



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

Summary Pilot Report

**Protecting Human Health and Environmental Remedy Components
Through Proactive Coordinated Monitoring with Terradex, One-Call, Local Permitting,
and Other Available Sources of Information**

February 2006

Note: This report serves to summarize the results of a cooperative pilot and should not be considered to be an expressed or implied endorsement by US EPA or any of the participants for any of the companies or processes described herein.

Executive Summary

Institutional Controls (ICs) are administrative and/or legal devices that help minimize the potential for human exposure to contamination and protect the integrity of remedial components. Common examples of ICs used at site cleanups are easements, zoning restrictions, and excavation permits. Due to a combination of technical challenges, cost, and long clean up times, there is an ongoing need to use ICs at Superfund and other cleanup sites. With an ever-growing number of ICs at contaminated sites, there is an increasing need for an effective way of continuously providing information to parties undertaking activities at a site that could potentially result in contact with contamination, damage to underground remedy components and/or interference with health-based land or water use restrictions. Being proactive in identifying and preventing these activities is critical in protecting excavation workers, the public, and the environment from potential exposure to contamination, and to protect the integrity of remedial infrastructure.

A prime example of the potential of an IC monitoring system to protect the public and the environment from exposure to contamination occurred in January 2006. While the Del Amo Superfund site was not technically a part of the pilot program, many of the same parties, using the same processes employed in the pilot program, detected and prevented a disaster from occurring there. Chevron had proposed drilling a 300-foot well for cathodic protection of one of its pipelines. The local permitting agency missed a conflict with a benzene plume in the area of the planned excavation and permitted Chevron to drill the well. The IC monitoring service used in the pilot program, Terradex, alerted stakeholders to the conflict and Chevron cancelled the drilling. Had the well been drilled, concentrated benzene would have polluted the Lynwood Aquifer that supplies drinkable water to Los Angeles County. Chevron is now working with regulators toward a solution that will protect human health and the environment.

This report summarizes the results of a collaborative pilot program implemented in California in January 2003 to test the use of “call-before-you-dig” or “One-call” systems, county permits, and other commonly available sources of information as a way of providing information on the location of contamination, the location of underground remedy components, and land or water restrictions in advance of planned excavations and/or property transactions. The pilot program participants include the U.S. Environmental Protection Agency (EPA), the California Environmental Protection Agency (Cal/EPA), Terradex, Inc.– an IC monitoring service – and the California One-call system. The pilot confirms that One-call systems, the real-estate Multiple Listing Service (MLS), county permits, and other public sources of information were very useful in providing information about site conditions to multiple parties prior to the initiation of activities at a site. From February to June 2004, a total of 1,124 land activities within or near areas where there was contamination, remedy components, and/or ICs were detected in the pilot. As of July 2005, 21 land use activities that could have directly conflicted with the areas of contamination, remedy components or ICs were identified before they occurred. These activities included proposed excavations reported through the California One-call

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system as well as building permit, real estate, water well, and construction activities identified through a combination of local agencies and public sources. The overall cost of the pilot was approximately \$6,000 per site. Although the pilot program has proven successful in identifying potential conflicts, certain aspects of the pilot planning process and ongoing operations could be improved for future use.

The following is a list of key lessons learned based on the pilot:

- Depending upon the amount of redevelopment or other improvement activity at a site, there can be a significant workload associated with conducting a thorough, pragmatic, and timely evaluation of all notifications of potential site conflicts.
- The pilot also illustrates that although the majority of notifications did not result in conflicts, there were a number of important potential conflicts identified. A key lesson was the importance of a formal screening step to determine whether, based on the notification, the potential for conflict was truly present. In the pilot, Terradex provides this critical screening.
- Specific criteria for determining what constitutes a potential conflict (and the subsequent notification of appropriate parties) at a particular site should be carefully calibrated. The California pilot demonstrates that parameters set too broadly can result in many unnecessary notifications.
- Other key lessons were the importance of gathering detailed site information in advance and establishing clear responsibilities for both response and follow up on site conflicts. Early involvement of site managers, property owners, lessors, utility easement holders, excavation designers and other stakeholders could help in a timely and coordinated flow of information and required actions. In addition, training, including step-by-step instructions, should be provided to all participants.
- The pilot demonstrates the critical importance of formally logging correspondence on site-specific follow up on a potential conflict. A web site accessible to all parties contained a running history that was an excellent tool to coordinate communications.
- At initial stakeholder meetings, responsibilities and coordination of the involved parties from each site should be identified and formalized to avoid miscues or uncertainty about which parties are responsible for which actions.

I. California Pilot Program Background¹

Institutional controls (ICs) are legal or administrative restrictions placed on properties to minimize the

¹ Sources of information about the pilot are: Bob Wenzlau, founder of Terradex; "USEPA-Cal/EPA-Terradex Institutional Control Information Sharing and Monitoring Pilot Interim Findings Report, February 2005," Terradex; "Institutional Control Monitoring for the Environmentally-Impaired Site: A Guide for the Responsible Party, Owner, Developer or Lender," Terradex; "California Silicon Valley Demonstration Stakeholder Committee Meeting Minutes, January 16, 2003," Terradex; Dante Rodriguez, IC coordinator, EPA Region 9; Alana Lee, EPA Region 9; Michael Bellot, OSRTI, EPA Headquarters.

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risk of exposure to environmental hazards (e.g., a deed notice that no digging is allowed below a certain depth) and to protect remedies. EPA has identified One-call systems, county permitting, land transaction, and other excavation databases as potential sources for providing information on long-term site conditions to a number of stakeholders. Advanced notification of hazards, remedy components, and use restrictions can protect workers, the general public, and the environment from exposure to contamination by informing excavators about contamination in the area *before* excavation or other potentially conflicting activities begin. Early and readily accessible information can also protect the integrity of a site's remedy by preventing damage to infrastructure associated with engineering controls. When an activity is planned on a contaminated or cleaned-up site, a number of sources can be used to inform excavators or other users of any potential conflicts. These potential intrusions were described in the pilot as **conflicts**. The key premise is that conflicts can be identified through a combination of One-call, permitting, property sale listings, and other sources like an **IC monitoring service** and preemptive actions and/or mitigation can occur. An IC monitoring service is a private entity that joins a One-call system and/or obtains information from other available sources (county excavation or well drilling permits, property sales records, etc.). The service continually screens proposed land activities from an array of sources in order to inform responsible parties (RPs), regulators, and other stakeholders about potential conflicts.

If a potential conflict arises, One-call systems are responsible for sending the appropriate underground facility owners notifications of the proposed activity. Such notifications are known as **alerts**. After receiving an alert signifying a conflict, it is necessary to determine whether the activity poses a threat. The pilot also relied on county information available on pending permits, requests for excavation bids and listing of property sale notifications to identify potential conflicts.

The purpose of the pilot program is to investigate and evaluate the feasibility and effectiveness of using One-call systems and other sources of available information in aiding long-term site management. The California pilot, which was implemented in January 2003, employs an IC monitoring service, Terradex, that not only is a member of the One-call system (One Dig Utility Protection: USA North), but also acquires land use activity information from the city and county building permitting offices, the water district, and the county property transaction recording office. The pilot involved two main phases: (1) the planning and startup process and (2) the ongoing operations of the program. The following evaluation of the pilot to date is organized according to these phases. Within each of the two sections, costs, shortcomings, and recommendations for improvement are identified. The lessons learned from this pilot can be applied to the implementation of future pilots.

The objectives of the pilot are to test:

- the sharing of site-specific information from EPA, the California Environmental Protection Agency (CalEPA), and RPs with the IC monitoring service, Terradex Corporation;
- the ability of Terradex to perform daily monitoring of land use activities (excavation activity, construction activity, real estate activity, building permit activity, and water well activity)

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- within or near IC restriction areas;
- the electronic transfer of conflict alerts from Terradex to EPA, CalEPA, local government agencies, and RPs;
- the necessary processes at EPA and CalEPA to address conflicts;
- the conflict prevention process within local government permit-issuing agencies;
- the conflict prevention process employed by RPs; and
- the ability of these data sources to protect human health and remedy components.

The system has been extremely successful in detecting potential conflicts. From February 2004 through June 2004, a total of 1,124 potential conflicting activities within or near areas of concern were identified and screened. As of July 2005, 21 land activities would have directly conflicted with areas of contamination, remedy components, or health-based restrictions. All of these conflicts were identified before the activities actually occurred.²

II. Planning Process

Site Selection

The first step in the planning process was the selection of the sites for participation in the pilot program. An informal selection team consisted of Bob Wenzlau of Terradex; Tom Cramer of US EPA Region 9, the California State Water Resources Control Board; and Mike Bellot of EPA Headquarters. Sites were selected for the pilot with a goal of incorporating a range of facilities with varying contaminated media, remedy components, and use restrictions. The sites were chosen on the basis of the following criteria:

- sites with sufficient available data as based on state and federal agencies' site-specific knowledge;
- sites that represent a range of EPA and state programs including Superfund sites, Resource Conservation and Recovery Act (RCRA) Corrective Action sites, Leaking Underground Storage Tank (LUST) sites, Federal Facility sites, and Brownfields; and
- sites with differing lead agencies or organizations (e.g., federal, state, local, RP).

The group selected 18 sites including the MEW Study Area (which encompasses three National Priorities List (NPL) sites: Fairchild Semiconductor Corp., Raytheon Corp., and Intel Corp.); two federal facility sites (Moffett Federal Airfield and NASA Ames Research Center); nine state-lead sites in Santa Clara County, California; and various other facilities undergoing remediation, but not listed on the NPL. Some of the areas involved in the pilot are: a slurry wall at the MEW Study Area, residential property with restricted land use near the MEW Study Area, and two areas with impaired ground water

² Terradex's Interim Findings Report issued in February 2005 lists 20 land use activities. The system identified one more conflicting activity after the interim report was completed.

on the Moffett Federal Airfield. The types of ICs at these sites include proprietary controls, governmental controls, and informational devices, and are related to contamination, the remedy, or use restrictions. In addition, area restrictions that are not ICs were also represented in the sites selected – Moffett Federal Airfield and other MEW Study Area sites do not yet have ICs in place, as ICs were not part of their remedies.

Recommendations for Improving Site Selection:

In general, any site that has contamination on-site, underground remedy components, and/or ICs could benefit from the approach used in the pilot. The number of people involved in the site selection for the California pilot was quite limited. The selection process might have been enhanced by expanding the pool of site selectors or strategically gathering input from additional stakeholders during the selection process. For instance, including site managers in the site selection process could give more of a sense of ownership in the pilot program and could also result in the selection of some sites that would be of greater benefit to the pilot program.

Because the California pilot does not include any fund-lead sites, there are no opportunities to examine differences between fund-lead, RP-lead, and state-lead sites within the context of the pilot program. In the future, if fund-lead sites are selected for pilots, EPA will be able to gather solid data comparing fund-lead sites to other types of sites.

Regulatory agencies tended to feel that the responsibility of the long-term stewardship for potential conflicts should be borne by the responsible parties. If RPs are uncooperative or no longer in existence, regulators may be subjected to an increased workload and more responsibility to screen and respond to notifications in a timely fashion. At some sites there were expressed concerns that responding to an alert may actually increase liability status. There was concern regarding accountability for advice given in response to an alert. In future pilots, site selectors may wish to consider the willingness of a site's RPs to cooperate with the pilot. At sites with cooperative RPs the burden on site managers will be minimized.

Establishing Roles and Responsibilities

After the pilot sites were chosen, members of the selection team organized stakeholder meetings with state representatives, contractors, RPs, and regulatory agencies to provide an overview of the Terradex monitoring service and of the pilot program as a whole. In addition, the site managers, who did not attend these meetings, were given informational handouts tailored to the particular sites for which they are responsible.

Recommendations for Improving the Establishment of Roles and Responsibilities:

At least one site manager felt she would have been better prepared to participate in the pilot program if she received more in-depth information about the possible actions that would be required, the roles of other involved parties, and specific written procedures to follow, including a procedure on how to respond to an alert.

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Training, including a step-by-step procedure for responding to alerts and a demonstration based on an actual alert would likely have been helpful in preparing participants in the pilot. Not only would training have made the pilot planning phase more effective, but it also would have clarified the responsibilities of all parties involved and might have prevented some confusion. Additionally, methods for avoiding duplication of efforts with a local permitting system or local water boards (e.g., for well-drilling notifications) could be developed. It is important to note that although local water boards may monitor potential conflicts with contaminated ground water, they may not be monitoring for potential disturbances to underground remediation mechanisms associated with ground water such as pump and treat systems. Duplicated efforts occurred in the California pilot at the Moffett Federal Airfield site where the current landowner (NASA) already receives information on proposed land activities directly.

In the California pilot, obligation issues have arisen when activities are proposed in areas that were contaminated by pollutants from an RP's facility, but are located beyond the RP's property boundaries. Another issue arose because of the transfer of site ownership at the Moffett Federal Airfield site. At this site, the Navy is responsible for the site cleanup, but NASA is the current property owner. This situation has led to confusion about who is obligated to respond to an alert. In addition, at the MEW Study Area site, the RPs are no longer using the site so there were some uncertainties regarding their responsibility to respond to potential conflicts. New developers at the site had signed a Prospective Purchaser's Agreement (PPA) prohibiting them from interfering with the site's remedy, but the PPA does not require them to respond to alerts.

In establishing future pilots, coordination of involved stakeholders could be formalized at the initial stakeholder meetings, and any accountability questions resulting from site ownership issues could be resolved at that point. The stakeholder meetings may have also been more effective had they been expanded to include other parties with a potential role to play in the pilot program. For instance, in addition to the stakeholders mentioned previously, it may be useful to also include EPA attorneys, lessors, utility easement holders, current or prospective property owners or developers, and representatives of the local jurisdiction(s).

Information Collection and Transfer to IC Monitoring Service

The next stage of the planning process involved the collection and transfer of target information, which includes contamination, remedy, and resource restrictions, to Terradex to be monitored for conflicts. Regulatory agencies (i.e., EPA and CalEPA) and RPs gathered information about the concentrations and locations of residual contamination; locations of any engineering controls and remediation infrastructure; IC boundaries, objectives, and restrictions; conditions of safe land use; and contact information of the parties to be alerted if a conflict arises. The flow of information is represented in Figure 1 on page 13.

The estimated labor costs for data collection and transmission to the IC monitoring service are approximately \$5,400 each for the regulatory agencies and the RPs for a total cost of \$10,800.³ The hours of labor expended by the regulatory agencies and RPs to collect the necessary data varied depending on the availability of information. For the MEW Study Area and Moffett Federal Airfield sites, the site manager obtained plume boundary information from available site fact sheets. The site manager was confident about the accuracy of the data on a plume that underlies a residential area. A very high level of accuracy was required when the plume boundary was mapped because a residential area was involved. The state Water Resources Control Board corroborated the boundary data, which gave the site manager additional confidence in the accuracy of the data. Disagreement in boundaries would have raised significant issues and delays in the pilot. For some sites included in the pilot, the site manager requested the coordinates of restricted areas from the RPs, who maintain an environmental database housing sampling data and parcel information in order to respond to information requests from developers.

In some cases data accessibility is a problem. Parcel boundaries for older sites often have to be obtained from the local land use office or county clerk's office. For more recently remediated sites this is not an issue because current data collection in the field includes recording boundary coordinates with Global Positioning System technology. The value of accurate geolocated maps cannot be stressed enough. The old saying that a picture is worth a thousand words accurately describes this key lesson. The more detailed and accurate the base map, the quicker and more accurate the conflict evaluation and subsequent follow up can be conducted. EPA should work toward a common set of protocols and procedures for developing georeferenced maps for all areas of contamination, areas of remedy components, and health-based restrictions.

Where maps did not exist, site managers drew maps and manually added the necessary information into Terradex's system through its Web-based application according to three types of designated zones: "restricted," "notification," and "watch" (shown in Figure 2 on page 14). These zones are defined in the Terradex system as follows:

- An area in a **restricted** zone is associated with a proprietary easement where the holder has an enforceable right. A local government or third party attempting a potential land activity in this area can therefore be stopped. A zone designated as restricted is typically within the property boundaries held by an RP.
- An area in a **notification** zone will trigger an advisory to a local government or third party attempting a potential land activity. The local government or third party is notified of the contamination, remedy, or restriction, but the RP does not hold sufficient property rights to enforce this notification. A notification zone designation is typically associated with off-site

³ All cost estimates were provided by Bob Wenzlau, Terradex. All labor cost estimates are based on the assumption that one hour of labor costs \$100.

plumes where, although an RP cannot enforce the advisory, existing law often causes its enforcement (e.g., through workplace health and safety codes).

- An area in a **watch** zone requires information to be provided to the regulatory agency or RP but does not require any notification to go to the local government or third party proposing the activity. The purpose of alerting the regulatory agency or RP to the proposed land activity is typically for observing any ground water pumping in close proximity to the site. In the case of ground water pumping, the information is used to evaluate whether the water supplier should be contacted.

Recommendations for Improving Information Collection and Transfer:

Finding accurate boundary information sometimes proves difficult, especially for sites where ICs are not yet in place. In some cases, site managers are forced to use boundary information that may not have been verified in the field because input data had not been updated since the remedial investigation. Another challenge to accurately establishing the boundaries of a contaminated area is the mutable nature of contamination. If a ground water plume has spread to additional land parcels, it is often difficult to identify and map the new plume boundary. This is especially true if a map with parcels and locations of wells is not available. In such cases, boundary information has to be extrapolated. Without precise geographic information, there is an increased risk of missing conflicts or generating and relaying false positive information to the local government or third party proposing the land activity. Because of the importance of accurate information, sites selected for future pilot projects should be carefully screened to ensure that they have up-to-date boundary information or methods should be established for obtaining accurate boundary information.

Information collection for the pilot program would be more efficient if information in IC tracking systems such as EPA's Institutional Controls Tracking System (ICTS) and CalEPA's Geotracker System were automatically transferred to the IC monitoring service. This transmission of information would be similar to Terradex's current process of sending alerts to ICTS and the Geotracker System through an automated data exchange link, which is discussed in the *Receiving Alerts* section. Such an automated data exchange would only be valuable, however, if the data in the IC tracking systems are complete, accurate, and up-to-date.

Setting Parameters and Urgency Levels

In the pilot, the site manager and/or RP for each site set the parameters for the conflict monitoring system. These parameters determine whether possible conflicts receive "alert" status. The parameters were set based on the specific nature and concentration of the contamination, the site remedy, and use restrictions. An example of a parameter that needs to be addressed is: At what soil depth might excavation interfere with subsurface contamination? Urgency levels and deadlines for response are also based on the parameters set by the site manager and/or the RP for alerts related to building permit activity, real estate activity, and water well activity. Those types of activities are typically identified through the local building permitting and property transaction recording offices and the water district. As a member of the One-call system, Terradex is obligated by law to respond within 48 hours to

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excavation alerts, so this deadline is inherited by the pilot participants for responding to potential conflicts from proposed excavation and construction activities.

Recommendations for Setting Parameters and Urgency Levels:

Initially the parameters for the California pilot sites were set too broadly. The agencies and RPs received numerous notifications of land activities that did not require review (e.g., an excavation in an area of restriction with a depth that would not interfere with an IC). Terradex resolved this over-notification problem by applying additional filters to the monitoring system based on input from pilot participants. Once the parameters for the sites were adjusted, the Terradex monitoring system proved much more efficient. In one pilot participant's experience, the number of alerts he received decreased at least one hundredfold.⁴

To avoid over-notifications in future pilot projects, the parameters should be carefully calibrated. Communicating detailed information about each site's characteristics (such as depth of subsurface contamination, and types and concentrations of contamination) directly to the monitoring service or One-call system would likely improve the service's or system's ability to set effective parameters and realistic urgency levels.

Costs of Planning and Startup Process

The overall cost to set up the pilot project was estimated to be about \$45,000. This total includes the regulatory agencies' and RPs' labor costs for collecting and providing data for the pilot. It also includes the technology, data, and labor costs incurred by the IC monitoring service. The average setup cost for each of the 18 sites involved in the pilot was about \$2,500.

III. Ongoing Operations

For the pilot program, the ongoing operations require the daily tracking by the monitoring service of local land activity from a variety of sources. To acquire land activity information, the monitoring service pays about \$1,000 per year to commercial providers and vendors for real estate and construction data, and about \$1,100 per year to the One-call system for excavation data. Continual effort is required by regulatory agencies and RPs to respond to notifications of potential conflicts. The ongoing operations of the pilot program consist of three key processes, which are diagramed in Figure 1 on page 13.

- The monitoring service (Terradex) shares the results of its continual land use monitoring with site managers, RPs, or local land use agencies through e-mailed notifications indicating potential conflicts, which they identify based on the parameters discussed previously. Terradex sends out the alerts at least two days prior to the scheduled start of the land use activity.

⁴ Interview with Dante Rodriguez, IC coordinator for EPA Region 9.

- RPMs and RPs reply to alerts by typing their responses into Terradex's Web-based interface.
- Terradex informs the local government or third party proposing the land activity of the response through the One-call system.

The Terradex monitoring service has a protocol for closing alerts after the conflict is mitigated or deemed innocuous. There is also a protocol for escalating the alert's status. If the RP does not respond to the alert by the deadline, Terradex notifies the regulating agency that the alert was issued and was not addressed in a timely way.

Receiving Alerts

Terradex sends alerts via e-mail to the appropriate party and through an automatic data exchange link to EPA's ICTS and CalEPA's Geotracker System. (As discussed in *Recommendations for Improving Information Collection and Transfer*, in the pilot, IC information did not flow through this data link in the opposite direction to aid in the planning process.) Terradex's Web-based application then displays the alert with the corresponding proposed land activity involved. (A snapshot of the application is shown in Figure 3 on page 15.) In addition, the application shows the names of all parties who have clicked on the link to access the details of the alert.

Recommendations for Improving Receipt of Alerts:

The most frequently cited shortcoming was over-notification. In some cases, the permits issued by local governments were too general and therefore generated unnecessary notifications. RPMs in the pilot program felt that having more detailed information about the site characteristics (e.g., contamination, use restrictions) and about the proposed activity might eliminate some of the over-notification.

Site managers participating in the pilot are not informed about whether excavators have followed their recommendations. To address this concern, one site manager suggested that, in addition to sending e-mail alerts, the system should issue a follow-up e-mail to those who have responded to an alert informing them about the outcome of the alert and whether excavators acted in accordance with responders' recommendations.

Responding to Alerts

The site manager and RPs respond to alerts unless the zone involved was designated as a "watch" zone, in which case, no response is required. For "restricted" or "notification" zones, safe land use and restriction information is then relayed to appropriate parties. In the pilot, responses were initially made through Terradex's e-mail exchanges. This became cumbersome, however, because the large volume of alerts and responses resulted in long and sometimes confusing e-mail strings. During the course of the pilot program Terradex remedied this problem by creating a "response-logging" site. The response logging site is an online bulletin board where all respondents can type in their responses, creating a dialogue among parties involved with the notification and the response to it. In some instances, the site manager contacted RPs or other stakeholders directly via phone or other channels in response to an

alert. Later in the pilot, RPs were given access to respond through the response logging Web site, allowing for collaborative discussion between RPs and site managers. The response logging site is very successful in improving communication among involved parties. It also provides a repository for all responses logged into the site and automatically creates an archive, which can serve as a tracking system for future review.

The annual number of hours spent responding to alerts was estimated to be approximately 36 hours for regulatory agencies and 18 hours for RPs, which translates to \$3,600 and \$1,800 respectively per year. The time required to respond to an alert varied depending on whether the alert included all pertinent information and on whether there were complications regarding the roles and responsibilities of involved parties. For the Moffett Federal Airfield and MEW Study Area sites, it took the RPM an average of about half an hour to respond to an alert; however, the greater the number of parties involved, the more time-consuming her response was likely to be. In cases where confusion arose regarding obligations of involved parties, the RPM consulted an EPA attorney. In other instances RPMs have called on the expertise of EPA risk assessors for help in responding to alerts. For alerts at some sites, both EPA and RPs issue responses.

Recommendations for Improving Responses to Alerts:

The problem caused by long and confusing e-mail strings was rectified by the creation of the response logging site described in the previous section. There are also other ways the system for responding to alerts could be made more efficient and effective. First, clarification at the outset of the pilot about which parties are responsible for responding to which alerts would likely have prevented some confusion among site owners, RPs, and EPA, and it may have alleviated the need for follow-up by site managers. In addition, some involved in the pilot feel that expectations about what kind of response should be issued are not clear and that the pilot could be improved if more precise instructions are given. Finally, site managers were sometimes unable to pinpoint the exact location of the activity based on the Terradex maps (See #2 in Figure 3). The online display of maps showing the location of the proposed land activity in the Terradex Web application could be sharpened and made more visually accurate.

Costs for Ongoing Operations

The annual cost of the ongoing operations of the pilot is estimated to be about \$61,000. This includes the costs that Terradex incurred to acquire and screen land activity data, and the labor costs of the monitoring service and of all parties and stakeholders involved in responding to alerts. Based on this estimate, it costs about \$3,400 to identify and resolve potential conflicts at each of the 18 sites in the pilot.

IV. Summary and Conclusions

By detecting 21 conflicting activities *before* they occurred, the pilot demonstrated the ability of a monitoring service, participating as a member of the local One-call system and obtaining permitting and other land transaction information to effectively monitor use activities in restriction areas. The pilot also demonstrated that the monitoring and response system can identify and in many cases prevent actions that could interfere with remedies in areas where contamination remains onsite.

The cost of conducting setup and ongoing operations in the pilot is estimated at \$6,000 per site. Much of this sum consists of costs incurred by the monitoring service in the development and maintenance of system applications, and the labor required to acquire and monitor data. The monitoring service's costs were about \$5,000 per site. Regulatory agencies incurred costs of about \$500. The average cost for RPs was about \$400.

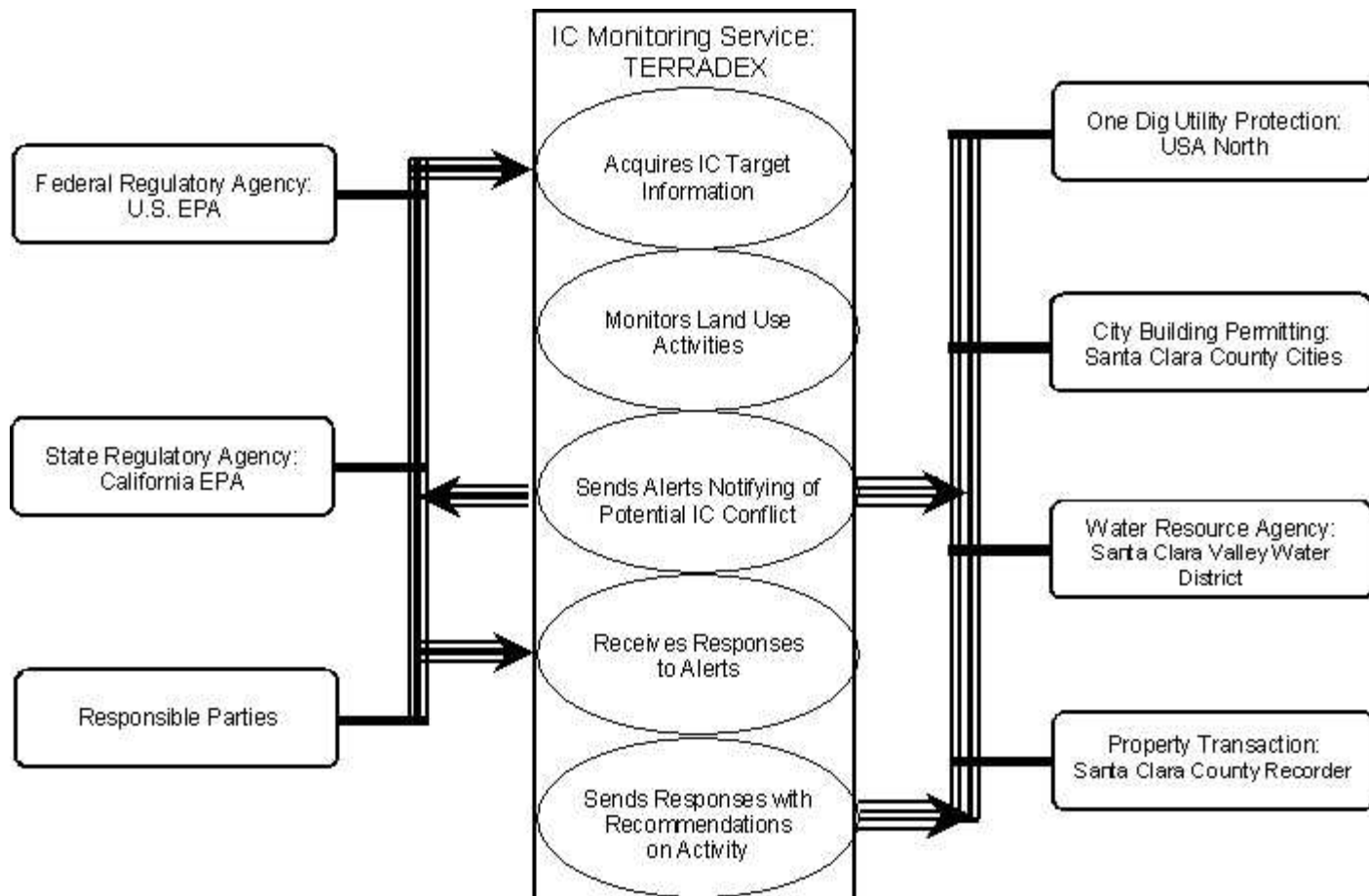
The system proved to be flexible enough to adapt throughout the course of the pilot based on feedback from site managers and other stakeholders, and has produced a number of valuable lessons.

Lessons Learned:

- The thorough, timely, and pragmatic evaluation of potential site conflicts can create a significant workload. The amount of time and resources required depends in part on the amount of activity on or near a site, and the willingness of PRPs to provide information and engage with other stakeholders.
- The pilot demonstrated the importance of setting specific criteria for determining what constitutes a potential conflict in order to avoid over-notification. A formal screening mechanism is also needed to determine whether the potential for conflict is truly present.
- The roles and responsibilities of all the parties involved should be clarified and training should be provided to avoid uncertainty and to ensure that the program runs efficiently. Taking time to firmly establish roles and articulate expectations will also help prevent duplication of effort with local permitting agencies or water boards.
- The pilot showed the importance of timely, organized communication. The response-logging provided a forum for coordinated communication and created a running history of responses to each alert.
- Accurate boundaries; precise, reliable maps; and other site specific information are essential for the system to function effectively. Sources of data, such as ICTS could be designed to transfer data to IC monitoring services or One-call systems.


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Figure 1. Information Flow in the Planning and Ongoing Processes of the California Pilot



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Figure 2. Sample of Terradex’s Web application demonstrating three land use monitoring zones: Restricted, Notification, and Watch.



Logged in as Cliff Kirchof
(ckirchof@sugar-land.sl.slb.com)
[Support/Feedback](#)

DASHBOARD

ADMIN TOOLS

USER PREFERENCES

HELP

SEARCH


USER PREFERENCES

LOG OUT

Sentinel: Moffett Field / MEW
Tracking #: 1000250000

Section 2: Zone Manager
View, add, and modify the list of advisory zones for this Site Sentinel below.

1. [Primary Site Information](#)
2. [Zone Manager](#)
3. [Commitments](#)
4. [Contact/Alert Manager](#)
5. [Site Related Documents](#)
6. [Terradex Process Administration](#)
7. [Save and Return to Sentinel Summary](#)



Red = Restricted
Blue = Notification
Green = Watch

List of Zones


Title	Zone Type	Buffer Zone	Edit	Delete
Orion Park Groundwater Contamination	Notification	100 feet	Edit	Delete
MEW Groundwater Plume	Notification	100 feet	Edit	Delete
Residential Vapor Monitoring Zone	Watch	50 feet	Edit	Delete
Record of Decision Area	Restricted	0 feet	Edit	Delete

ADD A ZONE

NEXT

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Figure 3. A Sample from the Terradex Application Highlighting the Online Process Associated with an Alert from a Proposed Excavation. Terradex maps display (1) boundaries of contamination, and (2) approximate location of future excavation. (3) Terradex investigates the depth of the proposed excavation and requests a response from regulatory agency/responsible parties. (4) Terradex displays the RPM’s response and requests a response from responsible parties under a set deadline.

GENERAL ALERT INFO	
Alert ID	1079426
Alert Status	Alert Still Open / Active
Alert Type	Excavation
Event Date	11/1/2004
EXCAVATION DETAILS	
Address	MOUNTAIN VIEW, CA
Valuation	N/A
Description	TR TO INST DRAIN & WTR SYS
Buffer Zone	0.1 miles
Contact Name / Company	LEUNORA KASPRZAK
Contact Address	151 BOTHELO AVE, MILPITAS, MILPITAS, CA 95035
Contact Phone	408-262-1418
SITE SENTINEL INFORMATION	
Sentinel Name	Moffett Field / MEW
Tracking Number	1000250000
Address	Middlefield Road and Moffett Field, Mountain View, CA.
Watch Zone	MEW Groundwater Plume
Alert Criteria	Excavations: monitor for >15 south of 101 and >5 feet north of 101. Water Wells: monitor for new groundwater usage or dry wells. Building/Occupancy/Real Estate: monitor for sensitive land uses including day care, school, senior care. Ignore environmental assessment work.
Terradex Follow-up	Excavations: notify excavator with copy to regulator. Water Well: notify driller and seek response from regulator and water resource agency. Sensitive landuse: notify owner/contractor and seek response from regulator and city. Copy RP on all.
Response Waiting Period	48 Hours
	

ACTION REQUESTS	
Request:	3
TR TO INST DRAIN & WTR SYS	
DATE WORK BEGIN: approximately 11-9 start date	
LOCATION: ALL/O N. WHISMAN RD FR MURLAGAN AVE GO S APP 450', Mountain View	
CONTACT: LEUNORA KASPRZAK Company: PRESTON PIPELINES INCORPORATED Address: 151 BOTHELO AVE, MILPITAS City: MILPITAS State: CA Zip: 95035 Telephone: 408-262-1418 Fax: 408-262-1870	
WORK DONE FOR: DEVCON CONST	
COMMENT: Terradex called contact person and Karl:	
- excavation is onsite and offsite of street address 465 N Whisman	
- excavation is up to 14 feet deep, 18 inches to 30 inches wide	
Response Deadline:	
ACTION REQUEST: Please let Terradex know by end of business day 11-4 if you have concerns and whether Terradex needs to inform the excavator. Thank you.	
Response: The Terradex follow-up should include notifying excavator of potentially contaminated soil and proper disposal. H&S monitoring of soil vapors.	
Response Date: 11/2/2004 (epa_quest@terradex.com)	
Request:	4
Discussed Situation with Alana Lee. Alana provided contact information to - Maile Smith, Weiss Associates, Project Manager for the MEW Regional Program and for Fairchild. 650.968.7000, lms@weiss.com - Elie Haddad, Locus Technologies, Project Manager for Raytheon and Air Issues 650.960.1640, haddade@locustec.com	
Maile, Elie, could you please review your site information and advise Terradex if there are any concerns with respect to pending excavations, whether any action steps need to be taken to assure safety for contractor and others.	
(Unanswered) Response Deadline: End of Business day 11-4-2004	
<input type="button" value="Submit Response"/>	

Note: This report serves to summarize the results of a cooperative pilot and should not be considered to be an expressed or implied endorsement by US EPA or any of the participants for any of the companies or processes described herein.