TEHAMA COUNTY
LOCAL AGENCY MANAGEMENT PROGRAM FOR ONSITE WASTEWATER TREATMENT SYSTEMS (OWTS)

APPENDICES

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SECTION 1 INTRODUCTION

1. A. BACKGROUND

The California Water Code authorizes the State Water Resources Control Board (SWRCB) to regulate all discharges, including those from Onsite Wastewater Treatment Systems, which could adversely impact water quality. The policies of the SWRCB are implemented locally through nine Regional Water Quality Control Boards. Historically, each regional board developed basin plans that outlined water quality objectives in their respective jurisdictions as well as policies and programs to achieve those objectives.

Discharges are regulated through the use of Waste Discharge Requirements (WDRs). Tehama County is in Region Five which is the Central Valley Regional Water Quality Control Board (CVRWQCB). The SWRCB regulatory authority extends to individual **Onsite Wastewater Treatment Systems (OWTS)**. General guidelines for the Siting, Design, and Construction of OWTS were part of each regional board's basin plans. The SWRCB and the regional boards recognize the advantages and efficiencies of OWTS regulation by local agencies. Consequently, while the regional boards retained primacy over large and specialized systems, direct regulatory authority for individual OWTS has been delegated to individual counties.

The State OWTS Policy and **Local Agency Management Program (LAMP)** are the culmination of the actions required by Assembly Bill 885 (AB 885). AB 885 was introduced to the California State assembly on February 25, 1999, and would have impacted only coastal counties. The final version approved on September 27, 2000, was more inclusive, affecting all California counties. This legislation directed the SWRCB to develop regulations or standards for OWTS to be implemented statewide by qualified local agencies that issue sewage disposal system permits, which in Tehama County is the Environmental Health Department (TCEHD). The SWRCB adopted the Water Quality Control Policy (State OWTS Policy) for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems on June 19, 2012. The Policy was subsequently approved by the Office of Administrative Law on November, 13, 2012, and became effective on May 13, 2013.

Under an approved LAMP, the requirement to obtain WDRs for an OWTS is conditionally waived for OWTS that are in conformance with the Policy. Failure of counties to submit and obtain approval of a LAMP would mean that septic system permits for only those sites meeting the more restrictive Tier 1 soil requirements could be issued by local agencies. All other existing sites would potentially be subject to the WDR process.

In 1984 Tehama County adopted the Tehama County on-site Sewage Disposal Code. Within the Code are Sections 9.22.050 which authorized the Administrative Authority to require compliance with higher requirements to maintain a safe and sanitary condition. Section 9.22.060 authorized the Dept. of Environmental Health to revise our standards and procedures for Standard and Modified Designs as required reflecting current Public Health standards and legal requirements. Board approved resolution required. Section 9.22.070 authorized the Dept. of Environmental Health to develop special design and activated systems which this Department did and was approved in 1994.

1. B. POLICY TIERS

The Adopted State Policy places OWTS in California into one of the following Tiers:

TIER 0 – Existing OWTS. These are defined as existing OWTS that are properly functioning, and do not meet the conditions of failing. These do not require corrective action as specifically described in Tier 4, and are not contributing to an impairment of surface water as specifically described in Tier 3.

TIER 1 - Low-risk new or replacement OWTS. These are new or replacement OWTS that meet low risk siting and design requirements as specified in Tier 1. Minimum soil depths to groundwater and minimum soil depth from the bottom of a dispersal system range from 5 to 20 feet, based on soil percolation rates.

TIER 2 - Local Agency Management Program for new and replacement OWTS. California is known for its extreme range of geological and climatic conditions. As such, the establishment of a single set of criteria for OWTS would either be too restrictive so as to protect the most sensitive case, or would have broad allowances that would not be protective enough under some circumstances. To accommodate this extreme variance, local agencies may submit management programs known as Local Agency Management Programs (LAMP) for approval by the CVRWQCB, then upon approval, manage the installation of new and replacement OWTS under that Program. An approved LAMP allows local agencies to develop customized management programs that address the soil and groundwater depths specific to that jurisdiction. The LAMP must be approved by the appropriate CVRWQCB. Under an approved LAMP, separation of the bottom of a dispersal system to groundwater of as little as two feet may be allowed with an approved OWTS. Once approved, the standards contained in an approved LAMP supersede the Tier 1 standards. However, systems meeting Tier 1 soil and siting criteria would be considered a conventional OWTS within Tehama County.

The specific purpose for Tier 2 consideration in Tehama County will be as follows:

- Replacement of OWTS with advanced treatment systems on substandard lots with failing systems.
- Replacement of existing seepage pits that are failing and have been previously approved.
- Development of existing lots with seepage pits where conventional dispersal fields are not approvable due to poor surface soils.
- Provide required annual reports to state reporting systems.

TIER 3 - Impaired Areas. Systems that are within 600 feet of impaired water bodies. There are no such water bodies identified within Tehama County.

TIER 4 - OWTS Requiring Corrective Action. OWTS that require corrective action or fail at any time while this Policy is in effect are automatically in Tier 4 and must follow Tier 1, or Tier 2 requirements pending completion of corrective action.

It is Tehama County's intent to regulate projected wastewater flows up to 10,000 gallons per day under TIER 2 for dispersal underground only. Additionally, through the use of a variety of supplemental treatment systems and/or alternate dispersal systems, this LAMP includes a number of differing system designs and monitoring requirements to meet the full intent of the State OWTS Policy. TCEHD is committed to protecting public health and water quality while allowing continued development in Tehama County.

1. C. PROHIBITIONS (OWTS Policy 9.4)
Pursuant to the State OWTS Policy, the following will not be authorized in this LAMP:

- Cesspools of any kind or size. (OWTS Policy 9.4.1)

- OWTS receiving a projected flow over 10,000 gallons per day. (OWTS Policy 9.4.2)

- OWTS that utilize any form of effluent dispersal that discharges on or above the post installation ground surface such as sprinklers, exposed drip lines, free-surface wetlands, a pond, or any other similar surface discharge. (OWTS Policy 9.4.3)

- Slopes greater than 30 percent without a slope stability report approved by a registered professional. (OWTS Policy 9.4.4)

- Decreased leaching area for IAPMO certified dispersal systems using a multiplier less than 0.70. (OWTS Policy 9.4.5)

- OWTS utilizing supplemental treatment without requirements for periodic monitoring or inspections. (OWTS Policy 9.4.6.)

- OWTS dedicated to receiving significant amounts of wastes dumped from RV holding tanks. (OWTS Policy 9.4.7)

- Separation of the bottom of dispersal system to groundwater less than two feet. (OWTS Policy 9.4.8)

- Installation of new or replacement OWTS where public sewer is available. The public sewer may be considered unavailable when such public sewer or any building or exterior drainage facility connected thereto is located more than 200 feet from any proposed building or exterior drainage facility on any lot or premises that abuts and is served by such public sewer. This provision does not apply to replacement OWTS where the connection fees and construction costs are greater than twice the total cost of the replacement OWTS and the local agency determines that the discharge from the OWTS will not affect groundwater or surface water to a degree that makes it unfit for drinking or other uses. (OWTS Policy 9.4.9)

Horizontal Setback Requirements Except as provided in the noted exceptions below. TCEHD may not approve new or replacement OWTS with the minimum horizontal setbacks less than any of the following: (OWTS Policy 9.4.10)

- 150 feet from a public water well where the depth of the effluent dispersal system does not exceed 10 feet in depth. (OWTS Policy 9.4.10.1)

- 200 feet from a public water well where the depth of the effluent dispersal system exceeds 10 feet in depth. (OWTS Policy 9.4.10.2)

- Where the effluent dispersal system is within 600 feet of a public water well and exceeds 20 feet in depth, the horizontal setback required to achieve a two-year travel time for microbiological contaminants shall be evaluated. A Qualified Professional (as defined OWTS Policy 1.0 herein adopted), shall conduct this evaluation. However, in no case shall the setback be less than 200 feet. (OWTS Policy 9.4.10.3)

- Where the effluent dispersal system is within 1,200 feet from a public water system's surface water intake point, within the catchment of the drainage, and located such that it may impact water quality at the intake point such as upstream of the intake point for flowing water bodies, the dispersal system shall be no less than 400 feet from the high water mark of the reservoir, lake, or flowing water body. (OWTS Policy 9.4.10.4)
  Note: This section could only affect the Paskenta water system in Tehama County

- Where the effluent dispersal system is located more than 1,200 feet but less than 2,500 feet from a public water system's surface water intake point, within the catchment area of drainage, and located such that it may impact water quality at the intake point such as upstream of the intake point for flowing water bodies, the dispersal system shall be no less than 200 feet from the high water mark of the reservoir, lake, or flowing water body. (OWTS Policy 9.4.10.5)

Exceptions

For replacement OWTS that do not meet these horizontal separation requirements, the replacement OWTS shall meet the horizontal separation to the greatest extent practicable. In such cases, the replacement OWTS shall utilize treatment and other mitigation measures, unless the permitting authority finds that there is no indication that the previous system is adversely affecting the public water source, and there is limited potential that the replacement system could impact the water source based on topography, soil depth, soil texture, and groundwater separation. (OWTS Policy 9.4.11)

1. D. EXISTING PARCELS (OWTS Policy 9.1.11) (OWTS Policy 9.1.12) (OWTS Policy 9.2.3)

There are thousands of existing parcels within Tehama County that have been developed using OWTS for sewage disposal/treatment purposes. TCEHD is aware that some existing OWTS may now be considered substandard as a result of their development prior to the adoption and implementation of current or historical Tehama County Sewage Disposal Standards (under standards less stringent than those required by the State OWTS Policy). Those systems may be on small lots, may not meet the new requirements of the State OWTS Policy, or may not meet all required setbacks. The OWTS serving these parcels will be carefully evaluated either under our complaint report program, when the system is evaluated after receipt of a repair/replacement permit application, or as part of a request to further develop the parcel(s). The intent of TCEHD would be to allow the continued use or uses on the parcel while bringing the OWTS serving the parcel into compliance with the State OWTS Policy to the greatest extent practicable.

1. E. SEPTAGE CAPACITY AND SEPTIC PUMPER TRUCK APPLICATIONS AND REGISTRATIONS (OWTS Policy 3.3.2) (OWTS Policy 9.2.6)

Septage is the term used for the partially treated solid and liquid material removed from septic tanks, and some treatment systems, by septic tank pumper trucks. This material includes settled solids, fats, oils, grease, other floating materials, and some amount of liquid. This solid material must be removed from septic tanks to prevent the tank from filling up and potentially damaging the dispersal system or any supplemental treatment system that may be in use. Removal frequency is different for each system.

Septage. Counties must ensure that a disposal site for septage is available. Tehama County has the following two septage disposal sites available:

1. Lourence Disposal Site on Rawson Road

2. Nunes Disposal Site on Jelly's Ferry Road

Both are operated under WDR's from CVRQCB. Each site employs Land Application for the discharge of septage from pumper trucks. These sites appear capable of accepting the current and projected flow.

Monthly reports are provided to TCEHD by septage pumpers operating in Tehama County. Reports include clients name, address, type and amount of waste, and reason for pumping tank.

Septic Pumper Truck Applications and Registrations
TCEHD requires applications from, issues registrations for, and inspects all registered septage pumper trucks annually within Tehama County. Inspections of pumper trucks by TCEHD primarily focus on health, sanitation, and safety issues relating to the trucks, equipment, and employees. Pumper/haulers are requested to notify TCEHD within 24 hours of the discovery of a failing OWTS with surfacing sewage.

1. F. DATA COLLECTION/REPORTING/NOTIFICATIONS/RESPONSIBILITIES (OWTS Policy 9.3) (OWTS Policy 9.3.1) (OWTS Policy 3.3.1)
As a condition of TCEHD oversight of OWTS within Tehama County, TCEHD has certain responsibilities related to data collection and reporting to the CVRWQCB as well as, in some cases, the owners/operators of public water systems and the State Water Resources Control Board's Division of Drinking Water (SWRCB-DDW). This Section details the data that must be collected by TCEHD and the procedures for reporting to the CVRWQCB and notifications to owners of public water systems and the SWRCB-DDW.

Water Quality Assessment Program (OWTS Policy 9.3.2) (OWTS Policy 9.3.2.1) (OWTS Policy 9.3.2.2) (OWTS Policy 9.3.2.3) (OWTS Policy 9.3.2.4) (OWTS Policy 9.3.2.5) (OWTS Policy 9.3.2.6) (OWTS Policy 9.3.2.7) (OWTS Policy 9.3.2.8) (OWTS Policy 9.3.2.9)
TCEHD will maintain a water quality assessment program to determine the general operational status of existing OWTS and OWTS permitted under this LAMP. TCEHD will evaluate the impact of discharges from OWTSs, and assess the extent to which groundwater and local surface water may be impacted. This program will primarily focus on areas where poor soil conditions, a high concentration of OWTS exist, and a high concentration of domestic water wells and OWTS exist. Data collected for this program will include the results of investigations into complaints of failing OWTS, inspections of operating OWTS (by TCEHD staff and service providers), sample results from our Public Water System regulatory program, sample results submitted from local watershed management groups, and any other water samples of surface or ground water reported to or obtained by TCEHD staff (may include, but not be limited to loan well inspections, data from Geotracker GAMA, and monitoring wells from TCEHD or state agency permitted facilities). This monitoring program may identify areas requiring additional scrutiny of soil test results and designs for proposed OWTS (new, repaired, replacement, and increased capacity of OWTS) and possibly the need for more frequent inspections or maintenance of OWTS.

Records Retention (OWTS Policy 3.4)
At a minimum, TCEHD will retain permanent records of permitting actions and will make them available to CVRWQCB staff within ten working days upon written request for review. The records for each permit shall reference under which Tier (1, 2, 4) the permit was issued. TCEHD does not currently use a computer database to track permits. Paper copies of completed system applications, soil test data, final drawings, and other related documents are kept in the TCEHD office. When the system has been granted final approval the approved As-Builts are scanned into an electronic database for the Building Department. For future reporting TCEHD will record permits in a method acceptable to CVRWQCB.

Reporting to the RWQCB (OWTS Policy 3.3) (OWTS Policy 9.3.3)
A. On an ongoing basis, TCEHD will collect data and report by February 1st annually, in a format prescribed by the State OWTS Policy and must include the following information:

1. The number and location of complaints pertaining to OWTS operation and maintenance, and identification of those which were investigated and how they were resolved.
2. The number, location, and description of permits issued for new and replacement OWTS and under which Tier the permit was issued, noting any variance allowed for systems otherwise in substantial conformance with the standards.
3. The applications and registrations issued for sewage haulers as part of the septic tank cleaning registration program.
4. Results of the Water Quality assessment Program intended to evaluate the impact of OWTS on groundwater. Any groundwater monitoring data collected shall be submitted in Electronic Deliverable Format (EDF) format for inclusion into GeoTracker, the SWRCBs database of which this data will have exclusive view by CVRWQCB staff. Any surface water monitoring data collected shall be submitted to the California Environmental Data Exchange Network (CEDEN) in a Surface Water Ambient Monitoring Program (SWAMP) comparable format. At this time, at a minimum, it is expected that groundwater monitoring will include, but not be limited to, any samples collected from small public water systems regulated by TCEHD and any other samples collected in response to complaints, and samples that may be required from OWTS monitoring wells.

B. Every five years, an evaluation of the monitoring program and an assessment of whether water quality is being impacted by OWTS in use within Tehama County must be completed. The evaluation, prepared by TCEHD for the CVRWQCB, would need to identify any changes in the Tehama County LAMP required to address any impacts from OWTS.

Reporting to Owners of Public Water Systems and Division of Drinking Water at the SWRCB (OWTS Policy 3.5) (OWTS Policy 9.2.11) (OWTS Policy 9.2.12) (OWTS Policy 9.10.4)
TCEHD shall notify the owner of a public well or water intake and the Division of Drinking Water at the SWRCB as soon as is practicable, but not later than 72 hours, upon verification of a major failure of an OWTS component within:

- 150 feet of a public water well; and
- Within 2,500 feet from a public water system surface water intake.

Additionally, TCEHD will notify the public water system prior to the issuance of a new installation or repair permit for an OWTS if a surface water intake is within 1200 feet of a proposed OWTS, is within the drainage catchment of the intake point and is located such that it may impact water quality at the intake point, or if the proposed OWTS is within the horizontal sanitary setback from a public well. Notification is to be made by TCEHD upon receipt of an application for a new or repair permit and prior to issuance of the permit. All notifications will be in letter format and mailed to the water system.

For OWTS permit applications for dispersal systems within the horizontal sanitary setback of a public well or a surface water intake point TCEHD shall first work with the owner of the proposed OWTS to see if relocation of the dispersal system is possible. Per the State OWTS Policy, an OWTS with supplemental treatment for nitrogen reduction and supplemental treatment for pathogen reduction will be required if the dispersal system could not be relocated to meet the required.

Outreach Program (OWTS Policy 9.2.5)

TCEHD has copies of sewage disposal standards, percolation test instructions and data sheets, and other related documents are available to the public in our office. All newly developed materials will be available when developed.

With few exceptions, documents in TCEHD files are public records. These include copies of OWTS documents such as permitting/installation records, site location drawings, and soil test data, copies of applications for permits to drill wells, copies of public water system sample results, soil test results conducted as part of a proposed land division, and other records that may relate to OWTS.

Upon request, TCEHD staff can provide presentations to local homeowner or industry groups or organizations regarding OWTS standards, use, operation, design, construction, and maintenance.

In addition to OWTS construction permits, TCEHD will require that an Operations and Maintenance plan be prepared for each system by the Qualified Professional designing the system. This document shall be provided to the property owner and will include procedures to ensure maintenance, repair, or replacement of failing critical items within 48 hours following discovery. To assist system owners in providing proper maintenance and repairs to their system and in reporting upset conditions, we will have available on our website a list of service providers, in addition to the list of Qualified Professionals currently on our website. This will include 24 hour contact numbers when available.

Should TCEHD implement a voluntary well monitoring program at some future date, the outreach program will include information on how well owners may participate.

TCEHD Responsibility

Permits issued for the construction of a replacement OWTS requiring an Operation and Maintenance (O&M) Plan shall be prepared for the OWTS owner by a qualified professional. This Plan will detail operating procedures and maintenance requirements and frequencies.

TCEHD will establish and maintain a record keeping and reporting system to ensure that current records are kept detailing the location, ownership, site evaluation, design, and O&M reports so that the performance of the treatment systems approved under Tier 2 can be monitored.

TCEHD will monitor and analyze the performance of OWTS within the County by reviewing O&M data.

TCEHD will assure timely follow-up and correction, including enforcement action when necessary, when problems are encountered with treatment or dispersal technologies which are being monitored through the O&M program.

TCEHD may perform O&M inspections, as needed, for quality assurance/quality control, surveys, and investigations.

Property Owner, Qualified Professional, and Service Provider Responsibility

Property owners, qualified professionals (consultants/designers), and service providers (system operators and maintenance technicians) all have responsibilities with respect to the use, operation, maintenance, inspection, and reporting related to all OWTS permitted in Tehama County. The failure of one of these team members to abide by their respective responsibilities may result in premature upset or failure of the OWTS. Failure of an OWTS can lead to surface water or groundwater contamination with untreated or partially treated wastewater and potential public health hazards. Another result of a failing OWTS is the expense to repair or replace the system. This can be equal to, or more than, the construction cost of the original system.

Property Owner

Every onsite wastewater treatment system requires care with use and timely maintenance to continue to function as they are designed to function. An OWTS is sized for an expected use. A number of OWTS have failed due to misuse or use beyond that expected when the system was designed and constructed. Using the system beyond its design flows will lead to premature failure. Using the system to dispose of large quantities of household cleansers or disposal of a wastewater stream different from that which the system was designed for can significantly reduce the life span and effectiveness of the OWTS. A property owner must be accurate with the

proposed use, quantity and wastewater stream, when discussing the proposed OWTS with their consultant and with TCEHD.

All OWTS require maintenance. This can be as simple as having the septic tank inspected and pumped on a regular basis to the necessarily more thorough inspection and maintenance of supplemental treatment systems. Generally, most permits issued under this LAMP include at least some inspection, maintenance, monitoring, and reporting requirements depending on the complexity of the system installed. Additionally, timeframes are specified for these activities. An owner of an OWTS must adhere to these tasks at their specified timeframes to assist in keeping these OWTSs operating as designed. Owners must contract with a Service provider, familiar with the type of OWTS in use, to conduct the inspections, maintenance, monitoring, and reporting tasks, as required at specified timeframes, by a valid installation/operating permit. An owner must correct deficiencies in the OWTS that have been identified by TCEHD and/or a service provider.

TCEHD does not currently have any graywater systems under consideration. An OWTS is designed for a specified wastewater strength and quantity. Property owners should be aware that, in the extreme, the use of a graywater system may have an impact on an OWTS in use at a site. Be sure that the Qualified Professional and TCEHD staff are aware that a graywater system may be constructed or consider an alternative OWTS, such as a drip dispersal system, allowing OWTS liquid waste to assist in watering vegetation at the site. TCEHD does not allow a reduction in the size of an OWTS when a graywater system is proposed at a site.

Qualified Professional (OWTS Policy 9.1.7) (OWTS Policy 9.1.10) (OWTS Policy 9.2.4)
Every new/proposed OWTS, and most onsite system repairs, must be designed by a Qualified Professional. This person must be a Registered Civil Engineer, Registered Geologist, or REHS. For most OWTS that meet Tier 1 requirements, this will be the TCEHD staff specialist assigned to the permit. Qualified Professionals will test each site, recommend a system for the site based on test results and site soil and groundwater depths, and design and provide specifications for that system. The Qualified Professional must be certain that the system is being designed for the proper wastewater flow.

The Qualified Professional will consider potential pathways of wastewater-sourced phosphate and other nutrients toward potentially threatened nearby surface water bodies, when present. They will also consider hydraulic mounding, nitrate and pathogen loading, and sufficiency of potential OWTS replacement areas. The OWTS, potential replacement areas, and all proposed site improvements and structures must fit onto existing and proposed parcels while meeting or exceeding all appropriate setbacks and would be verified by the Qualified Professional on the site plan.

The Qualified Professional must work with the installer to ensure that the system, as constructed, meets the specifications of their design and the permit issued by TCEHD. An accurate site plan, showing the system location must be prepared and provided to the property owner.

An operation and maintenance plan prepared by the system designer, and made available to the system owner is required of every alternate dispersal or supplemental treatment system installed on parcels in Tehama County. Proper use and routine maintenance at specified intervals, as specified by the plan, is necessary in order for an OWTS to function as designed for as long as possible. The OWTS designer shall prepare the following operations and maintenance plan:

- An accurate scale drawing showing the actual location of the OWTS installed on a parcel for ease in locating the system for inspections, maintenance, and monitoring. The drawing is to include the location of all system components;
- Where required, an Operations and Maintenance Manual specific to the type of system installed. It shall contain a narrative describing how the system achieves its treatment standards/goals. The manual shall note homeowner or service provider procedures to ensure maintenance for continued operation, repair, or replacement within 48 hours of identifying a failing system. The manual is to detail the type of maintenance or monitoring required and when these tasks should be done;
- Identify if the tasks can be performed by an owner or if a Service provider is the more appropriate choice to perform them;
- The plan shall include the names and telephone numbers of the Qualified Professional , licensed system installer, and OWTS Service provider, and;
- Identify any reporting required to TCEHD as a result of these inspections, monitoring, and maintenance or actual failure conditions.
- The plan is to be amended if the system is upgraded or requires repair.

Service Provider (OWTS Policy 9.2.4)
The property owner must contract with a Service provider (see definitions) if required by the plan to provide necessary inspection, maintenance, monitoring, and reporting services as specified in a valid OWTS permit as issued by TCEHD. Most OWTS owners may not understand how a system functions and recognize signs that the system needs maintenance or is failing. It is extremely important that the Service provider completes the required tasks to keep the system operating as planned.

When required by providers of proprietary equipment, the Service provider must meet and maintain the requirements for qualification for the specific proprietary equipment.

The Service provider shall provide all maintenance records to the property owner and report any system malfunction that results in surfacing sewage to the owner and TCEHD within 48 hours.

1. G. OWTS NEAR IMPAIRED WATER BODIES (OWTS Policy 9.1.8) (OWTS Policy 9.2.2)

Currently, there are no impaired surface water bodies in Tehama County listed in Attachment 2 of the State OWTS Policy. At such time as an impaired water body is listed, TCEHD will follow the applicable specific requirements of the State OWTS Policy.

Onsite Maintenance Districts (OWTS Policy 9.2.7)

There currently are no onsite maintenance districts or zones within Tehama County nor are any anticipated in the foreseeable future.

Regional Salt and Nutrient Management Plans (OWTS Policy 9.2.8)

There are no existing regional salt or nutrient management plans within Tehama County nor are any anticipated in the foreseeable future.

Watershed Management Groups (OWTS Policy 9.2.9)

Currently, TCEHD has no formal agreements with any watershed management groups within Tehama County.

1. H. PARCEL/LOT SIZE REQUIREMENTS (OWTS Policy 9.1.2) (OWTS Policy 9.1.10)

Tehama County has a one-acre minimum for new parcels. It should be noted that there has not always been a minimum lot size for existing lots to be served by an OWTS and many small parcels have been created over the years. Either way, the OWTS, including the 100 percent replacement area, shall meet all applicable setbacks to all proposed structures which include, but are not limited to, dwellings, wells, pools, barns, shops, garages, driveways, and other graded/paved/concrete areas which shall fit on the property without interfering with the OWTS.

See Section 4 for related documents that provide specific requirements regarding the creation of new parcels (land divisions) within Tehama County. Minimum parcel sizes are required by the County land use agencies per specific site zoning.

1. I. HIGH DOMESTIC WELL USAGE AREAS (OWTS Policy 9.1.4) (OWTS Policy 9.1.9) (OWTS Policy 9.1.11) (OWTS Policy 9.1.12)

With the exceptions of the town Paskenta, and some residents of Manton, all of Tehama County residents are served by public or privately operated well water systems, or single property domestic wells. These include systems operated by the incorporated cities, large water districts, and approximately 90 small public water systems regulated by TCEHD.

Overall, the population of Tehama County is estimated at having approximately 20,000 persons served by private domestic wells and some individual spring and surface water systems. The majority of these individual wells are on parcels with an OWTS. Areas of high domestic well use with OWTS' include the Antelope area of Red Bluff, Dairyville, Los Molinos, Proberta, and East Corning. There are vast areas of Tehama County developed on wells and OWTS but the density is not high enough to be defined as high domestic well usage areas.

TCEHD is aware of nitrogen impacts to groundwater as a result of the OWTS density in the Antelope area of Red Bluff. In this area all proposed new or replacement OWTS must be replaced with an advanced Nitrate treatment system as follows:

- 45 Mg/L +
- Pre-treatment required on all new or repair systems on all lots.
- Lots less than 1 acre require pre-treatment that meets NSF Standard 245. 50% reduction or greater.

- 20-45 Mg/L
- Lots 1 acre or greater, 30 inch max trench depth
- Lots less than 1 acre require pre-treatment

- <20mg/L Lots that meet setbacks
- Conventional Systems

The CVRWQCB report titled, "**POTENTIAL SOURCES, CHRONIC NITRATE IN PRIVATE DOMESTIC WELLS, ANTELOPE BLVD. AREA, NEAR RED BLUFF, TEHAMA COUNTY"**, will be used as a reference document in determining the required pre-treatment in this area.

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SECTION 2. ONSITE WASTEWATER TREATMENT SYSTEMS PERMITTING PROCESS (OWTS Policy 9.2.1)

2.A. STATE / COUNTY ROLES

State / County Coordination

OWTS discharge pollutants to groundwater and, therefore, are regulated by the State Water Code. Water Code Section 13282 allows the CVRWQCBs to authorize a local public agency to issue permits for and to regulate OWTS "to ensure that systems are adequately designed, located, sized, spaced, constructed, and maintained". The CVRWQCB, with jurisdiction over Tehama County, authorizes only the TCEHD to issue certain OWTS permits throughout the County.

Through the State OWTS Policy, the CVRWQCB has imposed conditions and restrictions on the County's permit program. TCEHD is authorized by Tehama Code Section 9.22.010 et seq. to issue permits for conventional OWTS and alternative OWTS with or without supplemental treatment within the County. The Adopted State OWTS Policy requires a minimum of five feet and up to twenty feet of separation maintained between the bottom of a dispersal system point and the highest anticipated groundwater level for conventional OWTS, and at least two feet of separation be maintained for some alternative dispersal systems, including some with supplemental treatment.

The goal of TCEHD's LAMP is to ensure that installed OWTS will last the life of any structure they serve and not cause any public exposure to surfacing sewage or potential contamination of

groundwater or surface waters. The separation requirements are a condition of the State's authorization for Tehama County to issue OWTS permits locally. The Technical Guidance Manual describes in detail how the County ensures that these State-imposed separation requirements are determined and met.

TCEHD / Land Use Agency Coordination

A fundamental point that persons seeking OWTS permits must remember is that the County OWTS permit process and local agency (Planning/Building Department), land use approval and permitting are essentially separate processes. While they are coordinated to a great extent, persons seeking OWTS permits from TCEHD should also review and ensure compliance with applicable site grading, land use, and building requirements.

Similarly, no local land use approval or permit, including, but not limited to, approved land divisions, property line adjustments, use permits, is a substitute for a County OWTS permit, or a guarantee that such a permit will be issued.

2.B. SYSTEM DESIGN CONSIDERATIONS

The most common type of conventional OWTS found in Tehama County consists of a septic tank connected to leach lines. In all cases, the majority of solids, fats, oil, and grease are removed in the septic tank and effluent from the septic tank is discharged below the ground surface, and organic material present in this effluent is digested by bacteria in unsaturated soil zones for treatment of the effluent underground. These systems are designed to operate in all weather conditions with minimal maintenance, other than periodic septic tank pumping to remove accumulated sludge and floating scum that form in the septic tank. Under this LAMP, sites with Tier 1 minimum of 5 to 20 feet of soil beneath a dispersal system trench, based on soil percolation rates, would not require mitigation or monitoring and a septic tank and leach line dispersal system could be constructed as authorized by a valid OWTS Permit.

In addition to conventional OWTS, Tehama County allows the use of alternative or non-conventional systems. These systems are generally used for those sites that cannot support the use of a conventional OWTS due to soil permeability problems, or soil depth problems. A variety of OWTS mitigations were accepted in the past to deal with these specific site conditions including shallow trenches, pumps, seepage pits, dual leach fields, and other systems and these are known as non-conventional systems. The Approved OWTS State Policy now sets a minimum soil depth and separation from groundwater at five to twenty feet without the use of a supplemental treatment and/or dispersal system to treat septic tank effluent prior to discharge into the soil. The TCEHD Director may allow the use of other systems not otherwise prohibited by the State OWTS Policy.

The size and type of OWTS necessary for a residence or other use will nearly always be a function of the following factors:

1. Soil Permeability. Permeability determines the degree to which soil can accept septic tank or supplemental treatment system effluent over a period of time. Permeability is determined by a percolation test and is reported as a percolation rate, in minutes per inch.

2. Unsaturated Soil Interval. The distance between the bottom of the OWTS dispersal field and the highest anticipated groundwater level or the impervious subsurface layer at the site.

3. Peak Daily Flow. The anticipated peak sewage flow in gallons per day. In many cases the number of bedrooms for a proposed home is used as an indicator of peak daily flow. Daily flow in non-residential uses is calculated from expected flows from charts in the Uniform Plumbing Code, adopted by Tehama County, and other similar charts or actual flows of similar projects acceptable to the Director.

4. Net Useable Land Area. The area available that meets all setback requirements from structures, easements, watercourses, or other geologic limiting factors for the design/placement of an OWTS. A site may not be developed beyond its capacity to properly treat and disperse the amount of liquid waste expected/generated. Some sites may not be acceptable for conventional or alternative OWTS based on high or low soil permeability and net useable area, regardless of the unsaturated soil interval available at the site. All new conventional OWTS in Tehama County will require five feet to twenty feet, based on soil evaluation, between the bottom of the dispersal system and the highest anticipated groundwater level for the site. An alternative Tier 2 OWTS may allow a minimum of three (3) feet on lots of 10 acres or for domestic use only, as provided in TCC Section **9.22.200**. Depth to groundwater varies tremendously with the amount of precipitation and soil types for specific sites and areas within Tehama County, therefore, the highest anticipated groundwater level must be established for any OWTS design in order to meet this separation requirement. Details in determining depth to groundwater and overall soil depth are provided in Section 5 of this LAMP. The net useable land area required for an OWTS will usually depend on soil permeability, soil depth, expected peak daily flows and the required 100 percent dispersal system replacement area.

5. Wastewater Strength. Wastewater strength has been of some importance with non-residential systems such as restaurants or other commercial or industrial systems. This is because there may be less water in the waste stream or more solid material, oils, fats, grease, or cleansing or sanitizing materials may be present when compared to those things expected in residential wastewater. High strength waste will not be considered under Tier 2 in Tehama County. Wastewater strength with residential systems may be more important in the future if graywater systems divert a large part of the liquid component of residential wastewater flow from the septic tank.

2.C. PERMITS ISSUED (OWTS Policy 3.3.3)

Historically, TCEHD issues an average of approximately 180 Sewage Disposal System Permits annually, depending on development, as follows:

- 90 new standard or conventional system permits;
- 10 new non-standard or non-conventional permits, generally seepage pits, and;
- 80 permits to replace failing or inadequate systems.

Under the County's approved LAMP, we would expect to continue to issue a similar number of total permits in different categories annually, depending on development, as follows:

- 90 new Tier 1 conventional system permits (not requiring treatment or alternate dispersal);
- 10 new non-conventional systems (alternate dispersal);
- 75 repair permits (without supplemental treatment or alternate dispersal), and;
- 5 repair permits (with supplemental treatment and/or alternate dispersal).

Under our current Sewage Disposal Systems Ordinance, new systems were considered conventional or non-conventional. Non-conventional systems are systems that require some mitigation as the sites did not outright meet the minimum soil standards required to construct a standard system in Tehama County. These mitigations include shallow soil depth, too fast or too slow soil percolation rates, use of seepage pits where conditions allow, use of a curtain drain to dewater a site, and use of a pump from the sump to reach the dispersal field.

Our intent is to use a small variety of mitigations under the Tier 2 LAMP to protect public health and water quality within Tehama County. For any OWTS with supplemental treatment or an alternate dispersal system, TCEHD will require the completion of inspections, maintenance, water monitoring/sampling, and/or reporting.

2.D. CESSPOOLS (OWTS Policy 9.2.13) (OWTS Policy 9.4.1)

A cesspool is a hole excavated into the ground to receive domestic wastewater from a structure. A cesspool does not have a tank or other water tight settling chamber nor does it have a proper pipe inlet/outlet, or a dispersal system to assist in effluent treatment and safe disposal. Cesspools have not been approved for use in Tehama County per our Sewage Disposal Standards dating to the mid 1970's. Cesspools are not authorized by this LAMP.

Any existing cesspool discovered by TCEHD through our repair or complaint process or through an application to increase the capacity of any existing OWTS shall be properly destroyed and replaced with an OWTS acceptable under this LAMP under the same process noted in Section 3, Failing OWTS and Corrective Action. Permits will not be issued for the construction of any cesspool.

2.E. RV HOLDING TANK WASTE (OWTS Policy 9.4.7)

Under the State OWTS Policy, TCEHD is prohibited from issuing permits for systems that receive a significant amount of wastes from RV holding tanks. Such systems are regulated by the RWQCB. TCEHD may issue permits for OWTS that receive RV holding tank wastes as long as those wastes are incidental to a more "normal" waste stream, such as a home with an RV waste dump station for use by the homeowner.

2.F. STEPS IN THE PERMIT APPLICATION PROCESS

All OWTS permit applications for new construction, repairs, or additions within Tehama County will be submitted to TCEHD.

Steps in the Permitting Process

In general, a "complete" OWTS permit application contains a completed application form, an accurate site plan, soils test results if required, and appropriate fees.

Soil Test Data

Soil test data may include a soil profile, percolation tests, groundwater monitoring results, and/or soil boring logs. The specific test data required is determined by the type of system proposed and may be modified as the results of those tests that are being conducted. Soil tests are typically required when:

- An existing parcel, created prior to soil test requirements for land divisions, is proposed for development;
- Grading or other soil disturbance has occurred in the previously tested/approved area;
- The system is being shifted out of the previously tested/approved area;
- An OWTS other than the type of system previously approved is being considered;
- An existing septic system fails or is proposed for expansion and no previous soil test data is available for the specific parcel.

TCEHD staff will review soil percolation and other test data submitted with the application and determine if the tests are adequate or if additional tests are needed. Parcels created since 1982 would have been created with eight-foot deep soil profiles to verify that at least five feet of suitable soil exists. Groundwater monitoring in eight-foot deep monitoring wells (or other

alternate method), was required when the inspection of the eight-foot deep pits did not clearly delineate the depth of a seasonal water table. This soil test data does not expire and this data should be adequate to allow a permit to be issued for an OWTS with an alternate dispersal or supplemental treatment system without the requirement for additional testing.

Project applicants are welcome to conduct additional tests to determine if soils at the site meet the more restrictive depth standards under this LAMP with the goal of constructing a conventional or less costly system. Additional tests would be required if the construction of a specific type of OWTS proposed for a site cannot be supported by the data on hand.

Some parcels created prior to 1982 were created with currently inadequate (under this LAMP) soil tests or without soil test requirements at all. Adequate soil testing would be required to verify that these sites meet either the conventional OWTS (Tier 1) or alternate dispersal OWTS requirements (Tier 2 LAMP). No supplemental treatment is currently allowed for development of substandard lots.

All required soils tests shall be conducted by, or be under the supervision of, a qualified professional such as a registered civil engineer, registered environmental health specialist, or a soil scientist.

With percolation tests and other soil data in hand, the applicant must develop and submit an accurate site plan for the proposed building project and the proposed OWTS. The site plan must take percolation and other soil test data and this guidance into account.

Application Site Plan

The application form identifies the location of the property, owner, applicant if not the owner, contractor, proposed use, parcel size, specific assessor parcel number, and proposed water supply for the proposed project. The application identifies any previous land use projects that may have required that soil test be conducted. The application also identifies the OWTS project as a new installation, a replacement, or a repair.

A complete OWTS permit application includes a detailed, accurate site plan which at a minimum depicts the following:

- The outline and dimensions of the parcel.
- The property owner’s name.
- The assessor’s parcel number for the property.
- The address of the property.
- A North arrow and scale.
- The acreage of the property.
- Dimensions/square footage/footprint and use of all structures.
- Easements shown and labeled.

- All OWTS and well locations, both existing and proposed. Also shows the distance to all neighboring OWTS and well(s) where applicable.
- Shows the required 100, or 200 percent dispersal system replacement area.
- All roads and driveways shown and labeled, list length, width, and turn radius, and estimate grade.
- Drainages and waterways shown and labeled, including roadside ditches, seasonal or dry creek beds, and distance(s) from existing and proposed OWTS.
- Indicates distances to toe and/or top of slopes and cuts, whichever is appropriate.
- Delineates areas and depth of fill.
- Shows the locations of all percolation tests where applicable, soil profile pits, borings, and groundwater monitoring wells.
- Shows all existing and proposed grading including depths of cuts and fills.
- Additional information may be requested for a proposed OWTS based on specific site features or conditions.
- Delineates flood plain, when applicable.

2.G. PERMIT APPLICATION REVIEW AND PERMIT ISSUANCE

TCEHD staff would review all available soil test data, the site plan, and application to determine if adequate information exists to issue an OWTS permit. Typically, TCEHD staff would make a site visit of the property to perform a site evaluation to verify that the soils data and site plan accurately reflect conditions at the site. After review, if it appears likely that the proposed OWTS (including replacement area) will fit into the site and will function properly, TCEHD will issue a OWTS Permit.

TCEHD may allow variances from the State OWTS Policy with regards to horizontal separation for replacement/repair system only. New installations and repairs shall conform to the Policy to the greatest extent practicable. TCEHD staff will work with applicants to determine if relocation of the proposed OWTS is possible to potentially avoid the requirement to add a supplemental treatment system. Variances will not be allowed for the creation of new parcels after the effective date of this LAMP. Records of the number, location, and description of permits issued for OWTS where a variance is granted shall be maintained for the annual report to the RWQCB. (OWTS Policy 9.2.3) (OWTS Policy 9.3.1)(9.4.11)

Grading or clearing of brush for the purpose of conducting a site evaluation and soil tests may require a grading permit issued by the Building/Planning Department. The requirements for this grading permit in the unincorporated area of Tehama County are available from the appropriate building agency. Any grading which damages or alters an approved or proposed sewage treatment dispersal area may be costly to correct, may delay the approval of a project, or may preclude the issuance of an OWTS permit.

2.H. FINAL INSPECTION (OWTS Policy 9.2.1)

Once an OWTS permit has been issued the OWTS can be installed. Such installation must meet all applicable requirements for OWTS construction in Tehama County and any special conditions specified for that site or permit. TCEHD staff may require a meeting with the system designer and installer at a pre-construction conference, as specified in the permit. The system must first be inspected by the system designer/qualified professional. If the qualified professional finds the system to be in compliance with the system design and issued permit, they would then request a final inspection by TCEHD staff. The system installation must be inspected and approved by TCEHD before the system can be backfilled. If this (or subsequent inspections if necessary) is satisfactory, TCEHD will provide a final approval for the OWTS permit. Occasionally, TCEHD will hold final approval on the OWTS permit pending the completion of specific conditions such as placement of backfill materials or final site grading.

Tehama County land use agencies require that OWTS are installed and final approval granted by TCEHD before occupancy of structures is allowed. OWTS permits, once issued, will be valid for a period of one year. Extensions and renewals of these permits will follow appropriate policy.

2. I. PRIMARY AND REPLACEMENT/RESERVE AREA REQUIREMENTS

In addition to primary system design criteria, all new OWTS design proposals, for both new construction and additions to an existing structure or approved use, must show 100 percent reserve area, or 200 percent for commercial systems, for eventual replacement of the active OWTS when it reaches the end of its use and fails. The Department may require that the replacement leach field be installed at the time the primary system is installed in the following situations:

1. The lot is a difficult site to conduct a leach field repair, sites where adequate replacement space is limited.
2. The percolation rates are greater than 60 minutes per inch.
3. The use is a commercial project, including food facilities which require 200 % replacement area.
4. Otherwise required by the Director for specified reasons.

A switching or alternating valve, to allow easy switching between fields, shall be installed at the time of construction where dual leach fields have been constructed to allow alternating use of fields at specified intervals.

2. J. SEPTIC TANKS

All conventional OWTS require the use of a water-tight septic tank to allow for the removal of solids and fats, oils, and grease from the wastewater prior to being discharged to a dispersal field. Alternative or supplemental treatment OWTS will also require the use of a septic tank unless a

settling chamber is a component of the treatment unit or treatment process. For specific information on the requirements for and sizing septic tanks see Section 4.

2. K. ALTERNATIVE OWTS TREATMENT SYSTEMS

On parcels not meeting the groundwater separation in Tier 1 of the State OWTS Policy, an alternative treatment system or dispersal system may be used to reduce the required separation to a minimum of three feet between the bottom of the dispersal discharge point and the highest anticipated depth to groundwater. Intermittent sand filters and recirculating sand filters can be constructed at sites from readily available materials or can be purchased as complete units from various manufacturers. Other alternative treatment units, commonly known as proprietary treatment units, can be purchased for installation and use at sites. See Section 3 of the Technical Guidance Manual for more information on the sizing, construction and design criteria, criteria for the selection of the appropriate system, and monitoring of supplemental treatment systems. The qualified professional hired by the property owner to conduct the necessary soils tests shall designate and properly size any treatment unit required for an OWTS on a particular parcel.

2. L. OWTS LEACH LINE DISPERSAL SYSTEMS

Dispersal systems for conventional OWTS in Tehama County typically consist of leach lines which are described in Section 4. Dispersal systems for alternative OWTS can also include seepage pits, mounds, shallow pressure distribution trenches (with rock or sand), and At-grade systems. The qualified professional hired by the property owner to conduct the necessary soils tests shall designate and properly size the type of dispersal system to be used, including, but not limited to, construction trench and backfill depths. The State OWTS Policy prohibits the installation of dispersal systems with less than 2 feet of separation between the bottom of the dispersal system and the highest elevation of a seasonal water table and this is reflected in the siting criteria of each specific dispersal system as discussed in the Technical Guidance Manual.

2. M. SETBACKS/VARIANCES (OWTS Policy9.2.3)

Setbacks required in the siting and construction of septic tanks, alternative treatment units, and dispersal systems are given in the charts in Section 4. It is anticipated that repairs to some failing OWTS will require a variance from these setbacks. Variances are evaluated by staff, and if deemed necessary, may be approved. TCEHD is committed to meeting setbacks to the greatest extent practicable while maintaining the continued use or occupation of the property by owners.

2. N. PROXIMITY TO PUBLIC SEWERS (OWTS Policy 9.2.10) (OWTS Policy 9.4.9)

TCEHD staff will require connection to a public sewer whenever a project is proposed near public sewers. TCEHD staff will rely on the agency operating the public sewer to make the determination of availability as guided by Section 1. C. of this LAMP.

SECTION 3. FAILING OWTS AND CORRECTIVE ACTION (OWTS Policy 9.1)

All OWTS have the potential to fail due to age, misuse, improper design, and/or construction. The failure may result in waste water backing up into plumbing fixtures, waste water discharge to the ground surface, effluent surfacing over a dispersal system area, or wastewater or effluent discharge into, and contamination of, potable groundwater or surface water. These failure conditions will require corrective action to mitigate potential risk to public health and/or contamination of the groundwater and the environment. Corrective action will be required in the event that an OWTS fails. Subsequently, enforcement actions may be necessary if corrective action is not completed within acceptable time frames.

Traditional leach field systems, even when designed and constructed correctly, progressively fail resulting in diminished capacity of some or all of the leach lines. Effluent from septic tanks distributed into leach lines eventually forms a clogging biomat, restricting the flow of effluent into the soil for treatment. Effluent would then need to travel further into a leach line to find porous soil. Eventually, all of the leach lines would be clogged by this biomat-coated soil and the system would no longer accept liquid, resulting over time in a failing system with sewage backing up into a structure or surfacing above a leach field.

Tree roots are another cause for system failure. Tree roots can enter the pipe and rock of a leach line and over time totally plug the leach line, again resulting in either a sewage backup to structures or surfacing effluent.

Less frequently, some change may have been made to site contours or drainage that adversely impacted the leach field, such as site grading or driving vehicles over the leach field, or shallow groundwater was present at the site but was not evident in soil pits or other tests again resulting in a failing system. These, and other similar causes of a failing system are referred to as a major failure generally resulting in the need to replace the entire leach line or other dispersal system.

Other examples of major failure would be a septic tank that was somehow damaged or was no longer watertight allowing the discharge of untreated sewage or the infiltration of groundwater into the tank. These could possibly be the result of the tank settling over time, the growth of tree roots into the tank, driving heavy vehicles or storing heavy items over the top of the tank, or improper setting of the tank when the system was originally constructed.

Examples of less serious or minor failures, and more easily repaired defects, would be a cracked distribution box or a crushed solid line between the septic tank and the distribution box.

Whatever the reason or severity, a failing system, or component, that may result in surface or groundwater contamination or a public health hazard shall be corrected, without delay, under a valid OWTS permit issued by TCEHD.

3. A. PROGRESSIVE FAILURE OF A LEACH FIELD

As discussed above, a newly constructed leach field progressively fails through normal use over time. Every system is different, depending on the soil type and construction variables, as is every household's use of a system. Progressive failure(s) may take several years to many decades to completely result in a failing leach field with sewage backups or surfacing onto the ground surface. This is the normal life span of a leach field system with the time span being somewhat unpredictable due to the variables. This progressive failure or diminished capacity is expected and is perfectly normal. This does not mean that the system is failing until liquid is no longer accepted into the soil. It does mean that the system is working as designed and as expected, yet reaches the end of its use. Short of excavating into a leach field, or measuring liquid levels in inspection wells into leach fields (when equipped), there is no accepted test that can demonstrate the degree toward which a system has progressed towards total failure and measure how the capacity of the leach field has diminished.

Today, there are some simple things that can be done to limit or delay this diminished capacity by progressive failure and extend the life of a leach field or other dispersal system. One inexpensive way is to install an outlet filter on a septic tank or pump tank. This filter will remove larger solids particles not removed in the septic tank to delay the formation of a thick, plugging biomat in a dispersal system. Another, but more costly method, is to pressure dose the entire leach or dispersal system equally. This will dose the entire dispersal system equally instead of dosing only the first few feet of a leach line as has been the practice up to now. Many alternate dispersal systems use one or both of these methods to extend the life span of dispersal systems by delaying the formation of a thick biomat.

All OWTS require periodic pumping, inspections, or maintenance to keep the system in proper working order and assure adequate treatment of effluent. Owners of property served by an OWTS must maintain their OWTS in good working order as failures may result in groundwater or local surface water contamination, health hazards, and costly corrective actions. Owners of OWTS that utilize a supplemental treatment or alternate dispersal system shall contract with a service provider, who is capable of operating, monitoring, and maintaining an OWTS in compliance with this LAMP, and carrying out the appropriate inspections, maintenance, monitoring, and reporting required in the OWTS Permit conditions.

3.B. CORRECTIVE ACTION REQUIREMENTS (OWTS Policy 3.3.1) (OWTS Policy 9.2.1)

1. TCEHD will conduct an investigation in a timely manner to determine the validity of a OWTS repair/replacement permit application, complaint report, or other notification of a failing OWTS or component, or the discovery of a cesspool in use. Upon receipt of a complaint report from a member of the public or a notification by a property owner or service provider, a violation file will be generated with an assigned tracking number.

2. Upon investigation and confirmation of a failing OWTS, TCEHD will issue a Notice of Violation directing the property owner to eliminate the immediate health hazard through pumping of the septic tank by a licensed septic tank pumper or by the elimination of wastewater flows from the structure. These actions shall continue until the system has been repaired/replaced and final approval granted by TCEHD. If known, the Notice of Violation shall note why the system is failing and with specific corrective actions needed. TCEHD will also require proper destruction of any cesspool found in use by issuing a Notice of Violation directing abatement. A new OWTS will be required for use.

   The Notice of Violation shall require repairs to the OWTS, as needed, within a reasonable time frame. An Inspection Report or Warning Notice may also be issued to the property owner at the time of the site inspection. Subsequently, a Notice of Violation detailing required corrective actions and time frames may be issued if the identified failure cannot be corrected immediately.

3. The proposed repair/replacement by a property owner and/or contractor in an OWTS Permit Application shall be evaluated by TCEHD to ensure it meets the minimum design requirements of this LAMP or that the proposed repair is otherwise in substantial conformance to the greatest extent practicable.

4. Any OWTS component failure, other than those listed in 5 and 6 below, such as a broken distribution box or broken piping connection (a minor failure), shall have that specific component repaired in a timely manner, under permit and inspection from TCEHD, so as to return the OWTS to proper functioning condition without the requirement to bring the entire OWTS into compliance with this LAMP.

5. In the event of failure of a septic tank (a major failure), such as a baffle, “tee”, or loss of structural integrity, or groundwater intrusion or sewage/effluent discharge, TCEHD will require that the septic tank be repaired or replaced to bring the tank into compliance with the septic tank specifications in this LAMP within a timely manner. An OWTS Permit Application will be required and a permit must be issued by TCEHD noting the corrections required. The system may not be backfilled or placed into use without an inspection and final approval from TCEHD.

6. In the event of the failure of a supplemental treatment system or a dispersal system (a major failure), the failing system and/or components shall be brought into compliance with this LAMP within a timely manner. Replacement of the failing system with a conventional or alternate dispersal system or supplemental treatment system will be specified in an OWTS Permit issued by TCEHD. The system may not be backfilled or placed into use without an inspection and final approval from TCEHD.

Supplemental treatment may be required in situations where ground or surface waters have been impacted by the failing OWTS.

7. Failure of either the septic tank, supplemental treatment system, or dispersal system may also lead to failure and required replacement of other components of the OWTS. Proper pumping, inspections, maintenance, and monitoring of the OWTS would be expected to reduce the frequency and severity of a failing component or multiple components.

8. Soils test by a qualified professional may be required, at the discretion of TCEHD, to properly characterize the site with a failing OWTS. Groundwater separation requirements from the bottom of the dispersal system and the highest anticipated groundwater level for repairs are the same as newly constructed systems: five (5) to twenty (20) feet (based on soil percolation rates) for conventional systems and as little as three (3) feet for systems with supplemental treatment and/or an alternate dispersal system and must be repaired to meet the LAMP requirements to the greatest extent practicable.

9. Required correction(s) shall be completed under permit and inspection from TCEHD within specified time frames. No component of an OWTS shall be backfilled and placed into use until authorized in writing by TCEHD staff after an inspection confirms substantial compliance with a valid TCEHD permit conditions and the standards in this LAMP.

10. Failure to complete the required corrective action within the time frames given will result in enforcement action which may include referral to the Tehama County District Attorney or City Attorney or Code Enforcement staff and could ultimately result in condemnation of the structure for immediate health hazard to residents and/or the public.

3.C. SUBSTANDARD SYSTEMS

TCEHD will evaluate sizing of an onsite system to ensure it is adequate for replacement residence or bedroom additions. Parcels with OWTS that are found to be substantially out of compliance with this LAMP shall be prohibited from having future additions to structures or other modifications to the property that would potentially increase wastewater flow to the OWTS or decrease the amount of useable area available for the OWTS. A new OWTS permit may be required to repair, replace, or add OWTS components to bring the system into compliance with this LAMP to the greatest extent practicable. The permit application would require any fees, test data, or system designs plans or specifications deemed necessary by the Director

Section 4 – LAND DIVISIONS OF PARCELS SERVED BY OWTS

In addition to the provisions of the Tehama County Ordinance Code regulating sewage disposal, the following regulations and standards apply to all individual sewage disposal, sewage disposal systems, and sewage disposal operations over which the Tehama County Director of Environmental Health has jurisdiction. References below to the Director of Environmental Health include his designees.

A. DEVELOPMENT NOT SERVED BY COMMUNITY SEWERAGE

1. Disposal Area
    a. Each parcel shall contain two disposal areas, each consisting of minimum 1/4 acre of usable disposal material in locations which could reasonably be utilized by a structure built at a desirable and feasible site.
    b. Disposal area shall not include:
        1) Land subject to flooding. In case of disputes concerning flooding potential, the flooded area shall be determined by calculating the expected 25-year frequency flood.
        2) Land closer than 150 feet to a lake, or reservoir, measured from the perennial high water line or 100 feet if down slope from the lake or reservoir.
        3) Land closer than 200 feet to any spring, or 100 feet if downhill from the spring.
        4) Land within 100 feet of any existing or proposed well site for the parcel or any adjoining parcels, or 150 feet from any public well.
        5) Land closer than fifty (50) feet to an intermittent or seasonal stream, measured from the top of the bank or other physically evident high water line. An intermittent stream is one which may continue to flow for five (5) or more days after the passage of a storm.
        6) Land closer than 25 feet to an ephemeral stream, measured from the edge of the channel. An ephemeral stream is one which flows for less than five (5) days after the passage of a storm. It contains no water from a spring, snow, or other long-continuing surface source and does not discharge to a perennial aquifer.
        7) Land closer than fifty (50) feet downhill from an unlined irrigation ditch or canal.

8) Land closer than fifty (50) feet uphill from an existing or proposed cut.
9) Land with a grade steeper than thirty (30) percent.
10) Filled land, unless the fill is engineered for sewage disposal and approved by the Tehama County Director of Environmental Health.
11) Dredger tailings.
12) Gravel bars of very pervious materials adjoining a stream or body of water.
13) Land used for road or utility easements. Overhead utility easements may be included if the utility, entity or agency holding the easement gives a permanent and unconditional release, easement or license for sewage disposal within the easement.

c. See Table 1 for setback distances for sewage disposal systems.

2. Disposal Material Characteristics

Usable disposal material has both of the following characteristics:

a. Percolation rates greater than five (5) and less than sixty (60) minutes per inch when tests are conducted by the method specified in the Manual of Septic Tank Practice, U.S. Department of Health and Human Services.

b. Percolation rates between 60 m.p.i. and no greater than 120 m.p.i. maybe approved only if specially designed by a registered civil engineer, geologist or registered environmental health specialist.

c. Depth to a seasonal high water table shall have at least five (5) feet of separation between trench bottom for lots of less than ten (10) acres and at least three (3) feet for lots greater than ten (10) acres.

3. Percolation Test, Test Pits and Groundwater Monitoring

a. Percolation Tests.

Three (3) percolation tests representative of the disposal area shall be conducted on each proposed disposal area by the method in the Manual of Septic Tank Practice.

b. Test Pits.

At least one test pit shall be excavated on each lot. It shall be at least two (2) feet wide and eight (8) feet deep. It shall slope towards one end at a rate no greater than 3:1. The soil profile shall be logged by a person qualified to perform percolation tests and witnessed by Tehama County Environmental Health Department.

c. Groundwater Monitoring.

1) The height of the seasonal high groundwater shall be determined by wet weather testing when any of the following is present:
a) Vegetation tolerant of, or indicative of, a high water table present on or in the vicinity of the parcel.
b) High groundwater has previously been found in the vicinity.
c) The test pits show cracked or creviced formations but no clear delineation of the top of the water table.
d) Other conditions or historical data that preclude accurate determination of the groundwater levels by dry weather observations.
e) Free water from seepage is observed in the test pit.

2) The height of seasonal high groundwater shall be determined by actual measurements of observation wells during periods of maximum soil moisture content, after eighty (80) percent of normal precipitation has occurred to meet or exceed field capacity of the soil, and produce a response in observation wells acceptable to the Tehama County Director of Environmental Health.

a) Direct Observation:

The design for constructing an observation well is shown on STD Plan 0963, and Tehama County Bulletin #1.

Measurements shall be taken at the times and intervals specified by the Tehama County Director of Environmental Health in response to local conditions. Except as the Tehama County Director of Environmental Health may otherwise direct, measurements (excluding land within the Anderson Cottonwood Irrigation District (A.C.I.D.)) shall be taken at approximately monthly intervals from January 1 to April 30. Land requiring groundwater monitoring caused by A.C.I.D. irrigation water and within the A.C.I.D. shall have monthly measurements beginning May 1 and ending August 31.

d. All of the above testing shall be done by, or under the supervision of a qualified registered civil engineer, registered geologist, registered environmental health specialist, certified engineering geologist, or soil scientist certified by the American Registry of Certified Professionals in Agronomy, Crops and Soils, or by a qualified testing laboratory approved by the Office of the State Architect.

e. The results of all percolation tests and groundwater monitoring shall be reported and the logs of all excavations shall be submitted to the Tehama County Director of Environmental Health and shall be accompanied by a plot plan to scale showing the test, well and pit locations. The map shall include the topography in the 1/4 acre disposal area at five (5) foot contour intervals. The Tehama County Director of Environmental Health may disregard any test or log that, in his opinion, does not represent the soil conditions of the parcel.

f. Lots Created for Uses which will not Generate Liquid Wastes.

1) This parcel was created utilizing agricultural exemption. No soils study was conducted for the creation of this parcel. Each of these parcels shall be identified on the recorded map with this statement: “This parcel is not approved for any use that will generate liquid wastes”. No permit to dispose of sewage or other liquid waste generated by the use of this property will be issued until applicable provisions of state and local law and the Tehama County Sewage Disposal Standards have been compiled with.

OR

2) This parcel was created utilizing agricultural exemption. No soils study was conducted for the creation of this parcel. Each of these parcels shall be identified on the recorded map with this statement: “Knowledge of soil conditions in this region/area indicates characteristics that may not be compatible with the Tehama County On-Site Sewage Disposal Code. This parcel is not approved for any use that will generate liquid wastes”.

No permit to dispose of sewage or other liquid waste generated by the use of this property will be issued until applicable provisions of state and local law and the Tehama County Sewage Disposal Standards have been compiled with.

4. Subdivisions

Whenever any subdivision of property results in the creation of any parcel or parcels less than one acre in size, the subdivider shall be required to construct a community sanitary sewer system to serve all of the parcels within the subdivision and to form a public entity (which may be a mutual water company) to operate and maintain the system, unless the approving authority grants a specific waiver of this requirement after consultation with the Regional Water Quality Control Board.

Seepage pits are not considered an appropriate sewage disposal method for newly created lots.

5. Maps

a. Tentative.

b. All tentative maps shall show for each parcel the location, boundaries and calculated acreage of the disposal area(s) as determined by the procedures of A3. The test results shall be submitted concurrently with the tentative land division application. If individual wells are proposed, the map shall show all existing and proposed well sites. The map shall be to scale and show topography in the 1/2 acre disposal area at five (5) feet contour intervals and location of the test pits, percolation tests, and piezometers.

c. Final and Parcel Maps.

d. For each parcel, the area(s) qualifying as disposal area shall be clearly delineated and labeled on the final or parcel map. If recordation of a parcel map is waived and developable parcels are proposed, a plot plan showing equivalent information shall be attached as an exhibit to, and recorded with, the notice of approval of waiver of parcel map. The face of each map or plot plan shall be annotated: "An onsite sewage disposal system shall be located only within the disposal area indicated for each parcel unless an alternative site is specifically approved by the Tehama County Director of Environmental Health." If individual wells are proposed, the map shall show all existing and proposed well sites.

e. All developments under this section shall comply with these standards unless exceptions are granted in accordance with Chapter 16.32, Tehama County Code.

B. CONSTRUCTION AND INSTALLATION

The following requirements apply to all lots regardless of when or how created.

1. Onsite Sewage Disposal (General)

a. Where permitted by Section 1101 of the CPC, a building or mobile home sewer may be connected to a sewage disposal system complying with the provisions of these Standards if a sewage disposal permit is first obtained. The type of systems shall be determined on the basis of location, soil

porosity and the groundwater level and shall be designed to receive all sanitary sewage from the property. Unless another design or method is approved by the Tehama County Director of Environmental Health, the system shall consist of a septic tank with effluent discharging into a subsurface disposal field.

b. Disposal systems shall be designed to utilize the most porous or absorbent and aerobic portions of the soil formation. Where the groundwater level extends to within three (3) feet minimum separation on lots greater than ten (10) acres and five (5) feet minimum separator on lots less than ten (10) acres where the upper soil is porous and the underlying stratum is rock or impervious soil, a septic tank and disposal field system may be installed but no seepage pit will be permitted in any event.

c. All onsite sewage disposal systems shall be designed so that additional subsurface disposal fields, equivalent to at least 100 percent of the required area of the original system, may be installed if the original system cannot absorb and treat all the sewage. No parcel shall be divided and no structure shall be erected or constructed if to do so would impair the usefulness of the 100 percent expansion area for its intended purpose.

d. No property shall be improved or used in excess of its capacity to properly absorb sewage effluent in the quantities and by the means provided in these Standards.

e. When the Tehama County Director of Environmental Health finds insufficient lot area or improper soil conditions for adequate sewage disposal for the use proposed, no sewage disposal, building or mobile home installation permit shall be issued and no onsite sewage disposal shall be permitted. Where space or soil conditions are critical, no permit shall be issued until engineering data and test reports have been submitted to and approved by the Tehama County Director of Environmental Health. The Tehama County Director of Environmental Health may approve a variance as to the location of any disposal field shown on a map or plot plan approved under Subsection A above if he finds that new information and public health and safety require the variance.

2. <u>Area of Disposal Fields and Seepage Pits</u>

The minimum effective absorption area in disposal fields in square feet of trench bottom and sidewall, and in seepage pits in square feet of side wall, shall be predicated on anticipated daily sewage flow in gallons, and type of soil found in the excavation.

a. For disposal fields, a minimum of 150 square feet of trench bottom shall be provided for each system, exclusive of all hardpan, rock, clay and other impervious formations. For large, specially-designed and approved systems, side wall area in excess of the required twelve (12) inches and not to exceed 36 inches below the leach line may be added to the square feet trench bottom area when computing absorption areas.

b. For seepage pits, the required wall area of the pit or pits shall be determined from the results of percolation tests made and interpreted as directed by the Tehama County Director of Environmental Health.

3. Septic Tanks

a. Plans for all septic tanks shall be submitted to the Tehama County Director of Environmental Health for approval and shall show all dimensions, reinforcing, structural calculations and such other pertinent data as may be required. Independent laboratory tests and calibrations shall be provided on prefabricated septic tanks as required by the Tehama County Director of Environmental Health.

b. Septic tanks shall be water-tight and constructed of sound and durable materials that are not subject to excessive corrosion or decay. Wooden septic tanks are prohibited. Each tank shall be structurally designed to withstand all anticipated earth or other loads and shall be installed level and on a solid bed.

c. Concrete covers shall be reinforced with steel reinforcing bars and poured-in-place covers shall be reinforced with 1/2-inch steel bars on not more than 20-inch centers. All covers shall be capable of supporting an earth load of not less than 300 pounds per square foot when the maximum coverage does not exceed three feet.

d. Septic tank design shall be such as to produce a clarified effluent and shall provide adequate space for sludge and scum accumulations consistent with the proposed use.

e. Septic tanks shall have a minimum of two (2) compartments. The inlet compartment of any septic tank shall account for two-thirds of the total capacity of the tank and have a liquid capacity of not less than 1,200 gallons, and shall be at least three (3) feet in width and five (5) feet in length. Liquid depth shall be not less than two (2) feet and six (6) inches. The secondary compartment of any septic tank shall have a capacity of one-third of the total capacity of the tank.

f. Access to each septic tank shall be provided by at least two (2) manholes twenty (20) inches in minimum dimension or by an equivalent removable cover slab. One manhole shall be located over the inlet and one over the outlet. Whenever a first compartment exceeds twelve (12) feet in length, an additional manhole shall be provided over the baffle wall. Septic tanks installed under concrete paving or blacktop shall have the required manholes accessible by either extending the manhole openings to grade in a manner acceptable to the Tehama County Director of Environmental Health, or by providing a removable concrete or other approved section, not less than twenty (20) inches in the least dimension, in the concrete paving or blacktop and located directly over the required manholes.

g. The inlet and outlet pipe or baffle shall extend four (4) inches above and at least twelve (12) inches below the water surface. The invert of the inlet pipe shall be at a level not less than two (2) inches above the invert of the outlet pipe.

h. Inlet and outlet pipe fittings or baffles and compartment partitions shall have a free vent area equal to the required cross-sectional area of the house sewer or private sewer discharging into the tank to provide free ventilation above the water surface from the disposal field or seepage pit through the septic tank, house sewer and stack to the outer air.

4. Disposal Fields

a. Distribution lines shall be constructed of materials approved by the Tehama County Director of Environmental Health provided that sufficient openings are available for distribution of the effluent into the trench area.

b. Before drain lines are laid, gravel, or similar filter materials clean in appearance and varying in size from 3/4 inch to 2-1/2 inches and otherwise acceptable to the Tehama County Director of Environmental Health shall be placed in the trench to the depth and grade required by this paragraph.

c. Where two (2) or more drain lines are installed, an approved distribution box of sufficient size to receive lateral lines shall be constructed at the head of each disposal field. The inverts of the inlet shall be at least one (1) inch above the outlets. Suitable baffles shall be provided to insure equal flow. Distribution boxes shall be installed in natural or compacted soil.

d. Connections between a septic tank and a distribution box, or between a distribution box and seepage pit or drain field, or between seepage pits shall be laid with approved watertight joints on natural ground or compacted fill.

e. Automatic siphon or dosing tanks shall be installed when required or as permitted by the Director of Environmental Health.

f. Disposal fields shall be constructed as follows:

Maximum length of each line	100 feet
Minimum bottom width of trench	24 inches
Minimum spacing of lines (edge to edge)	6 feet
Minimum depth of earth cover over lines	12 inches
Maximum grade of lines	3”/100’
Minimum grade of trench	Level
Maximum grade of trench	4”/100’
Minimum usable material below trench bottom	12 inches
Minimum filter material under drain lines	12 inches
Minimum filter material over drain lines	2 inches
Maximum filter material under drain lines	36 inches
Maximum distance drain pipe to edge of trench	18 inches

g. A disposal field shall not be installed in filled ground.

h. Straw, newspaper, untreated building paper or similar materials shall be placed over filter materials in leach lines or seepage pits prior to backfilling.

5. Seepage Pits

No seepage pit may be located in areas where individual wells are within 150 feet. Seepage pits are to be used only as a last resort when no other method of disposal is likely to function properly. No seepage pit may be constructed, maintained or used for sewage disposal unless the Tehama County Director of Environmental Health finds in each case that the use of the pit or pits will not cause a health hazard directly or indirectly. Seepage pits shall be constructed to the following standards:

a. Each seepage pit above any stratum containing water which is used or is usable as a source of domestic supply shall be separated from that stratum by an impervious stratum.

b. As soon as the pit is completed, a perforated pipe at least four (4) inches in diameter shall be extended from the bottom to the level of the forthcoming concrete seal. The pit shall then be filled with filter material conforming to the specifications in paragraph 4 above.

c. Percolation tests may be conducted to demonstrate the absorptive capacity of each pit to the satisfaction of the Tehama County Director of Environmental Health and the Regional Quality Control Board.

d. A stratum of earth less pervious than any of the soil above it shall be located at least four (4) feet beneath the surface. At the level of this stratum a slab of concrete shall be poured that is at least four (4) inches thick and is keyed into the stratum for at least six (6) inches.

e. All piping upstream from the concrete slab shall be of approved material and have watertight joints. The construction and capacity of the septic tank shall comply with paragraphs b and c above.

6. Tehama County Director of Environmental Health Authority

In individual cases, the Tehama County Director of Environmental Health may set more stringent requirements than these Standards where such higher requirements are essential to maintain a safe and sanitary condition.

7. Inspections

The system shall not be backfilled or put into use until it has been inspected and approved by the Department. Before the final inspection, it shall be complete and all portions shall be accessible for inspection.

TEHAMA COUNTY BULLETIN #1
GUIDELINES FOR MONITORING WELL CONSTRUCTION AND OBSERVATION FOR MATHEMATICAL MODELING

MONITORING WELLS (See Chapter 9, DWG. # 0960)

A. Observation wells should be drilled to ten (10) feet. This will allow an extra two (2) feet of hole to monitor water levels. Having numerous measurements is critical to the modeling process.

B. Use a drill to make the boring, do not use a backhoe. A backhoe results in a major disturbance to the soil around the bore to the extent the monitoring well is not measuring water levels reflective of the property's soil profile, but of a disturbed hole. Completion with a backhoe will generally result in water levels standing higher in the well than if completed by a drill.

C. Complete the hole during the summer when the soil is dry. Waiting until saturation occurs before drilling the hole can result in smearing of the hole wall which reduces the ability of the hole to drain, causing higher water levels to be recorded than would normally be found.

D. Complete the top three (3) feet of the hole with concrete rather than cuttings removed from the hole. Concrete will provide a seal that keeps surface water from entering the hole. Lack of a proper seal around the top of the hole is the primary source of erratic and unnaturally high water levels in the monitoring wells. The concrete (bagged type is the easiest to work with) can be installed either wet or dry. If installed dry, the concrete will pull moisture from the soil and set adequately; it also will not pass surface water if still in a dry state.

MEASUREMENT PERIOD AND FREQUENCY

A. Measurements should start before the well becomes saturated. It is critical in the modeling process to know how much rainfall occurred prior to saturation.

B. Experience has shown that saturation occurs after about 9-12 inches of cumulative rainfall, as measured from about October 1. Tracking the amount of rainfall occurring during the fall will give an idea of when measurements should begin. Once total rainfall reaches nine (9) inches, the wells should be measured at least once every three (3) days until saturation occurs.

C. Once saturation occurs, the well should be measured at least once weekly. This frequency should be adhered to regardless of where the water stands in the well (the Ordinance calls for weekly measurements if levels reach above four (4) feet). Measurements should continue on a weekly basis until the well goes dry. If any rainfall occurs after the well goes dry, monitoring should be resumed.

TABLE 1
SETBACK DISTANCES FOR SEWAGE DISPOSAL SYSTEMS
(9.22.180 TEHAMA COUNTY CODE)

Minimum Horizontal Distance Required From:	Building Sewer	Septic Tank	Disposal Field	Seepage Pit
Building or Structures 1*	2’	5’	8’	8’
Property Line	Clear 2*	5’	5’	8’
Individual Water Supply Wells	50’ 3*	50’	100’	150’
Public Water Supply Wells	50’ 3*	100’	100’	150’
Springs	50’	50’	100’	150’
Drainage Ditches/ Ephemeral Streams (Lasts a day or two)	25’	25’	25’	25’
Intermittent Streams (Comes and Goes/Not Continuous)	50’	50’	50’	50’
Perennial Streams (Present Year Round)	50’	100’	150’	150’
Trees	---	10’	---	10’
Seepage Pits	---	5’	10’	12’
Disposal Fields	---	5’	8’ 4*	10’
On-Site Domestic Water Service Line	1’ 5*	5’	5’	5’
Distribution Box	---	5’	5’	5’
Pressure Public Water Main	10’ 6*	10’	10’	10’
Cut or Fill Bank 8*	10’	10’	4xh 7*	4xh 7*
Lake or Reservoir	Clear	50’	100’	100’
Drinking Supply Lakes or Reservoir	Clear	50’	200’	200’

*1. Including porches and steps, whether covered or uncovered, breezeways, roofed porte-cocheres, roofed patios, carports, covered walks, covered driveways, and similar structures or appurtenances.
*2 See the Tehama County Building Dept.
*3. All drainage piping shall clear domestic water-supply wells by at least fifty feet. This distance may be reduced to not less than twenty- five feet when the drainage piping is constructed of materials approved for use within a building.
*4. Plus two feet for each additional foot of depth in excess of one foot below the bottom of the drain line. (Measured center-to-center.)
*5. See section 1108 of the uniform Plumbing code, 1985 Edition.
*6. For parallel construction. For crossings, approval by the Health Department shall be required.
*7. Distance In feet equals four times the vertical height of the cut or fill bank. Distance is measured from the top edge of the bank. (Thirty-five feet maximum)I
*8. Includes natural escarpments In excess of thirty-six Inches. Ord. 1351 12(B) (part), 1986)

NOTE: When disposal fields and/or seepage pits are installed in sloping ground, the minimum horizontal distance between any part of the leaching system and ground surface shall be fifteen (15) feet.

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SECTION 5. GROUNDWATER SEPARATION REQUIREMENTS FOR ONSITE WASTEWATER TREATMENT SYSTEMS AND OVERALL SOIL DEPTH DETERMINATIONS (OWTS Policy 9.5)

These requirements will be used for determining soil depths and groundwater levels when siting and designing Onsite Wastewater Treatment Systems (OWTS) on existing parcels to accomplish the following:

- Protect the groundwater quality by ensuring proper treatment of the sewage effluent prior to its entering into groundwater.

- Protect the public health from failing OWTS caused by high groundwater.

- Provide a methodology for the evaluation of potential building sites using OWTS with regards to maintaining minimum groundwater separation requirements of the Adopted State OWTS Policy.

MINIMUM DEPTHS TO GROUNDWATER AND MINIMUM SOIL DEPTH FROM THE BOTTOM OF THE DISPERSAL SYSTEM (OWTS Policy 9.4.8)

Pursuant to **Tier one (1)** of the State OWTS Policy, the minimum depth to the anticipated highest level of groundwater below the bottom of the leaching trench, and the native soil depth immediately below the leaching trench, shall not be less than the following:

Percolation Rate 1 to 5 MPI	Twenty (20) feet
Percolation Rate >5 to 30MPI	Eight (8) feet
Percolation Rate >30 to 120 MPI	Five (5) feet

Where MPI = Minutes per Inch (the time it takes for a column of water to drop one (1) inch in a controlled percolation test).

It is our intent, through this LAMP, to allow installation of systems in soils between 1 MPI and 120 MPI. Minimum soil depth and separation from a water table supplemental treatment, and alternate dispersal systems that may be allowed.
Groundwater typically fluctuates seasonally depending on local geology and precipitation levels. Groundwater levels fall in response to drought and well extraction and rise in response to

precipitation, flood agricultural practices, and possibly irrigation from residential development. OWTS failures due to high groundwater result in sewage effluent backing up into homes and/or surfacing on the ground creating public health hazards, and can contribute to the contamination of potable groundwater and surface water resources. The overall soil depth and depth to the highest anticipated groundwater level must be determined for each site proposed for an OWTS.

5.A. SOIL PROFILE PITS AND GROUNDWATER MONITORING (OWTS Policy 9.1.1) (OWTS Policy 9.1.3) (OWTS Policy 9.1.5) (OWTS Policy 9.1.6)

1. Parcels created prior to 1982 SHALL have soils tests to determine suitability for wastewater dispersal. This may include, depending on the type of OWTS proposed, soil profile pits, soil borings, percolation tests, and/or may require groundwater monitoring. The soil test guidelines detailed in Sections 5.A. and 5.B. are applicable to all parcels created before 1982.
2. Parcels created since 1982 were tested to a previous soil standard and may require some additional testing depending on the type of dispersal or supplemental treatment system proposed. The soil test guidelines detailed in Sections 5.A. and 5.B. are applicable in these situations.
3. Tests performed to create new parcels (land divisions) are discussed in Section 4 of this LAMP.

The results of soil profile pits and borings will assist in determination of site soil depth and the highest anticipated depth to a water table. Soil borings, conducted by a qualified professional, and with experience in boring interpretation, must be used to determine overall soil depth and depth to groundwater where deeper depths and unsafe site/soil conditions exist.

At least one test pit shall be excavated on each lot. It shall be at least two (2) feet wide and eight (8) feet deep. It shall slope towards one end at a rate no greater than 3:1. Soil borings are not limited to this eight (8) foot depth. The soil profile shall be logged by a Qualified Professional and backfilled. All pits/borings will be inspected by TCEHD staff.

The profile or boring shall have enough information to allow a determination of whether or not groundwater is present and, if so, the highest anticipated depth to water and the overall depth of soil at the site. Soil pits/borings are to be excavated a minimum of five feet in depth. Deeper borings to determine overall soil depth and depth to groundwater would be recommended if it is believed that soils at the site meet the minimum depth beneath the bottom of the dispersal system for a conventional OWTS.

All soil profile pits and deep borings shall have soils described as follows:

- For each pit or deep boring identify the property owner, pit/deep boring number, the slope percent of the area of the pit/boring, the date logged, and the qualified professional logging the pit/boring.

- All pit or deep boring logs, including failing pits/borings are to be submitted to EHD for review.

- Within each pit/boring, from the surface to bottom of the excavation, the following is to be provided for each horizon:

  Depth of each horizon within the pit/boring;
  Color(s) within each horizon;
  Amount (by percent) and size of gravels;
  Soil texture;
  The number, size, and prominence of soil mottles, where present;
  Soil structure;
  Consistence;
  Roots by number and size;
  Pores by number and size; and,
  Boundary thickness between horizons.

The end result is to have knowledge of the useable soil depth and depth to groundwater at the site. It is not always possible to determine the depth to a seasonal water table by observing soil pits or borings. If this is the case, then it may be necessary to have a possible water table depth determined by actual measurements in groundwater monitoring wells.

GROUNDWATER MONITORING

When the highest anticipated depth to groundwater cannot be determined with the use of pits, or is in dispute, groundwater monitoring wells, for monitoring and determining the highest anticipated depth to groundwater, will be required. Examples of the need for groundwater monitoring in wells include:

a. Vegetation tolerant of, or indicative of, a high water table present on or in the vicinity of the parcel.
b. High groundwater has previously been found in the vicinity.
c. The test pits show cracked or creviced formations but no clear delineation of the top of the table.
d. Other conditions or historical data preclude accurate determination of the groundwater levels by dry weather observations.
e. The test pits indicate less than five feet of disposal material over an impervious stratum (for a proposed land division).
f. Free water from seepage is observed in the test pit.

Maps showing the locations of monitoring wells constructed at the site, and their monthly or weekly monitoring results, are to be submitted to TCEHD along with soil profile information and percolation test results. Groundwater monitoring, as with other soil tests, is to be conducted by a qualified professional.

The height of seasonal high groundwater shall be determined by actual measurements of observation wells during periods of maximum soil moisture content, or by mathematical modeling after sufficient precipitation has occurred to meet or exceed field capacity of the soil, and produce a response in observation wells acceptable to the Director.

Well Construction
Groundwater monitoring wells, for OWTS purposes, are typically completed as follows:

a. Soil test pits. Soil profile test pits are converted to groundwater monitoring wells by placing a perforated pipe into the pit prior to backfilling with native soil.

b. **Drilled or bored hole.** A hole is drilled or bored to a desired depth, a perforated pipe is placed into the hole, clean pea gravel is placed around the perforated pipe, and a surface concrete seal is placed.

- Perforations will be saw slots, rather than drilled holes;
- Filter fabric is used to cover the perforations in soil pits;
- Use solid pipe for the upper two (2) feet of the well;
- A minimum of 12 inches of concrete will be placed in the upper annular space of drilled/bored wells;
- A minimum 2 mil plastic sheet may be draped over the excavated area of a soil pit used as a monitoring well to exclude direct access of surface water into the backfilled pit.
- At no time is a pit or bored/drilled hole to extend through a restrictive layer.

Observation
Groundwater monitoring well placement and depth must be representative of site conditions, soil percolation rate, and the type of OWTS proposed for the site/project. For example, a five (5) foot deep well is not adequate if you are proposing to install a conventional OWTS (no alternate treatment or dispersal system) if the percolation rate at the site is between 5 and 30 MPI, which requires eight (8) feet of soil beneath the bottom of a dispersal system.

Generally, at least 80% of the amount of normal rainfall normally received in an area for the period from December 1st to April 30th must be received for monitoring to be accepted by TCEHD. The Director may accept monitoring in years with less than the required amount of rainfall as long as the results appear, to the Director, to represent the highest groundwater depth for the site.

A. Direct Observation - Measurements shall be taken at the times and intervals specified by the Director in response to local conditions. Except as the Director may otherwise allow, measurements (excluding land within the A.C.I.D.) shall be taken at monthly/weekly intervals from January 1 to April 30. Land requiring groundwater monitoring caused by

A.C.I.D., or other areas under irrigation, shall have monthly/weekly measurements beginning May 1 and ending August 31.

At least one observation well shall be included within each proposed dispersal area suspected of having groundwater below the ground surface where that groundwater depth cannot be determined by observation of a soil pit. Groundwater ideally would not be less than that specific depth required for the type of system proposed. Fill, engineered for soil dispersal of effluent, may be placed to provide the necessary soil depth and separation from a seasonal water table (see technical guidance documents) where at least one foot of native soil is present.

If these monthly depth measurements are within one foot of the depth required for the specific type of system proposed, weekly observations shall be recorded throughout the remainder of the wet weather or irrigation season to better define the seasonal water table.

B. Mathematical Modeling – This approval is to be based on the results of calculations that demonstrate that the site meets the conditions required for the type of system proposed. Calculations shall be provided by a qualified professional knowledgeable in groundwater hydrology and be based on using a 10-year rainfall return interval for the most critical situations. It is recommended that this method be discussed with the qualified professional prior to the monitoring season to determine actual well placement, depth, construction, tracking of precipitation amounts, and frequency of measurements as these may differ from the minimum requirements for groundwater depth monitoring during a "normal" rainfall year.

Well Depth

Wells should be constructed at a depth of at least five feet, to a restrictive layer, or at depths deemed necessary for the type of system proposed at a site. In no case is a well to be constructed through a restrictive layer such as hardpan, bedrock, impervious clay stratum, or similar layer. A log/profile of soil strata encountered during construction is to be submitted with the monitoring results.

The number, placement, and depth of wells for mathematical modeling should be discussed with a qualified professional prior to well construction as should the frequency of readings.

There have been years that there has not been the minimum 80% of rainfall for groundwater monitoring to be accepted by TCEHD. And in other years, the reverse has been observed with monitoring wells failing when above average rainfall is received. TCEHD is exploring other options for monitoring to determine depth to groundwater.

Soil Analysis of Conditions Associated with Saturation

As an alternative to direct observation or mathematical modeling, an application may be submitted to the Director to evaluate individual sites where conditions associated with saturation exist.

(a) Conditions associated with saturation include:
    1. Reddish brown or brown soil horizons with gray (chromas of three or less) and/or red or yellowish red mottles; or
    2. Gray soil horizons, or gray soil horizons with red, yellowish re
    3. Soil profiles with concentrations of soluble salts at or near the ground surface.

(b) If conditions associated with saturation do not occur in "soils with rapid or very rapid permeability," saprolite or fractured bedrock, soils predictions of the highest level of the water table shall be based on direct observation or mathematical modeling.

(c) "Soil with rapid or very rapid permeability" means
    1. Soil which contains thirty-five (35) percent or more of course fragments two (2) millimeters in diameter or larger by volume with interstitial soil of sandy loam texture or coarser, as defined in the Soil Textural Classification Chart; or
    2. Coarse textured soil (loamy sand or sand as defined in the Soil Textural Classification Chart; or,
    3. Stone, cobbles, gravel, and rock fragments with too little soil material to fill interstices larger than one (1) millimeter in diameter.

(d) Saprolite means weather material underlying the soil that grades from soft thoroughly decomposed rock to rock that has been weathered sufficiently so that it can be broken in the hands or cut with a knife. It does not include hard bedrock or hard fractured rock. It has rock structure instead of soil structure.

Site evaluation procedures for determination of groundwater using "Conditions associated with Saturations"

Applications for site evaluation shall be made to the Director on approved forms. Each application must be completed in full, signed by the owner or his legally authorized representative, and be accompanied by all required exhibits and appropriate fee. Applicants shall provide at least two (2) test pits dimensions at least two (2) feet wide and which slope toward one end at a rate of no greater than 3 : 1 and be five (5) feet deep and located approximately seventy-five (75) feet apart and within the ½-acre dispersal area of a proposed parcel or an existing parcel. A new application and fee shall be submitted for each additional set of two test pits per parcel.

The Director shall be the sole determiner of groundwater levels based on "conditions associated with saturation". Evaluation of pits under this procedure must show conclusive evidence of the highest groundwater elevation. This shall not preclude the applicant from conducting direct observations or mathematical modeling.

SECTION 5. B. PERCOLATION TEST PROCEDURE (OWTS Policy 9.1.1) (OWTS Policy 9.1.3) (OWTS Policy 9.1.5) (OWTS Policy 9.1.6) (OWTS Policy 9.5)

This procedure establishes clear direction and methodology for percolation testing in Tehama County. The objectives are to determine the area necessary to properly treat and disperse sewage underground; to size the OWTS with adequate infiltration surface area based on expected hydraulic conductivity of the soil and the loading rate; and to provide for a system intended to allow for a long-term expectation of satisfactory performance.

All percolation testing for dispersal systems shall be conducted through the use of these percolation test procedures. The tests shall be performed by or be under the supervision, of a qualified professional. Any deviation shall be allowed only after receiving written approval by the Director.

PERCOLATION TEST HOLES PROCEDURES

Number of Percolation Holes

1. A minimum of three (3) percolation tests are required when percolation rates are 60 minutes per inch (MPI) or less. Four (4) tests are required when percolation rates exceed 60 minutes per inch.
2. Additional tests may be required on a site specific basis for reasons that include the following:
    a) Unacceptable or failed tests
    b) Areas of the dispersal field requiring defined limits for exclusion
    c) The dispersal field is located out of a concentrated area
    d) Soil conditions are variable or inconsistent
    e) To verify suitable soil permeability beneath the chosen leach field depth

Depth of Percolation Test Holes

1. Percolation test-hole depth shall be representative of the proposed dispersal system trench bottom depth or twelve (12) inches for systems such as an at-grade or drip dispersal system.
2. For each lot of proposed land divisions (see LAMP Section 4), two to three tests are to be conducted at a depth of 36 inches and the remainder at a depth of 12 inches.
3. Conditions which may require percolation testing deeper than dispersal depth include:
    a) Consolidated rock or suspected impervious soil layers beneath the site;
    b) Slopes exceeding 30 %;
    c) Other factors as might be determined by sound site evaluation practices.

Location of Percolation Test Holes

Percolation test holes shall be excavated in the area representing the proposed location of the dispersal system or within an expected 1/4-acre disposal area of a proposed parcel to be created by a land division. Percolation tests shall be conducted in soils suitable for dispersal of effluent that otherwise meet soil depth and groundwater depth for the type of system proposed for construction.

Test holes shall be representative of the dispersal area demonstrating site conditions throughout the entire wastewater treatment system or 1/4-acre sewage dispersal area (land divisions) with equal consideration of primary and reserve dispersal systems.

Identification of Percolation Test Holes

1. When specifically requested, locations are to be staked and flagged so the test-hole locations can be located.
2. They are to be identified as to location on the site plan with:
    a) A test hole number or letter;
    b) Depth of the test hole;
    c) Proposed lot/parcel number or letter if associated with a subdivision or other land use project requiring soil testing.

Construction of Percolation Test Holes

1. Diameter of percolation test holes shall be a minimum of six (6) inches.
2. If a shallow backhoe excavation is used, a percolation test hole at 12 – 14 inches in depth shall be excavated into the bottom of the backhoe bucket trench (the bottom of the percolation hole within this trench is to be at the percolation test-hole depth required for the project).

Preparation of the percolation test holes

1. Scarify the sides and bottom of the holes, as needed, to remove the soil surface areas that became smeared by the auger or other tool used to excavate the hole.
2. Remove as much loose material as possible from the hole.
3. Add two (2) inches of clean pea gravel to protect the bottom from scouring.

<u>Presoaking the percolation test holes</u>

Procedure

1. Carefully fill the test hole with a minimum of 12 – 14 inches of clear water over the gravel or to the ground surface in shallower test holes.
2. Refill the test hole as needed or otherwise maintain clear water in the hole for a minimum of four (4) hours. After four (4) hours, allow the water column to drop overnight. Testing must begin 24 hours after water was first added to the hole.

Saturation and swelling

1. Saturation means that the void spaces between soil particles are full of water. This can be accomplished in a short period of time.
2. Swelling is caused by the intrusion of water into the individual soil particles. This is a slow process, especially in clay-type soil, and is the reason for requiring a prolonged soaking.

To prevent sloughing of the sidewall in unstable soils, the following options may be employed:

a. Hardware cloth such as a 1/8 inch grid;

b. Perforated pipe or other rigid liner;
c. Gravel pack with either of the above (NOTE: a correction factor is necessary if a gravel pack is used. See sample correction factors for common scenarios following or show all calculations with test results.)

DETERMINATION OF PERCOLATON RATES

Depending on the soil type and permeability, and the results of the presoak, variations in the procedures used for determining percolation rates can be allowed. Testing shall proceed based on the conditions outlined in following cases.

Case 1 - Water remains overnight in the test hole following initiation of the 24 hour presoak.

1. Adjust the depth of water over the gravel to six (6) inches.
2. Measure the drop in the water level over a single thirty (30) minute period and calculate the percolation rate.

Case 2 - No water remains 24 hours after the presoak period was initiated.

1. Begin the test 24 hours after presoak was initiated.
2. Fill the hole with six inches of water over the gravel. If, after the first two fillings, the water column seeps away in less than 30 minutes go to **Case 3**. If water remains after 30 minutes complete the test by adjusting the water depth to 6 inches over the gravel and record the drop at the end of every 30 minute period.
3. Including the first two readings above, continue the readings and refilling every 30 minute interval for four hours.
4. The last water level drop is used to calculate the percolation rate.

Case 3 - No water remains in the hole after the first two 30 minute periods.

1. Refill the test hole to six (6) inches above the gravel.
2. Record the water level drop at ten (10) minute intervals for a period of one (1) hour, refilling to the six inch depth after each reading.
3. The last water level drop us used to calculate the percolation rate.

NOTE: In all three of these cases, readings shall be taken from a fixed reference point and shall be accurate to 1/16 of an inch.

CALCULATIONS AND MEASUREMENTS

Calculation Example

The percolation rate is reported in minutes per inch. For example, a 30 minute time interval with a ¾ inch fall would be as follows:

30 minutes divided by ¾ inch equals 40 minutes per inch (MPI).

In the example of a 10 minute interval with a 2 inch drop, the calculation is as follows:

10 minutes divided by 2 inch equals 5 minutes per inch (MPI).

Measurement Principles

1. The time interval for readings are to reflect the actual times and are to be maintained as near as possible to the intervals outlined for the test (10 or 30 minutes).
2. Measurements to the nearest $1/16^{th}$ inch should be adjusted to the slowest rate, e.g., a reading observed between 3/8 inch and 5/16 inch (80 MPI and 96 MPI) would be reported as the slower of the two, or 96 MPI.

Results Reporting

1. All test data and other required information is to be submitted to the TCEHD on forms and format acceptable to the TCEHD with appended data or information as needed.

2. Reports shall be signed with an original signature from the qualified professional who either performed or supervised the testing.

3. Qualified professionals who employ technicians are responsible for the work performed by the technician. It is incumbent upon the qualified professional to properly train, equip, and supervise anyone performing work under his or her direction and license.

4. The percolation test is only one of several critical factors in siting an OWTS. Site considerations may require special evaluation by a qualified professional to technically address issues such as high groundwater, steep slope, nitrate impacts, and cumulative impacts such as mounding and loading.

Appendix A

Definitions

1.0 Definitions. The following definitions apply to this Policy:

"303 (d) list" means the same as "**Impaired Water Bodies.**"

"At-grade system" means an OWTS dispersal system with a discharge point located at the preconstruction grade (ground surface elevation). The discharge from an at-grade system is always subsurface.

"Average annual rainfall" means the average of the annual amount of precipitation for a location over a year as measured by the nearest National Weather Service station for the preceding three decades. For example the data set used to make a determination in 2012 would be the data from 1981 to 2010.

"Basin Plan" means the same as "water quality control plan" as defined in Division 7 (commencing with Section 13000) of the Water Code. Basin Plans are adopted by each Regional Water Board, approved by the State Water Board and the Office of Administrative Law, and identify surface water and groundwater bodies within each Region's boundaries and establish, for each, its respective beneficial uses and water quality objectives. Copies are available from the Regional Water Boards, electronically at each Regional Water Boards website, or at the State Water Board's *Plans and Policies* web page (http://www.waterboards.ca.gov/plans_policies/).

"Bedrock" means the rock, usually solid, that underlies soil or other unconsolidated, surficial material.

"CEDEN" means California Environmental Data Exchange Network and information about it is available at the State Water Boards website or http://www.ceden.org/index.shtml.

"Cesspool" means an excavation in the ground receiving domestic wastewater, designed to retain the organic matter and solids, while allowing the liquids to seep into the soil. Cesspools differ from seepage pits because cesspool systems do not have septic tanks and are not authorized under this Policy. The term cesspool does not include pit-privies and out-houses which are not regulated under this Policy.

"Clay" means a soil particle; the term also refers to a type of soil texture. As a soil particle, clay consists of individual rock or mineral particles in soils having diameters <0.002 mm. As a soil texture, clay is the soil material that is comprised of 40 percent or more clay particles, not more than 45 percent sand and not more than 40 percent silt particles using the USDA soil classification system.

"Cobbles" means rock fragments 76 mm or larger using the USDA soil classification systems.

"Dispersal system" means a leachfield, seepage pit, mound, at-grade, subsurface drip field, evapotranspiration and infiltration bed, or other type of system for final wastewater treatment and subsurface discharge.

“Domestic wastewater” means wastewater with a measured strength less then high-strength wastewater and is the type of wastewater normally discharged from, or similar to, that discharged from plumbing fixtures, appliances and other household devices including, but not limited to toilets, bathtubs, showers, laundry facilities, dishwashing facilities, and garbage disposals. Domestic wastewater may include wastewater from commercial buildings such as office buildings, retail stores, and some restaurants, or from industrial facilities where the domestic wastewater is segregated from the industrial wastewater. Domestic wastewater may include incidental RV holding tank dumping but does not include wastewater consisting of a significant portion of RV holding tank wastewater such as at RV dump stations. Domestic wastewater does not include wastewater from industrial processes.

“Dump Station” means a facility intended to receive the discharge of wastewater from a holding tank installed on a recreational vehicle. A dump station does not include a full hook-up sewer connection similar to those used at a recreational vehicle park.

“Domestic well” means a groundwater well that provides water for human consumption and is not regulated by the California Department of Public Health.

“Earthen material” means a substance composed of the earth’s crust (i.e. soil and rock).

“EDF” see “electronic deliverable format.”

“Effluent” means sewage, water, or other liquid, partially or completely treated or in its natural state, flowing out of a septic tank, aerobic treatment unit, dispersal system, or other OWTS component.

“Electronic deliverable format” or **“EDF”** means the data standard adopted by the State Water Board for submittal of groundwater quality monitoring data to the State Water Board’s internet-accessible database system Geotracker(http://geotracker.waterboards.ca.gov/).

“Escherichia coli” means a group of bacteria predominantly inhabiting the intestines of humans or other warm-blooded animals, but also occasionally found elsewhere. Used as an indicator of human fecal contamination.

“Existing OWTS” means an OWTS that was constructed and operating prior to the effective date of this Policy, and OWTS for which a construction permit has been issued prior to the effective date of the Policy.

“Flowing water body” means a body of running water flowing over the earth in a natural water course, where the movement of the water is readily discernible or if water is not present it is apparent from review of the geology that when present it does flow, such as in an ephemeral drainage, creek, stream, or river.

“Groundwater” means water below the land surface that is at or above atmospheric pressure.

“High-strength wastewater” means wastewater having a 30-day average concentration of biochemical oxygen demand (BOD) greater than 300 milligrams-per-liter (mg/L) or of total suspended solids (TSS) greater than 330 mg/L or a fats, oil, and grease (FOG) concentration greater than 100 mg/L prior to the septic tank or other OWTS treatment component.

“IAPMO” means the International Association of Plumbing and Mechanical Officials.

“Impaired Water Bodies” means those surface water bodies or segments thereof that are identified on a list approved first by the State Water Board and then approved by US EPA pursuant to Section 303(d) of the federal Clean Water Act.

“Local agency” means any subdivision of state government that has responsibility for permitting the installation of and regulating OWTS within its jurisdictional boundaries; typically a county, city, or special district.

“Major repair” means either: (1) for a dispersal system, repairs required for an OWTS dispersal system due to surfacing wastewater effluent from the dispersal field and/or wastewater backed up into plumbing fixtures because the dispersal system is not able to percolate the design flow of wastewater associated with the structure served, or (2) for a septic tank, repairs required to the tank for a compartment baffle failure or tank structural integrity failure such that either wastewater is exfiltrating or groundwater is infiltrating.

“Mottling” means a soil condition that results from oxidizing or reducing minerals due to soil moisture changes from saturated to unsaturated over time. Mottling is characterized by spots or blotches of different colors or shades of color (grays and reds) interspersed within the dominant color as described by the USDA soil classification system. This soil condition can be indicative of historic seasonal high groundwater level, but the lack of this condition may not demonstrate the absence of groundwater.

“Mound system” means an aboveground dispersal system (covered sand bed with effluent leachfield elevated above original ground surface inside) used to enhance soil treatment, dispersal, and absorption of effluent discharged from an OWTS treatment unit such as a septic tank. Mound systems have a subsurface discharge.

“New OWTS” means an OWTS permitted after the effective date of this Policy.

“NSF” means NSF International (a.k.a. National Sanitation Foundation), a not for profit, non-governmental organization that develops health and safety standards and performs product certification.

“Oil/grease interceptor” means a passive interceptor that has a rate of flow exceeding 50 gallons-per-minute and that is located outside a building. Oil/grease interceptors are used for separating and collecting oil and grease from wastewater.

“Onsite wastewater treatment system(s)” (**OWTS**) means individual disposal systems, community collection and disposal systems, and alternative collection and disposal systems that use subsurface disposal. The short form of the term may be singular or plural. OWTS do not include “graywater” systems pursuant to Health and Safety Code Section 17922.12.

“Percolation test” means a method of testing water absorption of the soil. The test is conducted with clean water and test results can be used to establish the dispersal system design.

“Permit” means a document issued by a local agency that allows the installation and use of an OWTS, or waste discharge requirements or a waiver of waste discharge requirements that authorizes discharges from an OWTS.

“Person” means any individual, firm, association, organization, partnership, business trust, corporation, company, State agency or department, or unit of local government who is, or that is, subject to this Policy.

“Pit-privy” (a.k.a. outhouse, pit-toilet) means self-contained waterless toilet used for disposal of non-water carried human waste; consists of a shelter built above a pit in the ground into which human waste falls.

“Policy” means this Policy for Siting, Design, Operation and Management of OWTS.

“Pollutant” means any substance that alters water quality of the waters of the State to a degree that it may potentially affect the beneficial uses of water, as listed in a Basin Plan.

“Projected flows” means wastewater flows into the OWTS determined in accordance with any of the applicable methods for determining average daily flow in the *USEPA Onsite Wastewater Treatment System Manual, 2002,* or for Tier 2 in accordance with an approved Local Agency Management Program.

“Public Water System” is a water system regulated by the California Department of Public Health or a Local Primacy Agency pursuant to Chapter 12, Part 4, California Safe Drinking Water Act, Section 116275 (h) of the California Health and Safety Code.

“Public Water Well” is a ground water well serving a public water system. A spring which is not subject to the California Surface Water Treatment Rule (SWTR), CCR, Title 22, sections 64650 through 64666 is a public well.

“Qualified professional” means an individual licensed or certified by a State of California agency to design OWTS and practice as professionals for other associated reports, as allowed under their license or registration. Depending on the work to be performed and various licensing and registration requirements, this may include an individual who possesses a registered environmental health specialist certificate or is currently licensed as a professional engineer or professional geologist. For the purposes of performing site evaluations, Soil Scientists certified by the Soil Science Society of America are considered qualified professionals. A local agency may modify this definition as part of its Local Agency Management Program.

“Regional Water Board” is any of the Regional Water Quality Control Boards designated by Water Code Section 13200. Any reference to an action of the Regional Water Board in this Policy also refers to an action of its Executive Officer, including the conducting of public hearings, pursuant to any general or specific delegation under Water Code Section 13223.

“Replacement OWTS” means an OWTS that has its treatment capacity expanded, or its dispersal system replaced or added onto, after the effective date of this Policy.

“Sand” means a soil particle; this term also refers to a type of soil texture. As a soil particle, sand consists of individual rock or mineral particles in soils having diameters ranging from 0.05 to 2.0 millimeters. As a soil texture, sand is soil that is comprised of 85 percent or more sand particles, with the percentage of silt plus 1.5 times the percentage of clay particles comprising less than 15 percent.

“Seepage pit” means a drilled or dug excavation, three to six feet in diameter, either lined or gravel filled, that receives the effluent discharge from a septic tank or other OWTS treatment unit for dispersal.

“Septic tank” means a watertight, covered receptacle designed for primary treatment of wastewater and constructed to:

1. Receive wastewater discharged from a building;
2. Separate settleable and floating solids from the liquid;
3. Digest organic matter by anaerobic bacterial action;
4. Store digested solids; and
5. Clarify wastewater for further treatment with final subsurface discharge.

“Service provider” means a person capable of operating, monitoring, and maintaining an OWTS in accordance to this Policy.

“Silt” means a soil particle; this term also refers to a type of soil texture. As a soil particle, silt consists of individual rock or mineral particles in soils having diameters ranging from between 0.05 and 0.002 mm. As a soil texture, silt is soil that is comprised as approximately 80 percent or more silt particles and not more than 12 percent clay particles using the USDA soil classification system.

“Single-family dwelling unit” means a structure that is usually occupied by just one household or family and for the purposes of this Policy is expected to generate an average of 250 gallons per day of wastewater.

“Site” means the location of the OWTS and, where applicable, a reserve dispersal area capable of disposing 100 percent of the design flow from all sources the OWTS is intended to serve.

“Site Evaluation” means an assessment of the characteristics of the site sufficient to determine its suitability for an OWTS to meet the requirements of this Policy.

"Soil" means the naturally occurring body of porous mineral and organic materials on the land surface, which is composed of unconsolidated materials, including sand-sized, silt-sized, and clay-sized particles mixed with varying amounts of larger fragments and organic material. The various combinations of particles differentiate specific soil textures identified in the soil textural triangle developed by the United States Department of Agriculture (USDA) as found in Soil Survey Staff, USDA; *Soil Survey Manual, Handbook 18,* U.S. Government Printing Office, Washington, DC, 1993, p. 138. For the purposes of this Policy, soil shall contain earthen material of particles smaller than 0.08 inches (2 mm) in size.

"Soil Structure" means the arrangement of primary soil particles into compound particles, peds, or clusters that are separated by natural planes of weakness from adjoining aggregates.

"Soil texture" means the soil class that describes the relative amount of sand, clay, silt and combinations thereof as defined by the classes of the soil textural triangle developed by the USDA (referenced above).

"State Water Board" is the State Water Resources Control Board

"Supplemental treatment" means any OWTS or component of an OWTS, except a septic tank or dosing tank, that performs additional wastewater treatment so that the effluent meets a predetermined performance requirement prior to discharge of effluent into the dispersal field.

"SWAMP" means Surface Water Ambient Monitoring Program and more information is available at: http://www.waterboards.ca.gov/water_issues/programs/swamp/

"Telemetric" means the ability to automatically measure and transmit OWTS data by wire, radio, or other means.

"TMDL" is the acronym for "total maximum daily load." Section 303(d)(1) of the Clean Water Act requires each State to establish a TMDL for each impaired water body to address the pollutant(s) causing the impairment. In California, TMDLs are usually adopted as Basin Plan amendments and contain implementation plans detailing how water quality standards will be attained.

"Total coliform" means a group of bacteria consisting of several *genera* belonging to the family *Enterobacteriaceae*, which includes Escherichia coli bacteria.

"USDA" means the U.S. Department of Agriculture.

"Waste discharge requirement" or **"WDR"** means an operation and discharge permit issued for the discharge of waste pursuant to Section 13260 of the California Water Code

Appendix B

Tehama County Codes

Chapter 9.20 - CLEANING OF SEPTIC TANKS, CESSPOOLS AND SEEPAGE PITS

Sections:

- **9.20.010 - Statutory authority.**

All of the provisions of Health and Safety Code Sections 117400 through 117450 are hereby incorporated in and made a part of this chapter by reference thereto the same as if said sections were set out in haec verba herein.

(Ord. 1818 § 2(part), 2004)

- **9.20.020 - Bond of applicant.**

A.

Every application for said registration to carry on or engage in the business of cleaning of septic tanks, cesspools or sewage seepage pits or dispose of the cleanings therefrom the county, under said sections of the Health and Safety Code mentioned in Section 9.20.010 of this chapter, shall be accompanied by a surety bond executed in favor of the county, in the penal amount of one thousand dollars if the surety thereon is a corporation duly authorized by the laws of the state to execute such bonds. In the event a personal bond is furnished, the amount of said bond shall be two thousand dollars. Before any registration shall be issued, the county counsel shall examine and approve any such bond posted under this chapter.

B.

The condition of said bond shall be that applicant, as principal thereof, will well, truly, and faithfully perform all duties and obligations required by him by said sections of the Health and Safety Code and this chapter and such terms, conditions, orders and directions as the county deem necessary for the protection of human health and comfort pursuant to Health and Safety Code Section 117435.

(Ord. 1818 § 2(part), 2004)

- **9.20.030 - Registration fee.**

Every application for registration to carry on or engage in the business of cleaning of septic tanks, chemical toilets, cesspools or sewage seepage pits or to dispose of the cleanings therefrom as provided in said Health and Safety Code Sections 117405 and 117410, shall be accompanied by a fee of twenty-five dollars which shall be paid to and collected by the county division of environmental health. Said fee shall not be returnable in the event a registration is not issued or is revoked by the county health officer or his designated representative.

(Ord. 1818 § 2(part), 2004)

- **2.010 - Title for citation.**

The regulations set out in this chapter shall be known as the "Tehama County On-site Sewage Disposal Code."

(Ord. 1351 § 2, 1986)

- **9.22.020 - Purpose of provisions.**

The board of supervisors finds that in the rural lands of Tehama County, the leachfield method of sewage disposal is the most feasible means of sewage disposal, and is to be considered a permanent means. As such, it is the intent of this chapter to protect the health, safety and general welfare of the people of the county by providing minimum standards for the proper construction and repair of on-site sewage disposal systems. The purpose of these procedures is to protect surface water and groundwater from contamination by inadequately treated sewage.

(Ord. 1351 § 1, 1986)

- **9.22.030 - Definitions.**

As used in this chapter:

1. "Administrative authority" means the director of environmental health, or his designated representative.
2. "Alternative system" means any system other than a standard system, where reliability and performance is documented. These may include mounds, evapotranspiration beds, aerobic septic tanks, intermittent filters, and pressure distribution systems.
3. "Consultant" means any individual authorized under California law to design individual sewage disposal systems.
4. "Drainage ditch" means a depression in the ground surface that normally carries water only during and shortly after a rainfall. Distance from ditches is measured from the edge of the ditch.
5. "Dwelling" means a building where one abides or which is intended for human habitation.
6. "Ephemeral stream" means a stream which has a surface flow of water only for a limited period of time during and immediately following a storm. Distance from these streams is measured from the apparent high water line.
7. "Groundwater level" means zones of soil saturation which include perched water tables, shallow permanent groundwater tables or aquifers, temporary water tables, or zones that are seasonally, periodically or permanently saturated.

8.

"Hazardous waste" shall have the meaning as defined in Section 25117 of the California Health and Safety Code.

9.

"Health officer" means the health officer of the county, or his duly authorized representative.

10.

"Intermittent stream" means a watercourse that continuously flows water for a period greater than two months in any one year, but not continuously for that year. Distance from these streams is measured from the edge of the normal high water line.

11.

"Modified stream" means a standard stream that may have some minor deviation from code requirements. These may include shallow trenches, benching, underpavement trenches and pump systems (nonpressure distribution).

12.

"Nuisance" means anything which:

a.

Is injurious to health, or is indecent or offensive to the senses, or an obstruction of the free use of property, so as to interfere with the comfortable enjoyment of life or property; and

b.

Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal; and

c.

Occurs during or as a result of the treatment of disposal of wastes.

13.

"On-site sewage disposal system" means any existing or proposed private or public treatment and disposal system, including but not limited to a standard, modified, special design or alternative system installed or proposed to be installed on land which the owner of the system has the legal right to install the system.

14.

"Perennial stream" means a stream which maintains a surface flow during all of the year. Distance from these streams is measured from the edge of the apparent high water line.

15.

"Permanent water tables" means the upper surface of a saturated zone that exists yearround, including permanently perched water tables. The thickness of the saturated zone and, as a result, the elevation of the permanent groundwater tables, may fluctuate greatly during the year, but the saturated zone and associated permanent water table will be present at some depth beneath the land surface throughout the year.

16.

"Pollution" means an alteration of the quality of the waters of the state by waste.

17.

"Repair" means installation of all portions of an on-site sewage disposal system necessary to eliminate a safety or public health hazard or pollution of public waters created by an existing on-site sewage disposal system.

18.

"Septic tank" means a watertight receptacle which receives the discharge of a drainage system or part thereof, designed and constructed so as to retain solids, digest organic matter during a period of detention, and allow the effluent to drain into an on-site sewage disposal system.

19.

"Sewage" means any and all waste substances, liquid or solid, associated with human habitation, or which contains or may be contaminated with human or animal excreta or excrement, offal, or any feculent matter.

20.

"Soil" means the unconsolidated material (two millimeters or smaller) lying naturally on the surface of the earth that possesses percolative, infiltrative and filtration capabilities. For the purpose of this chapter, the U.S.D.A. system of soil classification will be used, including the U.S.D.A. textural triangle.

21.

"Special design systems" means a standard system with major deviations from code requirements. These may include fills and intercept drains.

22.

"Standard system" means a septic tank and leachfield installed according to Section 9.22.280 of this chapter. Minor modifications may be approved by the health officer. The basic standard system consists of a septic tank, one or more distribution boxes, three or four inch solid distribution pipe, three or four inch perforated leaching pipe, and threequarter inch to two and onehalf inch drainrock. The leachfield may consist of leaching trenches or a leaching bed located in a suitable soil mantle. Septic effluent is distributed by gravity flow throughout the leachfield through perforated pipe and drainrock.

23.

"Temporary water table" means the upper surface of a perched saturated zone that exists only on a seasonal or periodic basis. The elevation may fluctuate. However, a temporary water table and associated saturation zone will dry up entirely for a period of time each year.

24.

"Test trench" means a soil observation hole dug by hand or backhoe to a depth at least five feet greater than the bottom of the proposed sewage disposal system. One end is sloped to allow entrance into the trench.

(Ord. 1351 § 10, 1986)

- **9.22.040 - Technical standards-Compliance required.**

All on-site sewage disposal systems shall comply with standards of the Uniform Plumbing Code, most recently county adopted edition, and the Manual of Septic Tank Practice, 1967 Revision. Where there is a conflict between these two documents, the Uniform Plumbing Code shall supercede. Where differences occur between this code and referenced standards, the provisions of this code shall apply.

(Ord. 1351 § 3, 1986)

- **9.22.050 - Higher requirements authorized when.**

Nothing contained in this chapter shall be construed to prevent the administrative authority from requiring compliance with higher requirements than those contained herein where such higher requirements are essential to maintain a safe and sanitary condition.

(Ord. 1351 § 11(J), 1986)

- **9.22.060 - Design standards and site evaluation procedures.**

A.

The division of environmental health shall publish design standards and site evaluation procedures for standard and modified drain lines, disposal fields, and any other facilities normally found in conjunction with on-site sewage disposal systems.

B.

When and as required, the division of environmental health shall revise the published design standards to reflect the current public health concepts and legal requirements.

C.

The design and evaluation standards shall be presented to the county board of supervisors for adoption by resolution. When adopted, these standards shall have the force and effect of law.

(Ord. 1351 § 19, 1986)

- **9.22.070 - Special designs and alternative systems.**

A.

Where the criteria set forth for a standard or modified system cannot be attained, the administrative authority may approve a special design or alternative system.

B.

The division of environmental health shall publish guidelines for the design, evaluation and installation of special design and alternative sewage disposal systems.

C.

The design and evaluation guidelines shall be presented to the board of supervisors for adoption by resolution. When adopted, these standards shall have the force and effect of law.

D.

These systems shall be located, designed and installed under the direction of a consultant. After installation is completed, the consultant shall certify in writing to the division of environmental health that the system was located and installed in fidelity with the plans and specifications as approved. Minor deviations from the approved plans and specifications arising from prior unknown site conditions shall be accurately included in the certification. Major deviations shall be reported to the division of environmental health prior to installation, and new written approval shall be required.

(Ord. 1351 § 20, 1986)

- **9.22.080 - Sewers required-Connection to system-Exceptions.**

A.

Every building in which plumbing fixtures are installed, and every dwelling and premises having drainage piping thereon, shall be connected to a public sewer or on site sewage disposal system, as provided in subsections B and D of this section.

B.

When no public sewer, intended to serve any lot or premises, is available in any thoroughfare or rightofway abutting such lot or premises, drainage piping from any building, dwelling or works shall be connected to an approved on-site sewage disposal system.

C.

Within the limits prescribed by subsection D of this section, the rearrangement of a subdivision or lot which abuts and is served by a public sewer into smaller parcels shall not be deemed cause to permit the construction of an on-site sewage disposal system, and all plumbing or drainage systems on any such smaller parcel or parcels shall also connect to the public sewer.

D.

The public sewer may be considered as not being available when such public sewer is located more than two hundred feet from any proposed building on any lot or premises which abuts and is served by such public sewer.

E.

No permits shall be issued for the installation, alteration or repair of any on-site sewage disposal system or part thereof on any lot for which connection with a public sewer is available.

F.

On every lot or premises hereafter connected to a public sewer, all plumbing and drainage systems, or parts thereof, on such lot or premises, shall be connected with such public sewer.

G.

Exception. Singlefamily dwellings and buildings or structures accessory thereto, existing and connected to an approved on-site sewage disposal system prior to the time of connecting the premises to a public sewer may, when no hazard, nuisance or unsanitary condition is evidenced and written permission has been obtained from the director of environmental health, remain connected to such properly maintained on-site sewage disposal system when there is insufficient grade or fall to permit drainage to the sewer by gravity.

(Ord. 1351 § 5, 1986)

- **9.22.090 - System construction or repair-Permit required.**

No person, firm, association, organization, partnership, joint venture, business trust, corporation, company or special district formed under the laws of this state shall, within the unincorporated area of the county, construct, repair or alter an on-site sewage disposal system without first obtaining a permit from the division of environmental health, as provided in this chapter. Any person who shall commence any work for which a permit is required by this chapter without first having obtained a permit therefor shall, except under extraordinary circumstances, pay triple the permit fee established by the board of supervisors for such work, if subsequently permitted to obtain a permit. It shall be the responsibility of the septic installer to maintain a copy of this permit on the site during all stages of construction or repair.

(Ord. 1351 § 6, 1986)

- **9.22.100 - Permit-Application-Fee.**

Applications for permits shall be made to the division of environmental health on forms approved by the health officer, and shall contain all such information as the health officer requires, and be accompanied by the required fee established by the board of supervisors adopting the provisions set out in this chapter.

(Ord. 1351 § 8, 1986)

- **9.22.110 - Permit-Issuance denied and development prohibited when.**

If the administrative authority determines that there is insufficient lot area or improper soil conditions for adequate sewage disposal by seepage methods for the building or land use proposed, no building permit shall

be issued, and no on-site sewage disposal shall be permitted. The land developer or owner may submit additional engineering data, test reports and design calculations to the administrative authority for reevaluation.

(Ord. 1351 § 11(I), 1986)

- **9.22.120 - Permit-Violations not authorized.**

The issuance or granting of a permit pursuant to this chapter shall not be deemed or construed to be a permit for or approval of any violation of this chapter. The issuance or granting of a permit shall not prevent the enforcing agent from thereafter requiring correction of a violation, or from preventing construction operations from being carried out thereunder when in violation of this chapter.

(Ord. 1351 § 9, 1986)

- **9.22.130 - Fee schedule.**

The board of supervisors may establish a schedule of fees for permits, applications, appeals, and for other services, and such schedule, when adopted, shall become a part of this chapter. A copy of any schedule of fees established by the board shall be kept on file in the office of the clerk of the board of supervisors.

(Ord. 1351 § 30, 1986)

- **9.22.140 - Location of systems-Restrictions generally.**

A.

No on-site sewage disposal system, or part thereof, shall be located on any lot other than the lot which is the site of the building or structure served by such on-site sewage disposal system; nor shall any on-site sewage disposal system or part thereof be located at any point having less than the minimum distances indicated in Table I, set out in Section 9.22.180.

B.

Nothing contained in this chapter shall be construed to prohibit the use of all or part of an abutting lot to provide additional space for a private sewage disposal system or part thereof, when proper cause, transfer of ownership or change of boundary not in violation of other requirements has been first established to the satisfaction of the county. The instrument recording such action shall constitute an agreement with the administrative authority which shall clearly state and show that the area so joined or used shall be maintained as a unit during the time they are so used. Such agreement shall be recorded in the office of the county recorder as part of the condition of ownership of the properties, and shall be binding on all heirs, successors and assigns to such properties. A copy of the instrument recording such proceedings shall be filed with the administrative authority.

(Ord. 1351 § 12(A), 1986)

- **9.22.150 - Location of systems-Replacement areas.**

A.

All on-site sewage disposal systems shall be so situated on the parcel so that additional subsurface drainfields, equivalent to at least one hundred percent of the required original system, may be installed in the disposal area.

B.

Commercial, agricultural and industrial projects shall require a minimum of three hundred percent replacement area. System replacement areas shall be kept vacant, free of vehicular traffic and soil modification.

(Ord. 1351 § 11(F), 1986)

- **9.22.160 - Location of systems-Slope of drainfield.**

Slope shall not exceed thirty percent in the drainfield area.

(Ord. 1351 § 11(H), 1986)

- **9.22.170 - Location of systems-Prohibited areas.**

Areas which are not acceptable for the location of sewage disposal systems include:

A.

Areas within any easement that is dedicated for surface or subsurface improvement;

B.

Paved areas and driveways. Drainfields may be placed under paved areas only if no other legal area is available, and if the percolation rate is shown to be thirty minutes per inch or less, and is accepted by the administrative authority. If there is less than two feet of cover over the drainfield, a registered engineer shall calculate stress loading and/or structural integrity and certify that traffic will not affect the leach line;

APPENDIX C.

CALIFORNIA
Water Boards

EDMUND G. BROWN
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

Central Valley Regional Water Quality Control Board

TO: Bryan Smith, P.E.
Supervising Water Resources
Control Engineer

FROM: Eric Rapport, C.HG., C.E.G.
Senior Engineering Geologist,
Specialist

DATE: 22 July 2014

SIGNATURE: _____

SUBJECT: **POTENTIAL SOURCES, CHRONIC NITRATE IN PRIVATE DOMESTIC WELLS, ANTELOPE BLVD. AREA, NEAR RED BLUFF, TEHAMA COUNTY**

Summary:

In 2013, the Central Valley Regional Water Quality Control Board Redding Office (Central Valley Water Board) assisted the Department of Water Resources, Northern District (DWR) with an ongoing investigation of chronic nitrate in domestic wells near Red Bluff, in the Antelope Boulevard Area. DWR sampled 64 domestic wells for total nitrate and major ions. Central Valley Water Board staff assisted with a directed subsample for isotopes and wastewater indicators. United States Geological Survey (USGS) Menlo Park staff provided assistance with isotope data interpretation.

Results indicate that most nitrates are likely from point- and non-point wastewater sources, and continuously dispersing generally southeast in shallow permeable gravels and sands. Based on a preliminary review of potential wastewater sources, I recommend that we take appropriate further regulatory action near-term on three permitted facilities; Rio Vista Estates, Berrendos Community Services District, and Red Bluff RV Park. I recommend that the Tehama County Environmental Health Department take similar near-term action on Snug Harbor Mobile Village. These four facilities have high-capacity, community onsite wastewater treatment systems (OWTS) that may act as chronic point-sources of wastewater-related nitrate pollution. Combined, high-density, low-capacity individual OWTS in residential subdivisions also likely act as non-point nitrate sources. Effect of non-point source wastewater sources on the total nitrate extent is currently indeterminate, and possibly significant.

Therefore, I recommend that the County further review their files for other potential chronic point- and non-point wastewater related nitrate sources. Based on their findings, longer term we should consider requesting a groundwater monitoring well network and numerical pollutant transport model to assess changes in groundwater quality following regulatory action.

Introduction:

The Antelope Boulevard Area has identified chronic nitrate in domestic wells. The subject area, east of the Sacramento River and unincorporated, has mixed agricultural, residential, commercial, light-industrial, and institutional land uses. The area lacks piped potable water and sanitary sewers; individual dwellings have private domestic wells and OWTS. Some larger developments have high-capacity, community OWTS.

In 1987, Department of Water Resources (DWR) staff detected nitrate in private domestic wells in the area; this prompted informal restrictions on further building. DWR found nitrate as NO_3 to 62 milligrams/Liter (mg/L), and attributed detections to agricultural practices and wastewater. In 1988, the Tehama County Environmental Health Department and Central Valley Regional Water Quality Control Board (Central Valley Water Board) agreed informally to restrict building in the area based on State Water Resources Control Board Report 88-11WQ (Report) to the State Legislature. The Report suggests nitrogen removal for residential parcels less than one acre.

More recently, public agencies have considered sanitary sewer extension. Also, further sampling showed nitrate above its primary maximum contaminant level (PMCL). In 2000, the Tehama County Public Health Department issued a Declaration of Public Health Concern, and proposed a time schedule for sanitary sewer construction. The Central Valley Water Board requested a related master plan. In 2002, DWR sampled 88 domestic wells; 20% showed nitrate as NO_3 above 45 mg/L, the California Department of Public Health PMCL and our Water Quality Objective for chemical constituents. In 2003,170 local residents sampled their wells voluntarily; 54% were greater than ½ of the PMCL. In 2007, the State Water Resources Control Board granted the City of Red Bluff $43,673 for planning and designing a sanitary sewer. In 2010, the Tehama County Board of Supervisors authorized a Joint Powers Act to form a related governing agency.

However, affected domestic well owners would likely have mixed opinions on sanitary sewer connection. In the interim, lacking demonstrable correlation between Dischargers and potential receptors, our agency has limited means to address the identified pollution.

To help characterize key potential nitrate sources, in 2013 we assisted DWR with fieldwork and laboratory analyses. In October, Redding Office staff accompanied DWR's field teams. At our suggestion, along with total nitrate DWR requested their contract laboratory to run major ions on their total sample of 64 domestic wells. We added a directed subsample, $25,165 in laboratory fees. With DWR's guidance, we chose 12 wells, 10 with chronic nitrate greater than the PMCL, 1 with nitrate about ½ of the PMCL, and 1 blind duplicate. In the subsample, we requested our contract laboratories to run selected isotopes and wastewater indicators. United States Geological Survey (USGS) Menlo Park staff generously helped interpret isotope data.

The following sections summarize;

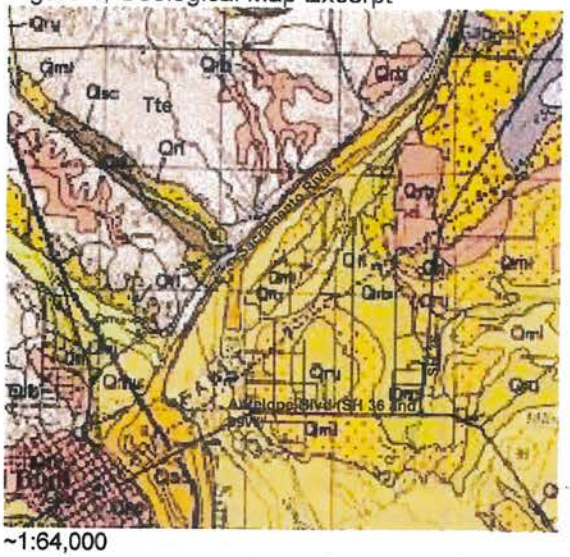
- Hydrogeological Setting,
- Total Nitrate and Major Ion Geochemistry Results,
- Isotope Results,
  - Tritium
  - Delta Oxygen-18 and Delta Deuterium of Water
  - Delta Nitrogen-15 and Delta Oxygen-18 of Nitrate
  - Total Boron and Delta Boron-11
- Sucralose and Acesulfame-K Results,
- Interpretations, and
- Recommendations.

Hydrogeological Setting:

The shallowest local aquifer units are Pleistocene and older alluvial sediments. Youngest to oldest, the area overlies the Pleistocene (Quaternary) Modesto, Riverbank, and Red Bluff Formations. Most of the area has exposures of the upper and lower members of the Modesto, and the slightly older Riverbank Formation, upper member. The area has limited exposures of the Red Bluff Formation, a terrace deposit. The Pliocene (Tertiary) Tehama Formation occurs only west of the subject area; erosion has removed most of the relatively younger deposits there. The Tehama, modestly permeable, is locally 1,000 to 2,000 feet thick. All younger deposits, highly permeable, have a local composite thickness typically less than 100 feet (Tehama County Flood Control and Water Conservation District 2012).

Figure 1 is an excerpt enlargement from USGS's geological map mosaic, http://ngmdb.usgs.gov/maps/mapview/, (portion shown cites Blake, et.al. 2000). Find the Sacramento River, State Highway 36, and Antelope Blvd. (State Highways 36 and 99W). The subject area is east of the river, west of State Highway 36, and to about 3 miles north, and 2 miles south of Antelope. The Tehama (Tte) extends over a broad area west of the river. Riverbank, Modesto, and Red Bluff, (Qru, Qmu, Qml, and Qrb) are east. Of potential interest, also note the buried, inferred Red Bluff Fault, down-to-the-south, with about 450 feet of estimated vertical offset (Harwood and Helley1987).

Figure 1, Geological Map Excerpt



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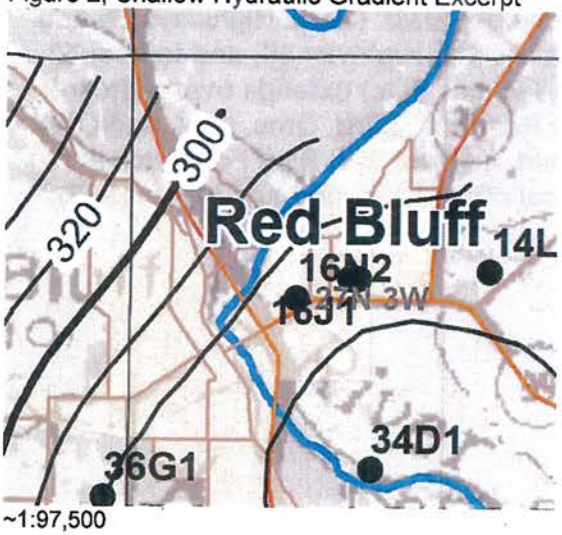
Soils derived from Qru, Qmu, and Qml are generally sandy loams and silt loams. Soils from Qrb are clay loams. Soils from Tte are gravelly sandy loams; see http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/california/redbluffCA1912/Soil_map.pdf (I excluded the local soils map; it is similar to the geological map.)

Shallowest hydraulic gradient is generally southeast. Figure 2 is an excerpt from DWR, http://www.water.ca.gov/groundwater/data_and_monitoring/northern_region/GroundwaterLevel/SacValGWContours/100t400_Wells_Spring-2013.pdf .

Figure 2, Shallow Hydraulic Gradient Excerpt



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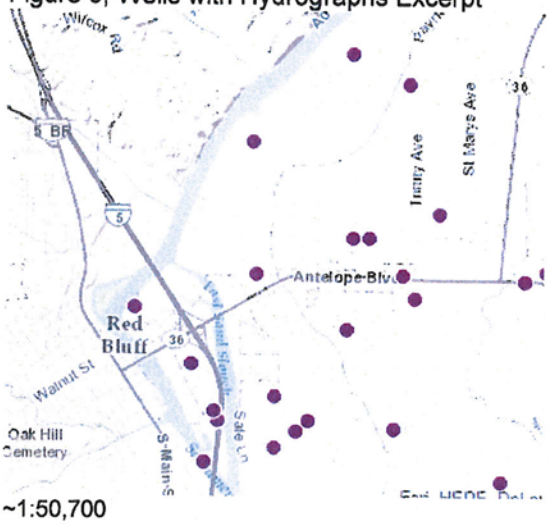
Shallowest groundwater flows are likely within the Modesto and Riverbank Formations, mostly sands and gravels with hydraulic conductivity (K) of 100 to 200 feet/day (ft/day).

Assuming hydraulic gradient (i) of 0.0001 to 0.001, and effective porosity (n_e) of 30%, groundwater velocity (actual, Ki/n_e), may range 0.03 to 0.6 ft/day, ~10 to 220 ft/year. Velocities are probably slower in the underlying Tehama Formation, locally mostly silts. Steeper gradient west of the river might be in part due to greater impedance to flow in the Tehama than in younger sediments. Flatter gradients east of the river are also likely due to aquifer recharge. Depth to the water table has ranged 20 to 40 feet below grade surface, based on several wells in the area. Figure 3, also from DWR, http://www.water.ca.gov/waterdatalibrary/, shows wells with hydrographic data.

Figure 3, Wells with Hydrographs Excerpt



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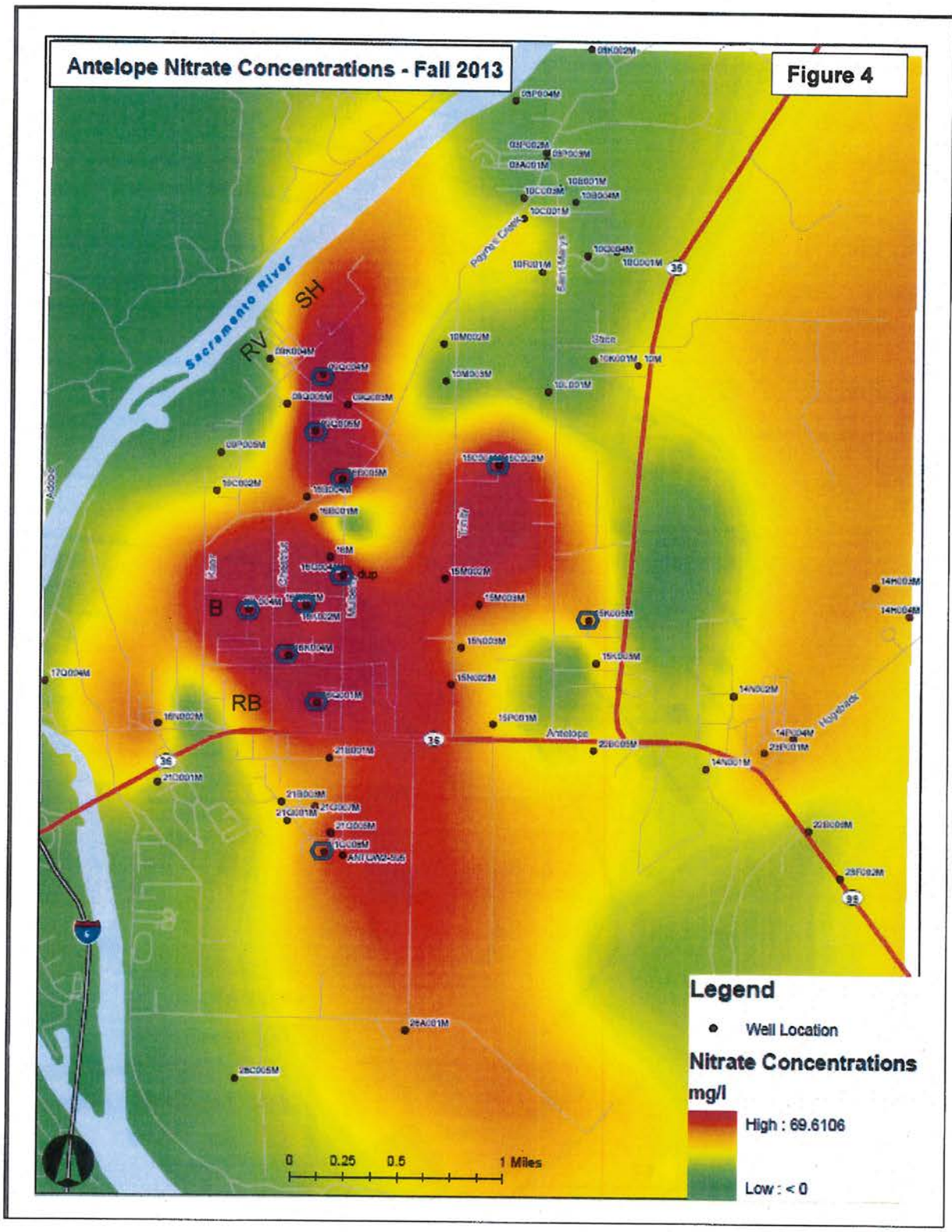
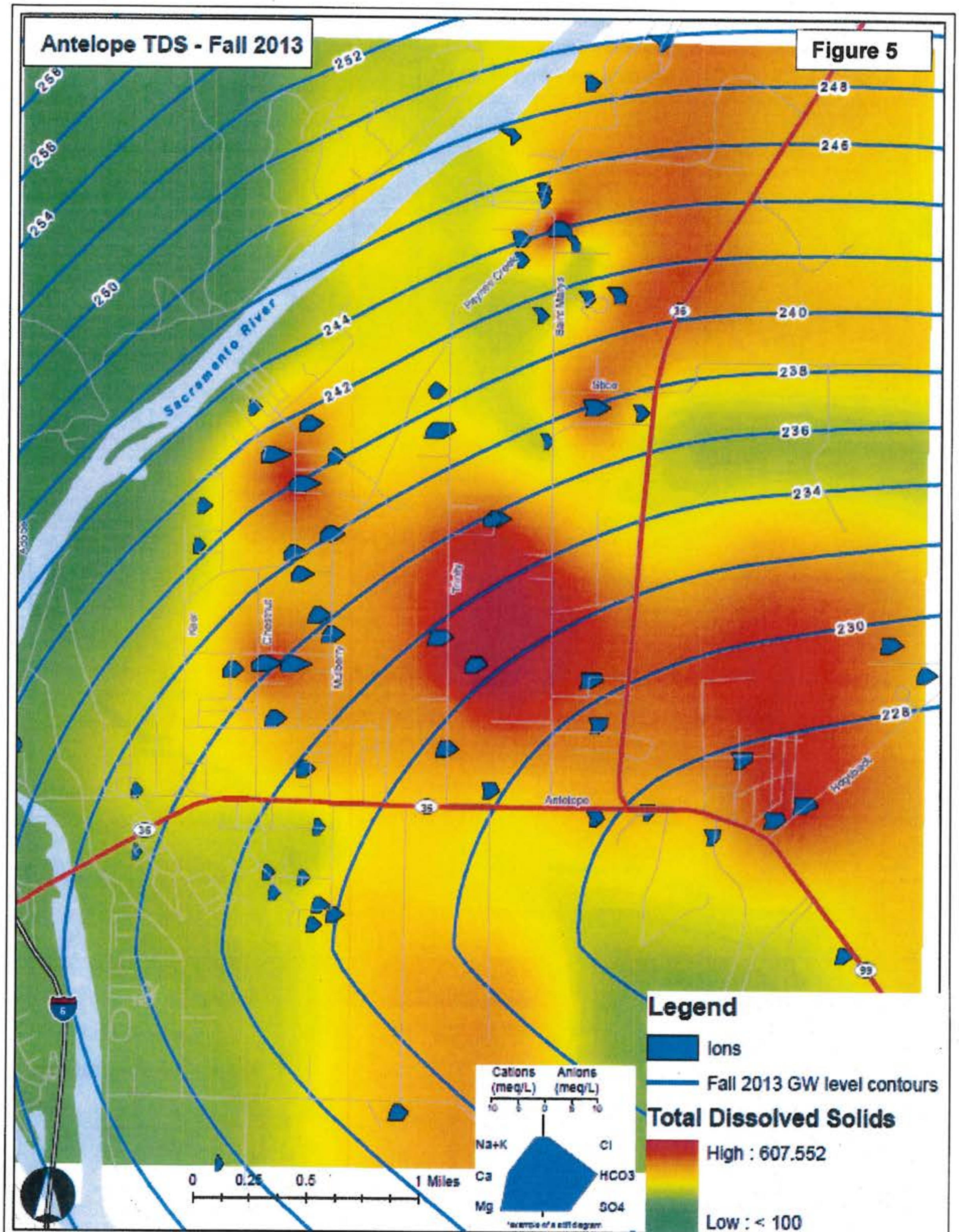
The wells in DWR's data library generally have confidential total depths and perforated intervals. However, 11 of the 64 wells sampled have publicly available records; these show terminal depths ranging 80 to 140 feet below grade surface (bgs). Of these, 3 have recorded perforated intervals; 60 to 80, 72 to 77, and 80 to 120 feet bgs. Therefore, wells with records likely penetrate the Modesto, Riverbank, and Tehama Formations. Several owners we met expressed concern that the water table has recently fallen abruptly due to the drought, and are considering installing deeper wells.

Total Nitrate and Major Ion Geochemistry Results:

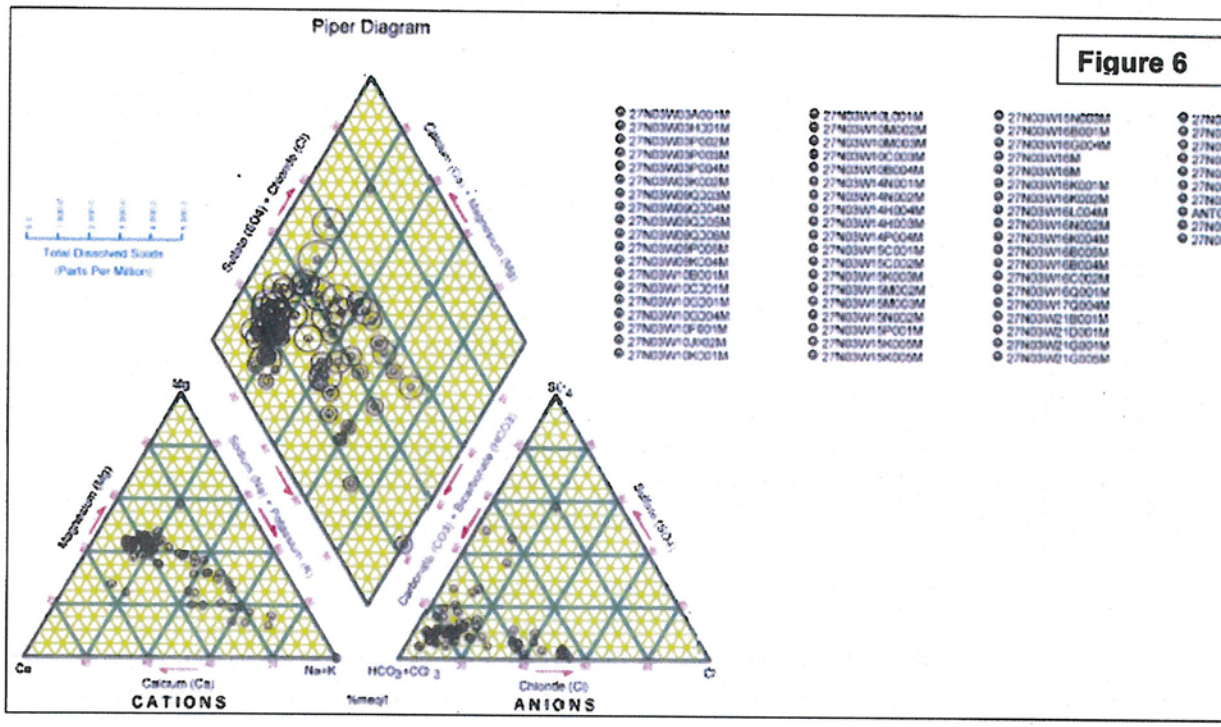
Figures 4 and 5, from DWR, show total nitrate, and total dissolved solids (TDS) along with major ions as Stiff Diagrams. Using ArcGIS, DWR staff mapped nitrate and TDS by inverse distance weighting. Nitrate is in milligrams/Liter (mg/L) as NO_3, TDS in mg/L, and major ions, in millequivalents/Liter (meq/L). Our staff assisted with Stiff Diagrams using GeoStiff, a shape file generator from the Texas Water Development Board. According to DWR staff, nitrate distributions are similar to previous events. Of the 64 wells sampled, 10 exceeded the PMCL for total nitrate, about 16%. Blue hexagons on the nitrate map show the directed subsample; see following sections. The well denoted "dup." had the blind duplicate.

On Figure 4, symbols RV, B, and RB show locations of three facilities with permitted, high-capacity community OWTS; Rio Vista Estates, Berrendos Community Service District, and Red Bluff RV Park, respectively. SH is an identified County regulated facility with closely-spaced, high-capacity OWTS; Snug Harbor Mobile Village. Further discussion on these follows summaries of analytical results.


Antelope Nitrate Concentrations - Fall 2013
Figure 4
Sacramento River
SH
RV
B
RB
Antelope
Hayhurst
Legend
Well Location
Nitrate Concentrations
mg/l
High : 69.6106
Low : < 0
0 0.25 0.5 1 Miles


Antelope TDS - Fall 2013
Figure 5
252
248
246
240
238
236
234
230
228
244
242
250
254
256
258
Sacramento River
Paynes Creek
Saint Marys
Trinity
Chestnut
Mulberry
Antelope
Hogsback
Legend
Ions
Fall 2013 GW level contours
Total Dissolved Solids
High : 607.552
Low : < 100
Cations (meq/L)
Anions (meq/L)
Na+K
Ca
Mg
Cl
HCO3
SO4
0
0.25
0.5
1 Miles

For Figure 5, ion balances in wells with nitrate as NO_3 <20 mg/L (0.32 meq/L) showed relative percent differences (RPDs) between cations and ions generally <5%. Higher nitrate caused imbalances, with RPDs to >20%. Addition of nitrate, in meq/L, generally restored balances. Qualitatively, highest TDS correlates with modal calcium and bicarbonate; see also Figure 6, a Piper Diagram via RockWorks® 2006.



Isotope Results:

On 7 and 8 October 2013, we collected our directed subsample. Due to general uncertainty on well perforation depths relative to local aquifer stratigraphy, we requested analyses of tritium, and oxygen-18 and deuterium of water, to assess potential variation of groundwater ages and origins. To assess between potential nitrate sources, for example whether synthetic fertilizer, animal manure, wastewater, or some mixture, we requested oxygen-18 and nitrogen-15 of nitrate. To further check for wastewater, we requested boron-11 and total boron, as potential evidence of household bleach and detergent. Our contract laboratory, ExcelChem, Roseville, subcontracted isotope analyses to ZymaX. Results follow:

Tritium

Table 1 shows results for tritium (^3H), in tritium units (TU), where 1 TU = 1 $^3H/10^{18}$ hydrogen atoms, 3.19 picoCuries/Kilogram. Most tritium, with a short half-life, 12.43 years, occurs in modern groundwater due to atmospheric testing of thermonuclear bombs from 1951 to 1980, with peak production in 1963 (Clark and Fritz 1997; see Chapter 7).

Table 1, Tritium Results Summary

Well ID	Tritium of H_20 (TU)
16Q001M	2.18
16K004M	2.26
09Q004M	2.26
09Q005M	1.53
16K001M	2.21
16B005M	2.39
16L004M	2.66
15C001M	2.03
15K005M	2.39
21G008M	2.20
16G004M	2.11
16G004M-dup	2.13

Results show low variation, ranging 1.53 to 2.66 TU, with an average of 2.20. Difference between duplicates was 0.02 TU. Reported analytical precision was 0.17 TU. For continental groundwater, qualitatively this indicates a mixture of sub-modern (pre-1952) and recent recharge. Overall, data indicate similar age among wells.

Delta Oxygen-18 and Delta Deuterium of Water

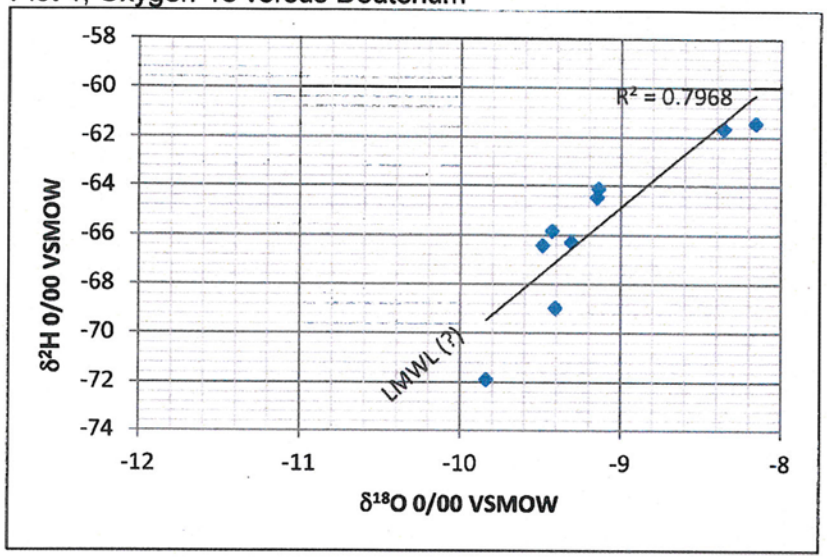
Table 2 shows results for delta oxygen-18 ($\delta^{18}O$) and delta deuterium ($\delta^{2}H$), in parts per thousand (per mil, 0/00) relative to Vienna Standard Mean Ocean Water (VSMOW).

Table 2, Oxygen-18 and Deuterium of Water Summary

Well ID	$\delta^{18}O$ of H_20 (‰ VSMOW)	$\delta^{2}H$ of H_20 (‰ VSMOW)
16Q001M	-9.83	-68.15
16K004M	-9.72	-67.35
09Q004M	-9.48	-66.63
09Q005M	-9.43	-65.82
16K001M	-9.14	-64.10
16B005M	-9.15	-64.46
16L004M	-9.41	-68.96
15C001M	-8.36	-61.67
15K005M	-8.16	-61.44
21G008M	-9.84	-71.89
16G004M	-9.49	-66.42
16G004M-dup	-9.31	-66.27

Differences between duplicates for $\delta^{18}O$ and $\delta^{2}H$ were 0.18, and 0.15 0/00, respectively. Reported analytical precisions were 0.10, and 0.40 0/00. Results show that oxygen-18 and deuterium are fairly co-linear; regression coefficient is ~0.8; see Plot 1.

Plot 1, Oxygen-18 versus Deuterium



Assuming the regression represents a local meteoric water line (LMWL), data indicate no obvious oxygen-18 enrichment relative to deuterium, therefore no current evidence of a partially evaporated source (Clark and Fritz 1997, see Chapter 4). Generally low variation indicates similarity between wells; oxygen-18 ranges -9.84 to -9.28 0/00, and deuterium, -71.89 to -61.44 0/00, with averages of -9.28 and -66.05.

Delta Nitrogen-15 and Delta Oxygen-18 of Nitrate

Table 3 shows delta nitrogen-15 ($\delta^{15}N$) and oxygen-18 ($\delta^{18}O$) of nitrate, in parts per thousand (per mil, 0/00) relative to air standard.

Table 3, Nitrogen-15 and Oxygen-18 of Nitrate

Well ID	$\delta^{15}N$ of NO_3 (‰ Air)	$\delta^{18}0$ of NO_3 (‰ Air)
16Q001M	7.35	-0.41
16K004M	7.53	-0.27
09Q004M	7.65	0.39
09Q05M	7.82	0.39
16K001M	7.28	0.05
16B005M	7.52	0.18
16L004M	7.42	-0.20
W15C001M	7.34	0.38
15K005M	7.09	-0.17
21G008M	7.59	0.12
16G004M	7.45	-0.13
16G004M-dup	7.33	-0.03

Results show low variation; nitrogen-15 ranges 7.09 to 7.82 0/00 and oxygen-18, -0.41

to 0.39 0/00, with averages of 7.45 and 0.03. Differences between duplicates for $\delta^{15}N$ and $\delta^{18}0$ were 0.12, and 0.10 0/00. Reported analytical precisions were 0.20, and 0.47 0/00. Results generally counter-indicate a mixture of sources.

Total Boron and Delta Boron-11

Table 4 shows total boron (B) in micrograms/Liter (µg/L), and delta boron-11 ($\delta^{11}B$) in parts per thousand (per mil, 0/00) relative to a standard reference material (SRM-951).

Table 4, Total Boron and Boron-11

Well ID	B (µg/L)	$\delta^{11}B$ (‰ SRM-951)
16Q001M	149	19.4
16K004M	83.2	21.2
09Q004M	<50#	7.6
09Q005M	<50#	8.3
16K001M	67.9	17.6
16B005M	<50#	16.5
16L004M	96.4	15.4
W15C001M	<50#	19.2
15K005M	1030	30.3
21G008M	92.1	9.7
16G004M	55.9	23.6
16G004M-dup	56.0	3.2

Method Reporting Limit, MRL

In contrast to other isotopes, total boron and boron-11 show high local variation. Total boron data appear accurate; RPD of duplicates is 0.18%. Well 15K005M has highest total boron; see Figure 4. This well is east of Trinity, closest to State Highway 36. For $\delta^{11}B$, the difference between duplicates is 20.4 0/00 and the reported analytical precision is 0.3 0/00, which indicates a data quality issue.

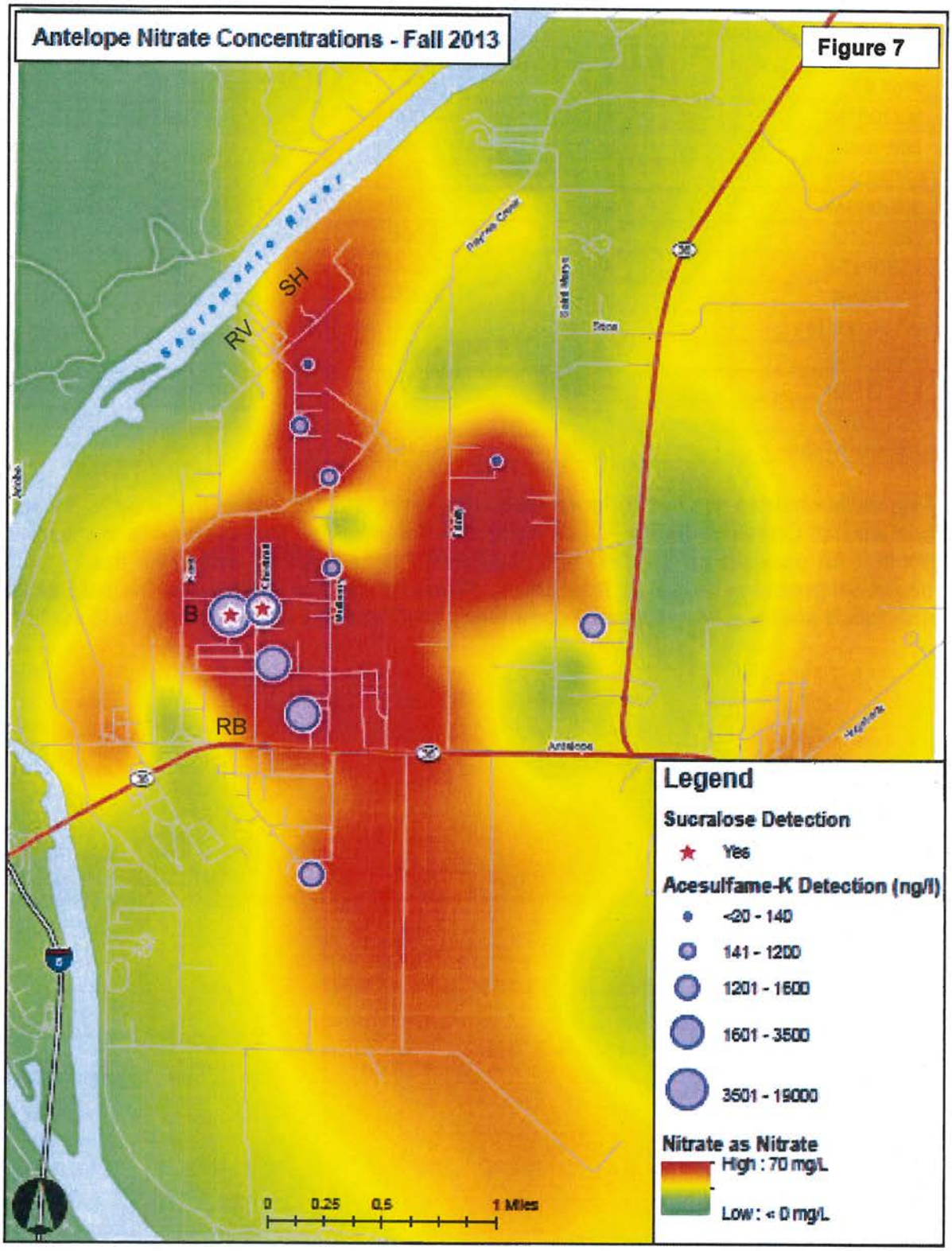
Sucralose and Acesulfame-K Results:

We first chose sucralose (i.e., Splenda®) as a wastewater indicator due to its stability relative to others such as caffeine (Oppenheimer, et al 2011, 2012). Based on further reviews of current technical literature, we added another artificial sweetener, acesulfame-K, which is reportedly more stable than sucralose in groundwater. (Buerge, et al 2009, Van Stempvoort et al 2011). ExcelChem subcontracted to Eurofins Eaton Analytical for sucralose and acesulfame-K analyses. Table 5 shows results in nanograms/Liter (ng/L).

Table 5, Sucralose

Well ID	Sucralose (ng/L)	Acesulfame-K (ng/L)
16Q001M	<100	3,500
16K004M	<100	3,300
09Q004M	<100	140
09Q005M	<100	770
16K001M	160	3,000
16B005M	<100	1,000
16L004M	1200	19,000
W15C001M	<100	<20
15K005M	<100	1,600
21G008M	<100	1,600
16G004M	<100	1,200
16G004M-dup	<100	1,200

Two wells showed positive for sucralose, 16K001M and 16L004M; these wells are east and west of Chestnut, about ½ mile north of Antelope. Ten of eleven wells showed positive for acesulfame-K. RPD of duplicates for acesulfame-K was lower than analytical precision. Figure 7 from DWR, shows nitrate and wastewater indicators. Also annotated are local high-capacity community OWTS; see *Interpretations*, next section.



Interpretations:

Based on the above, total nitrate in the subject area is continuously migrating southeast. Nitrate is chronic, with generally similar detections in domestic wells for over 20 years. The following is an analysis of potential sources.

Based on major ion geochemistry, tritium, and oxygen-18 results, nitrate pollution has likely followed consistent pathways. Spatially, total nitrate does not correlate strongly with TDS and major ions; see Figures 4 and 5. TDS, and modal calcium and bicarbonate from the total sample do correlate spatially; see Figures 5 and 6. While calcium and bicarbonate anomalies might be anthropogenic, they do not appear to correlate with nitrate pollution. Because total nitrate affects overall major ion balance, overall major ion distributions may have pre-existed nitrate discharge; calcium and bicarbonate anomalies might indicate flow paths that nitrate followed. Groundwater from wells in the directed subsample is similar in age and origin; see tritium, and delta oxygen-18 and delta deuterium of water results. Therefore, nitrate appears to have generally dispersed along consistent pathways, generally southeast through the area.

While current data are limited, boron in the directed subsample shows high variation, similar in overall magnitude to TDS and major ions; see total boron results. Local results may likewise be from an ambient source (Megan Young, PhD, Isotope Geochemist, USGS, pers. comm. 2013). Therefore, further boron data could help indicate overall flow paths. (Because boron-11 data have precision issues, I do not consider them in this analysis.)

While some dilute oxygen-18 of nitrate results might be imprecise, nitrogen-15 from all wells in the subsample is from one similar source, rather than a mixture; see delta nitrogen-15 and delta oxygen-18 of nitrate results. The total range of nitrogen-15 is very small in the directed subsample, counter-indicating a mixture of sources (Megan Young, pers. comm. 2013). Two wells in the subsample were positive for sucralose, ten for acesulfame-k, wastewater indicators. Therefore, nitrate in all wells from the directed subsample is mostly from wastewater.

Wastewater sources in the area include high-capacity, community OWTS and low-capacity, closely spaced individual OWTS; therefore nitrate could disperse from point- and non-point sources.

Assuming continuous point-source nitrate injection for infinite time, holding nitrate source (effluent) concentration and other parameters constant, overall plume size is a function of injection rate; for example, let;

$$C_{(x,y)} = (C_0(Q/b)/(2\pi(D_L/D_T)^{1/2} \exp(v_x x/2D_L)K_0[(v_x^2/4(D_L)(x^2/D_L+y^2/D_T))^{1/2}]$$

(Fetter 1999, Equation 2.3a)

Where:

Where:

$C_{(x,y)}$ = solute (nitrate) concentration, down-gradient (x) and cross-gradient (y) from a source (x,y= 0,0) at infinite time,
C_0 = point source concentration (nitrate in effluent)
Q = injection rate (nitrate loading),
b = aquifer thickness,
D_L = hydraulic dispersion coefficient, lateral (down-gradient),#
D_T = hydraulic dispersion coefficient, transverse (cross-gradient),#
v_x = actual groundwater velocity (see *Hydrogeological Setting*),
x = distance down-gradient from the source, along plume centerline,
y = distance cross-gradient from the source, and
K_0 = modified Bessel function of the second kind and zero order.

#, D_L and D_T are logarithmic functions of total plume length and groundwater velocity.

Table 6, a preliminary conceptual site model (CSM) based on the above equation, assumes a point source, and a total plume length of 2,000 feet. The CSM is subject to change based on further site investigations.

Table 6, Preliminary CSM, Nitrate Dispersion from Point Sources

Parameter	Individual Low-Capacity OWTS on Large Parcel	Community High-Capacity OWTS
C_0, mg/L nitrate as NO_3	135	135
Q, ft^3/day	*40*	*700*
b, ft	20	20
D_L, ft^2/day	7.4	7.4
D_T, ft^2/day	0.74	0.74
v_x, ft/day	0.5	0.5
x to PMCL, ft (45 mg/L)	<100	>2,000
x to 1/2 PMCL, ft (22.5 mg/L)	<100	>2,000
$C_{(x,y)}$ at x = 2,000 ft, y=0	2.8	48.9

The above estimate for an individual, low-capacity OWTS on a relatively large parcel is generally consistent in length with published studies (e.g., EPA 2002; see Chapter 3). For such a relatively isolated OWTS, assigned Q is 300 gallons/day (gpd), conservative assuming an average person uses 70 gpd. For high-capacity community OWTS, assigned Q is 5,000 gpd. While individual low-capacity OWTS on large parcels might impact nearby domestic wells, the preliminary CSM indicates that high-capacity community OWTS are more capable of producing plumes of the general scale shown on Figure 4. Table 7 summarizes the facilities shown on Figure 4 with high-capacity community OWTS.

Table 7, Identified Potential Sources of High Nitrate Loading Rates from Wastewater

Facility	Type	Lead Agency	Permit	Q, gpd	Q, ft^3/day
Rio Vista Estates	Treatment and percolation ponds	Central Valley Water Board	Order 93-086	15,300	2,045
Berrendos CSD	Individual pretreatment septic tanks, community treatment system	Central Valley Water Board	Order 98-132	>5,760	>770
Red Bluff RV Park	High-capacity community septic tank and leach-field	Central Valley Water Board	Order 91-185	7,000	936
Snug Harbor Mobile Village	Several closely spaced, high-capacity septic tanks and leach-fields	Tehama Co. Env. Health Dept.	local agency	~6,000	~800

Rio Vista Estates discharges approximately 15,300 gpd from 190 mobile homes to aerated stabilization/percolation ponds (Finding 3, Order 93-086). The facility, constructed in 1970, consists of a wet well with an outlet to a 70,000-gallon, concrete lined aerated lagoon. Sewage flows by gravity to a 90,000-gallon stabilization pond, then to two ½-million gallon oxidation/percolation ponds. Some domestic wells sampled southeast of the treatment system, on North Kaer Avenue, Drury Lane, and West Avenue, show relatively low nitrate concentrations. However others, on Krueger, Chucker, and Dunvin Courts, show chronically high nitrate concentrations, possibly attributable to this facility due to limited information on the system's construction currently in our case file. The Monitoring and Reporting Program in the Order requires groundwater monitoring, and the Discharger has complied. However, monitoring results are limited, from one, typically dry groundwater monitoring well northwest of the system.

Berrendos Community Services District discharges 5,760 to 6,000 gpd from 21 individual, 1,500-gallon septic tanks; these flow to recirculating textile filters, a four-compartment 5,300-gallon fiberglass tank, an up-flow filter, and then a leach-field (Finding 4, and Discharge Specification 4, Order 98-132). Nearby domestic wells, east and southeast of the facility on Sunset Place, Chestnut Avenue, and Roundup Avenue, show chronically high nitrate. Two have both sucralose, and among the highest acesulfame-K detections. The Monitoring and Reporting Program in the Order currently requires no groundwater monitoring.

Red Bluff RV Park discharges up to 7,000 gpd from 70 recreational vehicles to a septic tank and sand filter/leach-field (Finding 2, Order 91-185). A nearby domestic well, east of the facility on Block Lane, has chronically high nitrate, along with recent high acesulfame-K. The Monitoring and Reporting Program in the Order requires groundwater monitoring, specifically to address public agencies' concerns regarding the identified nitrate. The Discharger historically complied, sampling from two groundwater monitoring wells. From 1992 to 2001, peak nitrate in their North Monitoring Well was ~135 mg/L as NO_3 (~30 mg/L as N). Based on information in the case file, this monitoring well might be cross-gradient to the facility's leach-field. As of 2009, the

Discharger had delinquent monitoring reports.

Snug Harbor Mobile Village discharges about 6,000 gpd from 7 septic tanks, each with a capacity of 800 to 900 gallons. Each septic tank services 10 to 15 mobile homes (Tim Potanovic, Tehama County Environmental Health Department, pers. comm. 2013). Domestic wells south of the facility, on Krueger, Chucker, and Dunvin Courts, have chronically high nitrate concentrations, possibly attributable to this facility.

The above analysis does not consider the cumulative effect of non-point source nitrate sources on overall local pollution extent. The subject area includes several subdivisions with closely spaced, low-capacity OWTS. For example, a sample residential block between Berrendos, Chestnut, Roundup, and Kaer Avenues covers about 41 acres. Based on a preliminary review of a recent aerial photograph, the block averages roughly 5 homes per acre; see Figure 6:

Figure 6, Example Residential Block

~1:5,400

Hantzsche and Finnemore (1992) predict generalized nitrate impacts over an area with the following equation:

$$N_r = IN_W(1-d) + RN_b/(1 + R)$$

Where:

N_r = nitrate in shallow groundwater,
I = *average wastewater over a given acreage*,
N_W = nitrogen in wastewater
d = de-nitrification losses to the atmosphere
R = average recharge
N_b = background nitrate

I is the key parameter; my local estimate follows:

I=[(70 gal/person)*(4 persons/home)*(5 homes/ac)*(365 days/yr)]/[(43,560 ft^2/ac)(7.48 gal/ft^3)*(0.08 in/ft)] = 18.8 in/yr, ~ 19 in/yr.

Then, assuming N_w of 135 mg/L as NO_3, d of 30% (0.3, qualitatively a function of soil type), R of 18 in/yr, and negligible N_b (for argument's sake), average N_r as NO_3 solely from non-point source, low-capacity OWTS sources could be about 50 mg/L. Without de-nitrification, average N_r could be about 70 mg/L. The potential effect of non-point sources on overall local nitrate extent is currently indeterminate, and possibly significant.

Recommendations:

Based on the above, for the three identified permitted facilities with high-capacity community OWTS that may act as point-sources, I recommend near-term that we request the Dischargers to submit an appropriate work plan to further investigate subsurface conditions. Work scope should be sufficient to;

- Locate all potential waste discharge sources in the wastewater treatment system, whether by design or leakage,
- Characterize hydraulic gradient, and hydraulic conductivity and thickness of the shallowest water-bearing unit, effluent strength, and discharge rates from dispersal fields,
- Further assess threats to local receptors, and
- Recommend upgrades to further denitrify wastewater and further monitor groundwater, as appropriate based on findings.

A qualified licensed California Professional Engineer or Geologist should stamp the Plan.

For Snug Harbor Mobile Village, another potential point-source, I recommend that we advise Tehama County Environmental Health Department to request a similar Plan near-term, and consider transferring lead agency status to us for Waste Discharge Requirements.

We should also advise the County to further review their records for other potential chronic point- and non-point wastewater-related nitrate pollution sources. Based on their findings, longer term we should consider requesting an appropriate monitoring well network and numerical pollutant transport model to assess changes in groundwater quality following regulatory action.

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