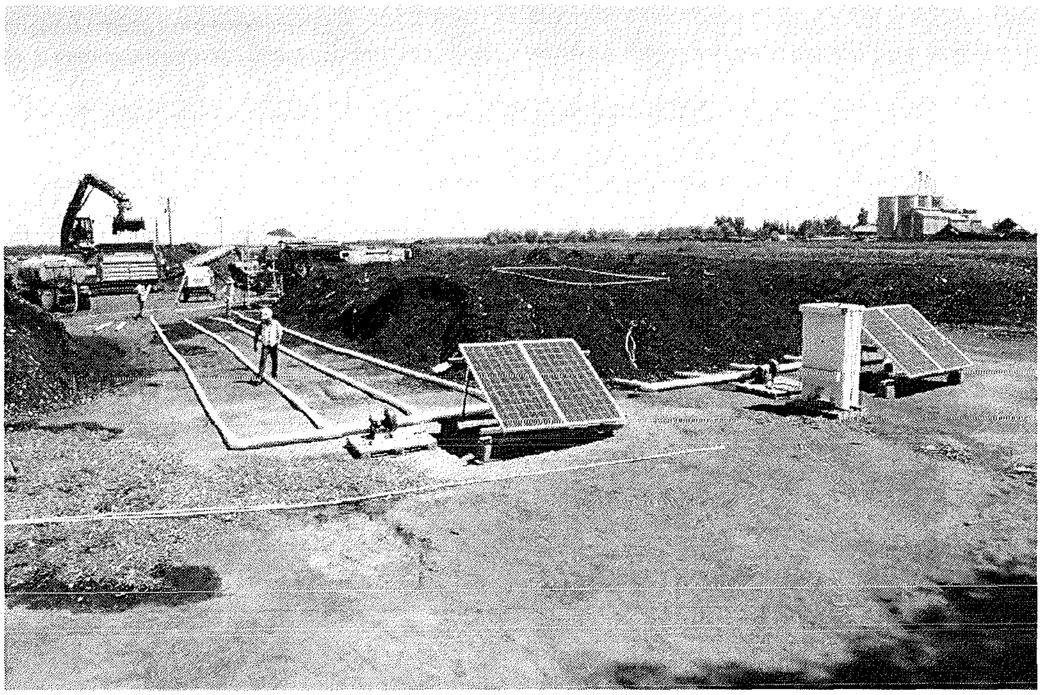


Photo 6: View of project with completed eASP zone 1 on right, and aeration pipes in place for Zone 2. Zone 1 photovoltaic system is complete; panels are in place for Zone 2.

Two sets of field tests were conducted on each of the three aeration manifolds to confirm that: 1) the airflow was balanced within the aeration system; and 2) sufficient air volume was delivered to the compost mix. These tests evaluated static pressure and airflow velocity. For the two tests, 3/8-inch diameter holes were drilled into the PVC aeration manifold at five junctions (pressure and velocity) and at the down-stream ends of each of the four lateral aeration pipes (pressure only). Figure 1 provides a schematic drawing of one aeration system to illustrate the layout of the aeration pipes and the locations for the two sets of tests.

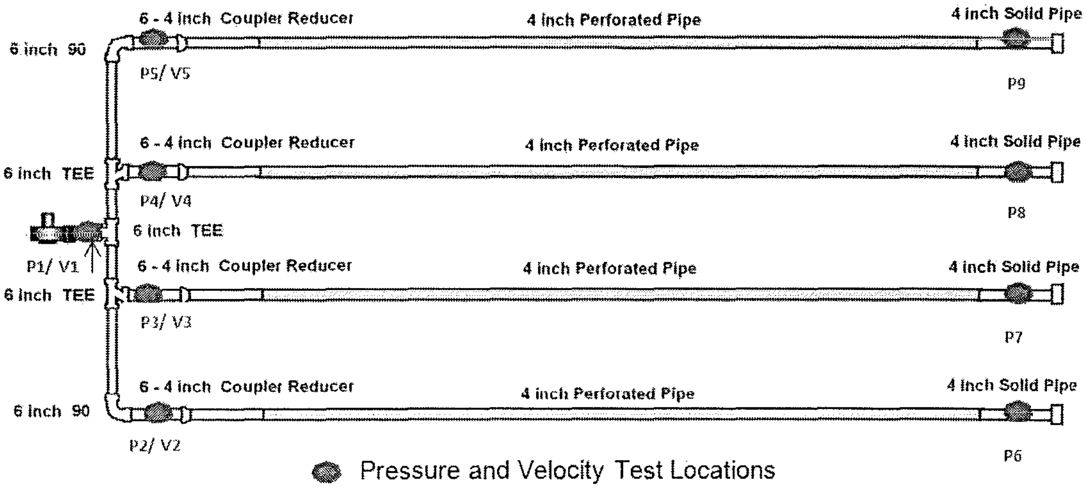


Figure 1: Schematic of an ASP manifold system, with the blower and manifold at the left and testing locations noted with blue dots and red numbers.

The pressure at nine different locations in each of the three aeration systems was determined using a magnehelic pressure gauge. The velocity of airflow was determined using a hot-wire anemometer. An example of each monitoring device is shown below.

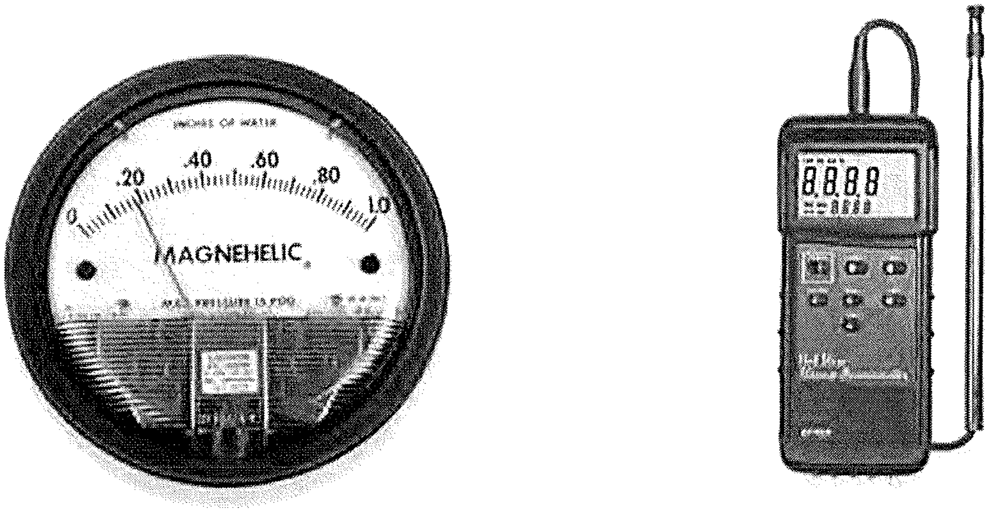


Photo 7: Magnehelic pressure gauge and hot-wire anemometer.

Extended Aerated Static Pile			**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Zone 1	Pressure	(in-sp)	3.0	2.5	2.2	2.2	2.4	2.2	2.4	2.4	2.3
	Velocity	(ft / min)	3200	2100	1950	1900	2200	--	--	--	--
Zone 2	Pressure	(in-sp)	2.8	2.6	2.4	2.4	2.8	1.6	1.4	1.3	0.7
	Velocity	(ft / min)	2600	2200	1850	2100	800	--	--	--	--
Zone 3	Pressure	(in-sp)	1.5	1.5	1.7	1.6	1.7	1.3	1.3	1.3	1.2
	Velocity	(ft / min)	3300	1700	1750	1800	2100	--	--	--	--

Table 3: Results of pressure and velocity tests for all 3 eASP zones. Velocity readings are not taken at the ends of the aeration lines (sites 6-9).

These test results confirmed that uniform airflow and sufficient air volume was delivered to the EASP System to meet the objectives of the project.

Photovoltaic System

Recent advances in photovoltaic (PV) technology make powering small motors at remote locations more feasible than ever before. The blower motors weigh about 90 pounds, and produce a maximum of 1.5 horsepower each. The blowers run directly from the four deep-cycle flooded lead acid batteries which were placed inside the white cabinets. The PV panels charge the batteries. The white cabinets also contain the inverter, which converts the direct current power produced by the panel into alternating current, as well as the timers, switches and the wiring harness, which limited the electrical operations in the field to basically a plug-and-play situation.

Specifications of the major components of each individual PV system are as follows:

Item	Manufacturer	Model	Specification
Panels	Astroenergy	CHSM 6612-290 Crystalline PV module	290 watt, 24 volt DC panel; 2 per zone
Inverter	Samlex	Pure Sine Wave SA 2000K-124	Converts 24 Volts DC to 2000 watts AC power at 120 Volts, 60 Hz
Charge Controller	Samlex	PR 3030	30 amp, 12 or 24 volt, fully programmable with LCD display
Batteries	U.S. Battery	AGM L16	390 amp hour 6V; 4 per zone
Blower	New York Blower	Compact GI 105	1.5 max HP; 3500 max rpm.

Table 4: Major components of the photovoltaic array.

The full PV systems were specified by O2 Compost and shipped to the site by Automation Electric and Controls of Mt. Vernon, Washington. The arrays were assembled on site by the study team. The hard cost for the complete units, including panels, batteries, inverter, timers, switches and blowers, as well as all piping, was about $10,000 each.

The PV panels were mounted on specially constructed aluminum frames. The frames were bolted to standard 4 x 4 wooden posts with lag screws. The posts were nailed to standard concrete/metal footings available at any hardware store. The panels were angled 45 degrees to the south. Because the summer sun in the SJV is so strong, and there was no shade at the site, it was not necessary for the panels to track the movement of the sun, or to match the angle of the panels with the angle of the sun. These steps may be necessary for winter operations.

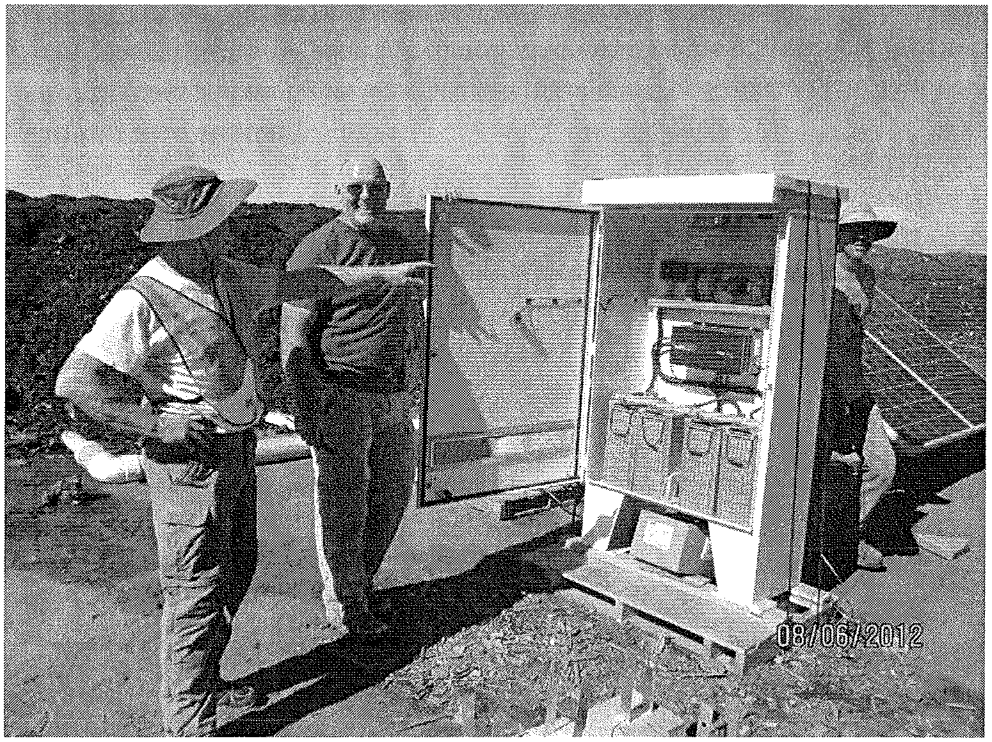


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Photo 8: Interior of the power array box. From bottom to top: batteries, inverter, timer and switches, and exhaust fan at very top. From left to right: Harold Ruppert and Peter Moon of 02 Compost, and Kevin Barnes, City of Bakersfield.

The blowers were cycled to operate 2 minutes out of every 20, easily achievable with summer sunlight in California. The only problem with the PV system concerned the small exhaust fan which was used to cool the components inside the white metal cabinet. August 2012 was an extremely hot month in the southern SJV, with nominal daytime temperatures above 100 degrees F nearly every day the project was in operation. This caused the exhaust fan to work overtime, drawing down the batteries. The thermostat on the exhaust fan ultimately had to be raised to its maximum level, potentially exposing the batteries and inverter to damaging heat buildup. Although the system continued to function throughout the life of the project, the batteries were degraded. For a permanent system, care should be given to place sensitive electronics in the shade.

Temperatures and pathogen reduction

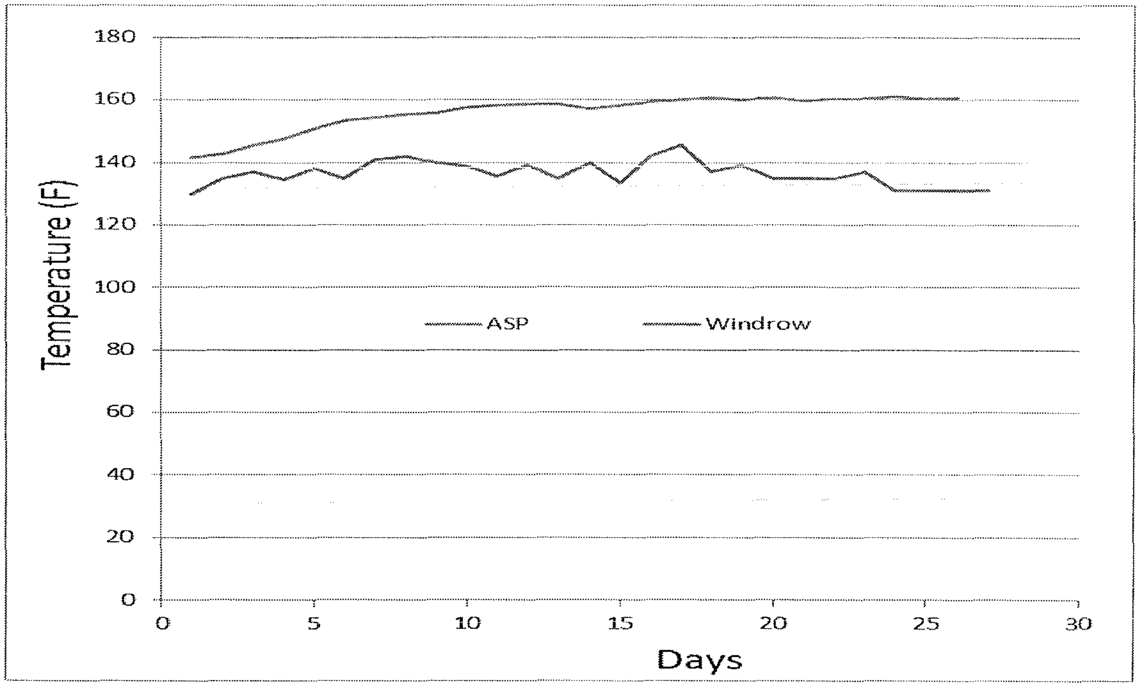
Section 17868.3 of Title 14 of the California Code of Regulations sets minimum temperature standards for pathogens reductions during composting. These standards, known as PFRP, are as follows:

- If the operation or facility uses a windrow composting process, active compost shall be maintained under aerobic conditions at a temperature of 55 degrees Celsius (131 degrees Fahrenheit) or higher for a pathogen reduction period of 15 days or longer. During the period when the compost is maintained at 55 degrees Celsius or higher, there shall be a minimum of five (5) turnings of the windrow.
- If the operation or facility uses an aerated static pile composting process, all active compost shall be covered with 6 to 12 inches of insulating material, and the active compost shall be maintained at a

temperature of 55 degrees Celsius (131 degrees Fahrenheit) or higher for a pathogen reduction period of 3 days.

These temperature standards are backed up by pathogen testing at the end of the curing stage, before finished compost may be sold.

A five-foot long temperature probe was purchased in order to take temperature readings. Temperatures for the eASP were taken at three different depths (2', 3' and 5' down) and at two locations on the pile. For control windrows, temperatures were taken at two locations per pile. Control windrows were turned on the operator's regular turning schedule, but were not turned on the basis of the age of any individual control.



Graph 1: Comparison of temperature readings between eASP and windrow over 22-day active composting period.

All eASP and control windrows met or exceeded state minimum temperature requirements for pathogen reduction. On average, eASPs ran hotter than windrows in this experiment. This is likely due to the larger pile size and the thick blanket of finished compost, both of which tend to hold in heat. Full temperature data is available in Appendix G.

Curing and testing

All eASP zones and windrows were allowed to compost for 30 days. At 30 days, composite samples were taken of each eASP zone and control windrow using the process described in California regulations (14 CCR, Section 17868.1) and were sent to Soil Control Laboratories in Watsonville, CA. Soil Control

Labs is one of two laboratories in California approved by the U.S. Compost Council's Seal of Testing Assurance (STA) program. The program was created in 2000 by the leading compost research scientists in the United States. The science behind the development of the STA Program and the various tests that are used is contained in 'Test Methods for the Examination of Composting & Compost', a publication which includes a suite of physical, chemical and biological tests. STA testing can be performed by a group of independent, certified labs across the U.S. and Canada.

Results of the 30-day STA testing are below.

30 DAYS		Zone 1	Control 1		Zone 2	Control 2		Zone 3	Control 3
	Sampled Date	9/7/2012			9/12/2012			9/17/2012	
	Unit Measures								
Moisture Content	%, Wet weight	43.3	42.3		37.8	39.8		38.5	43.3
Organic Matter	%, Dry weight	43	44.9		46.5	42.6		42.9	46.5
C/N Ratio	Ratio	18	18		17	19		18	17
pH		5.37	5.72		6.2	6.32		6.28	5.03
Particle Size	Max aggregate size, Inches	0.38	0.64		0.64	0.64		0.64	0.64
Nitrogen - Total	Total N, % dry weight	1.3	1.4		1.6	1.3		1.4	1.5
Nitrogen - Organic	%, dry weight	1.2	1.2		1.5	1.1		1.3	1.3
Maturity									
◆Ammonia	NH4-N, mg/kg dry weight	1300	1800		1200	1500		670	2000
◆Nitrate	NO3-N, mg/kg dry weight	33	16		38	9.6		10	51
◆Vigor (bio-assay)	Avg. % of Control	90	91.7		91.7	91.7		86.7	81.7
Stability									
◆CO2 Evolution	mg CO2-C/g OM/day	7.9	9.1		7.9	10		7.5	13
Potassium	K2O, % dry weight	1.2	1.2		1.4	1.3		1.3	1.4
Carbon - Organic	lb/ton	23	24		27	25		25	25
Soluble Salts	EC5, dS/m (mmhos/cm)	9.9	11		7.4	9.7		6.8	11
Safety									
◆Fecal Coliform	Pass/Fail	Pass	Pass		Pass	Pass		Pass	Pass
◆Salmonella	Pass/Fail	Pass	Pass		Pass	Pass		Pass	Pass
◆Trace Metals	Pass/Fail	Pass	Pass		Pass	Pass		Pass	Pass
Iron	Fe, mg/kg dry weight	11,000	9000		9300	8600		9700	9300
Bulk Density	lbs/cu ft dry weight	25	22		22	22		25	22
AgIndex	Ratio	10	8		9	8		10	9

Table 5: Comparison of 30-day laboratory results for all three eASP zones and control windrows.

In order to reach maturity, the compost process generally needs to run 60 days or more. So it comes as no surprise that all 30-day-old samples show an immature product. In nearly all maturity measurements, however, the eASP appears to be slightly more mature or more stable than its windrow counterpart, despite the lack of turning. In terms of CO2 evolution--the stability measurement--the eASP is superior in all 3 pairings. Therefore, we may conclude that the eASP will have a beneficial impact for operators on compost production issues; that is; we see no evidence of a time penalty for switching to the no-turn active compost method.

We should note that starting C:N ratios were below what is considered optimum. Composting experts agree an ideal C:N ratio for initial feedstock is between 25 and 35 parts carbon to one part nitrogen. This is particularly important for small manure facilities. Practically speaking, it is very difficult for large-scale operators to change the C:N ratio of large volumes of material. Sampling bias in C:N measurements is inherent because large particles are filtered out before final testing, and larger particles tend to be high in carbon, so actual stating C:N is likely higher than reported.

After 30 days, the control windrows moved into the regular composting operation on site. They were not sampled again. The three eASP zones were treated differently, as follows:

- Zone 1: Scooped up and placed into a windrow, treated the same as other curing piles on the site
- Zone 2: Flipped over onto Zone 1 and aerated for an additional 30 days
- Zone 3: Left in place and aerated for an additional 30 days

After 60 days, the three zones were again sampled, and the composite sample was sent to Soil Control Labs for a second round of STA testing.

Results of the 60-day STA testing are below.

60 DAYS		Zone 1 - Cure		Zone 2 - Cure		Zone 3 - Cure
Sampled Date						
Unit Measures						
Moisture Content	%, Wet weight	33.7		27.6		33.1
Organic Matter	%, Dry weight	37.3		32.9		53.8
C/N Ratio	Ratio	15		14		18
pH		6.12		7.33		4.71
Particle Size	Max aggregate size, Inches					
Nitrogen - Total	Total N, % dry weight	1.4		1.2		1.5
Nitrogen - Organic	%, dry weight	1.3		1.2		1.3
Maturity						
◆Ammonia	NH4-N, mg/kg dry weight	690		290		1,500
◆Nitrate	NO3-N, mg/kg dry weight	6.1		5.7		43
◆Vigor (bio-assay)	Avg. % of Control	100		100		88
Stability						
◆CO2 Evolution	mg CO2-C/g OM/day	7.5		6.2		23
Potassium	K2O, % dry weight	1.4		1.4		1.4
Carbon - Organic	lb/ton	21		17		28
Soluble Salts	EC5, dS/m (mmhos/cm)	7.5		4.2		10
Safety						
◆Fecal Coliform	Pass/Fail	Fail		Pass		Pass
◆Salmonella	Pass/Fail	Pass		Pass		Pass
◆Trace Metals	Pass/Fail	Pass		Pass		Pass
Iron	Fe, mg/kg dry weight	11,000		12,000		8,000
Bulk Density	lbs/cu ft dry weight	22		28		18
AgIndex	Ratio	>10		>10		9

Table 6: 60-day laboratory results for three eASP zones.

The complete tests for 30 and 60 days are found in Appendix D. Zone 1 failed the pathogen test at 60 days, even though it passed a similar test at 30 days. Per state law, this material could not be sold until it was re-composted and passed a subsequent test. Contamination of previously pathogen reduced materials is not uncommon at large composting sites. It can come from many sources, including handling by equipment that comes into contact non-pathogen-reduced materials, as well as external sources such as birds. The failure to achieve criteria is not believed to be related to the eASP composting technology employed, as this pile did pass its pathogen test at 30 days.

The complete 30-day laboratory tests are available in Appendix D. The 60-day tests are available in Appendix E.

Diesel Emissions Reductions

Reducing diesel emissions are important for mitigating the air quality impacts of composting. The VOCs emitted from the degradation of organic materials are much more voluminous than equipment emissions, but are biogenic in nature and comprised primarily of light alcohols (Kumar et al 2009). Light alcohols are not strongly implicated in ozone or secondary aerosol formation. (Carter et al 1995). NOx from diesel engines is implicated in both. Any process changes which reduce overall diesel use on the compost site are real, permanent reductions which will lead to reduced criteria pollutant levels in the SJV.

The project resulted in an average reduction in diesel use per ton of feedstock of approximately 87%, with commensurate reductions in all criteria pollutants and greenhouse gases associated with diesel use. When compared against older equipment, this could result in a reduction of as much as 7.5 tons of NOx and 2.5 tons of non-methane hydrocarbons per year per 100,000 tons processed. Savings against newer equipment generally run less than one ton of pollutant per 100,000 tons. Based on the estimates, and assuming two cubic yards per ton, diesel savings are calculated to be 2,940 gallons per year for the theoretical 100,000-ton-per-year facility. Lower density materials actually increase the diesel savings.

Cleaner diesel engines, electrification of grinders and other diesel equipment on compost sites, and the potential future advent of hybrid diesel-electric or natural-gas-powered heavy duty equipment will all contribute to a gradual shift toward less diesel use. However, bringing three-phase power to remote composting sites can be very expensive; costs exceeded $1 million for the Mt. Vernon composting site in Bakersfield. Newer loaders and trucks will be phased in under mobile source programs run by the SJV and the ARB, and are also expensive propositions for compost operators. Natural gas and hybrid loaders are still not commercially available, and will likely remain cost prohibitive for some time.

This project measures the reductions in diesel use from conveying materials directly from a grinder output to a pile. In a typical composting site, these tasks would be performed by diesel loaders, typically working in concert with diesel powered end-dump or side-dump trucks. For the purposes of this exercise, we measured only a short run covered by one telescopic-transfer conveyor that was available to rent for the project. However, a full scale production would realize much greater diesel reductions.

Facility-wide reductions could be estimated on a facility-by-facility basis, using a point half the distance from the site's grinder to the property line, as an average distance materials would need to be moved, and then calculate the amount of diesel hours needed to perform that operation.

We also measured the amount of time necessary to operate a water truck in order to maintain moisture in composting windrows. With the eASP, these functions were provided during pile build, and thereafter by a sprinkler system. One of the main drawbacks of using sprinklers on windrows is the potential for them to become ensnared in windrow turning equipment, resulting in their destruction and loss of valuable turner time. This is not a problem with the no-turn eASP system.

Even with extensive use of conveyors, loaders will remain indispensable equipment at compost site because of their speed, maneuverability and versatility. However, it may be possible to significantly reduce their use, which represents a cost savings and an air pollution benefit. Compared to grinders, conveyors use relatively little electricity, and can easily be powered by generators if necessary.

This project used a slow-speed shredder instead of a high speed grinder to prepare the feedstock for composting. The shredder uses an engine roughly half the size of a comparable grinder. It was also a newer model, with a Tier 4 compliant engine. The emissions reductions gained from this type of replacement are not considered as benefits from this project.

Overall, the eASP resulted in an 87% reduction in diesel fuel use per ton of production, and a corresponding reduction in the amount of criteria pollutants and GHGs from equipment use. The amount of actual pollutants reduced depends on the age of the diesel equipment in question. For the purposes of this project, pollutant reductions were calculated for both 1996 (Tier 0) engines and 2007 (Tier 3) engines.

The full diesel use calculations, and the calculations of reduced emissions from diesel use, are available in Appendix C.

Land Use Reductions

Taller, wider extended ASPs can process more materials per acre of land than traditional windrow. To the extent that many piles are laid parallel to one another, this advantage is increased. Larger piles can be moved or even cured using turner devices that rely on small conveyors rather than the spinning shaft typically used for windrows.

Land purchase is typically a concern when building a new compost site, but can also come into play if an existing operator was forced to construct a water-impermeable pad for active-phase composting. Based on the experiment, and compared to standard windrows at the Mt. Vernon compost facility in Bakersfield, the eASP can process approximately 3,552 tons per acre, while windrows (using some of the largest machines available) can process 1,580 tons per acre, an advantage of some 55.5% for the eASP.

For the theoretical 100,000 ton-per year-facility, the amount of acreage needed for active phase composting is also reduced by 55%. The amount of acreage necessary vary depending upon whether a composter uses a 70-day compost period or allows materials to cure to 90 days without being moved off the pad. The full calculations are available in Appendix I.

	Low acreage estimate (70-day compost cycle, 5 cycles per year)	**High acreage estimate (90-day compost cycle, 4 cycles per year)**
Extended ASP	5.63	7.03
Windrow	12.65	15.8

Table 7: Calculation of acres needed for active composting for theoretical 100,000 tons per year composting facility with 70-day or 90-day compost cycle. These calculations do not include land needed for feedstock receiving, grinding, screening, mixing or finished product storage.

Discussion

Composting is widely viewed as an inherently sustainable activity. The process of recycling nutrients and organic matter back into the soil will grow in importance over the coming years as the world's farmers struggle to feed billions of people. Composting is a critical part of California's efforts to achieve75% recycling and composting, as mandated by AB 341 (Chesbro, Statutes of 2011). In fact, attainment of the AB 341 standard is widely viewed as impossible without a rough doubling of composting capacity in California. This comes at a time when compost facilities are increasingly difficult and expensive to site, primarily due to air pollution issues.

The primary composting process used in California and much of North America, open windrows, may not be inherently sustainable. The process and profitability of operators heavily depends on the wide availability of relatively inexpensive diesel fuel. Composting facilities have little ability to raise their tipping fees or the prices for their finished product without losing market share to low-priced landfilling and relatively inexpensive manufactured fertilizer. If diesel fuel prices were to rise significantly in the future, compost facilities would find their profit margins squeezed and some may go out of business.

Composting facilities are difficult to site because of odor issues. Odor is most commonly associated with receiving and mechanical turning of relatively fresh feedstock. Rapid handling of fresh, odoriferous feedstock can be achieved by most operators; however, it is not always possible to reduce or alter turning schedules. Eliminating the need to turn during the odorous active composting phase may allow compost facilities to site closer to urban areas that generate feedstock, thus reducing diesel-intensive feedstock hauling.

As California increases its efforts to reduce landfilling and greenhouse gas generation, food waste composting will increase. Unlike green waste, food waste qualifies for GHG credits when composted. Food waste putrefies rapidly; however, often creating intense odors. No odorous emissions from the eASP built for this project were ever detected. Composting methods which reduce handling activities during the active phase seem likely to reduce odor issues, again, potentially allowing siting of composting facilities closer to the places where both food and green wastes are generated.

Previous emissions studies where foodwaste was a significant part of the feedstock suggest that VOC emissions could be significantly higher compared to green-waste -only piles, but this question has not been adequately researched. The South Coast AQMD already requires large foodwaste composting operators to install VOC capture systems. The high cost of these systems has limited food waste composting opportunities within the four counties of the SCQAMD.

Emissions reductions for VOCs (primarily non-methane, non-ethane organic compounds, or NMNEOC) from the eASP were expected in this study, but the measured reductions exceeded all expectations. In searching for potential explanations for the high rate of control, several factors come to the fore.

- EASPs reduce surface area. In a 2009 study for the San Joaquin Valley Unified Air Pollution Control District, very small windrows with high surface areas were shown to have higher emissions rates than the ordinary sized control windrow.
- The eASP surface was kept wet. In the same previous study for the San Joaquin Valley Unified Air Pollution Control District, wetting the surface of the windrow prior to turning reduced overall emissions by 19%. This study supports that finding and suggests that a consistently wet surface may produce even higher emissions control. With a smaller surface area, the eASP is less prone to drying out during hot SJV summers.
- The biofilter layer was 12" or more thick. In two previous studies, one by the California Integrated Waste Management Board and the aforementioned 2009 air district study, 6" thick compost caps delivered emissions reductions of 75% and 53%, respectively. Commercial biofilters are commonly 3' thick or greater, depending on the application. This study suggests that thicker biofilter compost cap layers are more capable of degrading NMNEOCs and other undesirable compounds.
- More uniform air and water. Aeration is applied uniformly to the greenwaste, maximizing aerobic decomposition and reducing anaerobic pockets. The other primary ingredient, water, is also applied regularly so that overly dry conditions never suppress microbial activity, further enhancing rapid and efficient aerobic decomposition. Controlling the aerobic activity is a key ingredient in maintaining more efficient and favorable aerobic decomposition regarding both the type of compounds generated and the amount of compound air emissions released per ton of greenwaste.

The main component of the compost cap, unscreened finished compost, is available at all composting sites. Methods to apply the cap on conventional windrows tend to be diesel intensive; however, conveyorization can be used to apply the layer on static piles with set site configurations. SJVUAPCD Rule 4566 requires the biofilter compost cap to be replenished after windrow turning at the very largest facilities, increasing their diesel footprint. State regulations require windrows to be turned five times in 15 days for pathogen reduction. However, state regulation does not require static piles with a one-foot-thick insulation layer to be turned for pathogen reduction purposes. By using the eASP system, operators can apply just one cap for the entire active composting phase.

The solar powered eASP system reduces dependency on diesel, and reduces feedstock handling during the critical active composting period, when odor and emissions potential is at its highest. The use of solar power means aeration systems can be located where they are needed, in remote locations, without expensive grid connections. In the SJV, available sunshine year-round is more than adequate for the relatively small motors needed for aeration, and with adequate battery backup such systems should be operable even during the rare prolonged foggy or rainy winter periods.

A drawback for the prototype eASP system was the, above-ground aeration pipes, which were destroyed during pile deconstruction. This problem can be overcome by substituting thick, durable pipes made of heavy plastic (typically used for water mains) in place of the thinner, low-cost pipes used in this project. Also, low-cost methods to embed aeration pipes in the ground should be technologically feasible for most operators, and are available commercially from some vendors.

Another challenge was setting proper moisture levels. Though the temporary eASP sprinkler system rigged for this project worked remarkably well, it was not as precise or as consistent as desirable. Once a compost operator configures an eASP site, designing a more effective, permanent system providing near-ideal moisture management should not prove a significant challenge. A similar situation occurred for the initial watering of the feedstock; the temporary system designed for this project proved adequate. However, permanent, engineered systems—perhaps integrated with the conveyor—would certainly provide more uniform feedstock moisture and would quite possibly save additional water.

A final drawback for larger pile sizes is the difficulty of monitoring conditions deep within the pile. The five-foot-long temperature probe purchased for this project is the longest readily available. However, it is not always possible or advisable to force the probe the full 5' into a pile. Also, this probe did not measure relative moisture. Technology is rapidly solving these problems. Low-cost remote data loggers are now available. These can be buried within piles, and can record a variety of parameters, including temperature and moisture, over the life of the project. Future projects should include the use of these devices.

Conclusions

This project compared standard windrow composting to an eASP design to compare emissions. The result of this project does establish that the eASP design tested reduces both water use and air emissions. The eASP was tested in a single selected configuration; therefore, the results of this project do not establish optimal blower speeds or water application rates. Additional testing would be required to establish a user guide to ensure minimum operating costs, best quality of product and minimum water use and air emissions.

The solar powered eASP with a biofilter compost cap appears to be a viable method for commercial-scale composting. The demonstrated NMNEOC, ammonia and GHG emissions reductions achieved in this project from the piles of decomposing organic materials were significant, in the range of 98%, 95% and 70% respectively. These levels of control match or exceed commercially available systems costing many times more. The practical effect of using electric conveyors instead of diesel-powered trucks and loaders to build the pile, and of using solar-powered aeration instead of diesel-powered windrow turners, creates additional emissions reductions of NOx and other criteria pollutants which are important in non-attainment air basins such as the San Joaquin Valley. The emission reductions cited are the result of a closely managed demonstration project and should not be considered as the expected performance of and "achieved in practice" permanent facility. Achieved in practice results might be less than the closely managed demonstration project; however additional reductions might be achieved by further work to establish optimal operating conditions.

In addition to the diesel reductions and the greatly reduced emissions from decomposing organic wastes, conversion to eASP systems has the potential to save operators money and reduce GHG impacts through process water savings and shrinking the amount of land needed to conduct active-phase composting.

In terms of product quality and maturity, the eASP appears to be at least as good as windrow systems.

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- Appendix A: Technical Emissions Testing Memo from Chuck Schmidt and Tom Card
- Appendix B: Emissions samples fluxes, calculations and charts
- Appendix C: Diesel fuel use reductions and calculated reductions of associated criteria pollutants and GHG emissions
- Appendix D: STA testing results on 30-day-old material
- Appendix E: Laboratory testing results on 60-day-old materials
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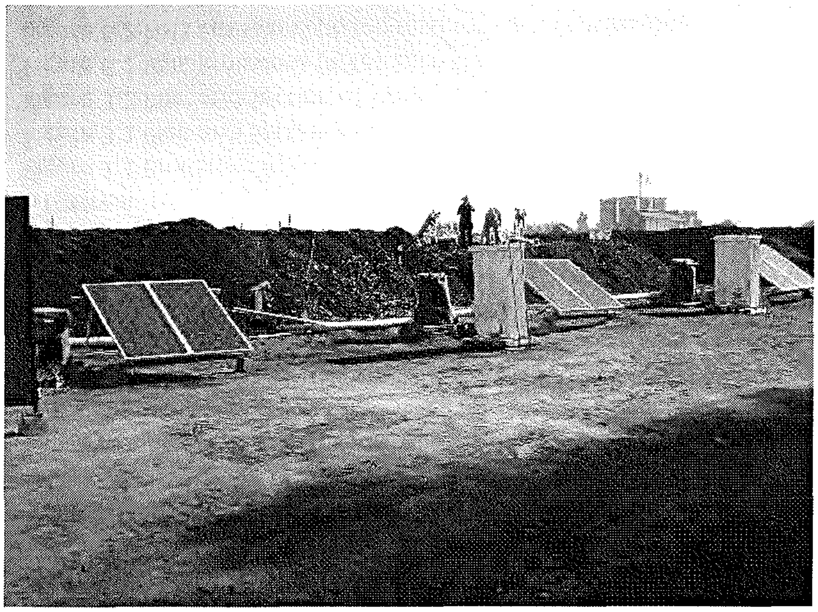
San Joaquin Valley Air Pollution Control District
Technology Advancement Program (TAP) 11-01

Aerated Static Pile Composting
with
Surface Biofiltration Layer Air Emissions Control

Air Emissions Assessment

Summary of VOC and Greenhouse Gas Air Emissions
with
Comparison to Windrow Composting Emissions



Report
Revision 1

January 2012

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1. Summary

A prototype Aerated Static Pile (ASP) composting process was assembled and operated to test both ability to produce quality compost and to quantify air emissions. The ASP utilized ambient air blown into the pile from the bottom; the blowers were powered by photovoltaic panels and associated batteries. The ASP had a biofiltration layer added to the surface to reduce air emissions. A series of compost windrows were built concurrent with the ASP using the same materials. The air emissions from the ASP were compared to the on-site measured air emissions of the current industry-standard windrow composting method.

Emissions were measured using the standard methods and techniques used for San Joaquin Valley Air Pollution Control District (SJVAPCD) regulatory compliance. This includes the use of the USEPA flux chamber as modified under South Coast Air Quality Management District (SCAQMD) Rule 1133, and analysis using SCAQMD Method 25.3 for VOC and 207.1 for ammonia (NH3). In addition to these traditional methods, nitrous oxide (N2O) was measured using NIOSH 6600 and organic species were measured using USEPA TO-15.

Tables 1.1 and 1.2 provide the measured and extrapolated emissions for the ASP and window (respectively) for the cycle periods of 22 days (all measurements) as well as 30 days and 60 days (both measured and extrapolated). The units are pounds of emitted compound per ton of initial compost mix.

Table 1.1 ASP Air Emissions (pounds per ton compost mix) for a 22 day compost period with extrapolated estimates for 30 day and 60 day periods.

		NH3		Greenhouse Gas			
Cycle Length	**VOC**	**Field**	**Lab**	**CO2**	**CH4**	**N2O**	**CO2e**
22 Day	0.10	0.02	0.01	206	5.1	0.01	315
30 Day	0.13	0.02	0.01	271	5.2	0.02	387
60 Day	0.22	0.02	0.01	517	5.6	0.08	658

Table 1.2 Windrow Air Emissions (pounds per ton compost mix) for 22 day, 30 day, and 60 day periods.

		NH3		Greenhouse Gas			
Cycle Length	**VOC**	**Field**	**Lab**	**CO2**	**CH4**	**N2O**	**CO2e**
22 Day	8.6	0.10	0.01	732	5.8	0.09	883
30 Day	10.4	0.19	0.04	1,036	8.1	0.15	1,253
60 Day	19.9	0.38	0.11	1,816	12.4	0.26	2,158

Figure 1.1 and Table 1.3 provides a summary of the emissions reduction (ASP emissions as compared to the on-site measured windrow) for the measured emissions duration of the ASP of 22 days as well as extrapolated ASP emissions for 30 day and 60 day cycle periods.

Figure 1.1 Emissions Reduction Summary (as compared to tested control windrow).

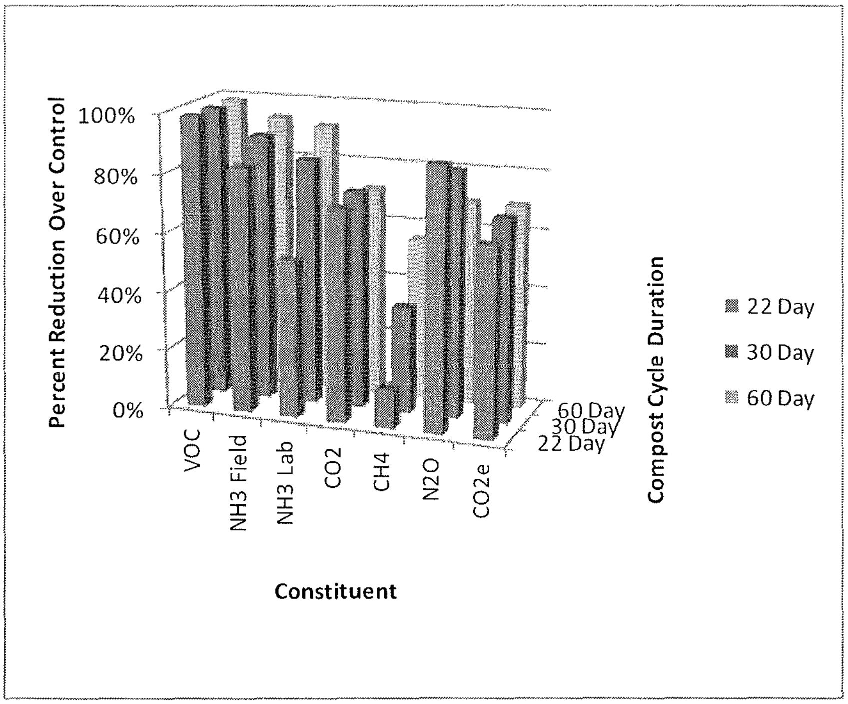


Table 1.3 Emissions Reduction Summary (as compared to tested control windrow).

		NH3		Greenhouse Gas			
Cycle Length	**VOC**	**Field**	**Lab**	**CO2**	**CH4**	**N2O**	**CO2e**
22 Day	98.8%	83%	53%	72%	13%	89%	64%
30 Day	98.8%	91%	84%	74%	36%	83%	69%
60 Day	98.9%	94%	92%	72%	55%	70%	70%

Table 1.4 provides the measured emissions in a regulatory context. The measured 22 day ASP emissions were compared to regulatory emission factors (nominally for windrow composting) from SJVAPCD and SCAQMD.

Table 1.4 Emissions Reduction Summary (pounds per ton mix) in a Regulatory Context.

Test Condition	VOC	NH3	CH4
Prototype ASP (22 Days)	0.10	0.01	5.05
SCAQMD (full life cycle)	3.76	0.82	0.87
% Reduction from SCAQMD Factor	97%	99%	-481%
SJVUAPCD (22-day active phase)	5.14		
% Reduction from SJV active phase	98%		

The VOC reduction achieved was greater than 97% when compared to any benchmark, and equal to or better than all known commercial VOC reduction technologies regardless of price. The windrow (on-site control) emissions were higher than expected, but even using the SJVAPCD emission factor, the control was still and impressive 98%.

Ammonia emission reductions were also substantial. However these varied based on the compared cycle time. For the complete cycle the ASP ammonia emissions, based on laboratory measurement, showed a 92% reduction over the on-site windrow. Greenhouse gas emissions were also reduced, but not as significantly as VOC and ammonia

The documentation for the emissions measurement and analysis is contained in this report as well as the attached Data Validation Technical Memorandum. All field notes and laboratory reports are attached following the technical memorandum.

2. Project Overview

This project was funded by a grant from the San Joaquin Valley Air Pollution Control District (SJVAPCD) to demonstrate the feasibility of a commercial-scale positively aerated, ASP compost system. The project was co-managed by the Association of Compost Producers and CalRecycle, with help from the City of Bakersfield and O2 Compost.

There were several facets to this project, including diesel fuel reduction and renewable energy, which were met by the use of electric conveyors to form the pile and photovoltaic power to run the blowers aerating the ASP. Our team was retained to sample and calculate the air emissions from the ASP compost system, and compare those emissions with those emitted by industry-standard composting windrows which were built out of the same materials on the same day.

The ASP was covered by a biofiltration layer of finished compost to control air emissions. The ASP was operated in a positive ventilation mode, meaning that the air to supply cooling, moisture control, and metabolic oxygen was blown into the pile with exhaust leaving the pile surface. Emissions sampling occurred during one hour cycles. Blowers generally ran two minutes out of every 20, meaning that one emissions sampling event would capture three full blower cycles.

3. Process Description

Prototype ASP

Figure 3.1 shows a plan and section of the prototype ASPs. There were three separate zones constructed to represent three different ages of compost. The starting feedstock was placed on top of previously installed air distribution piping and a plenum of large nominal diameter wood chips roughly one foot deep. After the compost was placed to approximately 8 feet of average depth, a nominal 12 inches of finished, unscreened compost was placed on the top of the pile as a biofilter compost cap. The cap acts much like a biofilter, reducing pollutants as they migrate up to the surface of the pile.

Photo 3.1 Compost Pile Configuration.

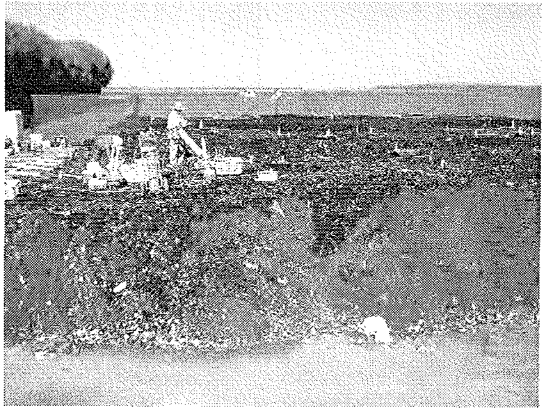
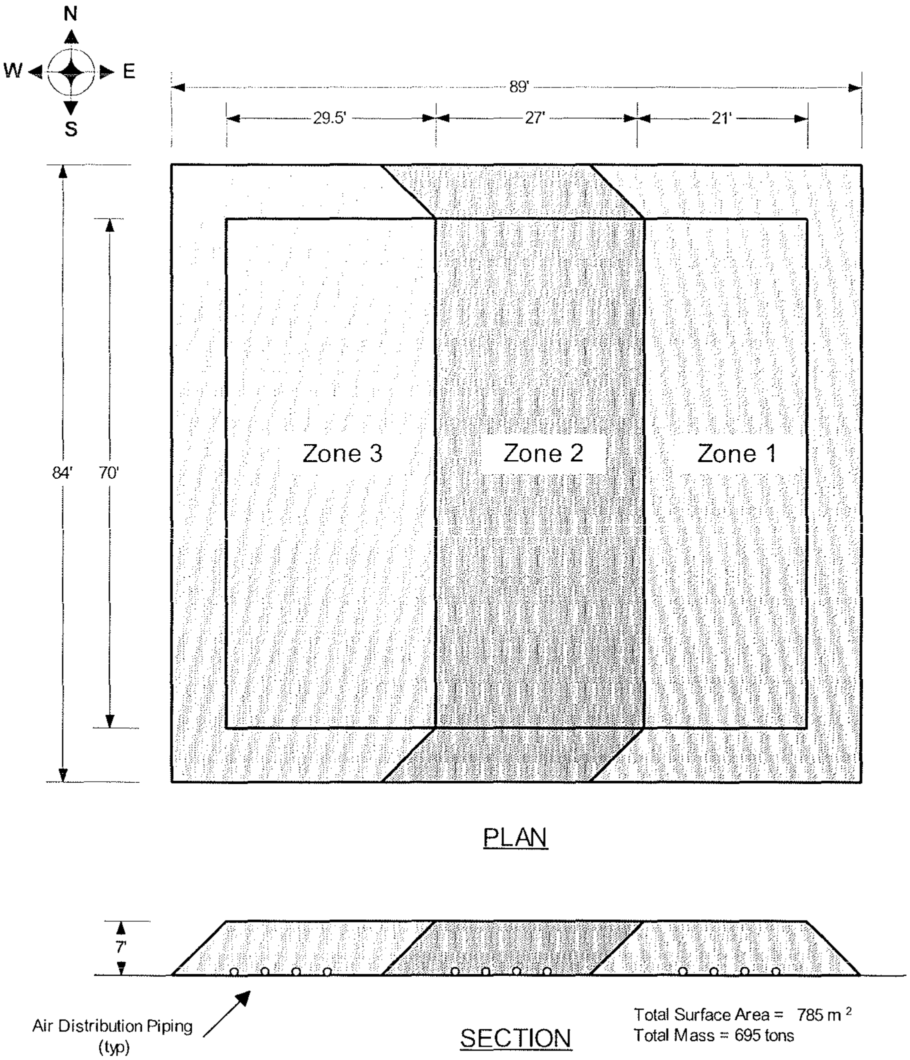


Figure 3.1 Plan and Section of ASP Piles.



The compost pile with biofilter was used to calculate total surface area. The mass of biofilter material was not used in the compost mix mass calculation.

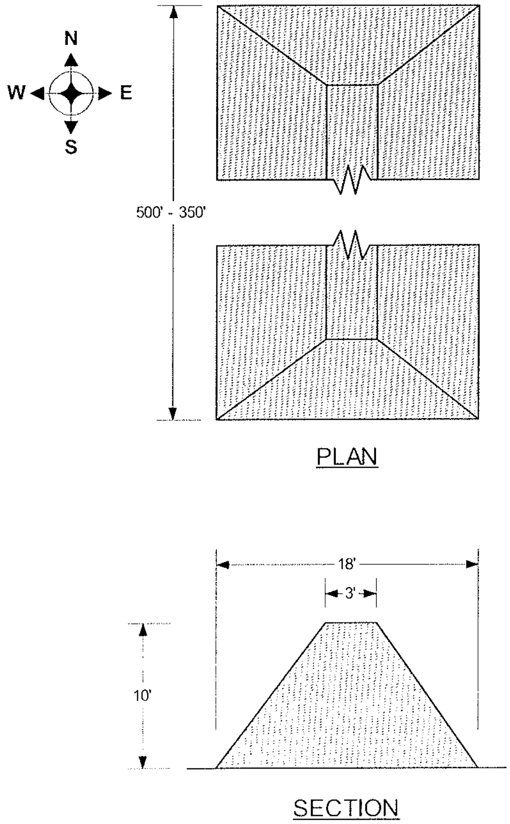
The total surface area of the ASP was 785 m^2 and the total mass of compost mix in the cells was 695 tons. The mass value of the compost cells was supplied by O2Compost. For emissions calculation purposes the ASP pile was assumed to be operational for a 21 day compost cycle.

Windrow

Photo 3.2 Windrow Configuration.

The host site normally composts in windrows. Windrows are the standard technology currently used in the United States to compost greenwaste. Figure 3.2 shows the layout of the windrows being tested for this study. The windrows shrink significantly during the compost duration. The initial area of a windrow was calculated to be 1,311 m2. At the end of cycle, this shrinks to 919 m2. For emissions calculation purposes it was assumed the shrinkage occurred linearly over the compost cycle. The site operator, Harvest Power, provided the mass of typical windrow as 782 tons of compost. Photo 3.2 shows a typical windrow on the site. The normal operating cycle for windrows at this site is 65 days or longer. The windrows are turned using a specialized mechanical device approximately eight times during the process cycle.

Figure 3.2 Plan and Section of Typical Site Windrows.

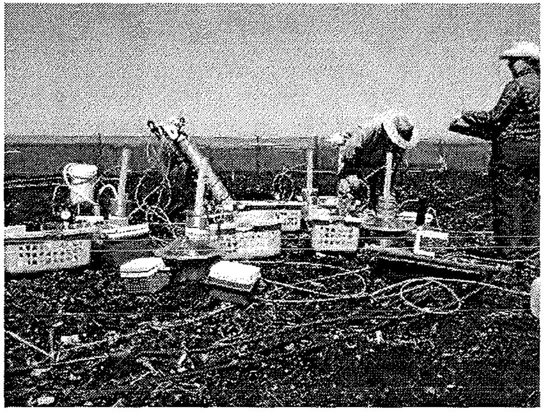


Initial Surface Area = 1,311 m ^{2}
Final Surface Area = 919 m ^{2}
Initial Mass = 782 tons

4. Emissions Measurement

All emissions measurements were made using USEPA validated flux chamber technology modified per SCAQMD Rule 1133 for measurement of composting air emissions. Photo 4.1 shows a typical measurement. The testing was conducted at pre-determined locations per zone (up to four measurements per zone and test condition) as a function of process day in the life cycle of the composting technology.

Photo 4.1 Typical Emissions Measurement.



Emissions were sampled and analyzed per SCAQMD Method 25.3 for VOC (total non-methane, non-ethane hydrocarbon), carbon dioxide (CO2), and methane (CH4). Ammonia (NH3) was sampled and analyzed using SCAQMD Method 207.1. Nitrous oxide (N2O) was sampled and analyzed using NIOSH Method 6600 (FTIR). Speciated organics were sampled and analyzed using USEPA Method TO-15.

Every test location completed measurements for Method 25.3. Only 25% of the test locations had the analysis completed for Method 207.1 (NH3), NIOSH 6600 (N2O), and TO-15.

For the ASPs, samples were taken on process days 3, 4, 5, 6, 10, 12, 13, 15, 17, 18, and 23. For the windrows, samples were taken on process days 0 (feed stock), 2, 3, 9, 11, 15, 29, and 63.

In general samples were taken in clusters of four representing near-field spatial variability for the ASPs and top/sides for the windrows. Far-field spatial measurements, that is measurements on the opposite end of the pile/windrow were taken on process day 4 for the ASPs and process day 15 for the windrows. These measurements were taken to determine if there were differences in emissions in different parts of the pile. In addition, a mixing event for the windrows was measured on process day 11.

A summary of the data is provided (in flux units) for the ASP (Table 4.1) and windrows/feedstock (Table 4.2). Complete data is provided in the Appendix. The accompanying Data Validation Technical Memorandum contains the complete data set, including QA/QC.

For emissions reporting purposes, only the laboratory ammonia data was used.

Table 4.1 Summary ASP Emission Measurement Data (flux in mg/m-m2).

SOURCE	DAY	LOCATION	Methane		CO2		NH3/Tube		NH3/Lab		TNMNEOC		N2O	
			Flux		Flux		Flux		Flux		Flux		Flux	
ASP ZONE 3	3	NW	2.49		2126		1.67		NA		**3.00**		NA	
ASP ZONE 3	3	SW	0.827		0.226		0.283		NA		**0.485**		NA	
ASP ZONE 3	3	NE	7.22		3644		0.485		0.439		**1.06**		0.201	
ASP ZONE 3	3	SE	1.97		2794		1.39				**3.37**		NA	
ASP ZONE 3	4	NW	2.76		3173		0.858		NA		**14.2**		NA	
ASP ZONE 3	4	SW	1.58		2256		0.436		NA		**3.31**		NA	
ASP ZONE 3	4	NE	9.18		3122		0.603		0.118		**2.02**		0.0520	<
ASP ZONE 3	4	SE	1.90		1918		0.741		NA		**2.50**		NA	
ASP ZONE 3	4	Top NW- Spatial	16.6		3768		1.73		NA		**3.25**		NA	
ASP ZONE 3	4	Side SE- Spatial	3.49		4174		1.01		NA		**18.9**		NA	
ASP ZONE 3	4	QC- Replicate	3.05		4.39		0.847		NA		**16.6**		NA	
ASP ZONE 3	5	NW	2.50		2031		0.0872		0.0318	<	**0.333**		0.0767	
ASP ZONE 3	5	SW	1.94		1888		0.0561		NA		**0.270**		NA	
ASP ZONE 3	5	NE	11.8		3537		0.0569		NA		**0.939**		NA	
ASP ZONE 3	5	SE	2.17		2279		0.3302		NA		**0.726**		NA	
ASP ZONE 3	6	NW	1.68		2115		0.00272	<	0.0378		**0.708**		0.0141	<
ASP ZONE 3	6	SW	1.31		1530		0.0845		NA		**0.339**		NA	
ASP ZONE 3	6	NE	8.39		2877		0.00556	<	NA		**0.458**		NA	
ASP ZONE 3	6	SE	1.80		2708		0.262		NA		**1.17**		NA	
ASP ZONE 2	10	NW	297		6329		0.371		0.0377	<	**2.50**		0.0192	<
ASP ZONE 2	10	SW	5.53		846		0.418		NA		**0.415**		NA	
ASP ZONE 2	10	NE	382		4360		0.257		NA		**0.821**		NA	
ASP ZONE 2	10	SE	20.7		0.290		0.317		NA		**0.838**		NA	
ASP ZONE 2	12	NW	489		6608		0.00580	<	0.0386	<	**2.15**		0.0751	
ASP ZONE 2	12	SW	16.06		740		0.00477	<	NA		**0.345**		NA	
ASP ZONE 2	12	NE	275		3892		0.0313		NA		**0.439**		NA	
ASP ZONE 2	12	SE	11.7		1721		0.133		NA		**0.429**		NA	
ASP ZONE 2	13	NW	369		10633		0.0158		0.0801		**6.36**		0.0204	<
ASP ZONE 2	13	SW	85.1		1515		0.0780		NA		**0.351**		NA	
ASP ZONE 2	13	NE	405		6452		0.00499	<	NA		**1.22**		NA	
ASP ZONE 2	13	SE	134		3935		0.00507	<	NA		**0.318**		NA	
ASP ZONE 1	15	NW	3.80		672		0.0450		0.023	<	**0.0846**	<	0.133	
ASP ZONE 1	15	SW	12.6		791		0.220		NA		**0.0518**	<		
ASP ZONE 1	15	NE	2.13		497		0.00414	<	NA		**0.0779**	<	NA	
ASP ZONE 1	15	SE	20.3		1669		0.0948		NA		**0.0973**		NA	
ASP ZONE 1	17	NW	39.6		2725		0.0877		0.0322	<	**0.747**		0.288	
ASP ZONE 1	17	SW	62.7		1784		0.0313		NA		**0.288**		NA	
ASP ZONE 1	17	NE	28.0		2144		0.00414	<	NA		**0.561**		NA	
ASP ZONE 1	17	SE	133		5274		0.0926		NA		**1.39**		NA	
ASP ZONE 1	18	NW	13.4		3067		0.00237	<	0.0985		**1.11**		0.151	
ASP ZONE 1	18	SW	20.7		2323		0.00499	<	NA		**0.871**		NA	
ASP ZONE 1	18	NE	4.94		2004		0.00553	<	NA		**1.09**		NA	
ASP ZONE 1	18	SE	42.2		4659		0.00321	<	NA		**1.17**		NA	
ASP ZONE 1	23	NW	3.67		2725		0.00229	<	0.0140	<	**1.05**		0.500	
ASP ZONE 1	23	SW	5.13		2279		0.00550		NA		**0.792**		NA	
ASP ZONE 1	23	NE	2.41		1847		0.143		NA		**0.918**		NA	
Media Blank	NA	QC-Blank	0.0256	ND	0.888		NA		NA		**0.0256**	ND	NA	
Media Blank	NA	QC-Blank	0.0256	ND	######		NA		NA		**0.0256**	ND	NA	
Media Blank	NA	QC-Blank	0.0951		2.38		NA		0.00769	<	**0.0367**		NA	
Medial Blank	NA	QC- Blank	0.0256	ND	1340		NA		NA		**0.0256**	ND	0.00705	<
Media Blank	NA	QC-Blank					NA						NA	

Table 4.2 Summary Windrow Emission Measurement Data (flux in mg/m-m2).

SOURCE	DAY	LOCATION	Methan		CO2		NH3/Tu		NH3/La		TNMN		N2O	
			Flux		Flux		Flux		Flux		Flux		Flux	
ESH DAY OLD CH	1	Top	0.0895		3012		0.0242		NA		**35.4**		NA	
FRESH CHOP	0	Top	0.0916		5145		0.00262	<	NA		**81.7**		NA	
FRESH CHOP	0	QC- Replicate	0.0906		5157		0.00256	<	NA		**75.3**		NA	
WINDROW WR-1	2	Top- West	0.448		3534		0.0975		0.0320	<	**54.1**		0.548	
WINDROW WR-1	2	Top- East	0.527		4699		0.107		NA		**56.8**		NA	
WINDROW WR-1	2	Side- North	0.495		5644		0.379		NA		**44.9**		NA	
WINDROW WR-1	2	Side- South	0.689		6267		0.110		NA		**83.4**		NA	
WINDROW WR-1	3	Top- West	3.02		7566		0.00504	<	0.0300	<	**167**		0.324	
WINDROW WR-1	3	Top- East	0.519		4823		0.155		NA		**204**		NA	
WINDROW WR-1	3	Side- North	3.57		4363		0.00496	<	NA		**135**		NA	
WINDROW WR-1	3	Side- South	0.469		3204		2.01		NA		**143**		NA	
WINDROW WR-2	9	Top- West	48.9		1264		0.00349	<	0.0206	<	**77.7**		0.616	
WINDROW WR-2	9	Top- East	65.0		2320		0.640		NA		**76.5**		NA	
WINDROW WR-2	9	Side- North	15.1		1199		0.463		NA		**15.9**		NA	
WINDROW WR-2	9	Side- South	4.68		2712		0.632		NA		**5.29**		NA	
WINDROW WR-2	11	Top	63.8		8834		0.0379		0.0595		**105**		0.422	
WINDROW WR-2	11	Side- South	15.3		7687		0.387		NA		**48.0**		NA	
WR-2 POST MIX	11	Top	36.6		4062		0.0314		NA		**165**		NA	
WR-2 POST MIX	11	QC-Replicate	31.2		4011		0.0258		0.0467	<	**163**		0.255	
WR-2 POST MIX	11	Side- South	11.5		5686		0.0183		NA		**110**		NA	
WINDROW WR-3	15	Top- East	63.1		6383		4.38		NA		**47.4**		NA	
WINDROW WR-3	15	Top- West	70.0		7075		0.371		0.0692	<	**27.5**		1.05	
WINDROW WR-3	15	Side- North	104		11061		0.845		NA		**51.3**		NA	
WINDROW WR-3	15	Side- South	206		14227		0.680		NA		**62.1**		NA	
WINDROW WR-3	15	Side- N. Spat.	158		6725		0.616		NA		**13.6**		NA	
WINDROW WR-3	15	Top- Spatial	43.8		4582		0.714		NA		**64.0**		NA	
WINDROW WR-3	15	QC-Replicate	45.0		4931		0.768		NA		**71.0**		NA	
WINDROW WR-3	29	Top- West	44.2		8529		4.88		0.853		**50.2**		1.50	
WINDROW WR-3	29	Top- East	58.0		7108		0.00381	<	NA		**53.4**		NA	
WINDROW WR-3	29	Side- South	39.4		6871		2.84		NA		**22.8**		NA	
WINDROW WR-4	63	Top- North	22.8		3349		0.0341		0.0347	<	**76.9**		0.0176	<
WINDROW WR-4	63	Top- South	16.1		5420		0.0499		NA		**76.0**		NA	
WINDROW WR-4	63	Side- West	4.80		1396		0.216		NA		**96.4**		NA	
WINDROW WR-4	63	Side- East	2.89		1625		0.105		NA		**67.9**		NA	
Media Blank	NA	QC-Blank	0.0256	ND	0.888		NA		NA		**0.0256**	ND	NA	
Media Blank	NA	QC-Blank	0.0256	ND	0.0282		NA		NA		**0.0256**	ND	NA	
Media Blank	NA	QC-Blank	0.0951		2.38		NA		NA		**0.0367**		NA	
Medial Blank	NA	QC- Blank	0.0256	ND	1340		NA		0.00769	<	**0.0256**	ND	0.00705	<
Media Blank	NA	QC-Blank					NA						NA	

5. Emissions Calculations

In order to calculate emissions for the complete process cycle, a process cycle was simulated using the data collected on the specific process days. The process cycle days that were not tested had the emissions estimated based on linear interpolation of the test data.

ASP Emissions

The simulated emissions in pounds per ton per day for each cycle day are provided in Attachment 1. The program design for the ASP anticipated that the primary composting process would take 22 days. However emissions estimates were extrapolated to both a 30 day period and a 60 day period. Table 5.1 presents the results of the 22 day measured period as well as the extrapolated longer periods.

Table 5.1 ASP Air Emissions (pounds per ton compost mix) for a 22 day compost period with extrapolated estimates for 30 day and 60 day periods.

		NH3		Greenhouse Gas			
Cycle Length	VOC	Field	Lab	CO2	CH4	N2O	CO2e
22 Day	0.10	0.02	0.01	206	5.1	0.01	315
30 Day	0.13	0.02	0.01	271	5.2	0.02	387
60 Day	0.22	0.02	0.01	517	5.6	0.08	658

Windrow Emissions

The windrow emissions were calculated in the same manner as the ASP emissions. The only exception is that windrow emissions included mixing events. The measured mixing event data showed that mixing increased the daily emissions by 8% on the mix day. Therefore, for the simulated emissions profile, each mix day emissions were multiplied by a factor of 1.08.

Windrow emissions estimates were calculated for a 22 day period, a 30 day period and a 60 day period. Table 5.2 presents the results of the windrow emissions calculations

Table 5.2 Windrow Air Emissions (pounds per ton compost mix) for 22 day, 30 day, and 60 day periods.

		NH3		Greenhouse Gas			
Cycle Length	VOC	Field	Lab	CO2	CH4	N2O	CO2e
22 Day	8.6	0.10	0.01	732	5.8	0.09	883
30 Day	10.4	0.19	0.04	1,036	8.1	0.15	1,253
60 Day	19.9	0.38	0.11	1,816	12.4	0.26	2,158

6. Data Analysis and Discussion

Comparative Emissions

Figures 6.1 through 6.5 shows how each emissions species compares for ASPs and windrows. The emissions beyond Day 22 for the ASP were extrapolated based on the last measurement.

Figure 6.1 VOC Emissions (#/ton mix) for Each Process Day.

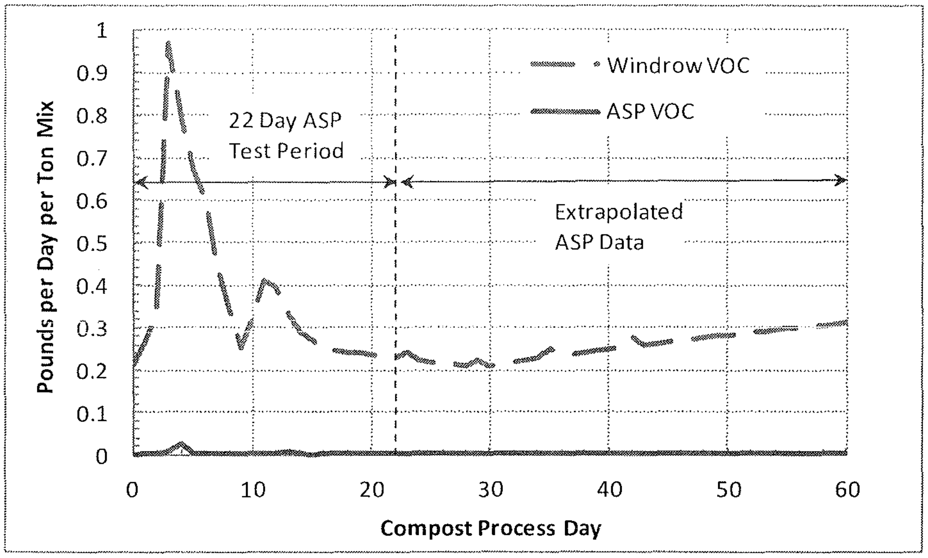


Figure 6.2 NH3 (Laboratory Data Only) Emissions (#/ton mix) for Each Process Day.

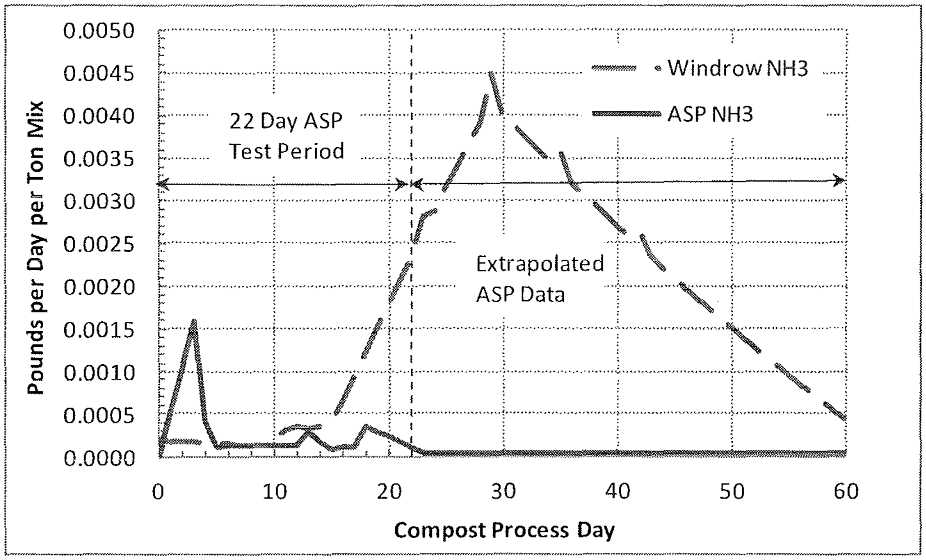


Figure 6.3 CO2 Emissions (#/ton mix) for Each Process Day.

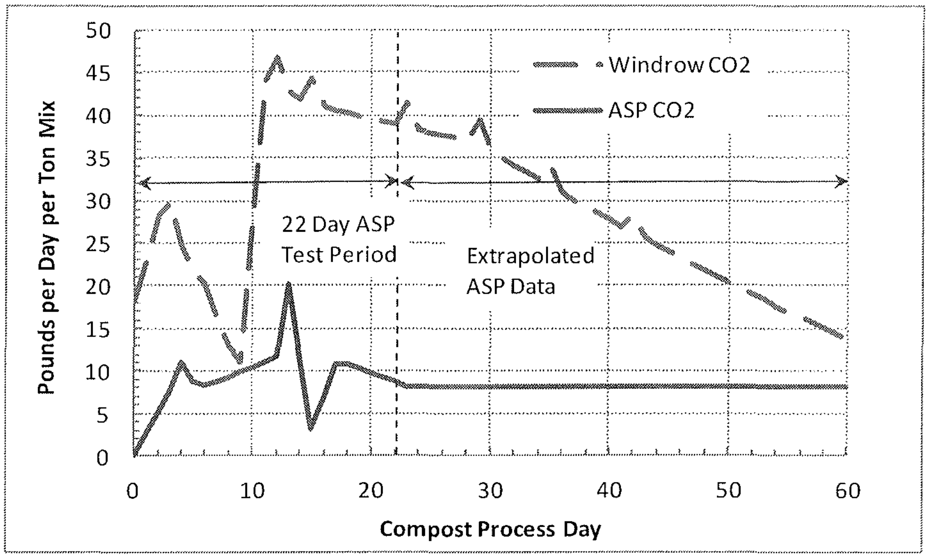


Figure 6.4 CH4 Emissions (#/ton mix) for Each Process Day.

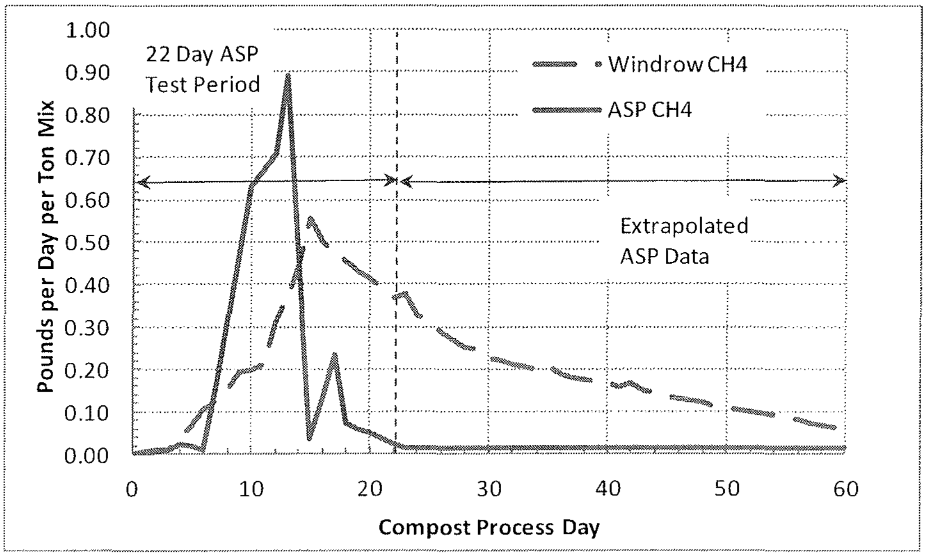
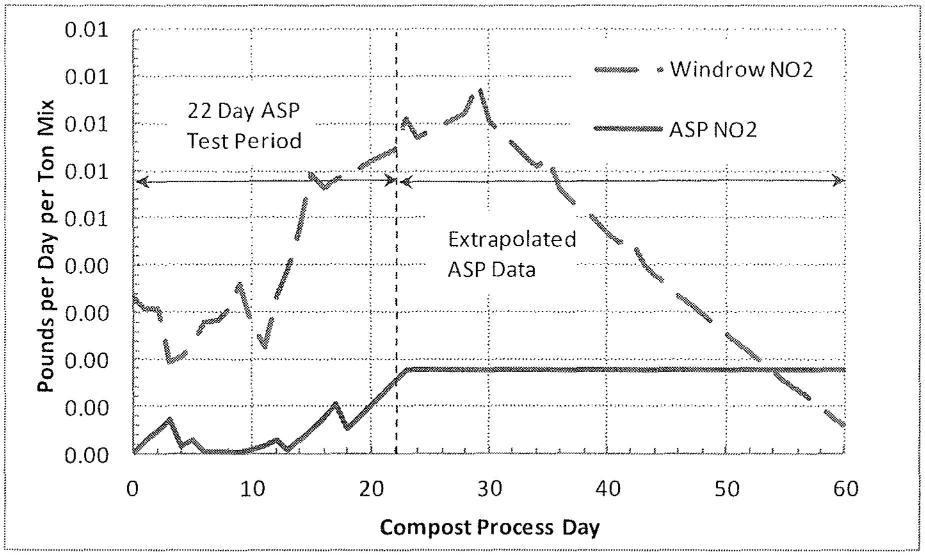


Figure 6.5 N2O Emissions (#/ton mix) for Each Process Day.



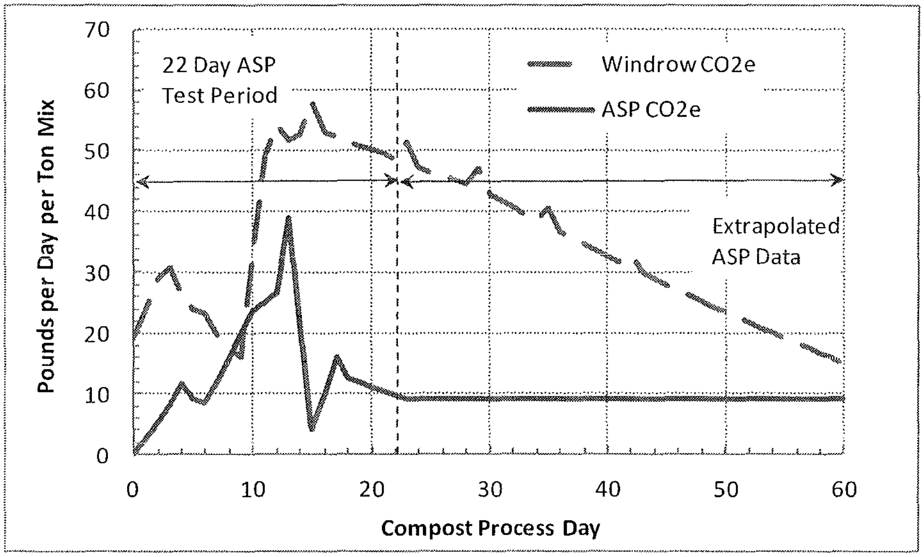
Greenhouse Gas Emissions

Using the CARB (40 CFR Part 98) CO_2 equivalency factors for the 100 yr planning horizon of

Methane	21
Nitrous Oxide	310

the CO2 equivalency of the all the greenhouse gases were calculated as are shown as a comparison of windrow to ASP in Figure 6.6. The ASP is shown to be significantly lower than windrow composting using this metric.

Figure 6.6 CO2 Equivalent Emissions (#/ton mix) for Each Process Day.



Emissions Reductions by ASP Technology

Figure 6.7 shows the emissions reductions for the ASP technology as compared to the control windrow technology. The calculation was made for the 22 day design period as well as extrapolated to 30 day and 60 day periods. Table 6.1 provides the quantitative data used to generate Figure 6.7.

Figure 6.7 Emissions Reduction Summary (as compared to tested control windrow).

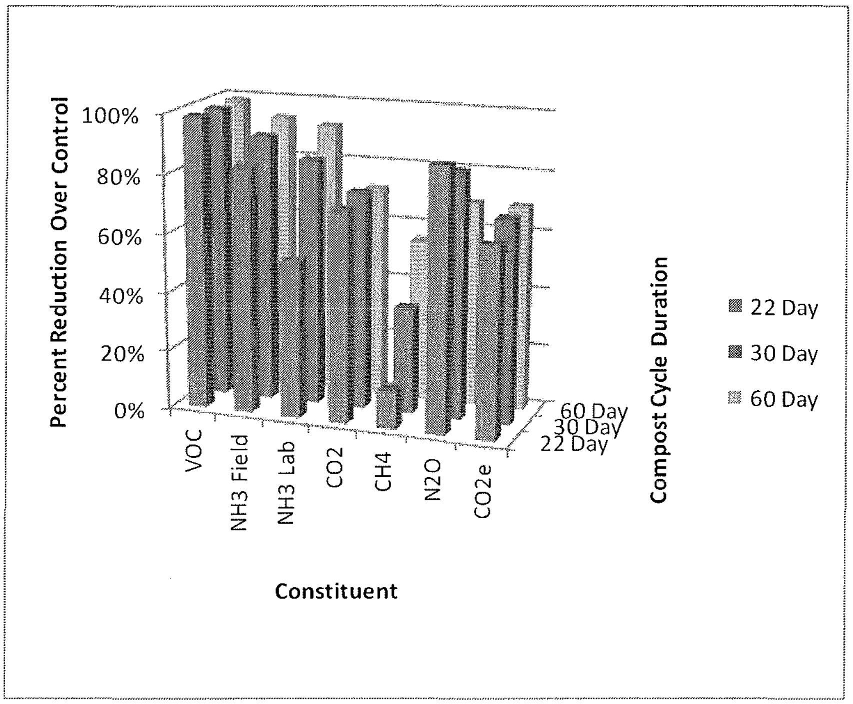


Table 6.1 Emissions Reduction Summary (as compared to tested control windrow).

		NH3		Greenhouse Gas			
Cycle Length	VOC	Field	Lab	CO2	CH4	N2O	CO2e
22 Day	98.8%	83%	53%	72%	13%	89%	64%
30 Day	98.8%	91%	84%	74%	36%	83%	69%
60 Day	98.9%	94%	92%	72%	55%	70%	70%

VOC emission reduction from ASP composting was nearly 99% based on the control windrows for all the cycle periods evaluated. The cycle period did affect both ammonia emissions reduction and methane emissions significantly. This is because the windrow ammonia emissions occurred late in the cycle and the ASP methane emissions occurred early in the cycle.

Table 6.2 presents the emissions reductions as compared to current regulatory emission factors from SJVAPCD and SCAQMD. VOC and ammonia emission reductions were ranged from 97% to 99%. The methane emissions from the ASP prototype were significantly higher than the current SCAQMD emission factor.

Table 6.2 Emissions Reduction Summary (pounds per ton mix) in a Regulatory Context.

Test Condition	VOC	NH3	CH4
Prototype ASP (22 Days)	0.10	0.01	5.05
SCAQMD (full life cycle)	3.76	0.82	0.87
% Reduction from SCAQMD Factor	97%	99%	-481%
SJVUAPCD (22-day active phase)	5.14		
% Reduction from SJV active phase	98%		

Discussion

The combination of better process control and the surface biofilter layer produced far lower emissions from the ASP as compared to the current industry-standard windrow. The degree of control for both VOCs and windrows exceeded that expected with even synthetic cover technologies. The relatively high level of control of greenhouse gas emissions was a surprise. It is important to note that this is the first thorough test of this technology, and further testing and evaluation should be completed before these high levels of control can be assured on an industry-wide basis.

Appendix 1

Detailed Calculation Spreadsheets

Table 1A – ASP Calculations.

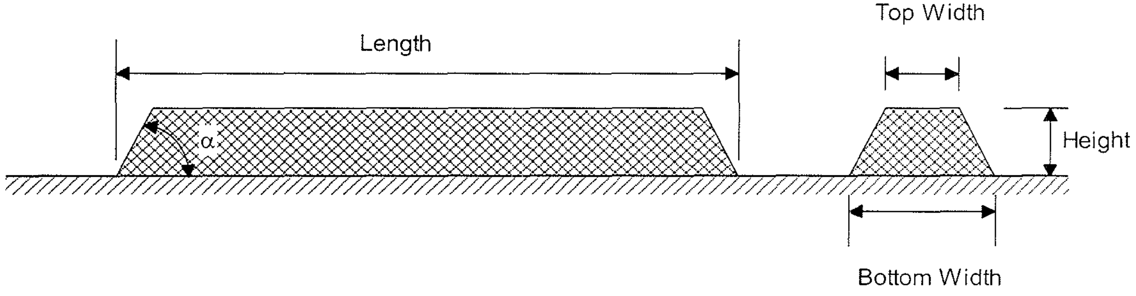
	Flux							Emissions (pounds)						Emissions (pounds/ton)						
Day	CH4	CO2	NH3 T	NH3 L	VOC	N2O	Area	CH4	CO2	NH3 T	NH3 L	VOC	N2O	CH4	CO2	NH3 T	NH3 L	VOC	N2O	CO2e
0	0	0	0	0	0	0.00	785											0.0000		
1	1.0	713.6	0.3	0.1	0.7	0.07	785	3	1,778	0.79	0.36	1.64	0.17	0.0037	2.56	0.0011	0.0005	0.0024	0.0002	2.7098
2	2.1	1427.2	0.6	0.3	1.3	0.13	785	5	3,556	1.59	0.73	3.28	0.33	0.0075	5.11	0.0023	0.0010	0.0047	0.0005	5.4195
3	3	2,141	0.96	0.44	1.98	0.20	785	8	5.335	2.38	1.09	4.93	0.50	0.0112	7.67	0.0034	0.0016	0.0071	0.0007	8.1293
4	6	3,069	0.90	0.12	7.37	0.05	785	15	7.647	2.23	0.29	18.36	0.13	0.0212	11.00	0.0032	0.0004	0.0264	0.0002	11.4984
5	5	2,434	0.13	0.03	0.57	0.08	785	11	6.065	0.33	0.08	1.41	0.19	0.0165	8.72	0.0005	0.0001	0.0020	0.0003	9.1514
6	3	2,308	0.09	0.04	0.67	0.01	785	8	5.750	0.22	0.09	1.67	0.04	0.0118	8.27	0.0003	0.0001	0.0024	0.0001	8.5314
7	46.6	2451.6	0.2	0.04	0.8	0.0	785	116	6.109	0.38	0.09	1.96	0.04	0.1668	8.78	0.0005	0.0001	0.0028	0.0001	12.3047
8	89.8	2595.7	0.2	0.04	0.9	0.0	785	224	6.468	0.53	0.09	2.26	0.04	0.3219	9.30	0.0008	0.0001	0.0032	0.0001	16.0779
9	133.1	2739.8	0.3	0.04	1.0	0.0	785	332	6.827	0.69	0.09	2.55	0.04	0.4769	9.82	0.0010	0.0001	0.0037	0.0001	19.8512
10	176	2,884	0.34	0.04	1.14	0.02	785	439	7,186	0.85	0.09	2.85	0.05	0.6319	10.33	0.0012	0.0001	0.0041	0.0001	23.6244
11	187.2	3062.2	0.2	0.0	1.0	0.0	785	466	7,630	0.48	0.10	2.47	0.12	0.6706	10.97	0.0007	0.0001	0.0036	0.0002	25.1072
12	198	3,240	0.04	0.04	0.84	0.08	785	493	8,075	0.11	0.10	2.10	0.19	0.7093	11.61	0.0002	0.0001	0.0030	0.0003	26.5900
13	248	5,634	0.03	0.08	2.06	0.02	785	619	14.038	0.06	0.20	5.14	0.05	0.8903	20.19	0.0001	0.0003	0.0074	0.0001	38.9050
14	129.1	3270.4	0.1	0.1	1.1	0.1	785	322	8,149	0.15	0.13	2.67	0.19	0.4626	11.72	0.0002	0.0002	0.0038	0.0003	21.5170
15	10	907	0.09	0.02	0.08	0.13	785	24	2,261	0.23	0.06	0.19	0.33	0.0348	3.25	0.0003	0.0001	0.0003	0.0005	4.1291
16	37.7	1944.5	0.1	0.0	0.4	0.2	785	94	4,845	0.18	0.07	1.03	0.52	0.1351	6.97	0.0003	0.0001	0.0015	0.0008	10.0382
17	66	2,982	0.05	0.03	0.75	0.29	785	164	7.430	0.13	0.08	1.86	0.72	0.2354	10.68	0.0002	0.0001	0.0027	0.0010	15.9473
18	20	3,013	0.00	0.10	1.06	0.15	785	51	7,509	0.01	0.25	2.64	0.38	0.0728	10.80	0.0000	0.0004	0.0038	0.0005	12.4929
19	17.0	2867.4	0.0	0.1	1.0	0.2	785	42	7,145	0.03	0.20	2.57	0.55	0.0609	10.27	0.0000	0.0003	0.0037	0.0008	11.7980
20	13.7	2721.5	0.0	0.1	1.0	0.3	785	34	6.782	0.06	0.16	2.50	0.72	0.0490	9.75	0.0001	0.0002	0.0036	0.0010	11.1032
21	10.4	2575.6	0.0	0.0	1.0	0.4	785	26	6,418	0.08	0.12	2.43	0.90	0.0371	9.23	0.0001	0.0002	0.0035	0.0013	10.4084
22	7.0	2429.6	0.0	0.0	0.9	0.4	785	18	6.054	0.10	0.08	2.36	1.07	0.0253	8.71	0.0001	0.0001	0.0034	0.0015	9.7135
23	4	2,284	0.05	0.01	0.92	0.50	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
24	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
25	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
26	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
27	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
28	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
29	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
30	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
31	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
32	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
33	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
34	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
35	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
36	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
37	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
38	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
39	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
40	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
41	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
42	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
43	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
44	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
45	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
46	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
47	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
48	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
49	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
50	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
51	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
52	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
53	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
54	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
55	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
56	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
57	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
58	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
59	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
60	4	2284	0.05	0.01	0.9	0.5	785	9	5,691	0.13	0.03	2.29	1.25	0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0187
							Tot:	3,868	359,300	16	6	156	55 Pounds							658
								6	517	0.02	0.01	0.22	0.08 #/ton mix							

Table 1B – Windrow Calculations.

	Flux								Emissions (pounds)						Emissions (pounds per ton)						
Day	CH4	CO2	NH3 T	NH3 L	VOC	N2O	Area	MF	CH4	CO2	NH3 T	NH3 L	VOC	N2O	CH4	CO2	NH3 T	NH3 L	VOC	N2O	CO2e
0	0	3012	0	0	35	1	1311	1.08	0	13,486	0.11	0.14	158.36	2.45	0	18	0.0001	0.0002	0.214	0.0033	19.3018
1	0.3	4024.2	0.1	0.0	47.6	0.5	1305	1.00	1	16,675	0.41	0.13	197.15	2.27	0.002	23	0.0006	0.0002	0.267	0.0031	23.5687
2	0.5	5036.0	0.2	0.0	59.8	0.5	1299	1.00	2	20,772	0.72	0.13	246.58	2.26	0.003	28	0.0010	0.0002	0.334	0.0031	29.1371
3	2	4989	1	0	162	0	1293	1.08	8	22,028	2.40	0.13	715.72	1.43	0.011	30	0.0033	0.0002	0.969	0.0019	30.6640
4	7.1	4469.9	0.5	0.0	142.4	0.4	1287	1.00	29	18,265	2.15	0.12	581.86	1.52	0.040	25	0.0029	0.0002	0.788	0.0021	26.1999
5	12.4	3950.6	0.5	0.0	122.7	0.4	1281	1.00	50	16,067	2.07	0.11	498.97	1.71	0.068	22	0.0028	0.0001	0.676	0.0023	23.9078
6	17.6	3431.3	0.5	0.0	103.0	0.5	1275	1.08	77	14,938	2.13	0.11	448.30	2.04	0.104	20	0.0029	0.0001	0.607	0.0028	23.2687
7	22.9	2912.0	0.5	0.0	83.3	0.5	1269	1.00	92	11,732	1.90	0.10	335.47	2.09	0.125	16	0.0026	0.0001	0.454	0.0028	19.3849
8	28.2	2392.7	0.5	0.0	63.6	0.6	1263	1.00	113	9,594	1.82	0.09	254.85	2.27	0.153	13	0.0025	0.0001	0.345	0.0031	17.1541
9	33.4	1873.5	0.4	0.0	43.9	0.6	1257	1.08	143	8,040	1.87	0.09	188.19	2.64	0.194	11	0.0025	0.0001	0.255	0.0036	16.0714
10	36.5	5067.0	0.3	0.0	60.2	0.5	1251	1.00	145	20,122	1.29	0.16	239.03	2.06	0.196	27	0.0017	0.0002	0.324	0.0028	32.2296
11	39.5	8260.6	0.2	0.1	76.5	0.4	1245	1.00	156	32,646	0.84	0.24	302.45	1.67	0.212	44	0.0011	0.0003	0.410	0.0023	49.3478
12	54.3	8159.1	0.5	0.1	69.4	0.6	1239	1.08	230	34,510	1.94	0.26	293.65	2.45	0.311	47	0.0026	0.0004	0.398	0.0033	54.2874
13	69.1	8057.6	0.7	0.1	62.3	0.7	1233	1.00	270	31,535	2.76	0.25	243.91	2.88	0.366	43	0.0037	0.0003	0.330	0.0039	51.5956
14	83.8	7956.2	0.9	0.1	55.2	0.9	1227	1.00	327	30,986	3.70	0.26	215.04	3.48	0.442	42	0.0050	0.0004	0.291	0.0047	52.6995
15	99	7855	1	0	48	1	1221	1.08	411	32,737	4.98	0.29	200.52	4.38	0.556	44	0.0067	0.0004	0.272	0.0059	57.8490
16	94.9	7829.6	1.3	0.1	47.7	1.1	1215	1.00	366	30,192	4.99	0.48	183.88	4.17	0.496	41	0.0068	0.0007	0.249	0.0056	53.0417
17	91.3	7804.4	1.4	0.2	47.3	1.1	1209	1.00	350	29,946	5.34	0.69	181.32	4.27	0.474	41	0.0072	0.0009	0.246	0.0058	52.2981
18	87.6	7779.2	1.5	0.2	46.8	1.1	1203	1.00	334	29,700	5.69	0.91	178.78	4.37	0.453	40	0.0077	0.0012	0.242	0.0059	51.5594
19	83.9	7754.1	1.6	0.3	46.4	1.2	1196	1.00	319	29,455	6.04	1.11	176.26	4.47	0.432	40	0.0082	0.0015	0.239	0.0061	50.8254
20	80.2	7728.9	1.7	0.3	46.0	1.2	1190	1.00	303	29,212	6.38	1.32	173.75	4.57	0.411	40	0.0086	0.0018	0.235	0.0062	50.0962
21	76.6	7703.8	1.8	0.4	45.5	1.2	1184	1.00	288	28,969	6.72	1.52	171.26	4.67	0.390	39	0.0091	0.0021	0.232	0.0063	49.3718
22	72.9	7678.6	1.9	0.5	45.1	1.3	1178	1.00	273	28,727	7.06	1.72	168.79	4.77	0.369	39	0.0096	0.0023	0.229	0.0065	48.6523
23	69.2	7653.5	2.0	0.5	44.7	1.3	1172	1.08	277	30,636	7.94	2.07	178.88	5.23	0.375	41	0.0108	0.0028	0.242	0.0071	51.5548
24	65.6	7628.3	2.1	0.6	44.3	1.3	1166	1.00	243	28,246	7.71	2.12	163.89	4.95	0.329	38	0.0104	0.0029	0.222	0.0067	47.2275
25	61.9	7603.2	2.2	0.6	43.8	1.4	1160	1.00	228	28,007	8.04	2.32	161.47	5.04	0.309	38	0.0109	0.0031	0.219	0.0068	46.5223
26	58.2	7578.0	2.3	0.7	43.4	1.4	1154	1.00	213	27,769	8.36	2.51	159.06	5.14	0.289	38	0.0113	0.0034	0.215	0.0070	45.8219
27	54.5	7552.9	2.4	0.7	43.0	1.4	1148	1.00	199	27,532	8.67	2.70	156.67	5.23	0.269	37	0.0117	0.0037	0.212	0.0071	45.1263
28	50.9	7527.7	2.5	0.8	42.6	1.5	1142	1.00	184	27,296	8.99	2.89	154.29	5.31	0.250	37	0.0122	0.0039	0.209	0.0072	44.4355
29	47	7503	3	1	42	1.5	1136	1.08	183	29,103	10.00	3.31	163.40	5.81	0.248	39	0.0135	0.0045	0.221	0.0079	47.0508
30	46.2	7368.6	2.5	0.8	43.2	1.5	1130	1.00	166	26,437	8.98	2.97	155.05	5.22	0.224	36	0.0122	0.0040	0.210	0.0071	42.6939
31	45.1	7234.6	2.4	0.8	44.3	1.4	1124	1.00	161	25,817	8.68	2.87	158.12	5.03	0.218	35	0.0117	0.0039	0.214	0.0068	41.6471
32	44.1	7100.6	2.4	0.8	45.4	1.4	1118	1.00	156	25,203	8.37	2.77	161.15	4.85	0.212	34	0.0113	0.0038	0.218	0.0066	40.6091
33	43.0	6966.7	2.3	0.8	46.5	1.3	1112	1.00	152	24,594	8.07	2.67	164.14	4.67	0.206	33	0.0109	0.0036	0.222	0.0063	39.5799
34	42.0	6832.7	2.2	0.7	47.6	1.3	1106	1.00	147	23,990	7.77	2.57	167.09	4.49	0.200	32	0.0105	0.0035	0.226	0.0061	38.5595
35	40.9	6698.7	2.1	0.7	48.7	1.2	1100	1.08	154	25,156	8.04	2.66	182.82	4.64	0.208	34	0.0109	0.0036	0.248	0.0063	40.3812
36	39.9	6564.7	2.1	0.7	49.8	1.2	1094	1.00	138	22,798	7.18	2.38	172.86	4.14	0.188	31	0.0097	0.0032	0.234	0.0056	36.5451
37	38.8	6430.8	2.0	0.7	50.9	1.1	1088	1.00	134	22,209	6.89	2.28	175.68	3.97	0.182	30	0.0093	0.0031	0.238	0.0054	35.5510
38	37.8	6296.8	1.9	0.6	52.0	1.1	1082	1.00	130	21,626	6.60	2.18	178.46	3.80	0.176	29	0.0089	0.0030	0.242	0.0051	34.5658
39	36.7	6162.8	1.8	0.6	53.1	1.1	1076	1.00	125	21,047	6.31	2.09	181.20	3.63	0.170	28	0.0085	0.0028	0.245	0.0049	33.5894
40	35.7	6028.8	1.8	0.6	54.1	1.0	1070	1.00	121	20,474	6.03	2.00	183.89	3.46	0.164	28	0.0082	0.0027	0.249	0.0047	32.6218
41	34.6	5894.9	1.7	0.6	55.2	1.0	1064	1.00	117	19,906	5.75	1.90	186.54	3.29	0.158	27	0.0078	0.0026	0.253	0.0045	31.6630
42	33.6	5760.9	1.6	0.5	56.3	0.9	1058	1.08	121	20,803	5.89	1.95	203.43	3.36	0.164	28	0.0080	0.0026	0.275	0.0046	33.0305
43	32.6	5626.9	1.6	0.5	57.4	0.9	1052	1.00	109	18,786	5.20	1.72	191.73	2.96	0.147	25	0.0070	0.0023	0.260	0.0040	29.7717
44	31.5	5492.9	1.5	0.5	58.5	0.8	1046	1.00	105	18,233	4.93	1.63	194.25	2.80	0.142	25	0.0067	0.0022	0.263	0.0038	28.8392
45	30.5	5359.0	1.4	0.5	59.6	0.8	1039	1.00	101	17,686	4.66	1.54	196.74	2.64	0.136	24	0.0063	0.0021	0.266	0.0036	27.9156
46	29.4	5225.0	1.3	0.4	60.7	0.8	1033	1.00	97	17,143	4.39	1.46	199.18	2.49	0.131	23	0.0059	0.0020	0.270	0.0034	27.0007
47	28.4	5091.0	1.3	0.4	61.8	0.7	1027	1.00	93	16,606	4.13	1.37	201.59	2.33	0.125	22	0.0056	0.0019	0.273	0.0032	26.0947
48	27.3	4957.1	1.2	0.4	62.9	0.7	1021	1.00	89	16,074	3.87	1.28	203.95	2.17	0.120	22	0.0052	0.0017	0.276	0.0029	25.1974
49	26.3	4823.1	1.1	0.4	64.0	0.6	1015	1.00	85	15,547	3.61	1.20	206.26	2.02	0.115	21	0.0049	0.0016	0.279	0.0027	24.3090
50	25.2	4689.1	1.0	0.3	65.1	0.6	1009	1.00	81	15,025	3.36	1.11	208.54	1.87	0.110	20	0.0045	0.0015	0.282	0.0025	23.4293
51	24.2	4555.1	1.0	0.3	66.2	0.5	1003	1.00	77	14,509	3.10	1.03	210.78	1.72	0.104	20	0.0042	0.0014	0.285	0.0023	22.5585
52	23.1	4421.2	0.9	0.3	67.3	0.5	997	1.00	73	13,997	2.86	0.95	212.97	1.57	0.099	19	0.0039	0.0013	0.288	0.0021	21.6964
53	22.1	4287.2	0.8	0.3	68.4	0.5	991	1.00	70	13,491	2.61	0.87	215.12	1.43	0.094	18	0.0035	0.0012	0.291	0.0019	20.8431
54	21.1	4153.2	0.8	0.3	69.5	0.4	985	1.00	66	12,990	2.37	0.79	217.23	1.28	0.089	18	0.0032	0.0011	0.294	0.0017	19.9986
55	20.0	4019.2	0.7	0.2	70.5	0.4	979	1.00	62	12,494	2.12	0.71	219.29	1.14	0.084	17	0.0029	0.0010	0.297	0.0015	19.1630
56	19.0	3885.3	0.6	0.2	71.6	0.3	973	1.00	59	12,003	1.89	0.63	221.32	1.00	0.079	16	0.0026	0.0008	0.300	0.0013	18.3361
57	17.9	3751.3	0.5	0.2	72.7	0.3	967	1.00	55	11,517	1.65	0.55	223.30	0.86	0.075	16	0.0022	0.0007	0.302	0.0012	17.5180
58	16.9	3617.3	0.5	0.2	73.8	0.2	961	1.00	51	11,036	1.42	0.47	225.24	0.72	0.070	15	0.0019	0.0006	0.305	0.0010	16.7087
59	15.8	3483.3	0.4	0.1	74.9	0.2	955	1.00	48	10,561	1.19	0.40	227.14	0.58	0.065	14	0.0016	0.0005	0.308	0.0008	15.9082
60	14.8	3349.4	0.3	0.1	76.0	0.1	949	1.00	45	10,090	0.96	0.32	229.00	0.45	0.060	14	0.0013	0.0004	0.310	0.0006	15.1165
61	13.7	3215.4	0.2	0.1	77.1	0.10	943	1.00	41	9,625	0.74	0.25	230.81	0.31	0.056	13	0.0010	0.0003	0.313	0.0004	14.3336
62	12.7	3081.4	0.2	0.1	78.2	0.06	937	1.00	38	9,165	0.52	0.17	232.59	0.18	0.051	12	0.0007	0.0002	0.315	0.0002	13.5595
63	12	2947	0	0	79	0.02	931	1.00	34	8,710	0.30	0.10	234.32	0.05	0.047	12	0.0004	0.0001	0.317	0.0001	12.7942
64	12	2947	0	0	79	0.02	925	1.00	34	8,653	0.30	0.10	232.80	0.05	0.046	12	0.0004	0.0001	0.315	0.0001	12.7112
65	12	2947	0	0	79	0.02	919	1.00	34	8,597	0.29	0.10	231.28	0.05	0.046	12	0.0004	0.0001	0.313	0.0001	12.6282
								Total	9,184	1,341,525	284	78	14,728	191 Pol	12	1,816				0	2.158
									12	1,816.47	0.38	0.11	19.94	0.26 #/ton mix							

ACP Final Report fo Valley Air TAP Program, May 2013, Appendix B, ASP Area Calculation

Property	Units	Value
Length	ft	84
Height	ft	7.0
Bottom Width	ft	89
Top Width	ft	75.0
Top Length	ft	70
alpha	R	0.79
	o	45
Top Perimeter	ft	290
Top Area	ft2	5,250
Bottom Perimeter	ft	346
Bottom Area	ft2	7,476
Slant height	ft	9.9
Surface Area	ft2	8,398
	m2	785
Volume	ft3	44,312
	yd3	1,641
Conversion Factors	ft2/m2	10.7
	ft3/yd3	27
Top Area Ratio		0.625146
Density	#/yd	900
Weight	pounds	1477070
	tons	738.5351



Mensuration formulas

$$S = \frac{p_1 + p_2}{2} s + A_2$$

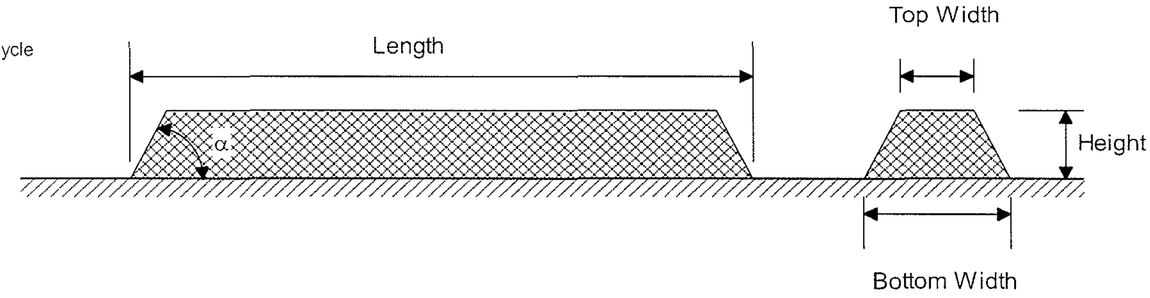
$$V = \frac{h(A_1 + A_2 + \sqrt{A_1 A_2})}{3}$$

$$s = \sqrt{h^2 + ((W_B - W_T)/2)}^2$$

where S = total surface area, p_1 = bottom perimeter, p_2 = top perimeter, s = slant height, V=volume, h=vertical height, A_1 = bottom area, A_2 = top area, α = bottom angle

ACP Final Report fo Valley Air TAP Program, May 2013, Appendix B, Windrow Area Calculation

Property	Units	Value	Value at the end of the cycle
Length	ft	500	350
Height	ft	10.0	10.0
Bottom Width	ft	18	18
Top Width	ft	3.0	3.0
Top Length	ft	485	335
alpha	R	0.93	0.93
	o	53	53
Top Perimeter	ft	976	676
Top Area	ft2	1,455	1,005
Bottom Perimeter	ft	1,036	736
Bottom Area	ft2	9,000	6,300
Slant height	ft	12.5	12.5
Surface Area	ft2	14,030	9,830
	m2	1,311	919
Volume	ft3	46,912	32,737
	yd3	1,737	1,212
Conversion Factors	ft2/m2	10.7	10.7
	ft3/yd3	27	27
Top Area Ratio		0.103706	0.102238
Density	#/yd	900	
Weight	pounds	1563745	
	tons	781.8723	



Mensuration formulas

$$S = \frac{p_1 + p_2}{2} s + A_2$$

$$V = \frac{h(A_1 + A_2 + \sqrt{A_1 A_2})}{3}$$

$$s = \sqrt{h^2 + ((W_B - W_T)/2)^2}$$

where S = total surface area, p_1 = bottom perimeter, p_2 = top perimeter, s = slant height, V=volume, h=vertical height, A_1 = bottom area, A_2 = top area, α = bottom angle

Table 1. Summary of Field Sample Collection Information and Field Data for ACP Valley Air TAP Compost Research Program; August 2012.

ACP Final Report fo Valley Air TAP Program, May 2013, Appendix B, Sample Data ASP and Windrow

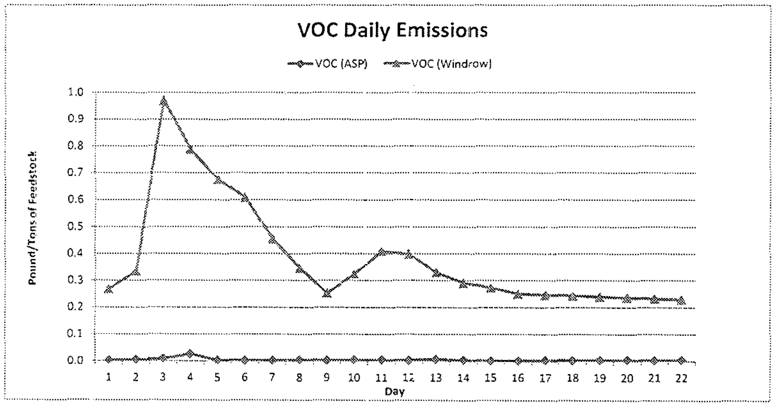
DATE	TIME	SOURCE	DAY	LOCATION	NH3	25.3	207.1	TO-15	N-6600	FLOW	HELIUM	HELIUM	HELIUM	FLOW	IN SURF	STACK	IN AIR	OUT SURF	OUT AIR	COMMENT
					(ppmv)	ID	ID	ID	ID	(ft/min)	ADDED (%)	REC (%)	RATIO	(m3/min)						
8202012	916	ASP ZONE 1	15	NW	0.5	G-101	A-101	T-101	N-101	63	10.09	3.06	0.303	0.0165	98	87	90	91	79	ASP Zone 1 constructed on 08/05/2012
8202012	916	ASP ZONE 1	15	SW	4	G-102	NA	NA	NA	42	10.09	5.01	0.497	0.0101	94	88	90	91	84	
8202012	915	ASP ZONE 1	15	NE	<0.05	G-103	NA	NA	N	50	10.07	3.32	0.330	0.0152	91	85	87	91	80	
8202012	915	ASP ZONE 1	15	SE	1	G-104	NA	NA	N	61	10.07	2.90	0.288	0.0174	94	88	90	87	82	
8202012	1105	ASP ZONE 2	10	NW	5	G-105	A-102	T-102	N-102	48	10.09	3.70	0.367	0.0136	109	97	99	93	88	ASP Zone 2 constructed on 08/10/2012
8202012	1105	ASP ZONE 2	10	SW	3	G-106	NA	NA	NA	63	10.09	1.97	0.195	0.0256	108	95	94	97	88	
8202012	1105	ASP ZONE 2	10	NE	2	G-107	NA	NA	NA	99	10.07	2.13	0.212	0.0236	109	97	100	97	89	
8202012	1105	ASP ZONE 2	10	SE	3	G-108	NA	NA	NA	69	10.07	2.60	0.258	0.0194	105	97	98	97	88	
8202012	1244	ASP ZONE 3	3	NW	6.5	G-109	NA	NA	NA	92	10.07	1.07	0.106	0.0471	121	102	105	101	93	ASP Zone 3 constructed on 08/17/2012
8202012	1245	ASP ZONE 3	3	SW	4.0	G-110	NA	NA	NA	41	10.07	3.87	0.384	0.0130	115	103	107	96	92	
8202012	1245	ASP ZONE 3	3	NE	3	G-111	A-103	T-103	N-103	75	10.09	1.70	0.168	0.0297	116	103	103	99	92	
8202012	1245	ASP ZONE 3	3	SE	9	G-112	NA	NA	NA	65	10.09	1.78	0.176	0.0283	121	105	108	123	94	
8202012	1453	WINDROW WR-3	15	Top- East	22	G-113	NA	NA	NA	112	9.70	1.33	0.137	0.0365	131	107	109	112	98	Windrow WR-3 constructed on 08/05/2012
8202012	1454	WINDROW WR-3	15	Top- West	3	G-114	A-104	T-104	N-104	94	9.70	2.14	0.221	0.0227	133	108	111	112	97	
8202012	1459	WINDROW WR-3	15	Side- North	5	G-115	NA	NA	NA	80	9.72	1.57	0.162	0.0310	152	112	122	115	99	
8202012	1506	WINDROW WR-3	15	Side- South	6	G-116	NA	NA	NA	81	10.09	2.43	0.241	0.0208	140	131	134	123	103	
8202012	1634	WINDROW WR-3	15	Side- N. Spatial	5	G-117	NA	NA	NA	88	9.72	2.15	0.221	0.0226	117	107	110	107	96	Spatial test: One side test and one top test
8202012	1630	WINDROW WR-3	15	Top- Spatial	5	G-118	NA	NA	NA	79	9.70	1.85	0.191	0.0262	116	107	108	101	100	Spatial test: One side test and one top test
8202012	1630	WINDROW WR-3	15	QC-Replicate	5	G-119	NA	NA	NA	79	9.70	1.72	0.177	0.0282	116	107	108	101	100	Replicate sample
8202012	1755	Media Blank	NA	QC-Blank	NA	G-120	NA	NA	NA	NA	10.07	9.86	0.979	98%	NA	NA	NA	NA	NA	UHP air in clean canister- media blank sample
8212012	752	WINDROW WR-2	9	Top- West	<0.05	G-201	A-201	T-201	N-201	34	9.72	3.81	0.392	0.0128	123	89	97	91	75	Windrow WR-2 constructed on 08/12/2012
8212012	752	WINDROW WR-2	9	Top- East	5	G-202	NA	NA	NA	53	9.72	2.07	0.213	0.0235	119	93	101	109	75	
8212012	754	WINDROW WR-2	9	Side- North	5	G-203	NA	NA	NA	71	9.70	2.85	0.294	0.0170	131	100	110	91	76	
8212012	756	WINDROW WR-2	9	Side- South	5	G-204	NA	NA	NA	65	10.09	2.17	0.215	0.0232	96	90	96	89	63	
8212012	941	WINDROW WR-1	2	Top- West	1	G-205	A-202	T-202	N-202	36	9.72	2.72	0.280	0.0179	100	89	89	91	84	Windrow WR-1 constructed on 08/20/2012
8212012	941	WINDROW WR-1	2	Top- East	1	G-206	NA	NA	NA	53	9.72	2.48	0.255	0.0196	106	91	94	93	89	
8212012	942	WINDROW WR-1	2	Side- North	4	G-207	NA	NA	NA	55	10.09	2.90	0.287	0.0174	97	88	90	96	81	
8212012	942	WINDROW WR-1	2	Side- South	1	G-208	NA	NA	NA	49	9.70	2.40	0.247	0.0202	103	92	96	86	85	
8212012	1200	WINDROW WR-4	63	Top- North	0.5	G-209	A-203	T-203	N-203	42	9.72	3.90	0.401	0.0125	115	110	115	110	89	Windrow WR-4 constructed on 06/19/12
8212012	1211	WINDROW WR-4	63	Top- South	0.5	G-210	NA	NA	NA	65	9.72	2.65	0.273	0.0183	120	105	110	109	95	
8212012	1217	WINDROW WR-4	63	Side- West	2	G-211	NA	NA	NA	68	9.70	2.45	0.253	0.0198	117	99	111	110	100	
8212012	1220	WINDROW WR-4	63	Side- East	1.0	G-212	NA	NA	NA	71	10.12	2.63	0.260	0.0192	114	113	114	107	91	
8212012	1402	ASP ZONE 3	4	NW	7	G-213	NA	NA	NA	63	9.70	2.16	0.223	0.0225	108	NA	107	108	98	
8212012	1402	ASP ZONE 3	4	SW	5	G-214	NA	NA	NA	56	9.70	3.04	0.313	0.0160	113	109	114	107	99	
8212012	1403	ASP ZONE 3	4	NE	3	G-215	A-204	T-204	N-204	160	10.12	1.37	0.135	0.0369	112	103	102	105	98	
8212012	1404	ASP ZONE 3	4	SE	5	G-216	NA	NA	NA	90	10.12	1.86	0.184	0.0272	117	103	107	106	97	
8212012	1537	ASP ZONE 3	4	Top NW- Spatial	19	G-217	NA	NA	NA	73	9.70	2.90	0.299	0.0167	112	106	106	102	99	Spatial test: One side test and one top test
8212012	1537	ASP ZONE 3	4	Side SE- Spatial	5	G-218	NA	NA	NA	90	9.70	1.31	0.135	0.0370	110	107	109	105	100	Spatial test: One side test and one top test
8212012	1537	ASP ZONE 3	4	QC- Replicate	5	G-219	NA	NA	NA	90	9.70	1.56	0.161	0.0311	110	107	109	105	100	Replicate sample
8212012	1645	Media Blank	NA	QC-Blank	NA	G-220	NA	NA	NA	NA	10.12	10.2	1.008	101%	NA	NA	NA	NA	NA	UHP air in clean canister- media blank sample
8222012	745	ASP ZONE 1	17	NW	1	G-301	A-301	T-301	N-301	51	10.12	3.15	0.311	0.0161	92	80	79	82	76	
8222012	745	ASP ZONE 1	17	SW	0.5	G-302	NA	NA	NA	64	10.12	4.40	0.435	0.0115	82	77	79	78	76	
8222012	745	ASP ZONE 1	17	NE	<0.05	G-303	NA	NA	NA	51	9.72	3.20	0.329	0.0152	86	80	84	88	76	
8222012	745	ASP ZONE 1	17	SE	0.5	G-304	NA	NA	N	112	9.72	1.43	0.147	0.0340	85	80	80	80	77	
8222012	918	ASP ZONE 2	12	NW	<0.05	G-305	A-302	T-302	N-302	81	10.12	2.38	0.235	0.0213	94	88	90	88	78	Blower fan not functioning properly
8222012	918	ASP ZONE 2	12	SW	<0.05	G-306	NA	NA	NA	58	10.12	2.89	0.286	0.0175	94	91	91	88	83	
8222012	918	ASP ZONE 2	12	NE	0.5	G-307	NA	NA	NA	66	9.92	4.33	0.436	0.0115	92	88	87	83	83	
8222012	918	ASP ZONE 2	12	SE	1	G-308	NA	NA	NA	74	9.92	2.03	0.205	0.0244	87	86	86	87	81	
8222012	1101	ASP ZONE 3	5	NW	1	G-309	A-303	T-303	N-303	60	10.12	3.16	0.312	0.0160	116	99	104	103	87	
8222012	1104	ASP ZONE 3	5	SW	1	G-310	NA	NA	NA	22	10.12	4.90	0.484	0.0103	112	104	107	108	90	
8222012	1104	ASP ZONE 3	5	NE	0.5	G-311	NA	NA	NA	62	9.92	2.37	0.239	0.0209	109	104	106	108	93	
8222012	1109	ASP ZONE 3	5	SE	3	G-312	NA	NA	NA	64	9.92	2.46	0.248	0.0202	119	103	107	107	90	

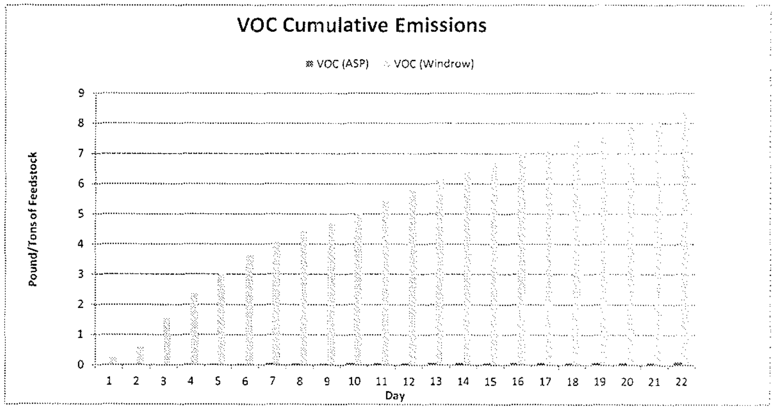
Table 1. Summary of Field Sample Collection Information and Field Data for ACP Valley Air TAP Compost Research Program; August 2012.

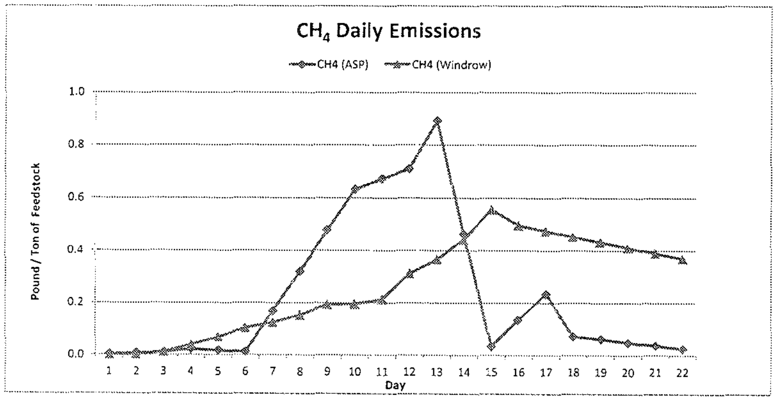
DATE	TIME	SOURCE	DAY	LOCATION	NH3	25.3	207.1	TO-15	N-6600	FLOW	HELIUM	HELIUM	HELIUM	FLOW	IN SURF	STACK	IN AIR	OUT SURF	OUT AIR	COMMENT
					(ppmv)	ID	ID	ID	ID	(ft/min)	ADDED (%)	REC (%)	RATIO	(m3/min)						
8222012	1315	WINDROW WR-1	3	Top- West	<0.05	G-313	A-304	T-304	N-304	60	9.91	2.68	0.270	0.0185	116	106	108	105	95	
8222012	1318	WINDROW WR-1	3	Top- East	1	G-314	NA	NA	NA	88	9.91	1.74	0.176	0.0285	111	101	103	101	90	
8222012	1322	WINDROW WR-1	3	Side- North	<0.05	G-315	NA	NA	NA	89	9.89	2.71	0.274	0.0182	112	106	106	93	96	
8222012	1333	WINDROW WR-1	3	Side- South	13	G-316	NA	NA	NA	88	9.93	1.75	0.176	0.0284	120	102	112	117	97	
8222012	1028	RESH DAY OLD CHO	1	Top	0.5	G-317	NA	NA	NA	NA	9.89	5.55	0.561	0.0089	98	NA	99	102	86	Representative of fresh chop used to build piles, about 1 day old
8222012	1230	FRESH CHOP	0	Top	NA	G-318	NA	NA	NA	NA	9.92	5.18	0.522	0.0096	NA	NA	NA	NA	NA	Representative of fresh chop, about 2 hours old
8222012	1230	FRESH CHOP	0	QC- Replicate	NA	G-319	NA	NA	NA	NA	9.92	5.30	0.534	0.0094	NA	NA	NA	NA	NA	Replicate sample
8222012	1437	Media Blank	NA	QC-Blank	NA	G-320	NA	NA	NA	NA	9.92	3.41	0.344	34%	NA	NA	NA	NA	NA	UHP air in clean canister- media blank sample
8232012	747	ASP ZONE 1	18	NW	<0.05	G-401	A-401	T-401	N-401	42	9.93	5.71	0.575	0.0087	81	74	76	78	70	Blower cycle is short due to power level
8232012	749	ASP ZONE 1	18	SW	<0.05	G-402	NA	NA	NA	61	9.93	2.72	0.274	0.0183	84	74	74	82	70	
8232012	730	ASP ZONE 1	18	NE	<0.05	G-403	NA	NA	NA	63	9.89	2.43	0.246	0.0203	79	75	75	80	71	
8232012	730	ASP ZONE 1	18	SE	<0.05	G-404	NA	NA	NA	49	9.89	4.18	0.423	0.0118	82	75	77	79	70	
8232012	907	ASP ZONE 2	13	NW	0.2	G-405	A-402	T-402	N-402	47	9.89	3.41	0.345	0.0145	85	83	87	85	74	
8232012	907	ASP ZONE 2	13	SW	0.8	G-406	NA	NA	NA	89	9.89	2.76	0.279	0.0179	81	85	82	80	84	
8232012	907	ASP ZONE 2	13	NE	<0.05	G-407	NA	NA	NA	60	9.93	2.72	0.274	0.0183	95	87	90	85	80	
8232012	907	ASP ZONE 2	13	SE	<0.05	G-408	NA	NA	NA	63	9.93	2.67	0.269	0.0186	90	89	93	92	81	
8232012	1037	ASP ZONE 3	6	NW	<0.05	G-409	A-403	T-403	N-403	37	9.93	4.98	0.502	0.0100	110	96	104	100	88	
8232012	1037	ASP ZONE 3	6	SW	1	G-410	NA	NA	NA	51	9.93	3.21	0.323	0.0155	113	97	101	119	90	
8232012	1037	ASP ZONE 3	6	NE	<0.05	G-411	NA	NA	NA	67	9.89	2.42	0.245	0.0204	103	100	102	105	90	
8232012	1037	ASP ZONE 3	6	SE	4	G-412	NA	NA	NA	37	9.89	4.11	0.416	0.0120	122	104	107	110	90	
8232012	1235	WINDROW WR-2	11	Top	0.3	G-413	A-404	T-404	N-404	71	9.92	2.14	0.216	0.0232	127	110	112	109	95	Pile watered on site schedule (08/23/2012, 1015); A/T/N replicate '405'
8232012	1235	WINDROW WR-2	11	Side- South	3	G-414	NA	NA	NA	81	9.91	2.09	0.211	0.0237	143	122	128	110	95	
8232012	1409	WR-2 POST MIX	11	Top	0.2	G-415	NA	NA	NA	60	9.92	1.72	0.173	0.0288	138	111	116	126	98	Scarab mixing at 1325-1335; test started 4 minutes post mixing
8232012	1409	WR-2 POST MIX	11	QC-Replicate	0.2	G-416	A-405	T-405	N-405	60	9.92	2.09	0.211	0.0237	138	111	116	126	98	Ammonia, VOCs, and nitrogen oxide replicates of '404' series
8232012	1412	WR-2 POST MIX	11	Side- South	0.2	G-417	NA	NA	NA	65	9.91	2.95	0.298	0.0168	137	123	126	119	97	Scarab mixing at 1325-1335; test started 4 minutes post mixing
8232012	1512	Medial Blank	NA	QC- Blank	NA	G-418	A-406	T-406	N-406	NA	10.07	10.02	0.995	100%	NA	NA	NA	NA	NA	UHP air in clean canister- media blank sample
8282012	808	ASP ZONE 1	23	NW	<0.05	G-501	A-501	T-501	N-501	26	9.76	5.80	0.594	0.0084	91	81	89	93	78	
8282012	808	ASP ZONE 1	23	SW	0.1	G-502	NA	NA	NA	37	9.91	4.89	0.493	0.0101	96	84	92	97	73	
8282012	808	ASP ZONE 1	23	NE	1	G-503	NA	NA	NA	61	9.91	1.89	0.191	0.0262	95	84	87	93	74	
8282012	1030	WINDROW WR-3	29	Top- West	40	G-504	A-502	T-502	N-502	60	9.76	2.18	0.223	0.0224	146	107	112	118	89	
8282012	1030	WINDROW WR-3	29	Top- East	<0.05	G-505	NA	NA	NA	51	9.76	3.49	0.358	0.0140	119	103	110	115	86	
8282012	1030	WINDROW WR-3	29	Side- South	30	G-506	NA	NA	NA	47	9.91	2.84	0.287	0.0174	140	114	120	122	84	
8292012	1154	Media Blank	NA	QC-Blank	NA	G-605	NA	NA	NA	NA	9.91		0.000		NA	NA	NA	NA	NA	Media blank in BOC testing data set for the batch

ACP Final Report fo Valley Air TAP Program, May 2013, Appendix B, Daily and Cumulative Emissions

	CH4				VOC				NH3 Field				NH3 Lab				N2O			
	Daily		Cumulative		Daily		Cumulative		Daily		Cumulative		Daily		Cumulative		Daily		Cumulative	
Day	CH4 (ASP)	CH4 (Windrow)	CH4 (ASP)	CH4 (Windrow)	VOC (ASP)	VOC (Windrow)	VOC (ASP)	VOC (Windrow)	NH3 Field (ASP)	NH3 Field (Windrow)	NH3 Field (ASP)	NH3 Field (Windrow)	NH3 Lab (ASP)	NH3 Lab (Windrow)	NH3 Lab (ASP)	NH3 Lab (Windrow)	N2O (ASP)	N2O (Windrow)	N2O (ASP)	N2O (Windrow)
1	0.0037	0.002	0.0037	0.002	0.0024	0.267	0.0024	0.267	0.0011	0.001	0.0011	0.001	0.0005	0.000	0.0005	0.000	0.0002	0.003	0.0002	0.003
2	0.0075	0.003	0.0112	0.005	0.0047	0.334	0.0071	0.601	0.0023	0.001	0.0034	0.002	0.0010	0.000	0.0016	0.000	0.0005	0.003	0.0007	0.006
3	0.0112	0.011	0.0224	0.016	0.0071	0.969	0.0142	1.570	0.0034	0.003	0.0069	0.005	0.0016	0.000	0.0031	0.001	0.0007	0.002	0.0014	0.008
4	0.0212	0.040	0.0436	0.056	0.0264	0.788	0.0406	2.358	0.0032	0.003	0.0101	0.008	0.0004	0.000	0.0036	0.001	0.0002	0.002	0.0016	0.010
5	0.0165	0.068	0.0601	0.124	0.0020	0.676	0.0426	3.033	0.0005	0.003	0.0105	0.010	0.0001	0.000	0.0037	0.001	0.0003	0.002	0.0019	0.012
6	0.0118	0.104	0.0719	0.228	0.0024	0.607	0.0450	3.640	0.0003	0.003	0.0109	0.013	0.0001	0.000	0.0038	0.001	0.0001	0.003	0.0020	0.015
7	0.1668	0.125	0.2387	0.353	0.0028	0.454	0.0478	4.095	0.0005	0.003	0.0114	0.016	0.0001	0.000	0.0040	0.001	0.0001	0.003	0.0020	0.018
8	0.3219	0.153	0.5606	0.506	0.0032	0.345	0.0511	4.440	0.0008	0.002	0.0122	0.018	0.0001	0.000	0.0041	0.001	0.0001	0.003	0.0021	0.021
9	0.4769	0.194	1.0375	0.700	0.0037	0.255	0.0547	4.695	0.0010	0.003	0.0132	0.021	0.0001	0.000	0.0042	0.001	0.0001	0.004	0.0021	0.025
10	0.6319	0.196	1.6694	0.896	0.0041	0.324	0.0588	5.018	0.0012	0.002	0.0144	0.023	0.0001	0.000	0.0044	0.002	0.0001	0.003	0.0022	0.027
11	0.6706	0.212	2.3400	1.108	0.0036	0.410	0.0624	5.428	0.0007	0.001	0.0151	0.024	0.0001	0.000	0.0045	0.002	0.0002	0.002	0.0024	0.030
12	0.7093	0.311	3.0493	1.419	0.0030	0.398	0.0654	5.825	0.0002	0.003	0.0152	0.026	0.0001	0.000	0.0046	0.002	0.0003	0.003	0.0026	0.033
13	0.8903	0.366	3.9396	1.785	0.0074	0.330	0.0728	6.156	0.0001	0.004	0.0153	0.030	0.0003	0.000	0.0049	0.003	0.0001	0.004	0.0027	0.037
14	0.4626	0.442	4.4022	2.227	0 0038	0.291	0.0766	6.447	0.0002	0.005	0.0155	0.035	0.0002	0.000	0.0051	0.003	0.0003	0.005	0.0030	0.042
15	0.0343	0.556	4.4370	2.783	0 0003	0.272	0.0769	6.718	0.0003	0.007	0.0159	0.042	0.0001	0.000	0.0052	0.003	0.0005	0.006	0.0035	0.048
16	0.1351	0.496	4.5721	3.279	0 0015	0.249	0.0784	6.967	0.0003	0.007	0.0161	0.049	0.0001	0.001	0.0053	0.004	0.0008	0.006	0.0042	0.053
17	0.2354	0.474	4.8076	3.753	0.0027	0.246	0.0810	7.213	0.0002	0.007	0.0163	0.056	0.0001	0.001	0.0054	0.005	0.0010	0.006	0.0052	0.059
18	0.0723	0.453	4.8803	4.206	0.0038	0.242	0.0848	7.455	0.0000	0.008	0.0163	0.064	0.0004	0.001	0.0058	0.006	0.0005	0.006	0.0058	0.065
19	0.0609	0.432	4.9412	4.637	0.0037	0.239	0.0885	7.694	0.0000	0.008	0.0164	0.072	0.0003	0.002	0.0060	0.008	0.0008	0.006	0.0066	0.071
20	0.0490	0.411	4.9903	5.048	0.0036	0.235	0.0921	7.929	0.0001	0.009	0.0165	0.080	0.0002	0.002	0.0063	0.009	0.0010	0.006	0.0076	0.077
21	0.0371	0.390	5.0274	5.438	0.0035	0.232	0.0956	8.161	0.0001	0.009	0.0166	0.090	0.0002	0.002	0.0065	0.012	0.0013	0.006	0.0089	0.084
22	0.0253	0.369	5.0526	5.807	0.0034	0.229	0.0990	8.389	0.0001	0.010	0.0167	0.099	0.0001	0.002	0.0066	0.014	0.0015	0.006	0.0105	0.090


VOC Daily Emissions


VOC Cumulative Emissions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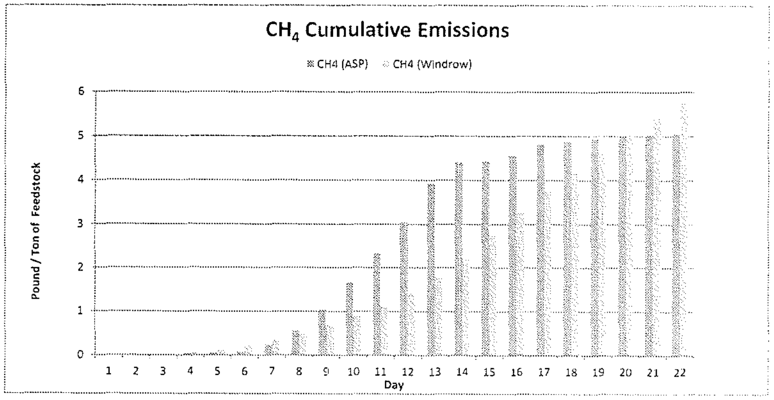
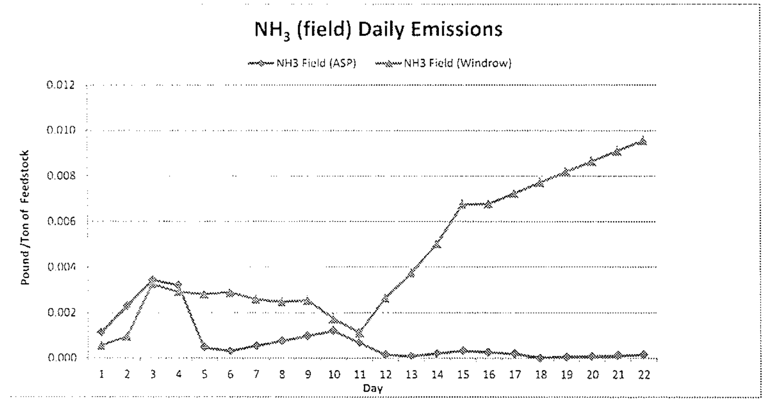
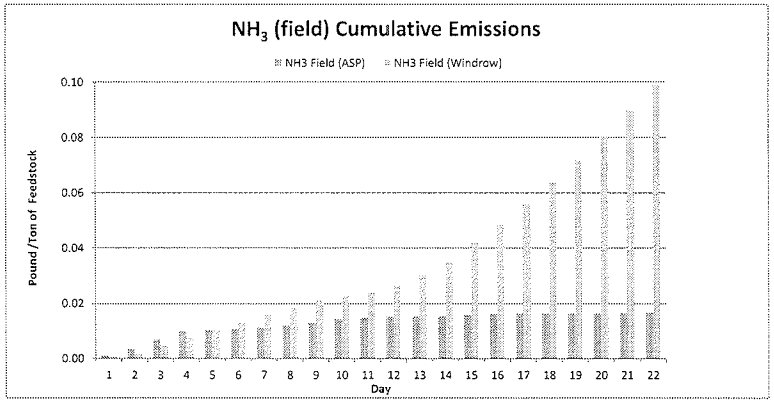
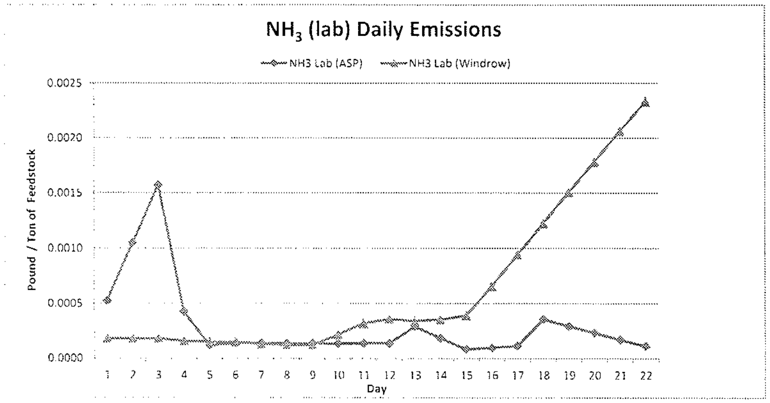

CH_4 Cumulative Emissions



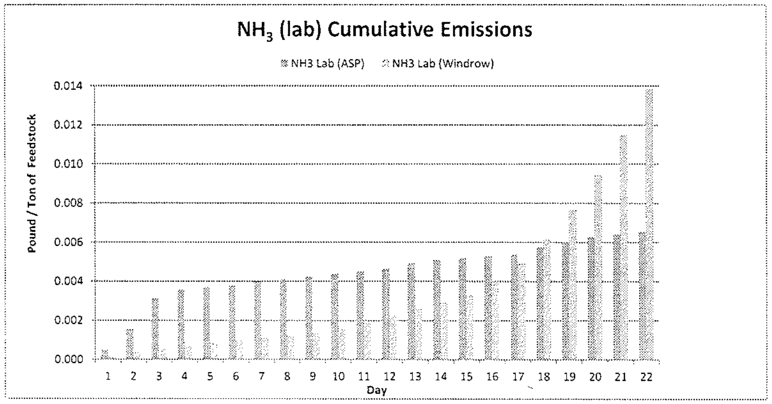
NH$_3$ (field) Daily Emissions



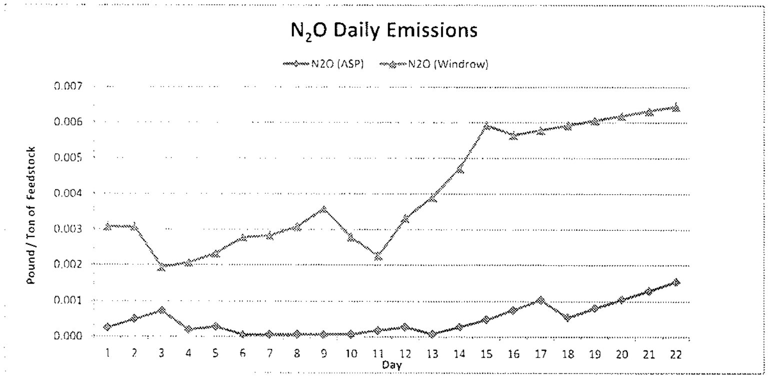
NH$_3$ (field) Cumulative Emissions



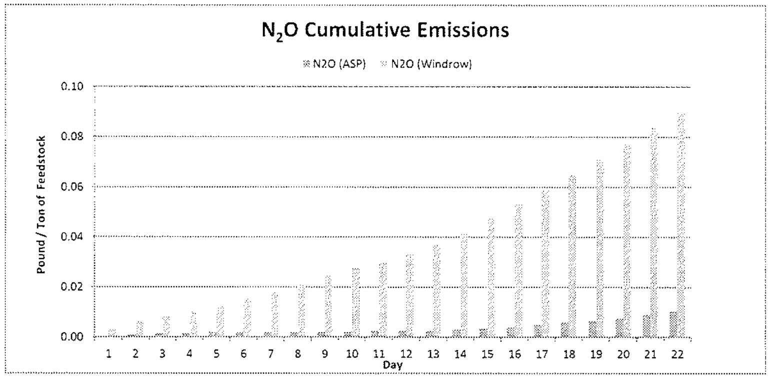
NH$_3$ (lab) Daily Emissions



NH$_3$ (lab) Cumulative Emissions



N$_2$O Daily Emissions

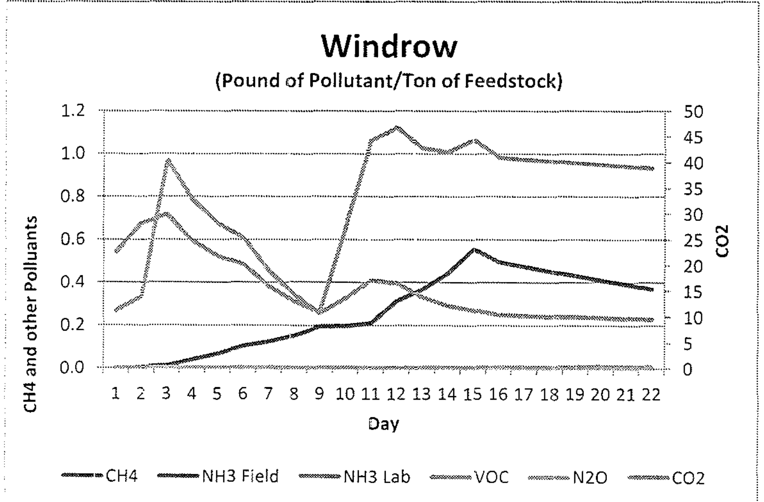


N$_2$O Cumulative Emissions

ACP Final Report fo Valley Air TAP Program, May 2013, Appendix B, Combo Time Series

Emissions (pounds/ton)

	ASP						Windrow					
Day	CH4	CO2	NH3 Field	NH3 Lab	VOC	N2O	CH4	CO2	NH3 Field	NH3 Lab	VOC	N2O
1	0.0037	2.56	0.0011	0.0005	0.0024	0.0002	0.002	22.579	0.001	0.000	0.267	0.003
2	0.0075	5.11	0.0023	0.0010	0.0047	0.0005	0.003	28.125	0.001	0.000	0.334	0.003
3	0.0112	7.67	0.0034	0.0016	0.0071	0.0007	0.011	29.827	0.003	0.000	0.969	0.002
4	0.0212	11.00	0.0032	0.0004	0.0264	0.0002	0.040	24.731	0.003	0.000	0.788	0.002
5	0.0165	8.72	0.0005	0.0001	0.0020	0.0003	0.068	21.756	0.003	0.000	0.676	0.002
6	0.0118	8.27	0.0003	0.0001	0.0024	0.0001	0.104	20.226	0.003	0.000	0.607	0.003
7	0.1668	8.78	0.0005	0.0001	0.0028	0.0001	0.125	15.885	0.003	0.000	0.454	0.003
8	0.3219	9.30	0.0008	0.0001	0.0032	0.0001	0.153	12.990	0.002	0.000	0.345	0.003
9	0.4769	9.82	0.0010	0.0001	0.0037	0.0001	0.194	10.886	0.003	0.000	0.255	0.004
10	0.6319	10.33	0.0012	0.0001	0.0041	0.0001	0.196	27.246	0.002	0.000	0.324	0.003
11	0.6706	10.97	0.0007	0.0001	0.0036	0.0002	0.212	44.204	0.001	0.000	0.410	0.002
12	0.7093	11.61	0.0002	0.0001	0.0030	0.0003	0.311	46.728	0.003	0.000	0.398	0.003
13	0.8903	20.19	0.0001	0.0003	0.0074	0.0001	0.366	42.700	0.004	0.000	0.330	0.004
14	0.4626	11.72	0.0002	0.0002	0.0038	0.0003	0.442	41.956	0.005	0.000	0.291	0.005
15	0.0348	3.25	0.0003	0.0001	0.0003	0.0005	0.556	44.327	0.007	0.000	0.272	0.006
16	0.1351	6.97	0.0003	0.0001	0.0015	0.0008	0.496	40.881	0.007	0.001	0.249	0.006
17	0.2354	10.68	0.0002	0.0001	0.0027	0.0010	0.474	40.547	0.007	0.001	0.246	0.006
18	0.0728	10.80	0.0000	0.0004	0.0038	0.0005	0.453	40.215	0.008	0.001	0.242	0.006
19	0.0609	10.27	0.0000	0.0003	0.0037	0.0008	0.432	39.883	0.008	0.002	0.239	0.006
20	0.0490	9.75	0.0001	0.0002	0.0036	0.0010	0.411	39.553	0.009	0.002	0.235	0.006
21	0.0371	9.23	0.0001	0.0002	0.0035	0.0013	0.390	39.225	0.009	0.002	0.232	0.006
22	0.0253	8.71	0.0001	0.0001	0.0034	0.0015	0.37	38.8973	0.0096	0.0023	0.2285	0.0065



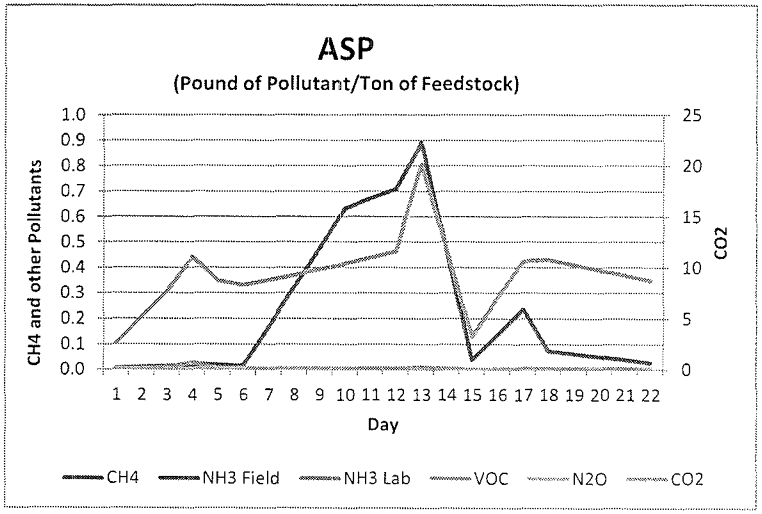


Table 2. Summary of ASP Flux Testing Data, Concentration Data (ppmvC, mg/m3), and Calculated Flux (mg/m2 min-1).

ACP Final Report to Valley Air TAP Program, May 2013. Appendix B, Sample Data for ASP

SOURCE	DAY	LOCATION	25.3 ID	207.1 ID	TO-15 ID	N-6600 ID	NH3/T (ppmv)	NH3/T (mg/m3)	Methane (ppmvC)	Methane (ppmv)	CO2 (ppmvC)	CO2 (mg/m3)	TNMNEOC (ppmvC)	TNMNEOC (mg/m3)	NMNEO Trap (ppmv)	NMNEO Tank (ppmv)	NH3/Lab (mg)	NH3 Vol (m3)	NH3/Lab (mg/m3)	Total Flow (m3/min)	Methane Flux	CO2 Flux	NH3/Tube Flux	NH3/Lab Flux	TNMNEOC Flux	N2O Flux	SOURCE	DAY	COMMENT
ASP ZONE 3	3	NW	G-109	NA	NA	NA	6.5	4.6	10.3	6.87	3200	5867	**12.4**	8.27	1.87	10.5	NA	NA	NA	0.0471	2.49	2126	1.67	NA	**3.00**	NA	ASP ZONE 3	3	
ASP ZONE 3	3	SW	G-110	NA	NA	NA	4.0	2.8	12.4	8.27	1.23	2.26	**7.28**	4.85	1.67	5.61	NA	NA	NA	0.0130	0.827	0.226	0.283	NA	**0.485**	NA	ASP ZONE 3	3	CO2 % ??
ASP ZONE 3	3	NE	G-111	A-103	T-103	N-103	3	2.1	47.4	31.6	8700	15950	**6.06**	4.64	2.04	4.92	0.016	0.00832	1.92	0.0297	7.22	3644	0.485	0.439	**1.06**	0.201	ASP ZONE 3	3	
ASP ZONE 3	3	SE	G-112	NA	NA	NA	9	6.4	13.6	9.07	7000	12833	**23.2**	15.5	1.72	21.5	NA	NA	NA	0.0283	1.97	2794	1.39		**3.37**	NA	ASP ZONE 3	3	
ASP ZONE 3	4	NW	G-213	NA	NA	NA	7	5.0	23.9	15.9	10000	18333	**123**	82.0	88.0	35.4	NA	NA	NA	0.0225	2.76	3173	0.858	NA	**14.2**	NA	ASP ZONE 3	4	
ASP ZONE 3	4	SW	G-214	NA	NA	NA	5	3.5	19.2	12.8	10000	18333	**40.4**	26.9	37.9	2.54	NA	NA	NA	0.0160	1.58	2256	0.436	NA	**3.31**	NA	ASP ZONE 3	4	
ASP ZONE 3	4	NE	G-215	A-204	T-204	N-204	3	2.1	48.5	32.3	6000	11000	**10.7**	7.13	5.49	5.25	0.008	0.0193	0.415	0.0369	9.18	3122	0.603	0.118	**2.02**	0.0520 <	ASP ZONE 3	4	
ASP ZONE 3	4	SE	G-216	NA	NA	NA	5	3.5	13.6	9.07	5000	9167	**17.9**	11.9	8.30	9.60	NA	NA	NA	0.0272	1.90	1918	0.741	NA	**2.50**	NA	ASP ZONE 3	4	
ASP ZONE 3	4	Top NW - Spatial	G-217	NA	NA	NA	19	13.5	194	129	16000	29333	**37.9**	25.3	4.52	33.4	NA	NA	NA	0.0167	16.6	3768	1.73	NA	**3.25**	NA	ASP ZONE 3	4	Spatial variability test
ASP ZONE 3	4	Side SE - Spatial	G-218	NA	NA	NA	5	3.5	18.4	12.3	8000	14667	**99.8**	66.5	7.65	92.2	NA	NA	NA	0.0370	3.49	4174	1.01	NA	**18.9**	NA	ASP ZONE 3	4	Spatial variability test
ASP ZONE 3	4	QC- Replicate	G-219	NA	NA	NA	5	3.5	19.1	12.7	10	18.3	**104**	69.3	5.99	98.0	NA	NA	NA	0.0311	3.05	4.39	0.847	NA	**16.6**	NA	ASP ZONE 3	4	QC- replicate
ASP ZONE 3	5	NW	G-309	A-303	T-303	N-303	1	0.71	30.5	20.3	9000	16500	**4.06**	2.71	0.5 <	4.06	0.004 <	0.0155 <	0.258 <	0.0160	2.50	2031	0.0872	0.0318 <	**0.333**	0.0767	ASP ZONE 3	5	
ASP ZONE 3	5	SW	G-310	NA	NA	NA	1	0.71	36.7	24.5	13000	23833	**5.12**	3.41	3.44	1.68	NA	NA	NA	0.0103	1.94	1888	0.0561	NA	**0.270**	NA	ASP ZONE 3	5	
ASP ZONE 3	5	NE	G-311	NA	NA	NA	0.5	0.35	110	73.3	12000	22000	**6.76**	5.84	2.74	6.02	NA	NA	NA	0.0209	11.8	3537	0.0569	NA	**0.939**	NA	ASP ZONE 3	5	
ASP ZONE 3	5	SE	G-312	NA	NA	NA	3	2.1	20.9	13.9	8000	14667	**7.01**	4.67	1.98	5.04	NA	NA	NA	0.0202	2.17	2279	0.3302	NA	**0.726**	NA	ASP ZONE 3	5	
ASP ZONE 3	6	NW	G-409	A-403	T-403	N-403	0.05 <	0.035 <	32.7	21.8	15000	27500	**13.8**	9.20	8.28	5.53	0.009	0.0183	0.492	0.0100	1.68	2115	0.00272 <	0.0378	**0.708**	0.0141 <	ASP ZONE 3	6	
ASP ZONE 3	6	SW	G-410	NA	NA	NA	1	0.71	16.5	11.0	7000	12833	**4.26**	2.84	3.75	1.0 <	NA	NA	NA	0.0155	1.31	1530	0.0845	NA	**0.339**	NA	ASP ZONE 3	6	
ASP ZONE 3	6	NE	G-411	NA	NA	NA	0.05 <	0.035 <	80.2	53.5	10000	18333	**4.38**	2.92	0.5 <	4.38	NA	NA	NA	0.0204	8.39	2877	0.00556 <	NA	**0.458**	NA	ASP ZONE 3	6	
ASP ZONE 3	6	SE	G-412	NA	NA	NA	4	2.8	29.2	19.5	16000	29333	**19.0**	12.7	5.77	13.2	NA	NA	NA	0.0120	1.80	2708	0.262	NA	**1.17**	NA	ASP ZONE 3	6	
ASP ZONE 2	10	NW	G-105	A-102	T-102	N-102	5	3.5	4264	2843	33000	60500	**35.8**	23.9	0.5 <	35.8	0.004 <	0.0111 <	0.360 <	0.0136	297	6329	0.371	0.0377 <	**2.50**	0.0192 <	ASP ZONE 2	10	
ASP ZONE 2	10	SW	G-106	NA	NA	NA	3	2.1	42.1	28.1	2344	4297	**3.16**	2.11	3.09	1.0 <	NA	NA	NA	0.0256	5.53	846	0.418	NA	**0.415**	NA	ASP ZONE 2	10	
ASP ZONE 2	10	NE	G-107	NA	NA	NA	2	1.4	3155	2103	13100	24017	**6.78**	4.52	0.5 <	6.78	NA	NA	NA	0.0236	382	4360	0.257	NA	**0.821**	NA	ASP ZONE 2	10	
ASP ZONE 2	10	SE	G-108	NA	NA	NA	3	2.1	208	139	1.06	1.94	**8.42**	5.61	1.36	7.06	NA	NA	NA	0.0194	20.7	0.290	0.317	NA	**0.838**	NA	ASP ZONE 2	10	CO2% ??
ASP ZONE 2	12	NW	G-305	A-302	T-302	N-302	0.05 <	0.035 <	4480	2987	22000	40333	**19.7**	13.1	3.91	15.8	0.004 <	0.0170 <	0.235 <	0.0213	489	6608	0.00580 <	0.0366 <	**2.15**	0.0751	ASP ZONE 2	12	
ASP ZONE 2	12	SW	G-306	NA	NA	NA	0.05 <	0.035 <	179	119	3000	5500	**3.84**	2.56	2.71	1.14	NA	NA	NA	0.0175	16.06	740	0.00477 <	NA	**0.345**	NA	ASP ZONE 2	12	
ASP ZONE 2	12	NE	G-307	NA	NA	NA	0.5	0.35	4659	3106	24000	44000	**7.45**	4.97	0.5 <	7.45	NA	NA	NA	0.0115	275	3892	0.0313	NA	**0.439**	NA	ASP ZONE 2	12	
ASP ZONE 2	12	SE	G-308	NA	NA	NA	1	0.71	93.6	62.4	5000	9167	**3.43**	2.29	2.22	1.21	NA	NA	NA	0.0244	11.7	1721	0.133	NA	**0.429**	NA	ASP ZONE 2	12	
ASP ZONE 2	13	NW	G-405	A-402	T-402	N-402	0.2	0.14	4968	3312	52000	95333	**85.5**	57.0	0.5 <	85.5	0.013	0.0181	0.718	0.0145	359	10633	0.0158	0.0801	**6.36**	0.0204 <	ASP ZONE 2	13	
ASP ZONE 2	13	SW	G-406	NA	NA	NA	0.8	0.57	927	618	6000	11000	**3.82**	2.55	3.82	1.0 ND	NA	NA	NA	0.0179	85.1	1515	0.0780	NA	**0.351**	NA	ASP ZONE 2	13	
ASP ZONE 2	13	NE	G-407	NA	NA	NA	0.05 <	0.035 <	4315	2877	25000	45833	**13.0**	8.67	0.5 <	12.6	NA	NA	NA	0.0183	405	6452	0.00499 <	NA	**1.22**	NA	ASP ZONE 2	13	
ASP ZONE 2	13	SE	G-408	NA	NA	NA	0.05 <	0.035 <	1410	940	15000	27500	**3.33**	2.22	0.5 <	3.33	NA	NA	NA	0.0186	134	3935	0.00507 <	NA	**0.318**	NA	ASP ZONE 2	13	
ASP ZONE 1	15	NW	G-101	A-101	T-101	N-101	0.5	0.35	44.9	29.9	2890	5298	**1.0** <	0.67 <	0.91	1.0 ND	0.004 <	0.0222 <	0.180 <	0.0165	3.80	672	0.0450	0.023 <	**0.0846** <	0.133	ASP ZONE 1	15	Over watered; not representative
ASP ZONE 1	15	SW	G-102	NA	NA	NA	4	2.8	243	162	5554	10182	**1.0** <	0.67 <	0.5 <	1.0 ND	NA	NA	NA	0.0101	12.6	791	0.220	NA	**0.0518** <		ASP ZONE 1	15	Over watered; not representative
ASP ZONE 1	15	NE	G-103	NA	NA	N	0.05 <	0.035 <	27.3	18.2	2317	4248	**1.0** <	0.67 <	0.78	1.0 ND	NA	NA	NA	0.0152	2.13	497	0.00414 <	NA	**0.0779** <	NA	ASP ZONE 1	15	Over watered; not representative
ASP ZONE 1	15	SE	G-104	NA	NA	N	1	0.71	228	152	6801	12469	**1.09**	0.73	0.50 <	1.0 <	NA	NA	NA	0.0174	20.3	1669	0.0948	NA	**0.0973**	NA	ASP ZONE 1	15	Over watered; not representative
ASP ZONE 1	17	NW	G-301	A-301	T-301	N-301	1	0.71	480	320	12000	22000	**9.05**	6.03	0.5 <	9.05	0.004 <	0.0154 <	0.260 <	0.0161	39.6	2725	0.0877	0.0322 <	**0.747**	0.288	ASP ZONE 1	17	
ASP ZONE 1	17	SW	G-302	NA	NA	NA	0.5	0.35	1063	709	11000	20167	**4.89**	3.26	0.5 <	4.89	NA	NA	NA	0.0115	52.7	1784	0.0313	NA	**0.288**	NA	ASP ZONE 1	17	
ASP ZONE 1	17	NE	G-303	NA	NA	NA	0.05 <	0.035 <	359	239	10000	18333	**7.20**	4.80	2.79	4.41	NA	NA	NA	0.0152	28.0	2144	0.00414 <	NA	**0.561**	NA	ASP ZONE 1	17	
ASP ZONE 1	17	SE	G-304	NA	NA	N	0.5	0.35	760	507	11000	20167	**7.99**	5.33	2.80	5.20	NA	NA	NA	0.0340	133	5274	0.0926	NA	**1.39**	NA	ASP ZONE 1	17	
ASP ZONE 1	18	NW	G-401	A-401	T-401	N-401	0.05 <	0.035 <	300	200.0	25000	45833	**24.9**	16.6	9.14	15.7	0.024	0.0163	1.47	0.0087	13.4	3067	0.00237 <	0.0985	**1.11**	0.151	ASP ZONE 1	18	
ASP ZONE 1	18	SW	G-402	NA	NA	NA	0.05 <	0.035 <	221	147	9000	16500	**9.28**	6.19	6.55	2.73	NA	NA	NA	0.0183	20.7	2323	0.00499 <	NA	**0.871**	NA	ASP ZONE 1	18	
ASP ZONE 1	18	NE	G-403	NA	NA	NA	0.05 <	0.035 <	47.5	31.7	7000	12833	**10.5**	7.00	7.69	2.78	NA	NA	NA	0.0203	4.94	2004	0.00553 <	NA	**1.09**	NA	ASP ZONE 1	18	
ASP ZONE 1	18	SE	G-404	NA	NA	NA	0.05 <	0.035 <	697	465	28000	51333	**19.3**	12.9	0.5 <	19.0	NA	NA	NA	0.0118	42.2	4659	0.00321 <	NA	**1.17**	NA	ASP ZONE 1	18	
ASP ZONE 1	23	NW	G-501	A-501	T-501	N-501	0.05 <	0.035 <	85.2	56.8	23000	42167	**24.4**	16.3	1.17	23.2	0.004 <	0.0185 <	0.216 <	0.0084	3.67	2725	0.00229 <	0.0140 <	**1.05**	0.500	ASP ZONE 1	23	
ASP ZONE 1	23	SW	G-502	NA	NA	NA	0.1	0.071	99.0	66.0	16000	29333	**15.3**	10.2	2.57	12.8	NA	NA	NA	0.0101	5.13	2279	0.00550	NA	**0.792**	NA	ASP ZONE 1	23	
ASP ZONE 1	23	NE	G-503	NA	NA	NA	1	0.71	17.9	11.9	5000	9167	**6.83**	4.55	2.77	4.06	NA	NA	NA	0.0262	2.41	1847	0.143	NA	**0.918**	NA	ASP ZONE 1	23	
Media Blank	NA	QC-Blank	G-120	NA	NA	NA	NA	NA	1 ND	0.67 ND	12.6	23.1	**1.0** ND	0.67 ND	0.8	1 ND	NA	NA	NA	0.005	0.0256 ND	0.888	NA	NA	**0.0256** ND	NA	Media Blank	NA	
Media Blank	NA	QC-Blank	G-220	NA	NA	NA	NA	NA	1 ND	0.67 ND	0.4	0.733	**1.0** ND	0.67 ND	0.51	1 ND	NA	NA	NA	0.005	0.0256 ND	0.0282	NA	NA	**0.0256** ND	NA	Media Blank	NA	
Media Blank	NA	QC-Blank	G-320	NA	NA	NA	NA	NA	3.71	2.47	33.8	62.0	**1.43**	0.95	0.75	1 <	0.004 <	0.0200 <	0.200 <	0.005	0.0951	2.38	NA	0.00769 <	**0.0367**	NA	Media Blank	NA	
Medial Blank	NA	QC- Blank	G-418	A-406	T-406	N-406	NA	NA	1 ND	0.67 ND	19000	34833	**1.0** ND	0.67 ND	0.6	1 ND	NA	NA	NA	0.005	0.0256 ND	1340	NA	NA	**0.0256** ND	0.00705 <	Medial Blank	NA	CO2 ppmv ??
Media Blank	NA	QC-Blank	G-505	NA	NA	NA	NA	NA												0.005			NA			NA	Media Blank	NA	

TNMNEOC: Total non-methane non-ethane organic carbon reported as methane (carbon # = 1)

Flux = (concentration, mg/m3)(total flow, m3/min)/(surface area, 0.13 m2) = mg/m2 min-1

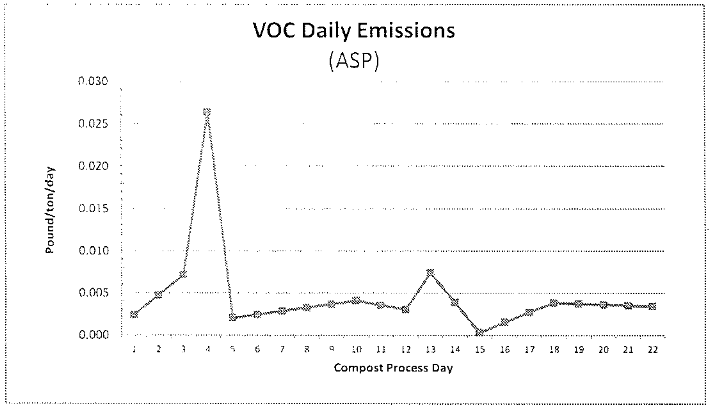
ACP Final Report fo Valley Air TAP Program, May 2013, Appendix B, ASP Daily Simulation

	Flux (mg/min-m2)									Emissions (pounds)							Emissions (pounds/ton)						
Day	CH4	CO2	NH3 T	NH3 L	VOC	N2O		Area		CH4	CO2	NH3 T	NH3 L	VOC	N2O		CH4	CO2	NH3 T	NH3 L	VOC	N2O	CO2e
0	0	0	0	0	0	0.00		785													0.0000		
1	1.0	713.6	0.3	0.1	0.7	0.07		785		3	1,778	0.79	0.36	1.64	0.17		0.0037	2.56	0.0011	0.0005	0.0024	0.0002	2.7211
2	2.1	1427.2	0.6	0.3	1.3	0.13		785		5	3,556	1.59	0.73	3.28	0.33		0.0075	5.11	0.0023	0.0010	0.0047	0.0005	5.4422
3	3	2,141	0.96	0.44	1.98	0.20		785		8	5,335	2.38	1.09	4.93	0.50		0.0112	7.67	0.0034	0.0016	0.0071	0.0007	8.1633
4	6	3,069	0.90	0.12	7.37	0.05		785		15	7,647	2.23	0.29	18.36	0.13		0.0212	11.00	0.0032	0.0004	0.0264	0.0002	11.5805
5	5	2,434	0.13	0.03	0.57	0.08		785		11	6,065	0.33	0.08	1.41	0.19		0.0165	8.72	0.0005	0.0001	0.0020	0.0003	9.2132
6	3	2,308	0.09	0.04	0.67	0.01		785		8	5,750	0.22	0.09	1.67	0.04		0.0118	8.27	0.0003	0.0001	0.0024	0.0001	8.5779
7	46.6	2451.6	0.2	0.04	0.8	0.0		785		116	6,109	0.38	0.09	1.96	0.04		0.1668	8.78	0.0005	0.0001	0.0028	0.0001	12.9712
8	89.8	2595.7	0.2	0.04	0.9	0.0		785		224	6,468	0.53	0.09	2.26	0.04		0.3219	9.30	0.0008	0.0001	0.0032	0.0001	17.3644
9	133.1	2739.8	0.3	0.04	1.0	0.0		785		332	6,827	0.69	0.09	2.55	0.04		0.4769	9.82	0.0010	0.0001	0.0037	0.0001	21.7577
10	176	2,884	0.34	0.04	1.14	0.02		785		439	7,186	0.85	0.09	2.85	0.05		0.6319	10.33	0.0012	0.0001	0.0041	0.0001	26.1510
11	187.2	3062.2	0.2	0.0	1.0	0.0		785		466	7,630	0.48	0.10	2.47	0.12		0.6706	10.97	0.0007	0.0001	0.0036	0.0002	27.7872
12	198	3,240	0.04	0.04	0.84	0.08		785		493	8,075	0.11	0.10	2.10	0.19		0.7093	11.61	0.0002	0.0001	0.0030	0.0003	29.4233
13	248	5,634	0.03	0.08	2.06	0.02		785		619	14,038	0.06	0.20	5.14	0.05		0.8903	20.19	0.0001	0.0003	0.0074	0.0001	42.4653
14	129.1	3270.4	0.1	0.1	1.1	0.1		785		322	8,149	0.15	0.13	2.67	0.19		0.4626	11.72	0.0002	0.0002	0.0038	0.0003	23.3632
15	10	907	0.09	0.02	0.08	0.13		785		24	2,261	0.23	0.06	0.19	0.33		0.0348	3.25	0.0003	0.0001	0.0003	0.0005	4.2612
16	37.7	1944.5	0.1	0.0	0.4	0.2		785		94	4,845	0.18	0.07	1.03	0.52		0.1351	6.97	0.0003	0.0001	0.0015	0.0008	10.5673
17	66	2,982	0.05	0.03	0.75	0.29		785		164	7,430	0.13	0.08	1.86	0.72		0.2354	10.68	0.0002	0.0001	0.0027	0.0010	16.8735
18	20	3,013	0.00	0.10	1.06	0.15		785		51	7,509	0.01	0.25	2.64	0.38		0.0728	10.80	0.0000	0.0004	0.0038	0.0005	12.7759
19	17.0	2867.4	0.0	0.1	1.0	0.2		785		42	7,145	0.03	0.20	2.57	0.55		0.0609	10.27	0.0000	0.0003	0.0037	0.0008	12.0298
20	13.7	2721.5	0.0	0.1	1.0	0.3		785		34	6,782	0.06	0.16	2.50	0.72		0.0490	9.75	0.0001	0.0002	0.0036	0.0010	11.2837
21	10.4	2575.6	0.0	0.0	1.0	0.4		785		26	6,418	0.08	0.12	2.43	0.90		0.0371	9.23	0.0001	0.0002	0.0035	0.0013	10.5376
22	7.0	2429.6	0.0	0.0	0.9	0.4		785		18	6,054	0.10	0.08	2.36	1.07		0.0253	8.71	0.0001	0.0001	0.0034	0.0015	9.7914
23	4	2,284	0.05	0.01	0.92	0.50		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
24	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
25	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
26	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
27	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
28	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
29	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
30	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
31	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
32	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
33	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
34	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
35	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
36	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
37	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
38	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
39	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
40	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
41	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
42	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
43	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
44	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
45	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
46	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
47	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
48	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
49	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
50	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
51	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
52	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
53	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
54	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
55	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
56	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
57	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
58	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
59	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
60	4	2284	0.05	0.01	0.9	0.5		785		9	5,691	0.13	0.03	2.29	1.25		0.0134	8.18	0.0002	0.0001	0.0033	0.0018	9.0453
		Simulations -- 60 Day							Total	3,868	359,300	16	6	156	55	Pounds							679
										6	517	0.02	0.01	0.22	0.08	#/ton mix							
				30 Day						3,588	188,582	13	5	87	17	Pounds							
										5	271	0.02	0.01	0.13	0.02	#/ton mix							
				22 Day						3,514	143,058	12	5	69	7								
										5	206	0.02	0.01	0.10	0.01	#/ton mix							

Process Day	CH4	CO2	NH3 T	NH3 L	VOC	N2O
3	3	2,141	0.96	0.44	1.98	0.20
4	6	3,069	0.90	0.12	7.37	0.05
5	5	2,434	0.13	0.03	0.57	0.08
6	3	2,308	0.09	0.04	0.67	0.01
10	176	2,884	0.341	0.038	1.142	0.019
12	198	3,240	0.044	0.039	0.841	0.075
13	248	5,634	0.026	0.080	2.061	0.020
15	10	907	0.091	0.023	0.078	0.133
17	66	2,982	0.054	0.032	0.747	0.288
18	20	3,013	0.004	0.099	1.061	0.151
23	4	2,284	0.050	0.014	0.920	0.500

Prototype Cell Dimensions		
Total Cell Area	785	m2
Zone 1 Mass	405,000	Pounds
Zone 2 Mass	490,000	Pounds
Zone 3 Mass	495,924	Pounds
Total	1,390,924	Pounds
	695,462	tons

		NH3		Greenhouse Gas			
Cycle Len	VOC	Field	Lab	CO2	CH4	N2O	CO2e
22 Day	0.10	0.017	0.007	206	5.1	0.01	335
30 Day	0.13	0.018	0.007	271	5.2	0.02	407
60 Day	0.22	0.024	0.008	517	5.6	0.08	679


VOC Daily Emissions
(ASP)

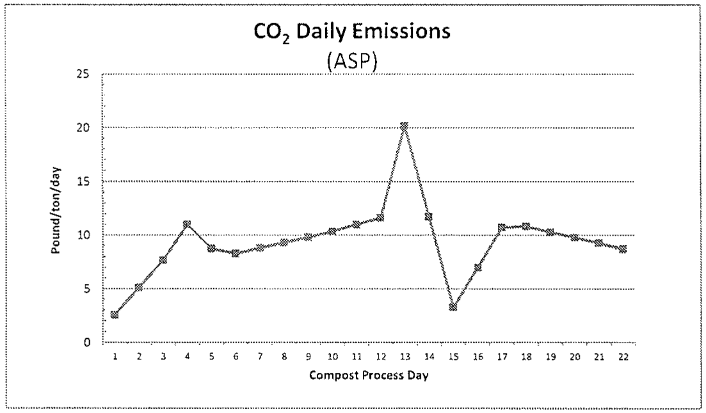

CO$_2$ Daily Emissions
(ASP)

Table 3. Summary of Windrow Data; Concentration Data (ppmvC, mg/m3) and Flux Data (mg/m2,min-1).

ram, May 2013, Appendix B, Sample Data for Windrow

SOURCE	DAY	LOCATION	Methane Flux		CO2 Flux		NH3/Tub Flux		NH3/La Flux		TNMN Flux		N2O Flux		SOURCE	DAY	COMMENT
ESH DAY OLD CH	1	Top	0.0895		3012		0.0242		NA		**35.4**		NA		FRESH DAY OLD CHOP	1	Less than 24 hours old
FRESH CHOP	0	Top	0.0916		5145		0.00262	<	NA		**81.7**		NA		FRESH CHOP	0	About 2 hours old post chop
FRESH CHOP	0	QC- Replicate	0.0906		5157		0.00256	<	NA		**75.3**		NA		FRESH CHOP	0	QC- Replicate
WINDROW WR-1	2	Top- West	0.448		3534		0.0975		0.0320	<	**54.1**		0.548		WINDROW WR-1	2	
WINDROW WR-1	2	Top- East	0.527		4699		0.107		NA		**56.8**		NA		WINDROW WR-1	2	
WINDROW WR-1	2	Side- North	0.495		5644		0.379		NA		**44.9**		NA		WINDROW WR-1	2	
WINDROW WR-1	2	Side- Scuth	0.689		6267		0.110		NA		**83.4**		NA		WINDROW WR-1	2	
WINDROW WR-1	3	Top- West	3.02		7566		0.00504	<	0.0300	<	**167**		0.324		WINDROW WR-1	3	
WINDROW WR-1	3	Top- East	0.519		4823		0.155		NA		**204**		NA		WINDROW WR-1	3	
WINDROW WR-1	3	Side- North	3.57		4363		0.00496	<	NA		**135**		NA		WINDROW WR-1	3	
WINDROW WR-1	3	Side- South	0.469		3204		2.01		NA		**143**		NA		WINDROW WR-1	3	
WINDROW WR-2	9	Top- West	48.9		1264		0.00349	<	0.0206	<	**77.7**		0.616		WINDROW WR-2	9	
WINDROW WR-2	9	Top- East	65.0		2320		0.640		NA		**76.5**		NA		WINDROW WR-2	9	
WINDROW WR-2	9	Side- North	15.1		1199		0.463		NA		**15.9**		NA		WINDROW WR-2	9	
WINDROW WR-2	9	Side- South	4.68		2712		0.632		NA		**5.29**		NA		WINDROW WR-2	9	
WINDROW WR-2	11	Top	53.8		8834		0.0379		0.0595		**105**		0.422		WINDROW WR-2	11	
WINDROW WR-2	11	Side- South	15.3		7687		0.387		NA		**48.0**		NA		WINDROW WR-2	11	
WR-2 POST MIX	11	Top	36.6		4062		0.0314		NA		**165**		NA		WR-2 POST MIX	11	
WR-2 POST MIX	11	QC-Replicate	31.2		4011		0.0258		0.0467	<	**163**		0.255		WR-2 POST MIX	11	QC- Replicate
WR-2 POST MIX	11	Side- South	11.5		5686		0.0183		NA		**110**		NA		WR-2 POST MIX	11	
WINDROW WR-3	15	Top- East	63.1		6383		4.38		NA		**47.4**		NA		WINDROW WR-3	15	
WINDROW WR-3	15	Top- West	70.0		7075		0.371		0.0692	<	**27.5**		1.05		WINDROW WR-3	15	
WINDROW WR-3	15	Side- North	104		11061		0.845		NA		**51.3**		NA		WINDROW WR-3	15	
WINDROW WR-3	15	Side- South	206		14227		0.680		NA		**62.1**		NA		WINDROW WR-3	15	
WINDROW WR-3	15	Side- N. Spat.	158		6725		0.616		NA		**13.6**		NA		WINDROW WR-3	15	Spatial variability test
WINDROW WR-3	15	Top- Spatial	43.8		4582		0.714		NA		**64.0**		NA		WINDROW WR-3	15	Spatial variability test
WINDROW WR-3	15	QC-Replicate	45.0		4931		0.768		NA		**71.0**		NA		WINDROW WR-3	15	QC-Replicate
WINDROW WR-3	29	Top- West	44.2		8529		4.88		0.853		**50.2**		1.50		WINDROW WR-3	29	
WINDROW WR-3	29	Top- East	58.0		7108		0.00381	<	NA		**53.4**		NA		WINDROW WR-3	29	
WINDROW WR-3	29	Side- South	39.4		6871		2.84		NA		**22.8**		NA		WINDROW WR-3	29	
WINDROW WR-4	63	Top- North	22.8		3349		0.0341		0.0347	<	**76.9**		0.0176	<	WINDROW WR-4	63	
WINDROW WR-4	63	Top- South	16.1		5420		0.0499		NA		**76.0**		NA		WINDROW WR-4	63	
WINDROW WR-4	63	Side- West	4.80		1396		0.216		NA		**96.4**		NA		WINDROW WR-4	63	
WINDROW WR-4	63	Side- East	2.89		1625		0.105		NA		**67.9**		NA		WINDROW WR-4	63	
Media Blank	NA	QC-Blank	0.0256	ND	0.888		NA		NA		**0.0256**	ND	NA		Media Blank	NA	QC-Blank
Media Blank	NA	QC-Blank	0.0256	ND	0.0282		NA		NA		**0.0256**	ND	NA		Media Blank	NA	QC-Blank
Media Blank	NA	QC-Blank	0.0951		2.38		NA		NA		**0.0367**		NA		Media Blank	NA	QC-Blank
Medial Blank	NA	QC- Blank	0.0256	ND	1340		NA		0.00769	<	**0.0256**	ND	0.00705	<	Medial Blank	NA	QC- Blank
Media Blank	NA	QC-Blank					NA						NA		Media Blank	NA	QC-Blank

TNMNEO- Total non-methane non-ethane organic carbon reported as methane (carbon # = 1)
Flux = (concentration, mg/m3)(total flow, m3/min)/(surface area, 0.13 m2) = mg/m2,min-1

ACP Final Report fo Valley Air TAP Program, May 2013, Appendix B, Daily Windrow Simulation

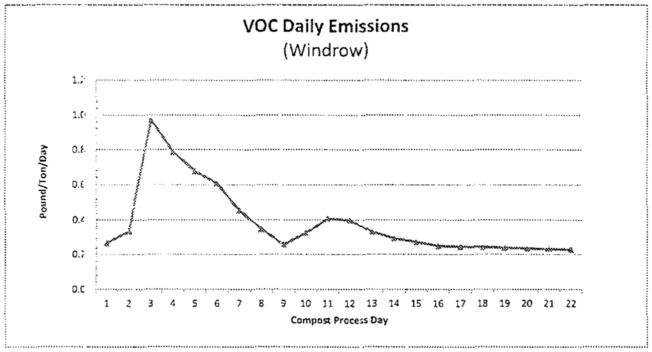
	Flux								Emissions (pounds)					
Day	CH4	CO2	NH3 T	NH3 L	VOC	N2O	Area	MF	CH4	CO2	NH3 T	NH3 L	VOC	N2O
0	0	3012	0	0	35	1	1311	1.08	0	13,486	0.11	0.14	158.36	2.45
1	0.3	4024.2	0.1	0.0	47.6	0.5	1305	1.00	1	16,675	0.41	0.13	197.15	2.27
2	0.5	5036.0	0.2	0.0	59.8	0.5	1299	1.00	2	20,772	0.72	0.13	246.58	2.26
3	2	4989	1	0	162	0	1293	1.08	8	22,028	2.40	0.13	715.72	1.43
4	7.1	4469.9	0.5	0.0	142.4	0.4	1287	1.00	29	18,265	2.15	0.12	581.86	1.52
5	12.4	3950.6	0.5	0.0	122.7	0.4	1281	1.00	50	16,067	2.07	0.11	498.97	1.71
6	17.6	3431.3	0.5	0.0	103.0	0.5	1275	1.08	77	14,938	2.13	0.11	448.30	2.04
7	22.9	2912.0	0.5	0.0	83.3	0.5	1269	1.00	92	11,732	1.90	0.10	335.47	2.09
8	28.2	2392.7	0.5	0.0	63.6	0.6	1263	1.00	113	9,594	1.82	0.09	254.85	2.27
9	33.4	1873.5	0.4	0.0	43.9	0.6	1257	1.08	143	8,040	1.87	0.09	188.19	2.64
10	36.5	5067.0	0.3	0.0	60.2	0.5	1251	1.00	145	20,122	1.29	0.16	239.03	2.06
11	39.5	8260.6	0.2	0.1	76.5	0.4	1245	1.00	156	32,646	0.84	0.24	302.45	1.67
12	54.3	8159.1	0.5	0.1	69.4	0.6	1239	1.08	230	34,510	1.94	0.26	293.65	2.45
13	69.1	8057.6	0.7	0.1	62.3	0.7	1233	1.00	270	31,535	2.76	0.25	243.91	2.88
14	83.8	7956.2	0.9	0.1	55.2	0.9	1227	1.00	327	30,986	3.70	0.26	215.04	3.48
15	99	7855	1	0	48	1	1221	1.08	411	32,737	4.98	0.29	200.52	4.38
16	94.9	7829.6	1.3	0.1	47.7	1.1	1215	1.00	366	30,192	4.99	0.48	183.88	4.17
17	91.3	7804.4	1.4	0.2	47.3	1.1	1209	1.00	350	29,946	5.34	0.69	181.32	4.27
18	87.6	7779.2	1.5	0.2	46.8	1.1	1203	1.00	334	29,700	5.69	0.91	178.78	4.37
19	83.9	7754.1	1.6	0.3	46.4	1.2	1196	1.00	319	29,455	6.04	1.11	176.26	4.47
20	80.2	7728.9	1.7	0.3	46.0	1.2	1190	1.00	303	29,212	6.38	1.32	173.75	4.57
21	76.6	7703.8	1.8	0.4	45.5	1.2	1184	1.00	288	28,969	6.72	1.52	171.26	4.67
22	72.9	7678.6	1.9	0.5	45.1	1.3	1178	1.00	273	28,727	7.06	1.72	168.79	4.77
23	69.2	7653.5	2.0	0.5	44.7	1.3	1172	1.08	277	30,636	7.94	2.07	178.88	5.23
24	65.6	7628.3	2.1	0.6	44.3	1.3	1166	1.00	243	28,246	7.71	2.12	163.89	4.95
25	61.9	7603.2	2.2	0.6	43.8	1.4	1160	1.00	228	28,007	8.04	2.32	161.47	5.04
26	58.2	7578.0	2.3	0.7	43.4	1.4	1154	1.00	213	27,769	8.36	2.51	159.06	5.14
27	54.5	7552.9	2.4	0.7	43.0	1.4	1148	1.00	199	27,532	8.67	2.70	156.67	5.23
28	50.9	7527.7	2.5	0.8	42.6	1.5	1142	1.00	184	27,296	8.99	2.89	154.29	5.31
29	47	7503	3	1	42	1.5	1136	1.08	183	29,103	10.00	3.31	163.40	5.81
30	46.2	7368.6	2.5	0.8	43.2	1.5	1130	1.00	166	26,437	8.98	2.97	155.05	5.22
31	45.1	7234.6	2.4	0.8	44.3	1.4	1124	1.00	161	25,817	8.68	2.87	158.12	5.03
32	44.1	7100.6	2.4	0.8	45.4	1.4	1118	1.00	156	25,203	8.37	2.77	161.15	4.85
33	43.0	6966.7	2.3	0.8	46.5	1.3	1112	1.00	152	24,594	8.07	2.67	164.14	4.67
34	42.0	6832.7	2.2	0.7	47.6	1.3	1106	1.00	147	23,990	7.77	2.57	167.09	4.49
35	40.9	6698.7	2.1	0.7	48.7	1.2	1100	1.08	154	25,156	8.04	2.66	182.82	4.64
36	39.9	6564.7	2.1	0.7	49.8	1.2	1094	1.00	138	22,798	7.18	2.38	172.86	4.14
37	38.8	6430.8	2.0	0.7	50.9	1.1	1088	1.00	134	22,209	6.89	2.28	175.68	3.97
38	37.8	6296.8	1.9	0.6	52.0	1.1	1082	1.00	130	21,626	6.60	2.18	178.46	3.80
39	36.7	6162.8	1.8	0.6	53.1	1.1	1076	1.00	125	21,047	6.31	2.09	181.20	3.63
40	35.7	6028.8	1.8	0.6	54.1	1.0	1070	1.00	121	20,474	6.03	2.00	183.89	3.46
41	34.6	5894.9	1.7	0.6	55.2	1.0	1064	1.00	117	19,906	5.75	1.90	186.54	3.29
42	33.6	5760.9	1.6	0.5	56.3	0.9	1058	1.08	121	20,803	5.89	1.95	203.43	3.36
43	32.6	5626.9	1.6	0.5	57.4	0.9	1052	1.00	109	18,786	5.20	1.72	191.73	2.96
44	31.5	5492.9	1.5	0.5	58.5	0.8	1046	1.00	105	18,233	4.93	1.63	194.25	2.80
45	30.5	5359.0	1.4	0.5	59.6	0.8	1039	1.00	101	17,686	4.66	1.54	196.74	2.64
46	29.4	5225.0	1.3	0.4	60.7	0.8	1033	1.00	97	17,143	4.39	1.46	199.18	2.49
47	28.4	5091.0	1.3	0.4	61.8	0.7	1027	1.00	93	16,606	4.13	1.37	201.59	2.33
48	27.3	4957.1	1.2	0.4	62.9	0.7	1021	1.00	89	16,074	3.87	1.28	203.95	2.17
49	26.3	4823.1	1.1	0.4	64.0	0.6	1015	1.00	85	15,547	3.61	1.20	206.26	2.02
50	25.2	4689.1	1.0	0.3	65.1	0.6	1009	1.00	81	15,025	3.36	1.11	208.54	1.87
51	24.2	4555.1	1.0	0.3	66.2	0.5	1003	1.00	77	14,509	3.10	1.03	210.78	1.72
52	23.1	4421.2	0.9	0.3	67.3	0.5	997	1.00	73	13,997	2.86	0.95	212.97	1.57
53	22.1	4287.2	0.8	0.3	68.4	0.5	991	1.00	70	13,491	2.61	0.87	215.12	1.43
54	21.1	4153.2	0.8	0.3	69.5	0.4	985	1.00	66	12,990	2.37	0.79	217.23	1.28
55	20.0	4019.2	0.7	0.2	70.5	0.4	979	1.00	62	12,494	2.12	0.71	219.29	1.14
56	19.0	3885.3	0.6	0.2	71.6	0.3	973	1.00	59	12,003	1.89	0.63	221.32	1.00
57	17.9	3751.3	0.5	0.2	72.7	0.3	967	1.00	55	11,517	1.65	0.55	223.30	0.86
58	16.9	3617.3	0.5	0.2	73.8	0.2	961	1.00	51	11,036	1.42	0.47	225.24	0.72
59	15.8	3483.3	0.4	0.1	74.9	0.2	955	1.00	48	10,561	1.19	0.40	227.14	0.58
60	14.8	3349.4	0.3	0.1	76.0	0.1	949	1.00	45	10,090	0.96	0.32	229.00	0.45
61	13.7	3215.4	0.2	0.1	77.1	0.10	943	1.00	41	9,625	0.74	0.25	230.81	0.31
62	12.7	3081.4	0.2	0.1	78.2	0.06	937	1.00	38	9,165	0.52	0.17	232.59	0.18
63	12	2947	0	0	79	0.02	931	1.00	34	8,710	0.30	0.10	234.32	0.05
64	12	2947	0	0	79	0.02	925	1.00	34	8,653	0.30	0.10	232.80	0.05
65	12	2947	0	0	79	0.02	919	1.00	34	8,597	0.29	0.10	231.28	0.05
						60 Day		Total	9,184	1,341,525	284	78	14,728	191 Pounds
									12	1,816.47	0.38	0.11	19.94	0.26 #/ton mix
						30 Day			5,982	765,362	142	31	7,647	111
									8	1,036.32	0.19	0.04	10.35	0.15 #/ton mix
						22 Day			4,289	540,334	73	10	6,354	69
									6	731.63	0.10	0.01	8.60	0.09

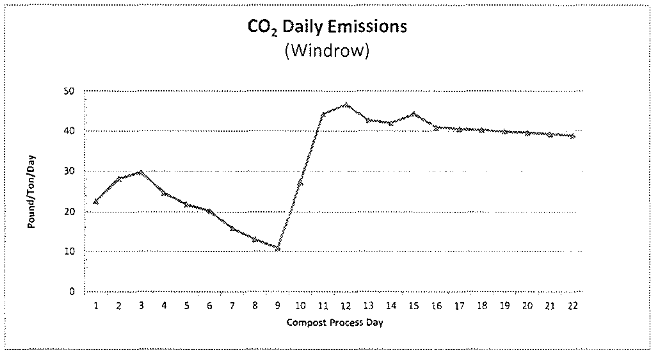
								21		
	Emissions (pounds per ton)							738.54	200.4	163
	CH4	CO2	NH3 T	NH3 L	VOC	N2O	CO2e	TAP	Site 2	Site 1
0	0	18	0.0001	0.0002	0.214	0.0033	19.3018	0.21		
1	0.002	23	0.0006	0.0002	0.267	0.0031	23.5687	0.27	0	0
2	0.003	28	0.0010	0.0002	0.334	0.0031	29.1371	0.33	0	1
3	0.011	30	0.0033	0.0002	0.969	0.0019	30.6640	0.97	0	1
4	0.040	25	0.0029	0.0002	0.788	0.0021	26.1999	0.79	0	1
5	0.068	22	0.0028	0.0001	0.676	0.0023	23.9078	0.68	0	1
6	0.104	20	0.0029	0.0001	0.607	0.0028	23.2687	0.61	0	1
7	0.125	16	0.0026	0.0001	0.454	0.0028	19.3849	0.45	0	0
8	0.153	13	0.0025	0.0001	0.345	0.0031	17.1541	0.35	0	0
9	0.194	11	0.0025	0.0001	0.255	0.0036	16.0714	0.25	0	0
10	0.196	27	0.0017	0.0002	0.324	0.0028	32.2296	0.32	0	0
11	0.212	44	0.0011	0.0003	0.410	0.0023	49.3478	0.41	0	0
12	0.311	47	0.0026	0.0004	0.398	0.0033	54.2874	0.40	0	0
13	0.366	43	0.0037	0.0003	0.330	0.0039	51.5956	0.33	0	0
14	0.442	42	0.0050	0.0004	0.291	0.0047	52.6995	0.29	0	0
15	0.556	44	0.0067	0.0004	0.272	0.0059	57.8490	0.27	0	0
16	0.496	41	0.0068	0.0007	0.249	0.0056	53.0417	0.25	0	0
17	0.474	41	0.0072	0.0009	0.246	0.0058	52.2981	0.25	0	0
18	0.453	40	0.0077	0.0012	0.242	0.0059	51.5594	0.24	0	0
19	0.432	40	0.0082	0.0015	0.239	0.0061	50.8254	0.24	0	0
20	0.411	40	0.0086	0.0018	0.235	0.0062	50.0962	0.24	0	0
21	0.390	39	0.0091	0.0021	0.232	0.0063	49.3718	0.23	0	0
22	0.369	39	0.0096	0.0023	0.229	0.0065	48.6523	0.23	0	0
23	0.375	41	0.0108	0.0028	0.242	0.0071	51.5548	0.24	0	0
24	0.329	38	0.0104	0.0029	0.222	0.0067	47.2275	0.22	0	0
25	0.309	38	0.0109	0.0031	0.219	0.0068	46.5223	0.22	0	0
26	0.289	38	0.0113	0.0034	0.215	0.0070	45.8219	0.22	0	0
27	0.269	37	0.0117	0.0037	0.212	0.0071	45.1263	0.21	0	0
28	0.250	37	0.0122	0.0039	0.209	0.0072	44.4355	0.21	0	0
29	0.248	39	0.0135	0.0045	0.221	0.0079	47.0508	0.22	0	0
30	0.224	36	0.0122	0.0040	0.210	0.0071	42.6939	0.21	0	0
31	0.218	35	0.0117	0.0039	0.214	0.0068	41.6471	0.21	0	0
32	0.212	34	0.0113	0.0038	0.218	0.0066	40.6091	0.22	0	0
33	0.206	33	0.0109	0.0036	0.222	0.0063	39.5799	0.22	0	0
34	0.200	32	0.0105	0.0035	0.226	0.0061	38.5595	0.23	0	0
35	0.208	34	0.0109	0.0036	0.248	0.0063	40.3812	0.25	0	0
36	0.188	31	0.0097	0.0032	0.234	0.0056	36.5451	0.23	0	0
37	0.182	30	0.0093	0.0031	0.238	0.0054	35.5510	0.24	0	0
38	0.176	29	0.0089	0.0030	0.242	0.0051	34.5658	0.24	0	0
39	0.170	28	0.0085	0.0028	0.245	0.0049	33.5894	0.25	0	0
40	0.164	28	0.0082	0.0027	0.249	0.0047	32.6218	0.25	0	0
41	0.158	27	0.0078	0.0026	0.253	0.0045	31.6630	0.25	0	0
42	0.164	28	0.0080	0.0026	0.275	0.0046	33.0305	0.28	0	0
43	0.147	25	0.0070	0.0023	0.260	0.0040	29.7717	0.26	0	0
44	0.142	25	0.0067	0.0022	0.263	0.0038	28.8392	0.26	0	0
45	0.136	24	0.0063	0.0021	0.266	0.0036	27.9156	0.27	0	0
46	0.131	23	0.0059	0.0020	0.270	0.0034	27.0007	0.27	0	0
47	0.125	22	0.0056	0.0019	0.273	0.0032	26.0947	0.27	0	0
48	0.120	22	0.0052	0.0017	0.276	0.0029	25.1974	0.28	0	0
49	0.115	21	0.0049	0.0016	0.279	0.0027	24.3090	0.28	0	0
50	0.110	20	0.0045	0.0015	0.282	0.0025	23.4293	0.28	0	0
51	0.104	20	0.0042	0.0014	0.285	0.0023	22.5585	0.29	0	0
52	0.099	19	0.0039	0.0013	0.288	0.0021	21.6964	0.29	0	0
53	0.094	18	0.0035	0.0012	0.291	0.0019	20.8431	0.29	0	0
54	0.089	18	0.0032	0.0011	0.294	0.0017	19.9986	0.29	0	0
55	0.084	17	0.0029	0.0010	0.297	0.0015	19.1630	0.30	0	0
56	0.079	16	0.0026	0.0008	0.300	0.0013	18.3361	0.30	0	0
57	0.075	16	0.0022	0.0007	0.302	0.0012	17.5180	0.30	0	0
58	0.070	15	0.0019	0.0006	0.305	0.0010	16.7087	0.30	0	0
59	0.065	14	0.0016	0.0005	0.308	0.0008	15.9082	0.31	0	0
60	0.060	14	0.0013	0.0004	0.310	0.0006	15.1165	0.31	0	0
61	0.056	13	0.0010	0.0003	0.313	0.0004	14.3336	0.31	0	
62	0.051	12	0.0007	0.0002	0.315	0.0002	13.5595	0.31	0	
63	0.047	12	0.0004	0.0001	0.317	0.0001	12.7942	0.32	0	
64	0.046	12	0.0004	0.0001	0.315	0.0001	12.7112	0.32	0	
65	0.046	12	0.0004	0.0001	0.313	0.0001	12.6282	0.31	0	
	12	1,816				0	2,158			

Process Day	CH4	CO2	NH3 T	NH3 L	VOC	N2O
0	0	3012	0	0	35	0.55
2	1	5036	0	0	60	0.55
3	2	4989	1	0	162	0.32
9	33	1873	0	0	44	0.62
11	40	8261	0	0	77	0.42
15	99	7855	1	0	48	1.05
29	47	7503	3	1	42	1.50
63	12	2947	0	0	79	0.02

		NH3		Greenhouse Gas			
Cycle Length	VOC	Field	Lab	CO2	CH4	2	CO2e
22 Day	8.60	0.099	0.014	732	5.8		883
30 Day	10.35	0.192	0.042	1,036	8.1		1253
60 Day	19.94	0.385	0.106	1,816	12.4		2158

Mixing Event		
Pre-Mix	77	
Post Mix	146	
Est Decay Perod	2	hours
Estimated Daily Imp	8%	
Mix Factor	108%	


VOC Daily Emissions
(Windrow)


CO$_2$ Daily Emissions
(Windrow)

ACP Final Report fo Valley Air TAP Program, May 2013, Appendix C, Emissions from Fuel Use

California Emissions Standard for Heavy Duty Diesel Engines	**NMHC**	**NOx**	**PM**
1996 Emission Standard in grams/bhp/hour	1.2	4	0.05
2007 Emission Standard in grams/bhp/hour	0.14	0.2	0.01

Table One - Conventional Windrow Operation

(operation begins at grinder discharge point)

				Pollution production in pounds					
Task Performed	**Equipment Type**	**Hrs Oper per Pile**	**Average bhp**	**1996 NMHC**	**1996 Nox**	**1996 PM**	**2007 NMHC**	**2007 Nox**	**2007 PM**
1. Push ground feedstock from grinder output into stockpile	Loader	5.2	250	3.4	11	0.14	0.4	0.6	0.03
2. Load feedstock from stockpile into dump truck	Loader	10.5	250	6.9	23	0.29	0.8	1.2	0.06
3. Truck feedstock from stockpile to windrow space	Truck	12.6	450	15.0	50	0.63	1.8	2.5	0.13
4. Push up feedstock to shape and size windrow	Loader	0.5	250	0.3	1	0.01	0.0	0.1	0.00
5. Drive water truck during windrow formation	Truck	0.3	450	0.4	1	0.01	0.0	0.1	0.00
6. Drive water truck to re-water windrow prior to turning	Truck	3.5	450	4.2	14	0.17	0.5	0.7	0.03
7. Turn windrow (7 turns: 1 mixing, 5 for PFRP in 15 days, 1 at day 22)	Turner	1.7	500	2.2	7	0.09	0.3	0.4	0.02
Total pounds of pollutant for 1260 cy windrow/22 day active phase:				**32.49**	**108.29**	**1.35**	**3.79**	**5.41**	**0.27**
Total pounds of pollutant per ton of feedstock @ 2cy/ton				**0.052**	**0.172**	**0.002**	**0.006**	**0.009**	**0.000**
Tons **of pollutant for 100,000 tons per year/22 day active phase**				**2.58**	**8.59**	**0.11**	**0.30**	**0.43**	**0.02**

Table Two - Extended Aerated Static Pile Operation

(operation begins at grinder discharge point)

				Pollution production in pounds					
Task Performed	**Equipment Type**	**Hrs Oper per Pile**	**Average bhp**	**1996 NMHC**	**1996 Nox**	**1996 PM**	**2007 NMHC**	**2007 Nox**	**2007 PM**
1. Place wood chip plenum layer on ASP bed	Loader	0.3	250	0.20	0.66	0.01	0.02	0.03	0.00
2. Convey ground feedstock from grinder to ASP	Conveyor	6.7	0	0.00	0.00	0.00	0.00	0.00	0.00
3. Load finished compost from stockpile into dump truck	Loader	0.3	250	0.20	0.66	0.01	0.02	0.03	0.00
4. Truck finished compost from stockpile to conveyor station	Truck	0.6	450	0.71	2.38	0.03	0.08	0.12	0.01
5. Load finished compost into conveyor	Loader	0.8	250	0.53	1.76	0.02	0.06	0.09	0.00
6. Convey finished compost to ASP	Conveyor	0.8	0	0.00	0.00	0.00	0.00	0.00	0.00
Totals pounds of pollutants for 506 cy eASP / 22 day active phase:				**1.640**	**5.467**	**0.068**	**0.191**	**0.273**	**0.014**
Total pounds of pollutant per ton of feedstock @ 2cy/ton				**0.006**	**0.022**	**0.000**	**0.001**	**0.001**	**0.000**
Tons **of pollutant for 100,000 tons per year/22 day active phase**				**0.324**	**1.081**	**0.014**	**0.038**	**0.054**	**0.003**
Percent reduction over windrow system				***-87%***	***-87%***	***-87%***	***-87%***	***-87%***	***-87%***
Tons saved				2.25	7.51	0.09	0.26	0.38	0.02

ACP Final Report fo Valley Air TAP Program, May 2013, Appendix C, Diesel Fuel Use Comparison

Composting in Extended Aerated Static Piles vs. Windrows

Table One - Conventional Windrow Operation

(operation begins at grinder discharge point)

Windrow Dimensions: 425 feet long 20 feet wide 8 feet high

Windrow Volume: 1,260 cubic yards per pile

Task Performed	Equipment Type	Diesel Gal/Hr	Cubic Yd Per Hr	Cubic Yd Per Pile	Hrs Oper per Task	Number of Reps	Hrs Oper per Pile	Fuel Use per Pile
1. Push ground feedstock from grinder output into stockpile	Loader	3.9	240	1,260	5.2	1	5.2	20.2
2. Load feedstock from stockpile into dump truck	Loader	3.9	120	1,260	10.5	1	10.5	40.4
3. Truck feedstock from stockpile to windrow space	Truck	1.6	100	1,260	12.6	1	12.6	19.8
4. Push up feedstock to shape and size windrow	Loader	3.9	200	100	0.5	1	0.5	1.9
5. Drive water truck during windrow formation	Truck	1.6	NA	NA	0.25	1	0.3	0.4
6. Drive water truck to re-water windrow prior to turning	Truck	1.6	NA	NA	0.5	7	3.5	5.5
7. Turn windrow (7 turns: 1 mixing, 5 for PFRP in 15 days, 1 at day 22)	Turner	20.3	5,040	1,260	0.2	7	1.7	35.5
Totals for 22 day active phase:							**34.3**	**123.7**

Averages for 22 day active phase: **37 Cubic Yards per Operator Hour** **10 Cubic Yards per Gallon of Fuel**

Table Two - Extended Aerated Static Pile Operation

(operation begins at grinder discharge point)

Pile Dimensions: Test piles averaged 85' long x 35' wide x approx 8' high.

Pile Volume: 506 average cubic yards of feedstock per test pile

Task Performed	Equipment Type	Diesel Gal/Hr	Cubic Yd Per Hr	Cubic Yd Per Pile	Hrs Oper per Task	Number of Reps	Hrs Oper per Pile	Fuel Use per Pile
1. Place wood chip plenum layer on ASP bed	Loader	3.9	120	40	0.33	1	0.3	1.3
2. Convey ground feedstock from grinder to ASP	Conveyor	0.0	75	506	6.75	1	6.7	0.0
3. Load finished compost from stockpile into dump truck	Loader	3.9	200	60	0.30	1	0.3	1.2
4. Truck finished compost from stockpile to conveyor station	Truck	1.6	100	60	0.60	1	0.6	0.9
5. Load finished compost into conveyor	Loader	3.9	75	60	0.80	1	0.8	3.1
6. Convey finished compost to ASP	Conveyor	0	75	60	0.80	1	0.8	0.0
Totals for 22 day active phase:							**9.6**	**6.5**

Averages for 22 day active phase: **53 Cubic Yards per Operator Hour** **78 Cubic Yards per Gallon of Fuel**

-87%

34 Tons per gallon extra using ASP
2941.176 gallons saved per 100,000 tons
100000 e 38 * e 39

US COMPOSTING COUNCIL

Seal of Testing Assurance

TCCBI - Harvest Power
John Jones
24487 Rd. 140
Tulare
CA 93274

Product Identification	Compost
Zone 1	

Date Sampled/Received: 07 Sep. 12 / 14 Sep. 12

COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 *tel:* 831.724.5422 *fax:* 831.724.3188

Compost Parameters	***Reported as*** *(units of measure)*	***Test Results***	***Test Results***
Plant Nutrients:	%, weight basis	Not reported	Not reported
Moisture Content	%, wet weight basis	43.3	
Organic Matter Content	%, dry weight basis	43.0	
pH	units	5.37	
Soluble Salts *(electrical conductivity EC_5)*	dS/m (mmhos/cm)	9.9	
Particle Size or Sieve Size	maxium aggregate size, inches	0.38	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	7.9	Moderately Un-Stable
	mg CO_2-C/g TS/day	3.4	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	90.0	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Pass	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg* Mo,Ni,Se,Zn

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Laboratory Group: Sep.12 B

Laboratory Number: 2090380-1/2

Analyst: Assaf Sadeh [redacted]

www.compostlab.com

US COMPOSTING COUNCIL

Seal of Testing Assurance

TCCBI - Harvest Power
John Jones
24487 Rd. 140
Tulare
CA 93274

Product Identification	Compost
Zone 1	

Date Sampled/Received: 07 Sep. 12 / 14 Sep. 12

COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 *tel:* 831.724.5422 *fax:* 831.724.3188

Compost Parameters	*Reported as (units of measure)*	*Test Results*	*Test Results*
Plant Nutrients:	%, weight basis	%, wet weight basis	%, dry weight basis
Nitrogen	Total N	0.75	1.3
Phosphorus	P_2O_5	0.32	0.57
Potassium	K_2O	0.69	1.2
Calcium	Ca	1.1	2.0
Magnesium	Mg	0.24	0.42
Moisture Content	%, wet weight basis	43.3	
Organic Matter Content	%, dry weight basis	43.0	
pH	units	5.37	
Soluble Salts *(electrical conductivity EC_5)*	dS/m (mmhos/cm)	9.9	
Particle Size or Sieve Size	% under 9.5 mm, dw basis	100.0	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	7.9	Moderately Un-Stable
	mg CO_2-C/g TS/day	3.4	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	90.0	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Pass	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg*
			Mo,Ni,Se,Zn

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Laboratory Group: Sep.12 B
Laboratory Number: 2090380-1/2

Analyst: Assaf Sadeh	[redacted]	www.compostlab.com

US COMPOSTING COUNCIL

Seal of Testing Assurance

Caltrans

TCCBI - Harvest Power
John Jones
24487 Rd. 140
Tulare CA 93274

Product Identification:
Zone 1

Date Sampled/Received: 07 Sep. 12 / 14 Sep. 12

COMPOST TECHNICAL DATA SHEET for Caltrans

LABORATORY: Soil Control Lab, 42 Hangar Way, Watsonville, CA 95076 tel (831) 724-5422 fax (831) 724-3188 www.compostlab.com

Compost Parameters	*Test Results*	*Reported as (units of measure)*	*TMECC Test Method*
pH	5.37	Unitless	04.11-A 1:5 Slurry pH
Soluble Salts (electrical conductivity)	9.9	dS/m (mmhos/cm)	04.10-A 1:5 Slurry Method Mass Basis
Moisture content	43.3	%, wet weight basis	03.09-A - Total Solids and Moisture
Organic Matter Content	43.0	%, dry weight basis	05.07-A Loss-on-Ignition Organic Matter Method (LOI)
Maturity Indicator (bioassay)			
Percent Emergence	100.0	average % of control	05.05-A Germination and vigor
Relative Seedling Vigor	90.0	average % of control	
Stability Indicator	7.9	mg CO2-C/g OM/day	05.08-B Carbon Dioxide Evoultion Rate
Particle Size	100.0	%, dry weight passing through 9.5 mm	02.02-B Sample Sieving for Aggregate Size Classification
Pathogens	Pass	PASS/FAIL: Per US EPA Class A standard, 40 CFR 503.32(a)	07.01-B Fecal coliforms
Pathogens	Pass	PASS/FAIL: Per US EPA Class A standard, 40 CFR 503.32(a)	07.02 Samonella
Physical Contaminants	None Detected	%, dry weight basis	02.02-C - Man-Made Inerts Total content
Physical Contaminants	None Detected	%, dry weight basis	02.02-C - Man-Made Inerts Sharps content
Heavy Metals Content	Pass	PASS/FAIL: Per US EPA Class A 40 CFR 503.13, tables 1 and 3.	04.06-Heavy Metals standard, and Hazardous Elements

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

For additional information pertaining to compost use, the specific compost parameters tested for within the Seal of Testing assurance Program, or the program in general, log on to the US Composting Council's TMECC web-site at http://www.tmecc.org.

This compost product has been sampled and tested as required by the Seal of Testing assurance Program on the United States Composting Council (USCC), using certain methods from the "Test Methods for the Examination of Compost and Composting" manual. Test results are available upon request by contacting the compost producer (address at top of page). The USCC makes no warranties regarding this product or its content, quality, or suitability for any particular use.

Laboratory Group: Sep.12 B
Laboratory Number: 2090380-1/2

Analyst: Assaf Sadeh
[redacted]
www.compostlab.com

ANALYTICAL CHEMISTS
and
BACTERIOLOGISTS
Approved by State of California

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com

SOIL CONTROL LAB

42 HANGAR WAY
WATSONVILLE
CALIFORNIA
95076
USA

Account #: 2090380-1/2-6908
Group: Sep.12 B #27
Reporting Date: September 26, 2012

TCCBI - Harvest Power
24487 Rd. 140
Tulare, CA 93274
Attn: John Jones

Date Received: 14 Sep. 12
Sample Identification: Zone 1
Sample ID #: 2090380 - 1/2

Nutrients	Dry wt.	As Rcvd.	units
Total Nitrogen:	1.3	0.75	%
Ammonia (NH_4-N):	1300	760	mg/kg
Nitrate (NO_3-N):	33	18	mg/kg
Org. Nitrogen (Org.-N):	1.2	0.68	%
Phosphorus (as P_2O_5):	0.57	0.32	%
Phosphorus (P):	2500	1400	mg/kg
Potassium (as K_2O):	1.2	0.68	%
Potassium (K):	10000	5700	mg/kg
Calcium (Ca):	2.0	1.1	%
Magnesium (Mg):	0.42	0.24	%
Sulfate (SO_4-S):	1900	1100	mg/kg
Boron (Total B):	27	15	mg/kg
Moisture:	0	43.3	%
Sodium (Na):	0.11	0.063	%
Chloride (Cl):	0.21	0.12	%
pH Value:	NA	5.37	unit
Bulk Density :	25	44	lb/cu ft
Carbonates ($CaCO_3$):	<0.1	<0.1	lb/ton
Conductivity (EC5):	9.9	NA	mmhos/cm
Organic Matter:	43.0	24.4	%
Organic Carbon:	23.0	13.0	%
Ash:	57.0	32.3	%
C/N Ratio	18	18	ratio
AgIndex	10	10	ratio

Stability Indicator:		Biologically
CO2 Evolution	Respirometery	Available C
mg CO_2-C/g OM/day	7.9	10
mg CO_2-C/g TS/day	3.4	4.4
Stability Rating	*moderately unstable*	*unstable*

Maturity Indicator: Cucumber Bioassay		
Compost:Vermiculite(v:v)	1:1	1:3
Emergence (%)	100	100
Seedling Vigor (%)	90	93
Description of Plants	*fungus*	*fungus*

Pathogens	Results	Units	Rating
Fecal Coliform	< 2.0	MPN/g	*pass*
Salmonella	< 3	MPN/4g	*pass*

Date Tested: 14 Sep. 12

Inerts	% by weight
Plastic	< 0.5
Glass	< 0.5
Metal	< 0.5
Sharps	ND

Metals	Dry wt.	EPA Limit	units
Aluminum (Al)	6700	-	mg/kg
Arsenic (As):	3.4	41	mg/kg
Cadmium (Cd):	< 1.0	39	mg/kg
Chromium (Cr):	14	1200	mg/kg
Cobalt (Co)	3.7	-	mg/kg
Copper (Cu):	60	1500	mg/kg
Iron (Fe):	11000	-	mg/kg
Lead (Pb):	25	300	mg/kg
Manganese (Mn):	200	-	mg/kg
Mercury (Hg):	< 1.0	17	mg/kg
Molybdenum (Mo):	1.8	75	mg/kg
Nickel (Ni):	10	420	mg/kg
Selenium (Se):	< 1.0	36	mg/kg
Zinc (Zn):	160	2800	mg/kg

Size & Volume Distribution

MM	% by weight	% by volume	BD g/cc
> 50	0.0	0.0	0.00
25 to 50	0.0	0.0	0.00
16 to 25	0.0	0.0	0.00
9.5 to 16	0.0	0.0	0.00
6.3 to 9.5	2.7	2.6	0.41
4.0 to 6.3	6.0	6.2	0.39
2.0 to 4.0	13.7	17.0	0.32
< 2.0	77.6	74.2	0.42

Bulk Density Description:<.35 Light Materials, .35-.60 medium weight materials, >.60 Heavy Materials

Analyst: Assaf Sadeh

[redacted]

*Sample was received and handled in accordance with TMECC procedures.

Account No.:
2090380 - 1/2 - 6908
Group: Sep.12 B No. 27

Date Received 14 Sep. 12
Sample i.d. Zone 1
Sample I.d. No. 1/2 2090380

INTERPRETATION:

Is Your Compost Stable?

Respiration Rate
7.9 mg CO2-C/ g OM/day

Biodegradation Rate of Your Pile
```
+++++++++++++++++++++++++++++++
< Stable          >|<Moderately Unstable>|<          Unstable          >|< High For Mulch
```

Biologically Available Carbon (BAC)
10 mg CO2-C/ g OM/day

Optimum Degradation Rate
```
+++++++++++++++++++++++++++++++++++++++
< Stable          >|<Moderately Unstable>|<          Unstable          >|< High For Mulch
```

Is Your Compost Mature?

AmmoniaN/NitrateN ratio
39 Ratio
```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
VeryMature>|<          Mature                              >|<   Immature
```

Ammonia N ppm
1300 mg/kg dry wt.
```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
VeryMature>|<          Mature                         >|<   Immature
```

Nitrate N ppm
33 mg/kg dry wt.
```
++++++++++++++++++++++++++
<   Immature                         >|<  Mature
```

pH value
5.37 units
```
++++++++++++++++++++++++++++++++++++++++++
<   Immature                                   >|< Mature       >|< Immature
```

Cucumber Emergence
100.0 percent
```
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
<  Immature                                                    >|< Mature
```

Is Your Compost Safe Regarding Health?

Fecal Coliform
< 1000 MPN/g dry wt.
```
+++++++
<  Safe                                        >|< High Fecal Coliform
```

Salmonella
Less than 3 /4g dry wt.
```
+++++++
<Safe   (none detected)                >|< High Salmonella Count(> 3 per 4 grams)
```

Metals US EPA 503
Pass dry wt.
```
+++++++++
<All Metals Pass                        >|< One or more Metals Fail
```

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)
3.1 Percent dry wt.
```
++++++++++++++++++++++++
<Low            >|< Average              >|< High Nutrient Content
```

AgIndex (Nutrients / Sodium and Chloride Salts) ((N+P2O5+K2O) / (Na + Cl))
10 Ratio
```
++++++++++++++++++++++++++++++++++++++++++++++++++
Na & Cl    >|<  Nutrient and Sodium and Chloride Provider       >|<  Nutrient Provider
```

Plant Available Nitrogen (PAN)
6 lbs/ton wet wt.

Estimated release for first season
```
+++++++++++++++++++++++++
Low Nitrogen Provider>|<      Average Nitrogen Provider              >|<High Nitrogen Provider
```

C/N Ratio
18 Ratio
```
+++++++++++++++++++++++++++++++++++
< Nitrogen Release    >|< N-Neutral >|< N-Demand>|<  High Nitrogen Demand
```

Soluble Available Nutrients & Salts (EC5 w/w dw)
9.9 mmhos/cm dry wt.
```
++++++++++++++++++++++++++++++++++++++++++++++++++++
SloRelease>|<  Average Nutrient Release Rate    >|<High Available Nutrients
```

Lime Content (CaCO3)
0 Lbs/ton dry wt.
```
+
<  Low  >|<             Average            >|<  High  Lime Content (as CaCO3)
```

What are the physical properties of your compost?

Percent Ash
57.0 Percent dry wt.
```
++++++++++++++++++++++++++++++++++++++++++++
<  High Organic Matter          >|<    Average              >|<  High Ash Content
```

Sieve Size % > 6.3 MM (0.25")
2.7 Percent dry wt.
```
+++++++++++++++++++++
All Uses           >|< Size May Restrict Uses for Potting mix and Golf Courses
```

Account No.:
2090380 - 1/2 - 6908
Group: Sep.12 B No. 27

Date Received 14 Sep. 12
Sample i.d. Zone 1
Sample I.d. No. 1/2 2090380

INTERPRETATION:

Is Your Compost Stable?

Respiration Rate

7.9 Moderate-selected use mg CO2-C/g OM/day

The respiration rate is a measurement of the biodegradation rate of the organic matter in the sample (as received). The respiration rate is determined by measuring the rate at which CO2 is released under optimized moisture and temperature conditions.

Biologically Available Carbon

10 Moderate-selected use mg CO2-C/g OM/day

Biologically Available Carbon (BAC) is a measurement of the rate at which CO2 is released under optimized moisture, temperature, porosity, nutrients, pH and microbial conditions. If both the RR and the BAC test values are close to the same value, the pile is optimized for composting. If both values are high the compost pile just needs more time. If both values are low the compost has stabilized and should be moved to curing. BAC test values that are higher than RR indicate that the compost pile has stalled. This could be due to anaerobic conditions, lack of available nitrogen due to excessive air converting ammonia to the unavailable nitrate form, lack of nitrogen or other nutrients due to poor choice of feedstock, pH value out of range, or microbes rendered non-active.

Is Your Compost Mature?

AmmoniaN:NitrateN ratio

39 immature

Ammonia N ppm

1300 immature

Nitrate N ppm

33 immature

pH value

5.37 immature

Composting to stabilize carbon can occur at such a rapid rate that sometimes phytotoxins remain in the compost and must be neutralized before using in high concentrations or in high-end uses. This step is called curing. Typically ammonia is in excess with the break-down of organic materials resulting in an increase in pH. This combination results in a loss of volatile ammonia (it smells). Once this toxic ammonia has been reduced and the pH drops, the microbes convert the ammonia to nitrates. A low ammonia + high nitrate score is indicative of a mature compost, however there are many exceptions. For example, a compost with a low pH (<7) will retain ammonia, while a compost with high lime content can lose ammonia before the organic fraction becomes stable. Composts must first be stable before curing indicators apply.

Cucumber Bioassay

100.0 Percent

Cucumbers are chosen for this test because they are salt tolerant and very sensitive to ammonia and organic acid toxicity. Therefore, we can germinate seeds in high concentrations of compost to measure phytotoxic effects without soluble salts being the limiting factor. Values above 80% for both percent emergence and vigor are indicative of a well-cured compost. Exceptions include very high salts that affect the cucumbers, excessive concentrations of nitrates and other nutrients that will be in range when formulated to make a growing media. In addition to testing a 1:1 compost: vermiculite blend, we also test a diluted 1:3 blend to indicate a more sensitive toxicity level.

Is Your Compost Safe Regarding Health?

Fecal Coliform

< 1000 / g dry wt. Fecal coliforms can survive in both aerobic and anaerobic conditions and is common in all initial compost piles. Most human pathogens occur from fecal matter and all fecal matter is loaded in fecal coliforms. Therefore fecal coliforms are used as an indicator to determine if the chosen method for pathogen reduction (heat for compost) has met the requirements of sufficient temperature, time and mixing. If the fecal coliforms are reduced to below 1000 per gram dry wt. it is assumed all others pathogens are eliminated. Potential problems are that fecal coliform can regrow during the curing phase or during shipping. This is because the conditions are now more favorable for growth than during the composting process.

Salmonella Bacteria

Less than 3 3 / 4g dry wt. Salmonella is not only another indicator organism but also a toxic microbe. It has been used in the case of biosolids industry to determine adequate pathogen reduction.

Metals

Pass The ten heavy metals listed in the EPA 503 regulations are chosen to determine if compost can be applied to ag land and handled without toxic effects. Most high concentrations of heavy metals are derived from woodwaste feedstock such as chrome-arsenic treated or lead painted demolition wood. Biosolids are rarely a problem.

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)

3.1 Average nutrient content

This value is the sum of the primary nutrients Nitrogen, Phosphorus and Potassium. Reported units are consistent with those found on fertilizer formulations. A sum greater than 5 is indicative of a compost with high nutrient content, and best used to supply nutrients to a receiving soil. A sum below 2 indicates low nutrient content, and is best-used to improve soil structure via the addition of organic matter. Most compost falls between 2 and 5.

Account No.:		Date Received	14 Sep. 12	
2090380 - 1/2 - 6908		Sample i.d.	Zone 1	
Group:	Sep.12 B No. 27	Sample I.d. No.	1/2	2090380

INTERPRETATION:

AgIndex (Nutrients/Na+Cl)

10 Average nutrient ratio Composts with low AgIndex values have high concentrations of sodium and/or chloride compared to nutrients. Repeated use of a compost with a low AgIndex (< 2) may result in sodium and/or chloride acting as the limiting factor compared to nutrients, governing application rates. These composts may be used on well-draining soils and/or with salt-tolerant plants. Additional nutrients form another source may be needed if the application rate is limited by sodium or chloride. If the AgIndex is above 10, nutrients optimal for plant growth will be available without concern of sodium and/or chloride toxicity. Composts with an AgIndex of above 10 are good for increasing nutrient levels for all soils. Most composts score between 2 and 10. Concentrations of nutrients, sodium, and chloride in the receiving soil should be considered when determining compost application rates. The AgIndex is a product of feedstock quality. Feedstock from dairy manure, marine waste, industrial wastes, and halophytic plants are likely to produce a finished compost with a low AgIndex.

Plant Available Nitrogen (lbs/ton)

6 Average N Provider Plant Available Nitrogen (PAN) is calculated by estimating the release rate of Nitrogen from the organic fraction of the compost. This estimate is based on information gathered from the BAC test and measured ammonia and nitrate values. Despite the PAN value of the compost, additional sources of Nitrogen may be needed during he growing season to off-set the Nitrogen demand of the microbes present in the compost. With ample nutrients these microbes can further breakdown organic matter in the compost and release bound Nitrogen. Nitrogen demand based on a high C/N ratio is not considered in the PAN calculation because additional Nitrogen should always be supplemented to the receiving soil when composts with a high C/N ratio are applied.

C/N Ratio

18 Indicates immaturity As a guiding principal, a C/N ratio below 14 indicates maturity and above 14 indicates immaturity, however, there are many exceptions. Large woodchips (>6.3mm), bark, and redwood are slow to breakdown and therefore can result in a relatively stable product while the C/N ratio value is high. Additionally, some composts with chicken manure and/or green grass feedstocks can start with a C/N ratio below 15 and are very unstable. A C/N ratio below 10 supplies Nitrogen, while a ratio above 20 can deplete Nitrogen from the soil. The rate at which Nitrogen will be released or used by the microbes is indicated by the respiration rate (BAC). If the respiration rate is too high the transfer of Nitrogen will not be controlable.

Soluble Nutrients & Salts (EC5 w/w dw - mmhos/cm)

9.9 High salts This value refers to all soluble ions including nutrients, sodium, chloride and some soluble organic compounds. The concentration of salts will change due to the release of salts from the organic matter as it degrades, volatilization of ammonia, decomposition of soluble organics, and conversion of molecular structure. High salts + high AgIndex is indicative of a compost high in readily available nutrients. The application rate of these composts should be limited by the optimum nutrient value based on soil analysis of the receiving soil. High Salts + low AgIndex is indicative of a compost low in nutrients with high concentrations of sodium and/or chloride. Limit the application rate according to the toxicity level of thesodium and/or chloride. Low salts indicates that the compost can be applied without risking salt toxicity, is likely a good source of organic matter, and that nutrients will release slowly over time.

Lime Content (lbs. per ton)

0 Low lime content Compost high in lime or carbonates are often those produced from chicken manure (layers) ash materials, and lime products. These are excellent products to use on a receiving soil where lime has been recommended by soil analysis to raise the pH. Composts with a high lime content should be closely considered for pH requirements when formulating potting mixes.

Physical Properties

Percent Ash

57.0 Average ash content Ash is the non-organic fraction of a compost. Most composts contain approximately 50% ash (dry weight basis). Compost can be high in ash content for many reasons including: excess minerilzation(old compost), contamination with soil base material during turning, poor quality feedstock, and soil or mineral products added. Finding the source and reducing high ash content is often the fastest means to increasing nutrient quality of a compost.

Particle Size % > 6.3 MM (0.25")

2.7 May restrict use Large particles may restrict use for potting soils, golf course topdressings, seed-starter mixes, and where a fine size distribution is required. Composts with large particles can still be used as excellent additions to field soils, shrub mixes and mulches.

Particle Size Distribution

Each size fraction is measured by weight, volume and bulk density. These results are particularly relevent with decisions to screen or not, and if screening, which size screen to use. The bulk density indicates if the fraction screened is made of light weight organic material or heavy mineral material. Removing large mineral material can greatly improve compost quality by increasing nutrient and organic concentrations.

Appendix:

Plant Available Nitrogen (PAN) calculations:
PAN = (X * (organic N)) + ((NH4-N) + (NO3-N))
X value = If BAC < 2 then X = 0.1
If BAC =2.1 to 5 then X = 0.2
If BAC =5.1 to 10 then X = 0.3
If BAC > 10 then X = 0.4
Note: If C/N ratio > 15 additional N should be applied.

Estimated available nutrients for use when calculating application rates

	lbs/ton (As Rcvd.)
Plant Available Nitrogen (PAN)	6.4
Ammonia (NH4-N)	1.52
Nitrate (NO3-N)	0.04
Available Phosphorus (P2O5*0.64)	4.1
Available Potassium (K2O)	13.7

US COMPOSTING COUNCIL

Seal of Testing Assurance

TCCBI - Harvest Power
John Jones
24487 Rd. 140
Tulare
CA 93274

Product Identification	Compost
Zone 1 Control	

Date Sampled/Received: 07 Sep. 12 / 14 Sep. 12

COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 *tel:* 831.724.5422 *fax:* 831.724.3188

Compost Parameters	*Reported as (units of measure)*	*Test Results*	*Test Results*
Plant Nutrients:	%, weight basis	Not reported	Not reported
Moisture Content	%, wet weight basis	42.3	
Organic Matter Content	%, dry weight basis	44.9	
pH	units	5.72	
Soluble Salts *(electrical conductivity EC_5)*	dS/m (mmhos/cm)	11	
Particle Size or Sieve Size	maxium aggregate size, inches	0.64	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	9.1	Un-Stable
	mg CO_2-C/g TS/day	4.1	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	91.7	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Pass	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg*
			Mo,Ni,Se,Zn

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Laboratory Group: Sep.12 B Laboratory Number: 2090380-2/2

Analyst: Assaf Sadeh [redacted] www.compostlab.com

US COMPOSTING COUNCIL

Seal of Testing Assurance

TCCBI - Harvest Power
John Jones
24487 Rd. 140
Tulare
CA 93274

Product Identification	Compost
Zone 1 Control	

Date Sampled/Received: 07 Sep. 12 / 14 Sep. 12

COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 *tel:* 831.724.5422 *fax:* 831.724.3188

Compost Parameters	*Reported as* *(units of measure)*	*Test Results*	*Test Results*
Plant Nutrients:	%, weight basis	%, wet weight basis	%, dry weight basis
Nitrogen	Total N	0.78	1.4
Phosphorus	P_2O_5	0.32	0.57
Potassium	K_2O	0.71	1.2
Calcium	Ca	1.2	2.0
Magnesium	Mg	0.24	0.42
Moisture Content	%, wet weight basis	42.3	
Organic Matter Content	%, dry weight basis	44.9	
pH	units	5.72	
Soluble Salts *(electrical conductivity EC_5)*	dS/m (mmhos/cm)	11	
Particle Size or Sieve Size	% under 9.5 mm, dw basis	97.8	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	9.1	Un-Stable
	mg CO_2-C/g TS/day	4.1	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	91.7	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Pass	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg* Mo,Ni,Se,Zn

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Laboratory Group: Sep.12 B
Laboratory Number: 2090380-2/2

Analyst: Assaf Sadeh [redacted]

www.compostlab.com

US COMPOSTING COUNCIL

Seal of Testing Assurance

Caltrans

TCCBI - Harvest Power
John Jones
24487 Rd. 140
Tulare CA 93274

Product Identification:
Zone 1 Control

Date Sampled/Received: 07 Sep. 12 / 14 Sep. 12

COMPOST TECHNICAL DATA SHEET for Caltrans

LABORATORY: Soil Control Lab, 42 Hangar Way, Watsonville, CA 95076 tel (831) 724-5422 fax (831) 724-3188 www.compostlab.com

Compost Parameters	*Test Results*	*Reported as (units of measure)*	*TMECC Test Method*
pH	5.72	Unitless	04.11-A 1:5 Slurry pH
Soluble Salts (electrical conductivity)	11	dS/m (mmhos/cm)	04.10-A 1:5 Slurry Method Mass Basis
Moisture content	42.3	%, wet weight basis	03.09-A - Total Solids and Moisture
Organic Matter Content	44.9	%, dry weight basis	05.07-A Loss-on-Ignition Organic Matter Method (LOI)
Maturity Indicator (bioassay) Percent Emergence Relative Seedling Vigor	 100.0 91.7	 average % of control average % of control	05.05-A Germination and vigor
Stability Indicator	9.1	mg CO2-C/g OM/day	05.08-B Carbon Dioxide Evoultion Rate
Particle Size	97.8	%, dry weight passing through 9.5 mm	02.02-B Sample Sieving for Aggregate Size Classification
Pathogens	Pass	PASS/FAIL: Per US EPA Class A standard, 40 CFR 503.32(a)	07.01-B Fecal coliforms
Pathogens	Pass	PASS/FAIL: Per US EPA Class A standard, 40 CFR 503.32(a)	07.02 Samonella
Physical Contaminants	None Detected	%, dry weight basis	02.02-C - Man-Made Inerts Total content
Physical Contaminants	None Detected	%, dry weight basis	02.02-C - Man-Made Inerts Sharps content
Heavy Metals Content	Pass	PASS/FAIL: Per US EPA Class A 40 CFR 503.13, tables 1 and 3.	04.06-Heavy Metals standard, and Hazardous Elements

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

For additional information pertaining to compost use, the specific compost parameters tested for within the Seal of Testing assurance Program, or the program in general, log on to the US Composting Council's TMECC web-site at http://www.tmecc.org.

This compost product has been sampled and tested as required by the Seal of Testing assurance Program on the United States Composting Council (USCC), using certain methods from the "Test Methods for the Examination of Compost and Composting" manual. Test results are available upon request by contacting the compost producer (address at top of page). The USCC makes no warranties regarding this product or its content, quality, or suitability for any particular use.

Laboratory Group: Sep.12 B
Laboratory Number: 2090380-2/2

Analyst: Assaf Sadeh [redacted]
www.compostlab.com

ANALYTICAL CHEMISTS
and
BACTERIOLOGISTS
Approved by State of California

SOIL CONTROL LAB

42 HANGAR WAY
WATSONVILLE
CALIFORNIA
95076
USA

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com

Account #: 2090380-2/2-6908
Group: Sep.12 B #28
Reporting Date: September 26, 2012

TCCBI - Harvest Power
24487 Rd. 140
Tulare, CA 93274
Attn: John Jones

Date Received: 14 Sep. 12
Sample Identification: Zone 1 Control
Sample ID #: 2090380 - 2/2

Nutrients	Dry wt.	As Rcvd.	units
Total Nitrogen:	1.4	0.78	%
Ammonia (NH_4-N):	1800	1100	mg/kg
Nitrate (NO_3-N):	16	9.3	mg/kg
Org. Nitrogen (Org.-N):	1.2	0.69	%
Phosphorus (as P_2O_5):	0.57	0.33	%
Phosphorus (P):	2500	1400	mg/kg
Potassium (as K_2O):	1.2	0.70	%
Potassium (K):	10000	5900	mg/kg
Calcium (Ca):	2.0	1.2	%
Magnesium (Mg):	0.42	0.24	%
Sulfate (SO_4-S):	2500	1400	mg/kg
Boron (Total B):	32	18	mg/kg
Moisture:	0	42.3	%
Sodium (Na):	0.12	0.067	%
Chloride (Cl):	0.27	0.15	%
pH Value:	NA	5.72	unit
Bulk Density :	22	38	lb/cu ft
Carbonates ($CaCO_3$):	<0.1	<0.1	lb/ton
Conductivity (EC5):	11	NA	mmhos/cm
Organic Matter:	44.9	25.9	%
Organic Carbon:	24.0	14.0	%
Ash:	55.1	31.8	%
C/N Ratio	18	18	ratio
AgIndex	8	8	ratio

Stability Indicator:		Biologically
CO2 Evolution	Respirometery	Available C
mg CO_2-C/g OM/day	9.1	12
mg CO_2-C/g TS/day	4.1	5.3
Stability Rating	*unstable*	*unstable*

Maturity Indicator: Cucumber Bioassay		
Compost:Vermiculite(v:v)	1:1	1:3
Emergence (%)	100	100
Seedling Vigor (%)	92	93
Description of Plants	*fungus*	*fungus*

Pathogens	Results	Units	Rating
Fecal Coliform	< 2.0	MPN/g	*pass*
Salmonella	< 3	MPN/4g	*pass*

Date Tested: 14 Sep. 12

Inerts	% by weight
Plastic	< 0.5
Glass	< 0.5
Metal	< 0.5
Sharps	ND

Metals	Dry wt.	EPA Limit	units
Aluminum (Al)	6600	-	mg/kg
Arsenic (As):	3.6	41	mg/kg
Cadmium (Cd):	< 1.0	39	mg/kg
Chromium (Cr):	15	1200	mg/kg
Cobalt (Co)	3.5	-	mg/kg
Copper (Cu):	53	1500	mg/kg
Iron (Fe):	9000	-	mg/kg
Lead (Pb):	22	300	mg/kg
Manganese (Mn):	210	-	mg/kg
Mercury (Hg):	< 1.0	17	mg/kg
Molybdenum (Mo):	2.3	75	mg/kg
Nickel (Ni):	10	420	mg/kg
Selenium (Se):	< 1.0	36	mg/kg
Zinc (Zn):	170	2800	mg/kg

Size & Volume Distribution

MM	% by weight	% by volume	BD g/cc
> 50	0.0	0.0	0.00
25 to 50	0.0	0.0	0.00
16 to 25	0.0	0.0	0.00
9.5 to 16	2.2	1.6	0.47
6.3 to 9.5	3.9	4.6	0.29
4.0 to 6.3	9.3	11.7	0.27
2.0 to 4.0	18.3	24.8	0.25
< 2.0	66.3	57.4	0.39

Bulk Density Description:<.35 Light Materials, .35-.60 medium weight materials, >.60 Heavy Materials

Analyst: Assaf Sadeh

[redacted]

*Sample was received and handled in accordance with TMECC procedures.

Account No.:
2090380 - 2/2 - 6908
Group: Sep.12 B No. 28

Date Received 14 Sep. 12
Sample i.d. Zone 1 Control
Sample I.d. No. 2/2 2090380

INTERPRETATION:

Page one of three

Is Your Compost Stable?

Respiration Rate Biodegradation Rate of Your Pile
9.1 mg CO2-C/ g OM/day

```
+++++++++++++++++++++++++++++++++++
< Stable          >|<Moderately Unstable>|<          Unstable          >|< High For Mulch
```

Biologically Available Carbon (BAC) Optimum Degradation Rate
12 mg CO2-C/ g OM/day

```
+++++++++++++++++++++++++++++++++++++++++++++++
< Stable          >|<Moderately Unstable>|<          Unstable          >|< High For Mulch
```

Is Your Compost Mature?

AmmoniaN/NitrateN ratio
110 Ratio

```
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
VeryMature>|<               Mature                              >|<   Immature
```

Ammonia N ppm
1800 mg/kg dry wt.

```
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
VeryMature>|<               Mature                         >|<   Immature
```

Nitrate N ppm
16 mg/kg dry wt.

```
++++++++++++
<   Immature                              >|<  Mature
```

pH value
5.72 units

```
+++++++++++++++++++++++++++++++++++++++++++++
<   Immature                                              >|< Mature       >|< Immature
```

Cucumber Emergence
100.0 percent

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
<  Immature                                                          >|< Mature
```

Is Your Compost Safe Regarding Health?

Fecal Coliform
< 1000 MPN/g dry wt.

```
+++++++++
< Safe                                        >|< High Fecal Coliform
```

Salmonella
Less than 3 /4g dry wt.

```
+++++++
<Safe   (none detected)                   >|< High Salmonella Count(> 3 per 4 grams)
```

Metals US EPA 503
Pass dry wt.

```
+++++++++
<All Metals Pass                          >|< One or more Metals Fail
```

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)
3.2 Percent dry wt.

```
+++++++++++++++++++++++++
<Low          >|< Average              >|< High Nutrient Content
```

AgIndex (Nutrients / Sodium and Chloride Salts) ((N+P2O5+K2O) / (Na + Cl))
8 Ratio

```
++++++++++++++++++++++++++++++++++++++++++
Na & Cl   >|<  Nutrient and Sodium and Chloride Provider       >|<  Nutrient Provider
```

Plant Available Nitrogen (PAN) Estimated release for first season
8 lbs/ton wet wt.

```
+++++++++++++++++++++++++++++++++
Low Nitrogen Provider>|<     Average Nitrogen Provider          >|<High Nitrogen Provider
```

C/N Ratio
18 Ratio

```
+++++++++++++++++++++++++++++++++++
< Nitrogen Release >|< N-Neutral >|< N Demand>|< High Nitrogen Demand
```

Soluble Available Nutrients & Salts (EC5 w/w dw)
11 mmhos/cm dry wt.

```
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++
SloRelease>|<  Average Nutrient Release Rate     >|<High Available Nutrients
```

Lime Content (CaCO3)
0 Lbs/ton dry wt.

```
+
< Low  >|<           Average           >|<  High  Lime Content (as CaCO3)
```

What are the physical properties of your compost?

Percent Ash
55.1 Percent dry wt.

```
+++++++++++++++++++++++++++++++++++++++++++
<  High Organic Matter          >|<   Average              >|<  High Ash Content
```

Sieve Size % > 6.3 MM (0.25")
6.1 Percent dry wt.

```
++++++++++++++++++++++++++++++++++++++++++++++++
All Uses          >|< Size May Restrict Uses for Potting mix and Golf Courses
```

Account No.:		Date Received	14 Sep. 12
2090380 - 2/2 - 6908		Sample i.d.	Zone 1 Control
Group:	Sep.12 B No. 28	Sample I.d. No.	2/2 2090380

INTERPRETATION:

Is Your Compost Stable?

Respiration Rate

9.1 Moderate-selected use mg CO2-C/g OM/day

The respiration rate is a measurement of the biodegradation rate of the organic matter in the sample (as received). The respiration rate is determined by measuring the rate at which CO2 is released under optimized moisture and temperature conditions.

Biologically Available Carbon

12 Moderate-selected use mg CO2-C/g OM/day

Biologically Available Carbon (BAC) is a measurement of the rate at which CO2 is released under optimized moisture, temperature, porosity, nutrients, pH and microbial conditions. If both the RR and the BAC test values are close to the same value, the pile is optimized for composting. If both values are high the compost pile just needs more time. If both values are low the compost has stabilized and should be moved to curing. BAC test values that are higher than RR indicate that the compost pile has stalled. This could be due to anaerobic conditions, lack of available nitrogen due to excessive air converting ammonia to the unavailable nitrate form, lack of nitrogen or other nutrients due to poor choice of feedstock, pH value out of range, or microbes rendered non-active.

Is Your Compost Mature?

AmmoniaN:NitrateN ratio

110 immature

Ammonia N ppm

1800 immature

Nitrate N ppm

16 immature

pH value

5.72 immature

Composting to stabilize carbon can occur at such a rapid rate that sometimes phytotoxins remain in the compost and must be neutralized before using in high concentrations or in high-end uses. This step is called curing. Typically ammonia is in excess with the break-down of organic materials resulting in an increase in pH. This combination results in a loss of volatile ammonia (it smells). Once this toxic ammonia has been reduced and the pH drops, the microbes convert the ammonia to nitrates. A low ammonia + high nitrate score is indicative of a mature compost, however there are many exceptions. For example, a compost with a low pH (<7) will retain ammonia, while a compost with high lime content can lose ammonia before the organic fraction becomes stable. Composts must first be stable before curing indicators apply.

Cucumber Bioassay

100.0 Percent Cucumbers are chosen for this test because they are salt tolerant and very sensitive to ammonia and organic acid toxicity. Therefore, we can germinate seeds in high concentrations of compost to measure phytotoxic effects without soluble salts being the limiting factor. Values above 80% for both percent emergence and vigor are indicative of a well-cured compost. Exceptions include very high salts that affect the cucumbers, excessive concentrations of nitrates and other nutrients that will be in range when formulated to make a growing media. In addition to testing a 1:1 compost: vermiculite blend, we also test a diluted 1:3 blend to indicate a more sensitive toxicity level.

Is Your Compost Safe Regarding Health?

Fecal Coliform

< 1000 / g dry wt. Fecal coliforms can survive in both aerobic and anaerobic conditions and is common in all initial compost piles. Most human pathogens occur from fecal matter and all fecal matter is loaded in fecal coliforms. Therefore fecal coliforms are used as an indicator to determine if the chosen method for pathogen reduction (heat for compost) has met the requirements of sufficient temperature, time and mixing. If the fecal coliforms are reduced to below 1000 per gram dry wt. it is assumed all others pathogens are eliminated. Potential problems are that fecal coliform can regrow during the curing phase or during shipping. This is because the conditions are now more favorable for growth than during the composting process.

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Pass The ten heavy metals listed in the EPA 503 regulations are chosen to determine if compost can be applied to ag land and handled without toxic effects. Most high concentrations of heavy metals are derived from woodwaste feedstock such as chrome-arsenic treated or lead painted demolition wood. Biosolids are rarely a problem.

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Account No.:
2090380 - 2/2 - 6908
Group: Sep.12 B No. 28

Date Received 14 Sep. 12
Sample i.d. Zone 1 Control
Sample I.d. No. 2/2 2090380

INTERPRETATION:

AgIndex (Nutrients/Na+Cl)

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18 Indicates immaturity As a guiding principal, a C/N ratio below 14 indicates maturity and above 14 indicates immaturity, however, there are many exceptions. Large woodchips (>6.3mm), bark, and redwood are slow to breakdown and therefore can result in a relatively stable product while the C/N ratio value is high. Additionally, some composts with chicken manure and/or green grass feedstocks can start with a C/N ratio below 15 and are very unstable. A C/N ratio below 10 supplies Nitrogen, while a ratio above 20 can deplete Nitrogen from the soil. The rate at which Nitrogen will be released or used by the microbes is indicated by the respiration rate (BAC). If the respiration rate is too high the transfer of Nitrogen will not be controlable.

Soluble Nutrients & Salts (EC5 w/w dw - mmhos/cm)

11 High salts This value refers to all soluble ions including nutrients, sodium, chloride and some soluble organic compounds. The concentration of salts will change due to the release of salts from the organic matter as it degrades, volatilization of ammonia, decomposition of soluble organics, and conversion of molecular structure. High salts + high AgIndex is indicative of a compost high in readily available nutrients. The application rate of these composts should be limited by the optimum nutrient value based on soil analysis of the receiving soil. High Salts + low AgIndex is indicative of a compost low in nutrients with high concentrations of sodium and/or chloride. Limit the application rate according to the toxicity level of thesodium and/or chloride. Low salts indicates that the compost can be applied without risking salt toxicity, is likely a good source of organic matter, and that nutrients will release slowly over time.

Lime Content (lbs. per ton)

0 Low lime content Compost high in lime or carbonates are often those produced from chicken manure (layers) ash materials, and lime products. These are excellent products to use on a receiving soil where lime has been recommended by soil analysis to raise the pH. Composts with a high lime content should be closely considered for pH requirements when formulating potting mixes.

Physical Properties

Percent Ash

55.1 Average ash content Ash is the non-organic fraction of a compost. Most composts contain approximately 50% ash (dry weight basis). Compost can be high in ash content for many reasons including: excess minerilzation(old compost), contamination with soil base material during turning, poor quality feedstock, and soil or mineral products added. Finding the source and reducing high ash content is often the fastest means to increasing nutrient quality of a compost.

Particle Size % > 6.3 MM (0.25")

6.1 May restrict use Large particles may restrict use for potting soils, golf course topdressings, seed-starter mixes, and where a fine size distribution is required. Composts with large particles can still be used as excellent additions to field soils, shrub mixes and mulches.

Particle Size Distribution

Each size fraction is measured by weight, volume and bulk density. These results are particularly relevent with decisions to screen or not, and if screening, which size screen to use. The bulk density indicates if the fraction screened is made of light weight organic material or heavy mineral material. Removing large mineral material can greatly improve compost quality by increasing nutrient and organic concentrations.

Appendix:

Plant Available Nitrogen (PAN) calculations:
PAN = (X * (organic N)) + ((NH4-N) + (NO3-N))
X value = If BAC < 2 then X = 0.1
If BAC =2.1 to 5 then X = 0.2
If BAC =5.1 to 10 then X = 0.3
If BAC > 10 then X = 0.4
Note: If C/N ratio > 15 additional N should be applied.

Estimated available nutrients for use when calculating application rates	lbs/ton (As Rcvd.)
Plant Available Nitrogen (PAN)	8.4
Ammonia (NH4-N)	2.20
Nitrate (NO3-N)	0.02
Available Phosphorus (P2O5*0.64)	4.1
Available Potassium (K2O)	14.2

US COMPOSTING COUNCIL

Seal of Testing Assurance

Date Sampled/Received: 12 Sep. 12 / 14 Sep. 12

TCCBI - Harvest Power
John Jones
24487 Rd. 140
Tulare
CA 93274

Product Identification Compost
Zone 2

COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 *tel:* 831.724.5422 *fax:* 831.724.3188

Compost Parameters	*Reported as (units of measure)*	*Test Results*	*Test Results*
Plant Nutrients:	%, weight basis	Not reported	Not reported
Moisture Content	%, wet weight basis	37.8	
Organic Matter Content	%, dry weight basis	46.5	
pH	units	6.20	
Soluble Salts *(electrical conductivity EC_5)*	dS/m (mmhos/cm)	7.4	
Particle Size or Sieve Size	maxium aggregate size, inches	0.64	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	7.9	Moderately Un-Stable
	mg CO_2-C/g TS/day	3.7	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	91.7	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Pass	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg* Mo,Ni,Se,Zn

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Laboratory Group: Sep.12 B

Laboratory Number: 2090381-1/2

Analyst: Assaf Sadeh [redacted]

www.compostlab.com

US COMPOSTING COUNCIL

Seal of Testing Assurance

Date Sampled/Received: 12 Sep. 12 / 14 Sep. 12

TCCBI - Harvest Power
John Jones
24487 Rd. 140
Tulare
CA 93274

Product Identification	Compost
Zone 2	

COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 *tel:* 831.724.5422 *fax:* 831.724.3188

Compost Parameters	*Reported as (units of measure)*	*Test Results*	*Test Results*
Plant Nutrients:	%, weight basis	%, wet weight basis	%, dry weight basis
Nitrogen	Total N	0.99	1.6
Phosphorus	P_2O_5	0.39	0.64
Potassium	K_2O	0.89	1.4
Calcium	Ca	1.3	2.1
Magnesium	Mg	0.30	0.48
Moisture Content	%, wet weight basis	37.8	
Organic Matter Content	%, dry weight basis	46.5	
pH	units	6.20	
Soluble Salts *(electrical conductivity EC_5)*	dS/m (mmhos/cm)	7.4	
Particle Size or Sieve Size	% under 9.5 mm, dw basis	94.7	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	7.9	Moderately Un-Stable
	mg CO_2-C/g TS/day	3.7	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	91.7	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Pass	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg*
			Mo,Ni,Se,Zn

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Laboratory Group: Sep.12 B

Laboratory Number: 2090381-1/2

Analyst: Assaf Sadeh

[redacted]

www.compostlab.com

US COMPOSTING COUNCIL

Seal of Testing Assurance

Caltrans

TCCBI - Harvest Power
John Jones
24487 Rd. 140
Tulare CA 93274

Product Identification:
Zone 2

Date Sampled/Received: 12 Sep. 12 / 14 Sep. 12

COMPOST TECHNICAL DATA SHEET for Caltrans

LABORATORY: Soil Control Lab, 42 Hangar Way, Watsonville, CA 95076 tel (831) 724-5422 fax (831) 724-3188 www.compostlab.com

Compost Parameters	*Test Results*	*Reported as* *(units of measure)*	*TMECC Test Method*
pH	6.20	Unitless	04.11-A 1:5 Slurry pH
Soluble Salts (electrical conductivity)	7.4	dS/m (mmhos/cm)	04.10-A 1:5 Slurry Method Mass Basis
Moisture content	37.8	%, wet weight basis	03.09-A - Total Solids and Moisture
Organic Matter Content	46.5	%, dry weight basis	05.07-A Loss-on-Ignition Organic Matter Method (LOI)
Maturity Indicator (bioassay)			
Percent Emergence	100.0	average % of control	05.05-A Germination and vigor
Relative Seedling Vigor	91.7	average % of control	
Stability Indicator	7.9	mg CO2-C/g OM/day	05.08-B Carbon Dioxide Evoultion Rate
Particle Size	94.7	%, dry weight passing through 9.5 mm	02.02-B Sample Sieving for Aggregate Size Classification
Pathogens	Pass	PASS/FAIL: Per US EPA Class A standard. 40 CFR 503.32(a)	07.01-B Fecal coliforms
Pathogens	Pass	PASS/FAIL: Per US EPA Class A standard, 40 CFR 503.32(a)	07.02 Samonella
Physical Contaminants	None Detected	%, dry weight basis	02.02-C - Man-Made Inerts Total content
Physical Contaminants	None Detected	%, dry weight basis	02.02-C - Man-Made Inerts Sharps content
Heavy Metals Content	Pass	PASS/FAIL: Per US EPA Class A 40 CFR 503.13, tables 1 and 3.	04.06-Heavy Metals standard, and Hazardous Elements

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

For additional information pertaining to compost use, the specific compost parameters tested for within the Seal of Testing assurance Program, or the program in general, log on to the US Composting Council's TMECC web-site at http://www.tmecc.org.

This compost product has been sampled and tested as required by the Seal of Testing assurance Program on the United States Composting Council (USCC), using certain methods from the "Test Methods for the Examination of Compost and Composting" manual. Test results are available upon request by contacting the compost producer (address at top of page). The USCC makes no warranties regarding this product or its content, quality, or suitability for any particular use.

Laboratory Group: Sep.12 B
Laboratory Number: 2090381-1/2

Analyst: Assaf Sadeh [redacted]

www.compostlab.com

ANALYTICAL CHEMISTS
and
BACTERIOLOGISTS
Approved by State of California

SOIL CONTROL LAB

42 HANGAR WAY
WATSONVILLE
CALIFORNIA
95076
USA

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com

Account #: 2090381-1/2-6908
Group: Sep.12 B #29
Reporting Date: September 26, 2012

TCCBI - Harvest Power
24487 Rd. 140
Tulare, CA 93274
Attn: John Jones

Date Received: 14 Sep. 12
Sample Identification: Zone 2
Sample ID #: 2090381 - 1/2

Nutrients	Dry wt.	As Rcvd.	units
Total Nitrogen:	1.6	0.99	%
Ammonia (NH_4-N):	1200	760	mg/kg
Nitrate (NO_3-N):	38	24	mg/kg
Org. Nitrogen (Org.-N):	1.5	0.93	%
Phosphorus (as P_2O_5):	0.63	0.39	%
Phosphorus (P):	2800	1700	mg/kg
Potassium (as K_2O):	1.4	0.89	%
Potassium (K):	12000	7400	mg/kg
Calcium (Ca):	2.1	1.3	%
Magnesium (Mg):	0.48	0.30	%
Sulfate (SO_4-S):	1000	620	mg/kg
Boron (Total B):	34	21	mg/kg
Moisture:	0	37.8	%
Sodium (Na):	0.13	0.080	%
Chloride (Cl):	0.26	0.16	%
pH Value:	NA	6.20	unit
Bulk Density :	22	36	lb/cu ft
Carbonates ($CaCO_3$):	<0.1	<0.1	lb/ton
Conductivity (EC5):	7.4	NA	mmhos/cm
Organic Matter:	46.5	28.9	%
Organic Carbon:	27.0	17.0	%
Ash:	53.5	33.2	%
C/N Ratio	17	17	ratio
AgIndex	9	9	ratio

Stability Indicator:		Biologically
CO2 Evolution	Respirometery	Available C
mg CO_2-C/g OM/day	7.9	9.5
mg CO_2-C/g TS/day	3.7	4.4
Stability Rating	*moderately unstable*	*unstable*

Maturity Indicator: Cucumber Bioassay		
Compost:Vermiculite(v:v)	1:1	1:3
Emergence (%)	100	100
Seedling Vigor (%)	92	93
Description of Plants	*mushroom*	*mushroom*

Pathogens	Results	Units	Rating
Fecal Coliform	< 2.0	MPN/g	*pass*
Salmonella	< 3	MPN/4g	*pass*

Date Tested: 14 Sep. 12

Inerts	% by weight
Plastic	< 0.5
Glass	< 0.5
Metal	< 0.5
Sharps	ND

Metals	Dry wt.	EPA Limit	units
Aluminum (Al)	6300	-	mg/kg
Arsenic (As):	2.8	41	mg/kg
Cadmium (Cd):	< 1.0	39	mg/kg
Chromium (Cr):	14	1200	mg/kg
Cobalt (Co)	3.7	-	mg/kg
Copper (Cu):	61	1500	mg/kg
Iron (Fe):	9300	-	mg/kg
Lead (Pb):	20	300	mg/kg
Manganese (Mn):	230	-	mg/kg
Mercury (Hg):	< 1.0	17	mg/kg
Molybdenum (Mo):	2.7	75	mg/kg
Nickel (Ni):	12	420	mg/kg
Selenium (Se):	< 1.0	36	mg/kg
Zinc (Zn):	170	2800	mg/kg

Size & Volume Distribution

MM	% by weight	% by volume	BD g/cc
> 50	0.0	0.0	0.00
25 to 50	0.0	0.0	0.00
16 to 25	0.0	0.0	0.00
9.5 to 16	5.3	3.1	0.66
6.3 to 9.5	9.8	10.8	0.34
4.0 to 6.3	8.8	10.8	0.31
2.0 to 4.0	14.4	21.5	0.25
< 2.0	61.6	53.8	0.43

Bulk Density Description:<.35 Light Materials, .35-.60 medium weight materials, >.60 Heavy Materials

Analyst: Assaf Sadeh

[redacted]

*Sample was received and handled in accordance with TMECC procedures.

Account No.:
2090381 - 1/2 - 6908
Group: Sep.12 B No. 29

Date Received 14 Sep. 12
Sample i.d. Zone 2
Sample I.d. No. 1/2 2090381

INTERPRETATION:

Page one of three

Is Your Compost Stable?

Respiration Rate Biodegradation Rate of Your Pile
7.9 mg CO2-C/ g OM/day
+++++++++++++++++++++++++++++++
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch

Biologically Available Carbon (BAC) Optimum Degradation Rate
9.5 mg CO2-C/ g OM/day
+++++++++++++++++++++++++++++++++++++
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch

Is Your Compost Mature?

AmmoniaN/NitrateN ratio
32 Ratio
+++
VeryMature>|< Mature >|< Immature

Ammonia N ppm
1200 mg/kg dry wt.
+++
VeryMature>|< Mature >|< Immature

Nitrate N ppm
38 mg/kg dry wt.
++++++++++++++++++++++++++++++
< Immature >|< Mature

pH value
6.20 units
++
< Immature >|< Mature >|< Immature

Cucumber Emergence
100.0 percent
++
< Immature >|< Mature

Is Your Compost Safe Regarding Health?

Fecal Coliform
< 1000 MPN/g dry wt.
+++++++
< Safe >|< High Fecal Coliform

Salmonella
Less than 3 /4g dry wt.
+++++++
<Safe (none detected) >|< High Salmonella Count(> 3 per 4 grams)

Metals US EPA 503
Pass dry wt.
+++++++++
<All Metals Pass >|< One or more Metals Fail

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)
3.7 Percent dry wt.
+++++++++++++++++++++++++++++
<Low >|< Average >|< High Nutrient Content

AgIndex (Nutrients / Sodium and Chloride Salts) ((N+P2O5+K2O) / (Na + Cl))
9 Ratio
+++
Na & Cl >|< Nutrient and Sodium and Chloride Provider >|< Nutrient Provider

Plant Available Nitrogen (PAN) Estimated release for first season
8 lbs/ton wet wt.
++++++++++++++++++++++++++++++
Low Nitrogen Provider>|< Average Nitrogen Provider >|<High Nitrogen Provider

C/N Ratio
17 Ratio
+++++++++++++++++++++++++++++++++
< Nitrogen Release >|< N-Neutral >|< N-Demand>|< High Nitrogen Demand

Soluble Available Nutrients & Salts (EC5 w/w dw)
7.4 mmhos/cm dry wt.
++++++++++++++++++++++++++++++++++++++
SloRelease>|< Average Nutrient Release Rate >|<High Available Nutrients

Lime Content (CaCO3)
0 Lbs/ton dry wt.
+
< Low >|< Average >|< High Lime Content (as CaCO3)

What are the physical properties of your compost?

Percent Ash
53.5 Percent dry wt.
++
< High Organic Matter >|< Average >|< High Ash Content

Sieve Size % > 6.3 MM (0.25")
15.2 Percent dry wt.
+++
All Uses >|< Size May Restrict Uses for Potting mix and Golf Courses

Account No.:
2090381 - 1/2 - 6908
Group: Sep.12 B No. 29

Date Received 14 Sep. 12
Sample i.d. Zone 2
Sample I.d. No. 1/2 2090381

INTERPRETATION:

Is Your Compost Stable?

Respiration Rate

7.9 Moderate-selected use mg CO2-C/g OM/day

The respiration rate is a measurement of the biodegradation rate of the organic matter in the sample (as received). The respiration rate is determined by measuring the rate at which CO2 is released under optimized moisture and temperature conditions.

Biologically Available Carbon

9.5 Moderate-selected use mg CO2-C/g OM/day

Biologically Available Carbon (BAC) is a measurement of the rate at which CO2 is released under optimized moisture, temperature, porosity, nutrients, pH and microbial conditions. If both the RR and the BAC test values are close to the same value, the pile is optimized for composting. If both values are high the compost pile just needs more time. If both values are low the compost has stabilized and should be moved to curing. BAC test values that are higher than RR indicate that the compost pile has stalled. This could be due to anaerobic conditions, lack of available nitrogen due to excessive air converting ammonia to the unavailable nitrate form, lack of nitrogen or other nutrients due to poor choice of feedstock, pH value out of range, or microbes rendered non-active.

Is Your Compost Mature?

AmmoniaN:NitrateN ratio

32 immature

Ammonia N ppm

1200 immature

Nitrate N ppm

38 immature

pH value

6.20 immature

Composting to stabilize carbon can occur at such a rapid rate that sometimes phytotoxins remain in the compost and must be neutralized before using in high concentrations or in high-end uses. This step is called curing. Typically ammonia is in excess with the break-down of organic materials resulting in an increase in pH. This combination results in a loss of volatile ammonia (it smells). Once this toxic ammonia has been reduced and the pH drops, the microbes convert the ammonia to nitrates. A low ammonia + high nitrate score is indicative of a mature compost, however there are many exceptions. For example, a compost with a low pH (<7) will retain ammonia, while a compost with high lime content can lose ammonia before the organic fraction becomes stable. Composts must first be stable before curing indicators apply.

Cucumber Bioassay

100.0 Percent

Cucumbers are chosen for this test because they are salt tolerant and very sensitive to ammonia and organic acid toxicity. Therefore, we can germinate seeds in high concentrations of compost to measure phytotoxic effects without soluble salts being the limiting factor. Values above 80% for both percent emergence and vigor are indicative of a well-cured compost. Exceptions include very high salts that affect the cucumbers, excessive concentrations of nitrates and other nutrients that will be in range when formulated to make a growing media. In addition to testing a 1:1 compost: vermiculite blend, we also test a diluted 1:3 blend to indicate a more sensitive toxicity level.

Is Your Compost Safe Regarding Health?

Fecal Coliform

< 1000 / g dry wt. Fecal coliforms can survive in both aerobic and anaerobic conditions and is common in all initial compost piles. Most human pathogens occur from fecal matter and all fecal matter is loaded in fecal coliforms. Therefore fecal coliforms are used as an indicator to determine if the chosen method for pathogen reduction (heat for compost) has met the requirements of sufficient temperature, time and mixing. If the fecal coliforms are reduced to below 1000 per gram dry wt. it is assumed all others pathogens are eliminated. Potential problems are that fecal coliform can regrow during the curing phase or during shipping. This is because the conditions are now more favorable for growth than during the composting process.

Salmonella Bacteria

Less than 3 3 / 4g dry wt. Salmonella is not only another indicator organism but also a toxic microbe. It has been used in the case of biosolids industry to determine adequate pathogen reduction.

Metals

Pass The ten heavy metals listed in the EPA 503 regulations are chosen to determine if compost can be applied to ag land and handled without toxic effects. Most high concentrations of heavy metals are derived from woodwaste feedstock such as chrome-arsenic treated or lead painted demolition wood. Biosolids are rarely a problem.

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)

3.7 Average nutrient content

This value Is the sum of the primary nutrients Nitrogen, Phosphorus and Potassium. Reported units are consistent with those found on fertilizer formulations. A sum greater than 5 is indicative of a compost with high nutrient content, and best used to supply nutrients to a receiving soil. A sum below 2 indicates low nutrient content, and is best-used to improve soil structure via the addition of organic matter. Most compost falls between 2 and 5.

Account No.:		Date Received	14 Sep. 12	
2090381 - 1/2 - 6908		Sample i.d.	Zone 2	
Group:	Sep.12 B No. 29	Sample I.d. No.	1/2	2090381

INTERPRETATION:

AgIndex (Nutrients/Na+Cl)

9 Average nutrient ratio Composts with low AgIndex values have high concentrations of sodium and/or chloride compared to nutrients. Repeated use of a compost with a low AgIndex (< 2) may result in sodium and/or chloride acting as the limiting factor compared to nutrients, governing application rates. These composts may be used on well-draining soils and/or with salt-tolerant plants. Additional nutrients form another source may be needed if the application rate is limited by sodium or chloride. If the AgIndex is above 10, nutrients optimal for plant growth will be available without concern of sodium and/or chloride toxicity. Composts with an AgIndex of above 10 are good for increasing nutrient levels for all soils. Most composts score between 2 and 10. Concentrations of nutrients, sodium, and chloride in the receiving soil should be considered when determining compost application rates. The AgIndex is a product of feedstock quality. Feedstock from dairy manure, marine waste, industrial wastes, and halophytic plants are likely to produce a finished compost with a low AgIndex.

Plant Available Nitrogen (lbs/ton)

8 Average N Provider Plant Available Nitrogen (PAN) is calculated by estimating the release rate of Nitrogen from the organic fraction of the compost. This estimate is based on information gathered from the BAC test and measured ammonia and nitrate values. Despite the PAN value of the compost, additional sources of Nitrogen may be needed during he growing season to off-set the Nitrogen demand of the microbes present in the compost. With ample nutrients these microbes can further breakdown organic matter in the compost and release bound Nitrogen. Nitrogen demand based on a high C/N ratio is not considered in the PAN calculation because additional Nitrogen should always be supplemented to the receiving soil when composts with a high C/N ratio are applied.

C/N Ratio

17 Indicates immaturity As a guiding principal, a C/N ratio below 14 indicates maturity and above 14 indicates immaturity, however, there are many exceptions. Large woodchips (>6.3mm), bark, and redwood are slow to breakdown and therefore can result in a relatively stable product while the C/N ratio value is high. Additionally, some composts with chicken manure and/or green grass feedstocks can start with a C/N ratio below 15 and are very unstable. A C/N ratio below 10 supplies Nitrogen, while a ratio above 20 can deplete Nitrogen from the soil. The rate at which Nitrogen will be released or used by the microbes is indicated by the respiration rate (BAC). If the respiration rate is too high the transfer of Nitrogen will not be controlable.

Soluble Nutrients & Salts (EC5 w/w dw - mmhos/cm)

7.4 Average salts This value refers to all soluble ions including nutrients, sodium, chloride and some soluble organic compounds. The concentration of salts will change due to the release of salts from the organic matter as it degrades, volatilization of ammonia, decomposition of soluble organics, and conversion of molecular structure. High salts + high AgIndex is indicative of a compost high in readily available nutrients. The application rate of these composts should be limited by the optimum nutrient value based on soil analysis of the receiving soil. High Salts + low AgIndex is indicative of a compost low in nutrients with high concentrations of sodium and/or chloride. Limit the application rate according to the toxicity level of thesodium and/or chloride. Low salts indicates that the compost can be applied without risking salt toxicity, is likely a good source of organic matter, and that nutrients will release slowly over time.

Lime Content (lbs. per ton)

0 Low lime content Compost high in lime or carbonates are often those produced from chicken manure (layers) ash materials, and lime products. These are excellent products to use on a receiving soil where lime has been recommended by soil analysis to raise the pH. Composts with a high lime content should be closely considered for pH requirements when formulating potting mixes.

Physical Properties

Percent Ash

53.5 Average ash content Ash is the non-organic fraction of a compost. Most composts contain approximately 50% ash (dry weight basis). Compost can be high in ash content for many reasons including: excess minerilzation(old compost), contamination with soil base material during turning, poor quality feedstock, and soil or mineral products added. Finding the source and reducing high ash content is often the fastest means to increasing nutrient quality of a compost.

Particle Size % > 6.3 MM (0.25")

15.2 May restrict use Large particles may restrict use for potting soils, golf course topdressings, seed-starter mixes, and where a fine size distribution is required. Composts with large particles can still be used as excellent additions to field soils, shrub mixes and mulches.

Particle Size Distribution

Each size fraction is measured by weight, volume and bulk density. These results are particularly relevent with decisions to screen or not, and if screening, which size screen to use. The bulk density indicates if the fraction screened is made of light weight organic material or heavy mineral material. Removing large mineral material can greatly improve compost quality by increasing nutrient and organic concentrations.

Appendix:

Plant Available Nitrogen (PAN) calculations:
PAN = (X * (organic N)) + ((NH4-N) + (NO3-N))
X value = If BAC < 2 then X = 0.1
If BAC =2.1 to 5 then X = 0.2
If BAC =5.1 to 10 then X = 0.3
If BAC > 10 then X = 0.4
Note: If C/N ratio > 15 additional N should be applied.

Estimated available nutrients for use when calculating application rates

	lbs/ton (As Rcvd.)
Plant Available Nitrogen (PAN)	7.7
Ammonia (NH4-N)	1.52
Nitrate (NO3-N)	0.05
Available Phosphorus (P2O5*0.64)	4.9
Available Potassium (K2O)	17.8

US COMPOSTING COUNCIL

Seal of Testing Assurance

Date Sampled/Received: 12 Sep. 12 / 14 Sep. 12

TCCBI - Harvest Power
John Jones
24487 Rd. 140
Tulare
CA 93274

Product Identification	Compost
Zone 2 Control	

COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 *tel:* 831.724.5422 *fax:* 831.724.3188

Compost Parameters	***Reported as** (units of measure)*	***Test Results***	***Test Results***
Plant Nutrients:	%, weight basis	Not reported	Not reported
Moisture Content	%, wet weight basis	39.8	
Organic Matter Content	%, dry weight basis	42.6	
pH	units	6.32	
Soluble Salts *(electrical conductivity EC_5)*	dS/m (mmhos/cm)	9.7	
Particle Size or Sieve Size	maxium aggregate size, inches	0.64	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	10	Un-Stable
	mg CO_2-C/g TS/day	4.3	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	91.7	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Pass	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg*
			Mo,Ni,Se,Zn

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Laboratory Group:	Sep.12 B	Laboratory Number:	2090381-2/2
Analyst: Assaf Sadeh	[redacted]	www.compostlab.com	

US COMPOSTING COUNCIL

Seal of Testing Assurance

TCCBI - Harvest Power
John Jones
24487 Rd. 140
Tulare
CA 93274

Product Identification Compost	
Zone 2 Control	

Date Sampled/Received: 12 Sep. 12 / 14 Sep. 12

COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 *tel:* 831.724.5422 *fax:* 831.724.3188

Compost Parameters	***Reported as*** *(units of measure)*	***Test Results***	***Test Results***
Plant Nutrients:	%, weight basis	%, wet weight basis	%, dry weight basis
Nitrogen	Total N	0.80	1.3
Phosphorus	P_2O_5	0.34	0.55
Potassium	K_2O	0.79	1.3
Calcium	Ca	1.6	2.6
Magnesium	Mg	0.26	0.43
Moisture Content	%, wet weight basis	39.8	
Organic Matter Content	%, dry weight basis	42.6	
pH	units	6.32	
Soluble Salts *(electrical conductivity EC_5)*	dS/m (mmhos/cm)	9.7	
Particle Size or Sieve Size	% under 9.5 mm, dw basis	99.1	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	10	Un-Stable
	mg CO_2-C/g TS/day	4.3	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	91.7	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Pass	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg* Mo,Ni,Se,Zn

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Laboratory Group: Sep.12 B

Laboratory Number: 2090381-2/2

Analyst: Assaf Sadeh [redacted]

www.compostlab.com

US COMPOSTING COUNCIL

Seal of Testing Assurance

Caltrans

TCCBI - Harvest Power
John Jones
24487 Rd. 140
Tulare CA 93274

Product Identification:
Zone 2 Control

Date Sampled/Received: 12 Sep. 12 / 14 Sep. 12

COMPOST TECHNICAL DATA SHEET for Caltrans

LABORATORY: Soil Control Lab, 42 Hangar Way, Watsonville, CA 95076 tel (831) 724-5422 fax (831) 724-3188 www.compostlab.com

Compost Parameters	*Test Results*	*Reported as (units of measure)*	*TMECC Test Method*
pH	6.32	Unitless	04.11-A 1:5 Slurry pH
Soluble Salts (electrical conductivity)	9.7	dS/m (mmhos/cm)	04.10-A 1:5 Slurry Method Mass Basis
Moisture content	39.8	%, wet weight basis	03.09-A - Total Solids and Moisture
Organic Matter Content	42.6	%, dry weight basis	05.07-A Loss-on-Ignition Organic Matter Method (LOI)
Maturity Indicator (bioassay)			
Percent Emergence	100.0	average % of control	05.05-A Germination and vigor
Relative Seedling Vigor	91.7	average % of control	
Stability Indicator	10	mg CO2-C/g OM/day	05.08-B Carbon Dioxide Evoultion Rate
Particle Size	99.1	%, dry weight passing through 9.5 mm	02.02-B Sample Sieving for Aggregate Size Classification
Pathogens	Pass	PASS/FAIL: Per US EPA Class A standard, 40 CFR 503.32(a)	07.01-B Fecal coliforms
Pathogens	Pass	PASS/FAIL: Per US EPA Class A standard, 40 CFR 503.32(a)	07.02 Samonella
Physical Contaminants	None Detected	%, dry weight basis	02.02-C - Man-Made Inerts Total content
Physical Contaminants	None Detected	%, dry weight basis	02.02-C - Man-Made Inerts Sharps content
Heavy Metals Content	Pass	PASS/FAIL: Per US EPA Class A 40 CFR 503.13, tables 1 and 3.	04.06-Heavy Metals standard, and Hazardous Elements

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

For additional information pertaining to compost use, the specific compost parameters tested for within the Seal of Testing assurance Program, or the program in general, log on to the US Composting Council's TMECC web-site at http://www.tmecc.org.

This compost product has been sampled and tested as required by the Seal of Testing assurance Program on the United States Composting Council (USCC), using certain methods from the "Test Methods for the Examination of Compost and Composting" manual. Test results are available upon request by contacting the compost producer (address at top of page). The USCC makes no warranties regarding this product or its content, quality, or suitability for any particular use.

Laboratory Group: Sep.12 B

Laboratory Number: 2090381-2/2

Analyst: Assaf Sadeh

[redacted]

www.compostlab.com

ANALYTICAL CHEMISTS
and
BACTERIOLOGISTS
Approved by State of California

SOIL CONTROL LAB

42 HANGAR WAY
WATSONVILLE
CALIFORNIA
95076
USA

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com

Account #: 2090381-2/2-6908
Group: Sep.12 B #30
Reporting Date: September 26, 2012

TCCBI - Harvest Power
24487 Rd. 140
Tulare, CA 93274
Attn: John Jones

Date Received: 14 Sep. 12
Sample Identification: Zone 2 Control
Sample ID #: 2090381 - 2/2

Nutrients	Dry wt.	As Rcvd.	units
Total Nitrogen:	1.3	0.80	%
Ammonia (NH_4-N):	1500	900	mg/kg
Nitrate (NO_3-N):	9.6	5.8	mg/kg
Org. Nitrogen (Org.-N):	1.1	0.66	%
Phosphorus (as P_2O_5):	0.55	0.33	%
Phosphorus (P):	2400	1500	mg/kg
Potassium (as K_2O):	1.3	0.79	%
Potassium (K):	11000	6600	mg/kg
Calcium (Ca):	2.6	1.6	%
Magnesium (Mg):	0.43	0.26	%
Sulfate (SO_4-S):	2400	1400	mg/kg
Boron (Total B):	28	17	mg/kg
Moisture:	0	39.8	%
Sodium (Na):	0.12	0.069	%
Chloride (Cl):	0.26	0.15	%
pH Value:	NA	6.32	unit
Bulk Density :	22	37	lb/cu ft
Carbonates ($CaCO_3$):	<0.1	<0.1	lb/ton
Conductivity (EC5):	9.7	NA	mmhos/cm
Organic Matter:	42.6	25.6	%
Organic Carbon:	25.0	15.0	%
Ash:	57.4	34.5	%
C/N Ratio	19	19	ratio
AgIndex	8	8	ratio

Stability Indicator: **CO2 Evolution**	Respirometery	Biologically Available C
mg CO_2-C/g OM/day	10	11
mg CO_2-C/g TS/day	4.3	4.8
Stability Rating	*unstable*	*unstable*

Maturity Indicator: Cucumber Bioassay		
Compost:Vermiculite(v:v)	1:1	1:3
Emergence (%)	100	100
Seedling Vigor (%)	92	93
Description of Plants	*healthy*	*healthy*

Pathogens	Results	Units	Rating
Fecal Coliform	< 2.0	MPN/g	*pass*
Salmonella	< 3	MPN/4g	*pass*

Date Tested: 14 Sep. 12

Inerts	% by weight
Plastic	< 0.5
Glass	< 0.5
Metal	< 0.5
Sharps	ND

Metals	Dry wt.	EPA Limit	units
Aluminum (Al)	6200	-	mg/kg
Arsenic (As):	3.1	41	mg/kg
Cadmium (Cd):	< 1.0	39	mg/kg
Chromium (Cr):	15	1200	mg/kg
Cobalt (Co)	3.6	-	mg/kg
Copper (Cu):	37	1500	mg/kg
Iron (Fe):	8600	-	mg/kg
Lead (Pb):	20	300	mg/kg
Manganese (Mn):	200	-	mg/kg
Mercury (Hg):	< 1.0	17	mg/kg
Molybdenum (Mo):	2.4	75	mg/kg
Nickel (Ni):	11	420	mg/kg
Selenium (Se):	< 1.0	36	mg/kg
Zinc (Zn):	430	2800	mg/kg

Size & Volume Distribution

MM	% by weight	% by volume	BD g/cc
> 50	0.0	0.0	0.00
25 to 50	0.0	0.0	0.00
16 to 25	0.0	0.0	0.00
9.5 to 16	0.9	1.0	0.30
6.3 to 9.5	4.9	5.8	0.29
4.0 to 6.3	7.9	9.1	0.30
2.0 to 4.0	16.4	22.0	0.26
< 2.0	69.9	62.1	0.39

Bulk Density Description:<.35 Light Materials,
.35-.60 medium weight materials, >.60 Heavy Materials

Analyst: Assaf Sadeh

[redacted]

*Sample was received and handled in accordance with TMECC procedures.

Account No.:
2090381 - 2/2 - 6908
Group: Sep.12 B No. 30

Date Received 14 Sep. 12
Sample i.d. Zone 2 Control
Sample I.d. No. 2/2 2090381

INTERPRETATION:

Page one of three

Is Your Compost Stable?

Respiration Rate Biodegradation Rate of Your Pile
10 mg CO2-C/ g OM/day
++
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch

Biologically Available Carbon (BAC) Optimum Degradation Rate
11 mg CO2-C/ g OM/day
++
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch

Is Your Compost Mature?

AmmoniaN/NitrateN ratio
160 Ratio
++
VeryMature>|< Mature >|< Immature

Ammonia N ppm
1500 mg/kg dry wt.
++
VeryMature>|< Mature >|< Immature

Nitrate N ppm
9.6 mg/kg dry wt.
+++++++
< Immature >|< Mature

pH value
6.32 units
++
< Immature >|< Mature >|< Immature

Cucumber Emergence
100.0 percent
+++
< Immature >|< Mature

Is Your Compost Safe Regarding Health?

Fecal Coliform
< 1000 MPN/g dry wt.
+++++++
< Safe >|< High Fecal Coliform

Salmonella
Less than 3 /4g dry wt.
+++++++
<Safe (none detected) >|< High Salmonella Count(> 3 per 4 grams)

Metals US EPA 503
Pass dry wt.
+++++++++
<All Metals Pass >|< One or more Metals Fail

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)
3.2 Percent dry wt.
+++++++++++++++++++++++++
<Low >|< Average >|< High Nutrient Content

AgIndex (Nutrients / Sodium and Chloride Salts) ((N+P2O5+K2O) / (Na + Cl))
8 Ratio
++
Na & Cl >|< Nutrient and Sodium and Chloride Provider >|< Nutrient Provider

Plant Available Nitrogen (PAN) Estimated release for first season
8 lbs/ton wet wt.
+++++++++++++++++++++++++++++++++
Low Nitrogen Provider>|< Average Nitrogen Provider >|<High Nitrogen Provider

C/N Ratio
19 Ratio
++++++++++++++++++++++++++++++++++++++
< Nitrogen Release >|< N-Neutral >|< N-Demand>|< High Nitrogen Demand

Soluble Available Nutrients & Salts (EC5 w/w dw)
9.7 mmhos/cm dry wt.
++
SloRelease>|< Average Nutrient Release Rate >|<High Available Nutrients

Lime Content (CaCO3)
0 Lbs/ton dry wt.
+
< Low >|< Average >|< High Lime Content (as CaCO3)

What are the physical properties of your compost?

Percent Ash
57.4 Percent dry wt.
++
< High Organic Matter >|< Average >|< High Ash Content

Sieve Size % > 6.3 MM (0.25")
5.8 Percent dry wt.
+++
All Uses >|< Size May Restrict Uses for Potting mix and Golf Courses

Account No.:		Date Received	14 Sep. 12
2090381 - 2/2 - 6908		Sample i.d.	Zone 2 Control
Group:	Sep.12 B No. 30	Sample I.d. No.	2/2 2090381

INTERPRETATION:

Is Your Compost Stable?

Respiration Rate

10 Moderate-selected use mg CO2-C/g OM/day

The respiration rate is a measurement of the biodegradation rate of the organic matter in the sample (as received). The respiration rate is determined by measuring the rate at which CO2 is released under optimized moisture and temperature conditions.

Biologically Available Carbon

11 Moderate-selected use mg CO2-C/g OM/day

Biologically Available Carbon (BAC) is a measurement of the rate at which CO2 is released under optimized moisture, temperature, porosity, nutrients, pH and microbial conditions. If both the RR and the BAC test values are close to the same value, the pile is optimized for composting. If both values are high the compost pile just needs more time. If both values are low the compost has stabilized and should be moved to curing. BAC test values that are higher than RR indicate that the compost pile has stalled. This could be due to anaerobic conditions, lack of available nitrogen due to excessive air converting ammonia to the unavailable nitrate form, lack of nitrogen or other nutrients due to poor choice of feedstock, pH value out of range, or microbes rendered non-active.

Is Your Compost Mature?

AmmoniaN:NitrateN ratio

160 immature

Ammonia N ppm

1500 immature

Nitrate N ppm

9.6 immature

pH value

6.32 immature

Composting to stabilize carbon can occur at such a rapid rate that sometimes phytotoxins remain in the compost and must be neutralized before using in high concentrations or in high-end uses. This step is called curing. Typically ammonia is in excess with the break-down of organic materials resulting in an increase in pH. This combination results in a loss of volatile ammonia (it smells). Once this toxic ammonia has been reduced and the pH drops, the microbes convert the ammonia to nitrates. A low ammonia + high nitrate score is indicative of a mature compost, however there are many exceptions. For example, a compost with a low pH (<7) will retain ammonia, while a compost with high lime content can lose ammonia before the organic fraction becomes stable. Composts must first be stable before curing indicators apply.

Cucumber Bioassay

100.0 Percent Cucumbers are chosen for this test because they are salt tolerant and very sensitive to ammonia and organic acid toxicity. Therefore, we can germinate seeds in high concentrations of compost to measure phytotoxic effects without soluble salts being the limiting factor. Values above 80% for both percent emergence and vigor are indicative of a well-cured compost. Exceptions include very high salts that affect the cucumbers, excessive concentrations of nitrates and other nutrients that will be in range when formulated to make a growing media. In addition to testing a 1:1 compost: vermiculite blend, we also test a diluted 1:3 blend to indicate a more sensitive toxicity level.

Is Your Compost Safe Regarding Health?

Fecal Coliform

< 1000 / g dry wt. Fecal coliforms can survive in both aerobic and anaerobic conditions and is common in all initial compost piles. Most human pathogens occur from fecal matter and all fecal matter is loaded in fecal coliforms. Therefore fecal coliforms are used as an indicator to determine if the chosen method for pathogen reduction (heat for compost) has met the requirements of sufficient temperature, time and mixing. If the fecal coliforms are reduced to below 1000 per gram dry wt. it is assumed all others pathogens are eliminated. Potential problems are that fecal coliform can regrow during the curing phase or during shipping. This is because the conditions are now more favorable for growth than during the composting process.

Salmonella Bacteria

Less than 3 3 / 4g dry wt. Salmonella is not only another indicator organism but also a toxic microbe. It has been used in the case of biosolids industry to determine adequate pathogen reduction.

Metals

Pass The ten heavy metals listed in the EPA 503 regulations are chosen to determine if compost can be applied to ag land and handled without toxic effects. Most high concentrations of heavy metals are derived from woodwaste feedstock such as chrome-arsenic treated or lead painted demolition wood. Biosolids are rarely a problem.

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)

3.2 Average nutrient content

This value is the sum of the primary nutrients Nitrogen, Phosphorus and Potassium. Reported units are consistent with those found on fertilizer formulations. A sum greater than 5 is indicative of a compost with high nutrient content, and best used to supply nutrients to a receiving soil. A sum below 2 indicates low nutrient content, and is best-used to improve soil structure via the addition of organic matter. Most compost falls between 2 and 5.

Account No.: Date Received 14 Sep. 12
2090381 - 2/2 - 6908 Sample i.d. Zone 2 Control
Group: Sep.12 B No. 30 Sample I.d. No. 2/2 2090381

INTERPRETATION: Page three of three

AgIndex (Nutrients/Na+Cl)

8 Average nutrient ratio Composts with low AgIndex values have high concentrations of sodium and/or chloride compared to nutrients. Repeated use of a compost with a low AgIndex (< 2) may result in sodium and/or chloride acting as the limiting factor compared to nutrients, governing application rates. These composts may be used on well-draining soils and/or with salt-tolerant plants. Additional nutrients form another source may be needed if the application rate is limited by sodium or chloride. If the AgIndex is above 10, nutrients optimal for plant growth will be available without concern of sodium and/or chloride toxicity. Composts with an AgIndex of above 10 are good for increasing nutrient levels for all soils. Most composts score between 2 and 10. Concentrations of nutrients, sodium, and chloride in the receiving soil should be considered when determining compost application rates. The AgIndex is a product of feedstock quality. Feedstock from dairy manure, marine waste, industrial wastes, and halophytic plants are likely to produce a finished compost with a low AgIndex.

Plant Available Nitrogen (lbs/ton)

8 Average N Provider Plant Available Nitrogen (PAN) is calculated by estimating the release rate of Nitrogen from the organic fraction of the compost. This estimate is based on information gathered from the BAC test and measured ammonia and nitrate values. Despite the PAN value of the compost, additional sources of Nitrogen may be needed during he growing season to off-set the Nitrogen demand of the microbes present in the compost. With ample nutrients these microbes can further breakdown organic matter in the compost and release bound Nitrogen. Nitrogen demand based on a high C/N ratio is not considered in the PAN calculation because additional Nitrogen should always be supplemented to the receiving soil when composts with a high C/N ratio are applied.

C/N Ratio

19 Indicates immaturity As a guiding principal, a C/N ratio below 14 indicates maturity and above 14 indicates immaturity, however, there are many exceptions. Large woodchips (>6.3mm), bark, and redwood are slow to breakdown and therefore can result in a relatively stable product while the C/N ratio value is high. Additionally, some composts with chicken manure and/or green grass feedstocks can start with a C/N ratio below 15 and are very unstable. A C/N ratio below 10 supplies Nitrogen, while a ratio above 20 can deplete Nitrogen from the soil. The rate at which Nitrogen will be released or used by the microbes is indicated by the respiration rate (BAC). If the respiration rate is too high the transfer of Nitrogen will not be controlable.

Soluble Nutrients & Salts (EC5 w/w dw - mmhos/cm)

9.7 High salts This value refers to all soluble ions including nutrients, sodium, chloride and some soluble organic compounds. The concentration of salts will change due to the release of salts from the organic matter as it degrades, volatilization of ammonia, decomposition of soluble organics, and conversion of molecular structure. High salts + high AgIndex is indicative of a compost high in readily available nutrients. The application rate of these composts should be limited by the optimum nutrient value based on soil analysis of the receiving soil. High Salts + low AgIndex is indicative of a compost low in nutrients with high concentrations of sodium and/or chloride. Limit the application rate according to the toxicity level of thesodium and/or chloride. Low salts indicates that the compost can be applied without risking salt toxicity, is likely a good source of organic matter, and that nutrients will release slowly over time.

Lime Content (lbs. per ton)

0 Low lime content Compost high in lime or carbonates are often those produced from chicken manure (layers) ash materials, and lime products. These are excellent products to use on a receiving soil where lime has been recommended by soil analysis to raise the pH. Composts with a high lime content should be closely considered for pH requirements when formulating potting mixes.

Physical Properties

Percent Ash

57.4 Average ash content Ash is the non-organic fraction of a compost. Most composts contain approximately 50% ash (dry weight basis). Compost can be high in ash content for many reasons including: excess minerilzation(old compost), contamination with soil base material during turning, poor quality feedstock, and soil or mineral products added. Finding the source and reducing high ash content is often the fastest means to increasing nutrient quality of a compost.

Particle Size % > 6.3 MM (0.25")

5.8 May restrict use Large particles may restrict use for potting soils, golf course topdressings, seed-starter mixes, and where a fine size distribution is required. Composts with large particles can still be used as excellent additions to field soils, shrub mixes and mulches.

Particle Size Distribution

Each size fraction is measured by weight, volume and bulk density. These results are particularly relevent with decisions to screen or not, and if screening, which size screen to use. The bulk density indicates if the fraction screened is made of light weight organic material or heavy mineral material. Removing large mineral material can greatly improve compost quality by increasing nutrient and organic concentrations.

Appendix:

Plant Available Nitrogen (PAN) calculations:
PAN = (X * (organic N)) + ((NH4-N) + (NO3-N))
X value = If BAC < 2 then X = 0.1
If BAC =2.1 to 5 then X = 0.2
If BAC =5.1 to 10 then X = 0.3
If BAC > 10 then X = 0.4
Note: If C/N ratio > 15 additional N should be applied.

Estimated available nutrients for use when calculating application rates

	lbs/ton (As Rcvd.)
Plant Available Nitrogen (PAN)	8.2
Ammonia (NH4-N)	1.80
Nitrate (NO3-N)	0.01
Available Phosphorus (P2O5*0.64)	4.4
Available Potassium (K2O)	15.9

US COMPOSTING COUNCIL

Seal of Testing Assurance

TCCBI - Harvest Power
John Jones
24487 Rd. 140
Tulare
CA 93274 (559) 686-1622

Product Identification	Compost
Zone 3	

Date Sampled/Received: 17 Sep. 12 / 19 Sep. 12

COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 *tel:* 831.724.5422 *fax:* 831.724.3188

Compost Parameters	*Reported as (units of measure)*	*Test Results*	*Test Results*
Plant Nutrients:	%, weight basis	Not reported	Not reported
Moisture Content	%, wet weight basis	38.5	
Organic Matter Content	%, dry weight basis	42.9	
pH	units	6.28	
Soluble Salts *(electrical conductivity EC_5)*	dS/m (mmhos/cm)	6.8	
Particle Size or Sieve Size	maxium aggregate size, inches	0.64	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	7.5	Moderately Un-Stable
	mg CO_2-C/g TS/day	3.2	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	86.7	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Pass	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg* Mo,Ni,Se,Zn

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Laboratory Group: Sep.12 C_1 Laboratory Number: 2090507-1/2

Analyst: Assaf Sadeh [redacted] www.compostlab.com

US COMPOSTING COUNCIL

Seal of Testing Assurance

Date Sampled/Received: 17 Sep. 12 / 19 Sep. 12

TCCBI - Harvest Power
John Jones
24487 Rd. 140
Tulare
CA 93274 (559) 686-1622

Product Identification	Compost
Zone 3	

COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 *tel:* 831.724.5422 *fax:* 831.724.3188

Compost Parameters	*Reported as (units of measure)*	*Test Results*	*Test Results*
Plant Nutrients:	%, weight basis	%, wet weight basis	%, dry weight basis
Nitrogen	Total N	0.83	1.4
Phosphorus	P_2O_5	0.36	0.57
Potassium	K_2O	0.83	1.3
Calcium	Ca	1.2	2.0
Magnesium	Mg	0.31	0.50
Moisture Content	%, wet weight basis	38.5	
Organic Matter Content	%, dry weight basis	42.9	
pH	units	6.28	
Soluble Salts *(electrical conductivity EC_5)*	dS/m (mmhos/cm)	6.8	
Particle Size or Sieve Size	% under 9.5 mm, dw basis	99.5	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	7.5	Moderately Un-Stable
	mg CO_2-C/g TS/day	3.2	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	86.7	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Pass	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg* Mo,Ni,Se,Zn

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

Laboratory Group: Sep.12 C 1 Laboratory Number: 2090507-1/2

Analyst: Assaf Sadeh [redacted] www.compostlab.com

US COMPOSTING COUNCIL

Seal of Testing Assurance

Caltrans

TCCBI - Harvest Power
John Jones
24487 Rd. 140
Tulare CA 93274 (559) 686-1622

Product Identification:
Zone 3

Date Sampled/Received: 17 Sep. 12 / 19 Sep. 12

COMPOST TECHNICAL DATA SHEET for Caltrans

LABORATORY: Soil Control Lab, 42 Hangar Way, Watsonville, CA 95076 tel (831) 724-5422 fax (831) 724-3188 www.compostlab.com

Compost Parameters	*Test Results*	*Reported as (units of measure)*	*TMECC Test Method*
pH	6.28	Unitless	04.11-A 1:5 Slurry pH
Soluble Salts (electrical conductivity)	6.8	dS/m (mmhos/cm)	04.10-A 1:5 Slurry Method Mass Basis
Moisture content	38.5	%, wet weight basis	03.09-A - Total Solids and Moisture
Organic Matter Content	42.9	%, dry weight basis	05.07-A Loss-on-Ignition Organic Matter Method (LOI)
Maturity Indicator (bioassay)			
Percent Emergence	100.0	average % of control	05.05-A Germination and vigor
Relative Seedling Vigor	86.7	average % of control	
Stability Indicator	7.5	mg CO2-C/g OM/day	05.08-B Carbon Dioxide Evoultion Rate
Particle Size	99.5	%, dry weight passing through 9.5 mm	02.02-B Sample Sieving for Aggregate Size Classification
Pathogens	Pass	PASS/FAIL: Per US EPA Class A standard, 40 CFR 503.32(a)	07.01-B Fecal coliforms
Pathogens	Pass	PASS/FAIL: Per US EPA Class A standard, 40 CFR 503.32(a)	07.02 Samonella
Physical Contaminants	None Detected	%, dry weight basis	02.02-C - Man-Made Inerts Total content
Physical Contaminants	None Detected	%, dry weight basis	02.02-C - Man-Made Inerts Sharps content
Heavy Metals Content	Pass	PASS/FAIL: Per US EPA Class A 40 CFR 503.13, tables 1 and 3.	04.06-Heavy Metals standard, and Hazardous Elements

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

For additional information pertaining to compost use, the specific compost parameters tested for within the Seal of Testing assurance Program, or the program in general, log on to the US Composting Council's TMECC web-site at http://www.tmecc.org.

This compost product has been sampled and tested as required by the Seal of Testing assurance Program on the United States Composting Council (USCC), using certain methods from the "Test Methods for the Examination of Compost and Composting" manual. Test results are available upon request by contacting the compost producer (address at top of page). The USCC makes no warranties regarding this product or its content, quality, or suitability for any particular use.

Laboratory Group: Sep.12 C_1
Laboratory Number: 2090507-1/2
Analyst: Assaf Sadeh [redacted]
www.compostlab.com

ANALYTICAL CHEMISTS
and
BACTERIOLOGISTS
Approved by State of California

SOIL CONTROL LAB

42 HANGAR WAY
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www.compostlab.com

Account #: 2090507-1/2-6908
Group: Sep.12 C_1 #8
Reporting Date: October 5, 2012

TCCBI - Harvest Power
24487 Rd. 140
Tulare, CA 93274
Attn: John Jones

Date Received: 19 Sep. 12
Sample Identification: Zone 3
Sample ID #: 2090507 - 1/2

Nutrients	Dry wt.	As Rcvd.	units
Total Nitrogen:	1.4	0.83	%
Ammonia (NH_4-N):	670	410	mg/kg
Nitrate (NO_3-N):	10	6.4	mg/kg
Org. Nitrogen (Org.-N):	1.3	0.80	%
Phosphorus (as P_2O_5):	0.58	0.36	%
Phosphorus (P):	2500	1600	mg/kg
Potassium (as K_2O):	1.3	0.82	%
Potassium (K):	11000	6900	mg/kg
Calcium (Ca):	2.0	1.2	%
Magnesium (Mg):	0.50	0.31	%
Sulfate (SO_4-S):	640	390	mg/kg
Boron (Total B):	30	18	mg/kg
Moisture:	0	38.5	%
Sodium (Na):	0.12	0.073	%
Chloride (Cl):	0.22	0.14	%
pH Value:	NA	6.28	unit
Bulk Density :	25	40	lb/cu ft
Carbonates ($CaCO_3$):	6.9	4.2	lb/ton
Conductivity (EC5):	6.8	NA	mmhos/cm
Organic Matter:	42.9	26.4	%
Organic Carbon:	25.0	15.0	%
Ash:	57.1	35.1	%
C/N Ratio	18	18	ratio
AgIndex	10	10	ratio

Stability Indicator:		Biologically
CO2 Evolution	Respirometery	Available C
mg CO_2-C/g OM/day	7.5	7.9
mg CO_2-C/g TS/day	3.2	3.4
Stability Rating	*moderately unstable*	*moderately unstable*

Maturity Indicator: Cucumber Bioassay		
Compost:Vermiculite(v:v)	1:1	1:3
Emergence (%)	100	100
Seedling Vigor (%)	87	87
Description of Plants	*fungus*	*fungus*

Pathogens	Results	Units	Rating
Fecal Coliform	< 2.0	MPN/g	*pass*
Salmonella	< 3	MPN/4g	*pass*

Date Tested: 19 Sep. 12

Inerts	% by weight
Plastic	< 0.5
Glass	< 0.5
Metal	< 0.5
Sharps	ND

Metals	Dry wt.	EPA Limit	units
Aluminum (Al)	6900	-	mg/kg
Arsenic (As):	3.1	41	mg/kg
Cadmium (Cd):	< 1.0	39	mg/kg
Chromium (Cr):	14	1200	mg/kg
Cobalt (Co)	3.8	-	mg/kg
Copper (Cu):	49	1500	mg/kg
Iron (Fe):	9700	-	mg/kg
Lead (Pb):	20	300	mg/kg
Manganese (Mn):	220	-	mg/kg
Mercury (Hg):	< 1.0	17	mg/kg
Molybdenum (Mo):	1.6	75	mg/kg
Nickel (Ni):	11	420	mg/kg
Selenium (Se):	< 1.0	36	mg/kg
Zinc (Zn):	170	2800	mg/kg

Size & Volume Distribution

MM	% by weight	% by volume	BD g/cc
> 50	0.0	0.0	0.00
25 to 50	0.0	0.0	0.00
16 to 25	0.0	0.0	0.00
9.5 to 16	0.5	0.4	0.50
6.3 to 9.5	2.7	2.9	0.41
4.0 to 6.3	5.1	5.7	0.39
2.0 to 4.0	12.6	19.3	0.29
< 2.0	79.0	71.6	0.48

Bulk Density Description:<.35 Light Materials, .35-.60 medium weight materials, >.60 Heavy Materials

Analyst: Assaf Sadeh

[redacted]

*Sample was received and handled in accordance with TMECC procedures.

Account No.: Date Received 19 Sep. 12
2090507 - 1/2 - 6908 Sample i.d. Zone 3
Group: Sep.12 C_1 No. 8 Sample I.d. No. 1/2 2090507

INTERPRETATION:

Page one of three

Is Your Compost Stable?

Respiration Rate Biodegradation Rate of Your Pile
7.5 mg CO2-C/ g OM/day
++++++++++++++++++++++++++++++
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch

Biologically Available Carbon (BAC) Optimum Degradation Rate
7.9 mg CO2-C/ g OM/day
++++++++++++++++++++++++++++++++
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch

Is Your Compost Mature?

AmmoniaN/NitrateN ratio
67 Ratio
+++
VeryMature>|< Mature >|< Immature

Ammonia N ppm
670 mg/kg dry wt.
++
VeryMature>|< Mature >|< Immature

Nitrate N ppm
10 mg/kg dry wt.
+++++++
< Immature >|< Mature

pH value
6.28 units
++
< Immature >|< Mature >|< Immature

Cucumber Emergence
100.0 percent
++
< Immature >|< Mature

Is Your Compost Safe Regarding Health?

Fecal Coliform
< 1000 MPN/g dry wt.
+++++++
< Safe >|< High Fecal Coliform

Salmonella
Less than 3 /4g dry wt.
+++++++
<Safe (none detected) >|< High Salmonella Count(> 3 per 4 grams)

Metals US EPA 503
Pass dry wt.
+++++++++
<All Metals Pass >|< One or more Metals Fail

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)
3.3 Percent dry wt.
++++++++++++++++++++++++++
<Low >|< Average >|< High Nutrient Content

AgIndex (Nutrients / Sodium and Chloride Salts) ((N+P2O5+K2O) / (Na + Cl))
10 Ratio
++
Na & Cl >|< Nutrient and Sodium and Chloride Provider >|< Nutrient Provider

Plant Available Nitrogen (PAN) Estimated release for first season
6 lbs/ton wet wt.
+++++++++++++++++++++++
Low Nitrogen Provider>|< Average Nitrogen Provider >|<High Nitrogen Provider

C/N Ratio
18 Ratio
++++++++++++++++++++++++++++++++++++
< Nitrogen Release >|< N-Neutral >|< N-Demand>|< High Nitrogen Demand

Soluble Available Nutrients & Salts (EC5 w/w dw)
6.8 mmhos/cm dry wt.
++++++++++++++++++++++++++++++++++++
SloRelease>|< Average Nutrient Release Rate >|<High Available Nutrients

Lime Content (CaCO3)
6.9 Lbs/ton dry wt.
+++++++++++
< Low >|< Average >|< High Lime Content (as CaCO3)

What are the physical properties of your compost?

Percent Ash
57.1 Percent dry wt.
++
< High Organic Matter >|< Average >|< High Ash Content

Sieve Size % > 6.3 MM (0.25")
3.2 Percent dry wt.
+++++++++++++++++++++++++
All Uses >|< Size May Restrict Uses for Potting mix and Golf Courses

Account No.:		Date Received	19 Sep. 12	
2090507 - 1/2 - 6908		Sample i.d.	Zone 3	
Group:	Sep.12 C_1 No. 8	Sample I.d. No.	1/2	2090507

INTERPRETATION:

Is Your Compost Stable?

Respiration Rate

7.5 Moderate-selected use mg CO2-C/g OM/day

The respiration rate is a measurement of the biodegradation rate of the organic matter in the sample (as received). The respiration rate is determined by measuring the rate at which CO2 is released under optimized moisture and temperature conditions.

Biologically Available Carbon

7.9 Moderate-selected use mg CO2-C/g OM/day

Biologically Available Carbon (BAC) is a measurement of the rate at which CO2 is released under optimized moisture, temperature, porosity, nutrients, pH and microbial conditions. If both the RR and the BAC test values are close to the same value, the pile is optimized for composting. If both values are high the compost pile just needs more time. If both values are low the compost has stabilized and should be moved to curing. BAC test values that are higher than RR indicate that the compost pile has stalled. This could be due to anaerobic conditions, lack of available nitrogen due to excessive air converting ammonia to the unavailable nitrate form, lack of nitrogen or other nutrients due to poor choice of feedstock, pH value out of range, or microbes rendered non-active.

Is Your Compost Mature?

AmmoniaN:NitrateN ratio

67 immature

Ammonia N ppm

670 immature

Nitrate N ppm

10 immature

pH value

6.28 immature

Composting to stabilize carbon can occur at such a rapid rate that sometimes phytotoxins remain in the compost and must be neutralized before using in high concentrations or in high-end uses. This step is called curing. Typically ammonia is in excess with the break-down of organic materials resulting in an increase in pH. This combination results in a loss of volatile ammonia (it smells). Once this toxic ammonia has been reduced and the pH drops, the microbes convert the ammonia to nitrates. A low ammonia + high nitrate score is indicative of a mature compost, however there are many exceptions. For example, a compost with a low pH (<7) will retain ammonia, while a compost with high lime content can lose ammonia before the organic fraction becomes stable. Composts must first be stable before curing indicators apply.

Cucumber Bioassay

100.0 Percent Cucumbers are chosen for this test because they are salt tolerant and very sensitive to ammonia and organic acid toxicity. Therefore, we can germinate seeds in high concentrations of compost to measure phytotoxic effects without soluble salts being the limiting factor. Values above 80% for both percent emergence and vigor are indicative of a well-cured compost. Exceptions include very high salts that affect the cucumbers, excessive concentrations of nitrates and other nutrients that will be in range when formulated to make a growing media. In addition to testing a 1:1 compost: vermiculite blend, we also test a diluted 1:3 blend to indicate a more sensitive toxicity level.

Is Your Compost Safe Regarding Health?

Fecal Coliform

< 1000 / g dry wt. Fecal coliforms can survive in both aerobic and anaerobic conditions and is common in all initial compost piles. Most human pathogens occur from fecal matter and all fecal matter is loaded in fecal coliforms. Therefore fecal coliforms are used as an indicator to determine if the chosen method for pathogen reduction (heat for compost) has met the requirements of sufficient temperature, time and mixing. If the fecal coliforms are reduced to below 1000 per gram dry wt. it is assumed all others pathogens are eliminated. Potential problems are that fecal coliform can regrow during the curing phase or during shipping. This is because the conditions are now more favorable for growth than during the composting process.

Salmonella Bacteria

Less than 3 3 / 4g dry wt. Salmonella is not only another indicator organism but also a toxic microbe. It has been used in the case of biosolids industry to determine adequate pathogen reduction.

Metals

Pass The ten heavy metals listed in the EPA 503 regulations are chosen to determine if compost can be applied to ag land and handled without toxic effects. Most high concentrations of heavy metals are derived from woodwaste feedstock such as chrome-arsenic treated or lead painted demolition wood. Biosolids are rarely a problem.

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)

3.3 Average nutrient content

This value is the sum of the primary nutrients Nitrogen, Phosphorus and Potassium. Reported units are consistent with those found on fertilizer formulations. A sum greater than 5 is indicative of a compost with high nutrient content, and best used to supply nutrients to a receiving soil. A sum below 2 indicates low nutrient content, and is best-used to improve soil structure via the addition of organic matter. Most compost falls between 2 and 5.

Account No.:		Date Received	19 Sep. 12	
2090507 - 1/2 - 6908		Sample i.d.	Zone 3	
Group:	Sep.12 C_1 No. 8	Sample I.d. No.	1/2	2090507

INTERPRETATION:

AgIndex (Nutrients/Na+Cl)

10 Average nutrient ratio Composts with low AgIndex values have high concentrations of sodium and/or chloride compared to nutrients. Repeated use of a compost with a low AgIndex (< 2) may result in sodium and/or chloride acting as the limiting factor compared to nutrients, governing application rates. These composts may be used on well-draining soils and/or with salt-tolerant plants. Additional nutrients form another source may be needed if the application rate is limited by sodium or chloride. If the AgIndex is above 10, nutrients optimal for plant growth will be available without concern of sodium and/or chloride toxicity. Composts with an AgIndex of above 10 are good for increasing nutrient levels for all soils. Most composts score between 2 and 10. Concentrations of nutrients, sodium, and chloride in the receiving soil should be considered when determining compost application rates. The AgIndex is a product of feedstock quality. Feedstock from dairy manure, marine waste, industrial wastes, and halophytic plants are likely to produce a finished compost with a low AgIndex.

Plant Available Nitrogen (lbs/ton)

6 Average N Provider Plant Available Nitrogen (PAN) is calculated by estimating the release rate of Nitrogen from the organic fraction of the compost. This estimate is based on information gathered from the BAC test and measured ammonia and nitrate values. Despite the PAN value of the compost, additional sources of Nitrogen may be needed during he growing season to off-set the Nitrogen demand of the microbes present in the compost. With ample nutrients these microbes can further breakdown organic matter in the compost and release bound Nitrogen. Nitrogen demand based on a high C/N ratio is not considered in the PAN calculation because additional Nitrogen should always be supplemented to the receiving soil when composts with a high C/N ratio are applied.

C/N Ratio

18 Indicates immaturity As a guiding principal, a C/N ratio below 14 indicates maturity and above 14 indicates immaturity, however, there are many exceptions. Large woodchips (>6.3mm), bark, and redwood are slow to breakdown and therefore can result in a relatively stable product while the C/N ratio value is high. Additionally, some composts with chicken manure and/or green grass feedstocks can start with a C/N ratio below 15 and are very unstable. A C/N ratio below 10 supplies Nitrogen, while a ratio above 20 can deplete Nitrogen from the soil. The rate at which Nitrogen will be released or used by the microbes is indicated by the respiration rate (BAC). If the respiration rate is too high the transfer of Nitrogen will not be controlable.

Soluble Nutrients & Salts (EC5 w/w dw - mmhos/cm)

6.8 Average salts This value refers to all soluble ions including nutrients, sodium, chloride and some soluble organic compounds. The concentration of salts will change due to the release of salts from the organic matter as it degrades, volatilization of ammonia, decomposition of soluble organics, and conversion of molecular structure. High salts + high AgIndex is indicative of a compost high in readily available nutrients. The application rate of these composts should be limited by the optimum nutrient value based on soil analysis of the receiving soil. High Salts + low AgIndex is indicative of a compost low in nutrients with high concentrations of sodium and/or chloride. Limit the application rate according to the toxicity level of thesodium and/or chloride. Low salts indicates that the compost can be applied without risking salt toxicity, is likely a good source of organic matter, and that nutrients will release slowly over time.

Lime Content (lbs. per ton)

6.9 Average lime content Compost high in lime or carbonates are often those produced from chicken manure (layers) ash materials, and lime products. These are excellent products to use on a receiving soil where lime has been recommended by soil analysis to raise the pH. Composts with a high lime content should be closely considered for pH requirements when formulating potting mixes.

Physical Properties

Percent Ash

57.1 Average ash content Ash is the non-organic fraction of a compost. Most composts contain approximately 50% ash (dry weight basis). Compost can be high in ash content for many reasons including: excess minerilzation(old compost), contamination with soil base material during turning, poor quality feedstock, and soil or mineral products added. Finding the source and reducing high ash content is often the fastest means to increasing nutrient quality of a compost.

Particle Size % > 6.3 MM (0.25")

3.2 May restrict use Large particles may restrict use for potting soils, golf course topdressings, seed-starter mixes, and where a fine size distribution is required. Composts with large particles can still be used as excellent additions to field soils, shrub mixes and mulches.

Particle Size Distribution

Each size fraction is measured by weight, volume and bulk density. These results are particularly relevent with decisions to screen or not, and if screening, which size screen to use. The bulk density indicates if the fraction screened is made of light weight organic material or heavy mineral material. Removing large mineral material can greatly improve compost quality by increasing nutrient and organic concentrations.

Appendix:

Plant Available Nitrogen (PAN) calculations:
PAN = (X * (organic N)) + ((NH4-N) + (NO3-N))
X value = If BAC < 2 then X = 0.1
If BAC =2.1 to 5 then X = 0.2
If BAC =5.1 to 10 then X = 0.3
If BAC > 10 then X = 0.4
Note: If C/N ratio > 15 additional N should be applied.

Estimated available nutrients for use when calculating application rates

	lbs/ton (As Rcvd.)
Plant Available Nitrogen (PAN)	5.9
Ammonia (NH4-N)	0.82
Nitrate (NO3-N)	0.01
Available Phosphorus (P2O5*0.64)	4.7
Available Potassium (K2O)	16.6

US COMPOSTING COUNCIL

Seal of Testing Assurance

TCCBI - Harvest Power
John Jones
24487 Rd. 140
Tulare
CA 93274 (559) 686-1622

Product Identification	Compost
Zone 3 Control	

Date Sampled/Received: 17 Sep. 12 / 19 Sep. 12

COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 *tel:* 831.724.5422 *fax:* 831.724.3188

Compost Parameters	*Reported as (units of measure)*	*Test Results*	*Test Results*
Plant Nutrients:	%, weight basis	Not reported	Not reported
Moisture Content	%, wet weight basis	43.3	
Organic Matter Content	%. dry weight basis	46.5	
pH	units	5.03	
Soluble Salts *(electrical conductivity EC_5)*	dS/m (mmhos/cm)	11	
Particle Size or Sieve Size	maxium aggregate size, inches	0.64	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	13	Un-Stable
	mg CO_2-C/g TS/day	6.2	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	81.7	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Pass	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg*
			Mo,Ni,Se,Zn

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Laboratory Group: Sep.12 C_1 Laboratory Number: 2090507-2/2

Analyst: Assaf Sadeh [redacted] www.compostlab.com

US COMPOSTING COUNCIL

Seal of Testing Assurance

Date Sampled/Received: 17 Sep. 12 / 19 Sep. 12

TCCBI - Harvest Power
John Jones
24487 Rd. 140
Tulare
CA 93274 (559) 686-1622

Product Identification Compost
Zone 3 Control

COMPOST TECHNICAL DATA SHEET

LABORATORY: Soil Control Lab; 42 Hangar Way; Watsonville, CA 95076 *tel:* 831.724.5422 *fax:* 831.724.3188

Compost Parameters	*Reported as (units of measure)*	*Test Results*	*Test Results*
Plant Nutrients:	%, weight basis	%, wet weight basis	%, dry weight basis
Nitrogen	Total N	0.85	1.5
Phosphorus	P_2O_5	0.36	0.61
Potassium	K_2O	0.82	1.4
Calcium	Ca	0.86	1.5
Magnesium	Mg	0.25	0.44
Moisture Content	%, wet weight basis	43.3	
Organic Matter Content	%, dry weight basis	46.5	
pH	units	5.03	
Soluble Salts *(electrical conductivity EC_5)*	dS/m (mmhos/cm)	11	
Particle Size or Sieve Size	% under 9.5 mm, dw basis	98.4	
Stability Indicator *(respirometry)*			*Stability Rating:*
CO_2 Evolution	mg CO_2-C/g OM/day	13	Un-Stable
	mg CO_2-C/g TS/day	6.2	
Maturity Indicator (bioassay)			
Percent Emergence	average % of control	100.0	
Relative Seedling Vigor	average % of control	81.7	
Select Pathogens	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.32(a)	Pass	*Fecal coliform*
		Pass	*Salmonella*
Trace Metals	PASS/FAIL: per US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3.	Pass	*As,Cd,Cr,Cu,Pb,Hg* Mo,Ni,Se,Zn

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Laboratory Group: Sep.12 C 1 Laboratory Number: 2090507-2/2

Analyst: Assaf Sadeh [redacted]

www.compostlab.com

US COMPOSTING COUNCIL

Seal of Testing Assurance

Caltrans

TCCBI - Harvest Power
John Jones
24487 Rd. 140
Tulare CA 93274 (559) 686-1622

Product Identification:
Zone 3 Control

Date Sampled/Received: 17 Sep. 12 / 19 Sep. 12

COMPOST TECHNICAL DATA SHEET for Caltrans

LABORATORY: Soil Control Lab, 42 Hangar Way, Watsonville, CA 95076 tel (831) 724-5422 fax (831) 724-3188 www.compostlab.com

Compost Parameters	*Test Results*	*Reported as (units of measure)*	*TMECC Test Method*
pH	5.03	Unitless	04.11-A 1:5 Slurry pH
Soluble Salts (electrical conductivity)	11	dS/m (mmhos/cm)	04.10-A 1:5 Slurry Method Mass Basis
Moisture content	43.3	%, wet weight basis	03.09-A - Total Solids and Moisture
Organic Matter Content	46.5	%, dry weight basis	05.07-A Loss-on-Ignition Organic Matter Method (LOI)
Maturity Indicator (bioassay)			
Percent Emergence	100.0	average % of control	05.05-A Germination and vigor
Relative Seedling Vigor	81.7	average % of control	
Stability Indicator	13	mg CO2-C/g OM/day	05.08-B Carbon Dioxide Evoultion Rate
Particle Size	98.4	%, dry weight passing through 9.5 mm	02.02-B Sample Sieving for Aggregate Size Classification
Pathogens	Pass	PASS/FAIL: Per US EPA Class A standard, 40 CFR 503.32(a)	07.01-B Fecal coliforms
Pathogens	Pass	PASS/FAIL: Per US EPA Class A standard, 40 CFR 503.32(a)	07.02 Samonella
Physical Contaminants	None Detected	%, dry weight basis	02.02-C - Man-Made Inerts Total content
Physical Contaminants	None Detected	%, dry weight basis	02.02-C - Man-Made Inerts Sharps content
Heavy Metals Content	Pass	PASS/FAIL: Per US EPA Class A 40 CFR 503.13, tables 1 and 3.	04.06-Heavy Metals standard, and Hazardous Elements

Participants in the US Composting Council's Seal of Testing Assurance Program have shown the commitment to test their compost products on a prescribed basis and provide this data, along with compost end use instructions, as a means to better serve the needs of their compost customers.

For additional information pertaining to compost use, the specific compost parameters tested for within the Seal of Testing assurance Program, or the program in general, log on to the US Composting Council's TMECC web-site at http://www.tmecc.org.

This compost product has been sampled and tested as required by the Seal of Testing assurance Program on the United States Composting Council (USCC), using certain methods from the "Test Methods for the Examination of Compost and Composting" manual. Test results are available upon request by contacting the compost producer (address at top of page). The USCC makes no warranties regarding this product or its content, quality, or suitability for any particular use.

Laboratory Group: Sep.12 C 1 Laboratory Number: 2090507-2/2

Analyst: Assaf Sadeh [redacted] www.compostlab.com

ANALYTICAL CHEMISTS
and
BACTERIOLOGISTS
Approved by State of California

SOIL CONTROL LAB

42 HANGAR WAY
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FAX: 831-724-3188
www.compostlab.com

Account #: 2090507-2/2-6908
Group: Sep.12 C_1 #9
Reporting Date: October 5, 2012

TCCBI - Harvest Power
24487 Rd. 140
Tulare, CA 93274
Attn: John Jones

Date Received: 19 Sep. 12
Sample Identification: Zone 3 Control
Sample ID #: 2090507 - 2/2

Nutrients	Dry wt.	As Rcvd.	units
Total Nitrogen:	1.5	0.85	%
Ammonia (NH_4-N):	2000	1200	mg/kg
Nitrate (NO_3-N):	51	29	mg/kg
Org. Nitrogen (Org.-N):	1.3	0.74	%
Phosphorus (as P_2O_5):	0.62	0.35	%
Phosphorus (P):	2700	1600	mg/kg
Potassium (as K_2O):	1.4	0.81	%
Potassium (K):	12000	6800	mg/kg
Calcium (Ca):	1.5	0.86	%
Magnesium (Mg):	0.44	0.25	%
Sulfate (SO_4-S):	840	470	mg/kg
Boron (Total B):	23	13	mg/kg
Moisture:	0	43.3	%
Sodium (Na):	0.12	0.068	%
Chloride (Cl):	0.29	0.16	%
pH Value:	NA	5.03	unit
Bulk Density :	22	38	lb/cu ft
Carbonates ($CaCO_3$):	<0.1	<0.1	lb/ton
Conductivity (EC5):	11	NA	mmhos/cm
Organic Matter:	46.5	26.4	%
Organic Carbon:	25.0	14.0	%
Ash:	53.5	30.3	%
C/N Ratio	17	17	ratio
AgIndex	9	9	ratio

Stability Indicator:		Biologically
CO2 Evolution	Respirometery	Available C
mg CO_2-C/g OM/day	13	14
mg CO_2-C/g TS/day	6.2	6.7
Stability Rating	*unstable*	*unstable*

Maturity Indicator: Cucumber Bioassay		
Compost:Vermiculite(v:v)	1:1	1:3
Emergence (%)	100	100
Seedling Vigor (%)	82	83
Description of Plants	*mushroom*	*fungus*

Pathogens	Results	Units	Rating
Fecal Coliform	< 2.0	MPN/g	*pass*
Salmonella	< 3	MPN/4g	*pass*

Date Tested: 19 Sep. 12

Inerts	% by weight
Plastic	< 0.5
Glass	< 0.5
Metal	< 0.5
Sharps	ND

Metals	Dry wt.	EPA Limit	units
Aluminum (Al)	6600	-	mg/kg
Arsenic (As):	2.7	41	mg/kg
Cadmium (Cd):	< 1.0	39	mg/kg
Chromium (Cr):	13	1200	mg/kg
Cobalt (Co)	3.4	-	mg/kg
Copper (Cu):	38	1500	mg/kg
Iron (Fe):	9300	-	mg/kg
Lead (Pb):	15	300	mg/kg
Manganese (Mn):	190	-	mg/kg
Mercury (Hg):	< 1.0	17	mg/kg
Molybdenum (Mo):	1.6	75	mg/kg
Nickel (Ni):	13	420	mg/kg
Selenium (Se):	< 1.0	36	mg/kg
Zinc (Zn):	140	2800	mg/kg

Size & Volume Distribution

MM	% by weight	% by volume	BD g/cc
> 50	0.0	0.0	0.00
25 to 50	0.0	0.0	0.00
16 to 25	0.0	0.0	0.00
9.5 to 16	1.6	0.9	0.52
6.3 to 9.5	4.6	3.4	0.40
4.0 to 6.3	8.5	9.1	0.28
2.0 to 4.0	19.9	25.1	0.24
< 2.0	65.4	61.5	0.32

Bulk Density Description:<.35 Light Materials, .35-.60 medium weight materials, >.60 Heavy Materials

Analyst: Assaf Sadeh

[redacted]

*Sample was received and handled in accordance with TMECC procedures.

Account No.: Date Received 19 Sep. 12
2090507 - 2/2 - 6908 Sample i.d. Zone 3 Control
Group: Sep.12 C_1 No. 9 Sample I.d. No. 2/2 2090507

INTERPRETATION:

Page one of three

Is Your Compost Stable?

Respiration Rate Biodegradation Rate of Your Pile
13 mg CO2-C/ ++
g OM/day < Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch

Biologically Available Carbon (BAC) Optimum Degradation Rate
14 mg CO2-C/ ++
g OM/day < Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch

Is Your Compost Mature?

AmmoniaN/NitrateN ratio
39 Ratio ++
VeryMature>|< Mature >|< Immature

Ammonia N ppm
2000 mg/kg ++
dry wt. VeryMature>|< Mature >|< Immature

Nitrate N ppm
51 mg/kg ++
dry wt. < Immature >|< Mature

pH value
5.03 units ++++++++++++++++++++++++++++++++++++++
< Immature >|< Mature >|< Immature

Cucumber Emergence
100.0 percent +++
< Immature >|< Mature

Is Your Compost Safe Regarding Health?

Fecal Coliform
< 1000 MPN/g dry wt. +++++++
< Safe >|< High Fecal Coliform

Salmonella
Less than 3 /4g dry wt. +++++++
<Safe (none detected) >|< High Salmonella Count(> 3 per 4 grams)

Metals US EPA 503
Pass dry wt. +++++++++
<All Metals Pass >|< One or more Metals Fail

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)
3.6 Percent ++++++++++++++++++++++++++++
dry wt. <Low >|< Average >|< High Nutrient Content

AgIndex (Nutrients / Sodium and Chloride Salts) ((N+P2O5+K2O) / (Na + Cl))
9 Ratio ++
Na & Cl >|< Nutrient and Sodium and Chloride Provider >|< Nutrient Provider

Plant Available Nitrogen (PAN) Estimated release for first season
9 lbs/ton ++++++++++++++++++++++++++++++++++++
wet wt. Low Nitrogen Provider>|< Average Nitrogen Provider >|<High Nitrogen Provider

C/N Ratio
17 Ratio +++++++++++++++++++++++++++++++++
< Nitrogen Release >|< N Neutral >|< N-Demand>|< High Nitrogen Demand

Soluble Available Nutrients & Salts (EC5 w/w dw)
11 mmhos/cm ++
dry wt. SloRelease>|< Average Nutrient Release Rate >|<High Available Nutrients

Lime Content (CaCO3)
0 Lbs/ton +
dry wt. < Low >|< Average >|< High Lime Content (as CaCO3)

What are the physical properties of your compost?

Percent Ash
53.5 Percent +++
dry wt. < High Organic Matter >|< Average >|< High Ash Content

Sieve Size % > 6.3 MM (0.25")
6.2 Percent ++
dry wt. All Uses >|< Size May Restrict Uses for Potting mix and Golf Courses

Account No.:		Date Received	19 Sep. 12
2090507 - 2/2 - 6908		Sample i.d.	Zone 3 Control
Group:	Sep.12 C_1 No. 9	Sample I.d. No.	2/2 2090507

INTERPRETATION:

Is Your Compost Stable?

Respiration Rate

13 High-for mulch mg CO2-C/g OM/day

The respiration rate is a measurement of the biodegradation rate of the organic matter in the sample (as received). The respiration rate is determined by measuring the rate at which CO2 is released under optimized moisture and temperature conditions.

Biologically Available Carbon

14 High-for mulch mg CO2-C/g OM/day

Biologically Available Carbon (BAC) is a measurement of the rate at which CO2 is released under optimized moisture, temperature, porosity, nutrients, pH and microbial conditions. If both the RR and the BAC test values are close to the same value, the pile is optimized for composting. If both values are high the compost pile just needs more time. If both values are low the compost has stabilized and should be moved to curing. BAC test values that are higher than RR indicate that the compost pile has stalled. This could be due to anaerobic conditions, lack of available nitrogen due to excessive air converting ammonia to the unavailable nitrate form, lack of nitrogen or other nutrients due to poor choice of feedstock, pH value out of range, or microbes rendered non-active.

Is Your Compost Mature?

AmmoniaN:NitrateN ratio

39 immature

Ammonia N ppm

2000 immature

Nitrate N ppm

51 mature

pH value

5.03 immature

Composting to stabilize carbon can occur at such a rapid rate that sometimes phytotoxins remain in the compost and must be neutralized before using in high concentrations or in high-end uses. This step is called curing. Typically ammonia is in excess with the break-down of organic materials resulting in an increase in pH. This combination results in a loss of volatile ammonia (it smells). Once this toxic ammonia has been reduced and the pH drops, the microbes convert the ammonia to nitrates. A low ammonia + high nitrate score is indicative of a mature compost, however there are many exceptions. For example, a compost with a low pH (<7) will retain ammonia, while a compost with high lime content can lose ammonia before the organic fraction becomes stable. Composts must first be stable before curing indicators apply.

Cucumber Bioassay

100.0 Percent

Cucumbers are chosen for this test because they are salt tolerant and very sensitive to ammonia and organic acid toxicity. Therefore, we can germinate seeds in high concentrations of compost to measure phytotoxic effects without soluble salts being the limiting factor. Values above 80% for both percent emergence and vigor are indicative of a well-cured compost. Exceptions include very high salts that affect the cucumbers, excessive concentrations of nitrates and other nutrients that will be in range when formulated to make a growing media. In addition to testing a 1:1 compost: vermiculite blend, we also test a diluted 1:3 blend to indicate a more sensitive toxicity level.

Is Your Compost Safe Regarding Health?

Fecal Coliform

< 1000 / g dry wt. Fecal coliforms can survive in both aerobic and anaerobic conditions and is common in all initial compost piles. Most human pathogens occur from fecal matter and all fecal matter is loaded in fecal coliforms. Therefore fecal coliforms are used as an indicator to determine if the chosen method for pathogen reduction (heat for compost) has met the requirements of sufficient temperature, time and mixing. If the fecal coliforms are reduced to below 1000 per gram dry wt. it is assumed all others pathogens are eliminated. Potential problems are that fecal coliform can regrow during the curing phase or during shipping. This is because the conditions are now more favorable for growth than during the composting process.

Salmonella Bacteria

Less than 3 3 / 4g dry wt. Salmonella is not only another indicator organism but also a toxic microbe. It has been used in the case of biosolids industry to determine adequate pathogen reduction.

Metals

Pass The ten heavy metals listed in the EPA 503 regulations are chosen to determine if compost can be applied to ag land and handled without toxic effects. Most high concentrations of heavy metals are derived from woodwaste feedstock such as chrome-arsenic treated or lead painted demolition wood. Biosolids are rarely a problem.

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)

3.6 Average nutrient content

This value is the sum of the primary nutrients Nitrogen, Phosphorus and Potassium. Reported units are consistent with those found on fertilizer formulations. A sum greater than 5 is indicative of a compost with high nutrient content, and best used to supply nutrients to a receiving soil. A sum below 2 indicates low nutrient content, and is best-used to improve soil structure via the addition of organic matter. Most compost falls between 2 and 5.

Account No.:
2090507 - 2/2 - 6908
Group: Sep.12 C_1 No. 9

Date Received 19 Sep. 12
Sample i.d. Zone 3 Control
Sample I.d. No. 2/2 2090507

INTERPRETATION:

AgIndex (Nutrients/Na+Cl)

9 Average nutrient ratio Composts with low AgIndex values have high concentrations of sodium and/or chloride compared to nutrients. Repeated use of a compost with a low AgIndex (< 2) may result in sodium and/or chloride acting as the limiting factor compared to nutrients, governing application rates. These composts may be used on well-draining soils and/or with salt-tolerant plants. Additional nutrients form another source may be needed if the application rate is limited by sodium or chloride. If the AgIndex is above 10, nutrients optimal for plant growth will be available without concern of sodium and/or chloride toxicity. Composts with an AgIndex of above 10 are good for increasing nutrient levels for all soils. Most composts score between 2 and 10. Concentrations of nutrients, sodium, and chloride in the receiving soil should be considered when determining compost application rates. The AgIndex is a product of feedstock quality. Feedstock from dairy manure, marine waste, industrial wastes, and halophytic plants are likely to produce a finished compost with a low AgIndex.

Plant Available Nitrogen (lbs/ton)

9 Average N Provider Plant Available Nitrogen (PAN) is calculated by estimating the release rate of Nitrogen from the organic fraction of the compost. This estimate is based on information gathered from the BAC test and measured ammonia and nitrate values. Despite the PAN value of the compost, additional sources of Nitrogen may be needed during he growing season to off-set the Nitrogen demand of the microbes present in the compost. With ample nutrients these microbes can further breakdown organic matter in the compost and release bound Nitrogen. Nitrogen demand based on a high C/N ratio is not considered in the PAN calculation because additional Nitrogen should always be supplemented to the receiving soil when composts with a high C/N ratio are applied.

C/N Ratio

17 Indicates immaturity As a guiding principal, a C/N ratio below 14 indicates maturity and above 14 indicates immaturity, however, there are many exceptions. Large woodchips (>6.3mm), bark, and redwood are slow to breakdown and therefore can result in a relatively stable product while the C/N ratio value is high. Additionally, some composts with chicken manure and/or green grass feedstocks can start with a C/N ratio below 15 and are very unstable. A C/N ratio below 10 supplies Nitrogen, while a ratio above 20 can deplete Nitrogen from the soil. The rate at which Nitrogen will be released or used by the microbes is indicated by the respiration rate (BAC). If the respiration rate is too high the transfer of Nitrogen will not be controlable.

Soluble Nutrients & Salts (EC5 w/w dw - mmhos/cm)

11 High salts This value refers to all soluble ions including nutrients, sodium, chloride and some soluble organic compounds. The concentration of salts will change due to the release of salts from the organic matter as it degrades, volatilization of ammonia, decomposition of soluble organics, and conversion of molecular structure. High salts + high AgIndex is indicative of a compost high in readily available nutrients. The application rate of these composts should be limited by the optimum nutrient value based on soil analysis of the receiving soil. High Salts + low AgIndex is indicative of a compost low in nutrients with high concentrations of sodium and/or chloride. Limit the application rate according to the toxicity level of thesodium and/or chloride. Low salts indicates that the compost can be applied without risking salt toxicity, is likely a good source of organic matter, and that nutrients will release slowly over time.

Lime Content (lbs. per ton)

0 Low lime content Compost high in lime or carbonates are often those produced from chicken manure (layers) ash materials, and lime products. These are excellent products to use on a receiving soil where lime has been recommended by soil analysis to raise the pH. Composts with a high lime content should be closely considered for pH requirements when formulating potting mixes.

Physical Properties

Percent Ash

53.5 Average ash content Ash is the non-organic fraction of a compost. Most composts contain approximately 50% ash (dry weight basis). Compost can be high in ash content for many reasons including: excess minerilzation(old compost), contamination with soil base material during turning, poor quality feedstock, and soil or mineral products added. Finding the source and reducing high ash content is often the fastest means to increasing nutrient quality of a compost.

Particle Size % > 6.3 MM (0.25")

6.2 May restrict use Large particles may restrict use for potting soils, golf course topdressings, seed-starter mixes, and where a fine size distribution is required. Composts with large particles can still be used as excellent additions to field soils, shrub mixes and mulches.

Particle Size Distribution

Each size fraction is measured by weight, volume and bulk density. These results are particularly relevent with decisions to screen or not, and if screening, which size screen to use. The bulk density indicates if the fraction screened is made of light weight organic material or heavy mineral material. Removing large mineral material can greatly improve compost quality by increasing nutrient and organic concentrations.

Appendix:		
	Estimated available nutrients for use when calculating application rates	
Plant Available Nitrogen (PAN) calculations:		lbs/ton (As Rcvd.)
PAN = (X * (organic N)) + ((NH4-N) + (NO3-N))		
X value = If BAC < 2 then X = 0.1	Plant Available Nitrogen (PAN)	9.3
If BAC =2.1 to 5 then X = 0.2	Ammonia (NH4-N)	2.40
If BAC =5.1 to 10 then X = 0.3	Nitrate (NO3-N)	0.06
If BAC > 10 then X = 0.4	Available Phosphorus (P2O5*0.64)	4.7
Note: If C/N ratio > 15 additional N should be applied.	Available Potassium (K2O)	16.4

ANALYTICAL CHEMISTS
and
BACTERIOLOGISTS
Approved by State of California

SOIL CONTROL LAB

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WATSONVILLE
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FAX: 831-724-3188
www.compostlab.com

Account #: 2100583-1/2-6908
Group: Oct.12 C #26
Reporting Date: November 1, 2012

TCCBI - Harvest Power
24487 Rd. 140
Tulare, CA 93274
Attn: John Jones

Date Received: 19 Oct. 12
Sample Identification: Zone #1- Cure
Sample ID #: 2100583 - 1/2

Nutrients	Dry wt.	As Rcvd.	units
Total Nitrogen:	1.4	0.94	%
Ammonia (NH_4-N):	690	460	mg/kg
Nitrate (NO_3-N):	6.1	4.0	mg/kg
Org. Nitrogen (Org.-N):	1.3	0.86	%
Phosphorus (as P_2O_5):	0.65	0.43	%
Phosphorus (P):	2800	1900	mg/kg
Potassium (as K_2O):	1.4	0.92	%
Potassium (K):	11000	7600	mg/kg
Calcium (Ca):	2.3	1.5	%
Magnesium (Mg):	0.47	0.31	%
Sulfate (SO_4-S):	2000	1300	mg/kg
Boron (Total B):	19	13	mg/kg
Moisture:	0	33.7	%
Sodium (Na):	0.13	0.086	%
Chloride (Cl):	0.19	0.13	%
pH Value:	NA	6.12	unit
Bulk Density :	22	34	lb/cu ft
Carbonates ($CaCO_3$):	1.8	1.2	lb/ton
Conductivity (EC5):	7.5	NA	mmhos/cm
Organic Matter:	37.3	24.7	%
Organic Carbon:	21.0	14.0	%
Ash:	62.7	41.6	%
C/N Ratio	15	15	ratio
AgIndex	> 10	> 10	ratio

Stability Indicator:		Biologically
CO2 Evolution	Respirometery	Available C
mg CO_2-C/g OM/day	7.5	8.8
mg CO_2-C/g TS/day	2.8	3.3
Stability Rating	*moderately unstable*	*unstable*

Maturity Indicator: Cucumber Bioassay		
Compost:Vermiculite(v:v)	1:1	1:3
Emergence (%)	100	100
Seedling Vigor (%)	100	100
Description of Plants	*healthy*	*healthy*

Pathogens	Results	Units	Rating
Fecal Coliform	> 1200	MPN/g	*fail*
Salmonella	< 3	MPN/4g	*pass*

Date Tested: 19 Oct. 12

Inerts	% by weight
Plastic	< 0.5
Glass	< 0.5
Metal	< 0.5
Sharps	ND

Metals	Dry wt.	EPA Limit	units
Aluminum (Al)	8300	-	mg/kg
Arsenic (As):	3.0	41	mg/kg
Cadmium (Cd):	< 1.0	39	mg/kg
Chromium (Cr):	15	1200	mg/kg
Cobalt (Co)	2.7	-	mg/kg
Copper (Cu):	69	1500	mg/kg
Iron (Fe):	11000	-	mg/kg
Lead (Pb):	17	300	mg/kg
Manganese (Mn):	160	-	mg/kg
Mercury (Hg):	< 1.0	17	mg/kg
Molybdenum (Mo):	1.5	75	mg/kg
Nickel (Ni):	10	420	mg/kg
Selenium (Se):	< 1.0	36	mg/kg
Zinc (Zn):	140	2800	mg/kg

Size & Volume Distribution

MM	% by weight	% by volume	BD g/cc
> 50	0.0	0.0	0.00
25 to 50	0.0	0.0	0.00
16 to 25	0.0	0.0	0.00
9.5 to 16	2.1	4.0	0.23
6.3 to 9.5	3.7	4.0	0.42
4.0 to 6.3	10.2	11.1	0.41
2.0 to 4.0	18.1	25.4	0.31
< 2.0	65.8	55.6	0.52

Bulk Density Description:<.35 Light Materials, .35-.60 medium weight materials, >.60 Heavy Materials

Analyst: Assaf Sadeh

[redacted]

*Sample was received and handled in accordance with TMECC procedures.

Account No.:
2100583 - 1/2 - 6908
Group: Oct.12 C No. 26

Date Received 19 Oct. 12
Sample i.d. Zone #1- Cure
Sample I.d. No. 1/2 2100583

INTERPRETATION:

Is Your Compost Stable?

Respiration Rate Biodegradation Rate of Your Pile
7.5 mg CO2-C/ g OM/day
+++++++++++++++++++++++++++++
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch

Biologically Available Carbon (BAC) Optimum Degradation Rate
8.8 mg CO2-C/ g OM/day
++++++++++++++++++++++++++++++++++
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch

Is Your Compost Mature?

AmmoniaN/NitrateN ratio
110 Ratio
+++
VeryMature>|< Mature >|< Immature

Ammonia N ppm
690 mg/kg dry wt.
+++
VeryMature>|< Mature >|< Immature

Nitrate N ppm
6.1 mg/kg dry wt.
++++
< Immature >|< Mature

pH value
6.12 units
++
< Immature >|< Mature >|< Immature

Cucumber Emergence
100.0 percent
+++
< Immature >|< Mature

Is Your Compost Safe Regarding Health?

Fecal Coliform
> 1000 MPN/g dry wt.
+++
< Safe >|< High Fecal Coliform

Salmonella
Less than 3 /4g dry wt.
+++++++
<Safe (none detected) >|< High Salmonella Count(> 3 per 4 grams)

Metals US EPA 503
Pass dry wt.
+++++++++
<All Metals Pass >|< One or more Metals Fail

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)
3.4 Percent dry wt.
++++++++++++++++++++++++++
<Low >|< Average >|< High Nutrient Content

AgIndex (Nutrients / Sodium and Chloride Salts) ((N+P2O5+K2O) / (Na + Cl))
11 Ratio
+++
Na & Cl >|< Nutrient and Sodium and Chloride Provider >|< Nutrient Provider

Plant Available Nitrogen (PAN) Estimated release for first season
7 lbs/ton wet wt.
++++++++++++++++++++++++++
Low Nitrogen Provider>|< Average Nitrogen Provider >|<High Nitrogen Provider

C/N Ratio
15 Ratio
+++++++++++++++++++++++++++++
< Nitrogen Release >|< N-Neutral >|< N Demand>|< High Nitrogen Demand

Soluble Available Nutrients & Salts (EC5 w/w dw)
7.5 mmhos/cm dry wt.
+++++++++++++++++++++++++++++++++++++++
SloRelease>|< Average Nutrient Release Rate >|<High Available Nutrients

Lime Content (CaCO3)
1.8 Lbs/ton dry wt.
++
< Low >|< Average >|< High Lime Content (as CaCO3)

What are the physical properties of your compost?

Percent Ash
62.7 Percent dry wt.
+++
< High Organic Matter >|< Average >|< High Ash Content

Sieve Size % > 6.3 MM (0.25")
5.9 Percent dry wt.
++
All Uses >|< Size May Restrict Uses for Potting mix and Golf Courses

Account No.:		Date Received	19 Oct. 12
2100583 - 1/2 - 6908		Sample i.d.	Zone #1- Cure
Group:	Oct.12 C No. 26	Sample I.d. No.	1/2 2100583

INTERPRETATION:

Is Your Compost Stable?

Respiration Rate

7.5 Moderate-selected use mg CO2-C/g OM/day

The respiration rate is a measurement of the biodegradation rate of the organic matter in the sample (as received). The respiration rate is determined by measuring the rate at which CO2 is released under optimized moisture and temperature conditions.

Biologically Available Carbon

8.8 Moderate-selected use mg CO2-C/g OM/day

Biologically Available Carbon (BAC) is a measurement of the rate at which CO2 is released under optimized moisture, temperature, porosity, nutrients, pH and microbial conditions. If both the RR and the BAC test values are close to the same value, the pile is optimized for composting. If both values are high the compost pile just needs more time. If both values are low the compost has stabilized and should be moved to curing. BAC test values that are higher than RR indicate that the compost pile has stalled. This could be due to anaerobic conditions, lack of available nitrogen due to excessive air converting ammonia to the unavailable nitrate form, lack of nitrogen or other nutrients due to poor choice of feedstock, pH value out of range, or microbes rendered non-active.

Is Your Compost Mature?

AmmoniaN:NitrateN ratio

110 immature

Ammonia N ppm

690 immature

Nitrate N ppm

6.1 immature

pH value

6.12 immature

Composting to stabilize carbon can occur at such a rapid rate that sometimes phytotoxins remain in the compost and must be neutralized before using in high concentrations or in high-end uses. This step is called curing. Typically ammonia is in excess with the break-down of organic materials resulting in an increase in pH. This combination results in a loss of volatile ammonia (it smells). Once this toxic ammonia has been reduced and the pH drops, the microbes convert the ammonia to nitrates. A low ammonia + high nitrate score is indicative of a mature compost, however there are many exceptions. For example, a compost with a low pH (<7) will retain ammonia, while a compost with high lime content can lose ammonia before the organic fraction becomes stable. Composts must first be stable before curing indicators apply.

Cucumber Bioassay

100.0 Percent

Cucumbers are chosen for this test because they are salt tolerant and very sensitive to ammonia and organic acid toxicity. Therefore, we can germinate seeds in high concentrations of compost to measure phytotoxic effects without soluble salts being the limiting factor. Values above 80% for both percent emergence and vigor are indicative of a well-cured compost. Exceptions include very high salts that affect the cucumbers, excessive concentrations of nitrates and other nutrients that will be in range when formulated to make a growing media. In addition to testing a 1:1 compost: vermiculite blend, we also test a diluted 1:3 blend to indicate a more sensitive toxicity level.

Is Your Compost Safe Regarding Health?

Fecal Coliform

> 1000 / g dry wt.

Fecal coliforms can survive in both aerobic and anaerobic conditions and is common in all initial compost piles. Most human pathogens occur from fecal matter and all fecal matter is loaded in fecal coliforms. Therefore fecal coliforms are used as an indicator to determine if the chosen method for pathogen reduction (heat for compost) has met the requirements of sufficient temperature, time and mixing. If the fecal coliforms are reduced to below 1000 per gram dry wt. it is assumed all others pathogens are eliminated. Potential problems are that fecal coliform can regrow during the curing phase or during shipping. This is because the conditions are now more favorable for growth than during the composting process.

Salmonella Bacteria

Less than 3 3 / 4g dry wt.

Salmonella is not only another indicator organism but also a toxic microbe. It has been used in the case of biosolids industry to determine adequate pathogen reduction.

Metals

Pass

The ten heavy metals listed in the EPA 503 regulations are chosen to determine if compost can be applied to ag land and handled without toxic effects. Most high concentrations of heavy metals are derived from woodwaste feedstock such as chrome-arsenic treated or lead painted demolition wood. Biosolids are rarely a problem.

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)

3.4 Average nutrient content

This value is the sum of the primary nutrients Nitrogen, Phosphorus and Potassium. Reported units are consistent with those found on fertilizer formulations. A sum greater than 5 is indicative of a compost with high nutrient content, and best used to supply nutrients to a receiving soil. A sum below 2 indicates low nutrient content, and is best-used to improve soil structure via the addition of organic matter. Most compost falls between 2 and 5.

Account No.:		Date Received	19 Oct. 12	
2100583 - 1/2 - 6908		Sample i.d.	Zone #1- Cure	
Group:	Oct.12 C No. 26	Sample I.d. No.	1/2	2100583

INTERPRETATION:

AgIndex (Nutrients/Na+Cl)

11 High nutrient ratio Composts with low AgIndex values have high concentrations of sodium and/or chloride compared to nutrients. Repeated use of a compost with a low AgIndex (< 2) may result in sodium and/or chloride acting as the limiting factor compared to nutrients, governing application rates. These composts may be used on well-draining soils and/or with salt-tolerant plants. Additional nutrients form another source may be needed if the application rate is limited by sodium or chloride. If the AgIndex is above 10, nutrients optimal for plant growth will be available without concern of sodium and/or chloride toxicity. Composts with an AgIndex of above 10 are good for increasing nutrient levels for all soils. Most composts score between 2 and 10. Concentrations of nutrients, sodium, and chloride in the receiving soil should be considered when determining compost application rates. The AgIndex is a product of feedstock quality. Feedstock from dairy manure, marine waste, industrial wastes, and halophytic plants are likely to produce a finished compost with a low AgIndex.

Plant Available Nitrogen (lbs/ton)

7 Average N Provider Plant Available Nitrogen (PAN) is calculated by estimating the release rate of Nitrogen from the organic fraction of the compost. This estimate is based on information gathered from the BAC test and measured ammonia and nitrate values. Despite the PAN value of the compost, additional sources of Nitrogen may be needed during he growing season to off-set the Nitrogen demand of the microbes present in the compost. With ample nutrients these microbes can further breakdown organic matter in the compost and release bound Nitrogen. Nitrogen demand based on a high C/N ratio is not considered in the PAN calculation because additional Nitrogen should always be supplemented to the receiving soil when composts with a high C/N ratio are applied.

C/N Ratio

15 Indicates immaturity As a guiding principal, a C/N ratio below 14 indicates maturity and above 14 indicates immaturity, however, there are many exceptions. Large woodchips (>6.3mm), bark, and redwood are slow to breakdown and therefore can result in a relatively stable product while the C/N ratio value is high. Additionally, some composts with chicken manure and/or green grass feedstocks can start with a C/N ratio below 15 and are very unstable. A C/N ratio below 10 supplies Nitrogen, while a ratio above 20 can deplete Nitrogen from the soil. The rate at which Nitrogen will be released or used by the microbes is indicated by the respiration rate (BAC). If the respiration rate is too high the transfer of Nitrogen will not be controlable.

Soluble Nutrients & Salts (EC5 w/w dw - mmhos/cm)

7.5 Average salts This value refers to all soluble ions including nutrients, sodium, chloride and some soluble organic compounds. The concentration of salts will change due to the release of salts from the organic matter as it degrades, volatilization of ammonia, decomposition of soluble organics, and conversion of molecular structure. High salts + high AgIndex is indicative of a compost high in readily available nutrients. The application rate of these composts should be limited by the optimum nutrient value based on soil analysis of the receiving soil. High Salts + low AgIndex is indicative of a compost low in nutrients with high concentrations of sodium and/or chloride. Limit the application rate according to the toxicity level of thesodium and/or chloride. Low salts indicates that the compost can be applied without risking salt toxicity, is likely a good source of organic matter, and that nutrients will release slowly over time.

Lime Content (lbs. per ton)

1.8 Low lime content Compost high in lime or carbonates are often those produced from chicken manure (layers) ash materials, and lime products. These are excellent products to use on a receiving soil where lime has been recommended by soil analysis to raise the pH. Composts with a high lime content should be closely considered for pH requirements when formulating potting mixes.

Physical Properties

Percent Ash

62.7 High ash content Ash is the non-organic fraction of a compost. Most composts contain approximately 50% ash (dry weight basis). Compost can be high in ash content for many reasons including: excess minerilzation(old compost), contamination with soil base material during turning, poor quality feedstock, and soil or mineral products added. Finding the source and reducing high ash content is often the fastest means to increasing nutrient quality of a compost.

Particle Size % > 6.3 MM (0.25")

5.9 May restrict use Large particles may restrict use for potting soils, golf course topdressings, seed-starter mixes, and where a fine size distribution is required. Composts with large particles can still be used as excellent additions to field soils, shrub mixes and mulches.

Particle Size Distribution

Each size fraction is measured by weight, volume and bulk density. These results are particularly relevent with decisions to screen or not, and if screening, which size screen to use. The bulk density indicates if the fraction screened is made of light weight organic material or heavy mineral material. Removing large mineral material can greatly improve compost quality by increasing nutrient and organic concentrations.

Appendix:

Plant Available Nitrogen (PAN) calculations:
PAN = (X * (organic N)) + ((NH4-N) + (NO3-N))
X value = If BAC < 2 then X = 0.1
If BAC =2.1 to 5 then X = 0.2
If BAC =5.1 to 10 then X = 0.3
If BAC > 10 then X = 0.4
Note: If C/N ratio > 15 additional N should be applied.

Estimated available nutrients for use when calculating application rates

	lbs/ton (As Rcvd.)
Plant Available Nitrogen (PAN)	6.6
Ammonia (NH4-N)	0.92
Nitrate (NO3-N)	0.01
Available Phosphorus (P2O5*0.64)	5.5
Available Potassium (K2O)	18.3

ANALYTICAL CHEMISTS
and
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Approved by State of California

SOIL CONTROL LAB

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FAX: 831-724-3188
www.compostlab.com

Account #: 2100583-2/2-6908
Group: Oct.12 C #27
Reporting Date: November 1, 2012

TCCBI - Harvest Power
24487 Rd. 140
Tulare, CA 93274
Attn: John Jones

Date Received: 19 Oct. 12
Sample Identification: Zone #2- Cure
Sample ID #: 2100583 - 2/2

Nutrients	Dry wt.	As Rcvd.	units
Total Nitrogen:	1.2	0.90	%
Ammonia (NH_4-N):	290	210	mg/kg
Nitrate (NO_3-N):	5.7	4.1	mg/kg
Org. Nitrogen (Org.-N):	1.2	0.87	%
Phosphorus (as P_2O_5):	0.72	0.52	%
Phosphorus (P):	3200	2300	mg/kg
Potassium (as K_2O):	1.4	0.98	%
Potassium (K):	11000	8100	mg/kg
Calcium (Ca):	2.4	1.7	%
Magnesium (Mg):	0.61	0.45	%
Sulfate (SO_4-S):	1300	910	mg/kg
Boron (Total B):	28	20	mg/kg
Moisture:	0	27.6	%
Sodium (Na):	0.11	0.080	%
Chloride (Cl):	0.19	0.14	%
pH Value:	NA	7.33	unit
Bulk Density :	28	38	lb/cu ft
Carbonates ($CaCO_3$):	15	11	lb/ton
Conductivity (EC5):	4.2	NA	mmhos/cm
Organic Matter:	32.9	23.8	%
Organic Carbon:	17.0	13.0	%
Ash:	67.1	48.6	%
C/N Ratio	14	14	ratio
AgIndex	> 10	> 10	ratio

Stability Indicator:		Biologically
CO2 Evolution	Respirometery	Available C
mg CO_2-C/g OM/day	6.2	7.1
mg CO_2-C/g TS/day	2.1	2.3
Stability Rating	*moderately unstable*	*moderately unstable*

Maturity Indicator: Cucumber Bioassay		
Compost:Vermiculite(v:v)	1:1	1:3
Emergence (%)	100	100
Seedling Vigor (%)	100	100
Description of Plants	*healthy*	*healthy*

Pathogens	Results	Units	Rating
Fecal Coliform	340	MPN/g	*pass*
Salmonella	< 3	MPN/4g	*pass*

Date Tested: 19 Oct. 12

Inerts	% by weight
Plastic	< 0.5
Glass	< 0.5
Metal	< 0.5
Sharps	ND

Metals	Dry wt.	EPA Limit	units
Aluminum (Al)	9100	-	mg/kg
Arsenic (As):	3.0	41	mg/kg
Cadmium (Cd):	< 1.0	39	mg/kg
Chromium (Cr):	13	1200	mg/kg
Cobalt (Co)	4.0	-	mg/kg
Copper (Cu):	54	1500	mg/kg
Iron (Fe):	12000	-	mg/kg
Lead (Pb):	20	300	mg/kg
Manganese (Mn):	230	-	mg/kg
Mercury (Hg):	< 1.0	17	mg/kg
Molybdenum (Mo):	1.7	75	mg/kg
Nickel (Ni):	11	420	mg/kg
Selenium (Se):	< 1.0	36	mg/kg
Zinc (Zn):	170	2800	mg/kg

Size & Volume Distribution			
MM	% by weight	% by volume	BD g/cc
> 50	0.0	0.0	0.00
25 to 50	0.0	0.0	0.00
16 to 25	0.0	0.0	0.00
9.5 to 16	0.0	0.0	0.00
6.3 to 9.5	1.7	1.8	0.55
4.0 to 6.3	3.9	5.3	0.42
2.0 to 4.0	10.8	17.5	0.36
< 2.0	83.6	75.4	0.64

Bulk Density Description:<.35 Light Materials,
.35-.60 medium weight materials, >.60 Heavy Materials

Analyst: Assaf Sadeh

[redacted]

*Sample was received and handled in accordance with TMECC procedures.

Account No.:
2100583 - 2/2 - 6908
Group: Oct.12 C No. 27

Date Received 19 Oct. 12
Sample i.d. Zone #2- Cure
Sample I.d. No. 2/2 2100583

INTERPRETATION:

Is Your Compost Stable?

Respiration Rate Biodegradation Rate of Your Pile
6.2 mg CO2-C/ g OM/day
+++++++++++++++++++++++++
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch

Biologically Available Carbon (BAC) Optimum Degradation Rate
7.1 mg CO2-C/ g OM/day
+++++++++++++++++++++++++++++
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch

Is Your Compost Mature?

AmmoniaN/NitrateN ratio
51 Ratio
+++
VeryMature>|< Mature >|< Immature

Ammonia N ppm
290 mg/kg dry wt.
+++++++++++++++++++++++++++++++++
VeryMature>|< Mature >|< Immature

Nitrate N ppm
5.7 mg/kg dry wt.
++++
< Immature >|< Mature

pH value
7.33 units
++
< Immature >|< Mature >|< Immature

Cucumber Emergence
100.0 percent
++
< Immature >|< Mature

Is Your Compost Safe Regarding Health?

Fecal Coliform
< 1000 MPN/g dry wt.
+++++++
< Safe >|< High Fecal Coliform

Salmonella
Less than 3 /4g dry wt.
+++++++
<Safe (none detected) >|< High Salmonella Count(> 3 per 4 grams)

Metals US EPA 503
Pass dry wt.
+++++++++
<All Metals Pass >|< One or more Metals Fail

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)
3.3 Percent dry wt.
++++++++++++++++++++++++++
<Low >|< Average >|< High Nutrient Content

AgIndex (Nutrients / Sodium and Chloride Salts) ((N+P2O5+K2O) / (Na + Cl))
11 Ratio
++
Na & Cl >|< Nutrient and Sodium and Chloride Provider >|< Nutrient Provider

Plant Available Nitrogen (PAN) Estimated release for first season
6 lbs/ton wet wt.
+++++++++++++++++++++++
Low Nitrogen Provider>|< Average Nitrogen Provider >|<High Nitrogen Provider

C/N Ratio
14 Ratio
++++++++++++++++++++++++++++
< Nitrogen Release >|< N-Neutral >|< N-Demand>|< High Nitrogen Demand

Soluble Available Nutrients & Salts (EC5 w/w dw)
4.2 mmhos/cm dry wt.
+++++++++++++++++++++++
SloRelease>|< Average Nutrient Release Rate >|<High Available Nutrients

Lime Content (CaCO3)
15 Lbs/ton dry wt.
+++++++++++++++++++++++++
< Low >|< Average >|< High Lime Content (as CaCO3)

What are the physical properties of your compost?

Percent Ash
67.1 Percent dry wt.
++
< High Organic Matter >|< Average >|< High Ash Content

Sieve Size % > 6.3 MM (0.25")
1.7 Percent dry wt.
+++++++++++++
All Uses >|< Size May Restrict Uses for Potting mix and Golf Courses

Account No.:		Date Received	19 Oct. 12
2100583 - 2/2 - 6908		Sample i.d.	Zone #2- Cure
Group:	Oct.12 C No. 27	Sample I.d. No.	2/2 2100583

INTERPRETATION:

Is Your Compost Stable?

Respiration Rate

6.2 Moderate-selected use mg CO2-C/g OM/day

The respiration rate is a measurement of the biodegradation rate of the organic matter in the sample (as received). The respiration rate is determined by measuring the rate at which CO2 is released under optimized moisture and temperature conditions.

Biologically Available Carbon

7.1 Moderate-selected use mg CO2-C/g OM/day

Biologically Available Carbon (BAC) is a measurement of the rate at which CO2 is released under optimized moisture, temperature, porosity, nutrients, pH and microbial conditions. If both the RR and the BAC test values are close to the same value, the pile is optimized for composting. If both values are high the compost pile just needs more time. If both values are low the compost has stabilized and should be moved to curing. BAC test values that are higher than RR indicate that the compost pile has stalled. This could be due to anaerobic conditions, lack of available nitrogen due to excessive air converting ammonia to the unavailable nitrate form, lack of nitrogen or other nutrients due to poor choice of feedstock, pH value out of range, or microbes rendered non-active.

Is Your Compost Mature?

AmmoniaN:NitrateN ratio

51 immature

Ammonia N ppm

290 mature

Nitrate N ppm

5.7 immature

pH value

7.33 mature

Composting to stabilize carbon can occur at such a rapid rate that sometimes phytotoxins remain in the compost and must be neutralized before using in high concentrations or in high-end uses. This step is called curing. Typically ammonia is in excess with the break-down of organic materials resulting in an increase in pH. This combination results in a loss of volatile ammonia (it smells). Once this toxic ammonia has been reduced and the pH drops, the microbes convert the ammonia to nitrates. A low ammonia + high nitrate score is indicative of a mature compost, however there are many exceptions. For example, a compost with a low pH (<7) will retain ammonia, while a compost with high lime content can lose ammonia before the organic fraction becomes stable. Composts must first be stable before curing indicators apply.

Cucumber Bioassay

100.0 Percent Cucumbers are chosen for this test because they are salt tolerant and very sensitive to ammonia and organic acid toxicity. Therefore, we can germinate seeds in high concentrations of compost to measure phytotoxic effects without soluble salts being the limiting factor. Values above 80% for both percent emergence and vigor are indicative of a well-cured compost. Exceptions include very high salts that affect the cucumbers, excessive concentrations of nitrates and other nutrients that will be in range when formulated to make a growing media. In addition to testing a 1:1 compost: vermiculite blend, we also test a diluted 1:3 blend to indicate a more sensitive toxicity level.

Is Your Compost Safe Regarding Health?

Fecal Coliform

< 1000 / g dry wt. Fecal coliforms can survive in both aerobic and anaerobic conditions and is common in all initial compost piles. Most human pathogens occur from fecal matter and all fecal matter is loaded in fecal coliforms. Therefore fecal coliforms are used as an indicator to determine if the chosen method for pathogen reduction (heat for compost) has met the requirements of sufficient temperature, time and mixing. If the fecal coliforms are reduced to below 1000 per gram dry wt. it is assumed all others pathogens are eliminated. Potential problems are that fecal coliform can regrow during the curing phase or during shipping. This is because the conditions are now more favorable for growth than during the composting process.

Salmonella Bacteria

Less than 3 3 / 4g dry wt. Salmonella is not only another indicator organism but also a toxic microbe. It has been used in the case of biosolids industry to determine adequate pathogen reduction.

Metals

Pass The ten heavy metals listed in the EPA 503 regulations are chosen to determine if compost can be applied to ag land and handled without toxic effects. Most high concentrations of heavy metals are derived from woodwaste feedstock such as chrome-arsenic treated or lead painted demolition wood. Biosolids are rarely a problem.

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)

3.3 Average nutrient content

This value is the sum of the primary nutrients Nitrogen, Phosphorus and Potassium. Reported units are consistent with those found on fertilizer formulations. A sum greater than 5 is indicative of a compost with high nutrient content, and best used to supply nutrients to a receiving soil. A sum below 2 indicates low nutrient content, and is best-used to improve soil structure via the addition of organic matter. Most compost falls between 2 and 5.

Account No.:
2100583 - 2/2 - 6908
Group: Oct.12 C No. 27

Date Received 19 Oct. 12
Sample i.d. Zone #2- Cure
Sample I.d. No. 2/2 2100583

INTERPRETATION:

AgIndex (Nutrients/Na+Cl)

11 High nutrient ratio Composts with low AgIndex values have high concentrations of sodium and/or chloride compared to nutrients. Repeated use of a compost with a low AgIndex (< 2) may result in sodium and/or chloride acting as the limiting factor compared to nutrients, governing application rates. These composts may be used on well-draining soils and/or with salt-tolerant plants. Additional nutrients form another source may be needed if the application rate is limited by sodium or chloride. If the AgIndex is above 10, nutrients optimal for plant growth will be available without concern of sodium and/or chloride toxicity. Composts with an AgIndex of above 10 are good for increasing nutrient levels for all soils. Most composts score between 2 and 10. Concentrations of nutrients, sodium, and chloride in the receiving soil should be considered when determining compost application rates. The AgIndex is a product of feedstock quality. Feedstock from dairy manure, marine waste, industrial wastes, and halophytic plants are likely to produce a finished compost with a low AgIndex.

Plant Available Nitrogen (lbs/ton)

6 Average N Provider Plant Available Nitrogen (PAN) is calculated by estimating the release rate of Nitrogen from the organic fraction of the compost. This estimate is based on information gathered from the BAC test and measured ammonia and nitrate values. Despite the PAN value of the compost, additional sources of Nitrogen may be needed during he growing season to off-set the Nitrogen demand of the microbes present in the compost. With ample nutrients these microbes can further breakdown organic matter in the compost and release bound Nitrogen. Nitrogen demand based on a high C/N ratio is not considered in the PAN calculation because additional Nitrogen should always be supplemented to the receiving soil when composts with a high C/N ratio are applied.

C/N Ratio

14 Indicates maturity As a guiding principal, a C/N ratio below 14 indicates maturity and above 14 indicates immaturity, however, there are many exceptions. Large woodchips (>6.3mm), bark, and redwood are slow to breakdown and therefore can result in a relatively stable product while the C/N ratio value is high. Additionally, some composts with chicken manure and/or green grass feedstocks can start with a C/N ratio below 15 and are very unstable. A C/N ratio below 10 supplies Nitrogen, while a ratio above 20 can deplete Nitrogen from the soil. The rate at which Nitrogen will be released or used by the microbes is indicated by the respiration rate (BAC). If the respiration rate is too high the transfer of Nitrogen will not be controlable.

Soluble Nutrients & Salts (EC5 w/w dw - mmhos/cm)

4.2 Average salts This value refers to all soluble ions including nutrients, sodium, chloride and some soluble organic compounds. The concentration of salts will change due to the release of salts from the organic matter as it degrades, volatilization of ammonia, decomposition of soluble organics, and conversion of molecular structure. High salts + high AgIndex is indicative of a compost high in readily available nutrients. The application rate of these composts should be limited by the optimum nutrient value based on soil analysis of the receiving soil. High Salts + low AgIndex is indicative of a compost low in nutrients with high concentrations of sodium and/or chloride. Limit the application rate according to the toxicity level of thesodium and/or chloride. Low salts indicates that the compost can be applied without risking salt toxicity, is likely a good source of organic matter, and that nutrients will release slowly over time.

Lime Content (lbs. per ton)

15 Average lime content Compost high in lime or carbonates are often those produced from chicken manure (layers) ash materials, and lime products. These are excellent products to use on a receiving soil where lime has been recommended by soil analysis to raise the pH. Composts with a high lime content should be closely considered for pH requirements when formulating potting mixes.

Physical Properties

Percent Ash

67.1 High ash content Ash is the non-organic fraction of a compost. Most composts contain approximately 50% ash (dry weight basis). Compost can be high in ash content for many reasons including: excess minerilzation(old compost), contamination with soil base material during turning, poor quality feedstock, and soil or mineral products added. Finding the source and reducing high ash content is often the fastest means to increasing nutrient quality of a compost.

Particle Size % > 6.3 MM (0.25")

1.7 May restrict use Large particles may restrict use for potting soils, golf course topdressings, seed-starter mixes, and where a fine size distribution is required. Composts with large particles can still be used as excellent additions to field soils, shrub mixes and mulches.

Particle Size Distribution

Each size fraction is measured by weight, volume and bulk density. These results are particularly relevent with decisions to screen or not, and if screening, which size screen to use. The bulk density indicates if the fraction screened is made of light weight organic material or heavy mineral material. Removing large mineral material can greatly improve compost quality by increasing nutrient and organic concentrations.

Appendix:		
	Estimated available nutrients for use when calculating application rates	
Plant Available Nitrogen (PAN) calculations:		lbs/ton (As Rcvd.)
PAN = (X * (organic N)) + ((NH4-N) + (NO3-N))		
X value = If BAC < 2 then X = 0.1	Plant Available Nitrogen (PAN)	5.8
If BAC =2.1 to 5 then X = 0.2	Ammonia (NH4-N)	0.42
If BAC =5.1 to 10 then X = 0.3	Nitrate (NO3-N)	0.01
If BAC > 10 then X = 0.4	Available Phosphorus (P2O5*0.64)	6.7
Note: If C/N ratio > 15 additional N should be applied.	Available Potassium (K2O)	19.5

ANALYTICAL CHEMISTS
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www.compostlab.com

Account #: 2100765-1/2-6908
Group: Oct.12 D #22
Reporting Date: November 6, 2012

TCCBI - Harvest Power
24487 Rd. 140
Tulare, CA 93274
Attn: John Jones

Date Received: 26 Oct. 12
Sample Identification: Zone-3 Cure
Sample ID #: 2100765 - 1/2

Nutrients	Dry wt.	As Rcvd.	units
Total Nitrogen:	1.5	1.0	%
Ammonia (NH_4-N):	1500	1000	mg/kg
Nitrate (NO_3-N):	43	29	mg/kg
Org. Nitrogen (Org.-N):	1.3	0.87	%
Phosphorus (as P_2O_5):	0.63	0.42	%
Phosphorus (P):	2800	1900	mg/kg
Potassium (as K_2O):	1.4	0.94	%
Potassium (K):	12000	7800	mg/kg
Calcium (Ca):	1.8	1.2	%
Magnesium (Mg):	0.44	0.29	%
Sulfate (SO_4-S):	1300	900	mg/kg
Boron (Total B):	27	18	mg/kg
Moisture:	0	33.1	%
Sodium (Na):	0.13	0.085	%
Chloride (Cl):	0.27	0.18	%
pH Value:	NA	4.71	unit
Bulk Density :	18	27	lb/cu ft
Carbonates ($CaCO_3$):	<0.1	<0.1	lb/ton
Conductivity (EC5):	10	NA	mmhos/cm
Organic Matter:	53.8	36.0	%
Organic Carbon:	28.0	19.0	%
Ash:	46.2	30.9	%
C/N Ratio	18	18	ratio
AgIndex	9	9	ratio

Stability Indicator:		Biologically
CO2 Evolution	Respirometery	Available C
mg CO_2-C/g OM/day	23	23
mg CO_2-C/g TS/day	12	12
Stability Rating	*very unstable*	*very unstable*

Maturity Indicator: Cucumber Bioassay		
Compost:Vermiculite(v:v)	1:1	1:3
Emergence (%)	100	100
Seedling Vigor (%)	83	93
Description of Plants	*fungus*	*fungus*

Pathogens	Results	Units	Rating
Fecal Coliform	< 2.0	MPN/g	*pass*
Salmonella	< 3	MPN/4g	*pass*

Date Tested: 26 Oct. 12

Inerts	% by weight
Plastic	< 0.5
Glass	< 0.5
Metal	< 0.5
Sharps	ND

Metals	Dry wt.	EPA Limit	units
Aluminum (Al)	5700	-	mg/kg
Arsenic (As):	2.7	41	mg/kg
Cadmium (Cd):	< 1.0	39	mg/kg
Chromium (Cr):	12	1200	mg/kg
Cobalt (Co)	2.7	-	mg/kg
Copper (Cu):	58	1500	mg/kg
Iron (Fe):	8000	-	mg/kg
Lead (Pb):	19	300	mg/kg
Manganese (Mn):	170	-	mg/kg
Mercury (Hg):	< 1.0	17	mg/kg
Molybdenum (Mo):	1.8	75	mg/kg
Nickel (Ni):	8.9	420	mg/kg
Selenium (Se):	< 1.0	36	mg/kg
Zinc (Zn):	160	2800	mg/kg

Size & Volume Distribution

MM	% by weight	% by volume	BD g/cc
> 50	0.0	0.0	0.00
25 to 50	0.0	0.0	0.00
16 to 25	0.0	0.0	0.00
9.5 to 16	2.5	2.5	0.35
6.3 to 9.5	7.5	8.4	0.32
4.0 to 6.3	8.7	10.9	0.28
2.0 to 4.0	15.5	21.0	0.26
< 2.0	65.9	57.1	0.41

Bulk Density Description:<.35 Light Materials,
.35-.60 medium weight materials, >.60 Heavy Materials

Analyst: Assaf Sadeh

[redacted]

*Sample was received and handled in accordance with TMECC procedures.

Account No.:		Date Received	26 Oct. 12
2100765 - 1/2 - 6908		Sample i.d.	Zone-3 Cure
Group:	Oct.12 D No. 22	Sample I.d. No.	1/2 2100765

INTERPRETATION:

Page one of three

Is Your Compost Stable?

Respiration Rate Biodegradation Rate of Your Pile
23 mg CO2-C/ g OM/day
++
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch

Biologically Available Carbon (BAC) Optimum Degradation Rate
23 mg CO2-C/ g OM/day
++
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch

Is Your Compost Mature?

AmmoniaN/NitrateN ratio
35 Ratio
++
VeryMature>|< Mature >|< Immature

Ammonia N ppm
1500 mg/kg dry wt.
++
VeryMature>|< Mature >|< Immature

Nitrate N ppm
43 mg/kg dry wt.
+++++++++++++++++++++++++++++++++++++
< Immature >|< Mature

pH value
4.71 units
+++
< Immature >|< Mature >|< Immature

Cucumber Emergence
100.0 percent
++
< Immature >|< Mature

Is Your Compost Safe Regarding Health?

Fecal Coliform
< 1000 MPN/g dry wt.
+++++++
< Safe >|< High Fecal Coliform

Salmonella
Less than 3 /4g dry wt.
+++++++
<Safe (none detected) >|< High Salmonella Count(> 3 per 4 grams)

Metals US EPA 503
Pass dry wt.
+++++++++
<All Metals Pass >|< One or more Metals Fail

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)
3.6 Percent dry wt.
+++++++++++++++++++++++++++++++
<Low >|< Average >|< High Nutrient Content

AgIndex (Nutrients / Sodium and Chloride Salts) ((N+P2O5+K2O) / (Na + Cl))
9 Ratio
+++
Na & Cl >|< Nutrient and Sodium and Chloride Provider >|< Nutrient Provider

Plant Available Nitrogen (PAN) Estimated release for first season
10 lbs/ton wet wt.
+++
Low Nitrogen Provider>|< Average Nitrogen Provider >|<High Nitrogen Provider

C/N Ratio
18 Ratio
+++++++++++++++++++++++++++++++++++++++
< Nitrogen Release >|< N-Neutral >|< N-Demand>|< High Nitrogen Demand

Soluble Available Nutrients & Salts (EC5 w/w dw)
10 mmhos/cm dry wt.
++
SloRelease>|< Average Nutrient Release Rate >|<High Available Nutrients

Lime Content (CaCO3)
0 Lbs/ton dry wt.
+
< Low >|< Average >|< High Lime Content (as CaCO3)

What are the physical properties of your compost?

Percent Ash
46.2 Percent dry wt.
++
< High Organic Matter >|< Average >|< High Ash Content

Sieve Size % > 6.3 MM (0.25")
10.0 Percent dry wt.
+++
All Uses >|< Size May Restrict Uses for Potting mix and Golf Courses

Account No.:
2100765 - 1/2 - 6908
Group: Oct.12 D No. 22

Date Received 26 Oct. 12
Sample i.d. Zone-3 Cure
Sample I.d. No. 1/2 2100765

INTERPRETATION:

Is Your Compost Stable?

Respiration Rate

23 High-for mulch mg CO2-C/g OM/day

The respiration rate is a measurement of the biodegradation rate of the organic matter in the sample (as received). The respiration rate is determined by measuring the rate at which CO2 is released under optimized moisture and temperature conditions.

Biologically Available Carbon

23 High-for mulch mg CO2-C/g OM/day

Biologically Available Carbon (BAC) is a measurement of the rate at which CO2 is released under optimized moisture, temperature, porosity, nutrients, pH and microbial conditions. If both the RR and the BAC test values are close to the same value, the pile is optimized for composting. If both values are high the compost pile just needs more time. If both values are low the compost has stabilized and should be moved to curing. BAC test values that are higher than RR indicate that the compost pile has stalled. This could be due to anaerobic conditions, lack of available nitrogen due to excessive air converting ammonia to the unavailable nitrate form, lack of nitrogen or other nutrients due to poor choice of feedstock, pH value out of range, or microbes rendered non-active.

Is Your Compost Mature?

AmmoniaN:NitrateN ratio

35 immature

Ammonia N ppm

1500 immature

Nitrate N ppm

43 immature

pH value

4.71 immature

Composting to stabilize carbon can occur at such a rapid rate that sometimes phytotoxins remain in the compost and must be neutralized before using in high concentrations or in high-end uses. This step is called curing. Typically ammonia is in excess with the break-down of organic materials resulting in an increase in pH. This combination results in a loss of volatile ammonia (it smells). Once this toxic ammonia has been reduced and the pH drops, the microbes convert the ammonia to nitrates. A low ammonia + high nitrate score is indicative of a mature compost, however there are many exceptions. For example, a compost with a low pH (<7) will retain ammonia, while a compost with high lime content can lose ammonia before the organic fraction becomes stable. Composts must first be stable before curing indicators apply.

Cucumber Bioassay

100.0 Percent

Cucumbers are chosen for this test because they are salt tolerant and very sensitive to ammonia and organic acid toxicity. Therefore, we can germinate seeds in high concentrations of compost to measure phytotoxic effects without soluble salts being the limiting factor. Values above 80% for both percent emergence and vigor are indicative of a well-cured compost. Exceptions include very high salts that affect the cucumbers, excessive concentrations of nitrates and other nutrients that will be in range when formulated to make a growing media. In addition to testing a 1:1 compost: vermiculite blend, we also test a diluted 1:3 blend to indicate a more sensitive toxicity level.

Is Your Compost Safe Regarding Health?

Fecal Coliform

< 1000 / g dry wt. Fecal coliforms can survive in both aerobic and anaerobic conditions and is common in all initial compost piles. Most human pathogens occur from fecal matter and all fecal matter is loaded in fecal coliforms. Therefore fecal coliforms are used as an indicator to determine if the chosen method for pathogen reduction (heat for compost) has met the requirements of sufficient temperature, time and mixing. If the fecal coliforms are reduced to below 1000 per gram dry wt. it is assumed all others pathogens are eliminated. Potential problems are that fecal coliform can regrow during the curing phase or during shipping. This is because the conditions are now more favorable for growth than during the composting process.

Salmonella Bacteria

Less than 3 3 / 4g dry wt. Salmonella is not only another indicator organism but also a toxic microbe. It has been used in the case of biosolids industry to determine adequate pathogen reduction.

Metals

Pass The ten heavy metals listed in the EPA 503 regulations are chosen to determine if compost can be applied to ag land and handled without toxic effects. Most high concentrations of heavy metals are derived from woodwaste feedstock such as chrome-arsenic treated or lead painted demolition wood. Biosolids are rarely a problem.

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)

3.6 Average nutrient content

This value is the sum of the primary nutrients Nitrogen, Phosphorus and Potassium. Reported units are consistent with those found on fertilizer formulations. A sum greater than 5 is indicative of a compost with high nutrient content, and best used to supply nutrients to a receiving soil. A sum below 2 indicates low nutrient content, and is best-used to improve soil structure via the addition of organic matter. Most compost falls between 2 and 5.

Account No.:		Date Received	26 Oct. 12	
2100765 - 1/2 - 6908		Sample i.d.	Zone-3 Cure	
Group:	Oct.12 D No. 22	Sample I.d. No.	1/2	2100765

INTERPRETATION:

AgIndex (Nutrients/Na+Cl)

9 Average nutrient ratio Composts with low AgIndex values have high concentrations of sodium and/or chloride compared to nutrients. Repeated use of a compost with a low AgIndex (< 2) may result in sodium and/or chloride acting as the limiting factor compared to nutrients, governing application rates. These composts may be used on well-draining soils and/or with salt-tolerant plants. Additional nutrients form another source may be needed if the application rate is limited by sodium or chloride. If the AgIndex is above 10, nutrients optimal for plant growth will be available without concern of sodium and/or chloride toxicity. Composts with an AgIndex of above 10 are good for increasing nutrient levels for all soils. Most composts score between 2 and 10. Concentrations of nutrients, sodium, and chloride in the receiving soil should be considered when determining compost application rates. The AgIndex is a product of feedstock quality. Feedstock from dairy manure, marine waste, industrial wastes, and halophytic plants are likely to produce a finished compost with a low AgIndex.

Plant Available Nitrogen (lbs/ton)

10 Average N Provider Plant Available Nitrogen (PAN) is calculated by estimating the release rate of Nitrogen from the organic fraction of the compost. This estimate is based on information gathered from the BAC test and measured ammonia and nitrate values. Despite the PAN value of the compost, additional sources of Nitrogen may be needed during he growing season to off-set the Nitrogen demand of the microbes present in the compost. With ample nutrients these microbes can further breakdown organic matter in the compost and release bound Nitrogen. Nitrogen demand based on a high C/N ratio is not considered in the PAN calculation because additional Nitrogen should always be supplemented to the receiving soil when composts with a high C/N ratio are applied.

C/N Ratio

18 Indicates immaturity As a guiding principal, a C/N ratio below 14 indicates maturity and above 14 indicates immaturity, however, there are many exceptions. Large woodchips (>6.3mm), bark, and redwood are slow to breakdown and therefore can result in a relatively stable product while the C/N ratio value is high. Additionally, some composts with chicken manure and/or green grass feedstocks can start with a C/N ratio below 15 and are very unstable. A C/N ratio below 10 supplies Nitrogen, while a ratio above 20 can deplete Nitrogen from the soil. The rate at which Nitrogen will be released or used by the microbes is indicated by the respiration rate (BAC). If the respiration rate is too high the transfer of Nitrogen will not be controlable.

Soluble Nutrients & Salts (EC5 w/w dw - mmhos/cm)

10 High salts This value refers to all soluble ions including nutrients, sodium, chloride and some soluble organic compounds. The concentration of salts will change due to the release of salts from the organic matter as it degrades, volatilization of ammonia, decomposition of soluble organics, and conversion of molecular structure. High salts + high AgIndex is indicative of a compost high in readily available nutrients. The application rate of these composts should be limited by the optimum nutrient value based on soil analysis of the receiving soil. High Salts + low AgIndex is indicative of a compost low in nutrients with high concentrations of sodium and/or chloride. Limit the application rate according to the toxicity level of thesodium and/or chloride. Low salts indicates that the compost can be applied without risking salt toxicity, is likely a good source of organic matter, and that nutrients will release slowly over time.

Lime Content (lbs. per ton)

0 Low lime content Compost high in lime or carbonates are often those produced from chicken manure (layers) ash materials, and lime products. These are excellent products to use on a receiving soil where lime has been recommended by soil analysis to raise the pH. Composts with a high lime content should be closely considered for pH requirements when formulating potting mixes.

Physical Properties

Percent Ash

46.2 Average ash content Ash is the non-organic fraction of a compost. Most composts contain approximately 50% ash (dry weight basis). Compost can be high in ash content for many reasons including: excess minerilzation(old compost), contamination with soil base material during turning, poor quality feedstock, and soil or mineral products added. Finding the source and reducing high ash content is often the fastest means to increasing nutrient quality of a compost.

Particle Size % > 6.3 MM (0.25")

10.0 May restrict use Large particles may restrict use for potting soils, golf course topdressings, seed-starter mixes, and where a fine size distribution is required. Composts with large particles can still be used as excellent additions to field soils, shrub mixes and mulches.

Particle Size Distribution

Each size fraction is measured by weight, volume and bulk density. These results are particularly relevent with decisions to screen or not, and if screening, which size screen to use. The bulk density indicates if the fraction screened is made of light weight organic material or heavy mineral material. Removing large mineral material can greatly improve compost quality by increasing nutrient and organic concentrations.

Appendix:

Plant Available Nitrogen (PAN) calculations:
PAN = (X * (organic N)) + ((NH4-N) + (NO3-N))
X value = If BAC < 2 then X = 0.1
If BAC =2.1 to 5 then X = 0.2
If BAC =5.1 to 10 then X = 0.3
If BAC > 10 then X = 0.4
Note: If C/N ratio > 15 additional N should be applied.

Estimated available nutrients for use when calculating application rates	lbs/ton (As Rcvd.)
Plant Available Nitrogen (PAN)	9.9
Ammonia (NH4-N)	2.00
Nitrate (NO3-N)	0.06
Available Phosphorus (P2O5*0.64)	5.5
Available Potassium (K2O)	18.8

Valley Tech

AGRICULTURAL LABORATORY SERVICES

2120 South 'K' Street
Tulare, California 93274
Office: 559 - 688-5684
Fax: 559 - 688-5768

REPORT of ANALYSIS

Client: HARVEST POWER CALIFORNIA, LLC
24478 ROAD 140
TULARE, CALIFORNIA 93274

Lab No.: 08-08M167
Sampled Date: 08-08-12
Report Date: 08-14-12
Submitted By: JOHN JONES

Material: COMPOST

	As Received Basis				100% D.M. Basis		
Sample Description	% H_2O	% Carbon	% Nitrogen	C/N	% H_2O	% Carbon	% Nitrogen
1. Zone 1 Composite #1 08/06/12	48.1	14.7	0.56	25.9	-	28.2	1.09
2. Zone 1 Composite #2 08/07/12	39.0	15.6	0.96	16.3	-	25.6	1.57

If you should have any questions, please call. Thank you.

[redacted]

Sam Modesitt
Chemist

Analysis by TMECC Method 03.09

TMECC - "Test Methods for the Examination of Composting and Compost," US Composting Council, June 2002

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AGRICULTURAL LABORATORY SERVICES

REPORT of ANALYSIS

Client: HARVEST POWER CALIFORNIA, LLC
24478 ROAD 140
TULARE, CALIFORNIA 93274

Lab No.: 08-13M298
Sampled Date: 08-13-12
Report Date: 08-24-12
Submitted By: JOHN JONES

Material: COMPOST

LOCATION: SJVAPCD

Zone 2

	------- As Received Basis -------				---- 100% D.M. Basis ----		
Sample Description	% H_2O	% Carbon	% Nitrogen	C/N	% H_2O	% Carbon	% Nitrogen
1. SJVAPCD - North	35.8	18.7	1.06	17.6	-	29.1	1.65
2. SJVAPCD - South	53.1	15.0	0.77	19.5	-	31.9	1.64

[redacted]e any questions, please call. Thank you.

Sam Modesitt
Chemist

Analysis by TMECC Method 03.09

TMECC - "Test Methods for the Examination of Composting and Compost," US Composting Council, June 2002

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Tulare, California 93274
Office: 559 - 688-5684
Fax: 559 - 688-5768

REPORT of ANALYSIS

Client: HARVEST POWER CALIFORNIA, LLC
24478 ROAD 140
TULARE, CALIFORNIA 93274

Lab No.: 08-20M549
Sampled Date: 08-17-12
Report Date: 08-24-12
Submitted By: JOHN JONES

Material: COMPOST

LOCATION: ZONE 3

	As Received Basis				100% D.M. Basis		
Sample Description	% H_2O	% Carbon	% Nitrogen	C/N	% H_2O	% Carbon	% Nitrogen
1. Zone 3 - North End	56.6	11.9	0.58	20.5	-	27.3	1.34
2. Zone 3 - South End	57.2	16.5	0.62	26.6	-	38.6	1.44

If you should have any questions, please call. Thank you.

[redacted]

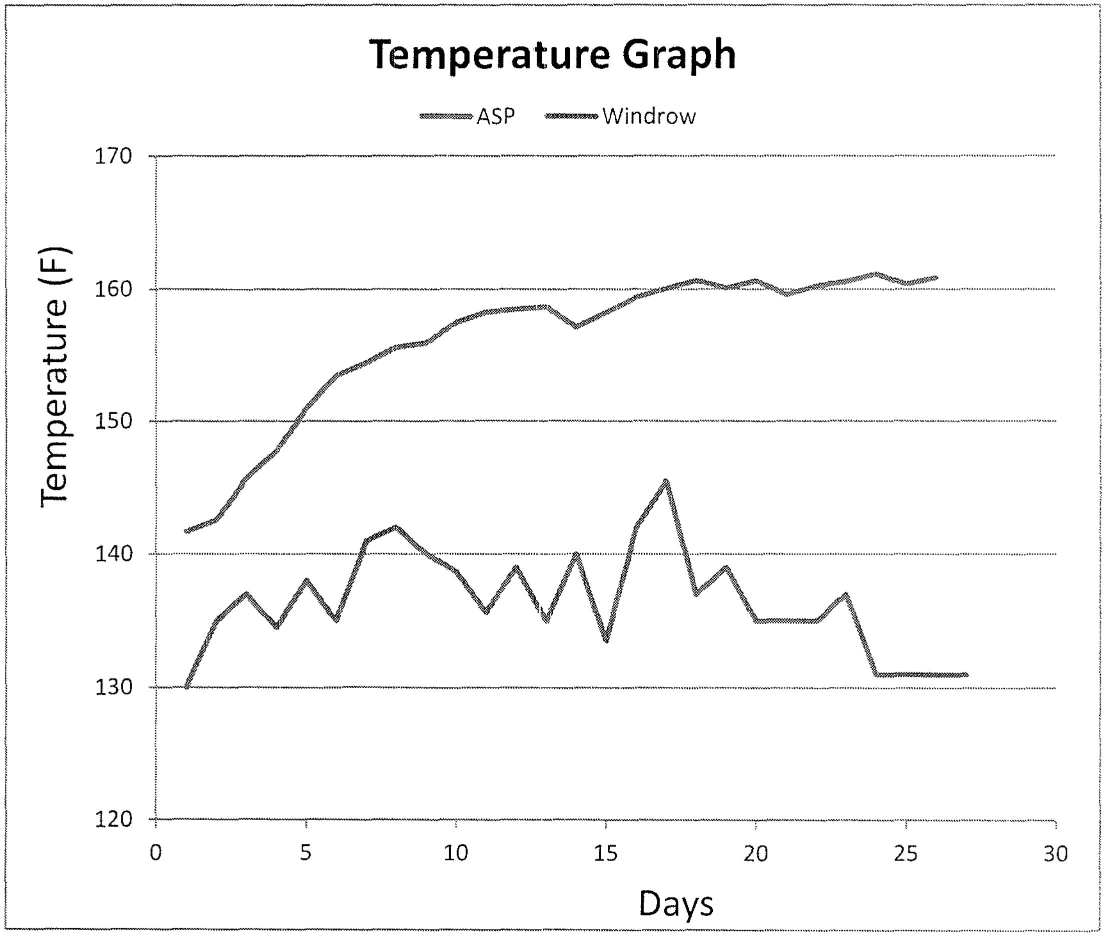
Sam Modesitt
Chemist

Analysis by TMECC Method 03.09

TMECC - "Test Methods for the Examination of Composting and Compost." US Composting Council, June 2002

ACP Final Report fo Valley Air TAP Program, May 2013, Appendix G, Temperature Graph

Day	ASP	Control
0		125
1	142	130
2	143	135
3	146	137
4	148	135
5	151	138
6	153	135
7	154	141
8	156	142
9	156	140
10	157	139
11	158	136
12	158	139
13	159	135
14	157	140
15	158	134
16	159	142
17	160	146
18	161	137
19	160	139
20	161	135
21	160	135
22	160	135
23	161	137
24	161	131
25	160	131
26	161	131
27		131
28		131



ACP Final Report fo Valley Air TAP Program, May 2013, Appendix G, Windrow Temperatures

Day	Zone	Temp 1	Temp 2	Temp Sum	# of Values	Average Temp
0	3	124	126	250	2	125
1	3	126	134	260	2	130
2	3	138	132	270	2	135
3	3	136	138	274	2	137
4	2	134	138	272	2	136
4	3	134	132	266	2	133
5	2	144	144	288	2	144
5	3	134	136	270	2	135
6	2	138	132	270	2	135
7	2	138	136	274	2	137
7	3	146	144	290	2	145
8	1	138	136	274	2	137
8	3	148	146	294	2	147
9	1	140	142	282	2	141
9	2	140	142	282	2	141
9	3	136	140	276	2	138
10	1	138	138	276	2	138
10	2	144	146	290	2	145
10	3	132	134	266	2	133
11	1	133	133	266	2	133
11	2	140	142	282	2	141
11	3	132	134	266	2	133
12	2	142	144	286	2	143
12	3	136	134	270	2	135
13	1	132	134	266	2	133
13	2	138	136	274	2	137
14	1	134	136	270	2	135
14	2	146	144	290	2	145
15	1	134	136	270	2	135
15	3	132	132	264	2	132
16	1	136	138	254	2	137
16	2	156	158	314	2	157
17	1	138	134	272	2	136
17	2	154	156	310	2	155
18	1	136	134	270	2	135
18	2	138	140	278	2	139
19	2	138	140	278	2	139
20	1	134	136	270	2	135
20	2	134	136	270	2	135
21	1	136	138	274	2	137
21	2	134	132	266	2	133
22	1	136	134	270	2	135
23	1	136	138	274	2	137
24	1	134	132	266	2	133
24	2	128	130	258	2	129
25	1	130	132	262	2	131
28	1	130	132	262	2	131

Average

Day	Temp Sum	# of Values	Average Temp
0	125	1	125
1	130	1	130
2	135	1	135
3	137	1	137
4	269	2	135
5	279	2	140
6	135	1	135
7	282	2	141
8	284	2	142
9	420	3	140
10	416	3	139
11	407	3	136
12	278	2	139
13	270	2	135
14	280	2	140
15	267	2	134
16	294	2	147
17	291	2	146
18	274	2	137
19	139	1	139
20	270	2	135
21	270	2	135
22	135	1	135
23	137	1	137
24	262	2	131
25	131	1	131
26	131	1	131
27	131	1	131
28	131	1	131

ACP Final Report fo Valley Air TAP Program, May 2013, Appendix G, ASP Temperatures

			T-X-1			T-X-2			T-X-3				Overall Combined			
Zone	Day	2'	3'	5'	2'	3'	5'	2'	3'	5'	Average		Day	Sum	# of Days	Average
1	0												0	141	1	140.7
	1												1	143	1	142.9
	2												2	287	2	143.3
	3												3	289	2	144.3
	4	138	154	154	140	151	158	166	164	146	152		4	448	3	149.4
	5												5	302	2	151.0
	6	150	152	156	142	146	160	168	166	150	154		6	306	2	153.2
	7	152	153	164	144	142	162	170	170	152	157		7	465	3	155.1
	8	140	156	140	154	156	164	164	158	160	155		8	311	2	155.7
	9	144	154	158	156	154	162	162	156	164	157		9	472	3	157.3
	10	142	152	156	158	156	160	164	158	163	157		10	474	3	158.0
	11	144	156	158	166	158	162	162	156	160	158		11	474	3	158.0
	12												12	318	2	159.0
	13	150	156	158	162	156	156	164	158	154	157		13	314	2	157.1
	14	152	160	160	164	158	158	162	160	156	159		14	315	2	157.7
	15	154	158	162	160	162	160	164	162	154	160		15	319	2	159.7
	16	156	160	160	162	160	162	160	164	156	160		16	477	3	159.1
	17	154	158	162	164	162	160	162	166	154	160		17	479	3	159.7
	18	156	160	164	162	164	162	160	164	152	160		18	481	3	160.4
	19												19	321	2	160.6
	20	158	162	162	160	160	160	158	162	154	160		20	319	2	159.4
	21	160	164	160	162	158	156	160	160	156	160		21	482	3	160.7
	22	162	162	164	160	160	158	162	162	158	161		22	321	2	160.6
	23	160	164	162	162	164	160	160	164	160	162		23	322	2	161.1
	24	158	162	160	158	160	162	158	162	158	160		24	481	3	160.4
	25	160	158	162	160	162	160	162	160	160	160		25	322	2	160.8
	26	158	160	160	158	160	158	158	162	158	159		26	320	2	159.8
2	0															
	1															
	2	120	130	124	154	154	160	162	134	146	143					
	3	124	132	126	136	156	164	164	136	142	142					
	4	140	138	118	160	162	168	166	140	134	147					
	5	138	140	130	142	166	164	164	154	144	149					
	6	140	142	144	160	162	162	160	152	146	152					
	7	144	146	148	158	160	164	158	160	148	154					
	8															
	9	148	150	146	158	162	162	164	158	150	155					
	10	150	152	148	160	164	164	160	156	154	156					
	11	152	154	144	158	158	160	162	158	156	156					
	12	154	156	146	156	160	162	160	162	158	157					
	13	156	146	150	158	162	164	162	164	152	157					
	14	154	144	148	160	164	162	160	162	154	156					
	15															
	16	160	158	146	158	162	160	158	160	156	158					
	17	164	160	148	160	164	162	160	158	154	159					
	18	162	162	158	162	160	160	162	160	158	160					
	19	160	164	160	160	162	162	164	162	160	162					
	20	158	160	162	158	160	158	160	160	158	159					
	21	160	162	164	160	162	160	162	164	160	162					
	22															
	23															
	24	162	160	162	162	160	158	160	162	158	160					
	25															
	26															
	27															
	28															
3	0	130	132	132	148	142	154	148	138	142	141					
	1	132	134	136	154	144	156	146	140	144	143					
	2	134	136	138	156	148	154	144	142	144	144					
	3	136	138	140	158	150	158	146	146	146	146					
	4	138	140	144	160	154	156	148	148	148	148					
	5	144	146	148	162	160	160	154	150	152	153					
	6															
	7	154	150	150	160	158	158	158	152	154	155					
	8	156	152	154	158	160	160	160	154	156	157					
	9	160	162	158	160	162	162	162	158	156	160					
	10	162	160	160	162	164	160	164	160	158	161					
	11	160	162	158	160	162	162	160	158	160	160					
	12	162	160	160	162	164	160	162	160	158	161					
	13															
	14															
	15	160	158	162	158	160	162	160	158	160	160					
	16	160	159	160	160	158	160	162	158	160	160					
	17	160	160	158	161	160	161	160	160	161	160					
	18	162	158	159	161	160	160	162	160	162	160					
	19	160	160	161	160	160	159	158	159	160	160					
	20															
	21	160	162	160	162	160	161	161	160	162	161					
	22	160	161	162	160	160	161	160	159	160	160					
	23	161	160	159	162	161	160	160	160	161	160					
	24	160	161	157	161	161	161	164	161	162	161					
	25	160	162	160	159	169	162	161	159	159	161					
	26	161	161	161	159	159	161	161	160	161	160					

ACP Final Report fo Valley Air TAP Program, May 2013, Appendix H, Water Use Calculations

Composting in Windrows vs. Extended Aerated Static Piles

EASP data is from the 2012 TAP research project in Tulare, CA.
Windrow data is from the City of Bakersfield's normal operation for reference.

Table One - Windrow Turning Method

(Water applied to normal 2,962 cubic yard windrows in Bakersfield)

Note: Windrows are watered within 3 hours prior to turning to achieve ball test for moisture per air district rule 4566.

	Gallons per Water Truck Load	# Loads per Watering Event*	Gallons per Event	# of Events per Pile	Gallons per Pile	Gallons per Cubic Yard
1. Hydrate newly formed windrow with water truck	4,000	4	16,000	1	16,000	5
2. Hydrate windrow prior to 6 turnings (5 in 15 days PFRP and 1 @ day 22)	4,000	3	12,000	6	72,000	24
Total for 22 day active phase:					**88,000**	**30**

*averaged for seasonal variation

Table Two - Extended Aerated Static Pile Method

(Water applied to each 506 cubic yard pile in Tulare)

Note: Item 2 (compost cover water) could be reduced since there was significant extra water runoff during pilot program.

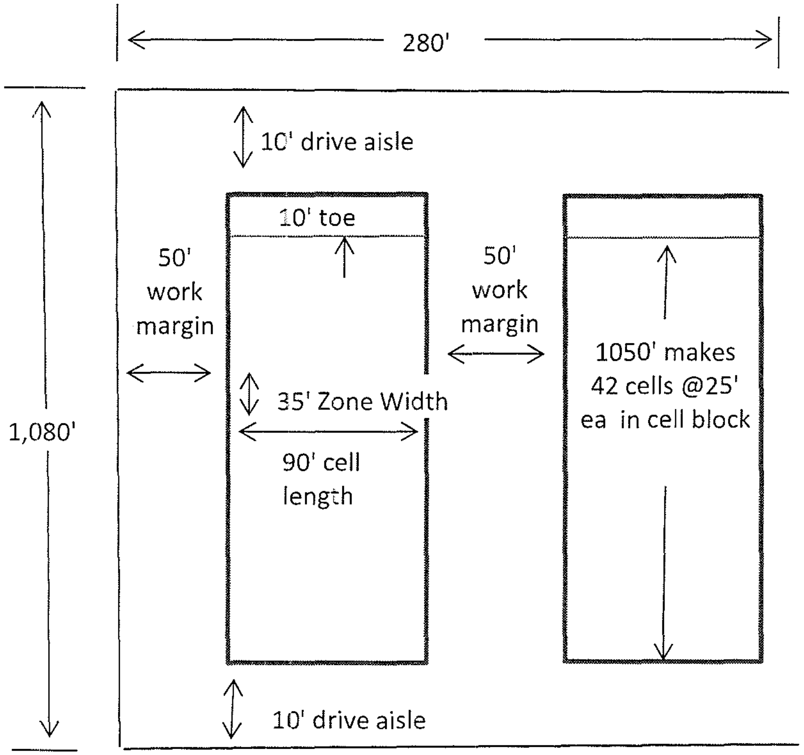
	Gallons per Minute Flow	Minutes per Watering Event*	Gallons per Event	# of Events per Pile	Gallons per Pile	Gallons per Cubic Yard
1. Hydrate incoming feedstock with 1 1/4" fire hose as pile is built	35	240	8,400	1	8,400	17
2. Moisten compost cover with 3 lawn sprinklers 6x/day till day 22	11	6	66	63	4,158	8
Total for 22 day active phase:					**12,558**	**25**

*averaged for seasonal variation

Comparsion of ASP and Windrow Layouts

ACP Final Report fo Valley Air TAP Program, May 2013, Appendix I, Facility Layour Comparison

A - EASP Facility Layout



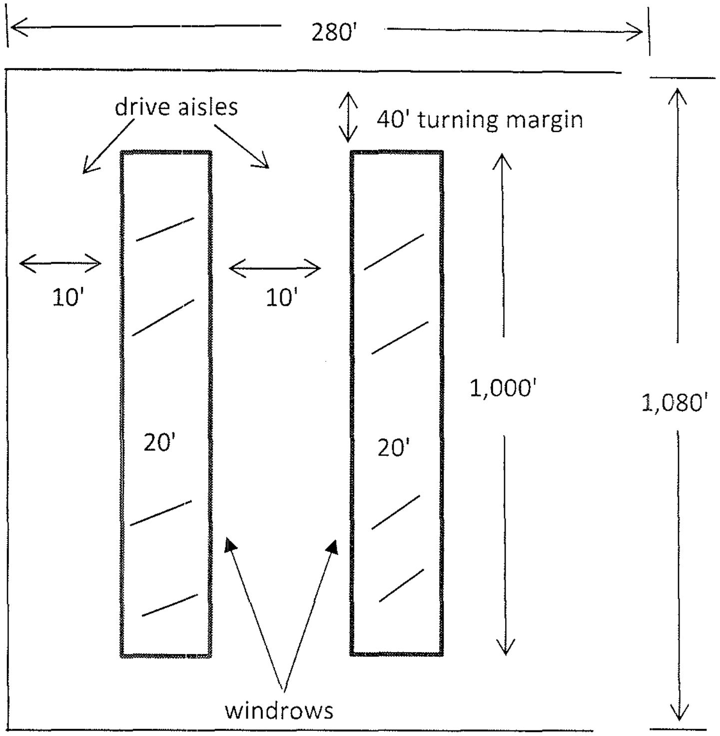
Footprint:

- 1080' X 140' = 151,200 sq.ft. / 43,560 ft^2/acre = 3.5 acres per cell block

Volume/Acre:

- 740 yd/cell X 42 cells/cell block = 31,080 cu yd per cell block
- Divide 3.5 acres per cell block = **8,880 cu.yd/acre**

B - Windrow Facility Layout



Footprint:

- 1080' X 30' = 32,400 sq.ft. / 43,560 ft per acre = 0.75 acres per row

Volume/Acre:

- 2,963 cu.yd/row
- Divide 0.75 acres/row = **3,950 cu.yd/acre**

ACP Final Report fo Valley Air TAP Program, May 2013, Appendix I, 100,000 TPY Facility Calculation

100,000 Ton/Year Facility Example

Number of cycles or turn over per year is facility specific. Therefore, assume range of four cycles (90 days) or five cycles (70 days)

Extended Aerated Static Pile (EASP)

$$\frac{8{,}880 \text{ cu yd/acre}}{2.5 \text{ cu yd/ton}} = 3{,}552 \text{ tons/acre}$$

➡ <u>90 day</u> (4 cycles year):

$$\frac{100{,}000 \text{ tons/year}}{4 \text{ cycles/year}} = 25{,}000 \text{ tons/cycle}$$

$$\frac{25{,}000 \text{ tons/cycle}}{3{,}552 \text{ tons/acre}} = \textbf{7.03 acre/cycle}$$

➡ <u>70 day</u> (5 cycles year):

$$\frac{100{,}000 \text{ tons/year}}{5 \text{ cycles/year}} = 20{,}000 \text{ tons/cycle}$$

$$\frac{20{,}000 \text{ tons/cycle}}{3{,}552 \text{ tons/acre}} = \textbf{5.63 acre/cycle}$$

Windrow

$$\frac{3{,}950 \text{ cu yd/acre}}{2.5 \text{ cu yd/ton}} = 1{,}580 \text{ tons/acre}$$

➡ <u>90 day</u> (4 cycles year):

$$\frac{100{,}000 \text{ tons/year}}{4 \text{ cycles/year}} = 25{,}000 \text{ tons/cycle}$$

$$\frac{25{,}000 \text{ tons/cycle}}{1{,}580 \text{ tons/acre}} = \textbf{15.8 acre/cycle}$$

➡ <u>70 day</u> (5 cycles year):

$$\frac{100{,}000 \text{ tons/year}}{5 \text{ cycles/year}} = 20{,}000 \text{ tons/cycle}$$

$$\frac{20{,}000 \text{ tons/cycle}}{1{,}580 \text{ tons/acre}} = \textbf{12.65 acre/cycle}$$

ACP Final Report fo Valley Air TAP Program, May 2013, Appendix I, Formula for Land Use Reduction

100,000 Ton/Year Facility Example (Short Formula)

Extended Aerated Static Pile (EASP)

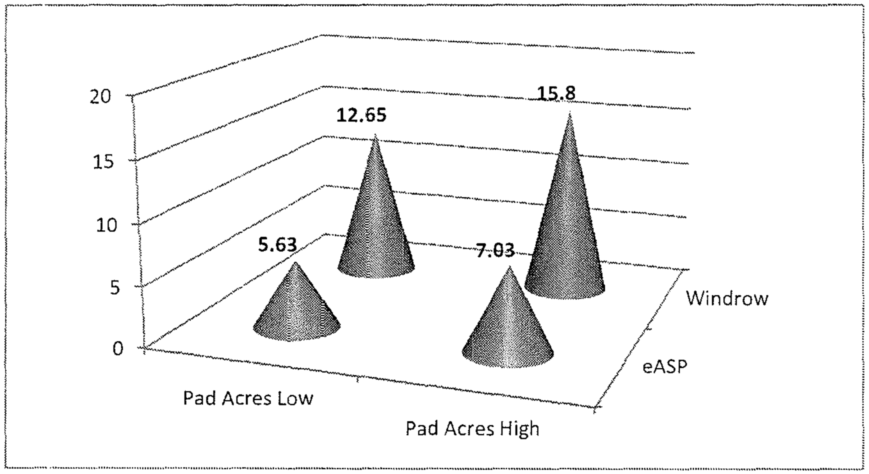
8,880 cu yd/acre
2.5 cu yd/ton = 3,552 tons/acre
90 day (4 cycles year): **7.03 acre/cycle**
70 day (5 cycles year): **5.63 acre/cycle**

	Pad Acres Low	Pad Acres High
eASP	5.63	7.03
Windrow	12.65	15.8

Windrow

3,950 cu yd/acre
2.5 cu yd/ton = 1,580 tons/acre
90 day (4 cycles year): **15.8 acre/cycle**
70 day (5 cycles year): **12.65 acre/cycle**

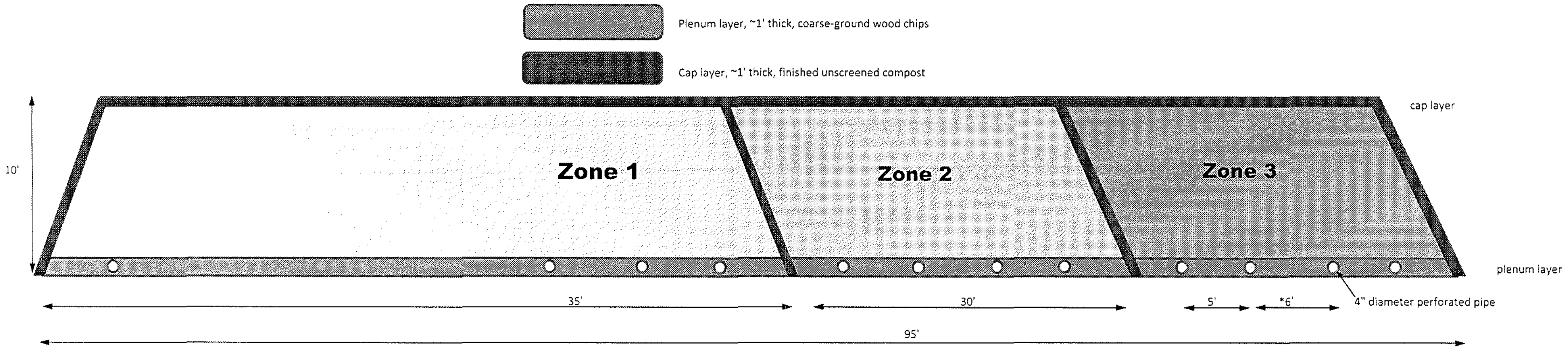
-55.5%
44.5%
44.5%



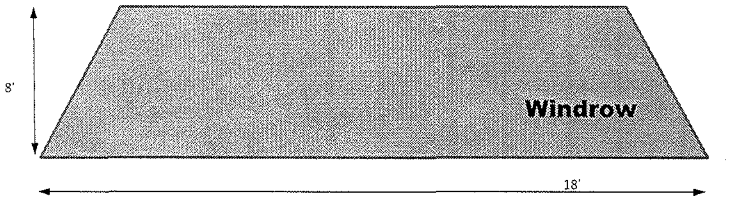
ACP Final Report fo Valley Air TAP Program, May 2013, Appendix I, Starting cross-section dimensions for ASP and Windrow

(shrinkage will occur)

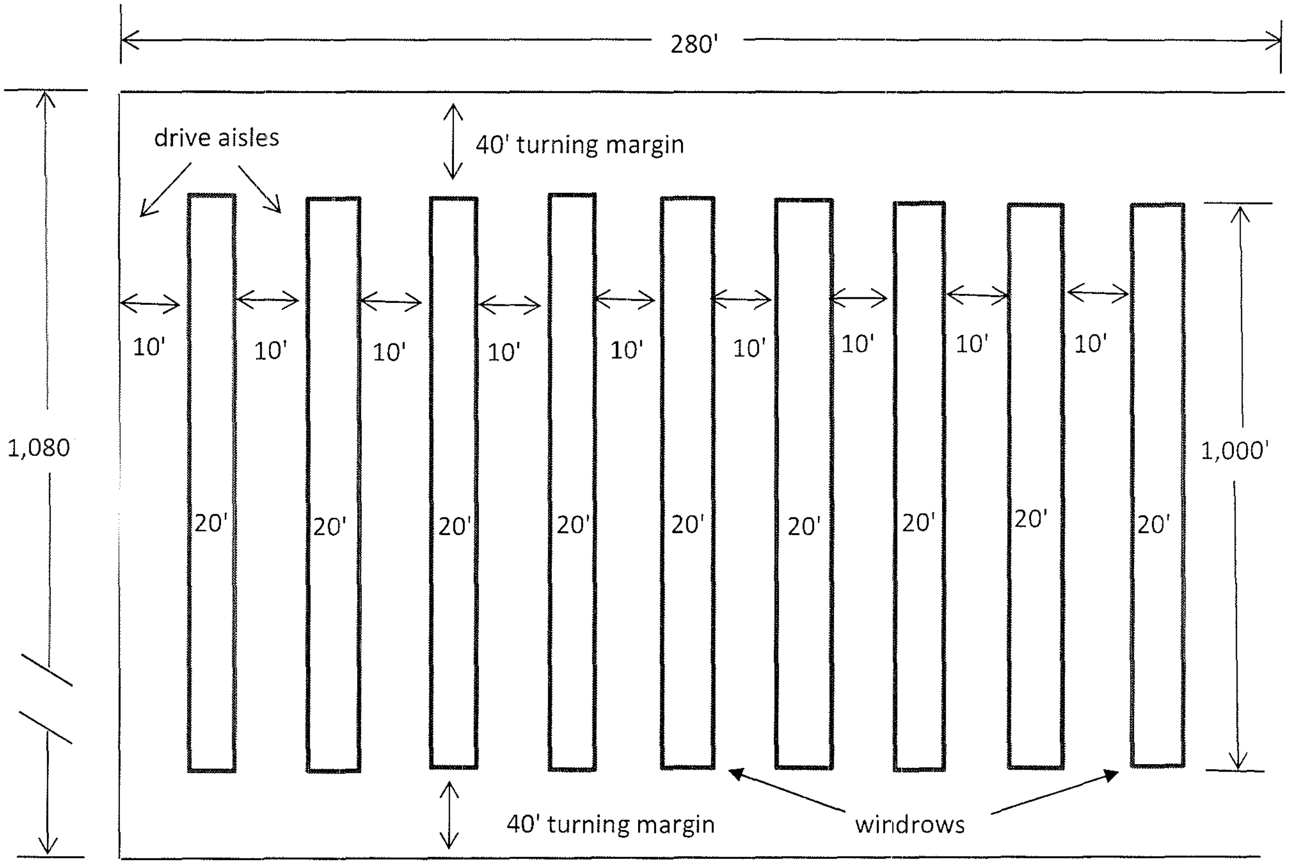
(drawings not exactly to scale)



* Center two aeration pipes tend to be slightly farther apart due to presence of blower and T-connector.



ACP Final Report fo Valley Air TAP Program, May 2013, Appendix I, Windrow Facility Layout



Footprint:

- 1080' X 30' = 32,400 sq.ft. / 43,560 ft per acre = 0.75 acre per row

Volume/Acre:

- 2,963 cu.yd/row
- Divide 0.75 acres/row = **3,950 cu.yd/acre**

Appendix 3

Soil Survey for Soils Within Project Boundary

USDA United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Eastern Stanislaus Area, California

West Main Compost Facility

February 4, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

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Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

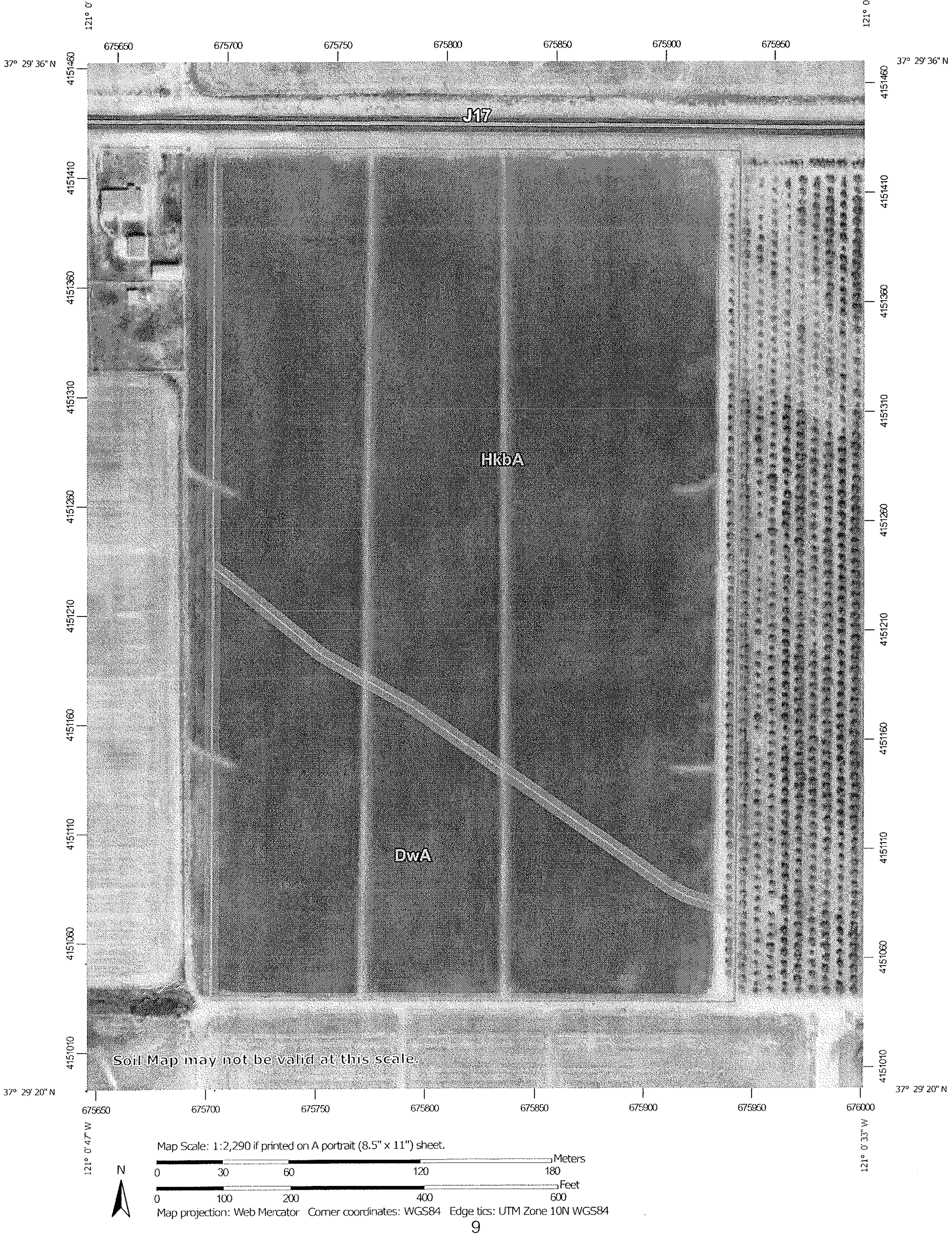
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



Map Scale: 1:2,290 if printed on A portrait (8.5" x 11") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- ☐ Area of Interest (AOI)

Soils

- ☐ Soil Map Unit Polygons
- Soil Map Unit Lines
- ▪ Soil Map Unit Points

Special Point Features

- Blowout
- ☒ Borrow Pit
- Clay Spot
- ◇ Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- ◎ Miscellaneous Water
- ◎ Perennial Water
- Rock Outcrop
- ✛ Saline Spot
- Sandy Spot
- Severely Eroded Spot
- ◇ Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- △ Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- ▨ Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Eastern Stanislaus Area, California
Survey Area Data: Version 14, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 19, 2015—Oct 29, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
DwA	Dinuba sandy loam, slightly saline-alkali, 0 to 1 percent slopes	6.8	29.3%
HkbA	Hilmar loamy sand, slightly saline-alkali, 0 to 1 percent slopes	16.4	70.7%
Totals for Area of Interest		**23.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Eastern Stanislaus Area, California

DwA—Dinuba sandy loam, slightly saline-alkali, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjbq
Elevation: 100 to 500 feet
Mean annual precipitation: 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 250 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Dinuba and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dinuba

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 10 inches: sandy loam
H2 - 10 to 30 inches: sandy loam
H3 - 30 to 60 inches: very fine sand, silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Hanford

Percent of map unit: 5 percent

Hydric soil rating: No

Hilmar

Percent of map unit: 5 percent
Hydric soil rating: No

Fresno

Percent of map unit: 5 percent
Hydric soil rating: No

HkbA—Hilmar loamy sand, slightly saline-alkali, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjd7
Elevation: 300 to 900 feet
Mean annual precipitation: 11 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Hilmar and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hilmar

Setting

Landform: Fan skirts
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind modified sandy alluvium derived from granite over silty alluvium derived from granite

Typical profile

H1 - 0 to 7 inches: loamy sand
H2 - 7 to 21 inches: sand
H3 - 21 to 29 inches: sandy loam
H4 - 29 to 60 inches: very fine sandy loam, silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare

Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Dinuba

Percent of map unit: 10 percent
Hydric soil rating: No

Delhi

Percent of map unit: 5 percent
Hydric soil rating: No

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Soil Survey for Soils Within 1-mile of Project Boundary

United States
Department of
Agriculture

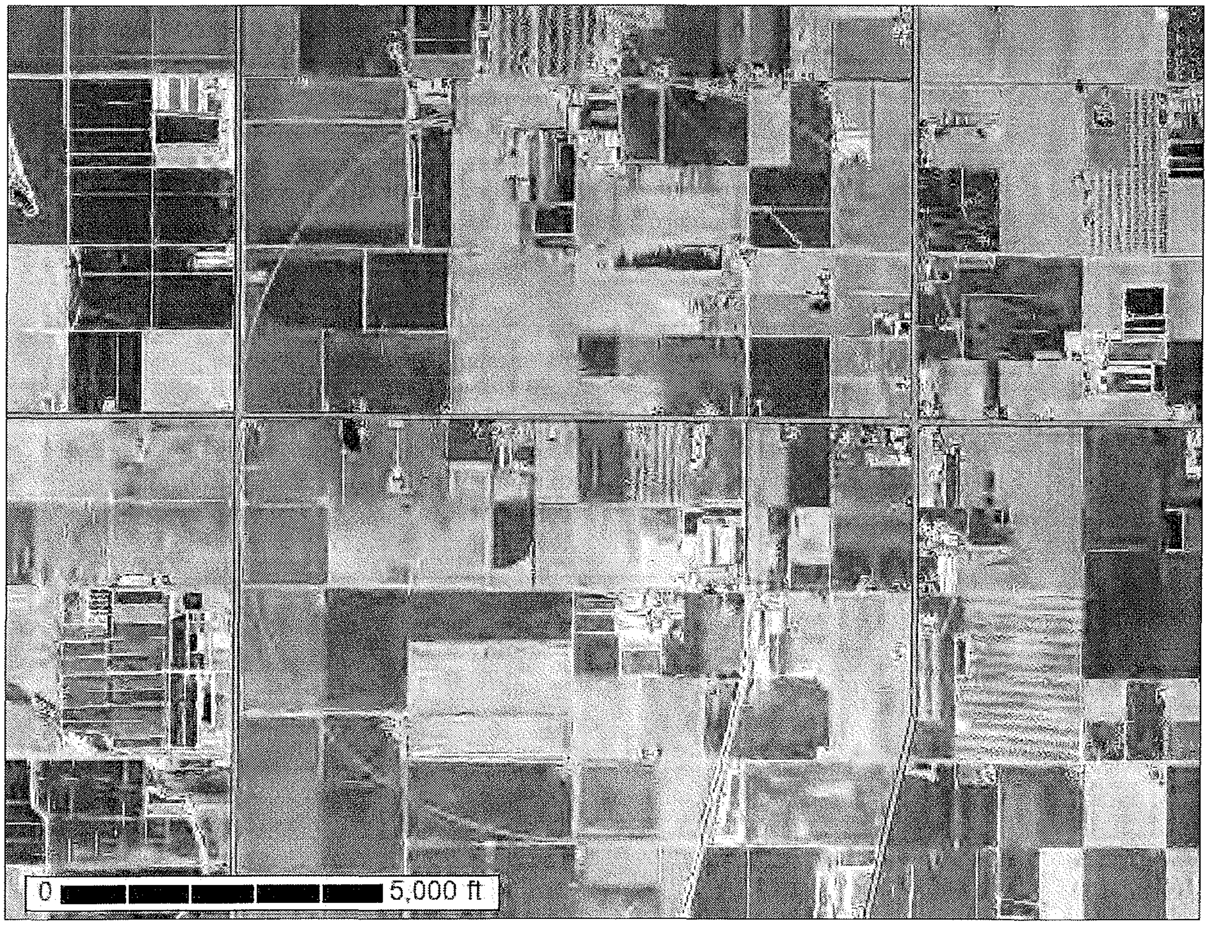
NRCS

Natural
Resources
Conservation
Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Eastern Stanislaus Area, California

1-mi Buffer Surrounding West Main Compost Facility



February 4, 2021

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report

Soil Map

Map Scale: 1:26,800 if printed on A portrait (8.5" x 11") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- ☐ Area of Interest (AOI)

Soils
- ☐ Soil Map Unit Polygons
- 〰 Soil Map Unit Lines
- ■ Soil Map Unit Points

Special Point Features
- Blowout
- ☒ Borrow Pit
- Clay Spot
- ◇ Closed Depression
- Gravel Pit
- ∴ Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- ◎ Miscellaneous Water
- ◎ Perennial Water
- Rock Outcrop
- + Saline Spot
- ∷ Sandy Spot
- Severely Eroded Spot
- ◇ Sinkhole
- Slide or Slip
- ø Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- △ Other
- Special Line Features

Water Features
- 〰 Streams and Canals

Transportation
- +++ Rails
- 〰 Interstate Highways
- 〰 US Routes
- 〰 Major Roads
- 〰 Local Roads

Background
- ▨ Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Eastern Stanislaus Area, California
Survey Area Data: Version 14, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 19, 2015—Oct 29, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
DrA	Dinuba sandy loam, 0 to 1 percent slopes	27.7	1.1%
DwA	Dinuba sandy loam, slightly saline-alkali, 0 to 1 percent slopes	1,690.9	66.7%
DxA	Dinuba sandy loam, moderately saline-alkali, 0 to 1 percent slopes	16.2	0.6%
DzA	Dinuba sandy loam, very poorly drained variant, slightly saline- alkali, 0 to 1 percent slopes	14.9	0.6%
FtA	Fresno sandy loam, slightly saline-alkali, 0 to 1 percent slopes	79.3	3.1%
FuA	Fresno sandy loam, moderately saline-alkali, 0 to 1 percent slopes	110.2	4.4%
HfA	Hilmar loamy sand, 0 to 1 percent	174.8	6.9%
HkbA	Hilmar loamy sand, slightly saline-alkali, 0 to 1 percent slopes	216.2	8.5%
WbA	Waukena fine sandy loam, moderately saline-alkali, 0 to 1 percent slopes	86.4	3.4%
WdA	Waukena sandy loam, slightly saline-alkali, 0 to 1 percent slopes	117.6	4.6%
Totals for Area of Interest		**2,534.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Eastern Stanislaus Area, California

DrA—Dinuba sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjbl
Elevation: 100 to 500 feet
Mean annual precipitation: 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 250 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Dinuba and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dinuba

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 10 inches: sandy loam
H2 - 10 to 30 inches: sandy loam
H3 - 30 to 60 inches: very fine sand, silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water capacity: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Hilmar

Percent of map unit: 5 percent
Hydric soil rating: No

Hanford

Percent of map unit: 5 percent
Hydric soil rating: No

Fresno

Percent of map unit: 5 percent
Hydric soil rating: No

DwA—Dinuba sandy loam, slightly saline-alkali, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjbq
Elevation: 100 to 500 feet
Mean annual precipitation: 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 250 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Dinuba and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dinuba

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 10 inches: sandy loam
H2 - 10 to 30 inches: sandy loam
H3 - 30 to 60 inches: very fine sand, silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0

Available water capacity: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Hanford

Percent of map unit: 5 percent
Hydric soil rating: No

Hilmar

Percent of map unit: 5 percent
Hydric soil rating: No

Fresno

Percent of map unit: 5 percent
Hydric soil rating: No

DxA—Dinuba sandy loam, moderately saline-alkali, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjbr
Elevation: 100 to 500 feet
Mean annual precipitation: 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Dinuba and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dinuba

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 10 inches: sandy loam
H2 - 10 to 30 inches: sandy loam
H3 - 30 to 60 inches: very fine sand, silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Hilmar

Percent of map unit: 5 percent
Hydric soil rating: No

Hanford

Percent of map unit: 5 percent
Hydric soil rating: No

Fresno

Percent of map unit: 5 percent
Hydric soil rating: No

DzA—Dinuba sandy loam, very poorly drained variant, slightly saline-alkali, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjbt
Elevation: 100 to 500 feet
Mean annual precipitation: 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Dinuba variant and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dinuba Variant

Setting

Landform: Depressions
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 10 inches: sandy loam
H2 - 10 to 30 inches: sandy loam
H3 - 30 to 60 inches: very fine sand, silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C
Hydric soil rating: Yes

Minor Components

Hilmar

Percent of map unit: 5 percent
Hydric soil rating: No

Hanford

Percent of map unit: 5 percent
Hydric soil rating: No

Fresno

Percent of map unit: 5 percent
Hydric soil rating: No

FtA—Fresno sandy loam, slightly saline-alkali, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjc3

Elevation: 0 to 250 feet
Mean annual precipitation: 8 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Fresno and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fresno

Setting

Landform: Fan remnants
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 18 inches: sandy clay loam
H3 - 18 to 38 inches: silt loam
H4 - 38 to 40 inches: cemented
H5 - 40 to 60 inches: sandy loam, loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 24 to 40 inches to duripan
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 20.0
Available water capacity: Low (about 3.7 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 10 percent
Landform: Depressions
Hydric soil rating: Yes

Traver

Percent of map unit: 5 percent
Hydric soil rating: No

FuA—Fresno sandy loam, moderately saline-alkali, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjc4
Elevation: 0 to 250 feet
Mean annual precipitation: 8 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Fresno and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fresno

Setting

Landform: Fan remnants
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 18 inches: sandy clay loam
H3 - 18 to 38 inches: silt loam
H4 - 38 to 40 inches: cemented
H5 - 40 to 60 inches: sandy loam, loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 24 to 40 inches to duripan
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 In/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 20.0
Available water capacity: Low (about 3.7 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 10 percent
Landform: Depressions
Hydric soil rating: Yes

Traver

Percent of map unit: 5 percent
Hydric soil rating: No

HfA—Hilmar loamy sand, 0 to 1 percent

Map Unit Setting

National map unit symbol: hjd3
Elevation: 300 to 900 feet
Mean annual precipitation: 11 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hilmar and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hilmar

Setting

Landform: Fan skirts
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind modified sandy alluvium derived from granite over silty alluvium derived from granite

Typical profile

H1 - 0 to 7 inches: loamy sand
H2 - 7 to 21 inches: sand
H3 - 21 to 29 inches: sandy loam
H4 - 29 to 60 inches: very fine sandy loam, silt loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Available water capacity: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Dinuba

Percent of map unit: 10 percent
Hydric soil rating: No

Delhi

Percent of map unit: 5 percent
Hydric soil rating: No

HkbA—Hilmar loamy sand, slightly saline-alkali, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjd7
Elevation: 300 to 900 feet
Mean annual precipitation: 11 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Hilmar and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hilmar

Setting

Landform: Fan skirts
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Wind modified sandy alluvium derived from granite over silty alluvium derived from granite

Typical profile

H1 - 0 to 7 inches: loamy sand
H2 - 7 to 21 inches: sand
H3 - 21 to 29 inches: sandy loam
H4 - 29 to 60 inches: very fine sandy loam, silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 5.0
Available water capacity: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Dinuba

Percent of map unit: 10 percent
Hydric soil rating: No

Delhi

Percent of map unit: 5 percent
Hydric soil rating: No

WbA—Waukena fine sandy loam, moderately saline-alkali, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjhr
Elevation: 1,500 to 3,800 feet
Mean annual precipitation: 50 inches
Mean annual air temperature: 55 degrees F
Frost-free period: 225 to 275 days
Farmland classification: Not prime farmland

Map Unit Composition

Waukena and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Waukena

Setting

Landform: Basin-floor remnants
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 6 inches: fine sandy loam
H2 - 6 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Moderately saline to strongly saline (8.0 to 18.0 mmhos/cm)
Sodium adsorption ratio, maximum: 20.0
Available water capacity: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Rossi

Percent of map unit: 5 percent
Hydric soil rating: No

Fresno

Percent of map unit: 5 percent
Hydric soil rating: No

WdA—Waukena sandy loam, slightly saline-alkali, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: hjht
Elevation: 1,500 to 3,800 feet
Mean annual precipitation: 50 inches
Mean annual air temperature: 55 degrees F
Frost-free period: 225 to 275 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Waukena and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Waukena

Setting

Landform: Basin-floor remnants
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 6 inches: sandy loam
H2 - 6 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 20.0
Available water capacity: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Rossi

Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Fresno

Percent of map unit: 5 percent
Hydric soil rating: No

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INTRODUCTION

This application package constitutes a Report of Waste Discharge (ROWD) pursuant to California Water Code Section 13260. Section 13260 states that persons discharging or proposing to discharge waste that could affect the quality of the waters of the State, other than into a community sewer system, shall file a ROWD containing information which may be required by the appropriate Regional Water Quality Control Board (RWQCB).

This package is to be used to start the application process for all waste discharge requirements (WDRs) and National Pollutant Discharge Elimination System (NPDES) permits* issued by a RWQCB except:

a) Those landfill facilities that must use a joint Solid Waste Facility Permit Application Form, California Integrated Waste Management Board Form E-1-77; and
b) General WDRs or general NPDES permits that use a Notice of Intent to comply or specify the use of an alternative application form designed for that permit.

This application package contains:

1. Application/General Information Form for WDRs and NPDES Permits [Form 200 (10/97)].
2. Application/General Information Instructions.

Instructions

Instructions are provided to assist you with completion of the application. If you are unable to find the answers to your questions or need assistance with the completion of the application package, please contact your RWQCB representative. *The RWQCBs strongly recommend that you make initial telephone or personal contact with RWQCB regulatory staff to discuss a proposed new discharge before submitting your application.* The RWQCB representative will be able to answer procedural and annual fee related questions that you may have. (See map and telephone numbers inside of application cover.)

All dischargers regulated under WDRs and NPDES permits must pay an annual fee, except dairies, which pay a filing fee only. The RWQCB will notify you of your annual fee based on an evaluation of your proposed discharge. Please do NOT submit a check for your first annual fee or filing fee until requested to do so by a RWQCB representative. Dischargers applying for reissuance (renewal) of an existing NPDES permit or update of an existing WDR will be billed through the annual fee billing system and are therefore requested NOT to submit a check with their application. Checks should be made payable to the State Water Resources Control Board.

Additional Information Requirements

A RWQCB representative will notify you within 30 days of receipt of the application form and any supplemental documents whether your application is complete. If your application is incomplete, the RWQCB representative will send you a detailed list of discharge specific information necessary to complete the application process. The completion date of your application is normally the date when all required information, including the correct fee, is received by the RWQCB.

*** NPDES PERMITS:** If you are applying for a permit to discharge to surface water, you will need an NPDES permit which is issued under both State and Federal law and may be required to complete one or more of the following Federal NPDES permit application forms: Short Form A, Standard Form A, Forms 1, 2B, 2C, 2D, 2E, and 2F. These forms may be obtained at a RWQCB office or can be ordered from the National Center for Environmental Publications and Information at (513) 891-6561.

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

STATE WATER RESOURCES CONTROL BOARD CALIFORNIA

INSTRUCTIONS

FOR COMPLETING THE APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR: WASTE DISCHARGE REQUIREMENTS/NPDES PERMIT

If you have any questions on the completion of any part of the application, please contact your RWQCB representative. A map of RWQCB locations, addresses, and telephone numbers is located on the reverse side of the application cover.

I. FACILITY INFORMATION

You must provide the factual information listed below for ALL owners, operators, and locations and, where appropriate, for ALL general partners and lease holders.

A. **FACILITY:**
Legal name, physical address including the county, person to contact, and phone number at the facility. (**NO P.O. Box numbers!** If no address exists, use street and nearest cross street.)

B. **FACILITY OWNER:**
Legal owner, address, person to contact, and phone number. Also include the owner's Federal Tax Identification Number.

OWNER TYPE:
Check the appropriate Owner Type. The legal owner will be named in the WDRs/NPDES permit.

C. **FACILITY OPERATOR (The agency or business, not the person):**
If applicable, the name, address, person to contact, and telephone number for the facility operator. Check the appropriate Operator Type. If identical to B. above, enter "same as owner".

D. **OWNER OF THE LAND:**
Legal owner of the land(s) where the facility is located, address, person to contact, and phone number. Check the appropriate Owner Type. If identical to B. above, enter "same as owner".

E. **ADDRESS WHERE LEGAL NOTICE MAY BE SERVED:**
Address where legal notice may be served, person to contact, and phone number. If identical to B. above, enter "same as owner".

F. **BILLING ADDRESS**
Address where annual fee invoices should be sent, person to contact, and phone number. If identical to B. above, enter "same as owner".

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

STATE WATER RESOURCES CONTROL BOARD CALIFORNIA

II. TYPE OF DISCHARGE

Check the appropriate box to describe whether the waste will be discharged to: A. Land, or B. Surface Water.

Check the appropriate box(es) which best describe the activities at your facility.

Hazardous Waste - **If you check the Hazardous Waste box, STOP and contact a representative of the RWQCB for further instructions.**

Landfills - **A separate form, APPLICATION FOR SOLID WASTE FACILITY PERMIT/WASTE DISCHARGE REQUIREMENTS, California Integrated Waste Management Board Form E-1-77, may be required. Contact a RWQCB representative to help determine the appropriate form for your discharge.**

III. LOCATION OF THE FACILITY

1. Enter the Assessor's Parcel Number(s) (APN), which is located on the property tax bill. The number can also be obtained from the County Assessor's Office. Indicate the APN for both the facility and the discharge point.

2. Enter the Latitude of the entrance to the proposed/existing facility and of the discharge point. Latitude and longitude information can be obtained from a U.S. Geological Survey quadrangle topographic map. Other maps may also contain this information.

3. Enter the Longitude of the entrance to the proposed/existing facility and of the discharge point.

IV. REASON FOR FILING

NEW DISCHARGE OR FACILITY:
A discharge or facility that is proposed but does not now exist, or that does not yet have WDRs or an NPDES permit.

CHANGE IN DESIGN OR OPERATION:
A material change in design or operation from existing discharge requirements. Final determination of whether the reported change is material will be made by the RWQCB.

CHANGE IN QUANTITY/TYPE OF DISCHARGE:
A material change in characteristics of the waste from existing discharge requirements. Final determination of whether the reported change would have a significant effect will be made by the RWQCB.

CHANGE IN OWNERSHIP/OPERATOR:
Change of legal owner of the facility. Complete Parts I, III, and IV only and contact the RWQCB to determine if additional information is required.

WASTE DISCHARGE REQUIREMENTS UPDATE OR NPDES PERMIT REISSUANCE:
WDRs must be updated periodically to reflect changing technology standards and conditions. A new application is required to reissue an NPDES permit which has expired.

OTHER:
If there is a reason other than the ones listed, please describe the reason on the space provided. (If more space is needed, attach a separate sheet.)

APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

It should be emphasized that communication with the appropriate RWQCB staff is vital before starting the CEQA documentation, and is recommended before completing this application. There are Basin Plan issues which may complicate the CEQA effort, and RWQCB staff may be able to help in providing the needed information to complete the CEQA documentation.

Name the Lead Agency responsible for completion of CEQA requirements for the project, i.e., completion and certification of CEQA documentation.

Check YES or NO. Has a public agency determined that the proposed project is exempt from CEQA?
If the answer is YES, state the basis for the exemption and the name of the agency supplying the exemption on the space provided. (Remember that, if extra space is needed, use an extra sheet of paper, but be sure to indicate the attached sheet under Section VII. Other.)

Check YES or NO. Has the "Notice of Determination" been filed under CEQA? If YES, give the date the notice was filed and enclose a copy of the Notice of Determination and the Initial Study, Environmental Impact Report, or Negative Declaration. If NO, check the box of the expected type of CEQA document for this project, and include the expected date of completion using the timelines given under CEQA. The date of completion should be taken as the date that the Notice of Determination will be submitted. (If not known, write "Unknown")

VI. OTHER REQUIRED INFORMATION

To be approved, your application MUST include a COMPLETE characterization of the discharge. If the characterization is found to be incomplete, RWQCB staff will contact you and request that additional specific information be submitted.

This application MUST be accompanied by a site map. A USGS 7.5' Quadrangle map or a street map, if more appropriate, is sufficient for most applications.

VII. OTHER

If any of the answers on your application form need further explanation, attach a separate sheet. Please list any attachments with the titles and dates on the space provided.

VIII. CERTIFICATION

Certification by the owner of the facility or the operator of the facility, if the operator is different from the owner, is required. The appropriate person must sign the application form.
Acceptable signatures are:

1. **for a corporation,** a principal executive officer of at least the level of senior vice-president;
2. **for a partnership or individual (sole proprietorship),** a general partner or the proprietor;
3. **for a governmental or public agency,** either a principal executive officer or ranking elected/appointed official.

DISCHARGE SPECIFIC INFORMATION

In most cases, a request to supply additional discharge specific information will be sent to you by a representative of the RWQCB. If the RWQCB determines that additional discharge specific information is not needed to process your application, you will be so notified.

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

I. FACILITY INFORMATION

A. Facility:

Name: Machado and Sons Construction, Inc. - West Main Compost Facility
Address: 1236 West Main Ave
City: Crows Landing
County: Stanislaus
State: CA
Zip Code: 95313
Contact Person: Sean Kilgrow
Telephone Number: (916) 206-4342

B. Facility Owner:

Name: Machado and Sons Construction, Inc.
Address: 1000 South Kilroy Rd.
City: Turlock
State: CA
Zip Code: 95380
Contact Person: Sean Kilgrow
Telephone Number: (916) 206-4342
Federal Tax ID: 77-0398995

Owner Type (Check One)
1. ☐ Individual
2. ☑ Corporation
3. ☐ Governmental Agency
4. ☐ Partnership
5. ☐ Other: ____________

C. Facility Operator (The agency or business, not the person):

Name: Machado and Sons Construction, Inc.
Address: 1000 South Kilroy Rd.
City: Turlock
State: CA
Zip Code: 95380
Contact Person: Sean Kilgrow
Telephone Number: (916) 206-4342

Operator Type (Check One)
1. ☐ Individual
2. ☑ Corporation
3. ☐ Governmental Agency
4. ☐ Partnership
5. ☐ Other: ____________

D. Owner of the Land:

Name: Dave and Cindy Starkey
Address: 1643 W. Tuolumne Rd
City: Ceres
State: CA
Zip Code: 95307
Contact Person: Dave Starkey
Telephone Number:

Owner Type (Check One)
1. ☑ Individual
2. ☑ Corporation
3. ☐ Governmental Agency
4. ☐ Partnership
5. ☐ Other: ____________

E. Address Where Legal Notice May Be Served:

Address: 1000 South Kilroy Rd.
City: Turlock
State: CA
Zip Code: 95380
Contact Person: Sean Kilgrow
Telephone Number: (916) 206-4342

F. Billing Address:

Address: 1000 South Kilroy Rd.
City: Turlock
State: CA
Zip Code: 95380
Contact Person: Sean Kilgrow
Telephone Number: (916) 206-4342

CALIFORNIA ENVIRONMENTAL
PROTECTION AGENCY

State of California
Regional Water Quality Control Board

STATE WATER RESOURCES CONTROL BOARD
EUREKA
CALIFORNIA

APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

II. TYPE OF DISCHARGE

Check Type of Discharge(s) Described in this Application (A <u>or</u> B):

☑ **A. WASTE DISCHARGE TO LAND** ☐ **B. WASTE DISCHARGE TO SURFACE WATER**

Check all that apply:

☐ Domestic/Municipal Wastewater Treatment and Disposal
☐ Cooling Water
☐ Mining
☐ Waste Pile
☐ Wastewater Reclamation
☐ Animal Waste Solids
☐ Land Treatment Unit
☐ Dredge Material Disposal
☐ Surface Impoundment
☐ Industrial Process Wastewater
☐ Animal or Aquacultural Wastewater
☐ Biosolids/Residual
☐ Hazardous Waste (see instructions)
☐ Landfill (see instructions)
☐ Storm Water
☑ Other, please describe: Tier 1 Composting Facility

III. LOCATION OF THE FACILITY

Describe the physical location of the facility.

1. Assessor's Parcel Number(s)
Facility: 058-003-006
Discharge Point:

2. Latitude
Facility: 37.492004
Discharge Point:

3. Longitude
Facility: -121.011339
Discharge Point:

IV. REASON FOR FILING

☑ New Discharge or Facility
☐ Change in Design or Operation
☐ Change in Quantity/Type of Discharge
☐ Changes in Ownership/Operator (see instructions)
☐ Waste Discharge Requirements Update or NPDES Permit Reissuance
☐ Other: ____________________

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Name of Lead Agency: Stanislaus County

Has a public agency determined that the proposed project is exempt from CEQA? ☐ Yes ☑ No

If Yes, state the basis for the exemption and the name of the agency supplying the exemption on the line below.
Basis for Exemption/Agency: ____________________

Has a "Notice of Determination" been filed under CEQA? ☐ Yes ☑ No

If Yes, enclose a copy of the CEQA document, Environmental Impact Report, or Negative Declaration. If no, identify the expected type of CEQA document and expected date of completion.

Expected CEQA Documents:

☐ EIR ☑ Negative Declaration

Expected CEQA Completion Date: NA

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

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APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

STATE WATER RESOURCES CONTROL BOARD
CALIFORNIA

VI. OTHER REQUIRED INFORMATION

Please provide a COMPLETE characterization of your discharge. A complete characterization includes, but is not limited to, design and actual flows, a list of constituents and the discharge concentration of each constituent, a list of other appropriate waste discharge characteristics, a description and schematic drawing of all treatment processes, a description of any Best Management Practices (BMPs) used, and a description of disposal methods.

Also include a site map showing the location of the facility and, if you are submitting this application for an NPDES permit, identify the surface water to which you propose to discharge. Please try to limit your maps to a scale of 1:24,000 (7.5' USGS Quadrangle) or a street map, if more appropriate.

VII. OTHER

Attach additional sheets to explain any responses which need clarification. List attachments with titles and dates below:

You will be notified by a representative of the RWQCB within 30 days of receipt of your application. The notice will state if your application is complete or if there is additional information you must submit to complete your Application/Report of Waste Discharge, pursuant to Division 7, Section 13260 of the California Water Code.

VIII. CERTIFICATION

"I certify under penalty of law that this document, including all attachments and supplemental information, were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated 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."

Print Name: Allen Waggoner [redacted]

Title: Senior Professional Geologist

Signature:

Date: 2/3/21

FOR OFFICE USE ONLY

Date Form 200 Received:	Letter to Discharger:	Fee Amount Received:	Check #:

California Environmental Protection Agency
Bill of Rights for Environmental Permit Applicants

California Environmental Protection Agency (Cal/EPA) recognizes that many complex issues must be addressed when pursuing reforms of environmental permits and that significant challenges remain. We have initiated reforms and intend to continue the effort to make environmental permitting more efficient, less costly, and to ensure that those seeking permits receive timely responses from the boards and departments of the Cal/EPA. To further this goal, Cal/EPA endorses the following precepts that form the basis of a permit applicant's "Bill of Rights."

1. Permit applicants have the right to assistance in understanding regulatory and permit requirements. All Cal/EPA programs maintain an Ombudsman to work directly with applicants. Permit Assistance Centers located throughout California have permit specialists from all the State, regional, and local agencies to identify permit requirements and assist in permit processing.

2. Permit applicants have the right to know the projected fees for review of applications, how any costs will be determined and billed, and procedures for resolving any disputes over fee billings.

3. Permit applicants have the right of access to complete and clearly written guidance documents that explain the regulatory requirements. Agencies must publish a list of all information required in a permit application and of criteria used to determine whether the submitted information is adequate.

4. Permit applicants have the right of timely completeness determinations for their applications. In general, agencies notify the applicant within 30 days of any deficiencies or determine that the application is complete. California Environmental Quality Act (CEQA) and public hearing requests may require additional information.

5. Permit applicants have the right to know exactly how their applications are deficient and what further information is needed to make their applications complete. Pursuant to California Government code Section 65944, after an application is accepted as complete, an agency may not request any new or additional information that was not specified in the original application.

6. Permit applicants have the right of a timely decision on their permit application. The agencies are required to establish time limits for permit reviews.

7. Permit applicants have the right to appeal permit review time limits by statute or administratively that have been violated without good cause. For state environmental agencies, appeals are made directly to the Cal/EPA Secretary or to a specific board. For local environmental agencies, appeals are generally made to the local governing board or, under certain circumstances, to Cal/EPA. Through this appeal, applicants may obtain a set date for a decision on their permit and, in some cases, a refund of all application fees (ask boards and departments for details).

8. Permit applicants have the right to work with a single lead agency where multiple environmental approvals are needed. For multiple permits, all agency actions can be consolidated under a lead agency. For site remediation, all applicable laws can be administered through a single agency.

9. Permit applicants have the right to know who will be reviewing their application and the time required to complete the full review process.

April 2, 2021

Teresa McDonald
Senior Planner
Stanislaus County Planning

Since 1982 Starkey Farms has been producing healthy foods in Stanislaus county. Community involvement has been part of Starkey Farms since day one. We give our full support to the W. Main compost facility. In addition to providing recycling compliance, the compost this facility will produce improves the soil quality at our farms.

The State of California has passed and is now implementing SB 1383. This legislation is the most significant waste reduction mandate to be adopted in California in the last 30 years. SB 1383 requires the state to reduce organic waste disposal by 75% by 2025. In other words, the state must reduce organic waste disposal by more than 20 million tons annually by 2025. We are glad to support this project which is a key component to local organic recycling

Starkey does plan to utilize as much W. Main compost as our farms can effectively implement into our soil management program. We anticipate that the W. Main facility will produce sufficient compost for those requirements.

Best Regards,

David Starkey

Starkey Farms

[redacted]