Five-Year Review Report

for

T H Agriculture & Nutrition Site

Fresno County, California

2 September 2008

Kennedy/Jenks Consultants
Engineers & Scientists

Kennedy/Jenks Consultants

622 Folsom Street
San Francisco, California 94107
415-243-2150
415-896-0999 (Fax)

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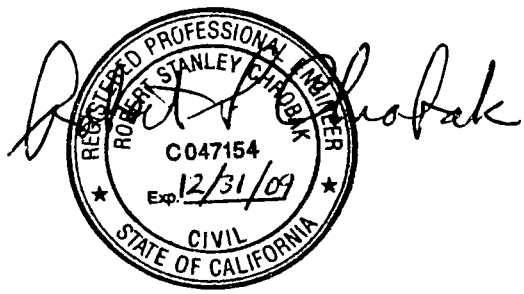

Prepared for

T H Agriculture & Nutrition, L.L.C.
15313 West 95th Street
Lenexa, KS 66219

K/J Project No. 844083*90

Table of Contents

Table of Contents (cont'd)

Table of Contents (cont'd)

List of Tables

List of Figures

List of Appendices

List of Acronyms and Abbreviations

1,2-DCA	1,2-dichloroethane
1,2,3-TCP	1,2,3-trichloropropane
ADWL	Acceptable Drinking Water Level
APN	Assessor's Parcel Number
ARAR	Applicable or Relevant and Appropriate Requirement
BHC	Benzene Hexachloride
CAO	Cleanup and Abatement Order
CCR	California Code of Regulations
CERCLA	Federal Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
City	City of Fresno
COC	Chemical of Concern
CRWQCB	California Regional Water Quality Control Board, Central Valley Region
DBCP	1,2-dibromo-3-chloropropane
DCP	1,3-dichloropropene
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DHS	California Department of Health Services
DTSC	California Environmental Protection Agency, Department of Toxic Substances Control
DWSP	Domestic Well Sampling Program
EPA	U.S. Environmental Protection Agency, Region 9
ERA	Ecological Risk Assessment
FCHD	Fresno County Health Department
FCOR	Final Close-Out Report
FRG	Final Remediation Goal
FS	Feasibility Study
GMP	Groundwater Monitoring Program
HRA	Multi-Pathway Health Risk Assessment
HT	Holding Time

List of Acronyms and Abbreviations (cont'd)

MB	Method Blank
MCL	Maximum Contaminant Level
ND	Not Detected
No.	Number
NOD	Notice of Deletion
NPL	National Priorities List
OM&M	Operation, Maintenance, and Monitoring
Order	Determination of Imminent and Substantial Endangerment and Remedial Action Order Docket No. HSA 86/87-020 ED
PCOR	Preliminary Close-Out Report
ppb	Parts per Billion
PRG	Preliminary Remediation Goal
QA/QC	Quality Assurance/Quality Control
RA	Remedial Action
RAO	Remedial Action Objective
RAP	Remedial Action Plan
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SGA	Southeast Growth Area
SVE	Soil Vapor Extraction
SDWA	Federal Safe Drinking Water Act
TBC	To Be Considered
TEFE	Technical and Economic Feasibility Evaluation
THAN	T H Agriculture & Nutrition, L.L.C.
UCL	Upper Confidence Level
µg/l	Micrograms per Liter
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
Vol.	Volume

Executive Summary

The T H Agriculture & Nutrition (THAN) Site consists of a 5-acre fully-fenced parcel in Fresno County approximately three miles northeast of the City of Fresno. The Site is the former location of an agricultural chemical formulation, packaging, and warehousing plant. THAN and prior owners of the Site formulated agricultural chemicals at the Site. From 1959 until present, the Site has been owned or operated by THAN. THAN discontinued operations at the Site in 1981. In addition to the Site, THAN currently owns an adjacent 20-acre orchard parcel that borders on the south, east, and west sides of the Site. Properties surrounding THAN's 25 acres of land consist of farms, orchards, and low-density residential developments. THAN has performed investigative and remedial activities at and around the Site under the direction of local, state and federal regulatory agencies.

Chemicals handled at the Site included agricultural chemicals, various raw materials used in agricultural chemical formulation, quality assurance laboratory chemicals, and solvents. In addition, certain chemicals were consigned or purchased and warehoused at the Site solely for resale. Pesticides handled at the Site and detected in soil and/or groundwater included organochlorine pesticides (e.g., dichlorodiphenyltrichloroethane (DDT), dichlorodiphenyldichloroethylene (DDE), dichlorodiphenyldichloroethane (DDD), toxaphene, chlordane, benzene hexachloride isomers (BHC), and dieldrin); organophosphates (e.g., diphenamid, malathion, trifluralin, guthion); chlorophenoxy herbicides and miscellaneous pesticides.

Current activity at the Site consists solely of maintenance and monitoring tasks. No modification to current land use for the Site is proposed or planned. A Deed Restriction has been recorded to ensure that future land use will not adversely affect the integrity and/or effectiveness of the Final Remedy or result in exposures to the public and environment of chemicals of concern strictly known to be associated with the Site.

The Final Remedy for the T H Agriculture & Nutrition (THAN) Site has included but is not limited to: soil vapor extraction; demolition and removal of various structures; excavation and management of impacted soils; construction of a low-permeability containment cover to minimize the potential for movement of residual chemicals from Site soils to other media; implementation of access controls and land use restrictions; demonstration and maintenance of appropriate financial assurances; monitored natural attenuation of groundwater; provision of as-needed alternative drinking water supplies; and performance of ongoing operation, maintenance, and monitoring activities. Remediation, monitoring, and reporting activities for the Site have been ongoing since 1981.

The trigger for this first Five-Year Review was the start of construction for the Soil Component of the Final Remedy on 20 November 2002. Construction of the Soil Component was substantially complete by 24 January 2003 and was documented in the *Final Close-Out Report* and *Final Remedial Action Completion Report.*

The current *Operations, Maintenance and Monitoring Plan and Agreement* were adopted for the Site in September 2005. In addition, a *Covenant and Agreement to Restrict Use of Property* was

recorded in September 2005. The Site was officially deleted from the National Priorities List on 21 August 2006.

Based on information gathered and activities performed for this first Five-Year Review process, the Final Remedy is functioning as designed and continues to be effective in protecting human health and the environment. Operations, maintenance, and monitoring activities are being performed, the Deed Restriction has been recorded, and monitoring reports have been submitted in accordance with applicable requirements. Minor repair/maintenance/ improvement issues have been identified for the Site and will be addressed by THAN in the near future. No emergency response actions have been required in the first Five-Year Review period.

The completed *Five-Year Review Summary Form* and *Five-Year Review Site Inspection Checklist* are included as Appendices A and B, respectively.

Section 1: Introduction

This *Five-Year Review Report* (Report) has been prepared by Kennedy/Jenks Consultants (Kennedy/Jenks) on behalf of T H Agriculture and Nutrition, L.L.C. (THAN) for the 5-acre fenced property located at 7183 East McKinley Avenue in Fresno, California (Site). This Report is submitted in accordance with requirements specified in the *Operation, Maintenance and Monitoring Plan* (OM&M Plan) [K/J, 2005] and the *Five-Year Review Work Plan* (Work Plan) [K/J, 2007a]. The California Environmental Protection Agency, Department of Toxic Substances Control (DTSC), as the lead agency for the Site, has responsibility for conducting the Five-Year Review. The United States Environmental Protection Agency, Region 9 (EPA) is the support agency for the Site.

As required by the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA), Section 121(c) and explained in the *Remedial Action Plan* (RAP) [K/J, 1999], the Soil and Groundwater Components of the Final Remedy shall be reviewed within five years after the initiation of the remedial action (i e. five years from 20 November 2002, the date on which construction of the bentonite/soil cap at the Site was initiated), and every five years thereafter, to assure that the Final Remedy remains effective in protecting human health and the environment. Accordingly, this Report provides information to evaluate the implementation and performance of the Final Remedy in order to determine if the Final Remedy is protective of human health and the environment.

The purpose of this Report is to transmit information to DTSC and EPA consistent with the Five-Year Review process. The ultimate responsibility for conducting the Five-Year Review and assessing the effectiveness of the Final Remedy rests with DTSC and EPA.

Kennedy/Jenks has prepared the Work Plan and this Report in accordance with EPA's *Comprehensive Five-Year Review Guidance, OSWER No. 9355.7-03B*-P [EPA, 2001]. The Five-Year Review shall include an evaluation of the Final Remedy to assess whether it is functioning as planned, that necessary operation and maintenance is being performed, that institutional controls are in place and protective, and that the Final Remedy remains protective of human health and the environment. In addition, the Five-Year Review should identify issues, if any, and recommendations to address such issues.

This is the first Five-Year Review for the Site. The review process was initiated in April 2007 with submission of the Work Plan. A draft Report was submitted to DTSC and EPA 5 October 2007. The draft Report was revised by Kennedy/Jenks to address EPA comments that were transmitted to DTSC in February 2008. No written comments were addressed to THAN or Kennedy/Jenks.

Section 2: Site Chronology

THAN has performed investigative and remedial activities at and around the Site under the direction of local, state and federal regulatory agencies, including the Fresno County Health Department (FCHD), California Regional Water Quality Control Board, Central Valley Region (CRWQCB), DTSC, and EPA. The following is a summary of significant regulatory actions pertaining to the Site.

1980 Site discovered.

1981 DTSC, then known as the California Department of Health Services (DHS), collected water samples from domestic wells located near the Site. These analyses indicated levels of agricultural chemicals in groundwater near the Site. DTSC, FCHD, and the CRWQCB requested and supervised an investigation by THAN. Operations ceased at the plant in the fall of 1981.

1984 CRWQCB issued a *Cleanup and Abatement Order* (CAO) [CRWQCB, 1984] that directed THAN to undertake specific investigation and remedial activities, under an enforceable schedule. DTSC assumed the lead agency role and the CRWQCB assumed an advisory role.

1985 On January 7th, DTSC issued a letter providing notice to THAN that the Site had been placed on the State Priority Ranking List (State Superfund List). In May, DTSC issued a *Determination of Imminent or Substantial Endangerment and Remedial Action Order, Docket No. HSA 84/85-001* (1985 Order) [DTSC, 1985]. The 1985 Order included requirements for THAN and other respondents to implement a domestic well sampling program (DWSP), provide alternate drinking water to those households with domestic water wells where groundwater samples contained chemicals of concern known to be associated with the Site at concentrations in excess of certain regulatory limits, and prepare a remedial investigation/feasibility study (RI/FS) report. CRWQCB issued a new CAO [CRWQCB, 1985] that was consistent with the 1985 Order.

1986 EPA added the Site to the *National Priorities List* (NPL) on June 10th (51 Fed. Reg. 21,054, 10 June 1986).

1987 DTSC issued a new *Determination of Imminent or Substantial Endangerment and Remedial Action Order, Docket No. HSA 86/87-020* (Order) [DTSC, 1991] to THAN and other respondents, which superseded all previous DTSC orders. The Order included requirements for THAN and other respondents to: (1) revise the DWSP, (2) develop and submit a RI/FS work plan pursuant to EPA guidelines, and (3) implement a phased groundwater investigation program to characterize offsite migration of chemicals in groundwater from the Site. DTSC issued amendments to the Order to incorporate technical changes relating to the groundwater investigation and to modify the DWSP. THAN submitted a *Phase I Work Plan* for groundwater

1987 (cont'd)	investigation on March 9th which was approved by DTSC in Amendments to the Order. THAN submitted a draft RI/FS Work Plan on May 7th. The Phase I groundwater investigation was performed during the summer and a *Phase I Groundwater Assessment Summary* was submitted [JHK, 1987].
1988	THAN submitted the final *Remedial Investigation/Feasibility Study Work Plan* [K/J, 1988]. CRWQCB rescinded its CAO based on the determination that DTSC's Order satisfied CRWQCB's concerns regarding the protection of water quality.
1990	The Phase II/III groundwater investigation was performed in the spring.
1991	DTSC issued further amendments to the Order. The *Phase II/III Groundwater Assessment Summary* was submitted in January.
1992	The draft RI Report and draft Multi-Pathway Health Risk Assessment (HRA) Report were submitted on March 31st, and the draft FS Report was submitted on June 5th.
1993	Revised draft RI/FS Reports were submitted on January 31st. DTSC conditionally approved the draft RI Report on April 27th and draft FS Report on June 23rd. The final *Remedial Investigation Summary Report* was submitted on May 28th [K/J, 1993]. The final *Feasibility Study Report* was submitted on June 30th [SEACOR, 1993]. The revised draft HRA Report was submitted on July 29th. DTSC confirmed approval of the final RI/FS Reports on August 6th.
1994	The preliminary draft RAP was submitted to the agencies on March 22nd.
1996	The final *Multi-Pathway Health Risk Assessment Report* (HRA) was submitted to the agencies on January 31st [ENVIRON, 1996].
1998	THAN submitted the final *Technical and Economic Feasibility Evaluation* (TEFE) [K/J, 1998].
1999	The *Final Remedial Action Plan* was submitted on May 3rd and approved by DTSC on June 30th following the public meeting and the public comment period [K/J, 1999].
2002	DTSC approved the *Project Manual Including Specifications and Drawings for THAN RAP Design of Soil Component and Cap* on June 28th [K/J, 2002]. On October 31st, the Contractor submitted the final version of implementation-related documents to DTSC. On November 8th, DTSC provided conditional authorization to initiate non-dust generating construction activities. The Contractor mobilized to the Site on November 20th. DTSC provided approval to construct the Soil Component on December 3rd after receipt of the Contractor's Health and Safety Plan and Dust and Vapor Control Plan [Kroeker, 2002].

2003 The majority of construction work was completed by January 24th. On March 5th, THAN submitted a draft Covenant and Agreement to Restrict Use of Property and a draft OM&M Agreement. THAN submitted the *Documentation Report for Implementation of Soil Component of Final Remedy* (Completion Report) on June 26th [K/J, 2003]. The Completion Report addressed construction and quality assurance/quality control (QA/QC) activities associated with the RAP. Construction activities were found to be consistent with the RAP. The Completion Report was approved by DTSC on June 30th.

2004 On June 24th, the preliminary Close-Out Report (PCOR) was signed by EPA to document completion of construction activities at the Site. A *Final Remedial Action Completion Report* (RA Report) was submitted to DTSC on September 28th [K/J, 2004]. EPA transmitted a letter approving the RA Report on September 29th.

2005 The *Operation, Maintenance and Monitoring Plan* (OM&M Plan) [K/J, 2005] and the *Operation, Maintenance and Monitoring Agreement* (OM&M Agreement) [DTSC, 2005a] were finalized in September. In addition, the *Covenant and Agreement to Restrict Use of Property* (Deed Restriction) [DTSC, 2005b] was recorded and the *Final Close-Out Report* (FCOR) [EPA, 2005] was published by EPA in September.

2006 In January, DTSC transmitted a letter certifying that required remedial actions are in place and functioning as planned, including all necessary administrative controls [DTSC, 2006]. The letter included a site remedial action certification package. In July, EPA published a *Notice of Intent to Delete* the Site from the NPL and requested public comment in the Federal Register, 71 Fed. Reg. 39,032 (11 July 2006) [EPA, 2006a]. In August, the Site was deleted from the NPL as announced in the *Notice of Deletion* (NOD) that was published in the Federal Register, 71 Fed. Reg. 48,479 (21 August 2006) [EPA, 2006b].

2007 The first Five-Year Review process for the Site was initiated and the *Five-Year Review Work Plan* was submitted in April [K/J, 2007a]. On September 14th, an E*valuation of Site Compliance Status and Proposed Modifications in Groundwater Monitoring* (Supplemental Groundwater Report) was submitted for DTSC's review and approval [K/J, 2007b]. THAN submitted the draft *Five-Year Review Report* to DTSC and EPA on October 5th.

2008	EPA provided DTSC comments regarding the draft 5-Year Review Report in February. No written comments were addressed to THAN. THAN revised the draft 5-Year Review Report to address EPA comments to DTSC and submitted the final Five-Year Review Report to DTSC and EPA in September. It is anticipated that EPA and DTSC will review the final report and make a determination on the protectiveness of the Final Remedy in September.

Section 3: Background

3.1 Site Location

The Site consists of a 5-acre parcel in Section 35, Township 13 South, Range 21 East of the Mount Diablo Base and Meridian, Fresno County, California, Fresno County Assessor's Parcel Number (APN) 310-062-09, approximately three miles northeast of the City of Fresno (City). The Site is flat and is situated on a gently southwestward-sloping area of low relief. Less than five feet variation in height occurs in the immediate Site vicinity. The Site lies on the eastern edge of the San Joaquin Valley, about 15 miles from the westernmost foothills of the Sierra Nevada in eastern Fresno County. A Site location map is provided as Figure 1.

3.2 Recent and Future Surrounding Land Use

Land use within a six-mile square area around the Site consists of low-density residential, light industrial, and agricultural. Several irrigation canals cross the area and several stormwater detention basins are also distributed through the area; there are no surface water bodies such as rivers or lakes in the immediate vicinity.

The Site and surrounding land is located in the City's Sphere of Influence and Southeast Growth Area (SGA). The SGA covers more than 14 square miles and has been designated as the City's major new growth community in the *2025 City of Fresno General Plan* [City, 2006]. It is anticipated that the SGA will house 20 percent of Fresno's growth over the next two decades, eventually housing 55,000 residents.

In the past few years during the housing boom, numerous residential developments were constructed north of the Site. Agricultural land south of the Site was also sold and developed as residential/business property. New homes were built on vacant parcels and second homes were added to developed parcels. The extension of State Highway 180 to Clovis Avenue also contributed to urbanization of the area. In the past year, development has slowed with the drop in US consumer confidence and fall in property values. However, today's slowdown is not expected to stop long-term growth in and around Fresno. Land use immediately surrounding the 5-acre Site (~half mile radius) has remained relatively unchanged and is expected to remain unchanged in the near future.

Current and future developments will demand water supply sources. The City has communicated plans for extending public utilities and water supply to accommodate anticipated growth in the SGA. The City has not established the extent and schedule for these future extensions to the City's water distribution system nor whether existing or future residents will be required to connect. As specified in the OM&M Plan, THAN will continue to monitor development and domestic well water usage in the vicinity of the Site.

3.3 History of Site Operations and Chemical Use

The Site is the former location of an agricultural chemical formulation, packaging, and warehousing plant. THAN and prior owners of the Site, including the Geigy Company, Inc.

(now Sygenta, Inc.) and Olin Mathieson Chemical Corporation (now Olin Corporation), formulated agricultural chemicals at the Site. From 1959 until present, the Site has been owned or operated by THAN. THAN discontinued operations at the Site in 1981. In addition to the Site, THAN currently owns an adjacent 20-acre orchard parcel that borders on the south, east, and west sides of the Site. Properties surrounding THAN's 25 acres of land consist of farms, orchards, and low-density residential developments.

Little is known about the physical plant or operations onsite prior to 1950. Between 1950 and 1981, the Site was utilized by several owners for the formulation, packaging, and warehousing of agricultural chemicals (i.e., pesticides). Chemicals handled at the Site included agricultural chemicals, various raw materials used in agricultural chemical formulation, quality assurance laboratory chemicals, and solvents. In addition, certain chemicals were consigned or purchased and warehoused at the Site solely for resale. Pesticides handled at the Site and detected in soil and/or groundwater included organochlorine pesticides (e.g., dichlorodiphenyltrichloroethane (DDT), dichlorodiphenyldichloroethylene (DDE), dichlorodiphenyldichloroethane (DDD), toxaphene, chlordane, benzene hexachloride isomers (BHC), and dieldrin); organophosphates (e.g., diphenamid, malathion, trifluralin, guthion); chlorophenoxy herbicides and miscellaneous pesticides. The RAP provides a more detailed description of operations and chemicals handled at the Site.

Current activity at the Site consists solely of monitoring and maintenance tasks per requirements of the OM&M Plan and Agreement. No modification to current land use for the Site is proposed or planned. A Deed Restriction has been recorded with the County of Fresno to ensure that future land use will not adversely affect the integrity and/or effectiveness of the Final Remedy or result in exposures to the public and environment of chemicals of concern strictly known to be associated with the Site.

3.4 Remedial Investigations

Since the spring of 1981, THAN has performed extensive remedial investigation activities at the Site to evaluate the extent to which chemicals handled in past operations may have affected soil and air at or near the Site and groundwater at, near and off the Site. The results of these investigations and response actions were documented in the *Remedial Investigation Report* [K/J, 1993] and *Feasibility Study Report* [SEACOR, 1993] and were summarized in the RAP [K/J, 1999]. Remedial actions are discussed in Section 4 of this Report.

3.5 Chemicals of Concern, Remedial Action Objectives, and Final Remediation Goals

Based on remedial investigation results, DTSC identified onsite soil and groundwater at or near the Site as media of potential public health or environmental concern. DTSC also identified specific chemicals of concern (COCs) in Site soil and groundwater for inclusion in the risk assessment.

Remedial Action Objectives (RAOs) that were developed and utilized during the feasibility study (FS) to evaluate remedial action alternatives are discussed in Section 2 of the FS Report [SEACOR, 1993] and summarized in the section below. The RAOs developed in the FS take

into account: the nature and extent of chemically-affected media and the fate and mobility characteristics of chemicals in those media; estimated risks to hypothetical biological receptors from potential current and future exposure to chemicals by pathways described in the HRA Report; and Applicable or Relevant and Appropriate Requirements (ARARs). ARARs are standards, criteria, or limits promulgated under federal or state law. ARARs are substantive environmental requirements, criteria, or limitations promulgated under federal or state law that either specifically address circumstances at a given CERCLA site or address problems or situations sufficiently similar to those presented at the CERCLA site that their use is well suited to the CERCLA site at issue. Only those state standards that are promulgated, identified by the state in a timely manner, and more stringent than federal requirements may be considered ARARs, as discussed in the RAP [K/J, 1999].

In a letter to THAN dated 6 August 1993, DTSC subsequently identified "key performance objectives" that would need to be met for the Soil and Groundwater Components of the Final Remedy. These performance objectives are based on, and in some instances are refinements of, the RAOs identified and used in the FS. Compliance with ARARs is one RAO identified for the Site.

Performance objectives identified by DTSC in the 6 August 1993 letter to THAN are summarized below:

Soil Performance Objectives

- Reduce the toxicity, volume and mobility of chemicals present in Site soils to the extent practical in order to: (1) eliminate existing or potential human exposures which pose a total cancer risk from all exposure routes of greater than $1x10^{-6}$ or a total hazard index greater than one for non-carcinogenic effects, and (2) control the migration of chemicals from Site soils to other media.

Groundwater Performance Objectives

- Comply with ARARs.
- Develop and implement a groundwater extraction and treatment system capable of achieving permanent containment, or removal of, chemicals released on or from the Site, which exceed final remediation goals as will be identified in the RAP/Record of Decision (ROD).
- Develop and implement a groundwater monitoring program capable of: (1) verifying that unacceptable human exposures or environmental impacts are not occurring as a result of the presence or movement of chemicals in groundwater, and (2) providing sufficient information to allow for analysis of the effectiveness of the groundwater remediation system.
- Require extracted groundwater to be put to beneficial use to the extent practicable.
- Establish a non-numeric preliminary remedial goal for DBCP in groundwater due to its regional presence, which would require an evaluation of DBCP at the time that final

remediation goals for other chemicals known to be associated with the Site in groundwater are attained.

- Establish provisions to deal with any significant release of DBCP, should it occur, from Site soils to groundwater resulting from a resaturation of the A-zone.

Final Remediation Goals (FRGs) are a subset of RAOs and consist of potential exposure pathway- and medium-specific chemical concentration goals that are protective of human health and the environment. FRGs were established for groundwater and onsite soils and finalized in the RAP. FRGs serve as the remediation goals for the Final Remedy. FRGs for soil and groundwater are presented in the RAP and included as Tables 1 and 2 of this Report.

Soil Final Remediation Goals

Several onsite chemical source areas were identified including the former landfill area, the former railroad loading dock, the former south loading dock, certain former subsurface drainage systems, and the former solvent storage area. Based on frequency of detection and comparison with published health-based criteria, the COCs remaining in onsite soils at low, residual levels include: organochlorine pesticides (DDT, DDD, DDE, dieldrin, lindane, and toxaphene), volatile organic compounds (VOCs) (chloroform, xylenes, and ethylbenzene), and the nematocide DBCP.

No chemical-specific ARARs for Site soils were identified in the FS. Instead, chemical-specific FRGs were developed for chemically-affected soils (Table 1). The FRGs were derived from the lesser value (more health protective value) of either the site-specific values calculated from the HRA or U.S. Preliminary Remediation Goals (PRGs) for industrial land use. Also, the more health protective value based on carcinogenic or non-carcinogenic effects was chosen. The preferred alternative includes restrictions to prevent residential development of the Site or other use of the Site involving sensitive receptors. FRGs were used in the development of the final design of the cap to evaluate the extent of chemically-affected soils at the Site that required capping. On the basis of the FRGs, the entire 5-acre Site was capped.

Groundwater Final Remediation Goals

Historical groundwater monitoring has confirmed the presence of slowly declining levels of COCs strictly known to be associated with the Site in both onsite/nearsite and offsite groundwater. Historically, the highest chemical concentrations in groundwater were detected in samples from the A-Zone (the shallowest water-bearing groundwater zone). Due to the significant drop in water levels since 1987, the A-Zone is currently unsaturated. Only rarely since 1987 have A-Zone monitoring wells yielded sufficient water to be sampled.

COCs for which FRGs have been established based on detection in samples of onsite/nearsite and offsite groundwater are: 1,2-dichloroethane (1,2-DCA), carbon tetrachloride, chloroform and dieldrin. In addition, non-numeric FRGs have been established for DBCP and 1,2,3-trichloropropane (1,2,3-TCP), which are regional contaminants not strictly associated with the Site. Established FRGs for COCs in groundwater are provided in Table 2.

For groundwater, FRGs may be chemical-specific (*i.e.*, a numerical value that establishes an acceptable concentration of a chemical substance that may remain in groundwater) and/or

action-specific (*i.e.*, a numerical value that establishes an acceptable concentration of a chemical substance in groundwater that is extracted, treated and discharged). Ranges of potential chemical-specific applicable or relevant and appropriate requirements for selected chemicals of concern in groundwater were presented in the FS Report. The ARARs, health-based criteria, and other pertinent factors as prescribed by applicable law and regulation were evaluated by DTSC to develop FRGs.

In a 6 March 1997 letter to THAN, DTSC provided a list of proposed FRGs and indicated that THAN could prepare a TEFE. Based on the TEFE, DTSC agreed in a letter dated 3 October 1997 to a revised list of proposed FRGs. These proposed values are now finalized. The groundwater FRGs were established for those chemicals of interest currently detected in domestic well or groundwater monitoring well samples. Action-specific FRGs for the discharge of treated groundwater, if necessary, would be set subsequently during the discharge permit application process.

Because of the regional presence of DBCP in groundwater, it would have been inappropriate to select a numeric chemical-specific FRG for DBCP in groundwater. Instead, a non-numeric remediation goal for DBCP was linked to the attainment of chemical-specific FRGs for other chemicals known to be associated with the Site. At such time as the data obtained from the groundwater monitoring program indicate that chemical-specific FRGs have been attained for these other chemicals, an evaluation of the DBCP in groundwater would be performed.

That evaluation would include an assessment of the background concentration of DBCP present in groundwater at that time and a comparison of DBCP concentrations found downgradient of the Site with the background concentration. The evaluation would also include an assessment of the mass of DBCP attenuated during implementation of the remedy and a comparison of this mass with the mass of other chemicals attenuated. THAN would then present the results of the evaluation to DTSC and propose further remedial action with regard to DBCP, if such is determined at that time to be necessary.

In addition to the non-numeric remediation goal identified for DBCP above, the final groundwater remedial alternative would be designed to reduce DBCP in groundwater, if any, that is extracted and treated to concentrations that would meet an action-specific FRG for the discharge of such water. As previously noted, this action-specific FRG for the discharge of treated groundwater would be set during the discharge permit application process. Another FRG would also be established for DBCP that would address potential future remediation of DBCP in onsite or nearsite groundwater, should resaturation of onsite A-zone soils result in an increase in DBCP concentrations in onsite or nearsite groundwater above the FRG for DBCP. This FRG would be based on an evaluation of background groundwater quality conditions to be made at and around the time of A-zone resaturation.

As noted above, the initial indications are that 1,2,3-TCP is similar to DBCP in being a regional groundwater pollutant [CW&M, 1998]. Accordingly, 1,2,3-TCP has a non-numeric remedial goal. If the regional presence of 1,2,3-TCP is confirmed, 1,2,3-TCP will be evaluated in the same manner as DBCP, as discussed above. If 1,2,3-TCP is also found to be associated with the Site, DTSC will establish a site-specific FRG above background.

An appropriate statistical test will be used to evaluate compliance with groundwater FRGs. The statistical test will be proposed to DTSC for approval. The choice of the tests will take into account the following factors:

- Choice of compliance wells.
- Use of non-parametric statistical tests when the FRG is the detection limit or close to the detection limit.
- Use of transformed data (e.g., lognormal) if appropriate.
- Application of the 95% upper confidence limit (UCL) to the cumulative risk (and not individual constituents).
- Rounding of cumulative risk values.
- Excluding 1,2,3-TCP (and DBCP) in the cumulative risk calculations.

Details of the statistical methodology and proposed application of the statistical tests were presented in the remedial design report.

3.6 Potential Future Uses of the Site

There are no current plans to develop the Site. At some future time, it is possible that the Site would be used for light commercial or industrial activity. These activities are consistent with the proposed remedial actions. The preferred remedial action alternative includes deed restrictions to prohibit the future development of the Site for residential use or use by sensitive populations (e.g., hospitals or day-care facilities). It also includes the installation of a protective cap over the onsite soils and restrictions to prevent disturbance of the protective cap.

Installation of a cap over onsite soils is expected to eliminate existing or potential human exposure to surface and subsurface chemically affected soils which pose greater than a 1.0×10^{-6} incremental cancer risk or a HI greater than 1. The protective cap also minimizes the potential for migration of chemicals in soil to groundwater or air.

The HRA evaluated future land-use scenarios, including onsite/offsite intrusive, short-term workers and long-term workers. The total estimated cancer and noncancer risks from exposure to soil and groundwater associated with some of these scenarios exceed the NCP guidelines for acceptable exposure levels, based on the normal distribution of chemical concentration data. The calculated risks were lower assuming a lognormal distribution. The HRA calculations do not include the additional reduction in risk which will be incurred upon the implementation of the Final Remedy. In summary, the presence of chemicals known to be associated with the Site in environmental media is not expected to have a long-term adverse impact on commercial or industrial development of the Site.

Potential beneficial uses of the groundwater at and in the vicinity of the Site include municipal, domestic, agricultural and industrial, as indicated by the Central Valley Region Water Quality Control Plan for the Tulare Lake Basin [CRWQCB, 2004]. Use of Site groundwater for nonpotable purposes such as irrigation is anticipated to continue to be a beneficial use.

Use of onsite and offsite groundwater for drinking water purposes will continue to be affected by the regional presence of DBCP, 1,2,3-TCP and by site-related chemicals if present above the FRGs.

Section 4: Remedial Actions

The Site was investigated and feasibility studies were performed in accordance with the Order issued by the DHS, a predecessor agency to DTSC, dated 23 January 1987 and amended on 8 May 1987 and 5 January 1991 [DTSC, 1991]. These activities are described in detail in various other documents including the RI Report [K/J, 1993], the FS Report [SEACOR, 1993], and the RAP [K/J, 1999]. The Final Remedy for the Site is described in the RAP, which was prepared pursuant to the Order and *California Health and Safety Code Section 25356.1.*

4.1 Interim Remedial Activities

Interim remedial activities completed for the Site have included soil excavation, structures demolition, soil vapor extraction (SVE), and provision of alternate drinking water supplies to nearby residents.

4.1.1 Soil Excavation

Two phases of soil excavation have been conducted at the Site. In the summer of 1984, approximately 14,000 cubic yards of chemically-affected soil and debris were removed from the former landfill area that was historically used for disposal of wastes. Also, the laboratory cisterns (former Drainage System A) and surrounding chemically-affected soils were excavated. In early 1989, in conjunction with demolition and removal of structures at the Site, approximately 10,000 cubic yards of chemically-affected soil were excavated in the former solvent storage area, the former railroad loading dock area, several known drainage systems and in the area around the former Dinoseb and Guthion tanks. The excavated soil and debris were disposed of offsite at a permitted landfill facility.

More than 24,000 cubic yards of chemically-affected soil were excavated, transported, and disposed of offsite during these two interim remedial activities.

4.1.2 Structures Demolition and Removal

In conjunction with the soil excavation in the former landfill area in 1984, the nearby concrete sump, tank, and concrete pad in the solvent storage area, the metal frame shed and the Dinoseb and Guthion tanks were dismantled and disposed of offsite at a permitted landfill facility.

Between January and April 1989, five structures were demolished at the Site, including the two-story brick building and the one-story wood frame building which housed the laboratory. The demolition debris was disposed of offsite at a permitted landfill facility. The structures were demolished based on the concentrations of organochlorine pesticides and other chemicals found in samples of the building materials as a result of past operations at the Site. In conjunction with the building demolition, a 10,000-gallon storage tank in the vicinity of the metal warehouse and a concrete slab in the former Solvent Storage Area were also demolished. Approximately 5,100 tons of chemically-affected building debris and the storage tank were disposed of offsite at a permitted landfill facility.

In 1992, an underground storage tank (UST) was identified south and east of the pump house. The steel UST was 5 feet long, 2.9 feet in diameter and contained approximately 75 gallons of boiler fuel oil. The UST was removed in May 1992 in accordance with Fresno County and DTSC regulations.

In 1994, a drainage system (drainage system H) was identified south of drainage system G and north of the former tool shed. Drainage system H and soils impacted by drainage system H were removed from the Site in May 1997.

4.1.3 Soil Vapor Extraction

Two SVE study systems were installed at the Site. One SVE system was installed in 1988 to evaluate the feasibility of removing chloroform and other volatile or semi-volatile compounds present from unsaturated zone soils in the former laboratory area. Another SVE system was installed in 1990 to evaluate the feasibility of removing xylenes and ethylbenzene from unsaturated zone soils in the former solvent storage area. It is estimated that through system shut down in July 1993, more than 11,700 pounds of xylene and ethylbenzene, and more than 15,800 pounds of total non-methane hydrocarbons were removed during the operation of the system.

The SVE systems are no longer in operation. The systems were operated successfully and the RAOs for chemicals in soil were achieved.

4.1.4 Alternate Water Supplies

Since 1985, THAN has provided bottled water or replacement carbon filters as needed to residents downgradient (southwest) of the Site not connected to the City's water distribution system and whose domestic wells yielded samples containing concentrations of chemicals known to be associated with the Site that exceeded Acceptable Drinking Water Levels (ADWLs). Beginning in 1987 and in accordance with the Order, THAN proposed to provide bottled water to all households included in its Domestic Well Sampling Program (DWSP) as well as to the Temperance Kutner Elementary School. A well would become a DWSP well upon the detection and confirmation of a chemical known to be associated with the Site other than DBCP in samples of groundwater collected from that well. In 1987, THAN also proposed to fund the extension of the existing municipal water distribution system to the Temperance Kutner Elementary School and all households included in the DWSP.

On 1 March 1988, pending written acceptance of THAN's proposal to extend the drinking water supply and issuance of amendments to the Order, THAN offered bottled water or replacement carbon filters, as needed, to households included in its DWSP regardless of sample results. On 12 March 1988, an authorized bottled water distributor initiated delivery of bottled water to the eligible households at THAN's expense.

From 1988 to 1990, THAN funded an extension of the City water distribution system eastward to Temperance Avenue to reduce the number of households using domestic wells as drinking water supply. The City now owns and operates this extension of the water distribution system. Households downgradient of the Site were offered a connection to the City water distribution system at THAN's expense.

There are currently three households on East Pine, located immediately south of the Site and beyond the City water system, which use carbon filtration systems purchased by THAN. The households are responsible for operation and maintenance of the carbon filtration systems.

4.2 Selection of Final Remedy

The Final Remedy was selected based on results of remedial investigations, interim remedial activities, and Site conditions at the time of submitting the RAP. As described in the RAP, the components of the Final Remedy include: (1) Soil Component; (2) Onsite/Nearsite/Offsite Groundwater Component; and (3) Further Engineering/Administrative/ Institutional Controls.

The preferred remedial action alternative was developed based on current conditions at the Site. Current conditions have been significantly improved by THAN's past interim remedial actions at the Site, which included:

- Onsite source removal by soil excavation and structures demolition.
- Removal of a UST and removal/abandonment of multiple onsite drainage systems.
- Onsite source area remediation by SVE.
- Removal of groundwater as an onsite and offsite exposure pathway by providing connections to municipal water supply for domestic use.

In the years after submittal of the FS Report, a number of factors led to a revised preferred remedial alternative. Continued monitoring has provided groundwater data showing low chemical concentrations that are slowly declining. Various environmental studies at other sites have shown natural attenuation may be a viable long-term component of remedial programs at sites. Natural attenuation is the reduction in concentration, mass, toxicity, and/or mobility of chemicals of concern with distance and time through naturally occurring processes in the environment. The naturally occurring processes that contribute to natural attenuation include biodegradation, diffusion, dilution, sorption, volatilization, and/or chemical and biochemical stabilization of chemicals. From the mid-1980s, natural attenuation has been an important component in the Final Remedy selected for a number of federal Superfund sites. A guidance document issued by EPA outlines situations for which they have determined that natural attenuation is appropriate, and states that monitored natural attenuation can be effective when used in conjunction with other active remedial actions and/or as a follow-up action [EPA, 1997].

The TEFE performed for the THAN Site showed that active groundwater remediation has little associated benefit compared with natural attenuation and is not cost effective [KJ, 1998]. For these reasons, the proposed groundwater extraction and treatment component of the remedial alternative was revised. In addition, other components were included to address concerns expressed by the DTSC. The components of the preferred remedial action alternative are outlined below:

- Soil Component
  - Soil vapor extraction

- Design and construction of a containment cover consisting of a bentonite clay, soil and vegetated cover to minimize contact with residual chemicals in soil, and minimize movement of chemicals from soil to other media (groundwater and air)
- Land use restrictions (e.g., no residential use or use by sensitive populations)
- Access control by maintaining the existing fencing and signs
- Appropriate financial assurance from THAN to support the design, construction and long-term maintenance of the Soil Component of the Final Remedy

- Groundwater Component - Onsite/Nearsite
  - Long-term groundwater monitoring of monitoring wells and domestic wells, as necessary
  - Monitored natural attenuation of low chemical concentrations in groundwater
  - Contingency plan for action (e.g., groundwater extraction and/or treatment, if necessary) if groundwater monitoring results for the A-zone (if groundwater is encountered) or the B-zone show that chemical levels are detected and confirmed to exceed FRGs
- Groundwater Component - Offsite
  - Groundwater containment at the compliance point if chemicals strictly known to be associated with the Site are confirmed at concentrations exceeding FRGs
  - Groundwater containment (at the compliance point) if warranted based on an evaluation of concentrations and trends of chemicals strictly known to be associated with the Site
  - Long-term groundwater monitoring of monitoring wells and domestic wells, as necessary
  - Monitored natural attenuation of low chemical concentrations in groundwater
- Further Engineering/Administrative/Institutional Controls
  - Continued provision (and expansion, as appropriate) of alternate water supply by connections to public water supply system, point-of-use treatment, or bottled water
  - Financial assurances to ensure long-term maintenance and operation of remedial actions
  - A review within five years and every five years thereafter to confirm that the remedy remains effective in protecting human health and the environment

These elements are described in more detail below.

4.2.1 Soil Component

The approved Soil Component of the Final Remedy involved placement of a low permeability bentonite clay liner, a rodent-control barrier, clean fill soil, and a hydroseed mix for vegetation of the final cover. It was constructed to minimize contact with any residual chemicals in soil, and to minimize the potential for movement of any such residual chemicals from soil to other media (groundwater, surface water, and air).

The constructed Soil Component consists of:

- A containment cover consisting of Claymax 200R bentonite clay; a rodent-control barrier consisting of 1-inch by 1-inch, 16-gauge hardware cloth; 18 inches of clean import fill graded to drain and prevent ponding; and a vegetative cover consisting of a native hydroseed mix.
- An infiltration trench with inspection ports on the south and west edges of the containment cover system to collect surface stormwater runoff from the containment cover system.
- Site security and access controls including two padlocked security gates, public warnings and signage, and 6-ft high chain link fencing with three-strand barbed wire.

The Soil Component of the Final Remedy also requires recorded land use restrictions to prohibit residential use and use by sensitive populations.

Soil Component activities included destruction of SVE wells. This was accomplished via overdrilling, using a high torque hollow-stem auger in accordance with County of Fresno requirements and a DTSC-approved work plan. Well materials were removed and the resulting void was sealed with a sealing material consisting of a neat cement grout containing 5% betonite by weight.

4.2.2 Groundwater Component

Groundwater monitoring has been performed since the early investigations of the Site, and long-term groundwater monitoring will continue to be an important feature of the Groundwater Component of the Final Remedy. Groundwater monitoring in recent years has confirmed the presence of low and, in general, slowly declining levels of site-related chemicals in both onsite/nearsite and offsite groundwater. Currently the B- and deeper groundwater zones are being monitored. If the A-zone resaturates, monitoring of the A-zone will also be included in the monitoring program. As discussed above, one of the objectives of the cap as part of the Soil Component is to minimize movement of any remaining low concentrations of chemicals from onsite soil to groundwater.

The TEFE report documented the time and expense required to accelerate the attainment of FRGs in groundwater. Groundwater in the vicinity of the site is not being used for domestic purposes, so any reduction in potential health risks by reducing chemical concentrations in groundwater is hypothetical. The past response efforts by THAN to connect nearby residents to the Fresno City Water Supply system have reduced potential risks from exposure to groundwater for domestic purposes to essentially zero. Further active efforts to reduce

concentrations known to be associated with the Site in groundwater would have a negligible benefit in risk reduction, and would be considerably more expensive.

In addition, the beneficial use of groundwater will not be altered following remediation of chemicals associated with the Site because of the regional presence of DBCP (and in some areas, nitrate and arsenic) in excess of drinking water standards. Also, based on an initial study, the presence of 1,2,3-TCP in groundwater appears to be a regional problem. Finally, active groundwater remediation results in only minor reductions in the time required for remediation compared with natural groundwater flow and natural attenuation of chemical concentrations. The negligible health benefits, lack of change in beneficial use, and the long time required for remediation do not justify the costs of active remediation. Nevertheless, containment of groundwater is a component of the remedy if warranted by groundwater conditions. Monitored natural attenuation is also a component of the remedial action alternative for groundwater.

Due to the regional presence of DBCP in groundwater, a non-numerical remedial goal for DBCP has been selected. The goal is linked to the attainment of chemical-specific FRGs for other chemicals known to be associated with the Site. At such time as the data obtained from the groundwater monitoring program indicate that chemical-specific FRGs have been attained for these other chemicals, an evaluation of the DBCP in groundwater would be performed. The evaluation of DBCP in groundwater would include an assessment of the background concentration of DBCP present in groundwater at that time and a comparison of DBCP concentrations found onsite and nearsite with the background concentration. The evaluation would also include an assessment of the mass of DBCP attenuated during implementation of the final remedy and a comparison of this mass with the mass of other chemicals attenuated. THAN would then present the results of the evaluation to DTSC and propose further remedial action with regard to DBCP, if such is determined at that time to be necessary.

Based on the presence of 1,2,3-TCP in groundwater from areas clearly unaffected by Site activities, and documented land application of soil fumigants D-D and/or Telone (which contain 1,3-Dichloropropene [DCP]) in the vicinity of the Site, the initial indications are that 1,2,3-TCP is a regional groundwater pollutant similar to DBCP [CW&M, 1998]. Accordingly, 1,2,3-TCP has a non-numeric remedial goal. If the regional presence of 1,2,3-TCP in groundwater is confirmed, 1,2,3-TCP will be evaluated in the same manner as DBCP, as discussed above. If 1,2,3-TCP is also found to be associated with the Site, DTSC will establish a site-specific FRG above background.

THAN has been conducting groundwater monitoring since 1981. Because the chemicals of concern have been present in groundwater over a long period of time, and have substantially attenuated (decreased in concentration), it is likely that this natural attenuation is due to biological, chemical, and physical processes that have historically occurred and are presently occurring. In addition to the routine groundwater monitoring, additional geochemical parameters have been analyzed to evaluate the effectiveness of monitored natural attenuation.

4.2.3 Further Engineering/Administrative/Institutional Controls

The Final Remedy also includes engineering, administrative, and institutional controls. These controls consist of: (1) continued provision (and expansion, as appropriate) of alternate water supplies; (2) continued provision of financial assurances as necessary to operate, maintain, and

monitor the Final Remedy; and (3) performance of a review within five years and every five years thereafter to confirm that the Final Remedy remains effective in protecting human health and the environment.

4.3 Implementation of the Final Remedy

Construction of the Soil Component was completed at the Site on 24 January 2003 in compliance with the *Project Manual Including Specifications and Drawings for THAN RAP Design of Soil Component and Cap* as approved by DTSC [K/J, 2002]. The Documentation Report was submitted to DTSC to summarize activities conducted during implementation of the Soil Component [K/J, 2003] and was approved by DTSC on 30 June 2003. The RA Report was submitted to DTSC on 28 September 2004 [K/J, 2004] and approved by DTSC on 29 September 2004.

The Soil Component was constructed to minimize contact with any residual COCs in Site soils, and to minimize the potential for movement of any such residual COCs from Site soils to other media (groundwater, surface water, and air). Site features after construction of the Soil Component are shown on Figure 2.

Construction of the Soil Component included:

- Installation of a containment cover consisting of a Claymax 200R bentonite clay; a rodent-control barrier consisting of 1"x1", 16-gauge hardware cloth; 18 inches of clean import fill graded to drain and prevent ponding; and a vegetative cover grown from a native hydroseed mix.

- Placement of an infiltration trench with inspection ports on the south and west edges of the containment cover system to collect surface stormwater runoff from the containment cover system.

- Installation of security and access controls including two padlocked security gates, public warnings and signage, and 6-feet high chain link fencing with three-strand barbed wire.

- Destruction of SVE wells. Two SVE systems had been installed on the Site. However, RAOs for the SVE activities were achieved in 1993 as reported in the *Recommendation for Permanent Closure of SVE Systems* [K/J, 1996]. Accordingly, SVE activities were discontinued and the systems were permanently closed in July 1993.

- Recorded land use restrictions to prohibit residential use and use by sensitive populations. The Deed Restriction was recorded on 26 September 2005 [DTSC, 2005b] to ensure that future land use activities will not adversely affect the integrity and/or effectiveness of the Soil Component or result in exposures to the public and the environment of COCs strictly known to be associated with the Site.

Currently, the Groundwater and Soil Components of the Final Remedy are operating, monitored and maintained in accordance with the OM&M Plan that was approved by DTSC on 21 September 2005 [KJ, 2005] and the OM&M Agreement that was executed by THAN and DTSC as of 29 September 2005 [DTSC, 2005a].

4.4 Site Deletion from the National Priorities List

On 29 September 2005, EPA published the FCOR [EPA, 2005] documenting that all response actions for the Site were completed in accordance with the *Close-Out Procedures for National Priorities List Sites (OSWER Directive 9320.2-09A-P)*.

EPA published a *Notice of Intent to Delete* the Site from the NPL and requested public comment in the Federal Register, 71 Fed. Reg. 39,032 (11 July 2006) [EPA, 2006a]. The Site was deleted from the NPL as announced in the NOD that was published in the Federal Register, 71 Fed. Reg. 48,479 (21 August 2006) [EPA, 2006b].

4.5 Operations, Maintenance, and Monitoring

THAN performs ongoing OM&M activities in accordance with requirements specified in the OM&M Plan and Agreement. A general description of current OM&M activities is provided below.

4.5.1 Inspections

Ongoing inspections of the Soil Component and groundwater monitoring wells are conducted to evaluate the integrity, permanence, and effectiveness of the Final Remedy. The frequency of inspections has been modified from a quarterly to a semiannual basis, as approved by DTSC.

Inspection requirements are described in the OM&M Plan and include observations of the containment cover, vegetation, fences, infiltration trench, monitoring wells, and general conditions of the Site. Inspectors note areas of erosion, ponding, burrowing, or other threats. The physical condition and security of the Site is noted and minor repairs are made on an as-needed basis. DTSC requires that THAN provide 60 calendar days advance written notice prior to conducting significant repairs to the Site. DTSC also requires submittal of a report within seven working days after the occurrence of any emergency or upset event. To date, no such emergency or upset event has occurred and no significant repairs have been necessary. Results of inspections performed since adoption of the OM&M Plan are discussed in Section 5.4.1.

In addition to ongoing semiannual inspections, the THAN site and surrounding orchards are visited by a local contractor about 2 to 3 times per week. The local contractor communicates with THAN regarding the status of the Site and need for maintenance and repair, if required.

4.5.2 Soils Management

THAN or future owners of the Site are responsible for OM&M activities associated with the Soil Component and the proper management of soils at the Site. The soil cap can not be disturbed except as approved by DTSC and in compliance with the OM&M Plan, the Deed Restriction, and applicable provisions of federal, state and local laws and regulations. Incidental disturbances to topsoil, due to landscape maintenance activities such as the mowing or planting of grasses or shallow-root plants, are expected and are permitted under the OM&M Plan. Any removed soils must be properly characterized, containerized, and transported in accordance

with applicable laws and regulations prior to any offsite disposal. To date, onsite soils have been managed by THAN in accordance with applicable requirements.

4.5.3 Groundwater Monitoring

THAN performs ongoing monitoring of groundwater at and near the Site in accordance with requirements specified in the OM&M Plan and the *Groundwater Monitoring Program* (GMP), which is included as Appendix A of the OM&M Plan [K/J, 2005]. The GMP presented in the OM&M Plan superseded and replaced previous monitoring programs, including the DWSP. The primary objective of groundwater monitoring is to monitor and minimize the potential for movement of COCs strictly known to be associated with the Site from onsite soil to groundwater and protect human health and the environment. THAN currently monitors and samples selected groundwater monitoring wells and domestic wells on a semiannual basis in accordance with GMP requirements.

4.5.3.1 Groundwater Monitoring Zones and Wells

The GMP currently includes 43 onsite, nearsite, and offsite monitoring wells and nearsite irrigation well 905.

Construction data for existing monitoring wells are presented in Table 3. Monitored zones and wells screened within each zone are listed in Table 4. Shallow A water-bearing zone (A-Zone) monitoring wells range in total depth from 39 to 51.5 feet. Intermediate depth B water-bearing zone (B-Zone) monitoring wells are approximately 82.5 to 121.5 feet deep. Deep C water-bearing zone (C-Zone) wells range in total depth from 152 to 170 feet deep. Deep D water-bearing zone (D-Zone) wells range in total depth from 201 to 207 feet deep. The term "water-bearing zone" used herein refers to a distinct layer or grouping of relatively permeable deposits, vertically separated from other water-bearing zones by a distinct, relatively impermeable layer or by multiple relatively impermeable layers.

Analytical results for samples collected from groundwater monitoring wells and proposed GMP modifications are discussed in Section 5.4.2. Historically, the highest chemical concentrations in groundwater were detected in samples from the A-Zone (the shallowest water-bearing groundwater zone). Due to the significant drop in water levels since 1987, the A-Zone is currently unsaturated. Only rarely since 1987 have A-Zone monitoring wells yielded sufficient water to be sampled.

4.5.3.2 Domestic Wells

The GMP currently includes seven domestic wells. Domestic wells 1012, 1013, 3019, and 3020 are located on East Pine Avenue beyond the City water system. The households served by domestic wells 986 and 1010 have elected to not connect to the City water system. Samples from domestic well 979 provide additional information on offsite groundwater quality.

These wells were selected by DTSC to monitor potential human exposures and movement of chemicals strictly known to be associated with the Site.

4.5.4 Reporting

The OM&M Plan requires THAN to submit ongoing semiannual table summary reports and annual reports to DTSC. THAN is also required to report "unusual or inconsistent" results to DTSC within 30 working days after receipt of analytical results. Letters are transmitted to domestic well owners summarizing any COCs that have been detected from the owner's well along with the regulatory limit for each detected COC. THAN has complied with reporting requirements specified in the OM&M Plan.

During the first 5-year review period, THAN has reported "unusual or inconsistent" results to DTSC. The unusual or inconsistent results reported have consisted of some first-time "J"-value detections of chemicals in a groundwater or domestic well included in the GMP. There have been no emergency response actions required as a result of any unusual or inconsistent result, which is further evidence that the Remedy is functioning as intended.

4.5.5 Costs

In general, OM&M costs include maintenance activities associated with the Soil Component, groundwater sampling and monitoring, and reporting. Estimated costs were transmitted to DTSC on 29 December 2004 to assist DTSC in developing financial assurance requirements associated with the OM&M of the Final Remedy. The OM&M annual cost for year 2005 was estimated at about $215,000 (based on year 2005 dollars). Year 2006 and 2007 OM&M costs were estimated near $145,000 per year (based on year 2005 dollars).

Actual OM&M costs for years 2005, 2006, and 2007 are summarized in the table below.

Year	Total Actual Cost (Rounded to Nearest $1,000)	Adjusted to Year 2005 Dollars[(a)]
2005	$212,000	$212,000
2006	$149,000	$143,000
2007 (through September)	$120,000	$111,000

(a) Assumes a prime rate of 4.0% and inflation rate of 1.9%. These are the same assumptions used in developing financial assurance requirements in December 2004.

There is not a significant difference between actual OM&M costs and the cost estimates prepared in December 2004, which is another indicator that the Final Remedy is functioning as intended. THAN will continue to perform required OM&M activities and provide sufficient financial assurances to ensure that future OM&M activities will be adequately supported.

Section 5: Five-Year Review Process

5.1 Administrative Components

On 25 April 2007, Kennedy/Jenks submitted the *Five-Year Review Work Plan for the THAN Site* to DTSC and EPA to propose an approach and schedule for collecting and presenting information to support the Five-Year Review [K/J, 2007a]. The ultimate responsibility for conducting the Five-Year Review rests with DTSC and EPA. The approved Five-Year Review process consists of six general tasks:

1. **Notification of Potentially Interested Parties.** Kennedy/Jenks assisted DTSC with preparation of a public notice document and identification of potentially interested parties. The public notice document consisted of a two-page fact sheet that described the Five-Year Review process and provided contact information where additional information could be obtained. At DTSC's request, Kennedy/Jenks mailed the fact sheet on 31 August 2007 to more than 1,000 individuals and nearby residences located within a three-quarter mile radius from the Site. The list was generated from information obtained from InfoUSA, a provider of database marketing services and national consumer/resident information and addresses. Appendix C provides a copy of the distributed public notice document (fact sheet).

2. **Development of a Review Schedule.** A review schedule was provided in the Work Plan and proposed various milestones for performing the Five-Year Review process. The completion dates for certain milestones have shifted from the dates provided in the Work Plan,

3. **Establishment of a Review Team.** The Five-Year Review Team was led by Mr. Danny Domingo of DTSC and Ms. Lynn Suer of EPA. THAN's role as a member of the Review Team was to gather, evaluate, and provide information to support DTSC and EPA in completing the Five-Year Review. Kennedy/Jenks, led by Mr. Robert S. Chrobak (designated Site Project Engineer of Record), assisted THAN with various activities including preparation of this Report. Mr. Bill Pretzer of Pretzer Farms provided input regarding ongoing operations and maintenance activities for the Site.

4. **Document Identification and Review.** THAN assisted DTSC and EPA with collection, review, and evaluation of information and data relevant to the Five-Year Review. Collected information is discussed in this Report and listed in Section 5.3 below.

5. **Site Inspection.** A special inspection of the Site was conducted by DTSC and Kennedy/Jenks representatives on 27 July 2007. EPA's *Five-Year Review Site Inspection Checklist* [EPA, 2001] was used as a guide for conducting the inspection. The completed inspection checklist is included in Appendix B. Based on Site observations, it appears that the Final Remedy is functioning as planned, that necessary operation and maintenance is being performed, and that institutional controls are in place and protective. Only minor maintenance issues were identified for repair. Details of the special inspection are provided in Section 5.5 below.

6. **Submittal of Five-Year Review Summary Report.** This Report has been prepared by Kennedy/Jenks on behalf of THAN to describe information collected and reviewed and to present preliminary findings and conclusions supported by the review of relevant data. DTSC and EPA are responsible for completing the Five-Year Review process and assessing the effectiveness of the Final Remedy.

5.2 Community Involvement

Community involvement activities consisted of preparing and mailing a public notice document (fact sheet) to potentially interested parties, including residents within a three-quarter mile radius, as discussed in Section 5.1 above. The fact sheet is attached as Appendix C. DTSC was contacted by one individual regarding the distributed fact sheet. The individual owned property that was outside of the area where groundwater is monitored downgradient of the Site. The individual contacted DTSC to inquire if sampling of the individual's well could be included in the current GMP. A public meeting was not deemed necessary by DTSC based on the low level of interest. All questions/concerns that were received are being addressed by DTSC.

5.3 Document Review

The following documents were reviewed as part of the Five-Year Review:

- EPA's 2001 Comprehensive Five-Year Review Guidance and Section 121 of CERCLA
- Site Investigation Documents (e.g., *Remedial Investigation/Feasibility Study Report*)
- Final Remedy Decision Documents (e.g., *Final Remedial Action Plan*)
- Remedial Action Objectives and Cleanup Levels as specified in Decision Documents
- Applicable or Relevant and Appropriate Requirements (ARARs)
- Construction Documents (e.g., As-Built Drawings, Completion Reports)
- EPA NPL Deletion Docket Documents (e.g., *Final Closeout Report* and *Notice of Deletion*)
- *Operation, Maintenance and Monitoring Plan* Including *Groundwater Monitoring Program*
- *Operation, Maintenance and Monitoring Agreement*
- *Covenant and Agreement to Restrict Use of Property* (Deed Restriction)
- Annual Reports Presenting Groundwater Monitoring and Sampling Analytical Results, Inspections for the Soil and Groundwater Components, and Description of Operation and Maintenance Activities and Implementation of Institutional Controls
- Supplemental Groundwater Investigation Reports (e.g., *Evaluation of Site Compliance Status and Proposed Modifications in Groundwater Monitoring Report*)
- *City of Fresno 2025 General Growth Plan* and Other Recent Documents Identifying Potential Plans for Development in Fresno's Southeast Growth Area
- Other Relevant Documents and Correspondence Retained in the THAN Document Repository

5.4 Data Review

Data collected from ongoing site inspections and groundwater monitoring events were reviewed as part of the Five-Year Review.

5.4.1 Ongoing Site Inspections

THAN has conducted ongoing inspections of the Site in accordance with OM&M Plan requirements. The frequency of inspections was evaluated and reduced from a quarterly to a semiannual basis as documented in a letter from DTSC dated 17 November 2006. Semiannual inspections of the Site will remain effective for monitoring possible seasonal impacts to the Final Remedy.

Based on observations made during ongoing inspections, the onsite components of the Final Remedy appear to be intact and effective for protecting human health and the environment. There have been no signs of human trespassing or disturbance to the Final Remedy. No major emergency or upset events have occurred at the Site during the Five-Year Review period.

Inspections have identified ongoing maintenance items of minor concern, including: rodent burrowing, small areas of erosion from stormwater runoff, soil accumulation in the infiltration trench, dogs or coyotes digging underneath the perimeter fence (likely in pursuit of rodents), and some instances, minor amounts of debris and trash being found on and outside the fenced Site. Instances of debris and trash being found on the 5-acre Site does not mean that there was trespassing on the Site. Given that the access gates are locked and that there is 3-strand barbed wire on the top of the fence, it is most likely that any trash found on the Site was either thrown over the fence or was deposited by wind. There have been no indications (e.g., broken locks, fence openings or damage, footprints, etc.) that people have entered the Site.

None of the conditions listed above were detrimental to implementation of the Final Remedy. Minor repairs are performed by THAN as necessary. The Soil Component of the Final Remedy includes a rodent control barrier that was designed to help prevent animals from burrowing through the bentonite liner and into underlying soil. THAN will continue to monitor rodent burrowing, repair holes, and attempt to prevent burrowing. Rodent burrowing does not appear to be compromising the integrity of the vegetated cover.

5.4.2 Groundwater Monitoring

Groundwater beneath the Site and in its vicinity has been characterized since 1981. THAN currently performs ongoing groundwater monitoring and reporting activities in accordance with the GMP presented in the OM&M Plan. Onsite monitoring wells are shown on Figure 3 and offsite monitoring wells are shown on Figure 4.

In September 2007, Kennedy/Jenks submitted for DTSC's and EPA's review an *Evaluation of Site Compliance and Proposed Modifications in Groundwater Monitoring* (Supplemental Groundwater Report) [K/J, 2007b]. The Supplemental Groundwater Report evaluates historic and existing groundwater conditions along with recent and tentative future land use in the vicinity of the Site and proposes modifications in groundwater monitoring on, near, and off the Site. Additionally, the Report provides an evaluation of the compliance of onsite and offsite

groundwater quality with the FRGs set forth in the RAP. The extent and frequency of groundwater and domestic well monitoring were reevaluated in light of consistent monitoring results showing concentrations of COCs below FRGs and/or at non-detectable concentrations in groundwater.

The Supplemental Groundwater Report demonstrates that concentrations of COCs in groundwater have generally remained below values established as numeric FRGs during the 1989 to 2006 time period, and that all groundwater COCs have remained below numeric FRGs since 2002. The data and statistical evaluation indicate that the Final Remedy (1) has been effective in protecting human health and the environment and (2) it is likely that this will continue in the future given that the Soil Component of the Final Remedy and access controls are in place, resaturation of the A-Zone is unlikely, and groundwater elevations and concentrations of COCs have decreased.

The Supplemental Groundwater Report proposed various modifications to the GMP including:

1. Decreasing the number and sampling frequency of onsite/nearsite groundwater monitoring wells;
2. Decreasing the number and sampling frequency of offsite groundwater monitoring wells;
3. Increasing the number of domestic wells monitored and modifying the sampling frequency for each domestic well to achieve a rotational quadrennial sampling schedule;
4. Discontinuing unnecessary monitoring of natural attenuation parameters in favor of continued groundwater monitoring for COCs that are strictly known to be associated with the Site.

The rationale for these proposed modifications is based on hydrogeologic evidence of improved groundwater quality, sustained immobilization of residual constituents in the A-Zone due to desaturation, slow groundwater flow rates and low or less-than detectable COCs strictly associated with the Site, and concentrations that continue to decline over time. Modifications proposed in the Supplemental Groundwater Report considered anticipated future development near the Site, which is located in the City's SGA. Anticipated future development in the area south and southeast of the Site is the primary reason for increasing the number of domestic wells monitored in the GMP.

THAN will continue to implement the OM&M Plan and current GMP until written approval of proposed modifications is provided by DTSC. A detailed evaluation of groundwater conditions is provided in the Supplemental Groundwater Report. In general, the Supplemental Groundwater Report evaluated the four COCs with established numeric FRGs: dieldrin, chloroform, 1,2-DCA and carbon tetrachloride. The regional contaminants DBCP and 1,2,3-TCP were not assessed in the analysis because DBCP and 1,2,3-TCP are not strictly associated with the Site. Most COC concentrations decreased to below FRGs by about 1995 and maintained a stable concentration at or below detection limits. The only exception was 1,2-DCA in offsite B-Zone well 183-B2, which was above the FRG until 2002 and then declined and stabilized to levels less than the detection limit.

Sections 6 and 7 present the statistical analysis of historical groundwater data and the evaluation of site compliance with FRGs, respectively, that were performed and summarized in the Supplemental Groundwater Report.

5.5 Five-Year Review Special Site Inspection

The Five-Year Review inspection of the Site was performed on 27 July 2007 by Mr. Jorn Grimsley, P.E., of Kennedy/Jenks and Mr. Danny Domingo of DTSC. The completed *Five-Year Review Site Inspection Checklist* is included as Appendix B.

The inspection demonstrated that the Final Remedy and institutional/access controls appear to be intact and effective for protecting human health and the environment. There have been no signs of human trespassing or disturbance to the Final Remedy. Minor trash and debris has been found on and around the Site in the past; however, it is most likely that trash found on the Site was thrown over the fence or deposited by wind. No significant problems were identified during the special inspection. DTSC and Kennedy/Jenks identified various maintenance items of minor concern that will need to be addressed by THAN. Items identified include:

1. **Fence.** Based on site observations, it appears that dogs or coyotes have accessed the Site by digging under the perimeter fence. Mr. Bill Pretzer of Pretzer Farms regraded soil in locations where there was space between the bottom of the fence and ground surface on the day of the inspection. The fence material appeared to be intact and effective in restricting human access. THAN will continue to monitor and maintain the fence to restrict access to the Site.

2. **Containment Cover Berms.** There appeared to be localized areas where stormwater runoff has caused minor erosion of containment cover berms, particularly in the southwest corner of the Site. Regrading of berms at locations of observed erosion is warranted and will be performed by THAN.

3. **Site Signage.** The existing signs posted on the Site security fence and gates are outdated. Replacement of the existing signs with new signs written in English and Spanish is warranted and will be performed by THAN.

4. **Monitoring Well Locks.** The onsite monitoring wells did not have locks on the well covers. Placement of locks on all monitoring wells is warranted to prevent access and will be performed by THAN.

5. **Stormwater Infiltration Trench.** Soil and silt have accumulated in the stormwater infiltration trench that is located on the south and west sides of the containment cover. The purpose of the infiltration trench is to collect stormwater runoff from the top of the containment cover and prevent stormwater runoff from leaving the Site. Soil and silt accumulation in the infiltration trench could provide a possible location where stormwater runoff from the containment cover could leave the Site and enter into the adjacent orchard parcel owned by THAN. Removal of accumulated soil and silt from the infiltration trench is warranted and will be performed by THAN.

6. **Rodent Burrowing.** Various locations were identified where rodents/ground squirrels have burrowed into soil and rock material on the Site. Instances of burrowing appear minor and have largely been controlled by THAN's ongoing maintenance efforts. Burrowing appears to be primarily concentrated in the stormwater infiltration trench and containment cover berms. Burrowing does not appear to be occurring on top of the containment cover. There was no evidence that burrowing has extended beyond the

rodent control barrier or reached the bentonite liner and underlying soil. Burrowing does not appear to be compromising the integrity of the vegetated cover. THAN will continue to monitor rodent burrowing, repair holes, and attempt to prevent burrowing.

5.6 Interviews

Mr. Bill Pretzer of Pretzer Farm Services was interviewed during the Five-Year Review inspection of the Site. Mr. Pretzer has been contracted by THAN to perform ongoing maintenance and observation activities. Mr. Pretzer lives close to the Site and visits the Site about two to three times per week. No significant problems were identified by Mr. Pretzer. To Kennedy/Jenks' knowledge, no other individuals have been interviewed by DTSC or EPA.

An interview documentation form and record is included as Appendix D.

5.7 Title Search

At the request of EPA, Kennedy/Jenks contacted the Chicago Title Company on 27 August 2008 to request that an expedited title search be performed to demonstrate that the Deed Restriction for the property is in place and functioning as intended. Chicago Title Company performed a search on the property located at 7183 East McKinley Avenue and found the Deed Restriction that was recorded in September 2005 with the County of Fresno. A copy of the Deed Restriction is provided in Appendix H.

Section 6: Statistical Analysis of Historical Groundwater Data

Groundwater quality beneath the Site and in its vicinity has been characterized by laboratory analytical data reported since 1981. Constituents evaluated in this section are the four COCs identified in the RAP and OM&M Plan [K/J, 1999 and 2005): dieldrin, chloroform, 1,2-DCA and carbon tetrachloride. The regional groundwater contaminants DBCP and TCP are not assessed in this analysis. The concentrations of COCs with established numeric FRGs in the groundwater are presented as concentration versus time chemographs (Figures F-1 through F-36, Appendix F). The presentation of data is first divided into each of the four COCs with established FRGs (dieldrin: Figures F-1 through F-9, chloroform: Figures F-10 through F-18, 1,2-DCA: Figures F-19 through F-27, and carbon tetrachloride: Figures F-28 through F-36), then by well type (A-Zone well, followed by B-Zone, C-Zone, D-Zone, and domestic wells), with the relevant onsite/nearsite and offsite dataset for each well type.

The groundwater data since 1989 were analyzed most intensively, at which point most of the source of chemical impact was removed from the Site. It was also between 1987 and 1989 that the A-Zone became dry and most A-Zone wells could no longer be sampled. Therefore, as of approximately 1989, new groundwater, soil and chemical source conditions existed at the Site. Accordingly, while historical data are provided in Appendix E, and the data for applicable sites and COCs are graphed in Appendix F, only data from 1989 to 2006 have been included in the calculation of descriptive statistics and in the trend analyses. A statistical summary of analytical data is presented in Table 5. Descriptive statistics calculated include the mean, median, standard deviation, 95th percentile (95%ile) and the 95% Upper Confidence Limit of the arithmetic mean (95% UCL).

The chemographs provide an illustration of the concentrations of the four key COCs in groundwater at varying depths below, upgradient and downgradient of the Site. Additional statistical analysis of changing concentrations over time may provide an indication of where new risks may exist or where concentrations have attenuated or declined to such a level that no risk of groundwater quality degradation or human health concern remain present. Trend analysis could therefore identify wells in the GMP which may require enhanced monitoring, reduced frequencies or even abandonment. Since the data are not normally distributed throughout the selected time period, the non-parametric Mann-Kendall trend analysis was calculated with a 95% confidence level using Starpoint Software's data analysis program ChemStat version 6.0. The Mann-Kendall test indicates at a 95% confidence level whether there is or is not a statistically significant trend in the groundwater data from one well. A common tool for determining the average concentration likely to be contacted over time is the 95% Upper Confidence Limit of the arithmetic mean (95% UCL). EPA recommends using this for Risk Assessment at Superfund sites [EPA, 2002]. The 95% UCL acknowledges the uncertainties and variability within an environmental data set without presenting an unacceptable risk to human health or the environment. The 95% UCL concentration was calculated for each of the four COCs for each well where enough data points existed to perform the calculation in ChemStat. The 95% UCL concentration essentially defines a value that equals or exceeds the true mean 95% of the time. That is, it is unlikely that the true mean concentration of the COC in the groundwater at a particular well will exceed the 95% UCL value with 95% confidence. The raw trend analysis and 95% UCL calculation output is included in Appendix G.

A number of data manipulation steps were undertaken before analysis could be conducted. Once the dieldrin, chloroform, 1,2-DCA and carbon tetrachloride data for each of the wells were queried from THAN's historical groundwater analytical results (stored in a Microsoft Access database and included as Appendix E), all "MB" ("method blank contamination") and "HT" ("sample exceeded holding time before analysis") samples were filtered out. When importing the data into and compiling the data for data analysis in Microsoft Excel, the "ND" values (samples where the concentrations of COCs were "not detected" or less than the detection or quantitation limit) were included as the detection limit value. The ND samples for dieldrin reported by the laboratory as "<0.05" parts per billion (ppb) were included in the dataset for this analysis as 0.05 ppb. The ND samples for chloroform, 1,2-DCA and carbon tetrachloride reported by the laboratory as "<0.5" ppb were changed to "0.5" ppb for inclusion in the chemographs and statistical analyses. A series of (mainly dieldrin) results prior to 1990 reported as "<1 ppb" or "<50 ppb" were not included in the chemographs nor the descriptive statistics, Mann-Kendall trend analyses, nor 95% UCL calculation. Samples analyzed with these higher than normal reporting limits are not considered reliable samples and have not been included in the analysis and will not be discussed further in this evaluation. However, these data are still included in the historical groundwater database (Appendix E). All other samples, including replicate samples, were included in the dataset used to undertake this evaluation and are illustrated in the chemographs (Appendix F, Figures F-1 through F-36). However, replicate samples were consolidated for the statistical analysis component of this analysis. Including replicate samples as multiple concentrations can skew the data. As a result, COC concentrations in wells that were sampled multiple times on the same day were averaged to arrive at an adjusted concentration for the COC at that well on that day. The concentrations presented in Table 5 are therefore calculations based on the adjusted source data.

6.1 Onsite and Nearsite Groundwater Quality and Trend Analysis

6.1.1 Dieldrin

Figures F-1, F-3 and F-5 present concentrations of dieldrin in onsite/nearsite wells in the A-, B- and C-Zones, respectively. Prior to the A-Zone becoming dry around 1987, A-Zone wells 138, 139 and 30-A recorded concentrations of dieldrin in groundwater above the FRG of 0.3 ppb. Dieldrin has not been detected above laboratory detection limits in an A-Zone sample since 1991.

Dieldrin has been detected at concentrations below the FRG of 0.3 ppb in all B-Zone onsite/nearsite wells over the 1989-2006 monitoring period. Only B-Zone wells 30-B, 150-B1 and irrigation well 905 have recorded concentrations above the laboratory detection limit of 0.05 ppb since 1989, and trend analysis shows a statistically significant decreasing dieldrin trend at well 905 (Table 5 and Figure F-3). The highest recent onsite/nearsite dieldrin concentration is 0.1 ppb in a sample from well 150-B1 in December 2006, although that concentration is not reflected in results for C-Zone well 150-C1 and no increasing trend was identified. Dieldrin is still currently being detected at onsite/nearsite wells 30-B, 150-B1, and 905, but the chemographs show that dieldrin concentrations have been relatively stable since the mid-1990s and are not expected to increase due to Site conditions given that the Soil Component of the Final Remedy and access controls are in place, resaturation of the A-Zone is

unlikely, and groundwater elevations have continued to drop. The 95% UCL values calculated for the only wells where dieldrin has been detected above the detection limit onsite since 1987 – wells 30-B, 150-B1 and 905 – are all below the FRG (0.06, 0.12 and 0.12 ppb respectively).

6.1.2 Chloroform

Figures F-10, F-12 and F-14 present concentrations of chloroform in onsite/nearsite wells in the A-, B- and C-Zones, respectively. Limited data analysis can be performed on the A-Zone wells since there is a lack of data for the 1989-2006 monitoring period. Since the A-Zone dewatered around 1987, any A-Zone wells that have had sufficient water to sample have recorded chloroform concentrations less than the detection limit of 0.5 ppb or slightly above the detection limit but still two orders of magnitude below the FRG of 100 ppb.

Chloroform concentrations in B-Zone groundwater indicate a marked difference prior to and after 1990 (Figure F-12). Prior to 1990, seven of the 11 B-Zone onsite/nearsite wells recorded chloroform concentrations above detection limits, with well 31-B exceeding the FRG on one occasion. Since May 1990 only two wells (30-B and 31-B), have recorded chloroform concentrations above the detection limit, although no sample has exceeded 1 ppb. Trend analysis indicates statistically significant decreasing trends in B-Zone wells 31-B, 32-B, 151-B1 and 155-B0.

One groundwater sample collected at upgradient well 154-C1 recorded a chloroform concentration above the laboratory detection limits in 1990. Apart from that, all other samples from onsite/nearsite C-Zone wells have chloroform concentrations below the detection limit of 0.5 ppb over the 1989-2006 monitoring period.

To summarize, the chemographs illustrate that chloroform concentrations in the onsite/offsite B-Zone wells have stabilized since 1990 and trend analysis suggests that there should be no future increasing trend for chloroform caused by Site conditions given that the Soil Component of the Final Remedy and access controls are in place, resaturation of the A-Zone is unlikely, and groundwater elevations have continued to drop.

6.1.3 1,2-DCA

Figures F-19, F-21 and F-23 present concentrations of 1,2-DCA in onsite/nearsite wells in the A-, B- and C-Zones, respectively. Prior to dewatering of the A-Zone around 1987, a number of wells reported concentrations above the detection limit and FRG of 0.5 ppb. Limited data analysis can be performed on the A-Zone wells since there have been a lack of data in the targeted 1989-2006 monitoring period. The only well that has a 95% UCL value above the detection limit is A-zone well 77-A1, however the 95% UCL value is 1.04 ppb, still two orders of magnitude less than the FRG of 100 ppb and consequently not of concern.

No onsite/nearsite wells screened in the B- or C-Zones have recorded 1,2-DCA concentrations above the detection limit/FRG since groundwater monitoring began. There should be no future increasing trend for 1,2-DCA caused by Site conditions given that the Soil Component of the Final Remedy and access controls are in place, resaturation of the A-Zone is unlikely, and groundwater elevations have continually dropped.

6.1.4 Carbon Tetrachloride

Figures F-28, F-30 and F-32 present concentrations of carbon tetrachloride in onsite/nearsite wells in the A-, B- and C-Zones, respectively.

No onsite/nearsite wells screened in the B- or C-Zones have recorded carbon tetrachloride concentrations above the detection limit/FRG since groundwater monitoring began. There should be no future increasing trend for carbon tetrachloride caused by Site conditions given that the Soil Component of the Final Remedy and access controls are in place, resaturation of the A-Zone is unlikely, and groundwater elevations have continued to drop.

6.2 Offsite Groundwater Quality and Trend Analysis

6.2.1 Dieldrin

Figures F-2, F-4, F-6 and F-7 present concentrations of dieldrin in offsite wells in the A-, B-, C- and D-Zones, respectively. The chemographs show that concentrations of dieldrin have never been reported above the analytical detection limit of 0.05 ppb for A-, C- and D-Zone groundwater monitoring wells. For offsite B-Zone wells, the chemograph shows that only well 153-B1 has reported dieldrin concentrations in groundwater above the FRG of 0.3 ppb. Peak concentrations of dieldrin in groundwater at well 153-B1 were recorded between 1989 and 1993, and rapidly declined to concentrations below the FRG thereafter. Other B-Zone wells to report detected values of dieldrin in groundwater since 1989 include wells 152-B1, 182-B1 and 183-B1, however concentrations remained below the FRG. Well 182-B1 has reported "J" values below the laboratory detection or quantitation limit since 1993. A "J" value is defined as an estimated concentration in the case where mass spectral data indicate the presence of a compound that meets the criteria for which the result is less than the laboratory quantitation limit, but greater than zero. This means that the laboratory identified dieldrin present in the groundwater in that sample, however the concentrations are still below the quantitation limit of 0.05 ppb and are therefore of low concern.

Despite dieldrin recorded at concentrations above the FRG at well 153-B1 over ten years ago and presence of the compound at well 183-B1, the concentrations have been low for some time and the Mann-Kendall trend analysis indicates a statistically significant decreasing dieldrin concentrations trend at 183-B1 and the chemographs visually indicate a decreasing trend at 153-B1 (Figure F-4).

6.2.2 Chloroform

Figures F-11, F-13, F-15 and F-16 present concentrations of chloroform in offsite wells in the A-, B-, C- and D-Zones, respectively. The sample collected in 1987 from A-Zone wells 152-A1 and 153-A1 indicated chloroform concentrations at and above detection limits, respectively, but below the FRG of 100 ppb. Figure F-13 indicates that the peak chloroform concentrations in the B-Zone groundwater occurred in the late 1980s and early 1990s, at which point chloroform concentrations in wells 152-B1 and 182-B1 approached the FRG. The chemograph shows that chloroform concentrations in B-Zone groundwater began to decline and were one order of magnitude less than their peak concentration by 1995. The Mann-Kendall trend analysis supports these declining trends in chloroform concentrations in groundwater (Table 5 and

Appendix G). The apparent increasing trend in chloroform concentration identified at well 184-B1 may be attributed to the series of non-detect values recorded in the well between 1989 and 1994. Chloroform concentrations recorded at well 184-B1 are still two orders of magnitude below the FRG, with a 95% UCL concentration of 0.8 ppb. To summarize, concentrations of chloroform in all wells representing B-Zone groundwater have been detected but are at stable and consistent values below 2 ppb for over eight years.

Figure F-15 indicates that chloroform in offsite C-Zone groundwater has been detected in three wells over the monitoring period: wells 152-C1, 182-C1 and 184-C1. Other wells such as 153-C1, 181-C0 and 183-C1 have consistently reported chloroform concentrations less than the detection limit of 0.5 ppb. Trend analysis performed on data from well 184-C1, part of the compliance well cluster, reported a statistically significant increasing chloroform trend, although the chemographs indicate the concentrations have stabilized around 8 ppb since around 1995. Additionally, the 95%ile of chloroform concentrations in C-Zone groundwater has not exceeded 15 ppb and the 95% UCL has not exceeded 8.5 ppb. Furthermore, chloroform concentrations in well 182-C1, which recorded the highest values in the C-Zone group, have decreased dramatically in the last eight years to concentrations around 1 ppb, two orders of magnitude below the FRG.

Figure F-16 shows that chloroform in D-Zone groundwater in offsite wells 181-D1, 182-D1 and 183-D1 has consistently been reported at below detection limits. Despite a statistically significant increasing trend calculated for chloroform in groundwater at 184-D1, the chemographs illustrate that all samples collected at the well have historically been less than 1 ppb, two orders of magnitude below the FRG. The recent samples with concentrations above the detection limit concentrations in well 184-D1 may be a result of the higher concentration groundwater in the shallower well 184-C1 (that peak around 1996) moving into the lower water-bearing zone. If that is the case, because the concentrations of chloroform in well 184-C1 did exceed 11 ppb it is unlikely that concentrations of chloroform in D-zone well 184-D1 will increase beyond that and it is highly unlikely that chloroform concentrations will approach the FRG.

6.2.3 1,2-DCA

Figures F-20, F-22, F-24 and F-25 present concentrations of 1,2-DCA in offsite wells in the A-, B-, C- and D-Zones, respectively. Concentrations of 1,2-DCA have never been detected above laboratory detection limits in wells screened in the A-Zone (Figure F-20) or the D-Zone (Figure F-25). Additionally, 1,2-DCA concentrations have not been detected above the laboratory detection limit (and FRG) of 0.5 ppb at B-Zone wells 181-B1, 183-B2 and compliance well 184-B1. The highest concentration of 1,2-DCA in B-Zone wells was reported in 183-B2 in the early 1990s. Since then, 1,2-DCA concentrations in groundwater have declined dramatically and have stabilized over the last three years to concentrations below the detection limit/FRG (Figure F-22). These declining trends are supported by the Mann-Kendall trend analysis (Table 5). 1,2-DCA was detected in concentrations above the detection limit and FRG in well 153-C1 in the late 1980s, however all samples in all C-Zone wells since then have recorded concentrations less than the laboratory detection limit (Figure F-24) and statistically significant decreasing trends were found in C-Zone wells 153-C1 and 184-C1.

6.2.4 Carbon Tetrachloride

Concentrations of carbon tetrachloride in groundwater downgradient of the Site exhibit similar spatial and temporal patterns as 1,2-DCA. Figures B-29, B-31, B-33 and B-34 present concentrations of carbon tetrachloride in offsite wells in the A-, B-, C- and D-Zones, respectively. Concentrations of carbon tetrachloride have never been detected above the laboratory detection limit of 0.5 ppb in wells screened in the A-Zone (Figure F-29), C-Zone (Figure F-33) or the D-Zone (Figure F-34). In B-Zone groundwater, carbon tetrachloride concentrations have not been detected above the laboratory detection limit (and FRG) of 0.5 ppb at wells 152-B1, 153-B1, 181-B1, 183-B1 and compliance well 184-B1. The highest concentrations of carbon tetrachloride in B-Zone wells were reported in well 183-B2 in the late 1990s. Carbon tetrachloride concentrations in groundwater in well 183-B2 have declined dramatically over recent years and have stabilized over the last three years to concentrations below the detection limit/FRG (Figure F-31). These declining trends are supported by the Mann-Kendall trend analysis (Table 5).

6.3 Domestic Supply Groundwater Quality and Trend Analysis

Figures F-8, F-17, F-26 and F-35 present concentrations of dieldrin, chloroform, 1,2-DCA and carbon tetrachloride, respectively, in the eight offsite domestic wells sampled as part of the GMP. The chemographs and descriptive statistics (Table 5) confirm that no samples from these eight domestic wells have indicated the presence of a COC at concentrations above laboratory detection limits. The domestic wells selected for sampling as part of the GMP are generally beyond the known extent of groundwater affected by Site activities and therefore they are of limited use in analyzing groundwater quality trends.

6.4 Summary

Monitoring wells located nearsite and offsite with detections of dieldrin, chloroform, 1,2-DCA, and carbon tetrachloride over the last decade are indicated as colored dots in Figures 5, 6, 7, and 8, respectively. A detection was included if a groundwater sample (from any groundwater depth at the well location) contained concentrations of the particular COC above the reported detection limit or when a J-value was identified. The laboratory assigns a "J" qualifier when the identification of the analyte is acceptable but the quantitative value is an estimate. All wells sampled during the period from 1997 to 2006 were included in these figures to provide a current characterization of groundwater. The spatial distribution of detections is similar amongst the four COCs, tracking the flow of groundwater to the southwest.

Generally, the four COCs in groundwater that are strictly known to be associated with the Site fall into two distribution patterns. It is important to note that, in both distribution patterns, concentrations of COCs in groundwater have remained below numeric FRGs for all wells since 2002. Dieldrin is generally found very infrequently in groundwater samples collected near the Site and downgradient as far as Olive Avenue. Chloroform, 1,2-DCA, and carbon tetrachloride occur less frequently in nearsite samples, but have been detected in samples from THAN's furthest downgradient well cluster 184 on Harvey Avenue. Chloroform detections range from nearsite wells to furthest downgradient well cluster 184. 1,2-DCA and carbon tetrachloride are consistently detected in samples from well 183-B2. 1,2-DCA was additionally detected in samples from two domestic wells in the general area of well 183-B2. Replicate December 2004

samples from well 184-C1 indicated the presence of 1,2-DCA and carbon tetrachloride, extending the known range of these COCs. In recent years, highest concentrations of chloroform are found in samples from well 184-C1. As noted, all concentrations of all four COCs have been below their respective numeric FRGs since 2002.

Section 7: Evaluation of Site Compliance with FRGs

The statistical analysis included in this Section details current Site compliance with FRGs and provides a basis for optimizing future groundwater monitoring to demonstrate continued compliance with FRGs.

7.1 Information Used in the Evaluation of Compliance with FRGs

The primary information used for evaluating Site compliance with FRGs is presented in Table 5. The wells are classified into four groups: a) onsite/nearsite monitoring wells; b) offsite monitoring wells; c) domestic wells; and d) proposed additional domestic wells currently not in the GMP. Wells listed in the four sections are organized by groundwater zones, from the shallow A-Zone, the intermediate depth B- and C-Zones, and the deep D-Zone. Groundwater quality information is listed from the left to right in the following order:

- dieldrin (FRG = 0.3 ppb, µg/l),
- chloroform (FRG = 100 ppb, µg/l),
- 1,2-dichloroethane (FRG = 0.5 ppb, µg/l), and
- carbon tetrachloride (FRG = 0.5 ppb, µg/l).

Statistical parameters (mean, median, standard deviation, 95%ile, and 95% UCL of the arithmetic mean) were calculated based on methods described in Section 6. A summary of the data is provided in Table 5. For this analysis compliance with FRGs will be determined using two parameters: the 95%ile and 95% UCL concentrations for each well and COC. The 95%ile of distributions are frequently used to determine whether environmental pollution levels exceed specified limits [Gilbert, 1987]. The "limit" in this situation is the numeric FRG. The 95%ile value indicates that the concentration of a COC will not exceed this value 95% of the time - a valid approximation of the maximum concentration that might be experienced in the groundwater most of the time. The 95%ile is therefore used in this analysis as a conservative approach to evaluating the concentrations of COCs in groundwater against the FRGs. The 95% UCL concentration is the most used method to determine the Exposure Point Concentration in risk assessment; that is, a conservative estimate of the average chemical concentration in an environmental medium. The 95% UCL concentrations quoted in this analysis identify the likely average concentration of a COC in a particular well, taking some environmental uncertainty into account.

The characteristics of increasing, decreasing, or no trend are calculated based on the Mann-Kendall analysis of data collected between 1989 and 2006. The use of these most recent data for trend and statistical parameter analyses is conservative based on the consistent decline in concentrations in wells to below FRGs at or some short time after the removal of contaminated soil in 1989 and after the A-Zone went dry in 1987. Data collected after 1989 show evidence of nearsite and downgradient groundwater quality response to the discontinuation of source-

release of constituents that are strictly known to be associated with the Site. Graphical depictions of these dramatic reductions in concentrations to below FRGs are evidenced in the chemographs included in Appendix F. The chemographs also suggest a relationship between groundwater depth and chemical concentration trends. Concentrations of COCs in the A-Zone decreased earlier on, followed by the B-Zone, then the C-Zone, and finally the D-Zone.

7.2 Onsite/Nearsite Groundwater Monitoring Wells

7.2.1 Shallow (A-Zone)

Low groundwater levels have prevented the sampling of A-Zone monitoring wells since 1987.

The data indicate that eight out of nine onsite/nearsite A-Zone wells included in the current GMP retain calculated 95%iles and 95% UCLs below FRGs for all four groundwater COCs that have an established numeric FRG.

A single A-Zone monitoring well, 77-A, retains a calculated dieldrin 95%ile of 0.42 ppb and 95% UCL of 0.35 ppb, and a 1,2-DCA 95%ile of 1.38 ppb and 95% UCL of 1.04 ppb. There have been only five occasions since dewatering of the A-Zone in 1987 when there was sufficient water to allow sampling. On only one (September 1991) of those occasions was the concentration of dieldrin and 1,2-DCA above the FRG. The inclusion of the relatively high concentrations for this one time event has therefore biased the 95%ile and 95% UCL calculations to be conservatively high. It is unclear whether the water encountered in well 77-A was indicative of groundwater resaturation of the A-Zone, or if the water in the well was a result of localized and temporary accumulation of groundwater or completion characteristics of the monitoring well. Based on this information, the data collected from well 77-A since dewatering in 1987 may be considered suspect and are not considered representative of A-Zone groundwater.

7.2.2 Intermediate Depth (B-Zone)

The data indicate that all 11 onsite/nearsite B-Zone monitoring wells included in the current GMP retain calculated 95%iles and 95% UCLs below FRGs for all four groundwater COCs that have an established numeric FRG.

There has not been any sample from any onsite/nearsite intermediate well that has reported concentrations of the four groundwater COCs at levels above numeric FRGs, since one sample analyzed for chloroform in 1985.

7.2.3 Deep (C-Zone)

The data indicate that all five of the onsite/nearsite C-Zone wells included in the current GMP retain calculated 95%iles and 95% UCLs below FRGs for all four groundwater COCs that have an established numeric FRG (Figure F-5, Appendix F).

Furthermore all groundwater samples from onsite/nearsite C-Zone wells showed concentrations of all groundwater COCs at or below detection limits, except for one sample collected in well

154-C1 in 1990 which contained chloroform at two orders of magnitude less than the FRG concentration.

7.3 Offsite Groundwater Monitoring Wells

7.3.1 Shallow (A-Zone)

No data exist for offsite A-Zone wells in the period of 1989 to present (Figure F-2, Appendix F).

7.3.2 Intermediate Depth (B-Zone)

The data indicate that two of seven offsite B-Zone wells in the current GMP retain calculated 95%iles and 95% UCLs below FRGs for all groundwater COCs that have an established numeric FRG. All seven offsite B-Zone wells retain calculated 95%iles and 95% UCLs below the chloroform FRG, while six of the seven offsite B-Zone wells retain 95%iles and 95% UCLs below the carbon tetrachloride FRG. Three of the seven offsite B-Zone wells retain 95%iles below the 1,2-DCA FRG and four of the seven retain 95% UCLs below the 1,2-DCA FRG. Finally, three of the seven offsite B-Zone wells retain 95%iles below the dieldrin FRG and five of the seven retain 95% UCLs below the dieldrin FRG.

Monitoring well 153-B1 retains a calculated dieldrin 95%ile of 0.78 ppb and 95% UCL of 0.42 ppb. This calculated 95%ile is attributed to samples collected between 1989 and 1993. The Mann-Kendall analyses demonstrates that there has been a statistically significant decreasing trend of dieldrin in groundwater at well 153-B1. The last time dieldrin concentrations at well 153-B1 were reported above the FRG was in 1993. Additionally, recent groundwater analyses reported concentrations of dieldrin near the detection limit of 0.05 ppb (Figure F-4, Appendix F). As such, the data indicate that FRGs have been met since 1993 and the trend analysis shows that concentrations are not likely to increase.

Table 5 shows that the calculated 95%ile and 95% UCL for 1,2-DCA in groundwater from offsite B-Zone monitoring well 182-B1 were 1 ppb and 0.63 ppb, respectively. These calculated values can be attributed to the 1,2-DCA concentrations above the detection limit and FRG at the well in the early 1990s. However, 1,2-DCA concentrations in groundwater at well 182-B1 have not been above the detection limit or FRG since 1995. Additionally, the trend analysis showed that statistically significant decreasing dieldrin, chloroform and 1,2-DCA trends were detected in groundwater from well 182-B1. It is therefore not expected that 1,2-DCA concentrations in groundwater at well 182-B1 will be recorded above the FRG in the future.

Concentrations of 1,2-DCA and carbon tetrachloride in groundwater samples from offsite B-Zone monitoring well 183-B2 have exceeded FRGs on a number of occasions since 1989, resulting in calculated 95%iles of 1.8 and 1.2 ppb, respectively, and 95% UCLs of 1.02 and 0.83 ppb, respectively. However, the concentration-time plots show that the concentrations of these COCs in groundwater at well 183-B2 have declined since the early 1990s and concentrations above the FRGs have not been recorded since July 2002 (Figures F-22 and F-31, Appendix F). The decreasing 1,2-DCA and carbon tetrachloride trends in the groundwater at well 183-B2 were confirmed by Mann-Kendall trend analyses.

7.3.3 Deep (C-Zone)

The data indicate that five of six offsite C-Zone wells in the current GMP have calculated 95%iles and 95% UCLs below FRGs for all four groundwater COCs that have an established numeric FRG. Concentrations of dieldrin, chloroform and carbon tetrachloride at offsite C-Zone wells have never exceeded the laboratory detection limits since sampling began.

The 95%ile and 95% UCL for 1,2-DCA at offsite C-Zone monitoring well 153-C1 were calculated at 0.60 and 0.52 ppb, respectively. Concentrations contributing to these higher calculated values can be attributed to samples collected prior to 1990 and are not representative of the entire or recent dataset, as the FRG has not been exceeded since 1990. Mann-Kendall analysis also confirmed a significant decreasing 1,2-DCA trend in groundwater at well 153-C1. It is therefore expected that 1,2-DCA concentrations at well 153-C1 will remain below the detection limit and will not rise above the FRG in the future.

7.3.4 Deep (D-Zone)

Analytical results for groundwater samples collected from all offsite D-Zone monitoring wells in the current GMP have consistently been below FRGs for the four groundwater COCs that have an established numeric FRG.

Table 2 shows that the calculated 95%iles and 95% UCLs for dieldrin, chloroform, 1,2-DCA and carbon tetrachloride in groundwater at wells 181-D1, 182-D1, 183-D1 and 184-D1 were all below FRGs. In fact, all wells have recorded COCs at concentrations less than detection limits since monitoring began, except for well 184-D1 which has reported chloroform concentrations slightly above the reported detection limit but not near the FRG (Figure F-16, Appendix F).

7.3.4.1 Deep Monitoring Well Data with Increasing Trend

As discussed earlier, there is evidence that COCs may have migrated from the shallow groundwater (A-Zone) to the deeper water bearing units. This is apparent in the time-sequential delays indicated on the chemographs, where the rise and fall of chloroform concentrations occurs successively from one groundwater zone to the next deeper zone at the same spatial location. Data show that there is evidence of a continued slight increasing concentration trend of chloroform in the offsite compliance monitoring wells 184-B1, C1, and D1 (Figures F-13, F-15, F-16, respectively, Appendix F). However, the calculated 95%ile for chloroform for these three zones (B-, C-, and D-Zones) are 1.2, 8.6, and 0.8 ppb, respectively, which are nearly two orders of magnitude below the FRG of 100 ppb. Regardless of the apparent slight increasing concentration of chloroform in the 184 well cluster, they are not expected to rise above FRGs given current groundwater quality trends.

7.4 Domestic Wells

Groundwater quality data from the eight domestic wells sampled as part of the current GMP show that concentrations of COCs have never been reported at levels above the laboratory detection limits, and have not exceeded numeric FRGs.

7.5 Summary

The comparison of calculated 95%iles and 95% UCLs with numeric FRGs demonstrates that the four groundwater COCs have consistently been reported below FRGs and detection limits for almost all monitoring wells sampled by THAN.

Where wells reported COC concentrations above FRGs over the 1989 to 2006 time period, most concentrations decreased to below FRGs by about 1995 and maintained a stable concentration at or below detection limits since then. The only exception is offsite B-Zone well 183-B2 which reported 1,2-DCA concentrations above the FRG until 2002, after which time concentrations declined and stabilized to levels less than the detection limit.

To summarize, this analysis shows that FRGs have been met in most cases over the 1989 to 2006 time period, and have all been met since 2002 for all groundwater COCs. The data indicate that the Final Remedy has been effective in protecting human health and the environment and that it is likely that this will continue in the future.

Section 8: Technical Assessment

EPA identifies three questions in the *Comprehensive Five-Year Review Guidance* [EPA, 2001] for developing the framework for organizing and evaluating data and formulating protectiveness statement(s). Each question is addressed below.

8.1 Question A: Is The Remedy Functioning As Intended By The Decision Documents?

Yes. Review of identified documents and data indicates that the Final Remedy is functioning as intended by the decision and design documents.

The Soil Component of the Final Remedy continues to minimize contact with any residual COCs in Site soils and minimizes the potential for movement of any such residual COCs from Site soils to other media (groundwater, surface water, and air). Groundwater conditions on and off the Site are well-defined and historic monitoring results demonstrate that, in general, the Site has complied with established numeric FRGs since 1989 and that all groundwater COCs have remained below numeric FRGs since 2002.

Operation and maintenance activities, as implemented, will continue to maintain the effectiveness of the Final Remedy. There have not been significant maintenance issues or emergency/upset events. There is not a significant difference between actual OM&M costs and the cost estimates prepared in December 2004, which is another indicator that the Final Remedy is functioning as intended.

Institutional and access controls (e.g., fencing, security gates and locks, warning signs) are in place and are successfully preventing exposure. THAN will replace the existing warning signs with updated signs.

The Deed Restriction has been recorded with the County of Fresno and was found by a title company during the Five-Year Review process. The results of the title search will be provided to DTSC and EPA, when available, as evidence that the Deed Restriction is in place and functioning as intended.

Current monitoring activities provide data that are adequate for evaluating the protectiveness and effectiveness of the Final Remedy.

No early indicators of potential Final Remedy problems were identified. Maintenance action items identified during the Five-Year Review inspection of the Site are considered minor, are being addressed, and are not significant or indicative that the Final Remedy is not protective.

8.2 Question B: Are The Exposure Assumptions, Toxicity Data, Cleanup Levels, And Remedial Action Objectives Used At The Time Of The Remedy Selection Still Valid?

Yes. The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the Final Remedy selection remain valid.

Changes in Standards and To Be Considered

Standards identified as ARARs in the RAP that still must be met at this time and that have been evaluated include: the federal *Safe Drinking Water Act* (SDWA) and its implementing regulations (40 Code of Federal Regulations [CFR] 141.11-141.16) and *Title 22 California Code of Regulations* (CCR) §64431-§64444. The United States Environmental Protection Agency develops federal maximum contaminant levels (MCLs) as required by the SDWA, and the California Department of Public Health develops state MCLs as required by Title 22 CCR §64431-§64444. The only change in federal or state MCLs cited in the development of the groundwater FRGs is related to chloroform. The federal and state MCL for total trihalomethanes, which includes chloroform, decreased from 100 micrograms per liter (µg/l) to 80 µg/l. There have been no other changes in federal or state MCLs cited in the development of the groundwater FRGs. There have been no new "to be considereds" (TBCs) in the development of soil or groundwater FRGs. There have been no changes in ARARs or TBCs that call into question the protectiveness of the Final Remedy. The Tulare Lake Basin Plan was amended in 2004. Amendments to the Tulare Lake Basin Plan in 2004 have been reviewed and do not call into question the protectiveness of the Final Remedy.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

The exposure assumptions used to develop the Multi-Pathway HRA included both current exposures (onsite and offsite workers, offsite adult and child residents) and future exposures (onsite workers, trespassers, and resident and offsite resident) [ENVIRON, 1996]. No new human health routes of exposure have been identified as the Site is currently fenced and vacant, Site land use consists solely of OM&M activities associated with the Final Remedy, a Deed Restriction has been recorded, and offsite land use continues to be primarily agricultural and residential. The *City of Fresno 2025 General Plan* [City, 2002] does not include the Site as a property that is marked for future redevelopment or land use change.

A number of residents in the surrounding area have connected to the City's water system for their domestic water use; however, there are some private domestic wells that are being used by residents that are not connected to the City's water supply. The City has communicated plans for extending public utilities and water supply to accommodate anticipated growth in the SGA. The City has not established the extent and schedule for these future extensions to the City's water distribution system nor whether existing or future residents will be required to connect. THAN continues to monitor domestic well water usage in the vicinity of the Site.

No chemical-specific ARARs for Site soils were identified in the RAP. Instead, chemical-specific FRGs were developed for soils. Since the development of the FRGs, the human health toxicity values have changed for the following COCs in soil: acetone, arsenic, chloroform, dacthal, DBCP, ethylbenzene, and xylenes. The current toxicity values for arsenic, chloroform, dacthal,

and xylenes reflect a higher level of toxicity than the values used to develop the FRGs for soil. Ethylbenzene is now considered a carcinogen by the Office of Environmental and Health Hazard Assessment, and the associated cancer toxicity values reflect a higher level of toxicity than the non-cancer values that were used to develop the FRG for soil.

The FRGs for soil were based on direct exposures (ingestion of and dermal contact with soil, and inhalation of vapors and particulates) by an industrial worker. The Final Remedy included capping the entire five acres of the Site; as a result, there are no direct exposures to residual COCs in underlying soils. The Final Remedy remains protective of human health, due to the reduction of direct exposure to soil, even though current toxicity values for arsenic, chloroform, dacthal, ethylbenzene, and xylenes reflect a higher level of toxicity than the values used to develop the FRGs for soil.

For groundwater COCs, FRGs were developed based on chemical-specific ARARs and Site-specific health-based levels. Since the development of the FRGs, the human health toxicity value for chloroform changed to reflect a higher level of toxicity. The FRG for chloroform was based on the chemical-specific ARAR, not the health-based level. The toxicity values for DBCP and 1,2,3-TCP have also changed; however, non-numeric FRGs were established for these chemicals, as they are regional contaminants not strictly associated with the Site. There have been no other changes in the toxicity values for COCs in groundwater.

There have been no newly identified COCs or COC sources. There have not been any unanticipated toxic byproducts identified and COC characteristics have not changed in a way that could affect the protectiveness of the Final Remedy. Since implementation of the Soil Component, physical conditions at the Site have not changed in a way that could affect the protectiveness of the Final Remedy.

Changes in Risk Assessment Methods

There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the Final Remedy. The assumptions used in evaluating risk and developing risk-based FRGs are considered conservative and reasonable.

Progress toward Meeting Remedial Action Objectives

The Final Remedy is progressing as expected. The Final Remedy is meeting the RAOs established for the Site that were presented in the RAP. In general, the Site has complied with established numeric FRGs since 1989 and all groundwater COCs have remained below numeric FRGs since 2002 [K/J, 2007b]. The Site is capped to control potential migration of residual COCs from Site soils to other media. The Deed Restriction, institutional controls, and Soil Component adequately prevent potential human and environmental exposure to Site soils. The current GMP provides sufficient information to allow evaluation of the effectiveness of the Final Remedy and monitoring the movement of COCs strictly known to be associated with the Site. The modified GMP proposed in the Supplemental Groundwater Report will continue to provide sufficient information for evaluating whether RAOs are being met. The proposed addition of select domestic wells and modified domestic well sampling schedule/frequency will improve groundwater monitoring in the area located south and southeast of the Site where future development and possible domestic well use is anticipated.

8.3 Question C: Has Any Other Information Come To Light That Could Call Into Question The Protectiveness Of The Remedy?

No. There is no other information that would call into question the protectiveness of the Final Remedy.

There have been no changes in onsite and offsite ecological habitats that would change the ecological exposure routes and conclusions of the Ecological Risk Assessment (ERA). The ERA did not identify significant risks to onsite and offsite ecological habitats; therefore, monitoring of ecological receptors is not necessary.

No ecological targets were identified during the risk assessment and none were identified in this Five-Year Review. No weather-related events have affected the protectiveness of the Final Remedy. There have not been any emergency or upset conditions (e.g., earthquake, flood, or other natural disaster) at or near the Site. No other information has been identified that would affect the protectiveness of the Final Remedy. THAN will continue to monitor land use, development, and domestic water use near the Site.

8.4 Technical Assessment Summary

According to the data reviewed, the site inspections, and site interviews, the Final Remedy is functioning as intended by decision and design documents. There have been no changes in the physical conditions to the Site that would affect the protectiveness of the Final Remedy. Since 1989, concentrations of COCs in groundwater have generally remained below levels that were established as numeric FRGs in the June 1999 RAP. Furthermore, all groundwater COCs have remained below numeric FRGs since 2002 and RAOs are being achieved. There have been no significant changes in the toxicity factors or exposure factors for COCs that were used in the risk assessment. There has been no change to the standardized risk assessment methodology that would affect the protectiveness of the Final Remedy. No other information has been identified that would call into question the protectiveness of the Final Remedy.

Section 9: Issues

Only minor issues were identified during the Five-Year Review Process. There are no issues that have affected or will affect the protectiveness of the Final Remedy. Minor issues identified are summarized in the table below.

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Evidence of small animal burrows at a few locations, primarily in the stormwater infiltration trench and containment cover berms	N	N
Minor erosion in few locations along south and east containment cover berms	N	N
Minor soil and silt accumulation in stormwater infiltration trench	N	N
Missing locks on monitoring well covers	N	N
Small space between security fence and ground at few locations	N	N
Outdated signs on security fence and gates	N	N

Section 10: Recommendations and Follow-Up Actions

THAN proposes to implement the follow-up actions identified below to improve current OM&M activities, condition of the Final Remedy, and address issues identified in Section 9. The oversight agencies for all of the recommendations/follow-up actions will remain DTSC and/or EPA.

Issue	Recommendations / Follow-Up Actions	Party Responsible	Affects Protectiveness? (Y/N)	
			Current	Future
Animal burrowing at few locations	Repair current holes; Perform ongoing O&M to minimize burrowing; Monitor burrowing to ensure rodent control barrier remains intact	THAN	N	N
Minor berm erosion	Regrade berms	THAN	N	N
Minor soil/silt accumulation in stormwater infiltration trench	Remove soil and rock from infiltration trench, wash rock, and replace rock	THAN	N	N
Missing locks on monitoring well covers	Replace locks	THAN	N	N
Small space between security fence and ground at few locations	Regrade ground to eliminate space below fence	THAN	N	N
Outdated signs	Replace with updated signs	THAN	N	N
-	Review and approve GMP modifications proposed in Supplemental Groundwater Report, if acceptable	DTSC	N	N

Section 11: Protectiveness Statement

The Final Remedy for the Site is functioning as intended and remains protective of human health and the environment.

Section 12: Next Review

The next five-year review is scheduled to be completed five years after the official completion date of this first Five-Year Review.

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Tables

Table 1: Final Remediation Goals for Soil Industrial Land Use

Chemical	Calculated Health-Based Concentration (mg/kg)		Final Remediation Goal (mg/kg)
	Site Specific[a]	US EPA[b]	
Acetone	770	8,800	770
Arsenic	2.7	2.4	2.4
Chloroform[c]	0.16	0.53	0.16
Dacthal	2,100,000	100,000	100,000
DBCP[c]	0.0041	1.4	0.0041
DDD	3.2	7.9	3.2
DDE	2.3	5.6	2.3
DDT	2.0	5.6	2.0
DEF	4.6	NA[d]	4.6
1,2-Dichloroethane[c]	NA[d]	0.55	0.55
Dieldrin[c]	0.047	0.12	0.05
Diphenamid	4,600	20,000	4,600
Ethion	140	340	140
Ethylbenzene	NA[d]	230	230
Lindane[c]	1.9	1.5	1.5
Malathion	3,500	14,000	3,500
Methyl Parathion	68	170	68
Parathion	1,000	4,100	1,000
PCNB[c]	1.8	7.3	1.8
Phosalone	630,000	NA	630,000
Toxaphene[c]	0.079	1.7	0.08
Trifluralin[c]	87	250	87
Xylenes	1,000	320	320

Notes:

(a) Based on exposure to chemicals by ingestion of and dermal contact with soil, and inhalation of vapors and particulates.
(b) US EPA PRG Table, August 1996; pathways considered are inhalation of vapors, soil ingestion, and dermal contact for semivolatile compounds.
(c) Carcinogenic chemicals. See Chapter VII of Health Risk Assessment (ENVIRON 1996) for a classification of carcinogens.
(d) NA = not available

Source: Table 7-4, RAP, K/J 1999.

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Table 2: Final Remediation Goals for Groundwater

Chemical of Concern	Promulgated Regulation Level[a] (ppb)	Health-Based Level[b] (ppb)	Detection Limit (ppb)	Final Remediation Goal (ppb)
Dieldrin	0.05	0.3	0.05	0.3
Chloroform	100	98	0.5	100
1,2-DCA	0.5	47	0.5	0.5
Carbon Tetrachloride	0.5	17[c]	0.5	0.5
1,2,3-TCP	UR[d]	0.16[c]	0.05	NN[e]
DBCP	0.2	4.8[c]	0.01	NN[f]

Notes:

(a) California MCL, California Action Level, or Federal MCL, whichever is most stringent.
(b) Either 10^{-4} cancer risk for carcinogens or HI=1 for systemic toxicants, from THAN Multipathway Health Risk Assessment unless otherwise noted.
(c) From US EPA PRG Table, 1 August 1996.
(d) UR = Unregulated.
(e) NN=Non-numeric – Since 1,2,3-TCP has been detected in groundwater clearly unaffected by site-related activities, a numeric remediation goal has been deferred by DTSC. If 1,2,3-TCP was found to be strictly site-related, then using the criteria applied to the site-related chemicals, a health-based level of 0.2 ppb would be established.
(f) NN=Non-numeric – Due to regional DBCP levels, satisfactory remediation of DBCP will be based on mass of DBCP attenuated by the remedy and an evaluation of its background levels at the time the other remediation goals have been met.

Source: Kennedy/Jenks (1999) Table 7-3.

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Table 3: Monitoring Well Construction Summary

Well Number	Total Depth[d]	Construction Interval by Depth (ft)[a][b]					Reference Points[c]	
		Solid Casing[e]	Screen Casing[f]	Sand Pack[g]	Bentonite Seal	Grout Seal	Top of Sounding Port	Ground Surface Elevation
29-B	121	0-90	90-120	51-120	47-51	0-47	344.95	343.71
30-A	51 5	0-20	20-50	17-50	14-17	0-14	345 81	345 93
30-B	121	0-90	90-120	51-120	47-51	0-47	346.94	345 84
31-A	51.5	0-19	19-49	15-49	12-15	0-12	345.83	345.32
31-B	120	0-80	80-110	51-120	47-51	0-47	346.48	345.22
32-A	51.5	0-20	20-50	18-50	15-18	0-15	346.29	345.70
32-B	121.5	0-80	80-110	58-110	55-58	0-55	346.31	345.53
77-A	48	0-25	25-45	21-48	17-21	0-17	348.11	341.98
77-B1	97	0-84.5	84.5-94.5	81.5-97	77.5-81.5	0-77.5	348.50	346 68
138	40.5	0-30	30-40	28-40	23-28	0-23	347.88	346 62
139	46	0-20	20-40	18-40	13-18	0-13	347.18	346.30
149-B1	89	0-79	79-89	76-89	73-76	0-73	348.51	346.78
149-C1	155	0-145	145-155	142-155	139-142	0-139	347.22	346.18
150-B1	92	0-82	82-92	79-92	76-79	0-76	347.78	346.06
150-C1	157	0-147	147-157	144-157	141-144	0-141	348.20	345 92
151-A1	39.5	0-22.5	22.5-37.5	19.5-38	16-19	0-16	348.18	345.45
151-B1	90	0-80	80-90	77-90	74-77	0-74	348.79	345 25
151-C1	153	0-137	137-147	131-148	125-131	0-125	346.69	345.05
152-A1	39	0-23	23-39	20-39	17-20	0-17	347.11	345.58
152-B1	93	0-83	83-93	80-93	77-80	0-77	348.29	345 68
152-C1	157	0-141	141-151	138-151	135-138	0-135	347.70	345 78
153-A1	39	0-23	23-39	20-39	17-20	0-17	344.68	343.18
153-B1	90	0-80	80-90	77-90	74-77	0-74	345.73	343.08
153-C1	155	0-145	145-155	142-155	139-142	0-139	344.90	343 08
154-A1	39	0-23	23-39	20-39	17-20	0-17	347.69	346.26
154-B1	92	0-82	82-92	79-92	76-79	0-76	348.07	346.09
154-C1	152	0-143	143-153	140-153	137-140	0-137	349.06	346.29
155-A1	45	0-15, 25-30; 40-45	15-25; 30-40	13.5-26.5, 28-41	12-13 5; 26.5-28; 41-45	0-12	348.74	347.58
155-B0	82.5	0-57	57-77	54-82 5	51.5-54	0-51.5	350.76	347.68
155-C1	158	0-144	144-154	141-157.5	137-141	0-137	345.73	346.38
181-B1	93	0-81	81-91	79-93	74-79	0-74	341.90	342.88
181-C0	160	0-135	135-145	129-148	124-129	0-124	341.99	343.08
181-D1	213.5	0-201	201-211	196-213.5	192-196	0-192	342.29	343.18
182-B1	90	0-76	76-86	73-90	70-73	0-70	340.57	339 38
182-C1	170	0-153	153-163	149-165	145-149	0-145	340.57	339.38
182-D1	217	0-203	203-213	199.5-215	193.5-199.5	0-193.5	340.53	339.48
183-B1	92	0-80	80-90	76-92	72-76	0-72	340 29	338.58
183-B2	113	0-99	99-109	95-111	91-95	0-91	339 69	338 58
183-C1	170	0-157	157-167	163-170	159-163	0-159	340.11	338.58
183-D1	201	0-185	185-195	181-201	177-181	0-177	339.05	338.48
184-B1	100	0-87	87-97	83-100	79-83	0-79	331.79	332.68
184-C1	160	0-147	147-157	139-160	134-139	0-134	331.95	332.68
184-D1	203	0-187	187-197	183-203	177-183	0-189	331.91	332.68
905	NA[8]	NA	NA	NA	NA	NA	NA	NA

Table 3: Monitoring Well Construction Summary

Notes:

(a) Well construction information for wells 29-B through 32-B and 138 through 154-C1 was taken from Ground Water Analyses January 1988 Onsite Monitoring Well Sampling, THAN Site, Eastern Fresno County, California, J. H. Kleinfelder, June 29, 1988.
(b) Values describe construction of the well in feet below ground surface.
(c) Reference points are measured with respect to the 1929 North American Vertical Datum (feet above mean sea level). Phase I well elevation measurements have been adjusted to this datum.
(d) Depth of original boring. Well casing may be slightly shorter (up to several feet, in some instances) due to hole closure or sidewall sloughing during completion. Differences of one to two feet may be found between these data and incidental references in other reports. Such differences are common, reflecting disparities between observers or between design and as-built measurements.
(e) Wells 29-B through 32-B are constructed of 2-inch ID Schedule 40 PVC. Wells 77-A through 139 and 155-C1 through 184-D1 are constructed of 4-inch ID Schedule 40 PVC. Wells 149-B1 through 154-C1 are constructed of 4-inch ID stainless steel. Wells 155-A1 and 155-B0 are constructed of 5-inch ID stainless steel.
(f) Screens for wells 29-B through 32-B, 138, and 139 are constructed of 2-inch ID Schedule 40 PVC with 0.020-inch slots. Screens for wells 77-A, 77-B1, 149-B1, 150-B1 through 151-B1, 152-A1 through 153-B1, 154-A1 through 154-C1, and 155-C1 through 184-D1 are constructed of 4-inch ID stainless steel with 0.010-inch slots. Screens for wells 149-C1 through 154-C1 are constructed of 4-inch ID stainless steel with 0.020-inch slots. The screen for well 151-C1 is constructed of 4-inch ID stainless steel with 0.015-inch slots. The screen for well 153-C1 is constructed of 4-inch ID stainless steel with 0.050-inch slots. Screens for wells 155-A1 and 155-B0 are constructed of 5-inch ID stainless steel with 0.008-inch slots.
(g) The sand packs for wells 29-B through 32-B and 138 through 154-C1 consist of No. 3 Monterey sand (No. 3 refers to grading size). The sand packs for wells 77-A, 155-C1, 181-C0, 184-C1, and 184-D1 consist of No. 0/30 Lonestar Lapis Lustre sand. The sand packs for wells 77-B1 and 183-C1 consist of No. 2/12 Lonestar Lapis Lustre sand. The sand packs for wells 155-A1 and 155-B0 consist of Lonestar Lapis Lustre Pipe 30 sand. The sand packs for wells 181-B1, 181-D1 through 183-B2, 183-D1, and 184-B1 consist of No. 1/20 Lonestar Lapis Lustre sand.
(h) NA = Information presently not available.

Table 4: Monitored Zones and Wells

Water-Bearing Zone	Total	Monitoring Well Number
A (shallow)	11	30-A, 31-A, 32-A, 77-A, 138, 139, 151-A1, 152-A1, 153-A1, 154-A1, 155-A1
B (intermediate)	18	29-B, 30-B, 31-B, 32-B, 77-B1, 149-B1, 150-B1, 151-B1, 152-B1, 153-B1, 154-B1, 155-B0, 181-B1, 182-B1, 183-B1, 183-B2, 184-B1, 905
C (deep)	11	149-C1, 150-C1, 151-C1, 152-C1, 153-C1, 154-C1, 155-C1, 181-C0, 182-C1, 183-C1, 184-C1
D (deep)	4	181-D1, 182-D1, 183-D1, 184-D1

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Table 5: Statistical Summary of Historical Analytical Results and Trend Analysis[a]

Dieldrin[b] [FRG: 0.3 ppb]

Well ID	GW Zone[c]	Mean	Median	St Dev[d]	95%ile[e]	95th UCL[f]	Trend[g]	Comment
				ONSITE/NEARSITE WELLS[h]				
30-A	A	0 09	0 09	0 05	0 12	NA[i]	NA	"<50ppb" values excluded from dataset. 95%UCL and trend tests not undertaken due to small dataset.
31-A	A	0 05	0.05	NC[j]	0 05	NA	NA	Only 1 sample collected since 1989 "<50ppb" values excluded from dataset. 95%UCL and trend tests not undertaken due to small dataset.
32-A	A	NS[k]	NS	NC	NC	NA	NA	No samples collected since 1989 "<50ppb" values excluded from dataset
77-A	A	0 18	0.05	0 18	0 42	0 35	No	Dieldrin concentrations in four of five samples collected since 1989 were below the FRG of 0 3ppb
151-A1	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989.
154-A1	A	0.05	0 05	NC	0 05	NA	NA	Only 1 sample collected since 1989. "<50ppb" values excluded from dataset 95%UCL and trend tests not undertaken due to small dataset
155-A1	A	0 07	0 07	NC	0 07	NA	NA	Only 1 sample collected since 1989 "<50ppb" values excluded from dataset 95%UCL and trend tests not undertaken due to small dataset
138	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989
139	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989
29-B	B	0 05	0 05	0 00	0 05	0 05	No	All samples were less than the detection limit
30-B	B	0 06	0 05	0 02	0 09	0 06	Increasing	Increasing trend identified in ChemStat, however the concentration time plots (Figure B3) indicate fairly stable concentrations
31-B	B	0 05	0 05	0 00	0 05	0 05	No	
32-B	B	0 05	0 05	0 00	0 05	0 05	No	All samples were less than the detection limit
77-B1	B	0 05	0.05	0 00	0.05	0 05	No	All samples were less than the detection limit
149-B1	B	0 05	0 05	0 00	0 05	0.05	No	All samples were less than the detection limit Samples with detection limits of "1 ppb" and "50ppb" have been excluded from the dataset
150-B1	B	0.09	0.08	0 04	0 17	0.12	No	"<1ppb" and "<50ppb" values excluded from dataset
151-B1	B	0 05	0 05	0.00	0.05	0 05	No	All samples were less than the detection limit "<1ppb" and "<50ppb" values excluded from dataset
154-B1	B	0 05	0 05	0.00	0.05	0 05	No	All samples were less than the detection limit "<1ppb" and "<50ppb" values excluded from dataset
155-B0	B	0 05	0 05	0.00	0 05	0 05	No	All samples were less than the detection limit "<1ppb" and "<50ppb" values excluded from dataset
905	B	0 10	0 10	0 05	0 20	0.12	Decreasing	Decreasing Dieldrin trend detected "<1ppb" and "<50ppb" values excluded from dataset
149-C1	C	0.05	0 05	0 00	0.05	0.05	No	All samples were less than the detection limit "<1ppb" and "<50ppb" values excluded from dataset
150-C1	C	0.05	0.05	0 00	0.05	0.05	No	All samples were less than the detection limit. "<1ppb" and "<50ppb" values excluded from dataset.
151-C1	C	0 05	0.05	0.00	0 05	0 05	No	All samples were less than the detection limit "<1ppb" and "<50ppb" values excluded from dataset
154-C1	C	0 05	0.05	0.00	0 05	0 05	No	All samples were less than the detection limit "<1ppb" and "<50ppb" values excluded from dataset
155-C1	C	0.05	0.05	0.00	0 05	0 05	No	All samples were less than the detection limit
				OFFSITE WELLS[h]				
152-A1	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989
153-A1	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989.
152-B1	B	0 05	0.05	0.01	0 06	0.05	No	Decreasing Dieldrin trend detected. "<1ppb" and "<50ppb" values excluded from dataset.

Table 5: Statistical Summary of Historical Analytical Results and Trend Analysis[a]

Well ID	GW Zone[c]	Mean	Median	St Dev[d]	95%ile[e]	95th UCL[f]	Trend[g]	Comment
Dieldrin[b] [FRG: 0.3 ppb]								
153-B1	B	0 34	0.33	0 26	0 78	0.42	Decreasing	Decreasing Dieldrin trend detected This is the only B-zone offsite well that measured dieldrin concentrations above the FRG of 0.3ppb, however all concentrations have been below FRGs since the September 1993 sampling event. "<1ppb" and "<50ppb" values excluded from dataset
181-B1	B	0.05	0.05	0.00	0.05	0.05	No	All samples were less than the detection limit
182-B1	B	0 05	0 05	0 01	0 06	0 05	Decreasing	Decreasing Dieldrin trend detected
183-B1	B	0 07	0 06	0 03	0.12	0 08	No	
183-B2	B	0 05	0.05	0 00	0.05	0 05	No	All samples were less than the detection limit.
184-B1	B	0.05	0.05	0 00	0 05	0 05	No	All samples were less than the detection limit
152-C1	C	0 05	0 05	0 00	0 05	0.05	No	All samples were less than the detection limit "<1ppb" and "<50ppb" values excluded from dataset
153-C1	C	0 05	0 05	0 00	0 05	0 05	No	All samples were less than the detection limit "<1ppb" and "<50ppb" values excluded from dataset
181-C0	C	0 05	0.05	0 00	0 05	0 05	No	All samples were less than the detection limit
182-C1	C	0 05	0 05	0.00	0 05	0 05	No	All samples were less than the detection limit
183-C1	C	0 05	0.05	0.00	0 05	0 05	No	All samples were less than the detection limit.
184-C1	C	0.05	0 05	0.00	0 05	0 05	No	All samples were less than the detection limit
181-D1	D	0 05	0 05	0.00	0 05	0 05	No	All samples were less than the detection limit.
182-D1	D	0 05	0 05	0 00	0 05	0.05	No	All samples were less than the detection limit
183-D1	D	0 05	0 05	0 00	0 05	0 05	No	All samples were less than the detection limit.
184-D1	D	0 05	0 05	0 00	0 05	0.05	No	All samples were less than the detection limit.
DOMESTIC WELLS[h]								
943	-[i]	0 05	0 05	0.01	0 05	0 05	No	All samples were less than the detection limit
979	-	0 05	0 05	0 00	0 05	0 05	No	All samples were less than the detection limit
986	-	0 05	0 05	0 00	0 05	NA	NA	All samples were less than the detection limit. 95%UCL and trend tests not undertaken due to small dataset
1010	-	0 05	0 05	0 00	0 05	NA	NA	All samples were less than the detection limit 95%UCL and trend tests not undertaken due to small dataset
1012	-	0.05	0 05	0.00	0 05	0 05	No	All samples were less than the detection limit
1013	-	0.05	0 05	0 00	0 05	0 05	No	All samples were less than the detection limit
3019	-	0 05	0 05	0 00	0 05	NA	NA	All samples were less than the detection limit 95%UCL and trend tests not undertaken due to small dataset.
3020	-	0.05	0 05	0 00	0 05	0 05	No	All samples were less than the detection limit
PROPOSED ADDITIONAL DOMESTIC (PAD) WELLS[h]								
1005	-	0 05	0 05	0 00	0 05	0 05	No	All samples were less than the detection limit
1017	-	0.05	0 05	NC	0 05	NA	NA	Only 1 sample collected since 1989
1021	-	0 05	0 05	NC	0 05	NA	NA	Only 1 sample collected since 1989
PAD-1[m]	-	No historical data (proposed well)						
PAD-2	-	No historical data (proposed well)						
PAD-3	-	No historical data (proposed well)						
PAD-4	-	No historical data (proposed well)						
PAD-5	-	No historical data (proposed well)						

Table 5: Statistical Summary of Historical Analytical Results and Trend Analysis[a]

Chloroform[n] [FRG: 100 ppb]

Well ID	GW Zone	Mean	Median	St Dev	95%ile	95[th] UCL	Trend	Comment
ONSITE/NEARSITE WELLS[h]								
30-A	A	0 5	0 5	0 0	0 5	NA	NA	Only 2 samples collected since 1989 95%UCL and trend tests not undertaken due to small dataset.
31-A	A	47.0	47.0	NC	47.0	NA	NA	Only 1 sample collected since 1989 95%UCL and trend tests not undertaken due to small dataset
32-A	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989
77-A	A	0 8	0 5	0 4	1 4	1 1	No	
151-A1	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989
154-A1	A	0 5	0 5	NC	0 5	NA	NA	Only 1 sample collected since 1989 95%UCL and trend tests not undertaken due to small dataset.
155-A1	A	0 5	0 5	0 0	0 5	NA	NA	Only 2 samples collected since 1989 95%UCL and trend tests not undertaken due to small dataset
138	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989
139	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989.
29-B	B	0.5	0 5	0 0	0 5	0.5	No	All samples were less than the detection limit
30-B	B	0 5	0 5	0 0	0 5	0 5	No	
31-B	B	1 1	0.5	2 5	3 6	1.8	Decreasing	Decreasing Chloroform trend detected in analysis and verified in concentration-time plot (Figure B12)
32-B	B	1 7	0 5	4 0	12.0	2 7	Decreasing	Decreasing Chloroform trend detected in analysis and verified in concentration-time plot (Figure B12).
77-B1	B	0 5	0 5	0 0	0 5	0 5	No	All samples were less than the detection limit
149-B1	B	0 5	0 5	0 0	0 5	0.5	No	All samples were less than the detection limit
150-B1	B	0 5	0 5	0 0	0.5	0 5	No	All samples were less than the detection limit.
151-B1	B	0 6	0 5	0.6	0 6	0 8	Decreasing	Decreasing Chloroform trend detected
154-B1	B	0 5	0 5	0 0	0 5	0.5	No	All samples were less than the detection limit
155-B0	B	1 2	0 5	3 2	0 8	1.9	Decreasing	Decreasing Chloroform trend detected.
905	B	0 5	0 5	0 3	0 5	0.6	No	
149-C1	C	0 5	0 5	0 0	0 5	0 5	No	All samples were less than the detection limit
150-C1	C	0 5	0 5	0 0	0 5	0 5	No	All samples were less than the detection limit.
151-C1	C	0 5	0 5	0 0	0 5	0 5	No	All samples were less than the detection limit
154-C1	C	0 5	0 5	0 2	0 5	0 6	No	
155-C1	C	0 5	0.5	0.0	0 5	0.5	No	All samples were less than the detection limit
OFFSITE WELLS[h]								
152-A1	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989
153-A1	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989
152-B1	B	18 8	16.2	17 4	63 6	24 1	Decreasing	Significant decreasing chloroform trend detected and reflected in plot (Figure B13) No samples since 1997
153-B1	B	0.7	0 5	0.7	1 2	0 9	No	No samples collected since 1997
181-B1	B	0 5	0.5	0 0	0 5	0 5	No	All samples were less than the detection limit
182-B1	B	30 8	14 0	37 0	99 7	39.9	Decreasing	Significant decreasing chloroform trend detected and reflected in plot (Figure B13) Concentrations of chloroform have been recorded below detection limits since December 1999
183-B1	B	0 5	0.5	0 0	0 5	0 5	No	
183-B2	B	0.6	0 5	0 5	0.5	0.7	No	
184-B1	B	0.7	0 5	0 3	1 2	0 8	Increasing	Despite trend analysis, concentration-time plots do not visually indicate a significant increasing chloroform trend Concentrations are well below FRGs
152-C1	C	0 7	0 5	0 6	1 7	0 9	No	No samples collected since 1997
153-C1	C	0.5	0.5	0 0	0 5	0 5	No	No samples collected since 1997. All samples were less than the detection limit.
181-C0	C	0 5	0 5	0 0	0 5	0.5	No	All samples were less than the detection limit.
182-C1	C	7.2	6 0	5.1	14 7	8.5	No	
183-C1	C	0 5	0.5	0.0	0.5	0 5	No	All samples were less than the detection limit.
184-C1	C	5 1	5 9	2 6	8.6	5.8	Increasing	Increasing chloroform trend detected. Concentrations are still well below FRGs
181-D1	D	0.5	0.5	0 0	0.5	0.5	No	All samples were less than the detection limit
182-D1	D	0.5	0.5	0.0	0 5	0.5	No	All samples were less than the detection limit
183-D1	D	0.5	0 5	0.0	0 5	0.5	No	All samples were less than the detection limit

Table 5: Statistical Summary of Historical Analytical Results and Trend Analysis[a]

Chloroform[n] [FRG: 100 ppb]

Well ID	GW Zone	Mean	Median	St Dev	95%ile	95th UCL	Trend	Comment
184-D1R	D	0 5	0 5	0 1	0 8	0.6	Increasing	Increasing chloroform trend detected. Concentrations are still well below FRGs.
DOMESTIC WELLS[h]								
943	-	0 5	0.5	0 0	0 5	0 5	No	All samples were less than the detection limit.
979	-	0 5	0.5	0.0	0.5	0 5	No	All samples were less than the detection limit.
986	-	0 5	0.5	0 0	0 5	0.5	No	All samples were less than the detection limit
1010	-	0 5	0 5	0 0	0 5	0 5	No	All samples were less than the detection limit.
1012	-	0 5	0.5	0 0	0 5	0 5	No	All samples were less than the detection limit
1013	-	0.5	0 5	0 0	0 5	0 5	No	All samples were less than the detection limit.
3019	-	0 5	0 5	0.0	0 5	NA	NA	All samples were less than the detection limit 95%UCL and trend tests not undertaken due to small dataset
3020	-	0 5	0 5	0 0	0 5	0 5	No	All samples were less than the detection limit.
PROPOSED ADDITIONAL DOMESTIC (PAD) WELLS[h]								
1005	-	0 5	0.5	0 1	0 6	0 5	No	
1017	-	0 5	0 5	0 0	0 5	NA	NA	All samples were less than the detection limit. 95%UCL and trend tests not undertaken due to small dataset
1021	-	0 5	0 5	NC	0 5	NA	NA	All samples were less than the detection limit 95%UCL and trend tests not undertaken due to small dataset
PAD-1	-	No historical data (proposed well)						
PAD-2	-	No historical data (proposed well)						
PAD-3	-	No historical data (proposed well)						
PAD-4	-	No historical data (proposed well)						
PAD-5	-	No historical data (proposed well)						

Table 5: Statistical Summary of Historical Analytical Results and Trend Analysis[a]

1,2-DCA[o] [FRG: 0.5 ppb]

Well ID	GW Zone	Mean	Median	St Dev	95%ile	95th UCL	Trend	Comment
					ONSITE/NEARSITE WELLS[h]			
30-A	A	0.50	0.50	0.00	0.50	NA	NA	Only 2 samples collected since 1989. 95%UCL and trend tests not undertaken due to small dataset.
31-A	A	0.50	0.50	NC	0.50	NA	NA	Only 1 sample collected since 1989. 95%UCL and trend tests not undertaken due to small dataset
32-A	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989.
77-A	A	0.72	0.50	0.44	1.38	1.04	No	Data only available between 1991 and1993.
151-A1	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989.
154-A1	A	0.50	0.50	NC	0.50	NA	NA	Only 1 sample collected since 1989 95%UCL and trend tests not undertaken due to small dataset
155-A1	A	0.50	0.50	0.00	0.50	NA	NA	Only 2 samples collected since 1989 95%UCL and trend tests not undertaken due to small dataset
138	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989.
139	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989
29-B	B	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
30-B	B	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit.
31-B	B	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
32-B	B	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit.
77-B1	B	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
149-B1	B	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
150-B1	B	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit.
151-B1	B	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
154-B1	B	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
155-B0	B	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit.
905	B	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit.
149-C1	C	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit.
150-C1	C	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
151-C1	C	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
154-C1	C	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
155-C1	C	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
					OFFSITE WELLS[h]			
152-A1	A	NS	NS	NC	NC	NA	NA	No samples.collected since 1989
153-A1	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989
152-B1	B	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
153-B1	B	0.51	0.50	0.04	0.60	0.52	Decreasing	Decreasing 1,2-DCA trend detected
181-B1	B	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
182-B1	B	0.59	0.50	0.18	1.00	0.63	Decreasing	Significant decreasing trend detected and reflected in plot (Figure B22).
183-B1	B	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
183-B2	B	0.89	0.75	0.48	1.80	1.02	Decreasing	Significant decreasing trend detected and reflected in plot (Figure B22)
184-B1	B	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
152-C1	C	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit.
153-C1	C	0.51	0.50	0.04	0.60	0.52	Decreasing	Decreasing 1,2-DCA trend and reflected in plot (Figure B24).
181-C0	C	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
182-C1	C	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit.
183-C1	C	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
184-C1	C	0.49	0.50	0.04	0.50	0.50	Decreasing	Decreasing 1,2-DCA trend detected.
181-D1	D	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit.
182-D1	D	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
183-D1	D	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
184-D1	D	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
					DOMESTIC WELLS[h]			
943	-[n]	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit.
979	-	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
986	-	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
1010	-	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit
1012	-	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit.
1013	-	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit.

Table 5: Statistical Summary of Historical Analytical Results and Trend Analysis[a]

1,2-DCA[o] [FRG: 0.5 ppb]

Well ID	GW Zone	Mean	Median	St Dev	95%ile	95th UCL	Trend	Comment
3019[f]	-	0.50	0.50	0.00	0.50	NA	NA	All samples were less than the detection limit. 95%UCL and trend tests not undertaken due to small dataset.
3020[f]	-	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit.
PROPOSED ADDITIONAL DOMESTIC (PAD) WELLS[h]								
1005[f]	-	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit.
1017[f]	-	0.50	0.50	0.00	0.50	NA	NA	All samples were less than the detection limit. 95%UCL and trend tests not undertaken due to small dataset.
1021[f]	-	0.50	0.50	NC	0.50	NA	NA	All samples were less than the detection limit 95%UCL and trend tests not undertaken due to small dataset
PAD-1[f]	-	No historical data (proposed well)						
PAD-2[f]	-	No historical data (proposed well)						
PAD-3[f]	-	No historical data (proposed well)						
PAD-4[f]	-	No historical data (proposed well)						
PAD-5[f]	-	No historical data (proposed well)						

Table 5: Statistical Summary of Historical Analytical Results and Trend Analysis[a]

Carbon Tetrachloride[p] [FRG: 0.5 ppb]

Well ID	GW Zone	Mean	Median	St Dev	95%ile	95th UCL	Trend	Comment
ONSITE/NEARSITE WELLS[h]								
30-A	A	0.50	0 50	0 00	0 50	NA	NA	All samples were less than the detection limit. 95%UCL and trend tests not undertaken due to small dataset.
31-A	A	0 50	0 50	NC	0 50	NA	NA	All samples were less than the detection limit. 95%UCL and trend tests not undertaken due to small dataset
32-A	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989
77-A	A	0 50	0 50	0 00	0 50	NA	NA	All samples were less than the detection limit. 95%UCL and trend tests not undertaken due to small dataset
151-A1	A	NS	NS	NC	NC	NA	NA	All samples were less than the detection limit. 95%UCL and trend tests not undertaken due to small dataset
154-A1	A	0 50	0.50	NC	0 50	NA	NA	All samples were less than the detection limit. 95%UCL and trend tests not undertaken due to small dataset.
155-A1	A	0 50	0 50	0 00	0.50	NA	NA	All samples were less than the detection limit. 95%UCL and trend tests not undertaken due to small dataset
138	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989.
139	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989
29-B	B	0.50	0 50	0.00	0.50	0.50	No	All samples were less than the detection limit.
30-B	B	0 50	0 50	0 00	0 50	0 50	No	All samples were less than the detection limit
31-B	B	0 50	0 50	0.00	0 50	0 50	No	All samples were less than the detection limit.
32-B	B	0.50	0 50	0 00	0 50	0 50	No	All samples were less than the detection limit
77-B1	B	0 50	0 50	0 00	0.50	0.50	No	All samples were less than the detection limit
149-B1	B	0.50	0 50	0.00	0 50	0 50	No	All samples were less than the detection limit
150-B1	B	0.50	0 50	0 00	0 50	0 50	No	All samples were less than the detection limit
151-B1	B	0 50	0 50	0 00	0 50	0 50	No	All samples were less than the detection limit
154-B1	B	0 50	0 50	0 00	0 50	0 50	No	All samples were less than the detection limit
155-B0	B	0.50	0 50	0 00	0 50	0 50	No	All samples were less than the detection limit
905	B	0 50	0 50	0 00	0 50	0 50	No	All samples were less than the detection limit
149-C1	C	0.50	0 50	0 00	0.50	0.50	No	All samples were less than the detection limit.
150-C1	C	0 50	0 50	0 00	0 50	0 50	No	All samples were less than the detection limit
151-C1	C	0.50	0 50	0 00	0.50	0 50	No	All samples were less than the detection limit
154-C1	C	0 50	0 50	0 00	0 50	0 50	No	All samples were less than the detection limit
155-C1	C	0.50	0.50	0 00	0 50	0 50	No	All samples were less than the detection limit.
OFFSITE WELLS[h]								
152-A1	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989
153-A1	A	NS	NS	NC	NC	NA	NA	No samples collected since 1989
152-B1	B	0 50	0 50	0 00	0.50	0 50	No	All samples were less than the detection limit. Did not include <2.5 ppb" value.
153-B1	B	0 50	0 50	0 00	0.50	0 50	No	All samples were less than the detection limit.
181-B1	B	0 50	0 50	0.00	0.50	0 50	No	All samples were less than the detection limit
182-B1	B	0.50	0 50	0 02	0.50	0 51	No	
183-B1	B	0 50	0 50	0.00	0.50	0 50	No	All samples were less than the detection limit
183-B2	B	0 75	0 69	0 29	1.20	0.83	Decreasing	Significant decreasing trend detected and reflected in plot (Figure B31).
184-B1	B	0.50	0 50	0 00	0.50	0 50	No	All samples were less than the detection limit.
152-C1	C	0.50	0 50	0.00	0.50	0 50	No	All samples were less than the detection limit
153-C1	C	0.50	0 50	0.00	0 50	0 50	No	All samples were less than the detection limit.
181-C0	C	0 50	0 50	0 00	0.50	0.50	No	All samples were less than the detection limit.
182-C1	C	0 50	0 50	0.00	0 50	0.50	No	All samples were less than the detection limit.
183-C1	C	0 50	0.50	0 00	0 50	0 50	No	All samples were less than the detection limit
184-C1	C	0.49	0 50	0 04	0 50	0 50	No	
181-D1	D	0.50	0 50	0 00	0.50	0 50	No	All samples were less than the detection limit
182-D1	D	0 50	0 50	0 00	0 50	0.50	No	All samples were less than the detection limit
183-D1	D	0 50	0 50	0.00	0 50	0 50	No	All samples were less than the detection limit
184-D1	D	0.50	0.50	0 00	0 50	0.50	No	All samples were less than the detection limit.
DOMESTIC WELLS[h]								
943	-	0 50	0.50	0 00	0 50	0 50	No	All samples were less than the detection limit
979	-	0.50	0.50	0.00	0 50	0.50	No	All samples were less than the detection limit
986	-	0 50	0 50	0.00	0.50	0.50	No	All samples were less than the detection limit
1010	-	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit.
1012	-	0.50	0.50	0.00	0.50	0.50	No	All samples were less than the detection limit.

Table 5: Statistical Summary of Historical Analytical Results and Trend Analysis[a]

Carbon Tetrachloride[p] [FRG: 0.5 ppb]

Well ID	GW Zone	Mean	Median	St Dev	95%ile	95th UCL	Trend	Comment
1013	-	0 50	0.50	0 00	0.50	0 50	No	All samples were less than the detection limit.
3019[i]	-	0.50	0.50	0 00	0.50	NA	NA	All samples were less than the detection limit. 95%UCL and trend tests not undertaken due to small dataset
3020[i]	-	0.50	0 50	0.00	0.50	0 50	No	All samples were less than the detection limit.
PROPOSED ADDITIONAL DOMESTIC (PAD) WELLS[h]								
1005[i]	-	0.50	0 50	0 00	0.50	0.50	No	All samples were less than the detection limit
1017[i]	-	0 50	0 50	0 00	0.50	NA	NA	All samples were less than the detection limit 95%UCL and trend tests not undertaken due to small dataset.
1021[i]	-	0 50	0 50	NC	0 50	NA	NA	All samples were less than the detection limit.95%UCL and trend tests not undertaken due to small dataset.
PAD-1[i]	-	No historical data (proposed well)						
PAD-2[i]	-	No historical data (proposed well)						
PAD-3[i]	-	No historical data (proposed well)						
PAD-4[i]	-	No historical data (proposed well)						
PAD-5[i]	-	No historical data (proposed well)						

Table 5: Statistical Summary of Historical Analytical Results and Trend Analysis[(a)]

Notes:

(a) Descriptive statistic calculations and trend analyses were only performed on data from 1989 to 2006, inclusive. Mann-Kendall trend analysis was performed on the groundwater data using ChemStat version 6.0, produced by Starpoint Software. Reported Detection Limit values were substituted when samples contained analytes at concentrations below the detection limits. Replicate samples of groundwater from the same well on the same day were averaged prior to calculating the descriptive statistics, trends and 95%UCL.

(b) Dieldrin is a chlorinated hydrocarbon ($C_{12}H_8Cl_6O$). Measurements were recorded in parts per billion (ppb, equivalent to micrograms per liter (ug/l)). The detection limit for Dieldrin is 0.05 ppb and the FRG for Dieldrin in groundwater at and around the THAN site is 0.3 ppb Note that in a few samples during 1989 the reported detection limit was 50 ppb or 1ppb. These values were not included in the trend analyses (or descriptive statistics) because they would yield false decreasing trend results Descriptive statistics calculated are also in ppb

(c) There are four likely groundwater (GW) or water-bearing zones in the area below and surrounding the THAN site - A B, C and D, in order of increasing depth. The A-Zone is currently unsaturated.

(d) St Dev = Standard Deviation

(e) 95%ile = 95th percentile. This calculation says that 95% of the time, the concentration is at or below the given value.

(f) 95%UCL = 95% Upper Confidence Limit (UCL) of the arithmetic mean. The 95% UCL defines the value that equals or exceeds the true mean 95% of the time. This is a tool (recommended by the U.S. E.P.A.) for acknowledging uncertainties and variability within an environmental data set without presenting an unacceptable risk to human health or the environment. The 95% UCL values were calculated using the Jackknife 95% UCL method in ChemStat version 6 0. The Jackknife method was chosen because the data are not normally distributed and samples sizes were usually small to moderate.

(g) Concentration trend information "Increasing" = Trend analysis indicated that a significant increasing trend existed in the groundwater concentrations for that constituent for the selected monitoring period "Decreasing" = Trend analysis indicated that a significant decreasing trend existed in the groundwater concentrations for that constituent over the selected monitoring period "No" = Trend analysis indicated that no significant trend (neither increasing nor decreasing) existed in the groundwater concentrations for that constituent over the selected monitoring period Trends were calculated using a non-parametric Mann-Kendall trend analysis tool in ChemStat version 6.0, using a 95% confidence limit.

(h) Wells are divided into 4 types based on locations and or the type of well being monitored. The four well types are.
   1) Onsite/Nearsite: Onsite wells are located on THAN's 5-acre parcel where the former Facility was situated. Nearsite wells are located on THAN's 20-acre property adjacent to the 5-acre parcel and also includes well 154 (B1, C1) as defined in the OM&M Plan.
   2) Offsite: Wells located in the vicinity, but offsite, of THAN's 25-acre property
   3) Domestic: Samples are obtained from domestic water wells in the vicinity of the THAN site.
   4) Proposed Additional Domestic. Data are presented for three additional domestic wells that are being proposed in this reduced monitoring program.

(i) NA = Not applicable. Trend analysis or calculation of the 95th UCL was not performed on groundwater data from wells with insufficient data points during the 1989 through 2006 time period.

(j) NC = Not calculated. Standard deviations can not be calculated for one data point. The 95%ile was labeled with "NC" when no data was available for a particular well between 1989 and 2006.

(k) NS = Not sampled. There was no sample collected at that well in the 1989 through 2006 time period.

(l) – = Groundwater bearing zone information was not available for domestic wells.

(m) PAD = Proposed Additional Domestic (well). These are unidentified wells not previously sampled by THAN. No current groundwater quality data exist for these wells.

(n) Chloroform is a purgeable halocarbon ($CHCl_3$). Measurements were recorded in parts per billion (ppb). The detection limit for Chloroform is 0.5 ppb and the FRG for Chloroform in groundwater at and around the THAN site is 100 ppb. Descriptive statistics calculated are also in ppb.

(o) 1,2-dichloroethane (1,2-DCA) is a chlorinated hydrocarbon ($C_2H_4Cl_2$). Measurements were recorded in parts per billion (ppb). The detection limit and FRG for 1,2-DCA is 0.5 ppb. Descriptive statistics calculated are also in ppb.

(p) Carbon Tetrachloride (CCl_4) is a purgeable halocarbon. Measurements were recorded in parts per billion (ppb). The detection limit and FRG for Carbon Tetrachloride is 0 5 ppb. Descriptive statistics calculated are also in ppb

= Well included in Proposed Groundwater Monitoring Program.

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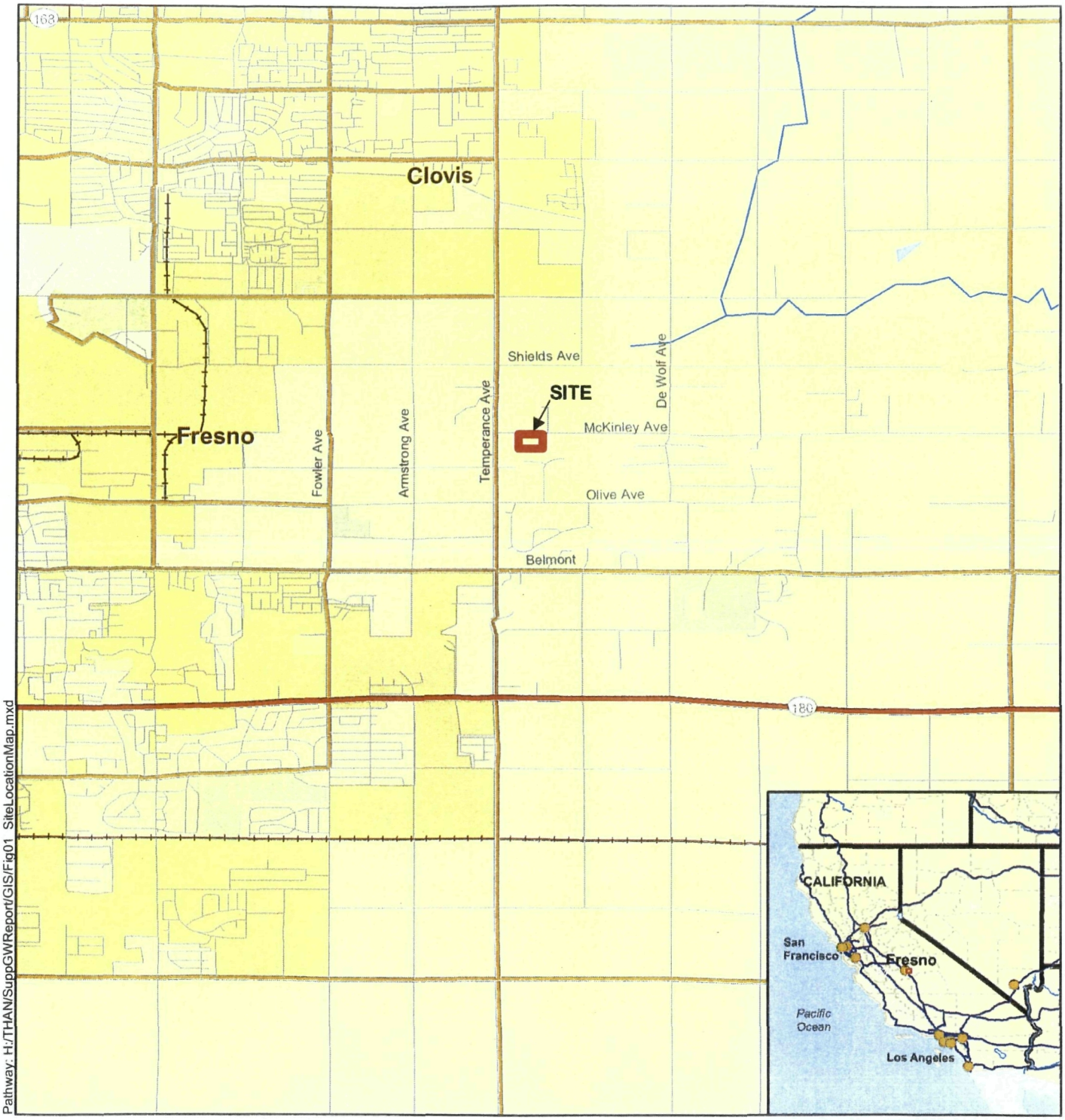
Figures



N

0 2,500 5,000 Feet

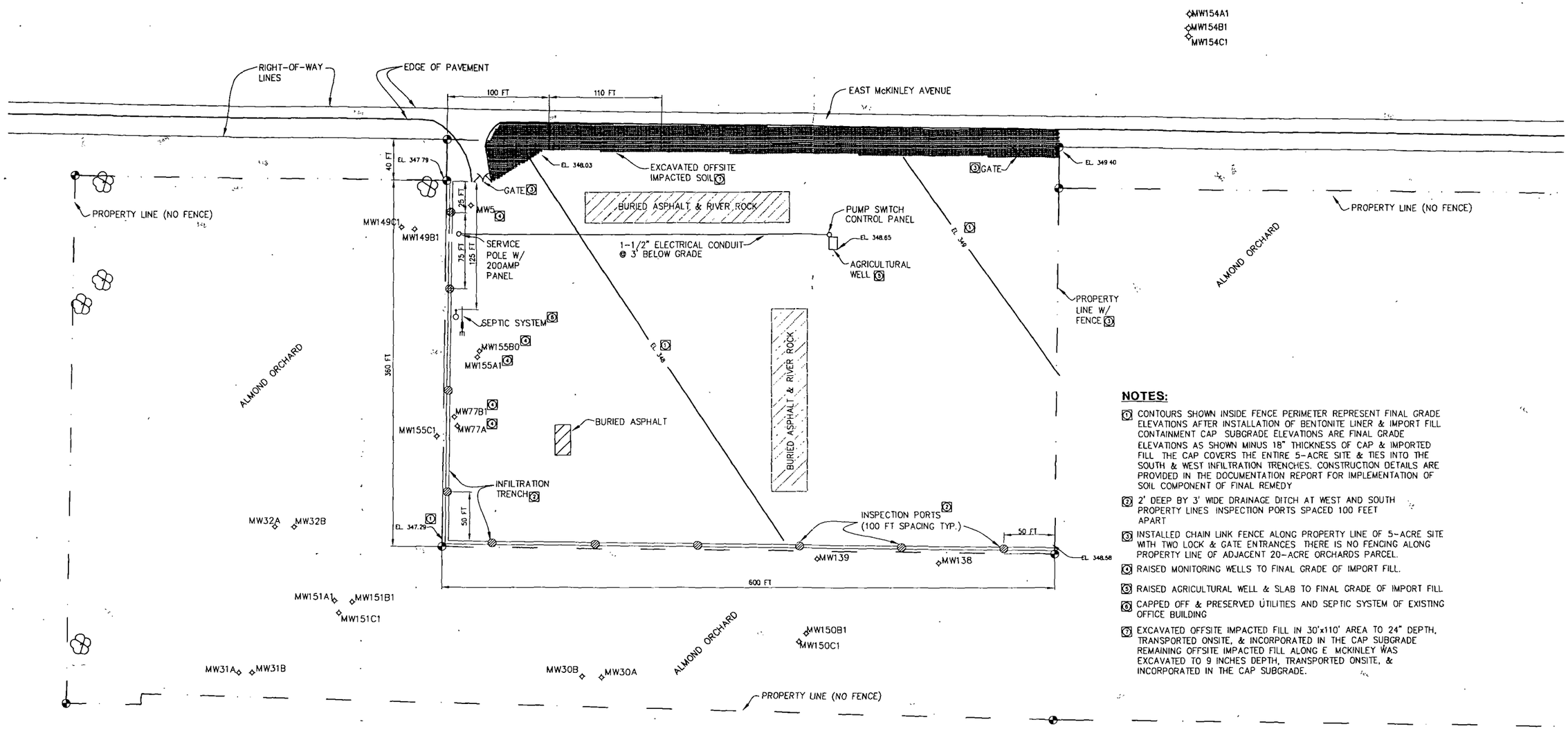
Kennedy/Jenks Consultants

T H Agriculture & Nutrition Site
Eastern Fresno County, California

Site Location Map

K/J 844083.90
September 2008

Figure 1



NOTES:

1. CONTOURS SHOWN INSIDE FENCE PERIMETER REPRESENT FINAL GRADE ELEVATIONS AFTER INSTALLATION OF BENTONITE LINER & IMPORT FILL CONTAINMENT CAP. SUBGRADE ELEVATIONS ARE FINAL GRADE ELEVATIONS AS SHOWN MINUS 18" THICKNESS OF CAP & IMPORTED FILL. THE CAP COVERS THE ENTIRE 5-ACRE SITE & TIES INTO THE SOUTH & WEST INFILTRATION TRENCHES. CONSTRUCTION DETAILS ARE PROVIDED IN THE DOCUMENTATION REPORT FOR IMPLEMENTATION OF SOIL COMPONENT OF FINAL REMEDY
2. 2' DEEP BY 3' WIDE DRAINAGE DITCH AT WEST AND SOUTH PROPERTY LINES. INSPECTION PORTS SPACED 100 FEET APART
3. INSTALLED CHAIN LINK FENCE ALONG PROPERTY LINE OF 5-ACRE SITE WITH TWO LOCK & GATE ENTRANCES. THERE IS NO FENCING ALONG PROPERTY LINE OF ADJACENT 20-ACRE ORCHARDS PARCEL.
4. RAISED MONITORING WELLS TO FINAL GRADE OF IMPORT FILL.
5. RAISED AGRICULTURAL WELL & SLAB TO FINAL GRADE OF IMPORT FILL
6. CAPPED OFF & PRESERVED UTILITIES AND SEPTIC SYSTEM OF EXISTING OFFICE BUILDING
7. EXCAVATED OFFSITE IMPACTED FILL IN 30'x110' AREA TO 24" DEPTH, TRANSPORTED ONSITE, & INCORPORATED IN THE CAP SUBGRADE. REMAINING OFFSITE IMPACTED FILL ALONG E. MCKINLEY WAS EXCAVATED TO 9 INCHES DEPTH, TRANSPORTED ONSITE, & INCORPORATED IN THE CAP SUBGRADE.

LEGEND:

- PROPERTY LINE
- EXISTING CONTOURS
- EL 348.. NEW CONTOURS, (FINAL GRADE ELEVATIONS) (7)
- MONITORING WELL
- INSPECTION PORT
- EXCAVATED OFFSITE IMPACTED FILL MATERIAL

0 50 100 200 300

APPROX. GRAPHIC SCALE: 1"=100'

N

Kennedy/Jenks Consultants

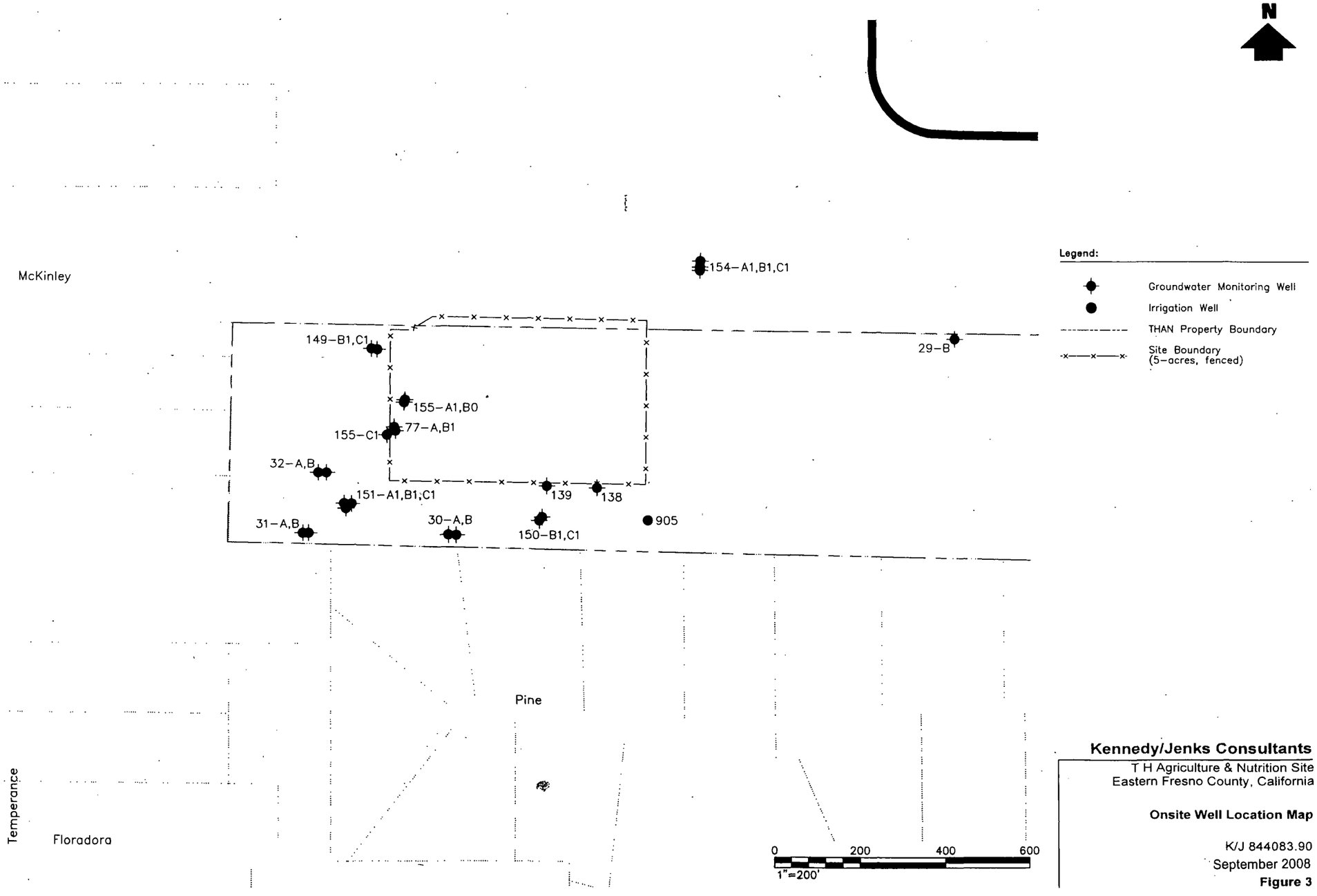
T H Agriculture & Nutrition Site
Eastern Fresno County, California

Existing Site Features

K/J 844083.90
September 2008

Figure 2

H://B4.lsb/844083.89/RA Report/Figure 3_5yrreview

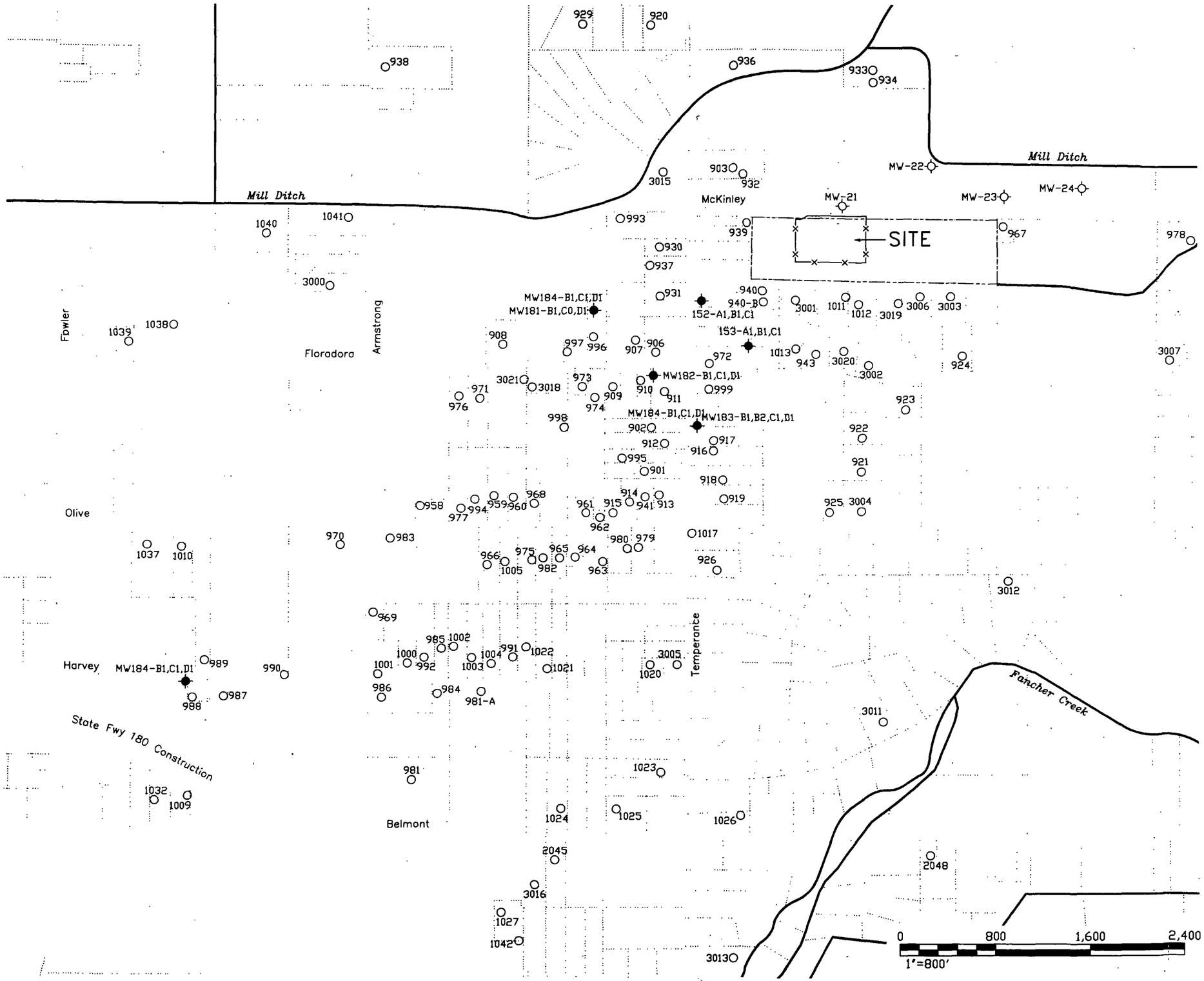


Kennedy/Jenks Consultants

T H Agriculture & Nutrition Site
Eastern Fresno County, California

Onsite Well Location Map

K/J 844083.90
September 2008
Figure 3



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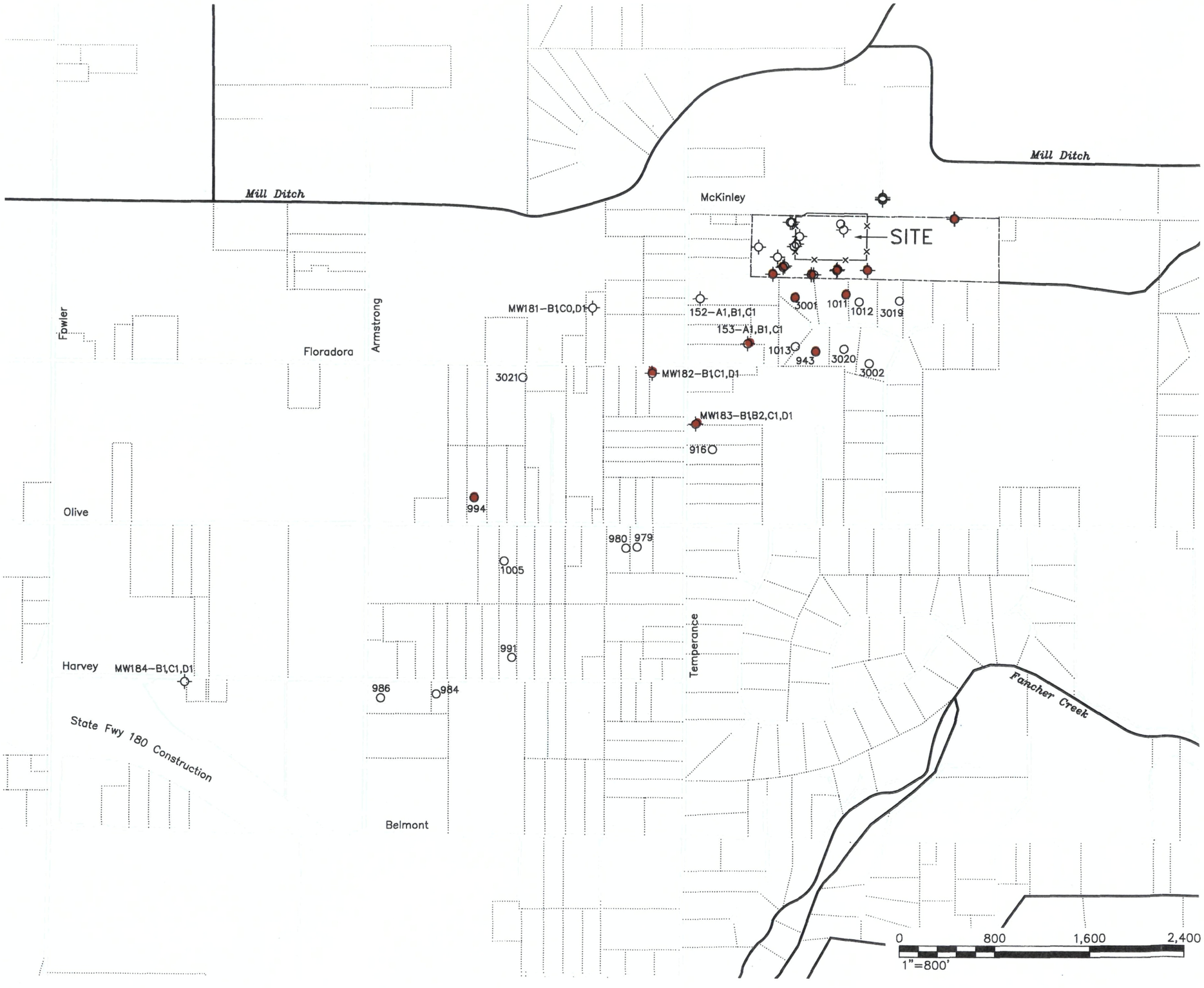
T H Agriculture & Nutrition Site
Eastern Fresno County, California

Offsite Well Location Map

K/J 844083.90
September 2008

Figure 4



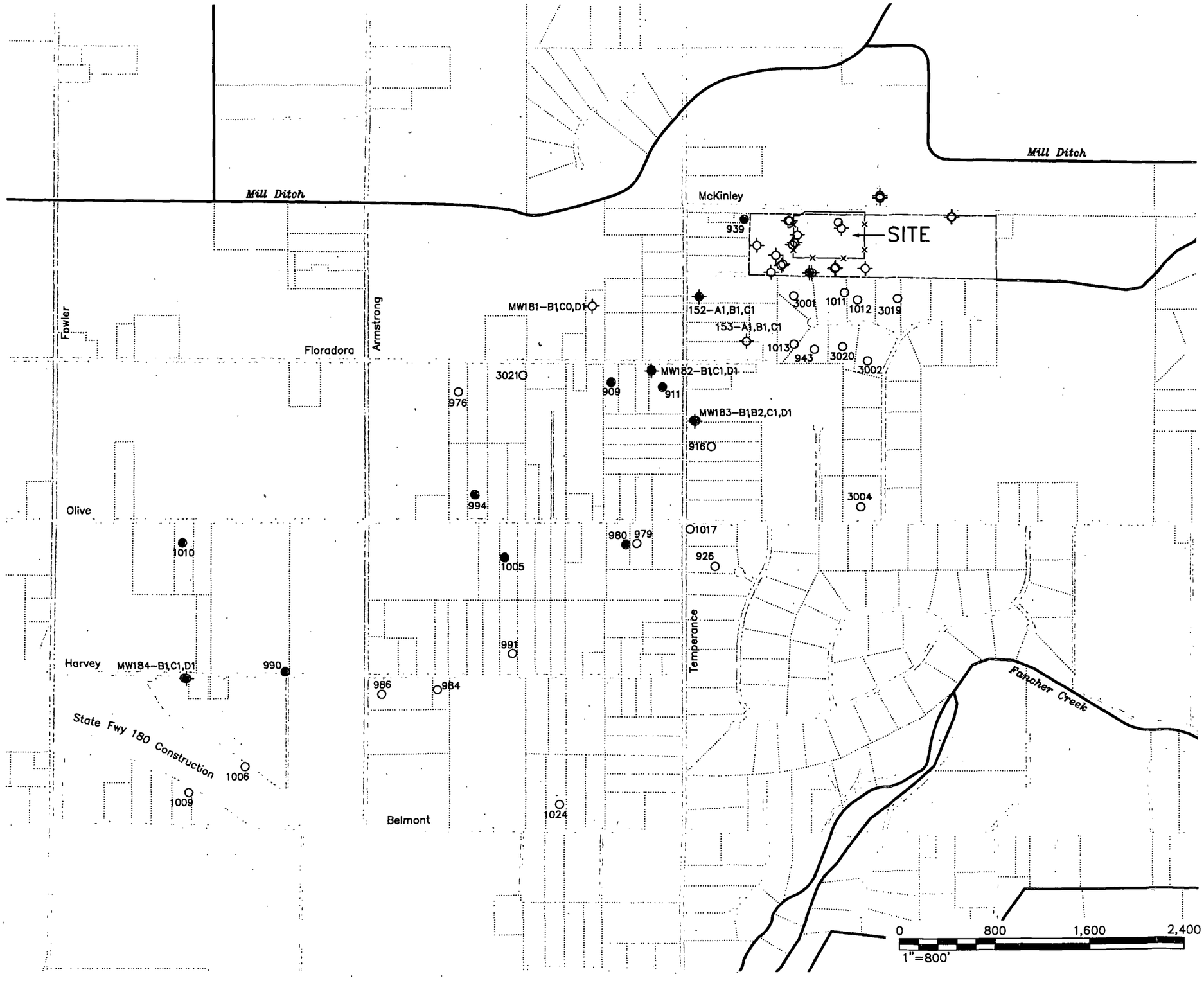
Kennedy/Jenks Consultants

T H AGRICULTURE & NUTRITION SITE
EASTERN FRESNO COUNTY, CALIFORNIA

DIELDRIN DETECTIONS
1997 to 2006

K/J 844083.90
September 2008

FIGURE 5



Legend:

- Groundwater Monitoring Well Sample Analyzed for Chloroform since January 1997
- Domestic Well Sample Analyzed for Chloroform since January 1997
- Chloroform Detected since January 1997
- THAN Property Boundary
- Site Boundary (5–acres, fenced)

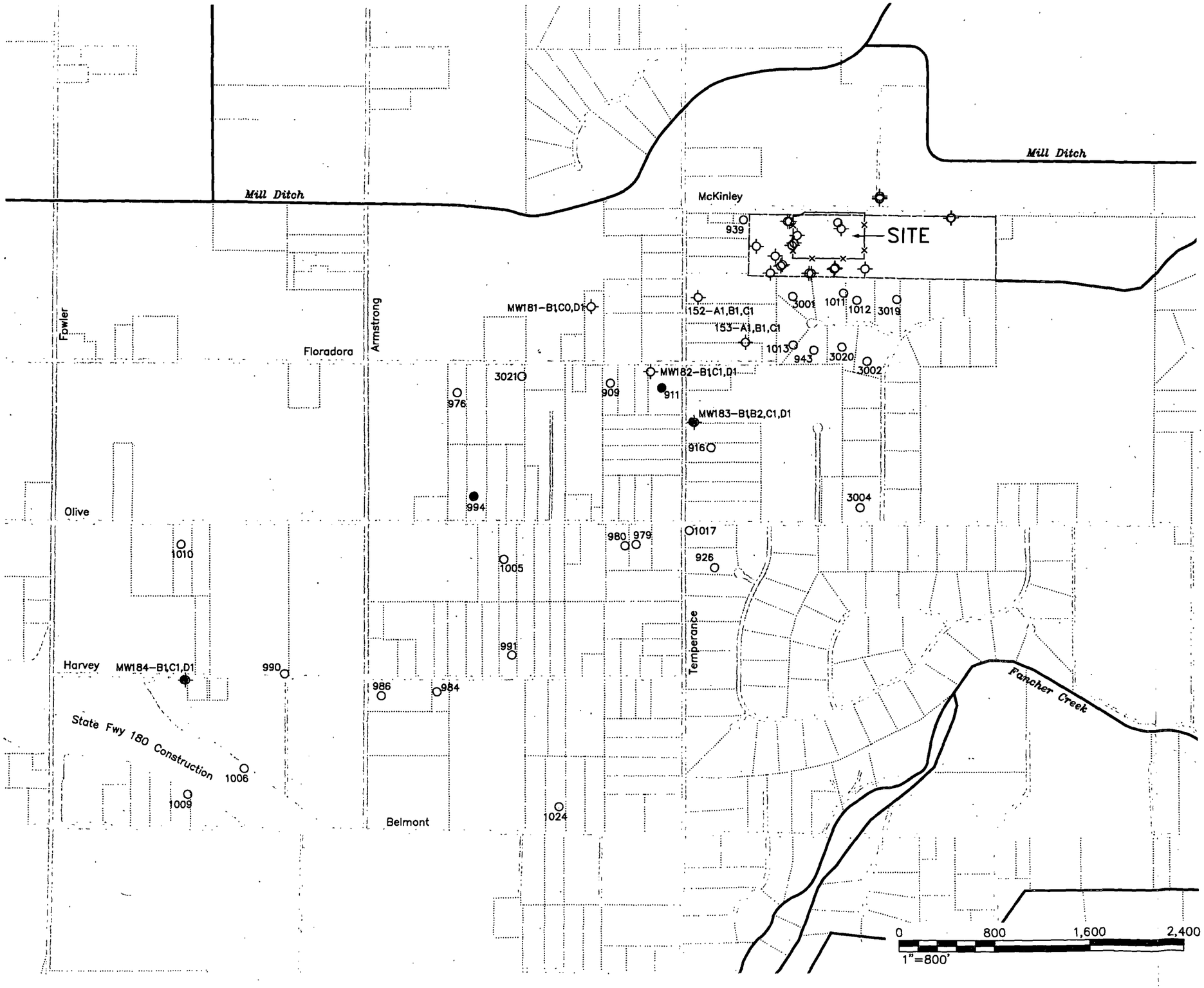
Kennedy/Jenks Consultants

T H AGRICULTURE & NUTRITION SITE
EASTERN FRESNO COUNTY, CALIFORNIA

CHLOROFORM DETECTIONS 1997 to 2006

K/J 844083.90
September 2008

FIGURE 6



Legend:

- Groundwater Monitoring Well Sample Analyzed for 1,2–DCA since January 1997
- Domestic Well Sample Analyzed for 1,2–DCA since January 1997
- 1,2–Dichloroethane (1,2–DCA) Detected since January 1997
- THAN Property Boundary
- Site Boundary (5–acres, fenced)

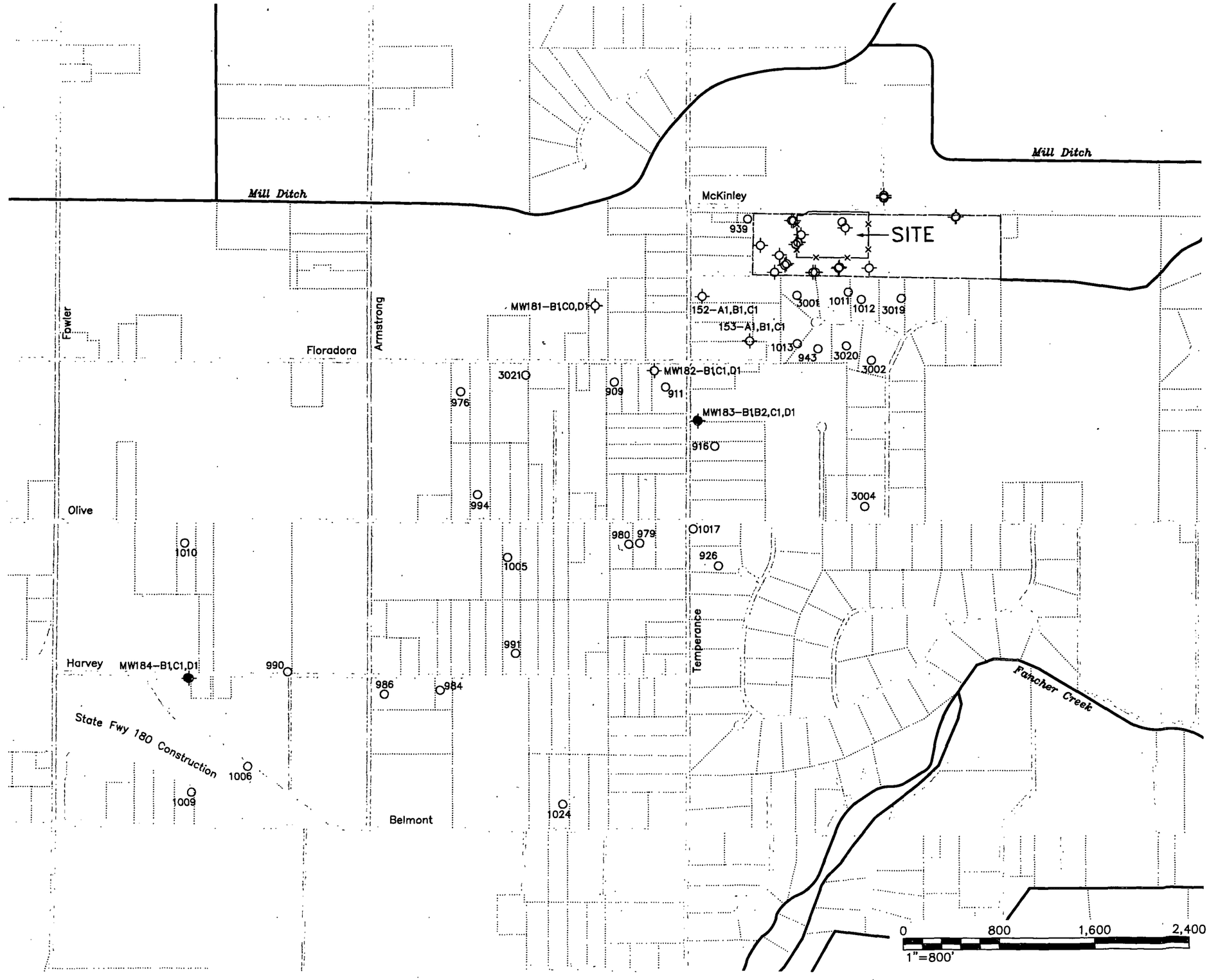
Kennedy/Jenks Consultants

T H AGRICULTURE & NUTRITION SITE
EASTERN FRESNO COUNTY, CALIFORNIA

1,2-DCA DETECTIONS 1997 to 2008

K/J 844083.90
September 2008

FIGURE 7



Kennedy/Jenks Consultants

T H AGRICULTURE & NUTRITION SITE
EASTERN FRESNO COUNTY, CALIFORNIA

CARBON TETRACHLORIDE DETECTIONS 1997 to 2006

K/J 844083.90
September 2008

FIGURE 8

Appendix A

Five-Year Review Summary Form

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: **THAN Fresno Site**		
EPA ID *(from WasteLAN)*: **CAD009106220**		
Region: 9	**State: CA**	**City/County: 7183 E. McKinley Ave., Eastern Fresno County**

SITE STATUS	
NPL status: Final **x** Deleted Other (specify)	
Remediation status (choose all that apply): Under Construction Operating **x** Complete	
Multiple OUs?* YES **x** NO	**Construction completion date: January 23, 2003**
Has site been put into reuse? YES **x** NO	

REVIEW STATUS	
Lead agency: EPA State Tribe **x** Other Federal Agency **DTSC**	
Author name: Mr. Danny Domingo	
Author title: P.G.	**Author affiliation: DTSC**
Review period:** **04 / 25 / 2007** to **11 / 20 / 2007 (Tentative Completion Date)**	
Date of site inspection: 07 / 20 / 2007	
Type of review: Post-SARA Pre-SARA NPL- Removal only Non-NPL Remedial Action Site NPL State/Tribe-lead Regional Discretion **x Post NPL Delisted Site**	
Review number: **x** 1 (first) 2 (second) 3 (third) Other (specify) _____	
Triggering action: Actual RA Onsite Construction at OU #____ G Actual RA Start at OU#____ Construction Completion G Previous Five-Year Review Report **x** Other (specify) **(construction of bentonite/soil cap initiated on 11/20/2002)**	
Triggering action date *(from WasteLAN)*: ___ / ___ / _____	
Due date *(five years after triggering action date)*: **11 / 20 / 2007**	

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:

No major issues were identified. Minor maintenance items were identified during the five-year review site inspection and will be addressed by THAN as described in Section 5.5 and Section 7 of Kennedy/Jenks Five-Year Review Report.

Recommendations and Follow-up Actions:

THAN will perform follow-up actions for minor maintenance issues identified. Section 8 of Kennedy/Jenks' Five Year Review Report describes follow-up actions.

Protectiveness Statement(s):

The Final Remedy for the Site is functioning as intended and remains protective of human health and the environment.

Other Comments:

THAN has submitted an *Evaluation of Site Compliance and Proposed Modifications in Groundwater Monitoring Report* to DTSC and EPA for review and consideration. THAN will continue to implement the current Groundwater Monitoring Program presented in the Operations, Maintenance, and Monitoring Plan until DTSC provides written approval of proposed monitoring modifications.

Appendix B

Five-Year Review Site Inspection Checklist

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION

Site name: THAN FRESNO	**Date of inspection:** 7/27/07
Location and Region: 7183 E. McKinley Ave, FRESNO COUNTY	**EPA ID:**
Agency, office, or company leading the five-year review: DTSC	**Weather/temperature:** clear / hot ~100°

Remedy Includes: (Check all that apply)

- X Landfill cover/containment
- X Access controls
- X Institutional controls
- Groundwater pump and treatment
- Surface water collection and treatment
- Other _____
- X Monitored natural attenuation
- Groundwater containment
- Vertical barrier walls

Attachments: Inspection team roster attached (1) (Site map attached)

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Kennedy / Jenks – Bob Chrobak (Project Engineer) / Jorn Grimsley (Staff Engineer)
   Name / Title / Date
   Interviewed at site at office by phone Phone no.
   Problems, suggestions; Report attached

2. **O&M staff** Bill Pretzer / O+M Contractor / 7/27/07
   Name / Title / Date
   Interviewed (at site) at office by phone Phone no.
   Problems, suggestions; (Report attached)

(1) Inspection Team: Danny Domingo, DTSC
Jorn Grimsley, Kennedy / Jenks Consultants

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency DTSC
Contact Danny Domingo — P.G. — ____ — 559-297-3932
Name — Title — Date — Phone no.
Problems; suggestions; Report attached ____

Agency ____
Contact ____ — ____ — ____ — ____
Name — Title — Date — Phone no.
Problems; suggestions; Report attached ____

Agency ____
Contact ____ — ____ — ____ — ____
Name — Title — Date — Phone no.
Problems; suggestions; Report attached ____

Agency ____
Contact ____ — ____ — ____ — ____
Name — Title — Date — Phone no.
Problems; suggestions; Report attached ____

4. **Other interviews** (optional) Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - O&M manual — ✓ Readily available — ✓ Up to date — N/A
   - As-built drawings — ✓ Readily available — ✓ Up to date — N/A
   - Maintenance logs — ✓ Readily available — ✓ Up to date — N/A

   Remarks

2. **Site-Specific Health and Safety Plan** — ✓ Readily available — ✓ Up to date — N/A
   - Contingency plan/emergency response plan — ✓ Readily available — ✓ Up to date — N/A

   Remarks INCLUDED IN O&M PLAN

3. **O&M and OSHA Training Records** — ✓ Readily available — Up to date — N/A

   Remarks

4. **Permits and Service Agreements**
   - Air discharge permit — Readily available — Up to date — ✓ N/A
   - Effluent discharge — Readily available — Up to date — ✓ N/A
   - Waste disposal, POTW — Readily available — Up to date — ✓ N/A
   - Other permits _____ — Readily available — Up to date — ✓ N/A

   Remarks

5. **Gas Generation Records** — Readily available — Up to date — ✓ N/A

   Remarks

6. **Settlement Monument Records** — Readily available — Up to date — ✓ N/A

   Remarks

7. **Groundwater Monitoring Records** — ✓ Readily available — ✓ Up to date — N/A

   Remarks

8. **Leachate Extraction Records** — Readily available — Up to date — ✓ N/A

   Remarks

9. **Discharge Compliance Records**
   - Air — Readily available — Up to date — ✓ N/A
   - Water (effluent) — Readily available — Up to date — ✓ N/A

   Remarks

10. **Daily Access/Security Logs** — Readily available — Up to date — ✓ N/A

    Remarks Controlled access (~~Bush~~ security fence, gates, locks)
    No logs

IV. O&M COSTS

1. **O&M Organization**

State in-house ✓Contractor for State
PRP in-house ✓Contractor for PRP
Federal Facility in-house Contractor for Federal Facility
Other _____

2. **O&M Cost Records**

✓Readily available ✓Up to date
Funding mechanism/agreement in place
Original O&M cost estimate _____ Breakdown attached

Total annual cost by year for review period if available (SEE 5-Yr Review Report)

From _____ (Date) To _____ (Date) _____ (Total cost) Breakdown attached
From _____ (Date) To _____ (Date) _____ (Total cost) Breakdown attached
From _____ (Date) To _____ (Date) _____ (Total cost) Breakdown attached
From _____ (Date) To _____ (Date) _____ (Total cost) Breakdown attached
From _____ (Date) To _____ (Date) _____ (Total cost) Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS

Applicable N/A

A. Fencing

1. **Fencing damaged** ~~None~~ Location shown on site map ✓Gates secured N/A

Remarks Regrade berm located on south fence to restrict access by dogs/coyotes. - Repaired today by Bill Pretzer

B. Other Access Restrictions

1. **Signs and other security measures** ✓Location shown on site map N/A

Remarks Update Prop. 65 signs - dates, contact, Chemicals Update DTSC signs. Updated signs to be in English and Spanish

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented	Yes	✓No	N/A
Site conditions imply ICs not being fully enforced	Yes	✓No	N/A

Type of monitoring (*e.g.*, self-reporting, drive by) SELF REPORTING

Frequency SEMIANNUAL Reporting, Weekly monitoring of site

Responsible party/agency DTSC

Contact Danny Domingo (Name) P.G. (Title) _____ (Date) 559-297-3932 (Phone no.)

Reporting is up-to-date	✓Yes	No	N/A
Reports are verified by the lead agency	✓Yes	No	N/A
Specific requirements in deed or decision documents have been met	✓Yes	No	N/A
Violations have been reported	Yes	✓No	N/A

Other problems or suggestions: Report attached

ICs appear adequate

2. **Adequacy** ✓ICs are adequate ICs are inadequate N/A

Remarks

D. General

1. **Vandalism/trespassing** Location shown on site map ✓No vandalism evident

Remarks

2. **Land use changes on site** (N/A)

Remarks

3. **Land use changes off site** N/A

Remarks No change in general. Residential developments South of site.

VI. GENERAL SITE CONDITIONS

A. Roads Applicable N/A

1. **Roads damaged** Location shown on site map ✓Roads adequate N/A

Remarks

B. Other Site Conditions

Remarks

VII. LANDFILL COVERS (Applicable) N/A

A. Landfill Surface

1. **Settlement** (Low spots) Location shown on site map ✓Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Cracks** Location shown on site map ✓Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____

3. **Erosion** (Various) ✓Location shown on site map Erosion not evident
   Areal extent 4'X 1'wide (TYP) Depth 6" (TYP)
   Remarks MAINLY CONCENTRATED IN SOUTHWEST CORNER OF CAP BERM, RUNOFF FROM STORMWATER

4. **Holes** ✓Location shown on site map Holes not evident
   Areal extent Various Depth 6" (TYP).
   Remarks Rodents burrowing / ongoing O&M occurring SITE O&M CONTRACTOR FILLING IN HOLES AS FOUND.

5. **Vegetative Cover** ✓Grass ✓Cover properly established ✓No signs of stress
   Trees/Shrubs (indicate size and locations on a diagram)
   Remarks GRASS dies off in summer, green in WINTER No remedy/corrective action necessary

6. **Alternative Cover (armored rock, concrete, etc.)** ✓N/A
   Remarks _____

7. **Bulges** Location shown on site map ✓Bulges not evident
   Areal extent _____ Height _____
   Remarks _____

8. **Wet Areas/Water Damage** ✓ Wet areas/water damage not evident
   - Wet areas — Location shown on site map — Areal extent_____
   - Ponding — Location shown on site map — Areal extent_____
   - Seeps — Location shown on site map — Areal extent_____
   - Soft subgrade — Location shown on site map — Areal extent_____

   Remarks_____

9. **Slope Instability** Slides — Location shown on site map ✓ No evidence of slope instability
   Areal extent_____
   Remarks_____

B. Benches Applicable ✓ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** — Location shown on site map — ✓ N/A or okay
   Remarks_____

2. **Bench Breached** — Location shown on site map — ✓ N/A or okay
   Remarks_____

3. **Bench Overtopped** — Location shown on site map — ✓ N/A or okay
   Remarks_____

C. Letdown Channels Applicable ✓ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** — Location shown on site map — No evidence of settlement
   Areal extent_____ Depth_____
   Remarks_____

2. **Material Degradation** — Location shown on site map — No evidence of degradation
   Material type_____ Areal extent_____
   Remarks_____

3. **Erosion** — Location shown on site map — No evidence of erosion
   Areal extent_____ Depth_____
   Remarks_____

4. **Undercutting** Location shown on site map ✓No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ ✓No obstructions
Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
✓No evidence of excessive growth
Vegetation in channels does not obstruct flow
Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations Applicable N/A

1. **Gas Vents** Active Passive
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance
✓N/A
Remarks_____

2. **Gas Monitoring Probes**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance ✓N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
Properly secured/locked ✓Functioning ✓Routinely sampled ✓Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks WELLS NEED LOCKS

4. **Leachate Extraction Wells**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance ✓N/A
Remarks_____

5. **Settlement Monuments** Located Routinely surveyed ✓N/A
Remarks_____

E. Gas Collection and Treatment Applicable N/A ✓

1. **Gas Treatment Facilities**
   Flaring Thermal destruction Collection for reuse
   Good condition Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   Good condition Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   Good condition Needs Maintenance N/A ✓
   Remarks_____

F. Cover Drainage Layer Applicable N/A ✓

1. **Outlet Pipes Inspected** Functioning N/A ✓
   Remarks_____

2. **Outlet Rock Inspected** Functioning N/A ✓
   Remarks_____

G. Detention/Sedimentation Ponds Applicable N/A ✓

1. **Siltation** Areal extent_____ Depth_____ N/A ✓
   Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   Erosion not evident
   Remarks_____

3. **Outlet Works** Functioning N/A ✓
   Remarks_____

4. **Dam** Functioning N/A ✓
   Remarks_____

H. Retaining Walls Applicable ✓N/A

1. **Deformations** Location shown on site map Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** Location shown on site map Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge Applicable ✓N/A

1. **Siltation** Location shown on site map Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** Location shown on site map ✓N/A
   Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** Functioning ✓N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS Applicable ✓N/A

1. **Settlement** Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   Performance not monitored
   Frequency_____ Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES Applicable ✓N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines Applicable ✓N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   Good condition All required wells properly operating Needs Maintenance ✓N/A
   Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines Applicable N/A

1. **Collection Structures, Pumps, and Electrical**
   ✓Good condition Needs Maintenance
   Remarks Requires minor maintenance to remove soil/silt accummulation in infiltration trench at various locations

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks_____

C. Treatment System Applicable ✓N/A

1. **Treatment Train** (Check components that apply)
   - Metals removal — Oil/water separation — Bioremediation
   - Air stripping — Carbon adsorbers
   - Filters_____
   - Additive (*e.g.*, chelation agent, flocculent)_____
   - Others_____
   - Good condition — Needs Maintenance
   - Sampling ports properly marked and functional
   - Sampling/maintenance log displayed and up to date
   - Equipment properly identified
   - Quantity of groundwater treated annually_____
   - Quantity of surface water treated annually_____

   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ✓N/A — Good condition — Needs Maintenance

   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   ✓N/A — Good condition — Proper secondary containment — Needs Maintenance

   Remarks_____

4. **Discharge Structure and Appurtenances**
   ✓N/A — Good condition — Needs Maintenance

   Remarks_____

5. **Treatment Building(s)**
   ✓N/A — Good condition (esp. roof and doorways) — Needs repair
   - Chemicals and equipment properly stored

   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   - Properly secured/locked — Functioning — Routinely sampled — Good condition
   - All required wells located — Needs Maintenance — ✓N/A

   Remarks_____

D. Monitoring Data

1. Monitoring Data
   ✓Is routinely submitted on time — ✓Is of acceptable quality

2. Monitoring data suggests: REMEDY IS EFFECTIVE
   Groundwater plume is effectively contained — Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
   Properly secured/locked ✓ Functioning ✓ Routinely sampled ✓ Good condition
   All required wells located Needs Maintenance N/A
   Remarks WELLS REQUIRE LOCKS

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

REMEDY APPEARS TO BE EFFECTIVE AND FUNCTIONING AS INTENDED.

NO MAJOR ISSUES IDENTIFIED

MINOR MAINTENCE ITEMS / CORRECTIVE ACTIONS IDENTIFIED.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

O+M ACTIVITIES ARE BEING IMPLEMENTED PER REQUIREMENTS OF O&M PLAN AND ARE ADEQUATE.

THE REMEDY IS INTACT AND IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

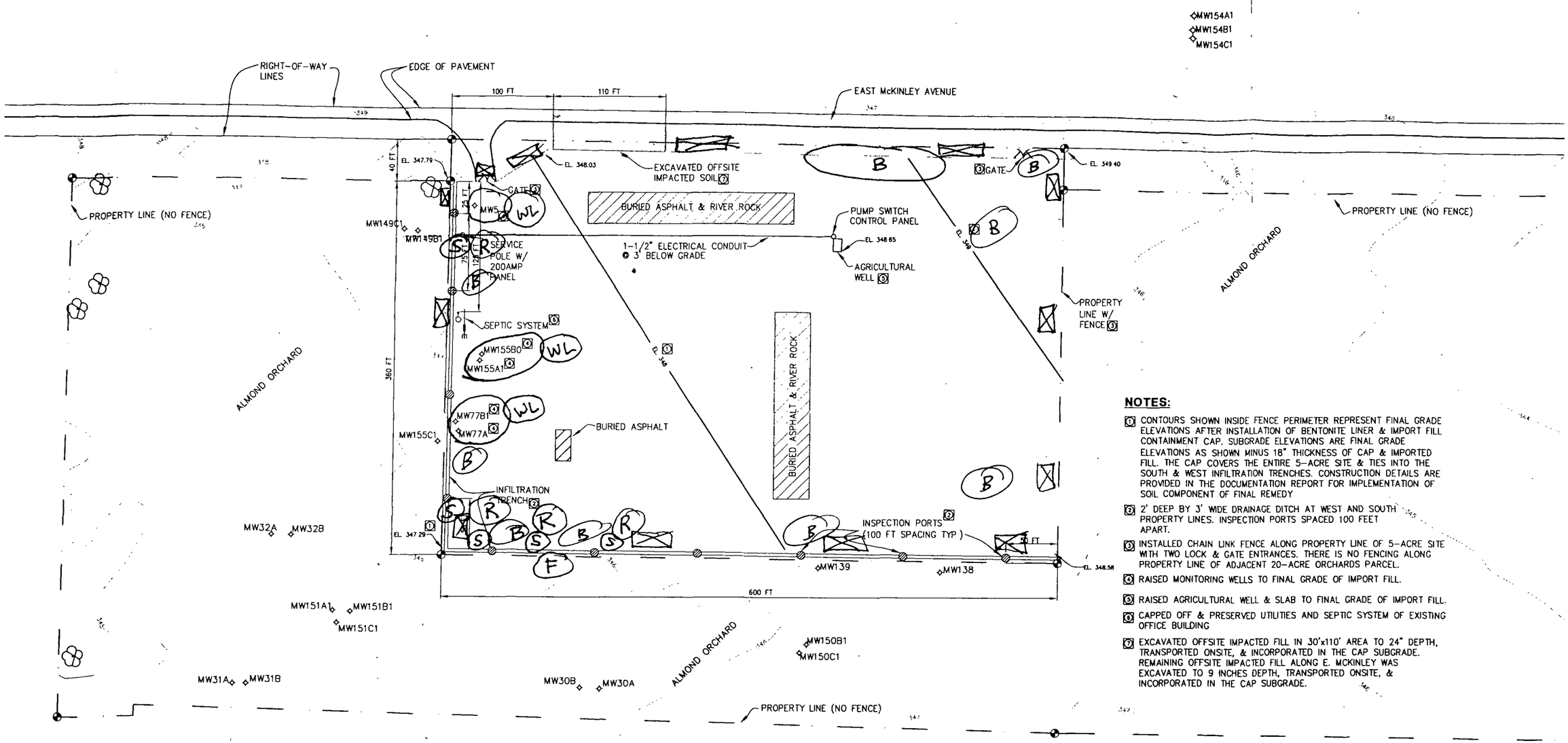
NO EARLY INDICATORS OF POTENTIAL REMEDY PROBLEMS HAVE BEEN IDENTIFIED.

THAN WILL ADDRESS MINOR MAINTENCE ITEMS IDENTIFIED DURING SITE INSPECTION

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

No optimization opportunities were identified



NOTES:

1. CONTOURS SHOWN INSIDE FENCE PERIMETER REPRESENT FINAL GRADE ELEVATIONS AFTER INSTALLATION OF BENTONITE LINER & IMPORT FILL CONTAINMENT CAP. SUBGRADE ELEVATIONS ARE FINAL GRADE ELEVATIONS AS SHOWN MINUS 18" THICKNESS OF CAP & IMPORTED FILL. THE CAP COVERS THE ENTIRE 5-ACRE SITE & TIES INTO THE SOUTH & WEST INFILTRATION TRENCHES. CONSTRUCTION DETAILS ARE PROVIDED IN THE DOCUMENTATION REPORT FOR IMPLEMENTATION OF SOIL COMPONENT OF FINAL REMEDY
2. 2' DEEP BY 3' WIDE DRAINAGE DITCH AT WEST AND SOUTH PROPERTY LINES. INSPECTION PORTS SPACED 100 FEET APART.
3. INSTALLED CHAIN LINK FENCE ALONG PROPERTY LINE OF 5-ACRE SITE WITH TWO LOCK & GATE ENTRANCES. THERE IS NO FENCING ALONG PROPERTY LINE OF ADJACENT 20-ACRE ORCHARDS PARCEL.
4. RAISED MONITORING WELLS TO FINAL GRADE OF IMPORT FILL.
5. RAISED AGRICULTURAL WELL & SLAB TO FINAL GRADE OF IMPORT FILL.
6. CAPPED OFF & PRESERVED UTILITIES AND SEPTIC SYSTEM OF EXISTING OFFICE BUILDING
7. EXCAVATED OFFSITE IMPACTED FILL IN 30'x110' AREA TO 24" DEPTH, TRANSPORTED ONSITE, & INCORPORATED IN THE CAP SUBGRADE. REMAINING OFFSITE IMPACTED FILL ALONG E. MCKINLEY WAS EXCAVATED TO 9 INCHES DEPTH, TRANSPORTED ONSITE, & INCORPORATED IN THE CAP SUBGRADE.

Inspection Key/Notes:

- Existing sign (to be replaced with updated sign)
- (B) Rodent burrowing (general location (to be filled in))
- (R) Signs of erosion/runoff (to be regraded)
- (F) Identified location where dogs/coyotes have dug under fence (to be regraded)
- (S) Soil/silt accumulation (soil to be removed, rocks cleaned) in infiltration trench
- (WL) Well lock missing (lock to be replaced)

LEGEND:

- PROPERTY LINE
- EXISTING CONTOURS
- NEW CONTOURS, (FINAL GRADE ELEVATIONS)
- MONITORING WELL
- INSPECTION PORT
- EXCAVATED OFFSITE IMPACTED FILL MATERIAL

0 50 100 200 300

APPROX. GRAPHIC SCALE: 1"=100'

N

Kennedy/Jenks Consultants

T H AGRICULTURE & NUTRITION, L.L.C.
7183 E. MCKINLEY, FRESNO, CA

IDENTIFIED O&M ITEMS AND EXISTING SITE FEATURES

K/J 844083.90
JULY 2007

5-YEAR REVIEW SITE INSPECTION

Appendix C

Five-Year Review Public Notice Document / August 2007 Fact Sheet

Department of Toxic Substances Control

Preventing environmental damage from hazardous waste, and restoring contaminated sites for all Californians.

State of California

California Environmental Protection Agency

Fact Sheet, August 2007

Five-Year Review of the Cleanup Remedy for the Former T H Agriculture and Nutrition Site (formerly known as Thompson Hayward) to Begin

Introduction

The California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) and the United States Environmental Protection Agency, Region 9 (USEPA) are conducting a five-year review of the effectiveness of the cleanup remedy for the Former TH Agriculture and Nutrition site (THAN). The five-acre site is located at 7183 East McKinley Avenue in Fresno.

The site is the former location of an agricultural chemical formulation, packaging, and warehousing plant. Activities at the site caused contamination of soil and groundwater with agricultural chemicals (1,2-dichloroethane, carbon tetrachloride, chloroform, dieldrin, ddt and toxaphene). Discovery of the contamination resulted in the investigation and cleanup of the site. Additional mitigation measures included supplying bottled water to, or connecting to, the City of Fresno Municipal water supply system.

The site is owned by T H Agriculture & Nutrition, L.L.C. From 1951 to 1981, a succession of owners operated a plant at the site for the formulation, packaging, and warehousing of a variety of agricultural chemicals. In addition, various chemicals and byproducts were generated onsite during the operational life of the plant. The site stopped producing chemicals in 1981, removed all equipment and inventory by the summer of 1982, and closed the plant in February 1983.

In June 1999, DTSC approved a cleanup plan called a Remedial Action Plan (RAP) for the site. The plan consisted of on-site consolidation and capping of contaminated site soil, monitoring natural attenuation (a process in which some contaminants break down naturally) in underlying groundwater, restriction of the site to industrial and commercial use, and the execution of an enforceable agreement to operate and maintain the final remedy.

Monitoring of the underlying groundwater system described in the RAP was implemented in 1999. Consolidation and capping of the contaminated soil on-site began in June 2002 and ended in June 2003. The site was certified clean by DTSC in January 2006, and was deleted from USEPA's National Priority List in August 2006. The site is currently vacant and fenced.

What is a Five-Year Review?

The federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Section 121(c), known as the federal Superfund law, requires DTSC and USEPA to review the final remedy for a site every five years to ensure that the cleanup of contaminated soil is still effective, functioning as planned, that necessary operation and

maintenance is performed, that institutional controls are in place, and the cleanup remedy is protective of human health and the environment. If the review finds that the site's remedy is not protecting human health and the environment, DTSC and USEPA will make recommendations to ensure that the remedy becomes effective, identify milestones toward achieving protectiveness, and provide a schedule to accomplish necessary tasks.

The five-year review process includes: 1) notifying the community that the review is being conducted; 2) inspecting the on-site capped area to document the condition of the cap and to determine if necessary actions are required to maintain the cap's integrity; 3) inspecting the monitoring wells and domestic wells that make up the groundwater monitoring system; 4) collecting, reviewing, evaluating groundwater data from the previous years, leading to the five-year review; and 5) preparing a report that details the findings of the five-year review.

What You Can Do To Get Involved

Community involvement is an important part of the five-year review process. If you have questions regarding the five-year review process, would like to participate, and/or provide information regarding site activities, please contact Mr. Danny Domingo, DTSC Project Manager by email at ddomingo.ca.gov or by phone at (559) 297-3932. You may also contact Ms. Heidi Nelson, Public Participation Specialist, Department of Toxic Substances Control by phone at (916) 255-3575 or free of charge at (866) 495-5651. Ms. Nelson can also be reached by email at hnelson@dtsc.ca.gov.

The findings of the five-year review will be available for review at the Fresno County Library, Sunnyside Branch, 5566 E. Kings Canyon Road, Fresno, California, 93727. Please call (559) 255-6594 for library days and hours of operation.

The findings are also available in the Administrative Record located at DTSC, 1515 Tollhouse Road, Clovis, California, 93611-0522. Please contact Mr. Danny Domingo at (559) 297-3932 to setup an appointment to review the Administrative Record.

Media Inquiries

Members of the media should contact Mr. Ron Baker, Public Information Officer, Department of Toxic Substances Control at (916) 324-3142, or by email at rbaker@dtsc.ca.gov.

Notice To The Hearing Impaired

You can obtain additional information by using the California State Relay service at (888) 877-5378 (TDD). Ask them to contact Mr. Danny Domingo at (559) 297-3932.

Website Information

If you would like to know more about DTSC, please visit our website at www.dtsc.ca.gov.

Appendix D

Interview Documentation Form and Record

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
Mr. Bill Pretzer	O&M Contractor	Pretzer Farms	7/27/07

INTERVIEW RECORD

Site Name: THAN FRESNO SITE		EPA ID No.:
Subject: FIRST FIVE YEAR REVIEW	Time: P.M.	Date: 7/27/07
Type: ☐ Telephone ☒ Visit ☐ Other Location of Visit: 7183 E. McKinley Ave. (SITE)	☐ Incoming ☐ Outgoing	

Contact Made By:

Name: MR. DONNY DOMINGO	Title: P.G.	Organization: DTSC

Individual Contacted: MR. JOHN GRIMSLEY P.E. KENNEDY/JENKS

Name: MR. BILL PRETZER	Title: O&M CONTRACTOR	Organization: PRETZER FARMS

Telephone No: 559-456-0700 Fax No: 559-456-0710 E-Mail Address: bmpretzer@gmail.com	Street Address: City, State, Zip:

Summary Of Conversation

Discussed ongoing O&M activities for the site. Asked Mr. Pretzer if there have been any problems at site and if existing O&M procedures are being performed as-needed. No major problems or issues were identified by Mr. Pretzer. Mr. Pretzer lives close to the site and visits the site on a frequent basis (~3x/week). Minor issues identified by Mr. Pretzer included: ongoing efforts to control rodents + burrowing, minor trash pick-up, and some instances where neighborhood dogs or coyotes have dug under the perimeter fence. (Note: Mr. Pretzer regraded identified locations of potential access under fence day of interview). There has not been evidence of human trespassing on the site; however, individuals have dumped trash and debris at the site. The soil cap is being maintained and has not been disturbed.

Appendix E

Historical Analytical Results for Onsite/Nearsite, Offsite and Domestic Wells

(CD-rom)

UNSCANNABLE MEDIA

To use the unscannable media document #2164986
contact the Region IX Superfund Records Center
at 415-536-2000.

Appendix F

Concentration versus Time Graphs

- Chemographs

Figure F-1: Dieldrin in A-Zone, Onsite/Nearsite Wells

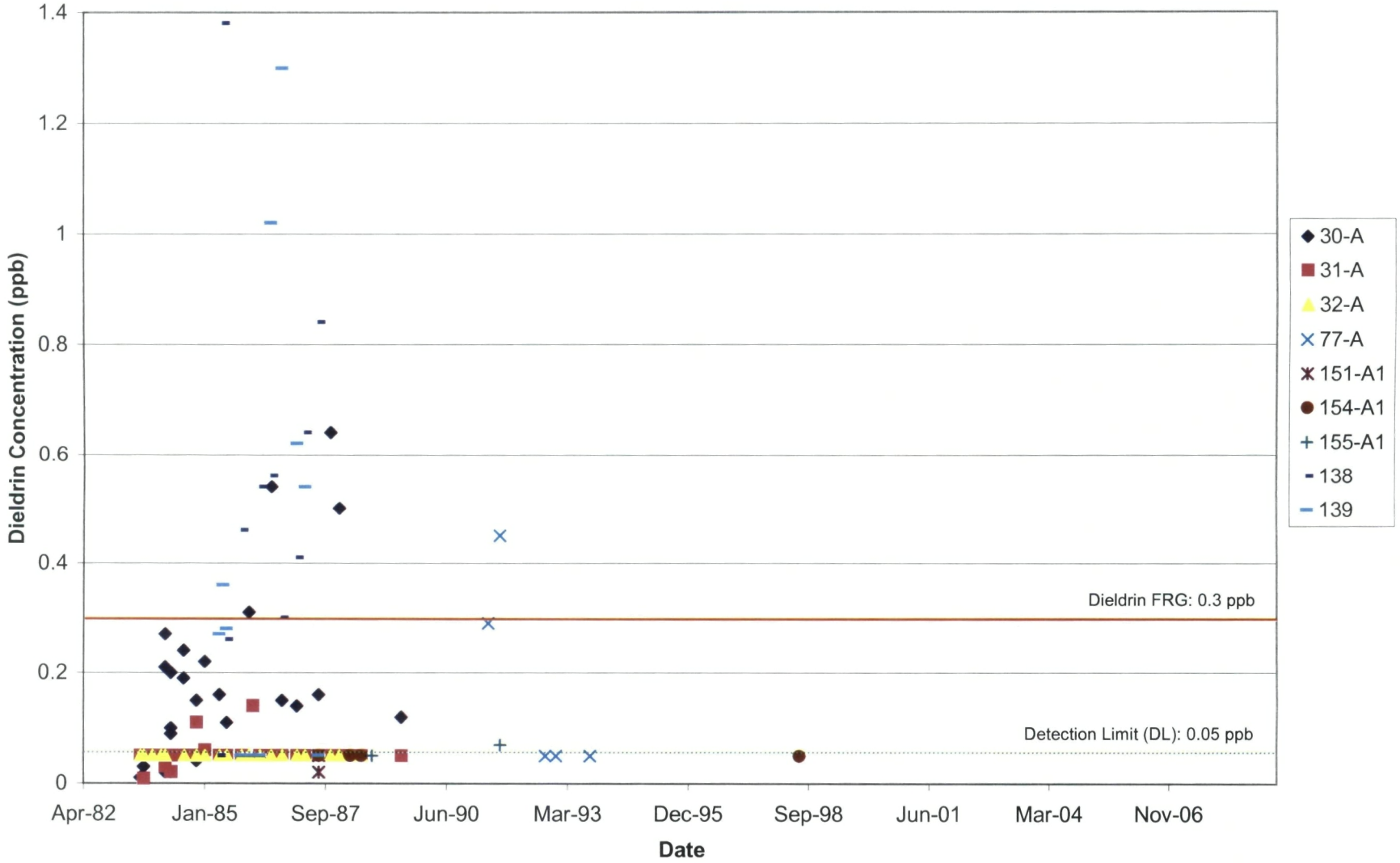


Figure F-2: Dieldrin in A-Zone, Offsite Wells

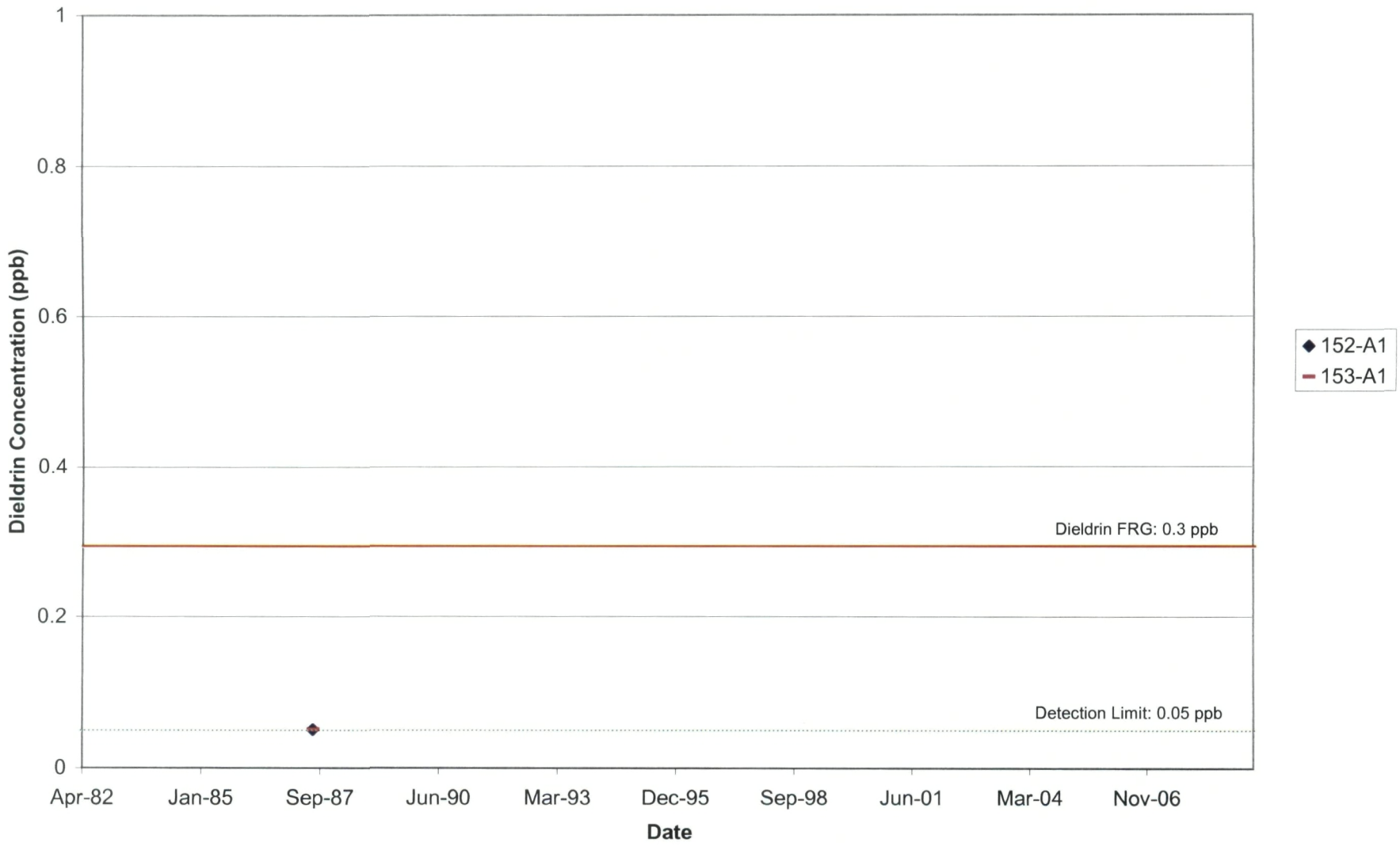


Figure F-3: Dieldrin in B-Zone, Onsite/Nearsite Wells

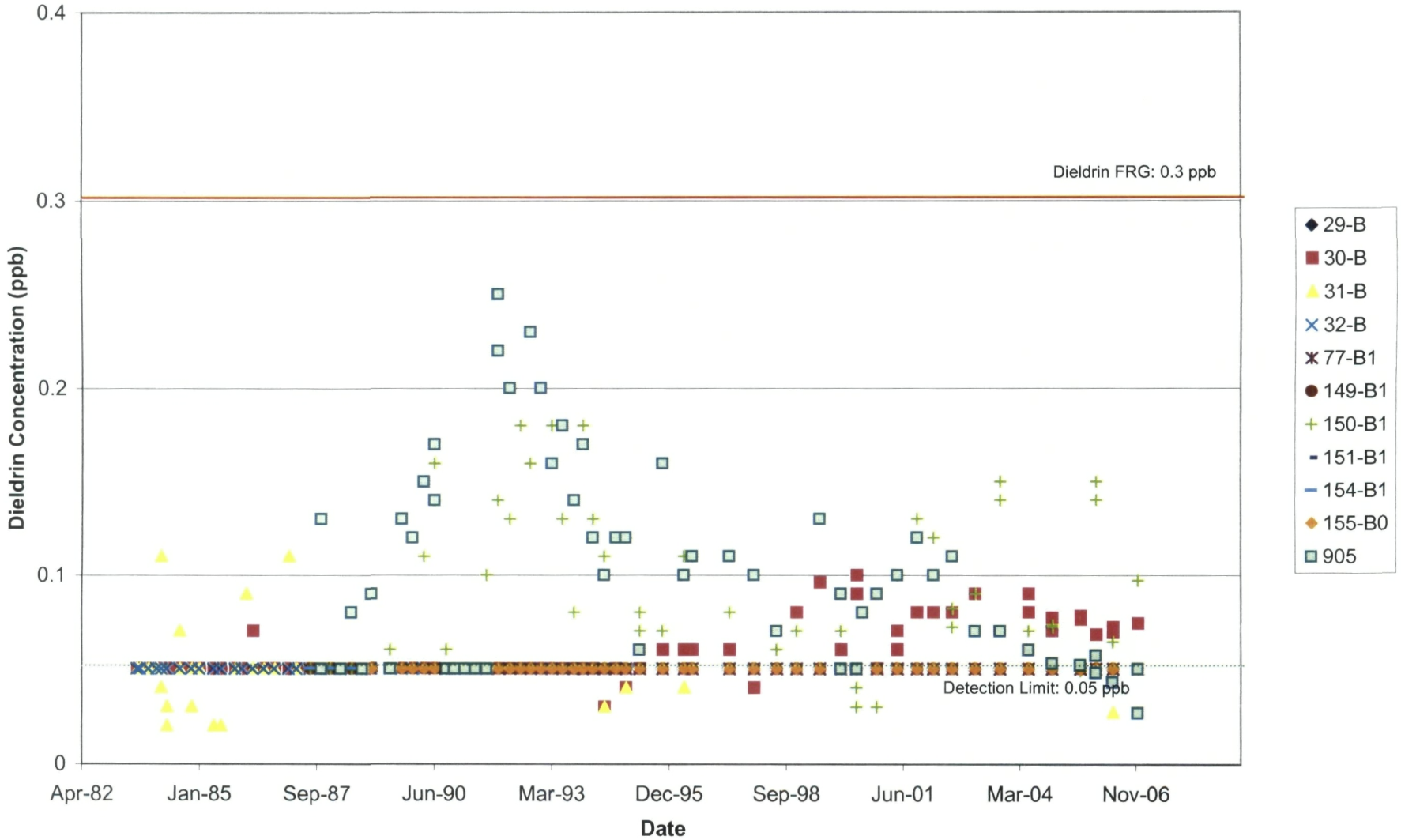


Figure F-4: Dieldrin in B-Zone, Offsite Wells

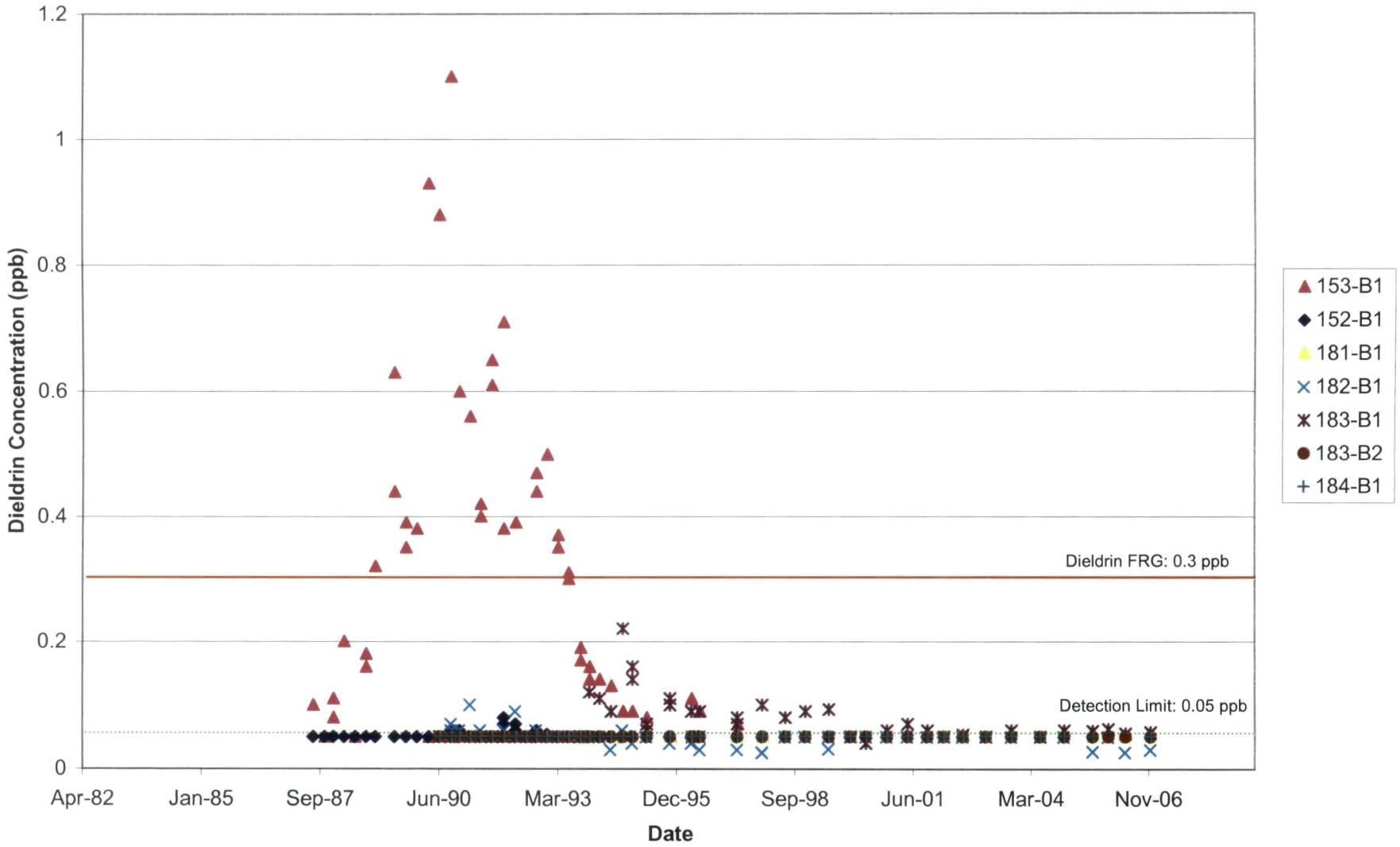


Figure F-5: Dieldrin in C-Zone, Onsite/Nearsite Wells

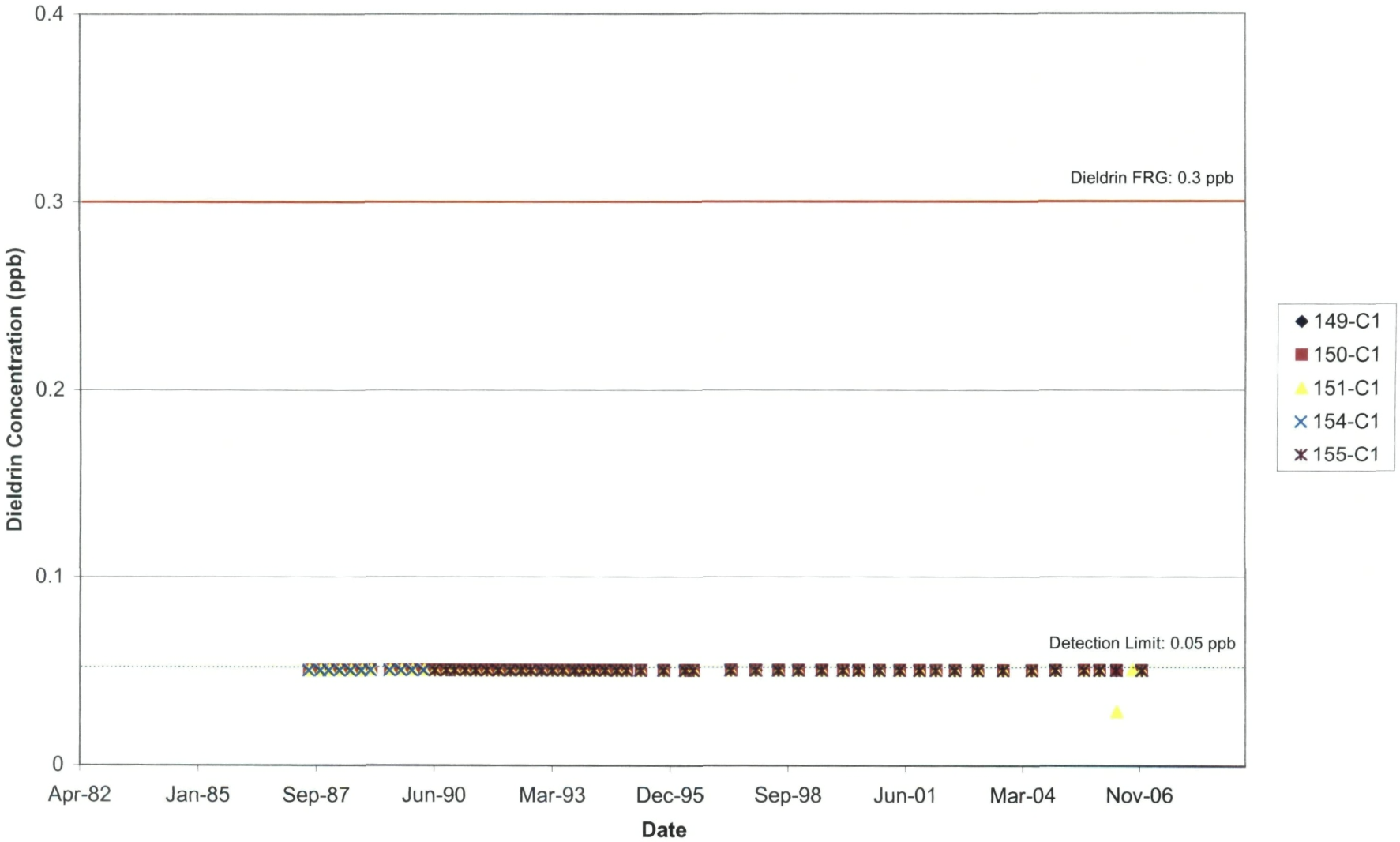


Figure F-6: Dieldrin in C-Zone, Offsite Wells

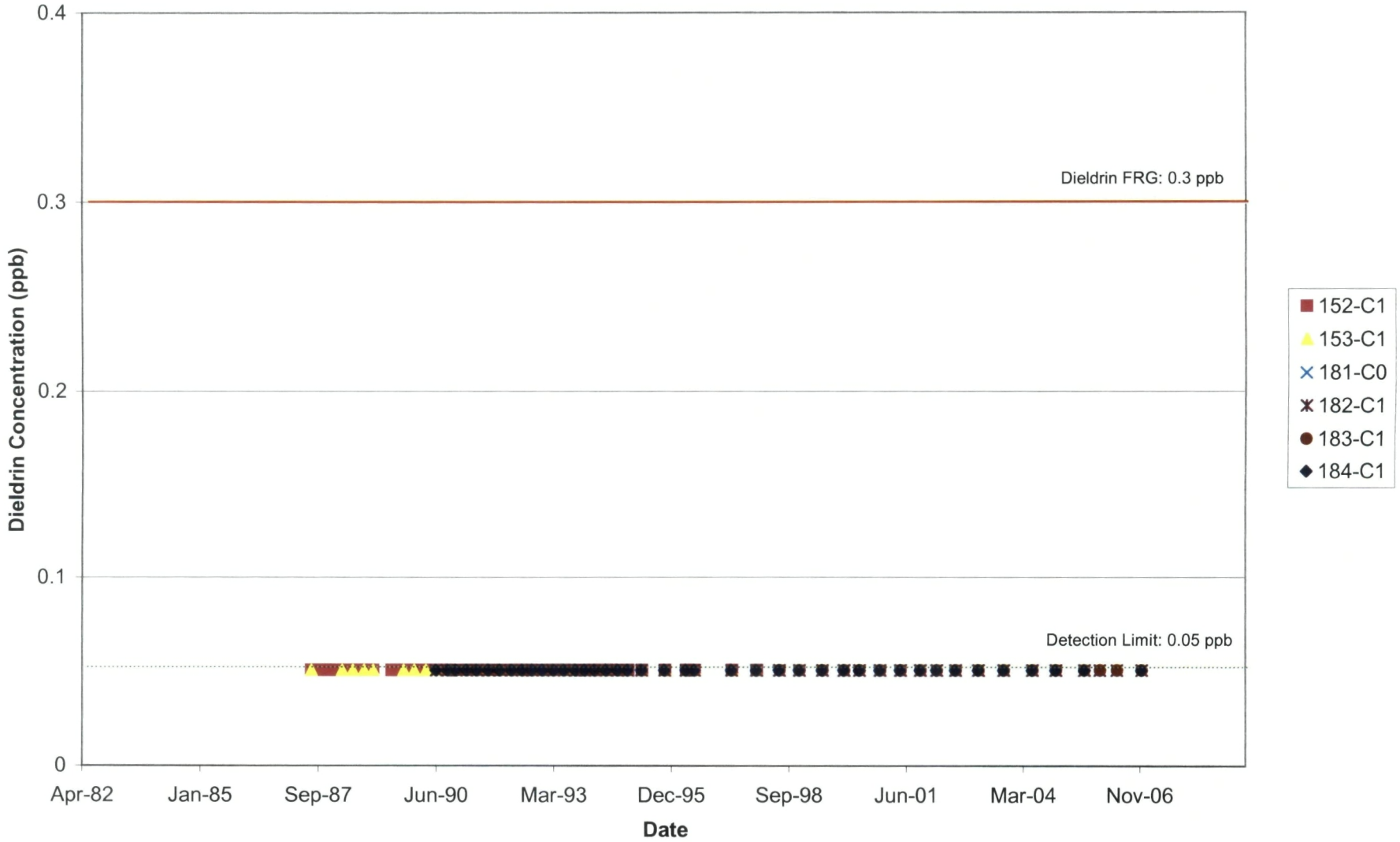


Figure F-7: Dieldrin in D-Zone, Offsite Wells

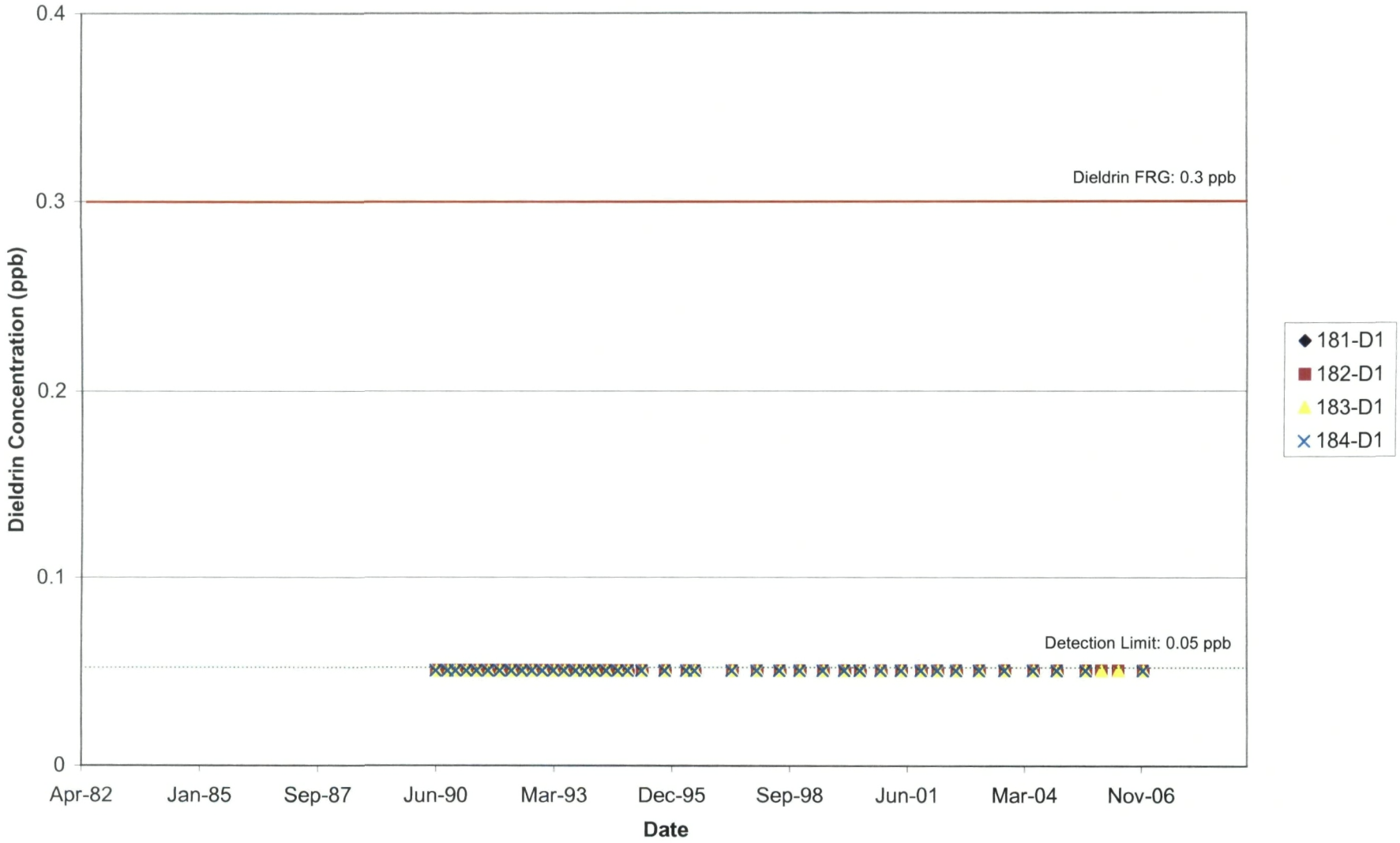


Figure F-8: Dieldrin in Domestic Offsite Wells

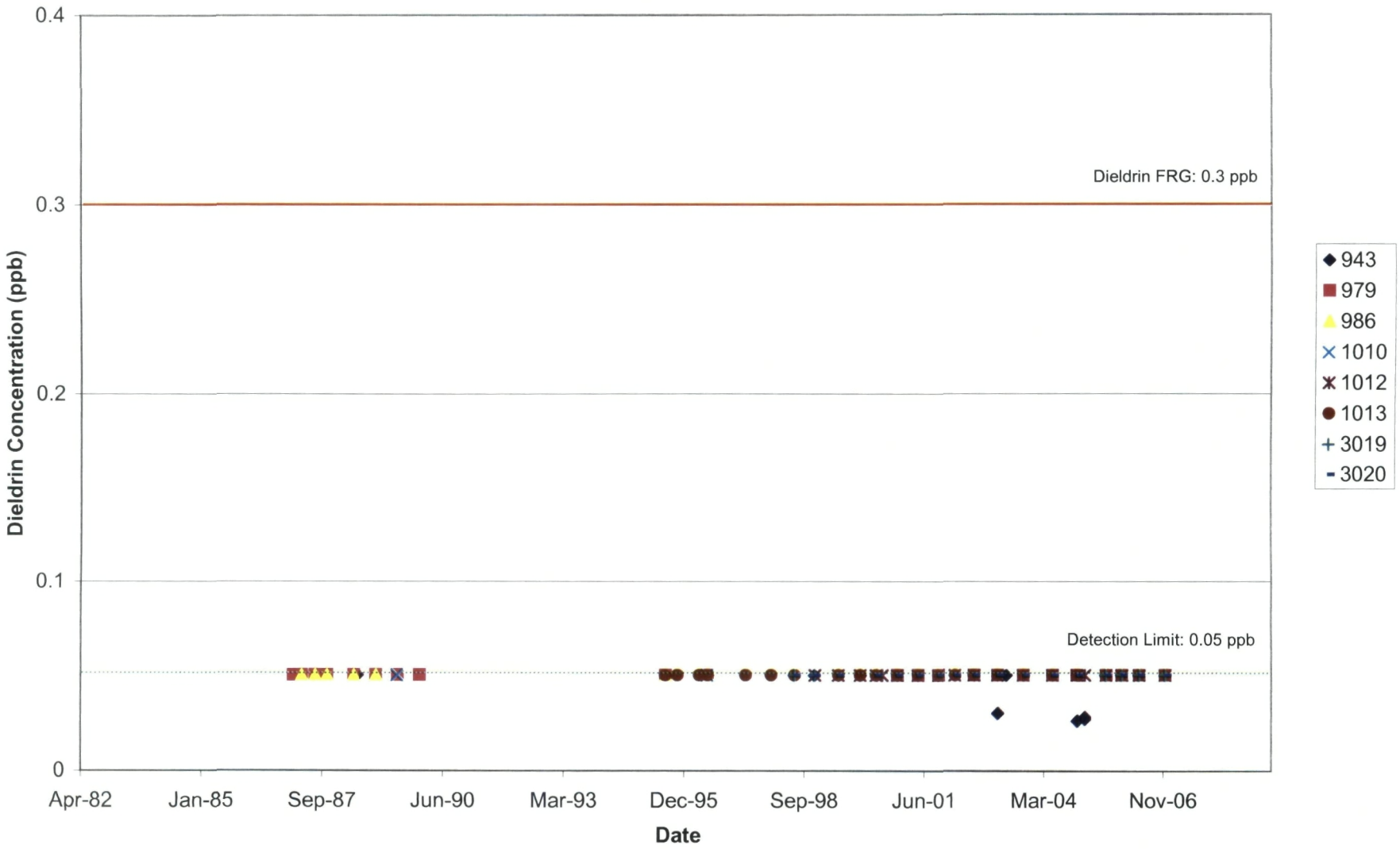


Figure F-9: Dieldrin in Proposed Domestic Wells (1005, 1017 and 1021)

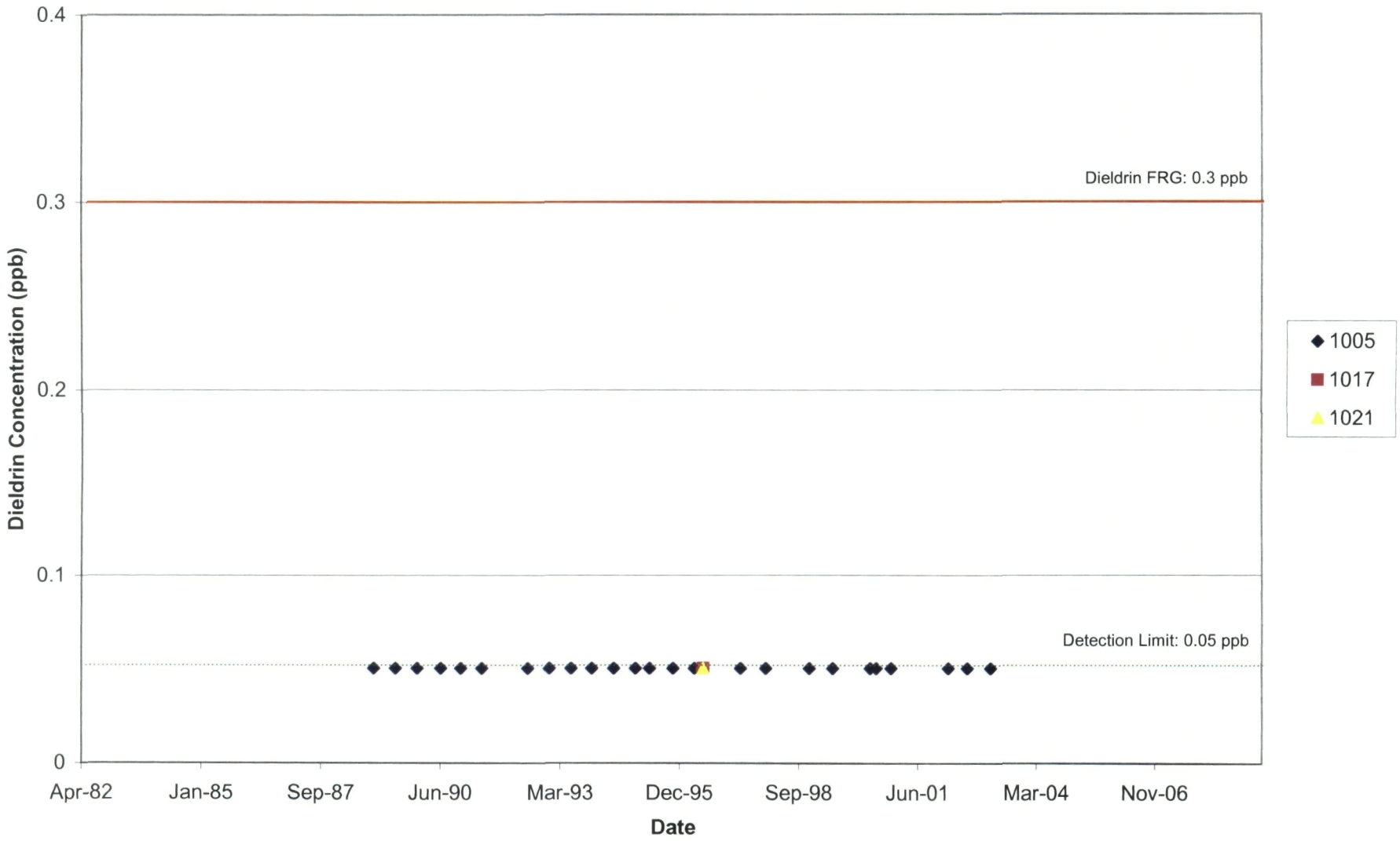


Figure F-10: Chloroform in A-Zone, Onsite/Nearsite Wells

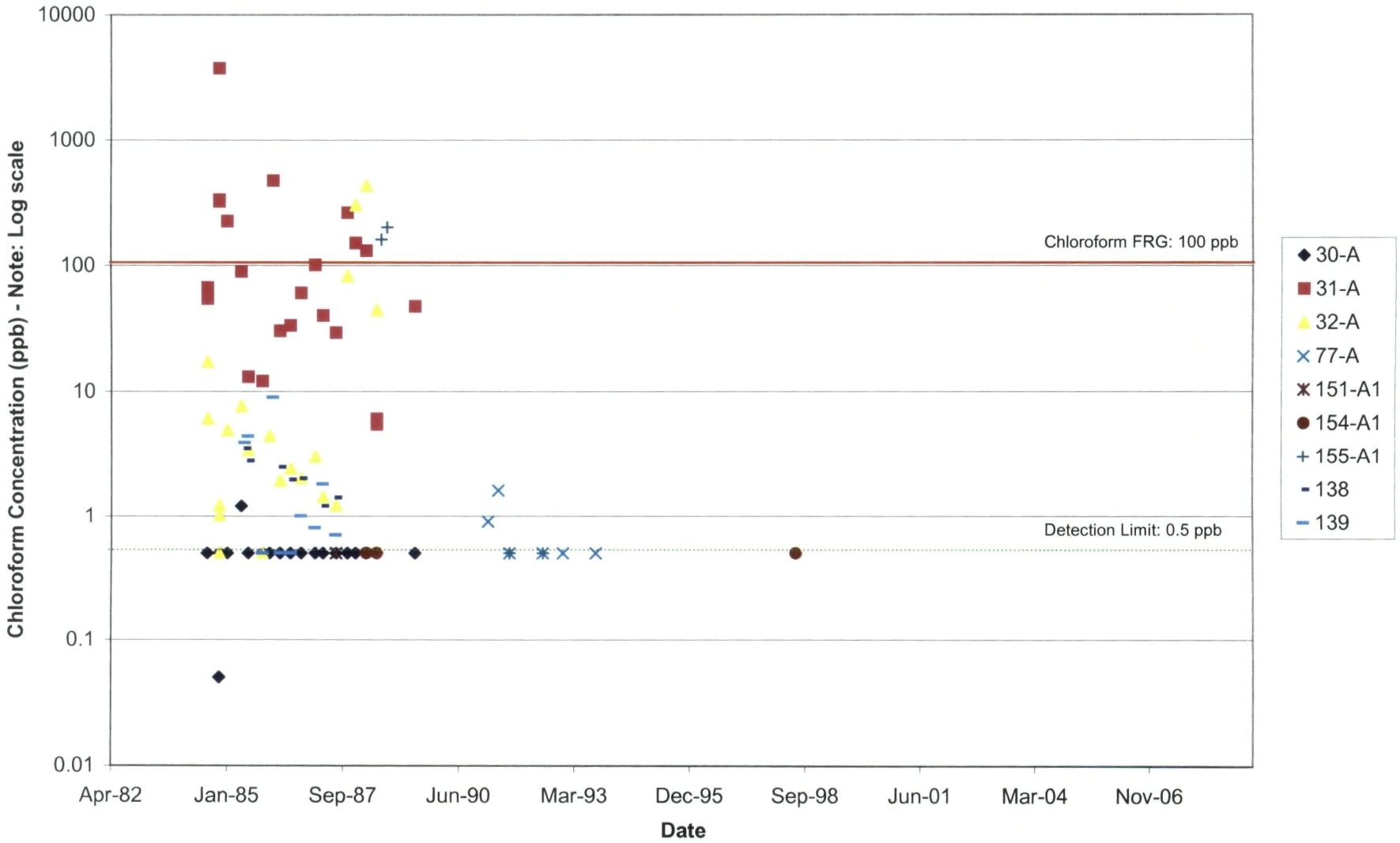


Figure F-11: Chloroform in A-Zone, Offsite Wells

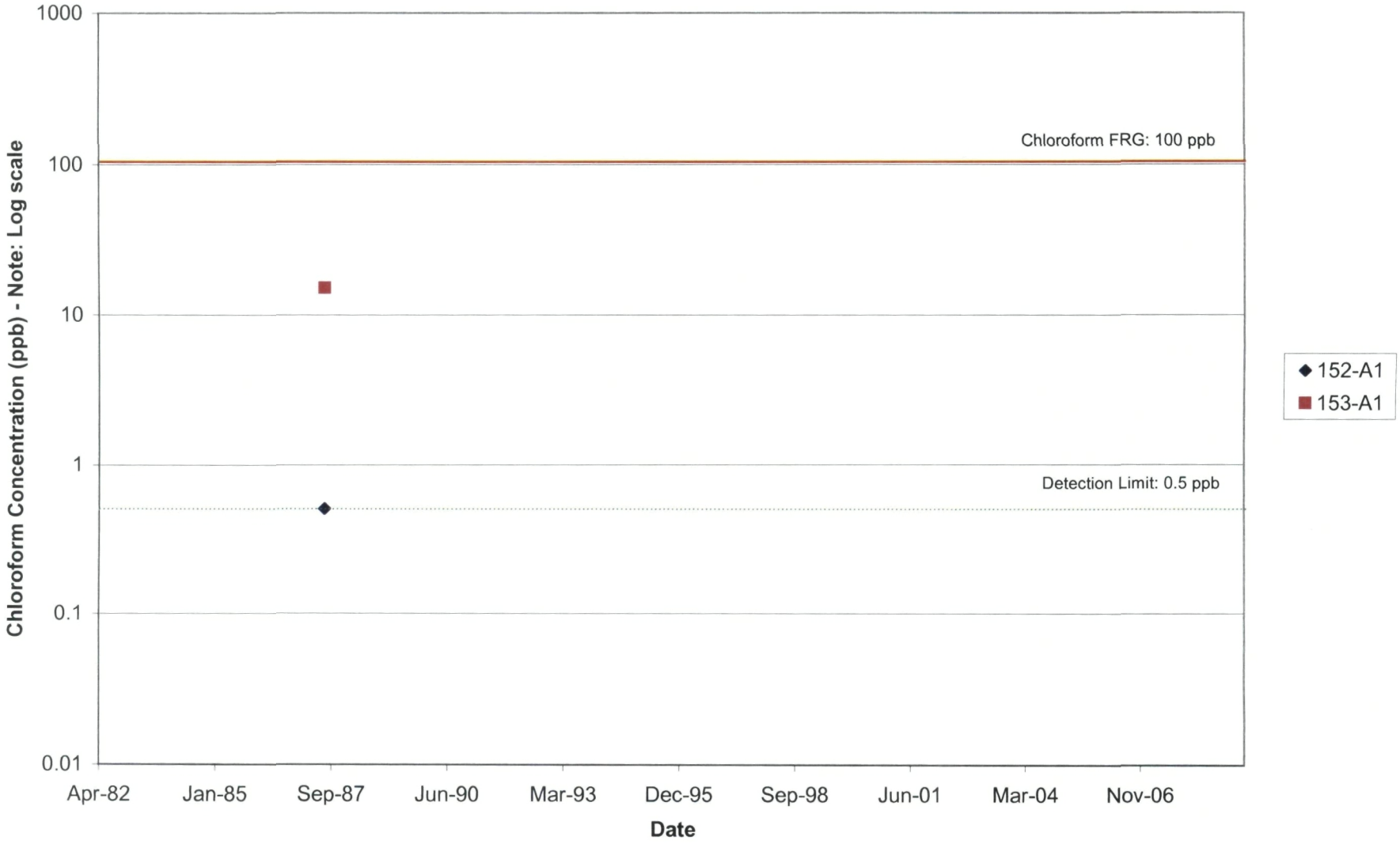


Figure F-12: Chloroform in B-Zone, Onsite/Nearsite Wells

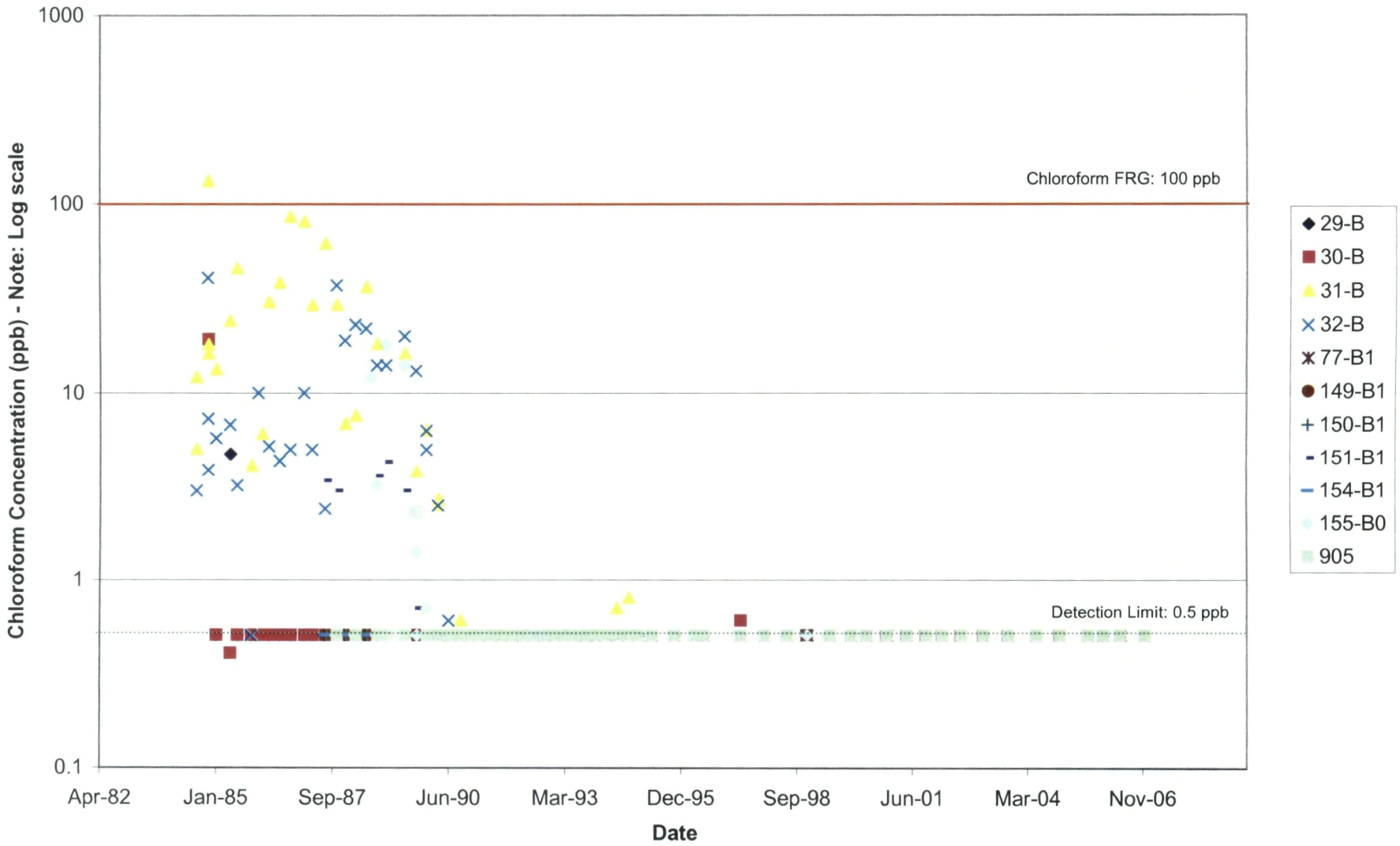


Figure F-13: Chloroform in B-Zone, Offsite Wells

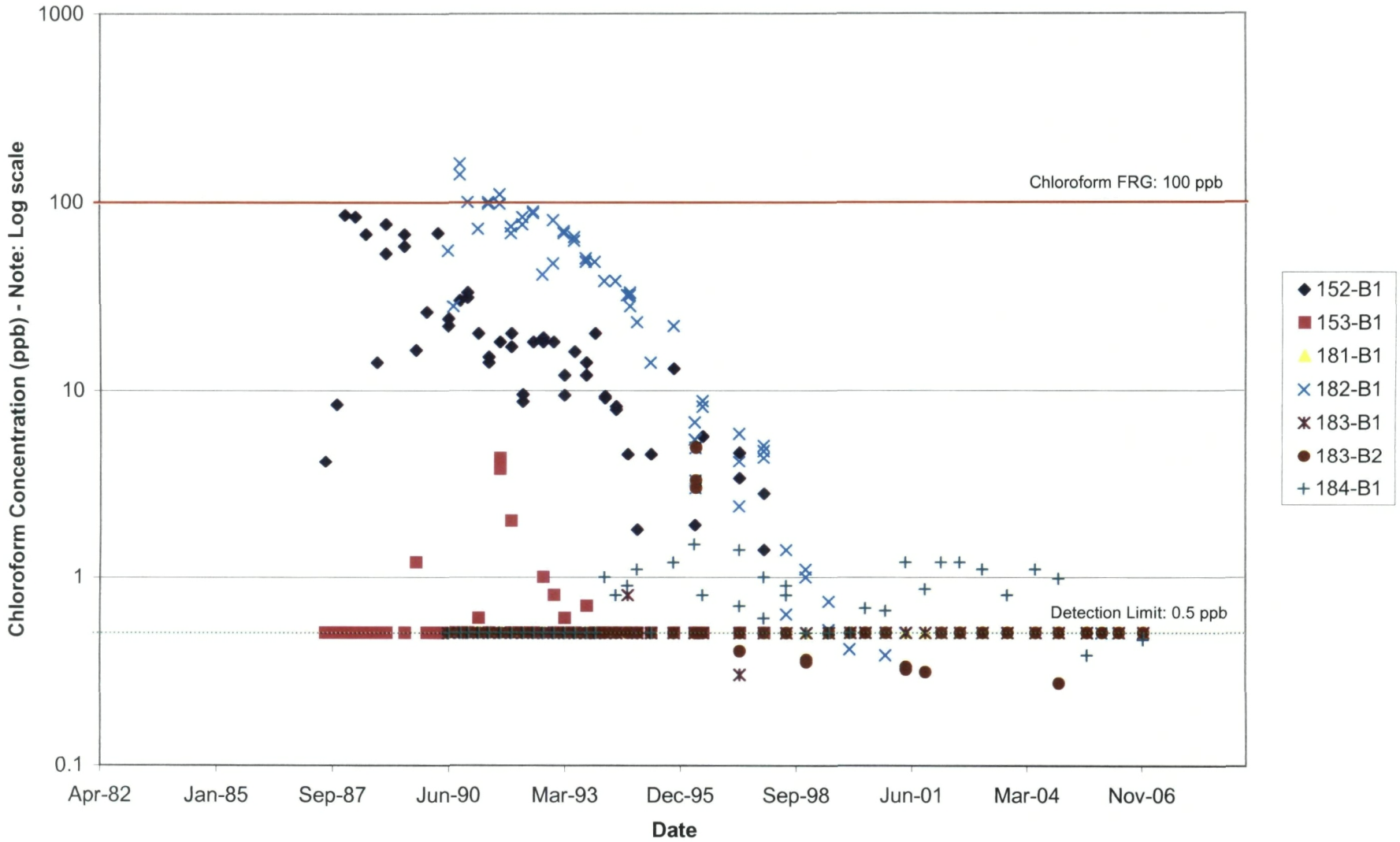


Figure F-14: Chloroform in C-Zone, Onsite/Nearsite Wells

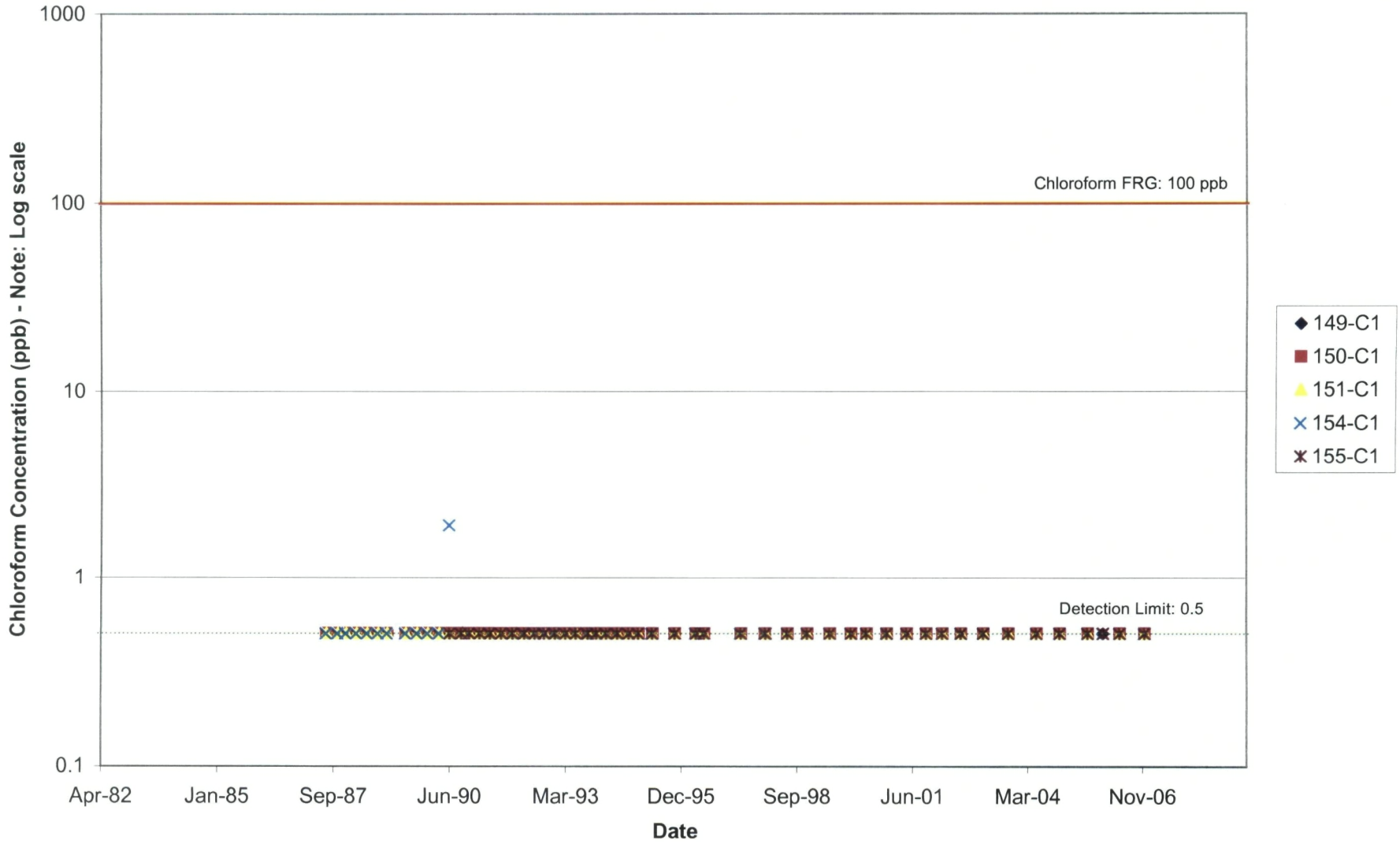


Figure F-15: Chloroform in C-Zone, Offsite Wells

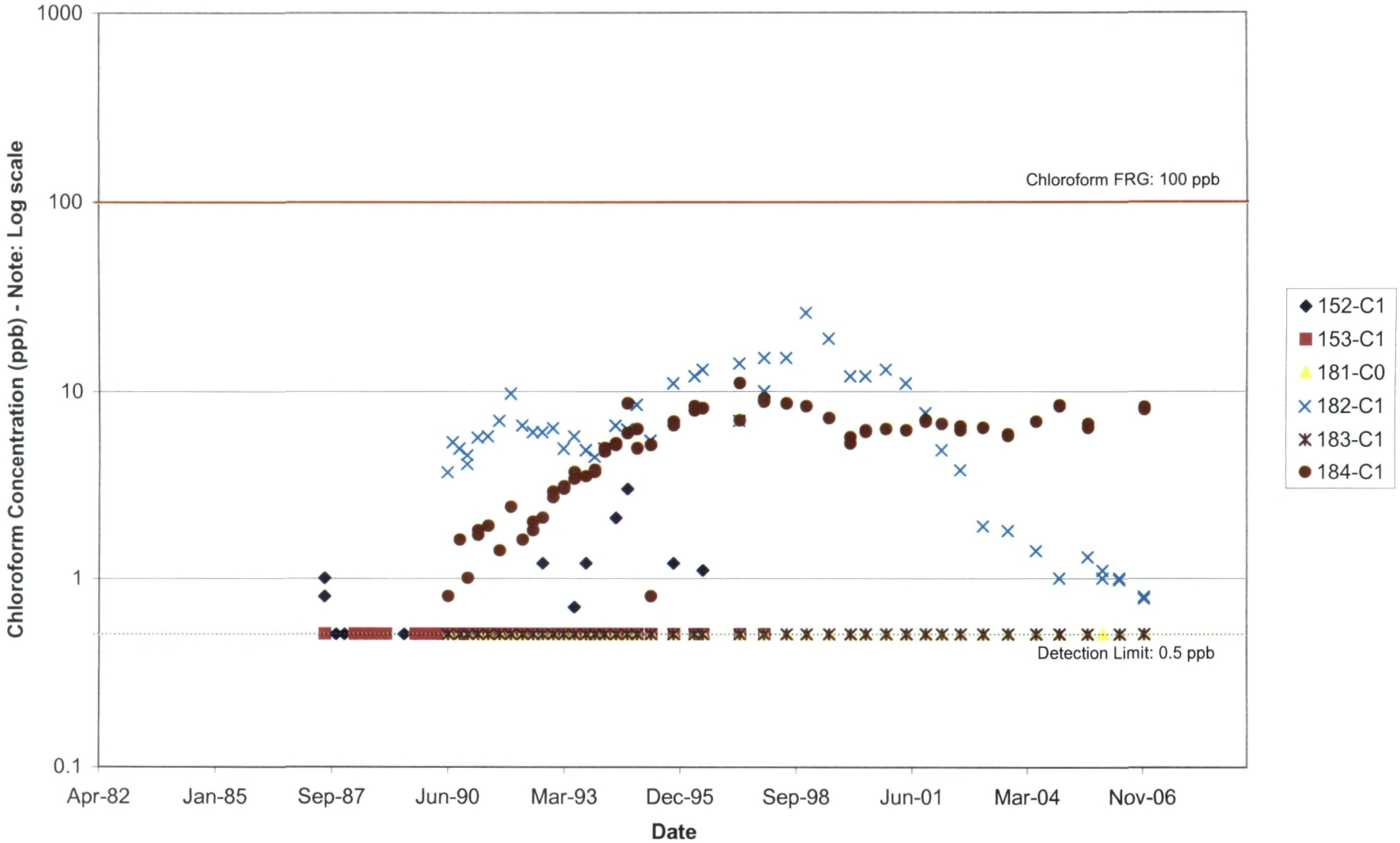


Figure F-16: Chloroform in D-Zone, Offsite Wells

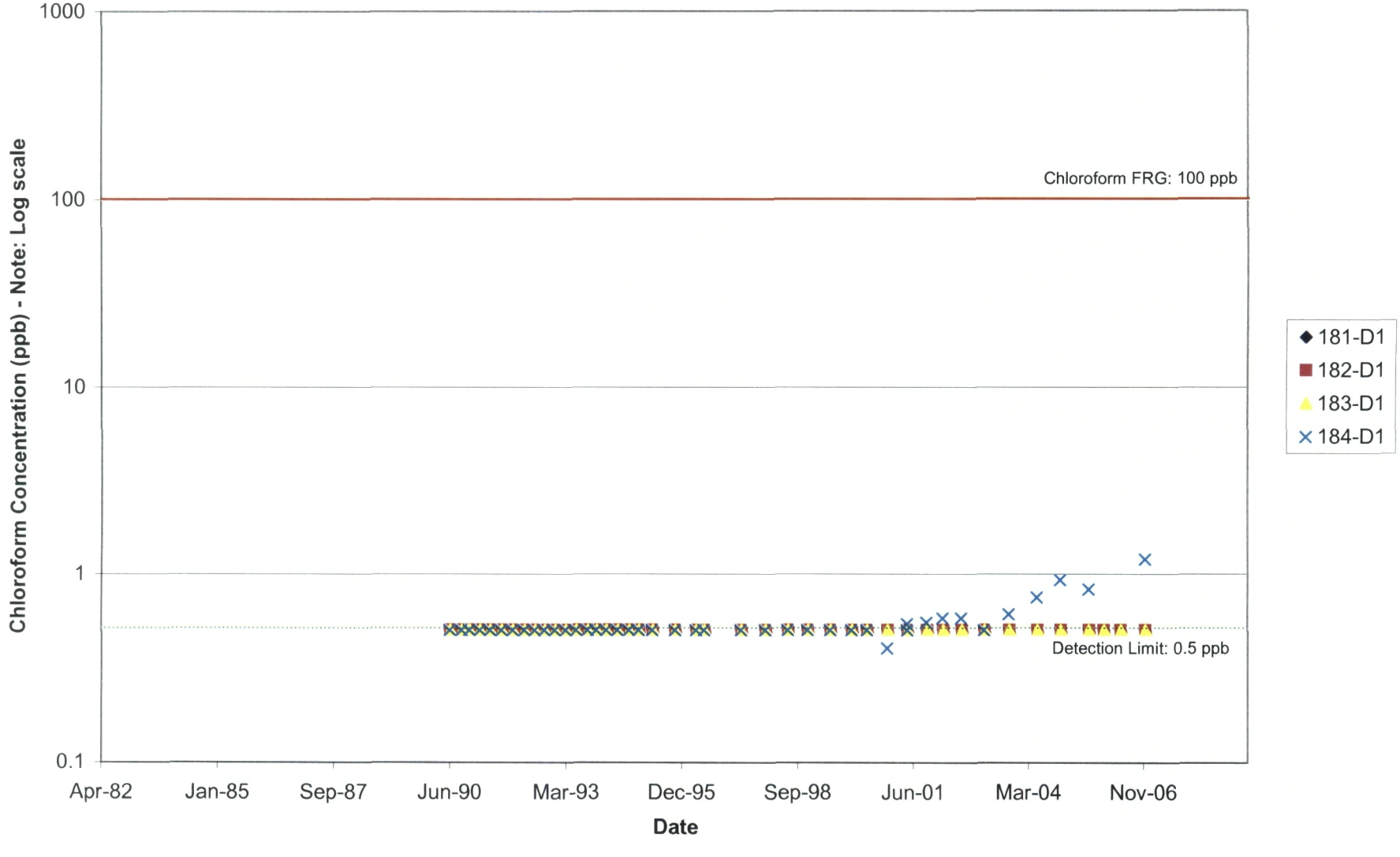


Figure F-17: Chloroform in Domestic Offsite Wells

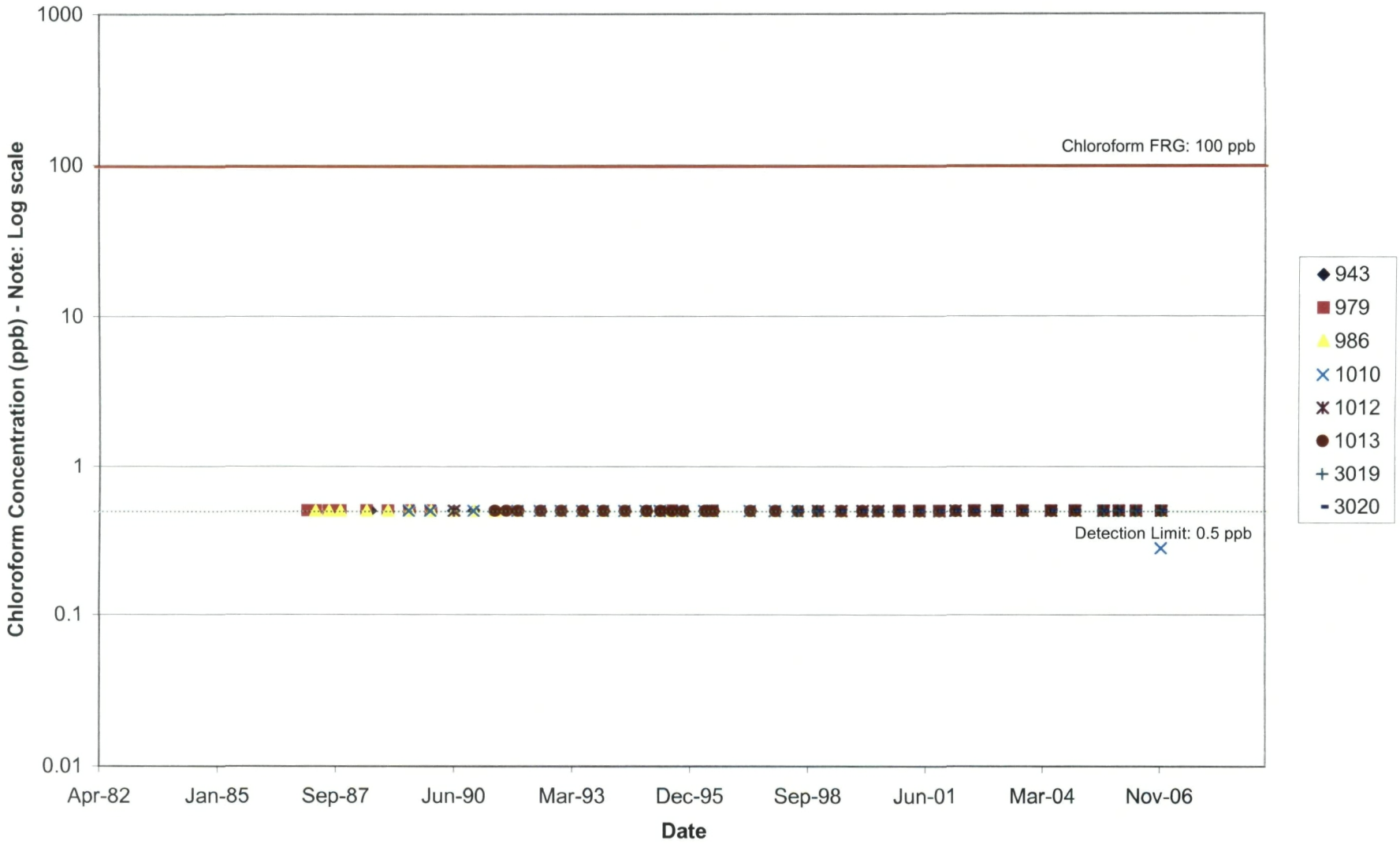


Figure F-18: Chloroform in Proposed Domestic Wells (1005, 1017, and 1021)

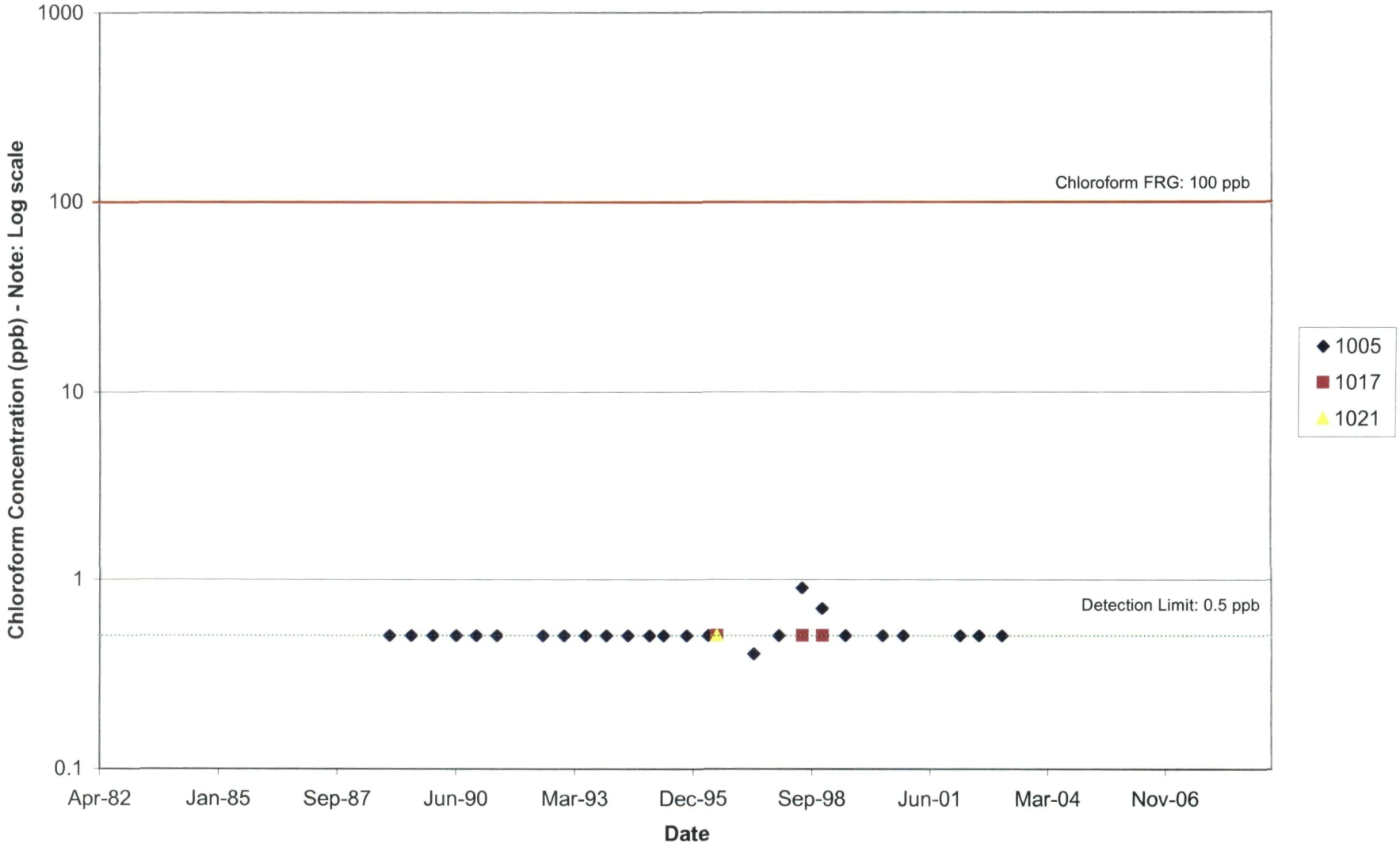


Figure F-19: 1,2-DCA in A-Zone, Onsite/Nearsite Wells

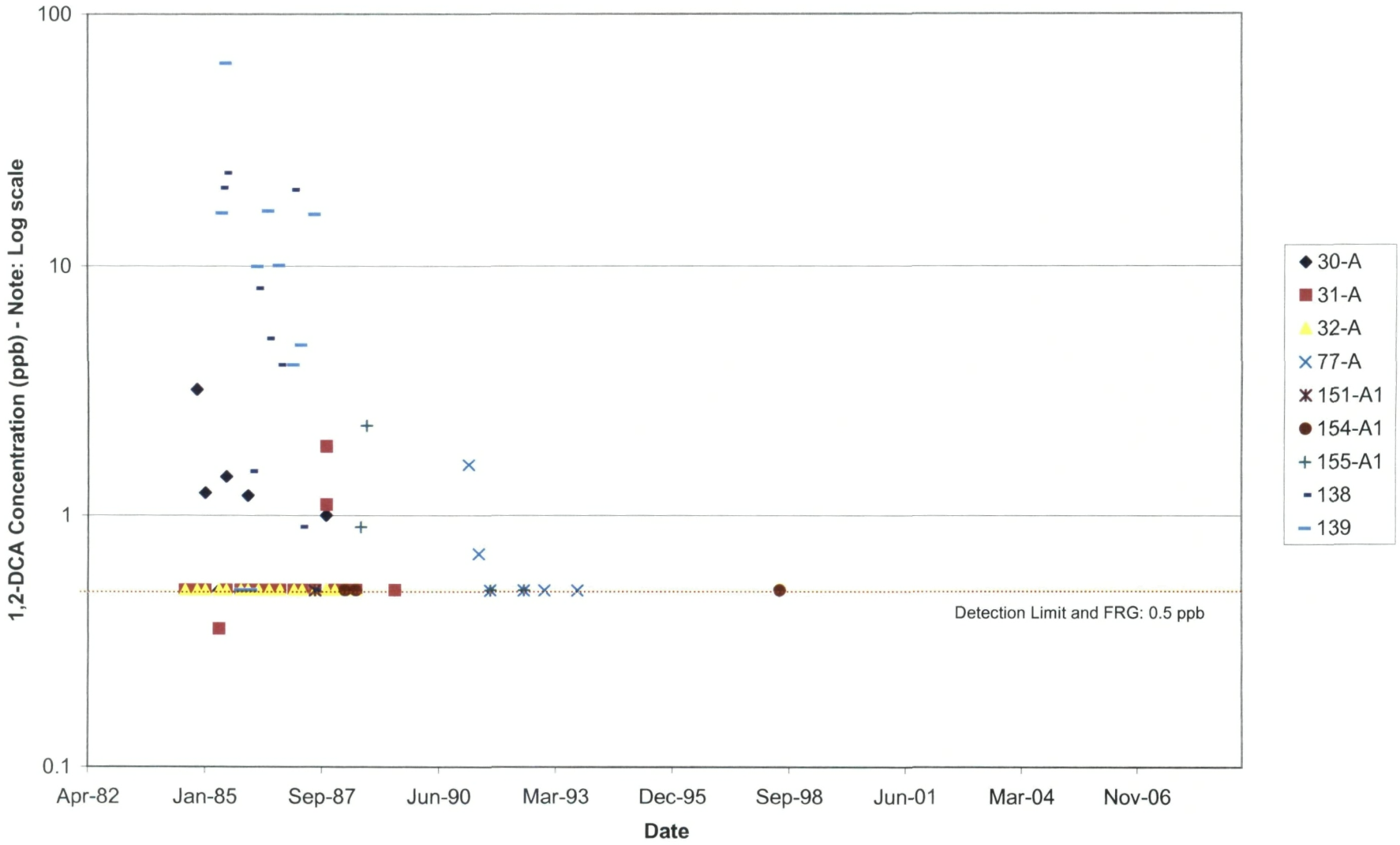


Figure F-20: 1,2-DCA in A-Zone, Offsite Wells

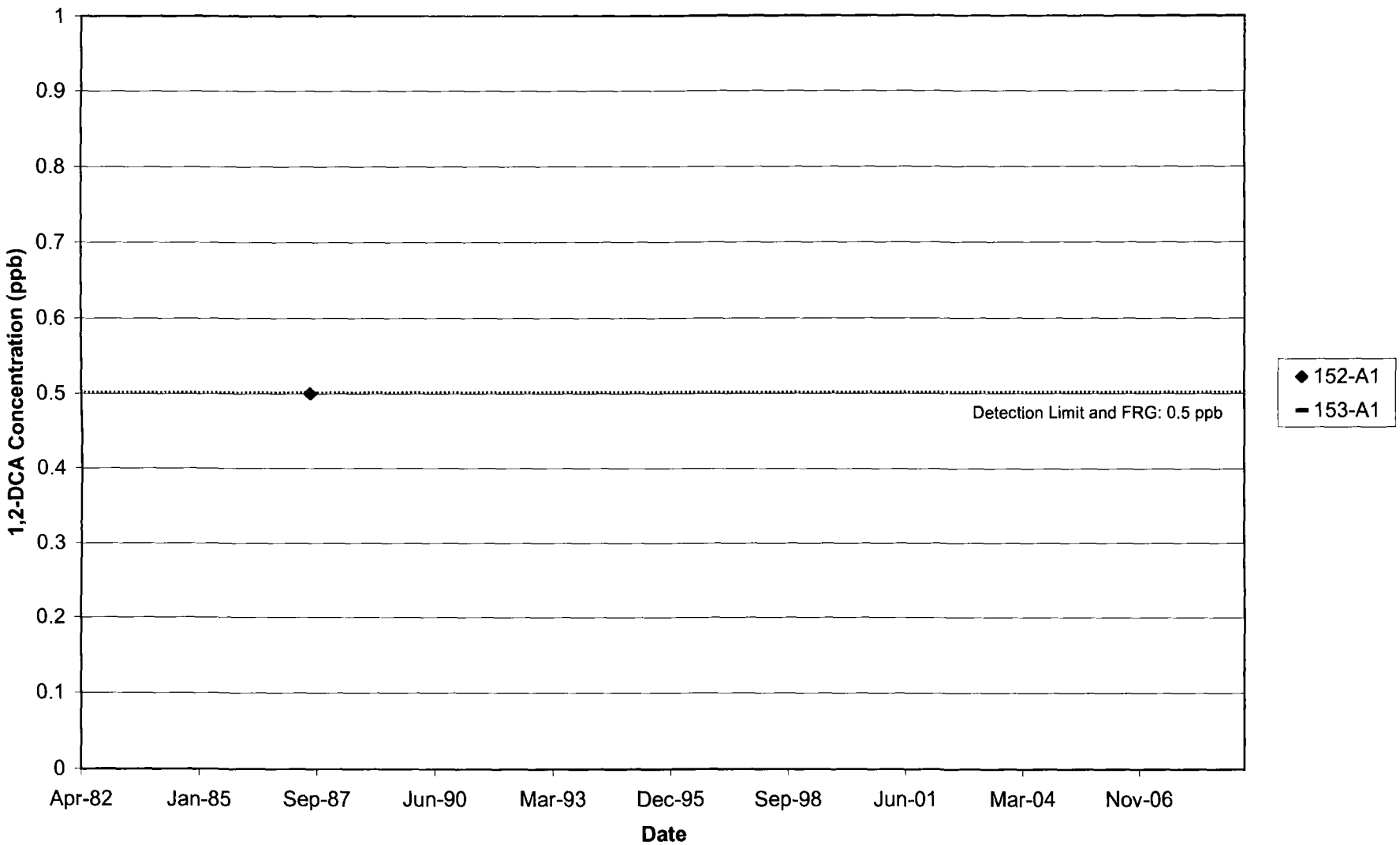


Figure F-21: 1,2-DCA in B-Zone, Onsite/Nearsite Wells

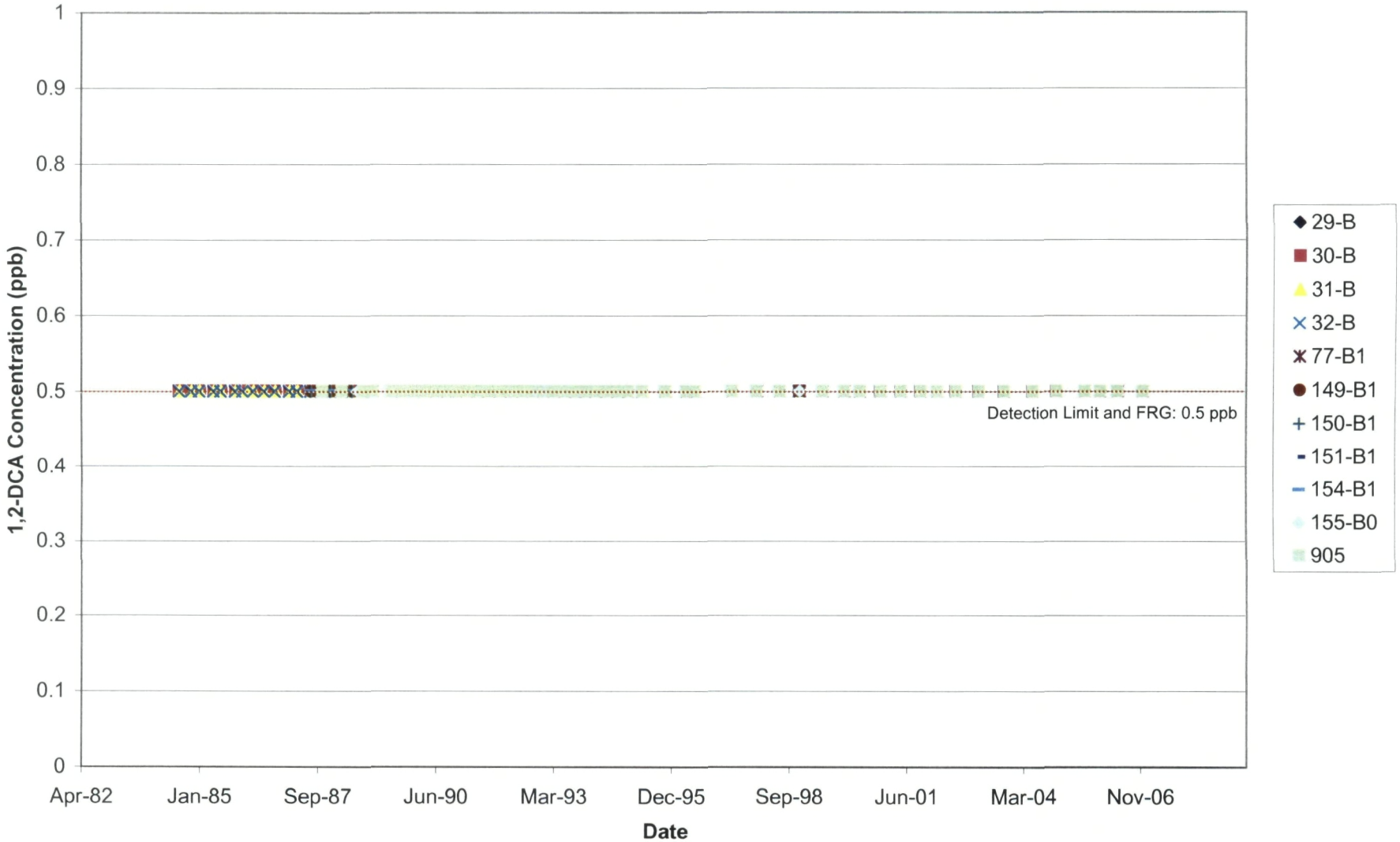


Figure F-22: 1,2-DCA in B-Zone, Offsite Wells

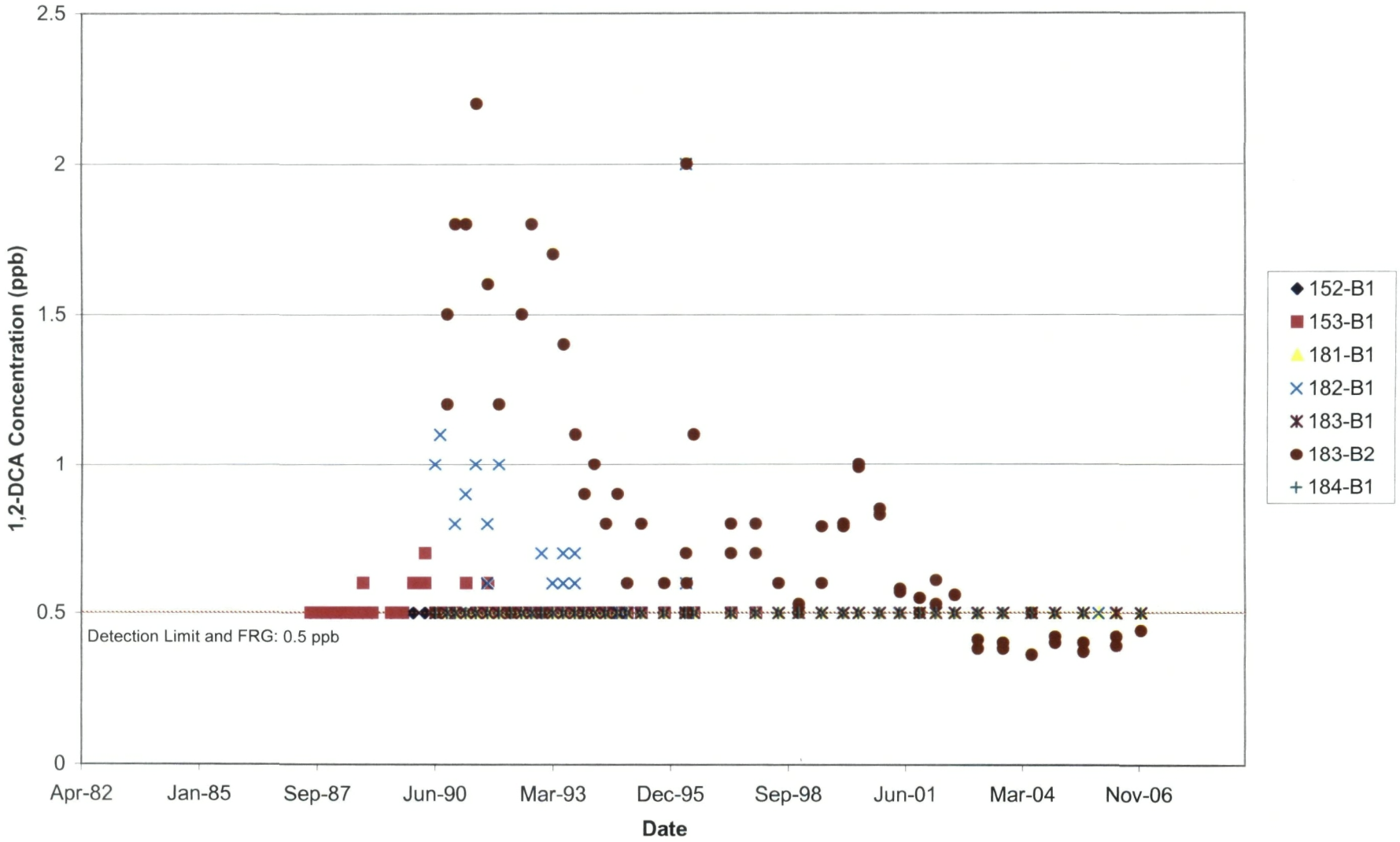


Figure F-23: 1,2-DCA in C-Zone, Onsite/Nearsite Wells

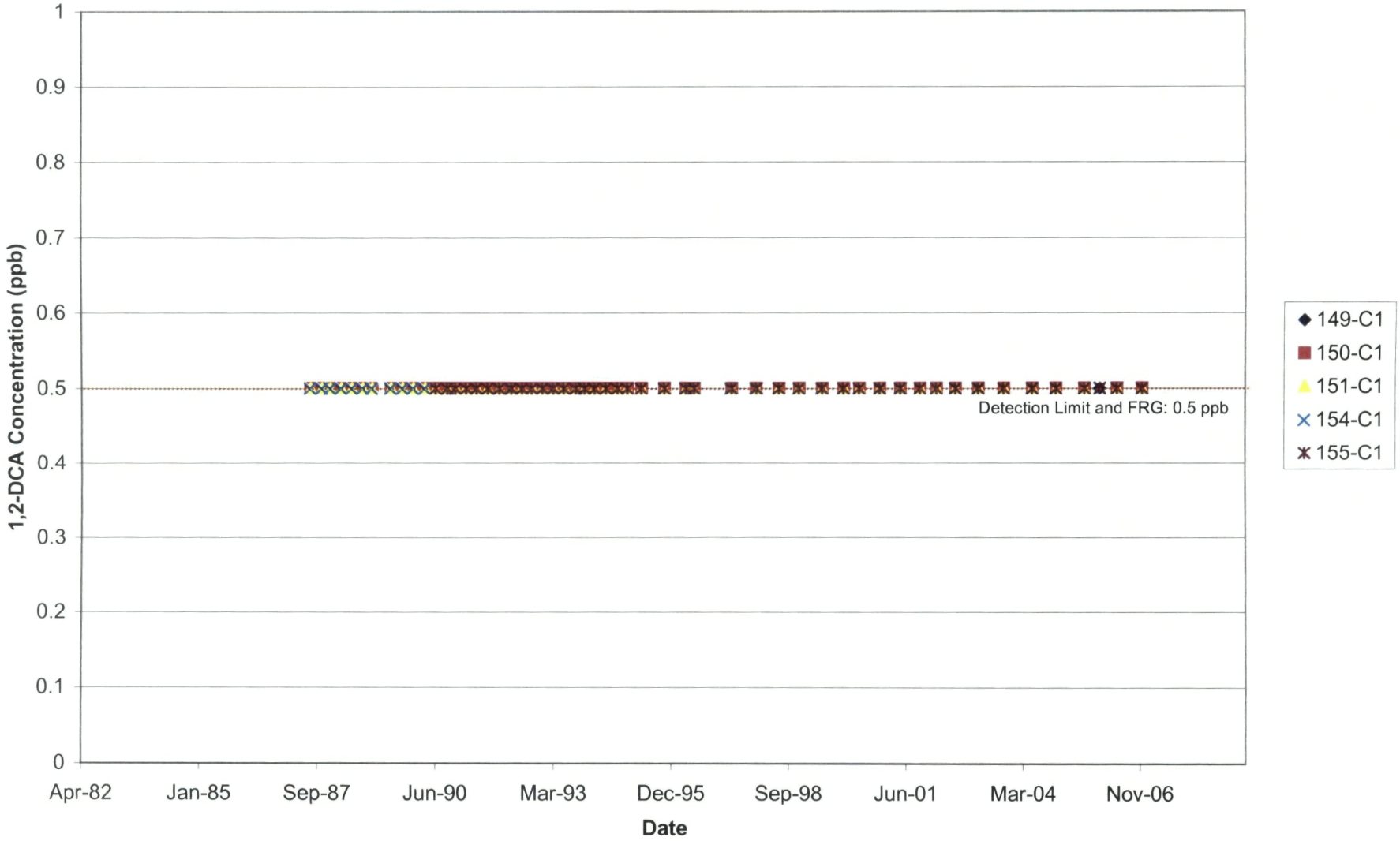


Figure F-24: 1,2-DCA in C-Zone, Offsite Wells

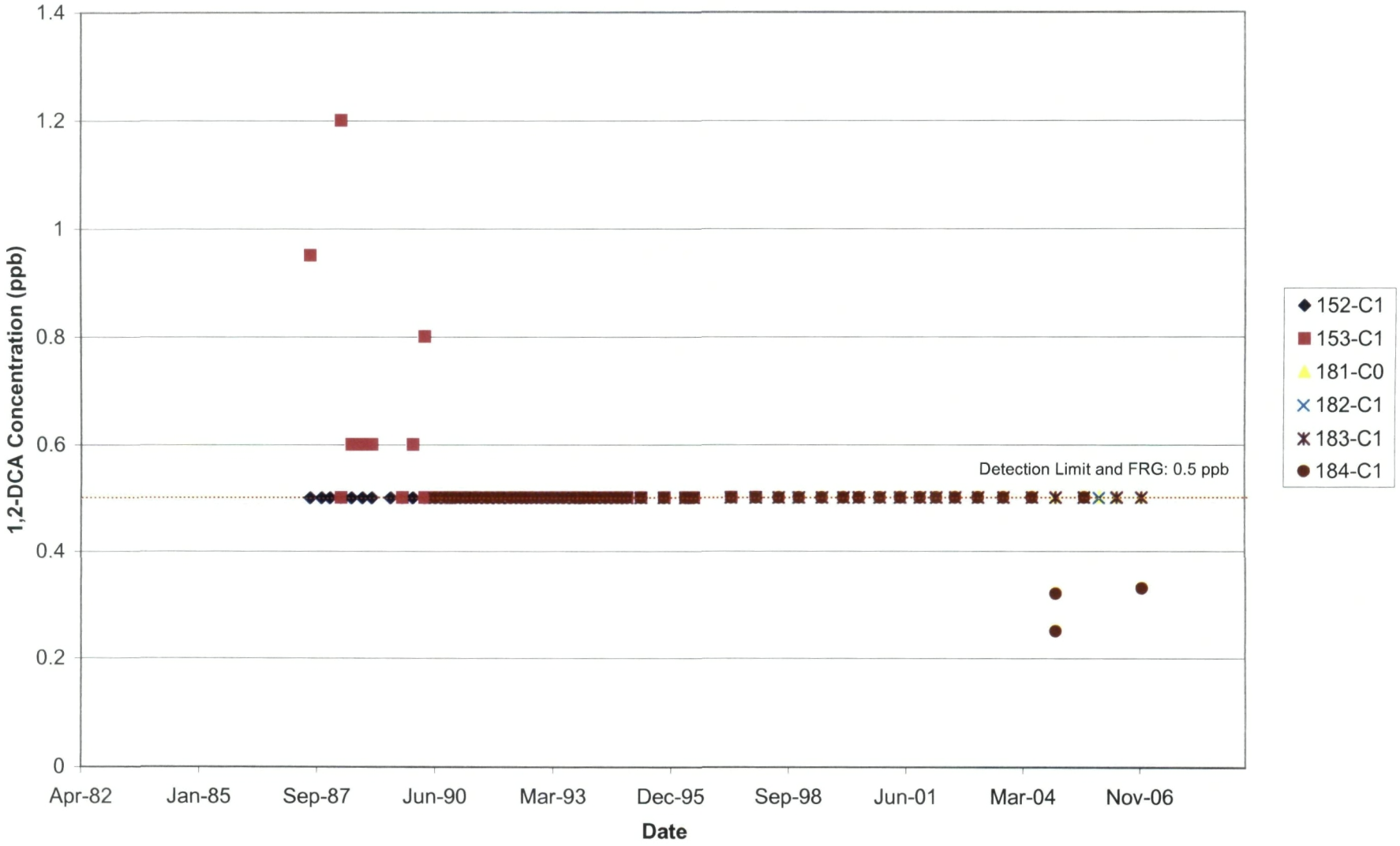


Figure F-25: 1,2-DCA in D-Zone, Offsite Wells

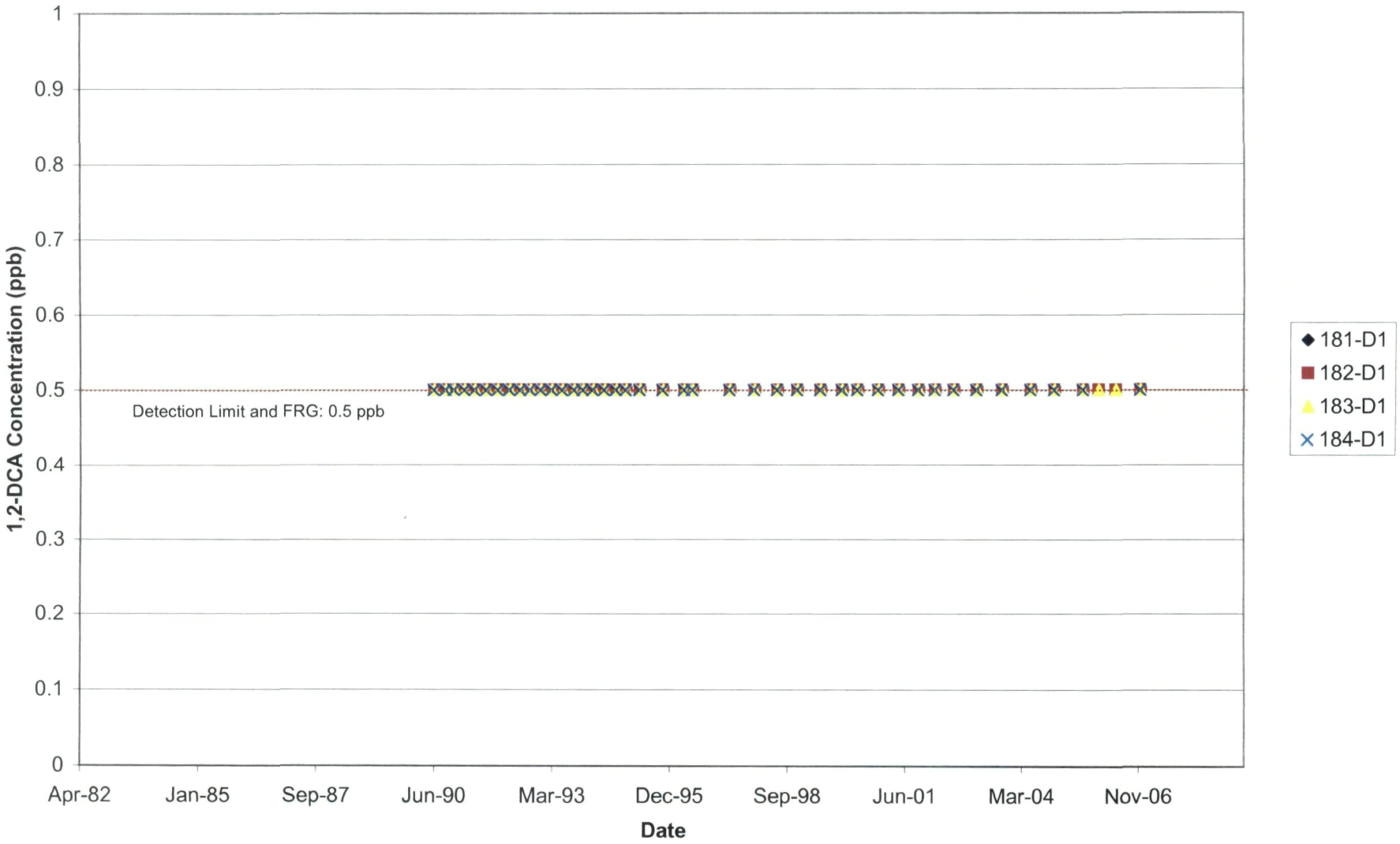


Figure F-26: 1,2-DCA in Domestic Offsite Wells

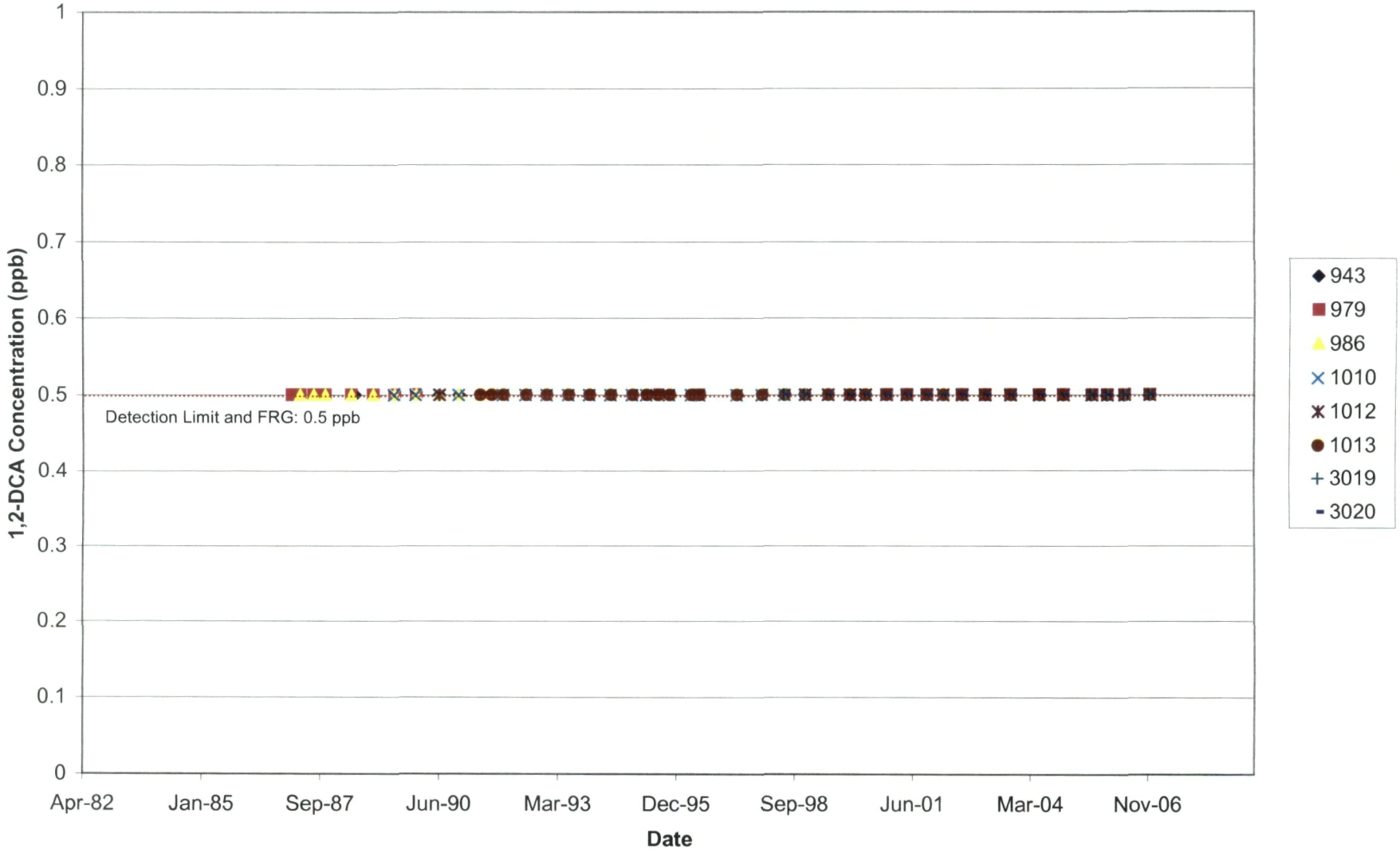


Figure F-27: 1,2-DCA in Proposed Additional Domestic Wells (1005, 1017, and 1021)

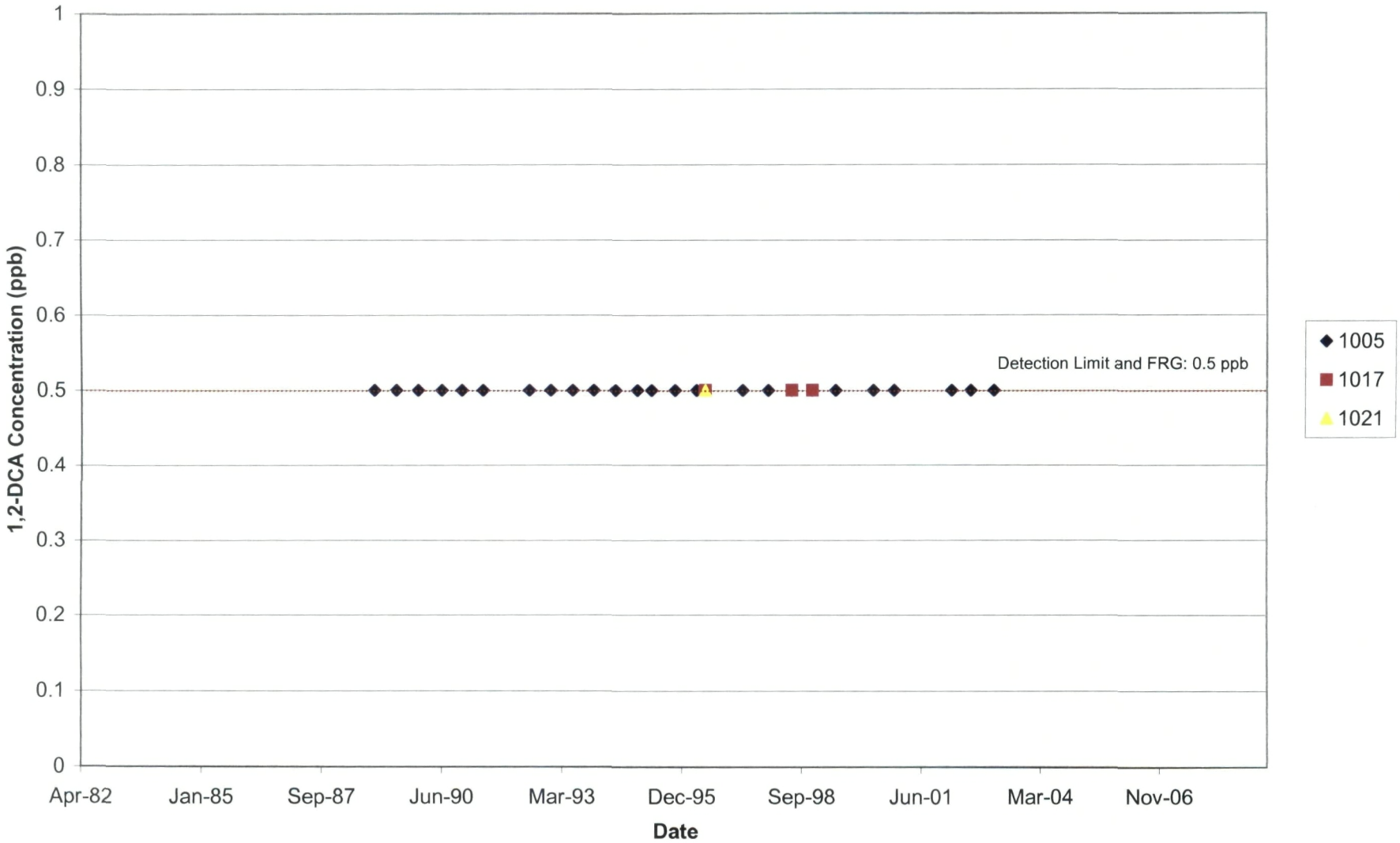


Figure F-28: Carbon Tetrachloride in A-Zone, Onsite/Nearsite Wells

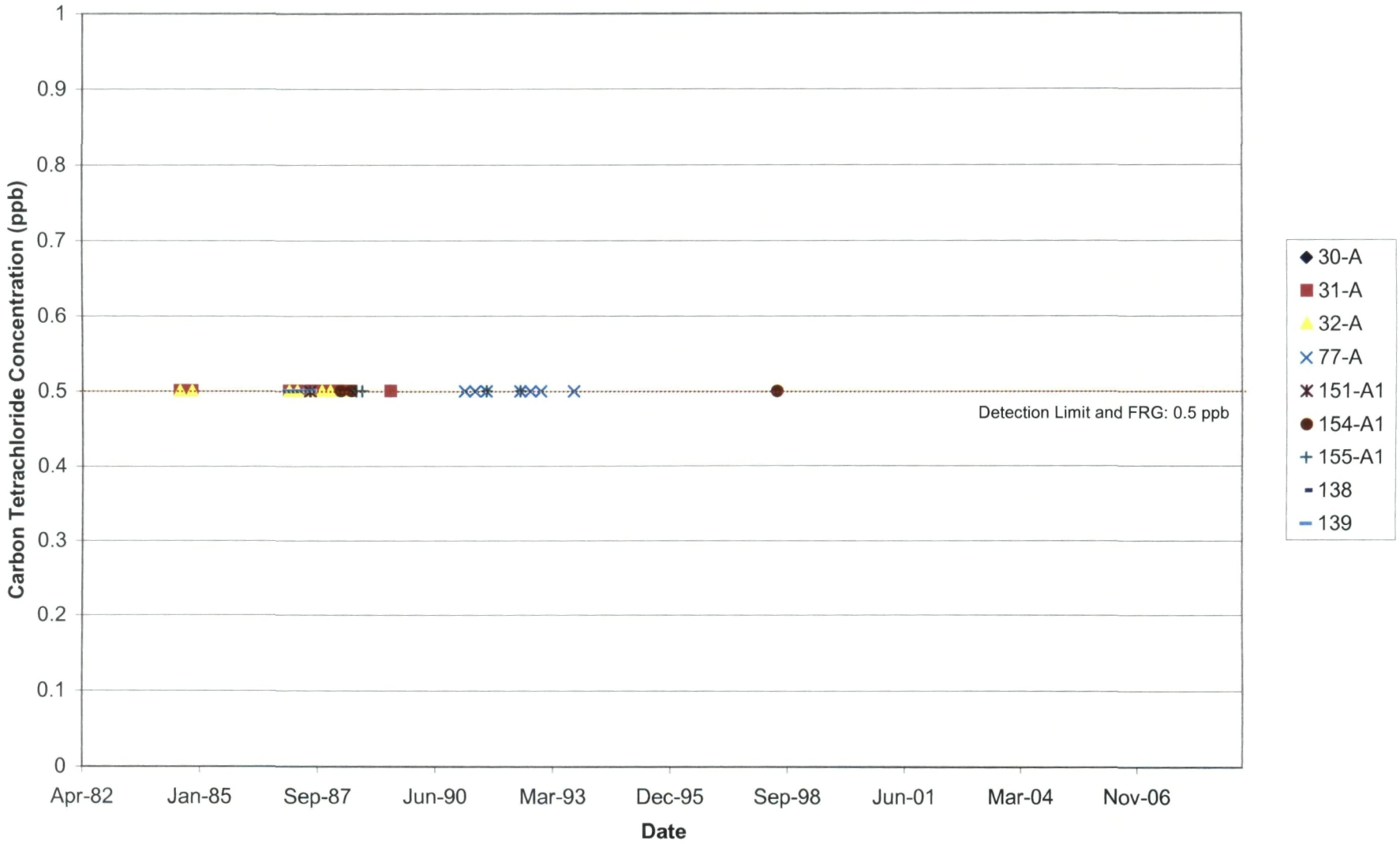


Figure F-29: Carbon Tetrachloride in A-Zone, Offsite Wells

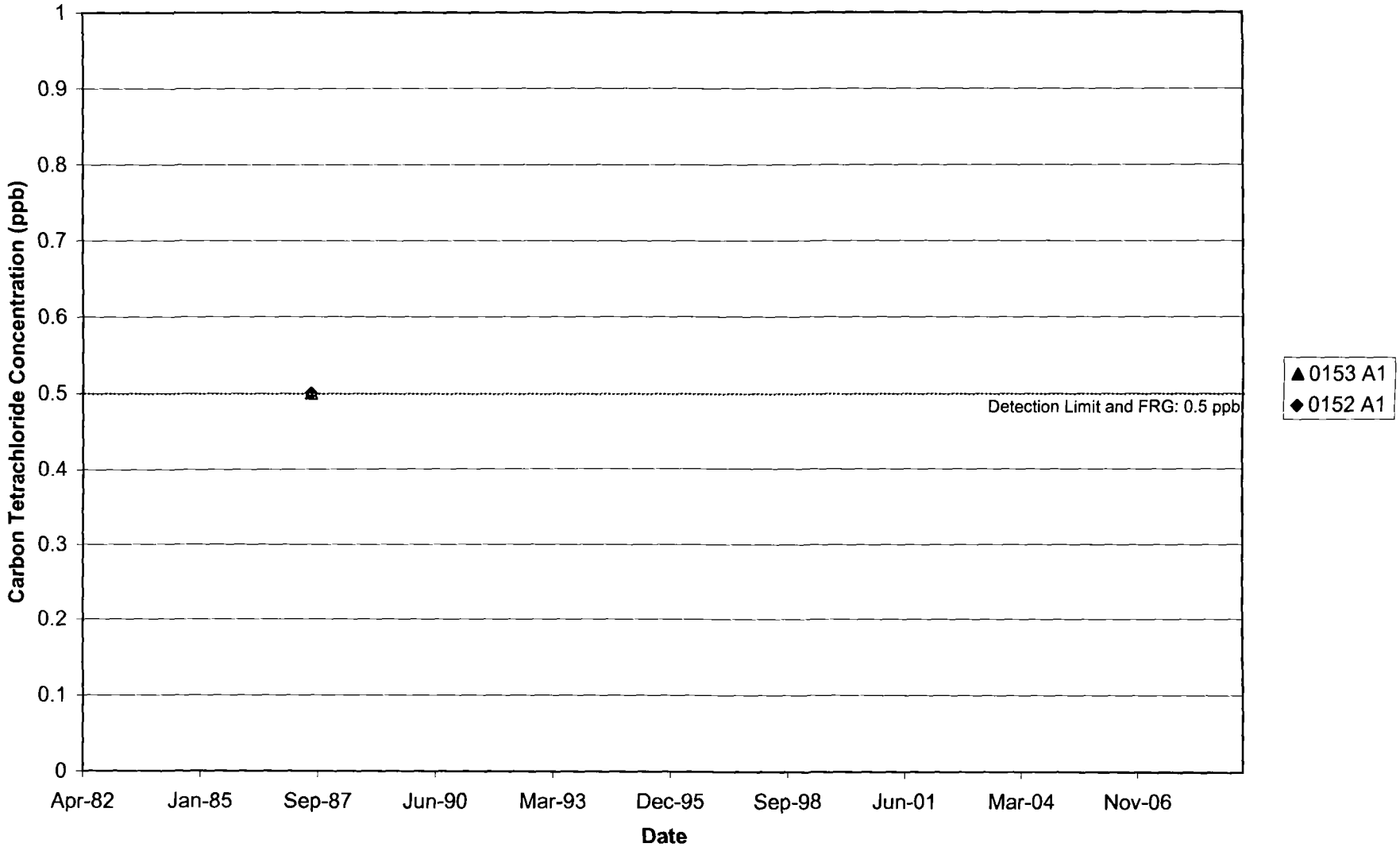


Figure F-30: Carbon Tetrachloride in B-Zone, Onsite/Nearsite Wells

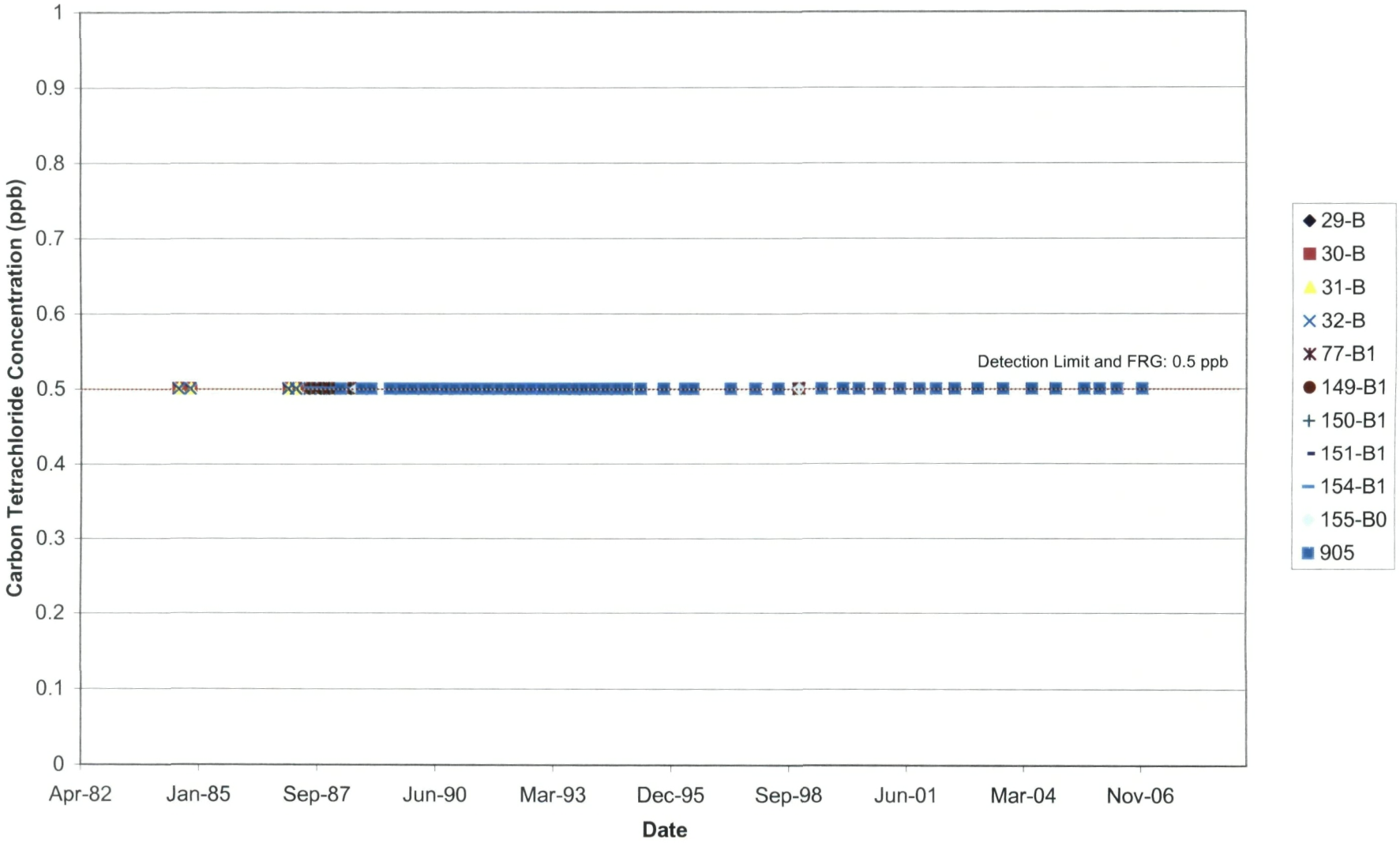


Figure F-31: Carbon Tetrachloride in B-zone, Offsite Wells

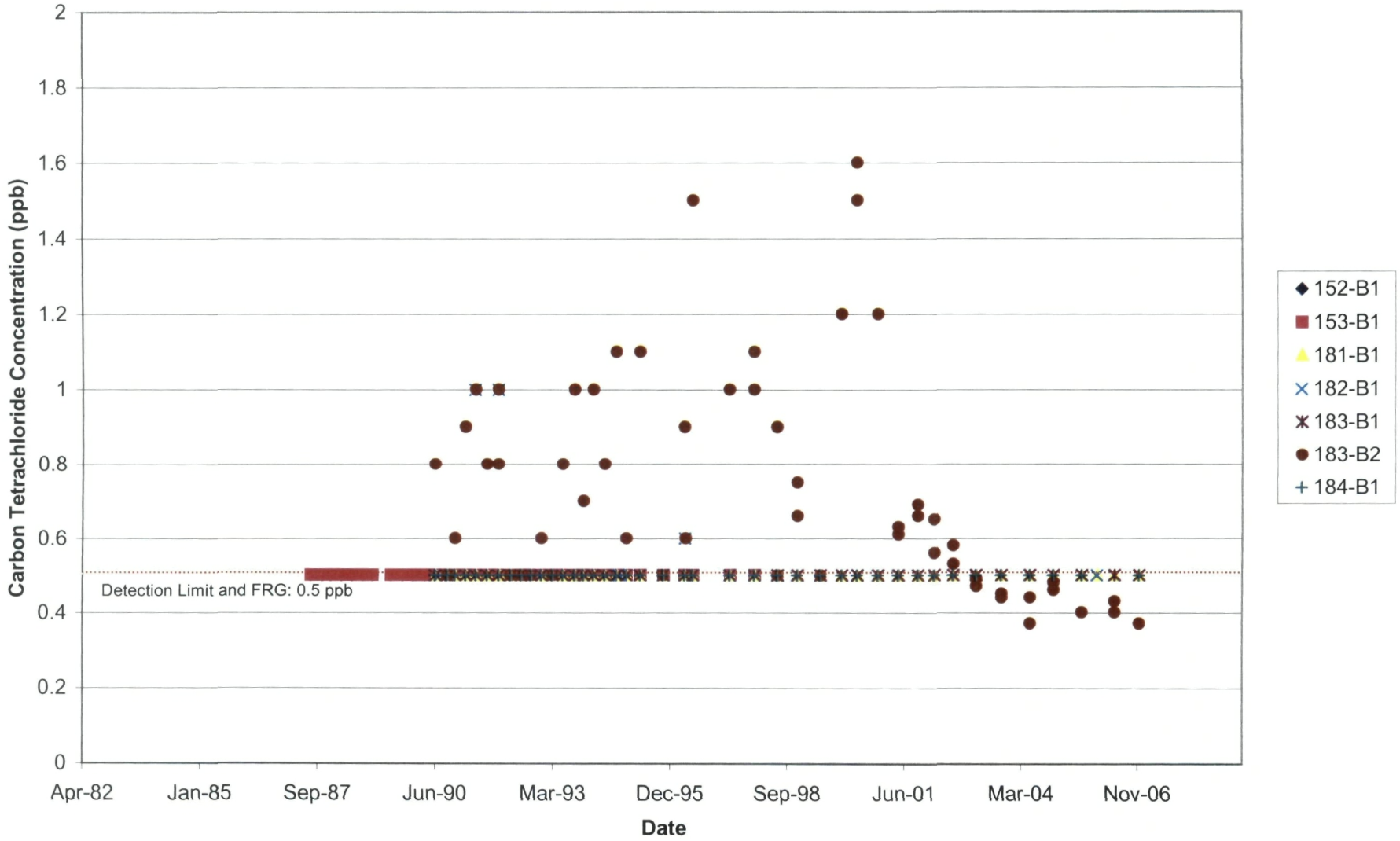


Figure F-32: Carbon Tetrachloride in C-Zone, Onsite/Nearsite Wells

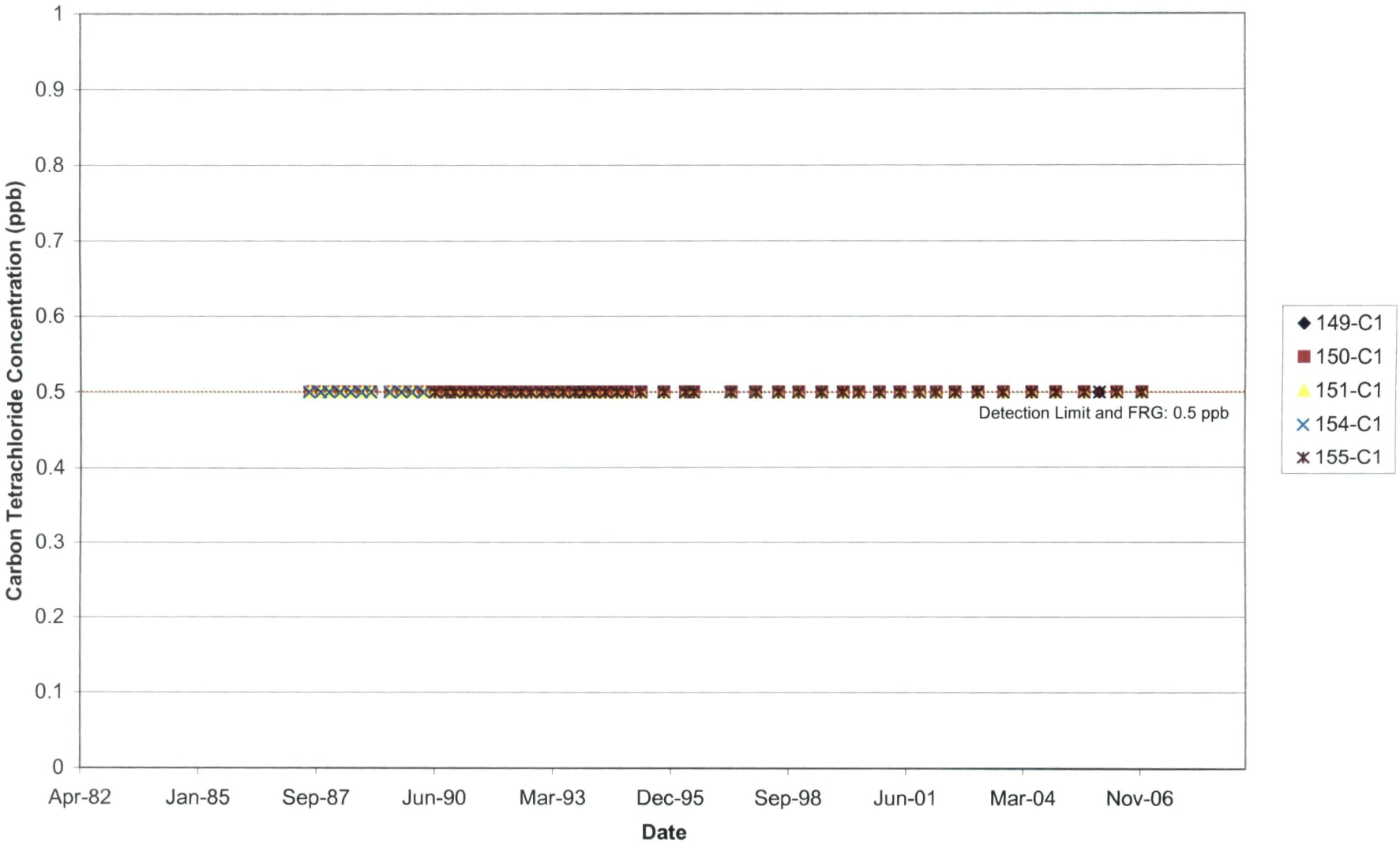


Figure F-33: Carbon Tetrachloride in C-Zone, Offsite Wells

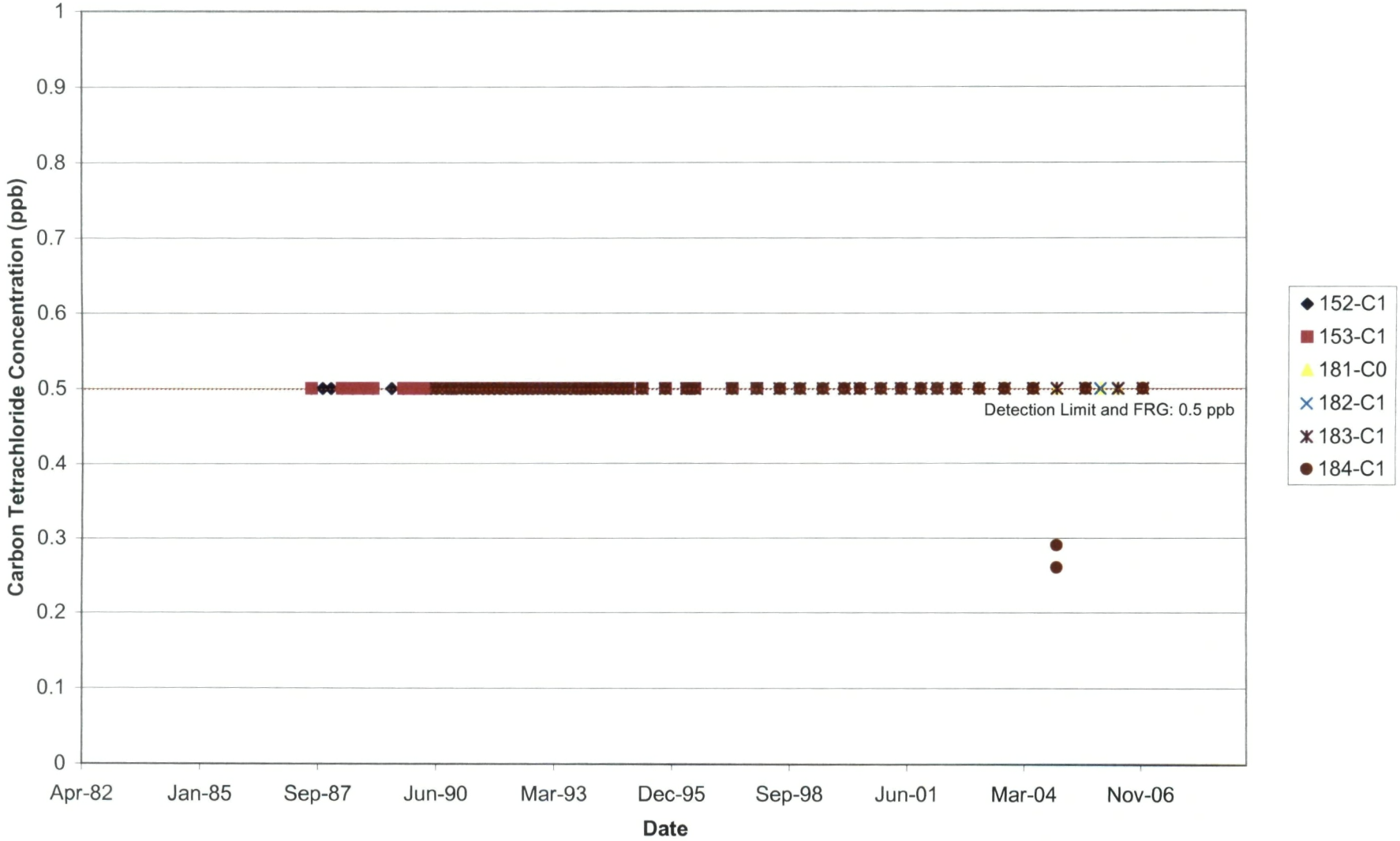


Figure F-34: Carbon Tetrachloride D-Zone, in Offsite Wells

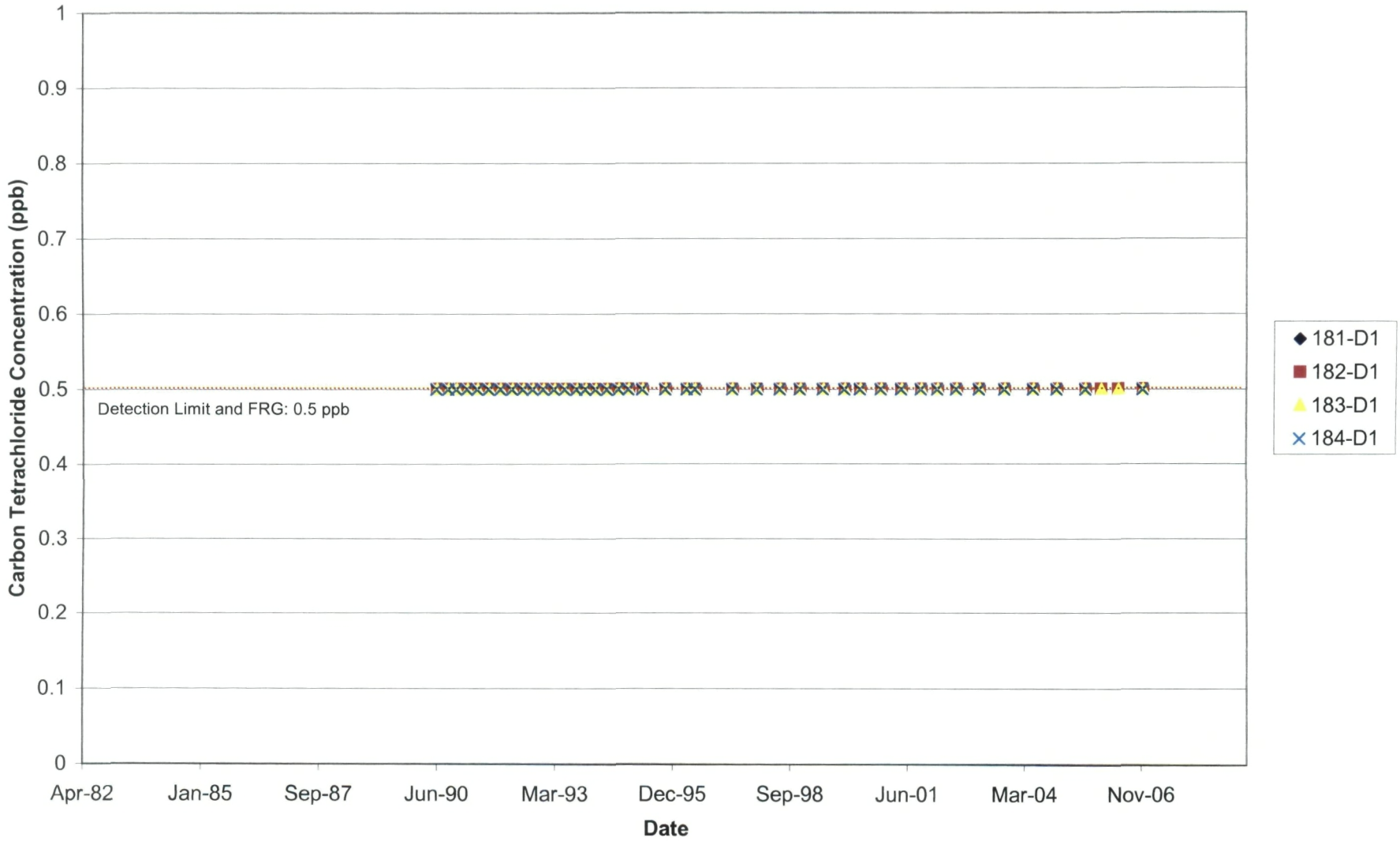


Figure F-35: Carbon Tetrachloride in Domestic Offsite Wells

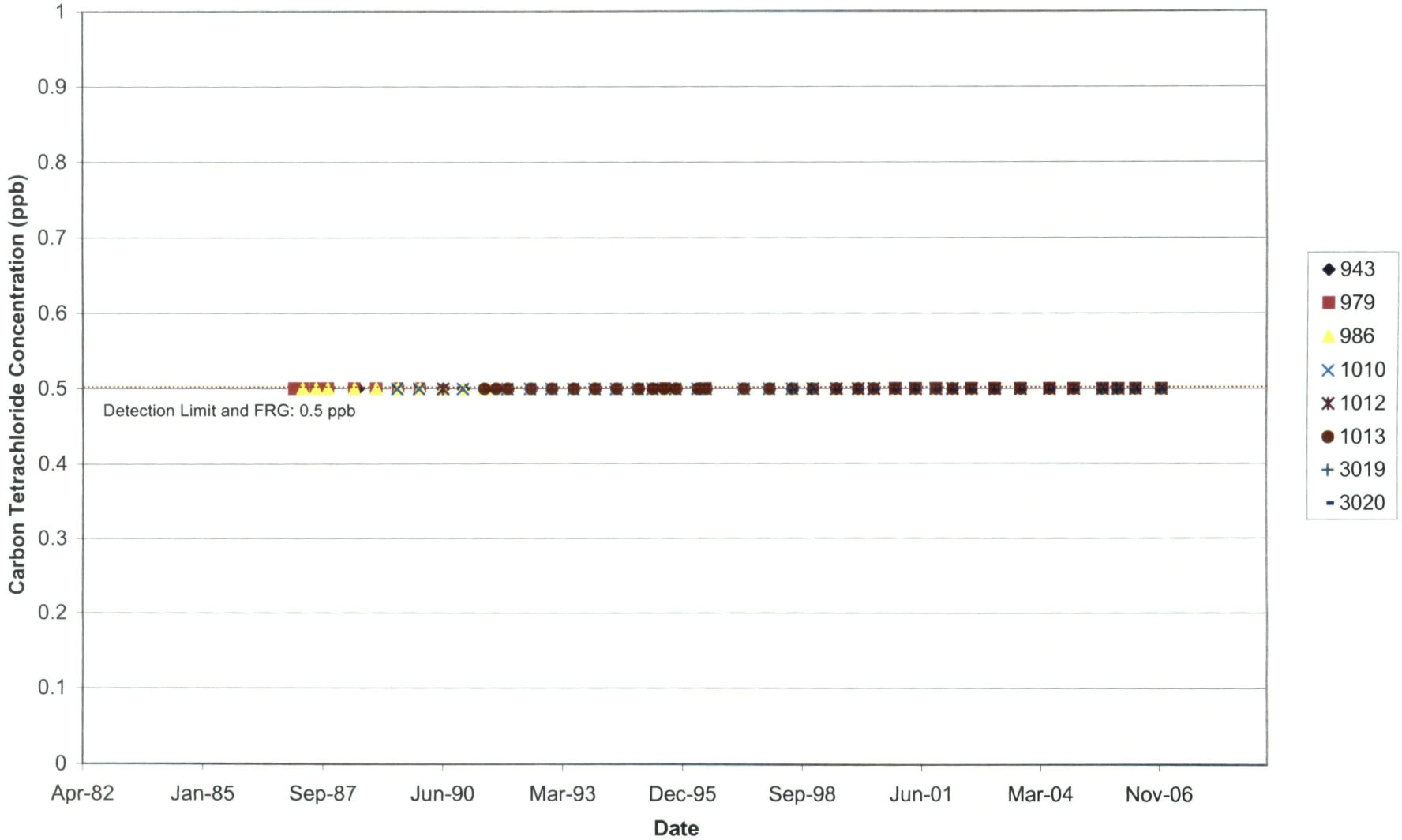
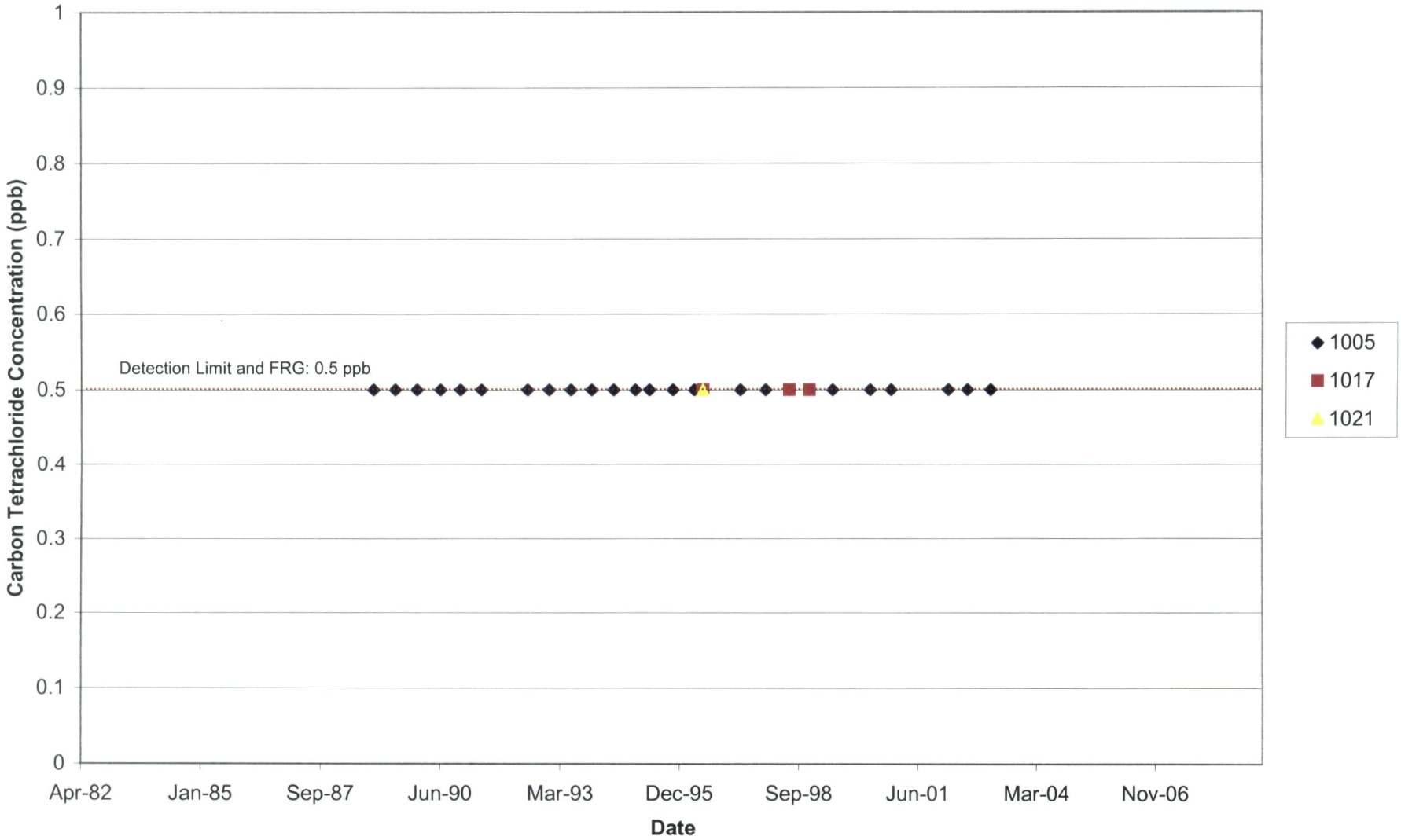


Figure F-36: Carbon Tetrachloride in Proposed Domestic Wells (1005, 1017, and 1021)



Appendix G

Statistical Trend Analysis Results and 95% UCL Calculations

(CD-rom)

Appendix G data is located on the CD enclosed under Appendix E.

Appendix H

Deed Restriction

21

Recording Requested by:

T H Agriculture & Nutrition, L.L.C.
15313 West 95th Street
Lenexa, KS 66219

When Recorded mail to:

Department of Toxic Substances Control
1515 Tollhouse Road
Clovis, CA 93611
Attn: Kevin Shaddy

FRESNO County Recorder
Robert C. Werner
DOC- 2005-0230132
Thursday, SEP 29, 2005 10:57:42
Tel Pd $69.00 Nbr-0001970004
DJG/R6/1-21

SPACE ABOVE THIS LINE RESERVED FOR RECORDER'S USE

COVENANT AND AGREEMENT TO RESTRICT USE OF PROPERTY

(Health and Safety Code section 25355.5)

ENVIRONMENTAL RESTRICTION (Civil Code section 1471)

(T H Agriculture & Nutrition Site, 7183 East McKinley Avenue, located in Section 35, Township 13 South, Range 21 East of the Mount Diablo Base and Meridian, Fresno County, California, Fresno County APN 310-062-09)

This Covenant and Agreement to Restrict Use of Property ("Covenant") is made by and between the California Department of Toxic Substances Control (the "Department") and T H Agriculture & Nutrition, L.L.C. ("Covenantor"), as the owner of record of certain land situated in the County of Fresno, State of California, which land is described in the Legal Description in Exhibit A, and shown outlined on the Site Plan in Exhibit B, (collectively referred to herein as the "Property"). Exhibit A and Exhibit B are attached hereto and incorporated herein by this reference. Pursuant to California Civil Code section 1471, the Department has determined that this Covenant is reasonably necessary to protect present or future public health or safety or the environment as a result of the presence on the land of hazardous materials as defined in California Health and Safety Code ("H&SC") section 25260. The Covenantor and the Department, collectively referred to as the "Parties", hereby agree, pursuant to Civil Code section 1471 and H&SC section 25355.5, that the use of the Property be restricted as set forth in

this Covenant. The Parties further intend that the provisions of this Covenant also be for the benefit of the U.S Environmental Protection Agency ("U.S. EPA") as a third party beneficiary.

ARTICLE I
STATEMENT OF FACTS

1.01 Historical Use of the Property. The Property consists of an approximately 5.5 acre parcel located at 7183 East McKinley Avenue in Fresno County, approximately three miles northeast of Fresno, California. The Property is the former location of an agricultural chemical formulation, packaging and warehousing plant. Between 1950 and 1981, the Property was owned and/or operated by several companies that formulated, packaged and/or warehoused agricultural chemicals there. From 1950 to 1955, the Property was initially leased and then purchased by the Geigy Company, Inc. (later known as Novartis Crop Protection, Inc and now known as Syngenta, Inc.). From 1955 until 1959, the site was owned and operated by Olin Mathieson Chemical Corporation (now Olin Corporation). Covenantor acquired and began to operate the Property in 1959 and discontinued operations at the Property in 1981.

1.02 Remedial Action Plan; Agency Oversight and Cleanup Orders.

a. In June 1999, a Final Remedial Action Plan ("RAP") for the Property was approved pursuant to H&SC section 25356.1. Covenantor is in the process of implementing the RAP, including long term operation, monitoring and maintenance, and the requirement to prepare and record land use restrictions as specified herein. A copy of the RAP and other documents related to the Property have been provided to the Sunnyside Branch of the Fresno County Public Library as the designated document repository maintained in connection with the Property. These and other documents related to the Property are also maintained at the Department's Clovis District Office.

b. Prior to development of the RAP, Covenantor performed investigative and remedial activities at and around the Property under the direction of several regulatory agencies. On February 3, 1984, the Central Valley Regional Water Quality Control Board ("RWQCB") issued a cleanup and abatement order ("1984 CAO") to Covenantor

and other parties associated with the Property. The 1984 CAO was amended on March 21, 1984. In early 1984, the California Department of Health Services ("DHS") (the Department's predecessor agency) began to take a more active role in oversight of investigation and remedial activities on the Property and, on May 28, 1985, DHS issued a Determination of Imminent or Substantial Endangerment and Remedial Action Order (Docket No. HSA 84/85-001) ("1985 Order") to Covenantor and other parties associated with the Property. On July 17, 1985, RWQCB issued a new cleanup and abatement order ("1985 CAO") with respect to the Property, which contained requirements consistent with the 1985 Order issued by DHS. On January 23, 1987, DHS issued a new Determination of Imminent or Substantial Endangerment and Remedial Action Order (Docket No. HSA 86/87-020 ED) ("1987 Order") to Covenantor and North American Philips Corporation, Olin Corporation, and Ciba Geigy Corporation, pursuant to H&SC sections 25358 3, 25355.5, 25187, 205 and 206. The 1987 Order, which superseded the 1985 Order, was amended on May 8, 1987 and again on January 5, 1991. On June 29, 1988, RWQCB rescinded the 1985 CAO, based on its determination that the Orders issued by DHS satisfied RWQCB's concerns regarding protection of water quality and that Covenantor was completing the requirements of the DHS Orders within the specified time-frames. Since 1987, Covenantor has performed the investigative and remedial activities specified in the 1987 Order, including development and implementation of the final RAP for the Property.

1.03 Pre-Remediation Conditions of the Property.

Since the spring of 1981, Covenantor has performed extensive remedial investigation activities at and around the Property. These investigations found that chemical constituents were present in onsite soil and in groundwater at or near the Property.

a. Soil. Soil samples were analyzed for the presence of organic chemicals and pesticides, priority pollutant metals, and certain inorganic chemicals. Several onsite chemical source areas were identified. The chemicals detected in onsite soils included organochlorine pesticides (DDT, DDD, DDE, dieldrin, lindane, and toxaphene), volatile

organic compounds (VOCs) (chloroform, xylenes, and ethylbenzene), and 1,2-Dibromo-3-chloropropane (DBCP).

b. Groundwater. Chemicals detected in samples of onsite and offsite groundwater included 1,2-dichloroethane (1,2-DCA), carbon tetrachloride, chloroform, dieldrin, DBCP, and 1,2,3-trichloropropane (1,2,3-TCP). Historically, the highest chemical concentrations in groundwater were detected in samples from the "A" zone (the shallowest water-bearing groundwater zone). Due to a significant drop in water levels since 1987, the "A" zone is currently unsaturated. Only rarely do "A" zone monitoring wells yield sufficient water to be sampled. Groundwater monitoring in recent years has confirmed that chemicals related to the Property are present in groundwater at low and, in general, slowly declining levels.

In the Fresno area, DBCP has been detected in groundwater regionally as a result of its regional application to crops. Recent groundwater studies indicate that, similar to DBCP, 1,2,3-TCP is likely a regional pollutant.

1.04 Remediation Activities and Current Condition of the Property.

a. Interim Remedial Measures. Interim remedial measures for the Property included soil excavation, structure demolition, soil vapor extraction, and the provision of alternative water supplies to nearby residents. More than 24,000 cubic yards of chemically-affected soil were excavated, and transported for offsite disposal during excavations conducted in 1984 and 1989. Numerous items and structures have been removed from the Property, including a concrete sump, concrete pads, storage tanks, a metal shed and other structures. Two soil vapor extraction systems, installed beginning in 1988 to remove volatile and semi-volatile organic compounds from unsaturated zone soils at the Property, were taken out of service in 1993 because the remedial action objectives for those compounds in that zone were achieved. Since 1985, Covenantor has provided bottled water or replacement carbon filters as needed to residences downgradient of the Property. From 1988 to 1990, Covenantor funded the design and construction of an extension of the City of Fresno domestic water supply system, and has

since offered connections to that system to households in Covenantor's domestic well sampling program at Covenantor's expense.

b Final Remedial Action Plan - Soil Component. Pursuant to the soil component of the remedy set forth in the RAP, Covenantor designed and constructed a soil cap, including a bentonite barrier covered by clean fill soils, to cover the Property and minimize or eliminate migration of chemicals from onsite soils to other media, such as air and groundwater. The soil component of the remedy also includes the land use restrictions imposed by this Covenant, as well as Property access controls (maintaining existing fencing and signs), and monitoring and maintenance of the cap. Operation, maintenance and monitoring of the cap is required pursuant to an Operation, Maintenance & Monitoring Plan as approved by the Department on September 23, 2005 and as may be modified subsequently from time to time with the approval of the CERCLA Lead Agency (the "OM&M Plan") and such OM&M Plan is incorporated by reference into an Operation, Maintenance and Monitoring Agreement ("OM&M Agreement") between Covenantor and the Department.

c. Final Remedial Action Plan – Groundwater Component. Because of the regional presence of DBCP and 1,2,3-TCP in groundwater, groundwater in the vicinity of the Property is not currently suitable for use as a source of drinking water. Groundwater monitoring in recent years has confirmed that chemicals related to the Property are present in groundwater at low and, in general, slowly declining levels. Therefore, the groundwater remedy consists of monitored natural attenuation, including long term monitoring of groundwater monitoring wells and domestic wells, with a provision for contingency plans if warranted in the future by groundwater conditions. Operation, maintenance and monitoring of the groundwater component of the remedy will be required pursuant to the OM&M Plan.

d. Final Remedial Action Plan – Further Controls. Additional controls provided for in the RAP include continued provision of alternative water supply by connections to a public water supply system, point-of-use treatment, or bottled water;

financial assurances to ensure long-term maintenance and operation of remedial actions; and five-year reviews to confirm that the remedy remains effective in protecting public health and the environment.

e. Current Condition of the Property. The cap required by the soil component of the RAP has been constructed and the Department issued a letter of approval on June 30, 2003 confirming that this element of the remedial work has been carried out in accordance with the RAP. In accordance with the RAP, Covenantor and the Department desire to further protect public health and safety by restricting future use of the Property as set forth herein. Hazardous substances, as defined in H&SC section 25316 and section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended ("CERCLA"), 42 U.S.C. section 9601(14), and listed at 40 Code of Federal Regulations ("C.F.R.") section 302.4, remain on all or portions of the surface and subsurface soils at the Property at concentrations of concern. These hazardous substances include, but are not limited to, the following: DDD, DDE, DDT, dieldrin, lindane and toxaphene. These substances are also hazardous materials as defined in H&SC section 25260.

1.05 Surrounding Land Use. Covenantor owns a 20-acre orchard parcel that borders the Property on its south, east and west sides. Properties within a one and one-half mile radius centered on the Property consist of farms, orchards, light-industrial properties, and low-density residential developments consisting primarily of single family homes. The Fresno Air Terminal is located approximately 2.25 miles west of the Site. All parcels adjoining the Property are zoned for rural residential use.

ARTICLE II
DEFINITIONS

2.01 Department. "Department" means the California Department of Toxic Substances Control and shall include its successor agencies, departments or other successor entity, if any.

2.02 U.S. EPA. "U.S. EPA" means the United States Environmental Protection Agency and shall include its successor agencies, if any.

2.03 Owner. "Owner" or "Owners" means the Covenantor and its successors in interest, including heirs and assigns, who hold title to all or any portion of the Property.

2.04 Occupant. "Occupant" means Owners and any person or entity entitled by ownership, leasehold, or other legal relationship to the right to occupy all or any portion of the Property.

2.05 CERCLA Lead Agency. "CERCLA Lead Agency" means the governmental entity having the designated lead responsibility to implement response action at the Property under the National Contingency Plan ("NCP"), codified at 40 C.F.R. Part 300. The Department is the CERCLA Lead Agency at the time of the recording of this instrument.

2.06 Improvements. "Improvements" means all buildings, roads, driveways, walkways, landscaped areas and paved parking areas, constructed or placed upon any portion of the Property.

ARTICLE III
GENERAL PROVISIONS

3.01 Restrictions to Run with the Land. This Covenant sets forth protective provisions, covenants, restrictions, and conditions (collectively referred to as "Restrictions"), upon and subject to which the Property and every portion thereof shall be improved, held, used, occupied, leased, sold, hypothecated, encumbered, and/or conveyed. Each and every Restriction: (a) runs with the land pursuant to H&SC section 25355.5 and Civil Code section 1471; (b) inures to the benefit of and passes with each and every portion of the Property; (c) is for the benefit of, and is enforceable by the Department; (d) is for the benefit of U.S. EPA as a third party beneficiary; and (e) is imposed upon the entire Property unless expressly stated as applicable only to a specific portion thereof.

3.02 Binding upon Owners/Occupants. Pursuant to H&SC section 25355.5(a)(1)(C), this Covenant binds all owners of the Property, their heirs, successors, and assignees, and the agents, employees, and lessees of the owners, heirs, successors, and assignees. Pursuant to Civil Code section 1471, all successive owners of the Property are expressly bound hereby for the benefit of the Department and U.S. EPA.

3.03. Written Notice of the Presence of Hazardous Substances. Prior to the sale, lease, sublease, assignment or other transfer of the Property, or any portion thereof, the owner, lessor, sublessor, assignor or other transferor shall give the buyer, lessee, sublessee, assignee or other transferee written notice that hazardous substances are located on or beneath the Property.

3.04. Incorporation into Deeds and Leases. The Restrictions set forth herein shall be incorporated by reference in each and all deeds, leases, assignments, or other transfers of all or any portion of the Property that are hereafter executed or renewed. Further, each Owner or Occupant shall include in any instrument conveying any interest in all or any portion of the Property, including but not limited to deeds, leases, and mortgages, a notice that is in substantially the following form:

> **NOTICE: THE INTEREST CONVEYED HEREBY IS SUBJECT TO AN ENVIRONMENTAL RESTRICTION AND COVENANT TO RESTRICT USE OF PROPERTY, RECORDED IN THE PUBLIC LAND RECORDS ON [DATE]_____, IN BOOK ____, PAGE _____, IN FAVOR OF AND ENFORCEABLE BY THE CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL, AND FOR THE BENEFIT OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY.**

3.05 Conveyance of Property. Not later than thirty (30) days after any conveyance of any ownership interest in the Property (excluding mortgages, liens, and other non-possessory encumbrances), the Owner shall provide notice of such conveyance to the Department and to U.S. EPA. The Department and U.S. EPA shall not, by reason of this Covenant, have authority to approve, disapprove, or otherwise affect proposed conveyance, except as otherwise provided by law or by a specific provision of this Covenant.

3.06 Costs of Administering the Restrictions to be paid by Owner. Without in any way limiting the provisions of Section 3.01 of this Agreement, the provisions of this Section 3.06 run with the land and will continue in perpetuity unless a variance is granted pursuant to Section 6.01, or unless terminated pursuant to Section 6.02. The Department has already incurred and will in the future incur costs associated with the administration of this Covenant. Therefore, the Covenantor hereby covenants for itself and for all subsequent owners that pursuant to Title 22, California Code of Regulations, section 67391.1(h), the Owner shall pay the Department's cost in administering the Restrictions. Notwithstanding Civil Code section 1466, in the event the Property ownership changes between the time that the Department's administrative costs were incurred and the invoice for such costs is received, each Owner of the Property for the period covered by the invoice, as well as the current Owner is responsible for such costs. Failure of the Owner to pay such costs when billed is a breach of the Covenant and enforceable pursuant to Section 5.01 of the Covenant. Further, the Covenantor, having chosen a remedy that employs land use restrictions, remains liable in the event of remedy failure and is deemed to enjoy the benefit of the Restrictions notwithstanding the fact that they may no longer be in possession of the Property. The OM&M Agreement provides additional information on payment of costs for activities associated with the deed restriction as well as information on the financial assurance as part of the OM&M Agreement.

ARTICLE IV

RESTRICTIONS; OM&M; ACCESS

4.01 Prohibited Uses. The Property shall not be used for any of the following purposes:

a. A residence, including any mobile home or factory built housing, constructed or installed for use as residential human habitation.

b. A hospital for humans.

c. A public or private school for persons under 21 years of age.

d. A day care center for children.

e. Any other purpose involving residential occupancy on a 24-hour basis.

4.02 Soil and Extracted Groundwater Management.

a. The Owner and Occupants shall manage soils on the Property and any groundwater extracted in connection with monitoring or remediation performed pursuant to the RAP and/or during any construction activities on the Property in accordance with: (i) all applicable provisions of state and federal laws and (ii) the OM&M Plan. A current version of the OM&M Plan shall be maintained as a public record by the Department and shall be provided by the Owner to the Sunnyside Branch of the Fresno County Public Library as the document repository maintained in connection with the Property (for so long as the Public Library maintains such repository), and shall be maintained by the Owner at a location on the Property if there exists upon the Property a building or other structure suitable for storing such a document. If the Sunnyside Branch of the Fresno County Public Library ceases to exist, moves out of the area, or determines that it can no longer maintain the document repository, then the Owner shall consult with the Department to identify a suitable alternative.

b. No activities that will disturb site soils (e.g. excavation, grading, removal, trenching, filling, earth movement or mining) shall be allowed on the Property without a Soil Management Plan approved by the CERCLA Lead Agency unless the soil disturbance is expressly allowed under the terms of the OM&M Plan.

4.03. Non-Interference with Cap, and Monitoring Systems.

a. Activities that may disturb the bentonite barrier in the soil cap (e.g. excavation, grading, removal, trenching, filling, earth movement, or mining) shall not be permitted on the Property without prior review and written approval by the CERCLA Lead Agency unless such activity is expressly allowed under the terms of the OM&M Plan.

b. Activities that may disturb the effectiveness of the groundwater monitoring well system (e.g. excavation, grading, removal, trenching, filling, earth movement, or mining) shall not be permitted on the Property without prior review and

written approval by the CERCLA Lead Agency unless such activities are expressly allowed under the terms of the OM&M Plan. Whether or not a particular activity not provided for in the OM&M Plan may disturb the effectiveness of the groundwater monitoring well system shall be determined by the CERCLA Lead Agency.

c. All uses and development of the Property shall preserve the integrity and physical accessibility of the soil cap and groundwater monitoring well system.

d. The soil cap shall not be altered without prior written approval by the CERCLA Lead Agency.

e. Owner shall notify the CERCLA Lead Agency of each of the following: (i) the type, cause, location and date of any damage to the soil cap and (ii) the type and date of repair of such damage. Notification to the CERCLA Lead Agency shall be made as provided below within ten (10) working days after, respectively, the discovery of any such damage and the completion of any repairs. Timely and accurate notification by any Owner or Occupant shall satisfy this requirement on behalf of all other Owners and Occupants.

4.04 Inspection and Maintenance of Cover Materials and Improvements. The bentonite/soil cap installed pursuant to the RAP and Improvements constructed on the Property shall be inspected and maintained as provided in the OM&M Plan. The Property shall be inspected as provided for in the OM&M Plan to ensure that there are no violations of the terms of this Covenant.

4.05 Access for Department. The Department shall have reasonable right of entry and access to the Property for inspection, monitoring, and other activities consistent with the purposes of this Covenant as deemed necessary by the Department in order to protect the public health or safety or the environment. Nothing in this instrument shall limit or otherwise affect U.S. EPA's right of entry and access, or U.S. EPA's authority to take response actions under CERCLA, the National Contingency Plan (40 C.F.R. Part 300) and its successor provisions, or other applicable federal law.

4.06 Access for Implementing OM&M Plan. The entities or persons responsible for implementing the OM&M Plan shall have reasonable right of entry and access to the Property for the purposes of implementing the OM&M Plan until the CERCLA Lead Agency determines that no further OM&M is necessary.

ARTICLE V
ENFORCEMENT

5.01 Enforcement. This Covenant shall be enforceable by the Department pursuant to Health and Safety Code, Division 20, Chapter 6.5, Article 8 (commencing with section 25180). Failure of the Covenantor, owner or Occupant to comply with any of the Restrictions specifically applicable to it shall be grounds for the Department to require that the Covenantor, owner, or Occupant modify or remove any Improvements (notwithstanding the definition of Improvements in Section 2.06, for purposes of this Section 5.01 "Improvements" shall mean all buildings, roads, driveways, and paved parking areas) constructed or placed upon any portion of the Property in violation of the Restrictions. All remedies available hereunder shall be in addition to any and all other remedies at law or in equity, including CERCLA, and violation of this Covenant shall be grounds for the Department to file civil or criminal actions as provided by law or equity.

ARTICLE VI
VARIANCE AND TERMINATION

6.01 Variance. Covenantor, or any other aggrieved person, may apply to the Department for a written variance from the provisions of this Covenant Such application shall be made in accordance with H&SC section 25233 and a copy of the application shall be submitted to U.S. EPA simultaneously with the application submitted to the Department. No variance may be granted under this Section 6.01 without prior notice to and opportunity to comment by U.S. EPA.

6.02 Termination. Covenantor, or any other aggrieved person, may apply to the Department for a termination of the Restrictions or other terms of this Covenant as they apply to

all or any portion of the Property. Such application shall be made in accordance with H&SC section 25234 and a copy of the application shall be submitted to U.S. EPA simultaneously with the application submitted to the Department. No termination may be granted under this Section 6.02 without prior notice to and opportunity to comment by U.S. EPA.

ARTICLE VII
TERM

7.01 Term. This Covenant shall continue in effect in perpetuity unless it is terminated in accordance with Section 6.02 hereof, or by the Department in the exercise of its discretion, or by law, or otherwise, after providing notice to and an opportunity to comment by U.S. EPA.

ARTICLE VIII
MISCELLANEOUS

8.01 No Dedication or Taking. Nothing set forth in this Covenant shall be construed to be a gift or dedication, or offer of a gift or dedication, of the Property, or any portion thereof to the general public or anyone else for any purpose whatsoever. Further, nothing set forth in this Covenant shall be construed to affect a taking under state or federal law.

8.02 Recordation. The Covenantor shall record this Covenant, with all referenced Exhibits, in the County of Fresno within ten (10) days of the Covenantor's receipt of a fully executed original.

8.03 Notices. Whenever any person gives or serves any notice, demand, or other communication with respect to this Covenant, each such notice, demand, or other communication shall be in writing and shall be deemed effective: (i) when delivered, if delivered personally or by nationally recognized overnight courier to the person being served or to an officer of a corporate party being served or official of a government agency being served; or (ii) five (5) business days after deposit in the mail if mailed by United States mail, postage paid certified, return receipt requested:

To Covenantor:

T H Agriculture & Nutrition, L.L.C.
15313 West 95th Street
Lenexa, KS 66219
Attention: James W. Smith, P.E

To Department:

Mr. James L. Tjosvold, P.E., Chief
Department of Toxic Substances Control
Northern California – Central
Cleanup Operations Branch
1515 Tollhouse Road
Clovis, CA 93611
Attention: Kevin Shaddy

To U.S. EPA:

Ms. Lynn Suer
Superfund Remedial Project Manager
Mail Code SFD-7-2
U.S. Environmental Protection Agency – Region IX
75 Hawthorne Street
San Francisco, CA 94105

Any party may change its address or the individual to whose attention a notice, demand, or other communication is to be sent by giving written notice in compliance with this Section 7.0.

8.04 Partial Invalidity. If any portion of the Restrictions or other terms set forth herein is determined by a court of competent jurisdiction to be invalid for any reason, the surviving portions of this Covenant, or the application of such portions to persons or circumstances other than those to which it is found to be invalid, shall remain in full force and effect as if such portion found invalid had not been included herein.

8.05 Liberal Construction. Any general rule of construction to the contrary notwithstanding, this instrument shall be liberally construed to effect the purpose of this instrument and the policy and purpose of CERCLA. If any provision of this instrument is found

to be ambiguous, an interpretation consistent with the purpose of this instrument that would render the provision valid shall be favored over any interpretation that would render it invalid.

8.06 Governing Law. This Covenant shall be governed by and construed in accordance with the laws of the State of California.

8.07 Third Party Beneficiary. U.S. EPA's rights as a third party beneficiary of this Covenant shall be governed by and construed in accordance with the laws of the State of California.

8.08 Article and Section Headings. Headings at the beginning of each numbered Article and Section of this Covenant are solely for the convenience of the Parties and are not a part of the Covenant.

8.09 Statutory References. All statutory references include successor provisions.

8.10 Effective Date. This Covenant shall be effective upon such date that the Covenant is fully executed by Covenantor and the Department (the "Effective Date").

8.11 Execution in Counterparts. This Covenant may be executed in original counterparts with the same force and effect as if executed in one complete original document.

IN WITNESS WHEREOF, the Parties execute this Covenant as of the Effective Date.

Covenantor: T H AGRICULTURE & NUTRITION, L.L.C.

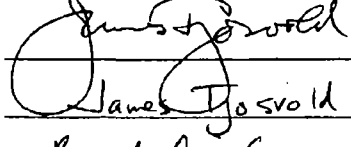
By: _____

Name: Joseph L. Wolf, Jr.

Title: President

Date: 9/26/05

Department: CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

By: 

Name: James Tjosvold

Title: Branch Chief

Date: 9/26/05

Acknowledgment as to Covenantor T H Agriculture & Nutrition, L.L.C.:

STATE OF New York)
COUNTY OF New York)

On this 26 day of September, in the year 2005, before me Joan Taylor, personally appeared Joseph L. Wolf, Jr., personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Signature: Joan Taylor

JOAN TAYLOR
Notary Public, State of New York
No. 01TA6076178
Qualified in Nassau County
Commission Expires June 24, 2006

(5)

Acknowledgment as to California Department of Toxic Substances Control:

STATE OF CALIFORNIA)
)
COUNTY OF Sacramento)

On this 26th day of September in the year 2005, before me Kathleen M. Duncan personally appeared James T. Jarrold, personally known to me ~~(or proved to me on the basis of satisfactory evidence)~~ to be the person~~(s)~~ whose name~~(s)~~ is/~~are~~ subscribed to the within instrument and acknowledged to me that he/~~she/they~~ executed the same in his/~~her/their~~ authorized capacity~~(ies)~~, and that by his/~~her/their~~ signature~~(s)~~ on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Signature: Kathleen M. Duncan

KATHLEEN DUNCAN
Commission # 1324587
Notary Public - California
Sacramento County
My Comm. Expires Oct 26, 2005

EXHIBIT A

LEGAL DESCRIPTION OF PROPERTY

That certain real property situate in and being a portion of the Northwest quarter of Section 35, Township 13 South, Range 21 East, Mount Diablo Base and Meridian, Fresno County, California, and being more particularly described as follows:

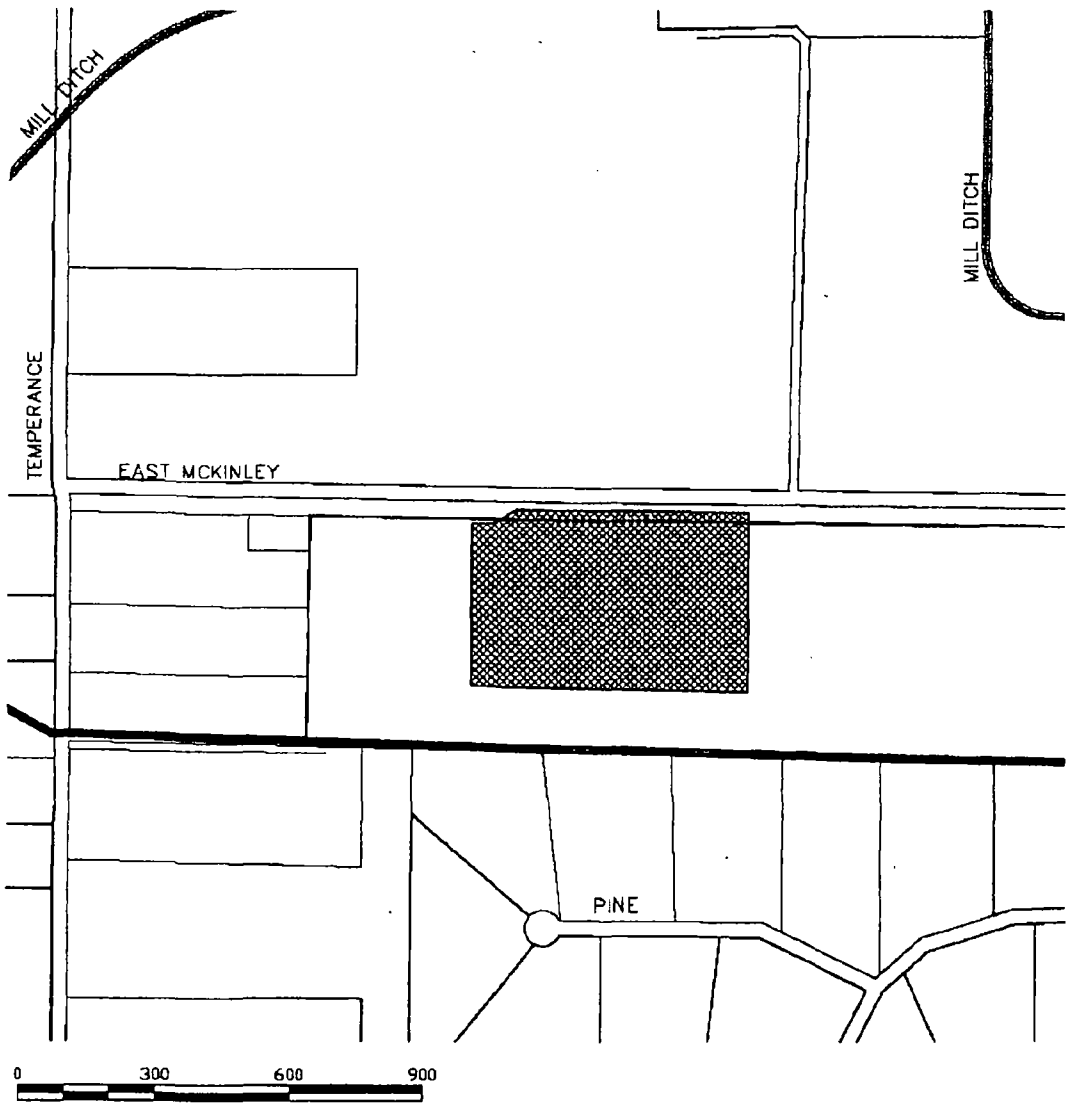
Commencing at a point 30 feet South of a point on the North line of Section 35, Township 13 South, Range 21 East, Mount Diablo Base and Meridian, 937 feet East of the Northwest corner of said Section 35; thence North 89° East parallel with the North line of Section 35, a distance of 600 feet; thence South 1° East along a line at right angles to the North line of said Section 35, a distance of 400 feet; thence South 89° West parallel with the North line of said Section 35 a distance of 600 feet; thence North 1° West along a line at right angles to the North line of said Section 35, a distance of 400 feet to the point of commencement.

APN: 310-062-09

EXHIBIT B

SITE PLAN

(SEE NEXT PAGE)



LEGEND:

SITE

N

Kennedy/Jenks Consultants

T H AGRICULTURE & NUTRITION SITE
EASTERN FRESNO COUNTY, CALIFORNIA

SITE PLAN

K/J 844083*90
SEPTEMBER 2005

EXHIBIT B