Final Meeting Minutes

October 15, 2008

The Unified Community Advisory Board
Meeting started at 6:11 p.m.

The following list of attendees is annotated to indicate the affiliations of people other than Unified Community Advisory Board (UCAB) members.

Ignacio Gomez
Janice Crist
Yolanda Herrera
Gerald Korte
Christine Krikliwy
Marti Lindsey
Alex Richards
Henry Vega
Fred Brinker, Tucson Airport Authority
Susan Hess, Arizona Department of Environmental Quality (ADEQ)
Matthew Jefferson, Environmental Protection Agency (EPA)
George Warner, ASC
David Barrazza, City of Tucson
Christine Aguirre, ERM
David Abranovic, ERM
Ron Barbea, Tohono O'odham Nation
Ruth Benson
Mark Berge, 162 Fighter Wing
Jeff Biggs, Tucson Water
Donna Creech, Shaw Environmental
Stephen Dean, Tucson Water
Karel Detteman, Tech Law
Aaron Etnyre, BB&E
José Garcia, EPA
Jim Hatton, AECOM
Jason Hilker, ERM
Paul Hendricks, CAP
Estella K. Holmes, ASC
Sandra Jake
Tom Maertens, AECOM
Albert & Linda Martinez
George Maseeh, Malcom Pirnie
Pamela Matthews, ERM
Denise Moreno, University of Arizona (UA) SBRP
Kelly Reis, AECOM
Bill DiGuiseppi, AECOM
Daniel Samorano, Raytheon
Catherine Schladwiler, Malcolm Pirnie
Mona Silvas, Elvira Neighborhood
Alex Sproule
Charlie White, ERM
Bill Wittman, AECOM
Martin Zeleznik, EPA

WELCOME/INTRODUCTIONS

Ignacio Gomez opened the meeting and welcomed everyone in attendance. He thanked those who had participated in the Technical Assistance Services for Communities (TASC) forum conducted 14 October 2008. He said that although they did not have the turnout they had hoped for, it was important to inform the community of the situation. UCAB meeting attendees introduced themselves.

Mr. Gomez announced that Board members Ann Montaño, Helen Guttierez, and Rich Kessler were excused from this evening's meeting. He also congratulated Jeff Biggs on his appointment as Director of Tucson Water and noted that this would be Jose Garcia's last meeting. He thanked Mr. Garcia for all the assistance he has given to the UCAB.

MINUTES FROM JULY 2008 MEETING

Upon motion made and seconded, the minutes for the July 2008 meeting were approved by a unanimous vote of 7-0.

NEW BUSINESS

EPA 1,4-dioxane Update by Matthew Jefferson

Mr. Jefferson gave a brief update of the 1,4-dioxane FRI forum. He commended Krissy Russell-Hedstrom, the Technical Assistance Service for Communities (TASC) contractor, for the fantastic work she did in pulling the information together. He shared Mr. Gomez' sentiment that the turnout was not what they had hoped, but he said the message delivered was the right message, which was that the water from the Tucson Airport Remediation Project (TARP) treatment plant is safe and that they continue to put all their efforts into investigating and making operational decisions regarding the TARP treatment plant.

Mr. Jefferson said there were a series of meetings between EPA and the Air Force that examined the entire 1,4-dioxane plume, particularly focusing on 1,4-dioxane north of Los Reales Road. The Air Force is completing the first phase of this study, which compiled and evaluated all existing documentation/data collected over the last six years. Recommendations will be made next regarding what data gaps exist and what modeling is needed to understand 1,4-dioxane plume and how it moves throughout the groundwater. These results should be available to the EPA in late November 2008, and Mr. Jefferson said he would have a more substantial update at the next UCAB meeting.

EPA Technical Assistance Services for Communities for 1,4-dioxane Update by José Garcia

Mr. Garcia described the TASC-contracted meeting, which had been requested by the UCAB to gain more information about 1,4-dioxane. He said the meeting was a good compromise to get information without going through the Technical Assistance Grant process, which is very involved and paper-intensive. He applauded all the agencies and potentially responsible parties who attended to answer questions.

Mr. Garcia explained that the TASC is available for other contaminants of concern and is not limited just to 1,4-dioxane. He said the PDF of the fact sheet is available, as well as the presentation. He noted that Ms. Russell-Hedstrom worked as an independent contractor, doing all the research and presenting her findings uninfluenced by the EPA. He added that as long as UCAB keeps hammering home the issue of drinking-water source safety, he was comfortable with the forum. Mr. Garcia thanked David Barrazza for his assistance in finding the location, saying it was a beautiful location with a very helpful staff.

Mr. Garcia said he is now moving from the EPA's Superfund program to the Border program, and that he will stop in at future UCAB meetings if he is in the area.

Air Force Plant 44 Update by Bill DiGuiseppi

HiPOx Installation

Mr. DiGuiseppi mentioned that Earth Tech recently had been acquired by AECOM.

He then provided an update on the high pressure oxidation (HiPOx) advanced oxidation system being installed at Air Force Plant 44 (AFP44). He pointed out that this system addresses 1,4-dioxane as well as trichloroethene (TCE), dichloroethene, and other volatile constituents. In July 2008 the treatment system was designed, fabricated, and delivered. It has been wired and electrical controls have been added. Mr. DiGuiseppi explained that the system uses hydrogen peroxide mixed with ozone; ozone typically is generated from liquid oxygen, which is a potentially dangerous product to handle. The original plan was to work with a local vendor to lease equipment; however, there have been insurmountable contractual issues related to this approach. An alternative technology uses an oxygen concentrator, which takes oxygen from the air. This system is simpler, less dangerous, and actually lower cost over the life of the system. In the meantime, concrete and steelwork should be accomplished in the next few months, with start up in the winter 2009 timeframe.

1,4-Dioxane Focused Remedial Investigation

Mr. DiGuiseppi discussed the 1,4-dioxane focused remedial investigation (FRI). He presented a map showing the general area of the 1,4-dioxane plume, noting the concentrations have been relatively steady. The US Geological Survey has done sampling for the Air Force in area north of Los Reales Road once or twice annually since 2006 and the data shows consistent trends, with concentrations mostly remaining steady or declining slightly. Existing data have been compiled from Tucson Water, the Airport, and the ADEQ to study the geology, the hydrogeology, and the chemistry to understand the potential source areas of 1,4-dioxane, how it has migrated over time, and where it will migrate next.

The next phase of the FRI entails a work plan for the intrusive work, which includes installing additional wells, collecting additional samples and performing more groundwater modeling for better understanding.

Mr. DiGuiseppi offered a slight correction to information previously presented about 1,4-dioxane. He said that 1,4-dioxane was present in most stabilizers in a small amount, and in TCE at less than one percent levels, but is present in 1,1,1-trichlorethane (1,1,1-TCA), a slightly different solvent, at up to eight percent. Analytical data suggest 1,4-dioxane is actually tied to TCA, and that there were clear distinctions between where TCE and TCA were used and released. Mr. DiGuiseppi noted that Site 2, the largest source removal area for 75,000 pounds of volatile organic compounds, contained no 1,4-dioxane.

Question: Alex Richards regarding the differences between the map presented by Mr. DiGuiseppi tonight and the map presented at the forum, indicating the plume had grown.

Mr. DiGuiseppi said that the differences are because the maps are from different years and contain varying degrees of information. He explained that the plume has not grown because of migration, but because more wells have been installed which then allow for better interpretation.

Question: Yolanda Herrera regarding whether people should be concerned about TCA.

Mr. DiGuiseppi said that TCA is not a concern because it breaks down very quickly. TCA breaks down into DCE, which is thought to be not as toxic as TCE. Jim Hatton interjected that DCE is one of the original compounds detected and is being cleaned up at the same time as the TCE. Mr. DiGuiseppi noted that soaps and detergents have replaced these toxic solvents.

Question: Henry Vega regarding a system used years ago involving the use of water electro-light cleaning.

Mr. DiGuiseppi said that processes now are much cleaner than what was done in the past.

Question: Henry Vega regarding the number of new monitoring wells on the northwest side, around the Home Depot area and the concentrations detected.

Mr. DiGuiseppi deferred to the Tucson Water, but said he is aware of one monitoring well planned near the corner of I-19 and Irvington, but that it has not yet been drilled.

Shallow Groundwater Zone Remedial Process Optimization

This zone is located in the northwest corner of AFP44 and is perched (or elevated) water above the main aquifer. A vapor and water extraction and treatment system has been running for the last 10 years. The vapor and water levels were reduced to a certain level but then have remained steady for approximately the last five years. He said it is apparent that this system is not going to be as effective as it needs to be. Mr. DiGuiseppi said the remedial process optimization is an investigation of what works and/or what would work better. This will require drilling of additional wells and performing surface and downhole geophysics to identify pathways that water may be moving, such as the buried channels that were identified at the Airport, Additional drilling and testing information will be analyzed in cooperation with Dr. Mark Brusseau at the UA with the goal to understand the geology and chemistry better and to figure out how best to clean up this problem area.

Drilling also will be done at Sites 2 and 3 where in situ chemical oxidation has been used but some affected groundwater remains. This will allow a greater look at the finer grain materials to see whether the fluids used to clean up the constituents of concern have migrated into the tight material or are being missed.

The final location Mr. DiGuiseppi discussed is an area near EPA-3, a well where concentrations climbed over time, plateaued and went down, and are climbing again. One additional well will be installed to help the USAF and agencies understand where the constituents of concern are coming from and why the concentrations are what they are.

Question: Ms. Herrera regarding the orientation of the map presented.

Mr. DiGuiseppi explained that most wells are on AFP44 but there are several wells on the Tohono O'Odham reservation, which requires going through the well-lease process to make arrangements. He noted that good data exists in one area and also in an area 3,000 feet away, showing one area that is clean and the constituents in the shallow groundwater zone clay are gone. The other has elevated concentrations and the shallow groundwater zone has concentrations too. The question to be determined next is "what does the area in between look like?"

Question: Denise Moreno regarding when drilling was expected to begin.

Mr. DiGuiseppi said drilling depended on approvals and discussions with the regulators. The first work plan draft was recently turned in, and he anticipated drilling would begin after the first of the year.

Question: Mr. Gomez regarding potassium permanganate, assuming that was the purple liquid previously mentioned.

Mr. DiGuiseppi explained that potassium permanganate was one option to consider. He said the wells in the shallow ground zone pump only about 7 to 14 gallons per minute (gpm), while wells in the regional aquifer pumped 200 to 300 gpm. Because of this, he said pump and treat is not necessarily a good option. If the geophysics show a nice zone of concentrated gravel, pumping and treating groundwater from that gravel might be a good idea, but that it is likely an in-ground solution is needed to take care of the problem in place.

Question: Mr. Vega regarding whether the irregular readings between the areas has anything to do wit the point of depression in some of the wells.

Mr. DiGuiseppi said historically some wells were pumped and injection wells had water coming in, which could have an impact on flow. He noted that how it moves now may be different from how it moved 10 years ago--which may be different from how it will move a year from now. Once the HiPOx system is operational, pumping will increase from the 1,000 gpm currently being pumped to 2,000 or more gpm to capture other areas.

General Contamination Update (extent of TCE and 1,4-Dioxane)

Mr. DiGuiseppi said there are still a couple of concentrated areas, and that pumping is going on aggressively in the northern area to capture that. He again noted EPA-3 has problems and again stated that additional wells will be installed to try to understand that better. He again pointed out Site 2, where in the early days of the UCAB the concentrations were 3,000 to 4,000 parts per billion (ppb) of TCE and now the highest concentration is 32 ppb. He said the in situ chemical oxidation appears to have been very successful and suggested that perhaps the plume will have been completely treated in the Site 2 area.

Question: Mr. Vega regarding TCE first being used in 1974.

Mr. DiGuiseppi explained that, according to records, TCE was used before TCA, which was first used in approximately 1971. TCA was used until approximately 1994 when Freon was used briefly before the introduction of the soaps/detergents used today.

Question: Mr. Vega regarding information on when TCE was first used.

The AFP44 facility was originally built to manufacture parts for weapons, including metal plating and cleaning of metal parts. TCE was a very effective and widespread solvent for cleaning metal parts. Mr. DiGuiseppi said TCE was invented in the late 1800s, was used extensively worldwide, and is the most common constituent he has found during his 20-year environmental career.

Mr. Jefferson added that the work being done at Site 2 is one of the Air Force's great successes. He said that when he first became involved in 2003, concentration levels were about 500 ppb and are now down to about 32 ppb. Site 14 is one of the most challenging for AFP44, where many different techniques have been tried but investigation into other solutions is ongoing.

Question: Mr. Vega regarding follow-up on dense nonaqueous phase liquid.

Mr. DiGuiseppi explained that dense nonaqueous phase liquid (DNAPL) refers to when there is more TCE in water than can dissolve in the water. The excess TCE will separate out and sink, as oil and vinegar do. DNAPL itself is actually very difficult to actually find in samples, but historically the TCE concentrations in the groundwater were high enough to suggest that DNAPL was probably present in at least two locations at AFP44. Both locations have been cleaned up above the water table and those sources have been removed. Below the water table, the concentrations are not high enough to suggest the presence of DNAPL.

Mr. Gomez noted several people had joined the meeting in progress. Ron Barbea said he is a Solid Waste Client Inspector with the Solid Waste Regulatory Office of the Tohono O'Odham Nation Environmental Protection Office. He said the Environmental Protection Office plans to have more of a presence at the UCAB meetings in the future to allow them to track what is going on. Mr. Gomez noted that the Tohono O'Odham Nation is a certified member of the UCAB, and suggested next meeting they take a seat at the Board table. Following other introductions, Mr. Gomez thanked people for coming and stressed the importance of community involvement.

Air National Guard Expansion by Christine Aguirre

Ms. Aguirre said installation of the in situ pilot test monitoring wells had begun Tuesday, 14 October 2008, and that a total of 20 wells would be installed for the pilot test during the next couple of months.

Question: Mr. Vega regarding the changing of carbon in the filtration system.

Ms. Aguirre explained that vapor phase carbon was used to treat the vapor stream coming off the air strippers and that the carbon was last replaced in 2003. Effluent-vapor sampling is done every month, with no high concentrations being reported. The carbon will be replaced if/when higher concentrations appear.

Airport Property Update by Fred Brinker

Mr. Brinker said the treatment system has been in operation for one year. Last week approximately 40 pounds of TCE were removed, and the system currently is running at about 62 gpm. He explained that a problem had developed with iron bacteria clogging the wells and attacking the pumps, and the pumps now will have to be cleaned every six months to maintain capacity. He noted a shaft had broken off the blower on the soil vapor extraction system (SVE). This was repaired and the system is now back in service. About 150 pounds of TCE were removed last month through the SVE system in the technical impracticability (TI) zone behind the hangars where the concentrations have decreased by 80 percent in just one year over the initial values.

Mr. Brinker said that, overall, 500 to 600 pounds of TCE would be removed from the groundwater and 5,000-plus pounds from the soil in a year.

Mr. Brinker explained that shallow groundwater zones are very complex from a hydrological standpoint. The wells are not uniformly spaced because pumping is from the gravel channels underlying the shallow groundwater. Shallow groundwater does not drain into them. He said they are continuing to see a gradual development of a capture zone across the site. In some areas the TCE levels in the groundwater are starting to drop while in others the levels are increasing, which means the TCE is migrating under the influence of the pumping toward the pumps.

He noted that potassium permanganate is being used at the Samsonite Building area, and in the past year-and-a-half there has not been much rebound. Concentrations still are below maximum contaminant levels in all the monitoring wells that do not contain purple liquid. He said there are hits of 1,1-dichloroethene, which is the breakdown product of TCA and indicates there was a TCA release long ago.

Mr. Brinker stated that the cleanup of the Canale drains has been completed. Holes were cored into the drains, the constituents were hydrojetted, and the holes were plugged. The constituent then were dewatered and stabilized and sent to a hazardous waste landfill.

The remaining project in the polychlorinated biphenyls soils remedy is the Hangar 1 drain clean out, which will be done after the first of the year when the present tenant has left.

Mr. Brinker also mentioned that the UA is doing an investigation of the TI zone and should begin drilling in the next few weeks. They will be using roto-sonic drilling, which allows them to drill a continuous core and remove it from the ground to see the entire stratigraphy. This will provide some good information as to what the actual TI zone looks like.

Question: Mr. Vega and Mr. Richards regarding the procedure used to clean the iron bacteria from the affected wells.

Mr. Brinker explained the wells need to be scrubbed and brushed to remove the plaque generated by the bacteria, and then washed with acid to adjust the pH to knock back the bacteria, and then jetted to clean the bacteria out of the well. The water then has to be pulled out of the ground and properly disposed. Because there is no way to stop the bacteria, the process has to be repeated every six months. If this is not done, the bacteria literally will eat the metal out of the well.

Tucson Water 1,4-dioxane Management Update by Stephen Dean

Mr. Dean said Tucson Water continues to manage and mitigate 1,4-dioxane entering the TARP treatment plant and at the point of entry to the water supply with blending strategies. Since June 2003, 759 total samples have been collected at the TARP treatment plant. The average concentration of 1,4-dioxane coming into the plant is 1.51 ppb, with an output of 1.61 ppb and 1.14 ppb at the point of entry. By blending the nine extraction wells and the SS-wells and B-zone drop, the 1,4-dioxane levels remain under 2 ppb.

Mr. Gomez noted the work Tucson Water has been doing for the community was well explained at the FRI.

Question: Mr. Vega regarding the readings of the new monitoring well southeast of I-19 and Irvine.

Mr. Dean explained that particular well had not yet been drilled. A new monitoring well was drilled last year south of Drexel Avenue between 12th and 6th, which is in close proximity to the five south wells. The 1,4-dioxane level there is roughly 7 ppb and TCE 3 ppb, which is representative of what is seen in the shallow aquifer. Mr. Brinker added that the well was added to cover a data gap in that area.

Question: Mr. Gomez regarding water going into the TARP plant.

Mr. Brinker said that the area is where the aquifer is divided. This set of wells was installed to capture that water before it reaches the undivided regional aquifer around Irvington.

Question: Ms. Herrera regarding whether the mobile homes in that area use private well water or city water.

Mr. Dean said that to the best of his knowledge none of the private wells are in use. Mr. Dean noted that in the TARP area there are 50 monitoring/sentinel wells in

conjunction with the recovery wells, and there are active production wells outside the plume that are used to blend with the TARP water to reduce the 1,4-dioxane levels. Mr. Brinker added that the Pima County Department of Environmental Quality samples all the private wells. Mr. Jefferson added that no private wells are used for drinking water, though they are used for irrigation. The wells are sampled once annually, and the owners are informed of the results.

Question: Mr. Richards regarding the water from the west side wells being used by the south side.

Mr. Dean explained there are three wells in the northwest part outside the plume area. Approximately 7 million gallons of water per day goes through the TARP treatment plant and into the TARP relift, and is blended with water from these three wells before going to the reservoir. He said the rough boundaries for this water use are Silver Lake and 22nd Street on the south, Country Club on the east, River Road on the north, and Silver Bell on the west. Booster stations pick up some of this water along with the Clear Water supply from Avra Valley and blend again before pushing into the foothills.

Question: Mr. Richards regarding the chart in his water bill listing different areas having various water hardness/pH.

Mr. Dean said there are different water-quality zones, and these depend on which supply is being used and on seasonal demands. All the water supplies are hydraulically connected with redundancy as well, and the water parameters vary depending on source supply and on daily demands throughout the city.

Question: Sandra Jake regarding the availability of maps showing the location of reservoirs.

Mr. Dean replied that maps are available, but for security reasons they are not made public.

UCAB Final Report on the TCE Curriculum by Marti Lindsey

Ms. Lindsey distributed handouts that students are using in the curriculum, such as a reprint provided by the 1985 Arizona Daily Star (as provided by the *Arizona Daily Star* with copies by Tucson Water). These copies already are being used in the classroom at the Wildcat School, which is the UA charter school. She said there are Language Arts lessons about reading the newspaper critically and asking questions rather than believing everything presented. Other lessons include:

- Government, i.e., how the EPA came into being and the role of the EPA in the cleanup;
- The people in Tucson who have taken on the role of community leaders;

- Environmental justice and our role as advocates, not just victims but for the entire community;
- Science lessons; and
- Engineering lessons.

Ms. Lindsey said the lessons are very hands-on for the students. She explained there were specific aims for this curriculum, which can be found on the web at http//coep.pharmacy.arizona.edu/tce/index.html. This program has improved the health education in Tucson in pockets, not necessarily the way UCAB originally envisioned because the Sunnyside Unified School District (SUSD) did not take this up the way they had promised. However, Ms. Lindsey said the Howenstein School and other individual schools are using the curriculum, and it is her hope that next year some of these students will share what they've learned with the Board.

The curriculum originally was written for high school students, but there are middle school teachers who are very interested and are adapting the program.

Ms. Lindsey said this program could not have happened without the support of the EPA, the UCAB, and all of the members who come to the quarterly meetings. She said this had been collaborated initially with the SUSD, and all the teachers who took on the original writing were SUSD teachers. One of these teachers is a leader in the group, and he was fascinated by the issue of how the problem began as a rural problem and suddenly there were so many people around who were affected. There have been two professional development sessions with teachers and now approximately six classrooms are using the lessons.

Ms. Lindsey noted that the way this program was created allows it to perpetuate. There is no cost; it is all freely available. She said as soon as you approach teachers about TCE, they are interested and want to know more. She said an interesting unintended consequence of this curriculum is that last year she began teaching a health literacy class for pharmacy students, who then go out and deliver lessons in schools. Because of this class, 21 pharmacy students have learned about TCE, only one of whom had known anything about TCE before. She said the students who had attended UCAB meetings the last two years from the Howenstein School have all graduated and the program is beginning again with sophomores.

She explained that included in the handouts this evening were her final report, a list of what was accomplished, and a brief summary of the most current information about the health effects of TCE. She said the lessons are all available online.

Mr. Gomez added that a recruitment effort would soon be starting, and that he was looking for school teachers from the SUSD and he said that he would be approaching

the principals of both SUSD high schools about recruiting students in their junior and senior years. He noticed that the Board is a 20-member group with approximately 13 members currently. He made a general call to the public, saying it has been personally frustrating when people he depends on miss two or three meetings and come only intermittently. Mr. Gomez pointed out that this group is a "team" and everybody has been doing their job. A committee was formed, comprised of Mr. Gomez, Mr. Kessler, Ms. Lindsey, Mr. Richards, Mr. Vega, for this recruitment undertaking. Ms. Lindsey suggested recruiting Chris Martin from the Howenstein School, as he has been a major conduit into the schools.

Question: Mr. Vega regarding whether the lessons were for four years of high school.

Ms. Lindsey explained there was a set of lessons called Tox-RAP for young children, which leads them to recognize there is a process for doing risk assessments and understand contamination in preparation for the lessons designed for high school.

Mr. Vega stated that studies are being done throughout the country with various chemicals on mice, and felt that the southwest had been a non-volunteer study. He said he was glad to see this program expanding. Ms. Lindsey said she believes there is a broad interest and that by showing people these lessons can work, it will help in recruiting parents to attend UCAB.

Question: Christine Krikliwy regarding the interviews she conducted with Board members in the production of the curriculum.

Ms. Lindsey said the interviews were utilized to train the teachers, who then the put the curriculum together. She felt that the interviews might have gotten use in the curriculum had they been video-taped, and she suggested at some time in the future this could happen. Mr. Gomez noted that this is the only curriculum in the country of its kind, which teaches the history of the site, what chemicals were involved, what diseases occurred, and the effect on the community. He said that the Tucson Unified School District has expressed interest in a similar program, so it would be expanding.

Mr. Garcia said that the contractor-prepared fact sheets left over from the FRI were on the back table, as well as extra fact sheets EPA had mailed out.

CALL TO GOVERNMENT AGENCIES

There were no government agency items to be discussed.

CALL TO THE AUDIENCE

Mr. Gomez said that four classes from SUSD had recently celebrated the classes of 1958/1919/1960/1961. He noted that these four classes were the first to have graduated from Sunnyside High School.

Mona Silvas aid she lives near Nogales Highway and Elvira on the east side of South 6th near the Challenger Middle School and is concerned whether the fruit from her trees is safe to eat or if her soil is contaminated. She said the UA had determined the land was contaminated when the Elvira Neighborhood Association had plans to create a local park a short distance from her property. Apartments were instead built on that land. Ms. Silvas said the soil was totally covered by the apartments, but that the neighbors had been breathing the contaminated soil stirred up during construction.

Mr. Brinker said to the best of his knowledge there had been no industrial activities in those portions of vacant land. He explained that the contamination UCAB has worked with constituents in the groundwater caused by releases either at AFP44 or the Airport Authority within the boundaries of the property at depths of approximately 150 feet. Environmental studies were done when the Challenger Middle School first opened, because of the concern that the school had been built in a Superfund site on top of a contaminated groundwater plume. He added that it was determined there had been no industrial activities on the surface in that area and the groundwater was deep enough that it would not cause a problem for the school.

Mr. Brinker said that today's regulations require an environmental assessment before any construction, and suggested Ms. Silvas check with the apartments for the results of their assessment. Ms. Herrerra recommended Ms. Silvas' question be researched and an answer brought back at the next meeting. Mr. Jefferson said he would look into this issue and get back with Ms. Silvas.

FOLLOW-UP ACTION ITEMS

- UCAB membership attendance; and
- Follow-up to Ms. Silvas' question.

Upon motion made and seconded, the meeting was adjourned at 8:06 p.m.

www.epa.gov/superfund/community/tasc

TECHNICAL ASSISTANCE SERVICES FOR COMMUNITIES

Tucson International Airport Area Superfund Site

Basic Facts About 1,4-Dioxane and the Tucson International Airport Area

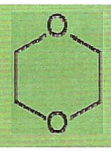
This fact sheet summarizes key issues associated with 1,4-dioxane contamination at the Tucson International Airport Area Superfund Site (TIAA). This fact sheet was produced by EPA's Technical Assistance Services for Communities (TASC) program.

Trichloroethylene (TCE) has been the primary contaminant of concern at TIAA since the site's discovery several decades ago. 1,4-Dioxane was not identified at TIAA until 2002 when it was detected in groundwater at three of TIAA's project areas: the Tucson Airport Remediation Project, Air Force Plant 44, and the Airport Property. Since these discoveries, a groundwater plume of 1,4-dioxane has been characterized (see map at right). This plume is different from the TCE groundwater plume previously characterized at the site. 1,4-Dioxane can cause negative health effects and so may be a concern for Tucson area residents. Tucson area groundwater has been treated for TCE for a number of years, and treatment for 1,4-dioxane is in its early stages.

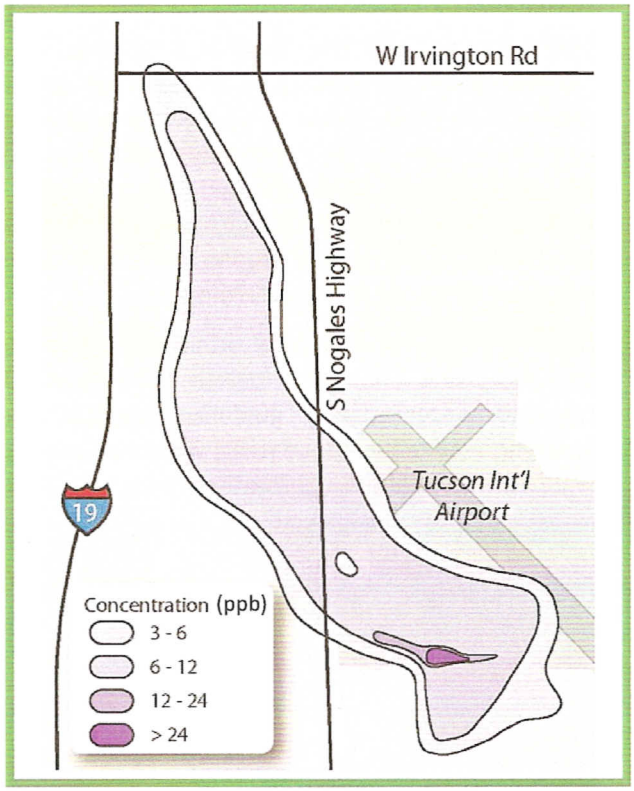
What is 1,4-dioxane?

1,4-Dioxane is a flammable, colorless, synthetic, organic chemical with a faint pleasant odor. It does not stick to soil particles, so once it is introduced into the ground, it moves quickly into groundwater. Because it does not degrade under natural conditions, it remains in groundwater and migrates with it. This helps to explain the large area that the TIAA 1,4-dioxane plume covers.

At right: The structure of 1,4-dioxane. It is an organic molecule containing only carbon, hydrogen, and oxygen atoms.



1,4-Dioxane is used in a variety of ways, including as a stabilizer of TCE and another chemical, trichloroethane (TCA). Historically, about 90 percent of 1,4-dioxane has been used to stabilize TCA. Recent laws have limited the use of TCA due to its potential to deplete the ozone layer, and as a result, the use of 1,4-dioxane has declined in recent years. 1,4-Dioxane is also used in the manufacture of shampoos, cosmetics, and detergents and as a solvent to dissolve greasy substances. 1,4-Dioxane contamination has been detected in at least 30 other Superfund sites including the Lowry Landfill in Colorado and the Charles-George Reclamation Trust Landfill in Massachusetts.



Above: 1,4-Dioxane Plume Extent at TIAA in 2006 (modified from Arizona Department of Environmental Quality map)

Why is 1,4-dioxane an issue now?

Older laboratory methods were only capable of detecting 1,4-dioxane at very high levels. New detection technologies capable of detecting lower concentrations (between 0.024 and 16 parts per billion (ppb)) only became available starting in 1997. In addition, the Agency for Toxic Substances and Disease Registry added 1,4-dioxane to its Priority List of Hazardous Substances (a list of chemicals commonly found at Superfund sites that pose the most significant potential threat to human health due to their known or suspected toxicity and potential for human exposure) in 2005. These two events led to 1,4-dioxane becoming a contaminant of concern in groundwater at TIAA.

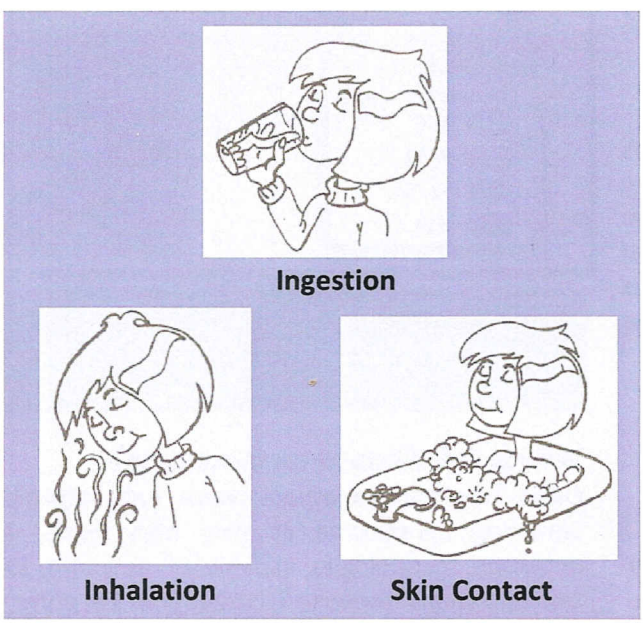
What are the health effects of 1,4-dioxane?

Humans can be exposed to 1,4-dioxane through inhalation (such as by breathing shower vapors), exposure to the skin (such as by bathing), or ingestion of contaminated water and food. Human inhalation of low levels of 1,4-dioxane over short periods of time have been shown to cause eye and nose irritation. Studies on the health effects of skin exposure and human ingestion of 1,4-dioxane are not available, but drinking water with high levels of 1,4-dioxane has been shown to damage the liver and kidneys of rats. Laboratory studies have also shown that long-term exposure to high levels of 1,4-dioxane in drinking water can cause cancer in the livers and noses of rats. It is not well understood whether animal studies such as these can accurately predict human health effects, but based on the animal studies, EPA considers 1,4-dioxane a probable human carcinogen.

There is currently no federal drinking water standard for 1,4-dioxane. Three EPA regions and 11 states have provided water quality guidance for 1,4-dioxane, however, (see table, above right) which can be used by regulators to establish appropriate cleanup goals for contaminated sites. Guidance levels range from 3 ppb in California and Missouri to 85 ppb in Michigan. EPA Regions 3, 6, and 9 set a guidance level of 6.1 ppb for tap water. Of these guidance levels, only Colorado's is enforceable; limits of 6.1 ppb by March 2005 and 3.2 ppb by March 2010 are set in that state.

Water Quality Guidance Levels for 1,4-Dioxane

Location	Water Type	Concentration (ppb)
EPA Regions 3, 6 & 9	Tap Water	6.1
California	Drinking Water	3
Missouri	Groundwater	3
Colorado	Groundwater and Surface Water	3.2
Florida	Groundwater	3.2
Pennsylvania	Groundwater	5.6
Delaware	Groundwater	6
West Virginia	Groundwater	6.1
Texas	Groundwater	18.6
Maine	Drinking Water	32
South Carolina	Drinking Water	70
Michigan	Drinking Water	85



Above: Methods of Human Exposure to 1,4-Dioxane

How can 1,4-dioxane in ground water be treated?

The pump and treat method currently used to treat ground water for TCE at TIAA is not effective in treating 1,4-dioxane. EPA and responsible parties are currently evaluating the extent of the contamination to determine what treatment methods are appropriate at the Tucson Area Remediation Project. In July 2007, an advanced oxidation process treatment system applying a combination of hydrogen peroxide and liquid ozone was installed at Air Force Plant 44. This type of system has been used in several sites with 1,4-dioxane contamination including McClellan Air Force Base in California, the Charles George Landfill in Massachusetts, and the Pall-Gelman Sciences site in Michigan. While other types of treatment, including bioremediation and granular activated carbon absorption, have been used at other sites, advanced oxidation process treatment is considered to be the most effective in remediating 1,4-dioxane.

For more information on the Tucson International Airport Area Superfund Site, Please visit:
www.epa.gov/region09/tucsonairport

For More Information on EPA's TASC Program, Please Contact:
Luis Garcia-Bakarich
TASC Coordinator - EPA Region 9
garcia-bakarich.luis@epa.gov
(415) 972-3237

www.epa.gov/superfund/community/tasc

SERVICIOS DE ASISTENCIA TÉCNICA A COMUNIDADES

Sitio del Superfondo del Área del Aeropuerto Internacional de Tucson

Datos básicos acerca del 1,4-dioxano y el Aeropuerto Internacional de Tucson

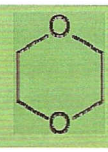
Esta hoja informativa resume aspectos clave relativos a la contaminación por 1,4-dioxano en el Sitio del Superfondo del Área del Aeropuerto Internacional de Tucson (AAIT), y fue preparada por el programa del Servicio de Asistencia Técnica a Comunidades (TASC por sus siglas en inglés) de la EPA.

El tricloroetileno (TCE) ha sido el contaminante de mayor preocupación en el AAIT desde el descubrimiento del sitio, hace varias décadas. El 1,4-dioxano no se identificó en el AAIT sino hasta 2002, cuando se detectó en los mantos freáticos de tres áreas del proyecto del AAIT: en el Proyecto de Remediación del Aeropuerto de Tucson, en la Planta 44 de la Fuerza Aérea, y en los terrenos del aeropuerto. Desde su descubrimiento se definió un penacho de los acuíferos contaminados por 1,4-dioxano (véase el mapa a la derecha). Este penacho es diferente del penacho anteriormente definido para los acuíferos contaminados por TCE en el sitio. El 1,4-dioxano puede tener efectos negativos sobre la salud y por ende puede ser motivo de preocupación para los residentes del área de Tucson. Los acuíferos del área de Tucson han sido tratados durante varios años para eliminar el TCE, y el tratamiento para el 1,4-dioxano se encuentra en sus primeras fases.

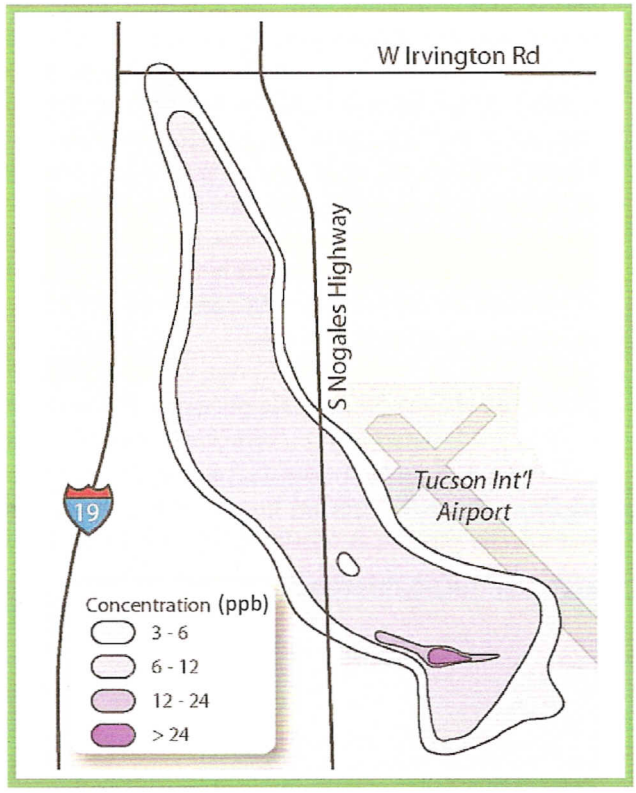
¿Qué es el 1,4-dioxano?

El 1,4-dioxano es una sustancia química orgánica, inflamable, incolora y sintética con un ligero olor agradable. No se adhiere a las partículas de tierra, de modo que, una vez introducido al suelo, pasa rápidamente a los mantos freáticos. Dado que no se degrada en condiciones naturales, permanece en los acuíferos y migra con ellos. Esto ayuda a explicar la extensa área que cubre el penacho del 1,4-dioxano en el AAIT.

Derecha: Estructura del 1, 4-dioxano. Molécula orgánica que solo contiene átomos de carbono, hidrógeno y oxígeno.



El 1,4-dioxano tiene varios usos, entre otros, como estabilizador del TCE y otra sustancia química, el tricloroetano (TCA). Tradicionalmente, cerca del 90% del 1,4-dioxano se ha utilizado para estabilizar el TCA. Legislación reciente ha limitado el uso de TCA debido a su potencial para destruir la capa de ozono y, como resultado, el uso de 1,4-dioxano ha disminuido en los últimos años. El 1,4-dioxano también se usa en la fabricación de champús, cosméticos y detergentes, así como solvente de sustancias grasas. Se ha detectado contaminación por 1,4-dioxano en por lo menos otros 30 sitios del Superfondo, incluyendo el vertedero Lowry, en Colorado, y el vertedero del Fideicomiso de Reclamación Charles-George, en Massachusetts.



Arriba: Extensión del penacho de 1, 4-dioxano en el AAIT en 2006 (modificado a partir del mapa del Departamento de Calidad Ambiental de Arizona).

¿Por qué el 1,4-dioxano se ha convertido ahora en un problema?

Antiguos métodos de laboratorio solo podían detectar 1,4-dioxano en concentraciones muy elevadas. No fue sino hasta 1997 cuando se contó con nuevas tecnologías capaces de detectar concentraciones más bajas [entre 0.024 y 16 partes por billón (ppb)*]. Además, la Agencia para el Registro de Sustancias Tóxicas y Enfermedades incluyó al 1,4-dioxano en su Lista Prioritaria de Sustancias Peligrosas (una lista de sustancias químicas comúnmente encontradas en los sitios del Superfondo que representan la mayor amenaza potencial para la salud humana debido a su toxicidad conocida o potencial, y a las posibilidades de exposición humana) en 2005. Estos dos sucesos hicieron que el 1,4-dioxano que contamina los mantos freáticos del AAIT se convirtiera en motivo de preocupación.

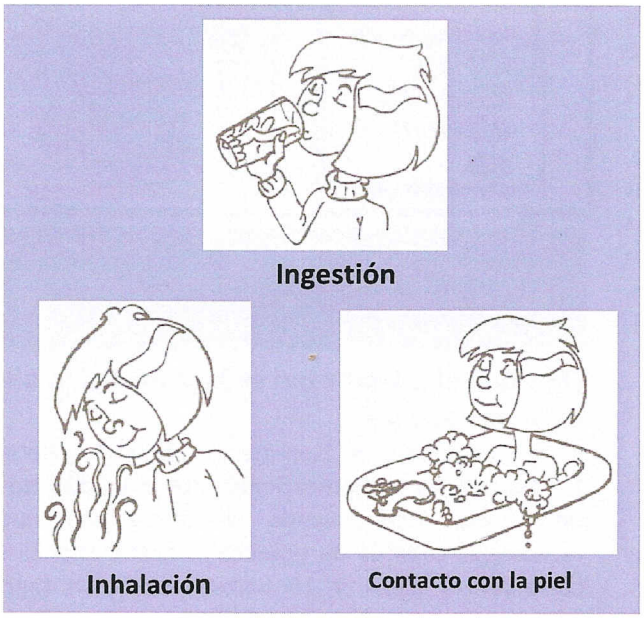
* *parts per billion* estadounidenses.

Agencia de Protección Ambiental de EE. UU.
Servicios de Asistencia Técnica a Comunidades (TASC), 2008

¿Cuáles son los efectos del 1,4-dioxano en la salud?

Los seres humanos pueden verse expuestos al 1,4-dioxano por inhalación (por ejemplo, inhalando vapores de la regadera), contacto con la piel (por ejemplo, al bañarse), o ingestión de agua y alimentos contaminados. Se ha demostrado que la inhalación de niveles bajos de 1,4-dioxano durante periodos cortos provoca irritación en ojos y nariz. No hay estudios disponibles sobre los efectos en la salud humana de la exposición por contacto con la piel o por ingestión de 1,4-dioxano, pero se ha demostrado que el agua potable con niveles elevados de 1,4-dioxano causa daños al hígado y los riñones de ratas. Estudios de laboratorio también han demostrado que la exposición de largo plazo a niveles elevados de 1,4-dioxano a través del agua potable puede producir cáncer en hígados y narices de ratas. No se ha determinado si estudios en animales como éstos pueden predecir con exactitud los efectos en la salud humana pero, con base en estudios en animales, la EPA considera al 1,4-dioxano un posible carcinógeno humano.

Actualmente no existe una norma federal para el 1,4-dioxano en el agua potable. No obstante, tres regiones de la EPA y 11 estados han ofrecido orientación sobre niveles de 1,4-dioxano para la calidad del agua (véase cuadro arriba a la derecha) que los legisladores pueden usar a fin de establecer objetivos de limpieza adecuados



Arriba: Formas de exposición humana al 1,4-dioxano

Para obtener más información sobre el Sitio del Superfondo del Área del Aeropuerto Internacional de Tucson por favor visite:
www.epa.gov/region09/tucsonairport

Orientación sobre niveles de 1,4-dioxano para la calidad del agua

Ubicación	Tipo de agua	Concentración (ppb)
Regiones 3, 6 y 9 de la EPA	Agua del grifo	6.1
California	Agua potable	3
Missouri	Agua subterránea	3
Colorado	Agua subterránea y Agua superficial	3.2
Florida	Agua subterránea	3.2
Pensilvania	Agua subterránea	5.6
Delaware	Agua subterránea	6
Virginia del Oeste	Agua subterránea	6.1
Texas	Agua subterránea	18.6
Maine	Agua potable	32
Carolina del Sur	Agua potable	70
Michigan	Agua potable	85

para sitios contaminados. Los niveles de orientación varían de 3 ppb en California y Missouri a 85 ppb en Michigan. Las regiones 3, 6 y 9 de la EPA establecen un nivel de orientación de 6.1 ppb para agua del grifo. De estos niveles de orientación, solo el de Colorado es exigible; en ese estado se establecieron límites de 6.1 ppb para marzo de 2005 y de 3.2 ppb para marzo de 2010.

¿Cómo puede eliminarse el 1,4-dioxano de los mantos acuíferos?

El método de bombeo y tratamiento actualmente usado para eliminar el TCE de los acuíferos del AAIT no es eficaz para eliminar el 1,4-dioxano. La EPA y las partes responsables evalúan actualmente el grado de contaminación a fin de determinar qué métodos de tratamiento son adecuados en el Proyecto de Remediación del Área de Tucson. En julio de 2007 se instaló en la Planta 44 de la Fuerza Aérea un sistema de tratamiento mediante proceso de oxidación avanzado que aplica una combinación de peróxido de hidrógeno y ozono líquido. Este tipo de sistema se ha usado en varios sitios contaminados con 1,4-dioxano, incluyendo la Base de la Fuerza Aérea McClellan, en California, el vertedero Charles-George, en Massachusetts, y el sitio de ciencias Pall-Gelman, en Michigan. Si bien otros tipos de tratamiento, incluyendo biorremediación y absorción con carbón granular activado se han usado en otros sitios, el tratamiento mediante proceso de oxidación avanzado es considerado el más eficaz para eliminar el 1,4-dioxano.

Para obtener más información sobre el programa de TASC de la EPA por favor comuníquese con:
Luis García-Bakarich
Coordinador TASC – Región 9 de la EPA
garcia-bakarich.luis@epa.gov
(415) 972-3237

Agencia de Protección Ambiental de EE. UU.
Servicios de Asistencia Técnica a Comunidades (TASC), 2008

TRICHLOROETHYLENE (TCE) CONTAMINATION, EXPOSURE, AND CLEANUP CURRICULUM

Marti Lindsey, UCAB Member
Outreach Director, Southwest Environmental Health Sciences Center, College of Pharmacy, University of Arizona

TCE

Specific Aims

- Develop an interdisciplinary curriculum to engage high school students and their teachers in both the hard sciences and the social studies aspects of the TCE problem in Tucson.
  - The curriculum was developed and is available at http://coep.pharmacy.arizona.edu/tce/index.html
- Improve the environmental education in Tucson
  - Individual teachers' environmental health teaching skills were improved at several high schools
  - The curriculum is incorporated into the curriculum at Wildcat School
  - Unfortunately were unable to incorporate into the Sunnyside School District as much as was planned

TCE

Project Activities

- Collaboration with UCAB - Thank You!
- Collaboration with the Sunnyside School District for development and implementation
- Recruitment and training for curriculum writing teachers about the TCE contamination
- Lessons developed for integrated science, chemistry, language arts, government, and history
- Implementation of the lessons and student activities related to their learning
- Professional development for the teachers of the Sunnyside School District in Tucson, Arizona

TCE

Accomplishments

- The curriculum was developed and it does address the issue of the TCE contamination and cleanup in Tucson from an interdisciplinary perspective.
- The curriculum is freely available to teachers nation wide. There is considerable traffic on the Outreach web site. It receives an average of 14,538 requests for pages per month.
- The UCAB partners have been very supportive and involved. They have committed to helping further dissemination of the curriculum.

TCE

Sustainability

- Fifteen (15) teachers were educated about the issue during the project.
- Ten (10) additional teachers have received training since the end of the grant
- Twenty-one (21) pharmacy students have learned about TCE in my class
- Howenstine students created a poster for the TIAA Treatment Plant Dedication
- Howenstine students presented their learning to the UCAB in 2007 & 2008
- Wildcat students will present their learning in 2009

TCE

Thank you for all your support!

TCE

Tucson International Airport Area Superfund Site

U.S. Environmental Protection Agency • Region 9 • San Francisco, CA • September 2008

Background on Tucson Airport Superfund Site

In 1981, the US Environmental Protection Agency (U.S. EPA) and the City of Tucson conducted groundwater sampling and analyzed data from city municipal water wells within the Tucson International Airport Area (TIAA), which covers approximately a ten square mile area. The investigation, which began in 1982, revealed elevated levels of **volatile organic compounds** (VOCs)*, including **trichloroethylene** (TCE) and **perchloroethylene** (PCE), in several south-side City water wells. As a result, these wells were closed for use as public drinking water wells. The TIAA was listed as a Federal Superfund site in 1983.

Subsequent sampling identified a main **plume** of groundwater contamination approximately one-half mile wide and five miles in length (see maps 2 and 3). U.S. EPA and the Arizona Department of Environmental Quality (ADEQ) have been involved in investigations and cleanup activities at TIAA since the initial discovery of VOCs in the groundwater. The Tucson International Airport Area Site (referred to as 'the Site') is divided into seven areas (see map 1 for areas). Eleven city drinking water wells and several private household wells have been shut down (the last one was shut down in 1983) as a result of contamination. More information about the Site can be found at the Tucson Public Library, El Pueblo Branch, 101 W. Irvington Road, Tucson, AZ 85714.

Air Force Plant 44:

Safe Drinking Water Act Order

Air Force Plant 44 is a government-owned, contractor-operated facility that is operated by Raytheon Missile Systems Company (formerly known as Hughes Missile Systems Company).

In the past, the facility used a variety of different chemicals in its industrial processes, including TCE (until 1971), as a metal degreaser and chromium in electroplating. Hazardous substances generated by plant activities included the following: TCE, **dichloroethylene** (1, 1-DCE), **trichloroethane** (TCA) (until 1994), and **1,4-dioxane**, which was a stabilizing additive for TCA. Additional hazardous wastes produced were alcohols, **methyl ethyl ketone** (MEK), and other **solvents**; used oil and lubricants; waste paint and sludges; and industrial wastewater treatment residue containing metals such as **chromium, cadmium** and **cyanide**.

Please Join Us:

The Unified Community Advisory Board (UCAB) will be hosting a public meeting to discuss new information about the chemical 1,4-dioxane and its impacts on the Tucson public water supply.

Presentations will be given by Ecology and Economics Inc., the City of Tucson's Department of Water, U.S. EPA, and members of the UCAB.

Tuesday, October 14, 2008
6:00pm - 7:45pm

Santa Rosa Neighborhood Center
1080 S. 10th Ave
Tucson, AZ 85701

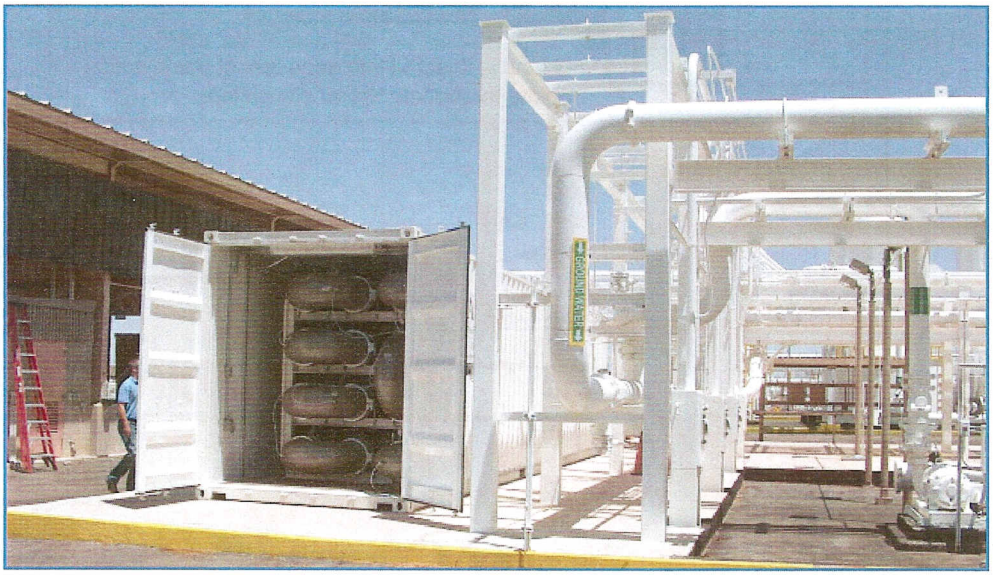


Photo 1: Installation of the advanced oxidation process system at Air Force Plant 44

*Words in **bold** are defined in the Glossary on page 8

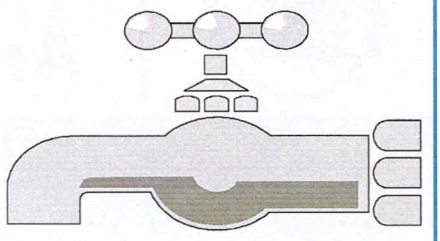
Improvements in technology have allowed for the detection of 1,4-dioxane down to 1 part per billion. After further investigations, the chemical was discovered at the Tucson Airport Remediation Project's (TARP) plant and later at Air Force Plant 44 and the Airport Property. In July 2007, the U.S. EPA ordered the Raytheon Company and the U.S. Air Force to clean up a migrating plume of groundwater contaminated with 1,4-dioxane at Air Force Plant 44.

Under the order, Raytheon and the U.S. Air Force were required to update its treatment facility for TCE and install and operate an advanced oxidation process (AOP) system to treat 1,4-dioxane (See photo 1). The 1,4-dioxane contamination is entering the groundwater coming from its 1,365-acre Air Force Plant 44 facility, which is part of and located on the southern end of the Site.

In July 2008, the Air Force installed a new system for treating 1,4-dioxane using AOP. The AOP system injects hydrogen peroxide (H_2O_2) and ozone (O_3) at multiple points into the mixing chamber with the contaminated water. The water and chemicals pass through a mixer to ensure that it is completely combined. The reaction of the water and chemicals together rids the contaminated water of 1,4-dioxane and TCE and converts it to carbon dioxide and water (See Figure 1). The system will begin operating later this year.

The current extraction and treatment system is not effectively containing the contaminated groundwater plume from the Air Force Plant 44 facility, allowing TCE and 1,4-dioxane to migrate north and combine with a separate plume originating at the Tucson International Airport. Without the work directed in the Order, the migrating contaminants could affect TARPs ability to successfully continue treating TCE and managing 1,4-dioxane. TARP treats water that serves approximately 50,000 residents in north Tucson.

Is My Water Safe?



Your drinking water is safe. All drinking water provided by public water suppliers in Tucson is required to meet Federal and State drinking water standards.

Raytheon and the Air Force expect to have the modifications to their treatment facility up and running by late-2008. The technology in the advance oxidation system has been used at other Superfund sites to treat 1,4-dioxane contamination. The addition of this system will ensure TARP continues to meet its goal of no more than 3 **ppb** of 1,4-dioxane in drinking water and reduces electricity use at the facility. By containing the source area at Air Force Plant 44, EPA anticipates that TARP will continue to maintain 1,4-dioxane below 3 ppb and TCE below 1.5 ppb.

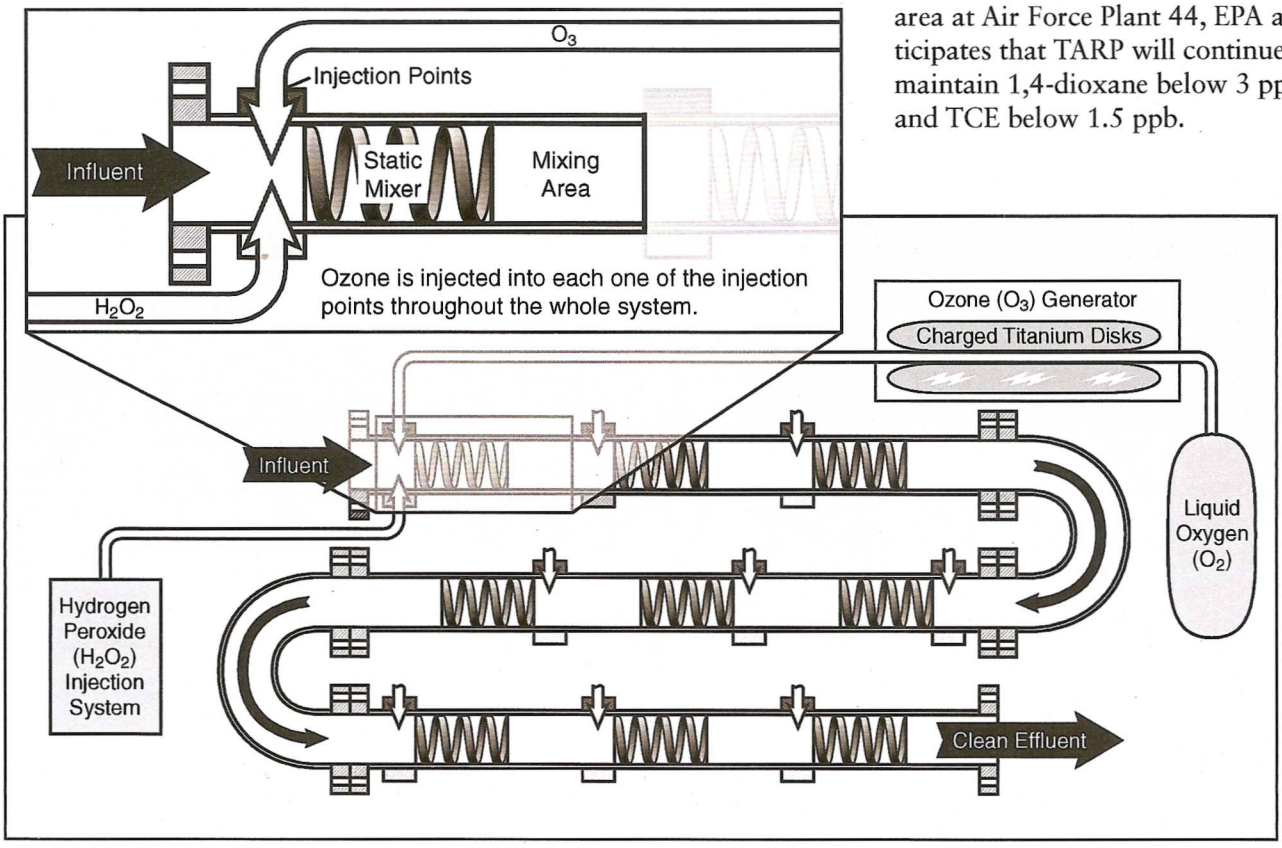


Figure 1: Advanced Oxidation Process System

Tucson Area Remediation Project (TARP)

TARP is a treatment facility responsible for a 4-mile long, 1-mile wide project area where the majority of the Site's contamination is concentrated. The contamination comes from Air Force Plant 44 and the Tucson International Airport property. TARP does not treat any type of soil contamination associated with the Site.

The treatment plant has been in operation since 1994 and utilizes air **stripping** technology and carbon filtration to remove TCE from the groundwater (See photo 2). As of March 2008, 29.5 billion gallons of water have been cleaned and 3,557 pounds of TCE have been removed. This system provides clean drinking water to 50,000 residents of Tucson (about 9% of the municipal water supply).

Photo 2: TARP Treatment Facility

Tucson International Airport

At the Tucson International Airport property (specifically the Airport Three Hangars Area off South Susana St.), chemicals were used for airplane modification and engine part degreasing from 1942 to 1958. During this period, VOCs were used and disposed of on airport property. While TCE was the primary VOC used, other VOCs included **methylene chloride, chloroform, carbon tetrachlorine** and **benzene. Persistent organic chemicals**, such as **polychlorinated biphenyls (PCB's)**, were also used at the site.

University of Arizona's Superfund Basic Research Program (UA SBRP) and US-Mexico Binational Center for Environmental Studies and Toxicology (Binational Center)

Since October 2006 , the U.S. EPA has been collaborating with members of the UA SBRP and Binational Center to provide information and answer community questions regarding the TIAA Superfund Site's remediation strategies and the health effects of TCE and 1,4-dioxane. They also serve to support the Unified Community Advisory Board's (UCAB) outreach activities in the community.

The UA SBRP have developed informational materials on TCE and 1,4-dioxane, as well as other materials on contaminants currently confronting the Southwestern region of the United States. Materials are available in both English and Spanish and prepared for people with a technical background (SciTransfer Bulletins) and without a technical background (Informational Materials).

For more information on the UA SBRP, visit: http://superfund.pharmacy.arizona.edu/prof_comm_info.php or contact Monica Ramirez at (520) 260-6620 or ramirez@pharmacy.arizona.edu

For more information on the UA Binational Center, visit http://binational.pharmacy.arizona.edu/outreach.php or contact Denise Moreno at (520) 429-1428 or dmoreno@pharmacy.arizona.edu.

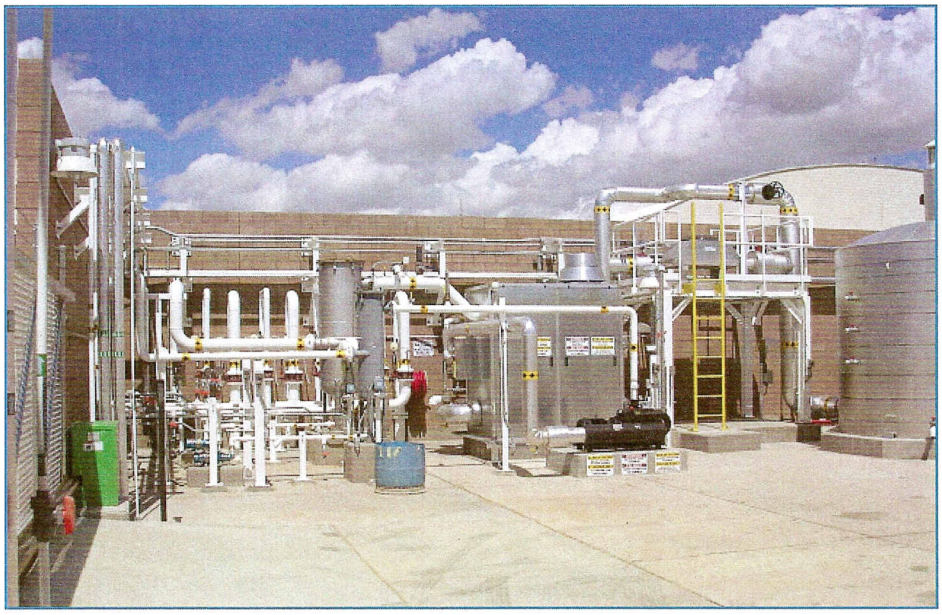


Photo 3: SVE System at the Tucson International Airport

Tucson International Airport Continued...
In November 2007, the Tucson International Airport Authority completed the fifth and final major treatment component for the Tucson Airport Superfund Site. The $5.5 million soil and groundwater treatment facility is located on the southern end of the Three Hangars site (See Picture 3 and 4).

The facility will use 11 extraction wells to treat approximately 34 million gallons of groundwater a year for TCE. This treatment system will bring TCE levels down from over 1600 ppb to approximately 0.5 ppb. A reinjection well will pump up to 100 gallons-per-minute of treated water back into the **aquifer**. In addition, seven soil vapor extraction wells were installed that will pass the extracted air through three continuous carbon filters. It is expected that over 30,000 pounds of contaminants will be removed in the first year.

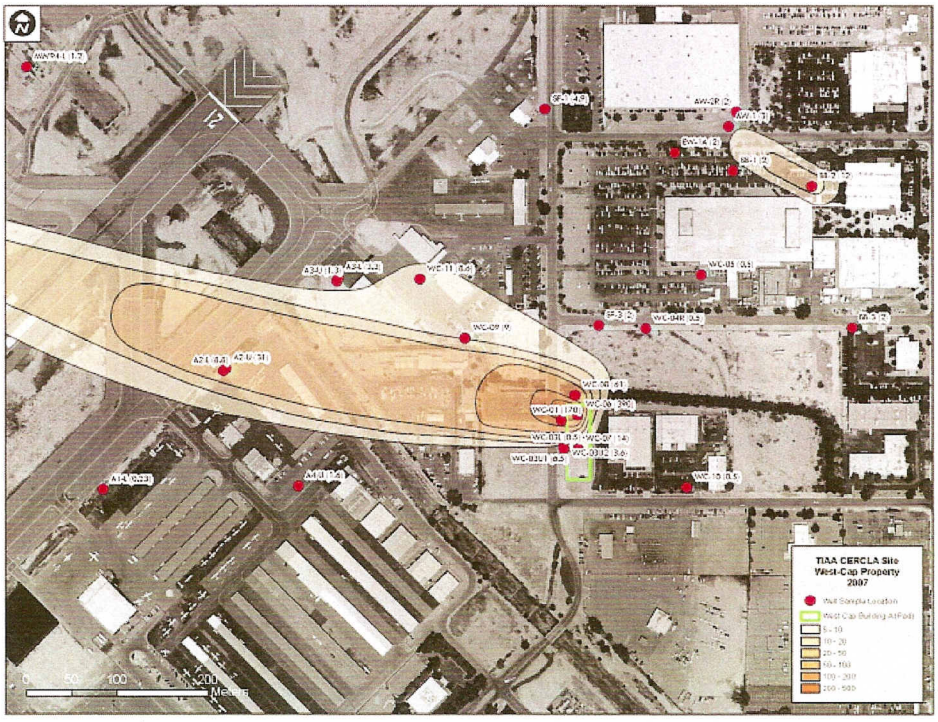
The University of Arizona recently was award a $900,000 grant from the Department of Defense environmental research program to perform a four-year research project in the two-acre, **Technical Impractability (TI)** zone of the Airport property. In 1997, the TI zone was considered too complicated to remediate, allowing the Airport Authority to contain the contaminants to the zone. The University of Arizona will investigate this TI Zone to determine how and where the contaminants flow in this area. It is hoped that this research will lead to better ways to contain and remediate in the TI zone.

West Cap

The West Cap site was a former manufacturer of magnets and film capacitors that operated from the early 1960s until the early 1980s. It is believed that industrial solvents containing VOCs and other contaminants were released through improper floor drains and leaking drainpipes. These disposal practices resulted in the current groundwater contamination at the West Cap **Operable Unit (OU)**. The size of the plume is approximately 400 feet wide and half a mile long extending under the airport runway with concentrations of the plume ranging from 530 ppb to 49 ppb.

Based on extensive well sampling, U.S. EPA has determined that the groundwater in the West Cap site is contaminated in the Upper Zone of the regional aquifer. Land use around the West Cap OU includes residential, military, aviation, industrial/commercial, undeveloped open space and washes (See map 1). None of the contaminated groundwater is being served as drinking water or pumped for industrial use.

Photo 4: Pump and Treat System at the Tucson International Airport



Map 1: West Cap Sample locations

West Cap Continued...

The U.S. EPA is continuing its work on developing a clean up strategy for treating the contaminated groundwater at the West Cap OU. A six-month treatability study is being designed with a proposed start date in November 2008. This study will evaluate the potential of **in-situ chemical oxidation** using **potassium permanganate** to remediate the TCE and PCE. Currently, the contamination plume is mixing with the AZ National Air Guard's groundwater plume and being captured by its treatment facility just northwest of the site. Using in-situ chemical oxidation will shorten the estimated time for the cleanup and will lessen the overall **carbon footprint** created by the remediation process by saving the energy that would have been required to pump the extraction wells, power the treatment plant, and operate the reinjection well. The chemical oxidation process will complete the remediation process in the subsurface with almost no power requirements.

Arizona Air National Guard

Since 1956, the Arizona Air National Guard (AANG) 162nd Fighter Tactical Group has been used to train fighter pilots from the U.S. and foreign countries. Operations include fueling and aircraft maintenance activities. These activities resulted in the release of hazardous waste contaminating the soil and ground water. The soil extraction system was shut down in 1997 after performance goals were met. The pump and treat system is still operating with eleven extraction wells pumping 116 gallons per minute with the highest concentration of TCE at 8.2 ppb. The contaminated water is treat using **granulated activated carbon** (see photo 5) to non-detect and re-injected in the regional aquifer.

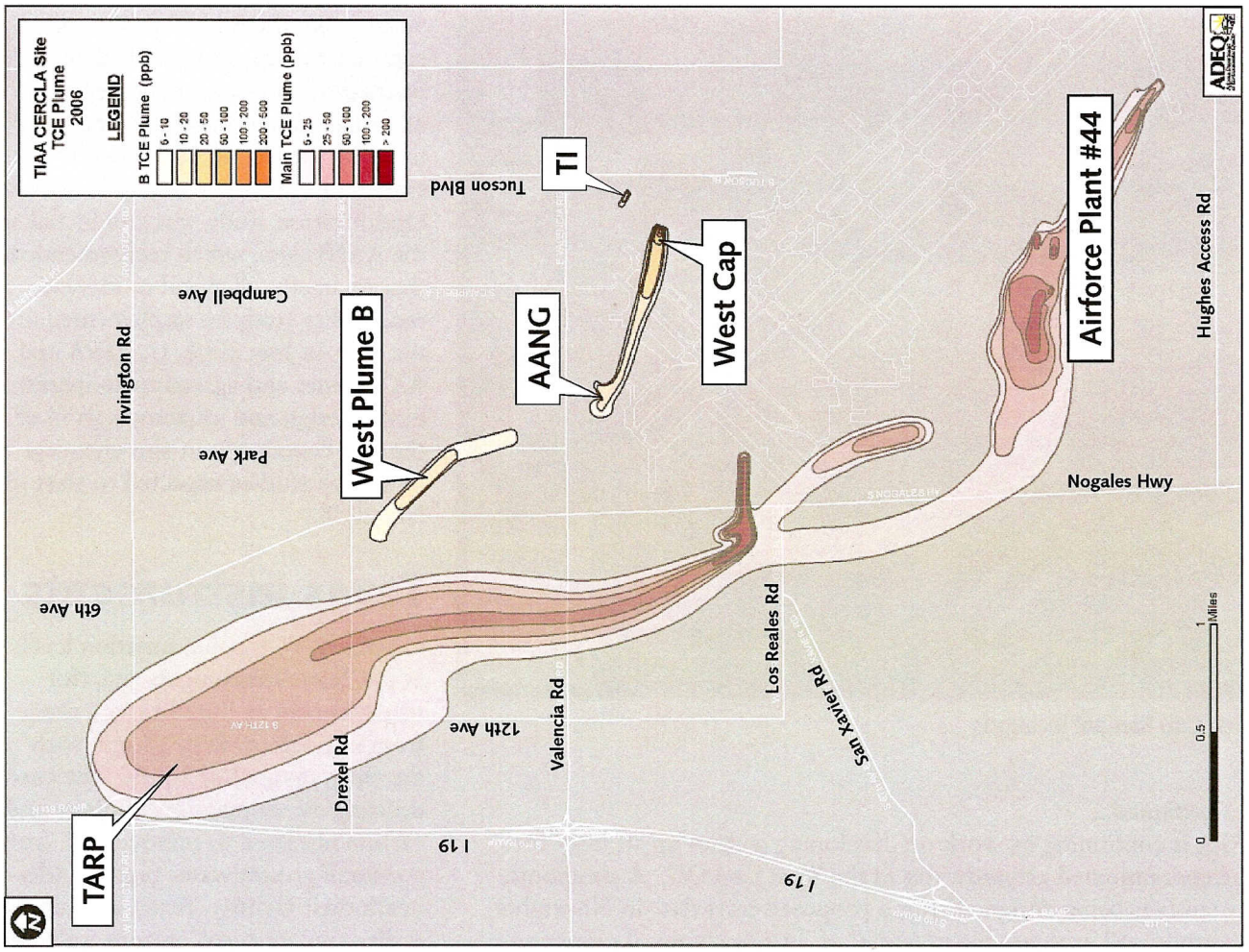
Photo 5: AANG Overview

Since 2006, the AANG has installed eight new monitoring wells that will be used to monitor and assure that all of the contamination is being captured by the existing pump and treat system. In 2007, a Remedial Process Optimization study was conducted at the AANG site, which recommended that an in-situ chemical oxidation treatability study be implemented at the site. In July 2008, U.S. EPA and AANG met and agreed to cooperate in the design and implementation of the two concurrent in-situ chemical oxidation studies expected to start in late 2008.

Texas Instruments

Currently, TCE contamination levels at the Texas Instruments site, (formerly known as Burr Brown), range from not detectible to 15 ppb with the clean up goal of 5 ppb. They are utilizing air stripping technology and carbon filtration to remove TCE from the small groundwater plume underneath their facility. Texas Instruments drilled two new exploratory wells in May 2008 to help them characterize the site better and allow them to consider alternative remediation.

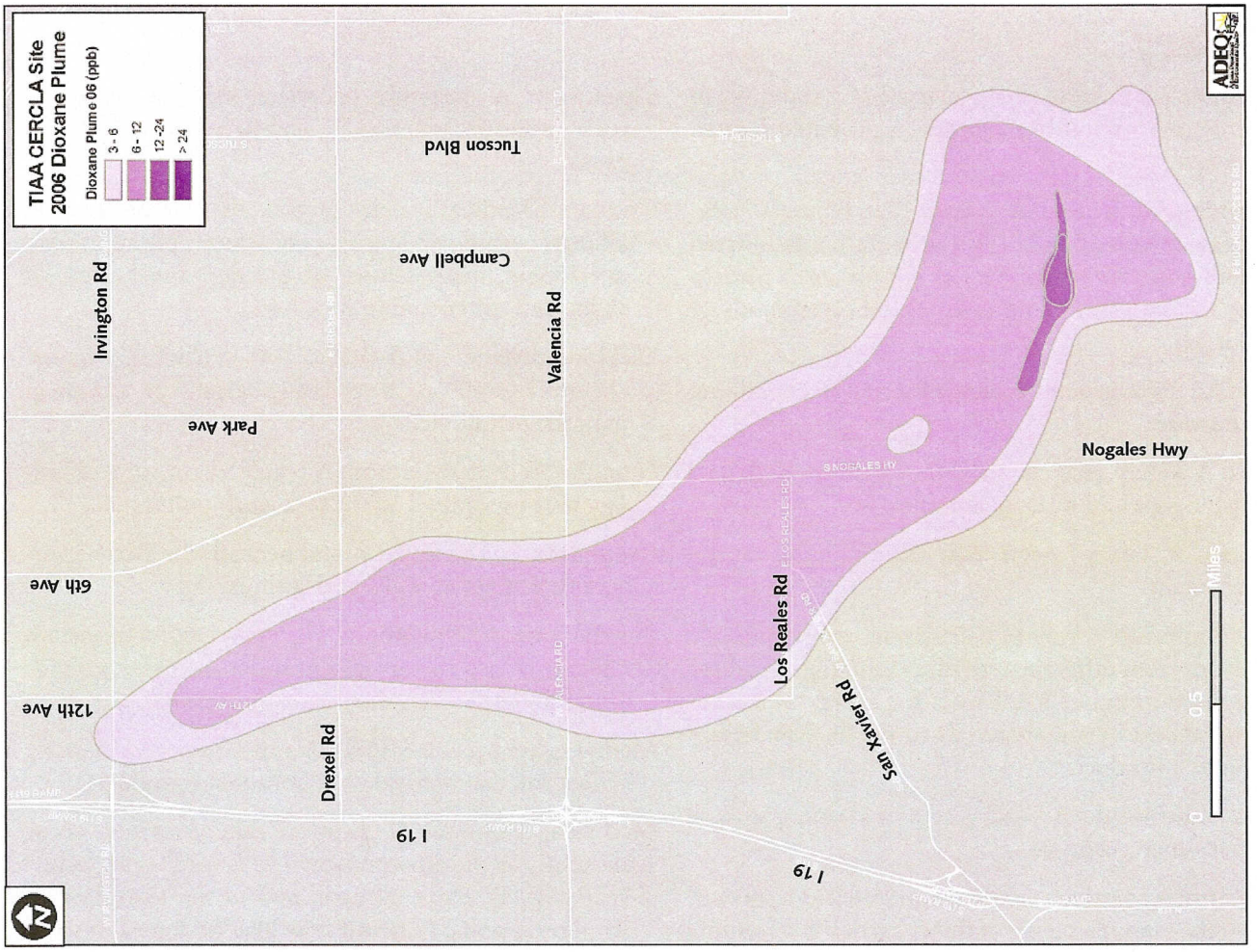
Texas Instruments informed the U.S. EPA in December 2007 that they will be ending their production activities in the Tucson area sometime in 2009. The Agency is working with them to develop a plan for continued treatment of the remaining contaminated groundwater at the site.



Map 2: TCE Plume

Table 1:
Tucson Airport Superfund Site Progress Chart

		Preliminary Assessment/ Site Inspection (PA/SI)	Remedial Investigation (RI)	Feasibility Study (FS)	Record of Decision (ROD)	Remedial Design (RD)	Remedial Action (RA)	Operation and Maintenance (O&M)
AFP # 44 / Raytheon	TCE	12/01/82	11/19/85	11/19/85	11/19/85	3/1987	3/1987	Underway
	1, 4-dioxane	_____	7/13/07	7/13/07	7/13/07	8/11/08	Underway	_____
TARP	TCE	12/01/82	8/22/88	8/22/88	8/22/88	6/05/91	11/07/95	Underway
	1, 4-dioxane	Underway	_____	_____	_____	_____	_____	_____
Tucson International Airport (3 Hangars)		12/01/82	9/30/97	9/30/97	9/30/97	4/28/05	Underway	_____
West Cap		12/01/82	9/30/97	9/30/97	9/08/04	10/17/03	Underway	_____
Arizona Air National Guard (AANG)		12/01/82	_____	_____	_____	5/12/97	9/30/97	Underway
Tucson International Airport/ Burr-Brown (Texas Instruments)		12/01/82	8/22/88	8/22/88	3/16/90	9/12/91	11/09/92	Underway
West Plume B		12/01/82	9/08/04	9/08/04	9/08/04	Underway	_____	_____



Map 3: 2006 Dioxane Plume

Opportunities for Community Involvement!

We encourage community members who are interested in being active participants in the Unified Community Advisory Board (UCAB) to attend their meetings. UCAB is a unique outreach program which involves and empowers the local community as major stakeholders in environmental decisions. These stakeholders (the general public, community activists, University of Arizona, Tucson International Airport, the Air Force, Raytheon, ADEQ, and U.S. EPA) work together to resolve issues, and participate in the cleanup process at the Tucson International Airport Area Superfund Site. They also serve as a hub for the exchange of information among local community members.

The UCAB meetings are open to the public and meet from 6:30-8:30 pm the third Wednesday of the month in January, April, July, and October at El Pueblo Center on 101 W. Irvington Rd. in Tucson. There are no special skills needed to participate and membership is free.

U.S. EPA and ADEQ will continue to update residents on the Tucson Airport Superfund site through factsheets, public meetings, and regularly scheduled UCAB meetings. Please feel free to call or write the U.S. EPA or ADEQ using the contact information in this factsheet.

For more information on how to participate in the UCAB, contact José García or Matthew Jefferson. (Contact information on the back of this factsheet)

Glossary

1,4-dioxane: An organic chemical used as a stabilizer in solvents and for other purposes; a probable human carcinogen.

Air Stripping: A treatment system that removes volatile organic compounds (VOCs) from contaminated ground water or surface water by forcing a stream of air through the water, causing the compounds to evaporate.

Aquifer: An underground geologic formation containing groundwater.

Benzene: A widely used chemical formed from both natural processes and human activities.

Cadmium: A heavy metal that accumulates in the environment.

Carbon Footprint: A way of calculating carbon dioxide emissions from different activities including emissions from the burning of fossil fuels for energy and from the extraction of raw materials to the final manufacturing of a product.

Carbon tetrachlorine: A VOC used as a cleaning solvent and for other purposes.

Chloroform: A colorless, volatile liquid used as a solvent, and in the manufacturing of fluorocarbon refrigerants and plastics; a probable human carcinogen.

Chromium: A naturally occurring element found in rocks, animals, plants, soil, and in volcanic dust and gases.

Cyanide: Chemical usually used in electroplating, metallurgy, organic chemicals production, photographic developing, manufacture of plastics, fumigation of ships, and some mining processes.

Dichloroethylene (1,1-DCE): A volatile organic chemical used as a cleaning agent in chemical manufacturing.

Granular Activated Carbon: A water treatment technology that uses pure carbon to adsorb pollutants.

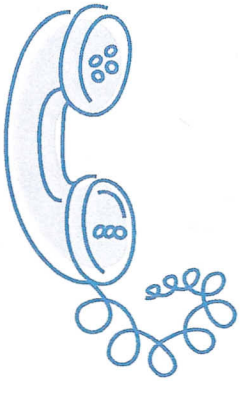
Groundwater: The water found beneath the Earth's surface that supplies wells and springs.

In-situ Chemical Oxidation: The introduction of certain chemicals into the ground in order to make groundwater and/or soil contaminants less harmful.

Methyl Ethyl Ketone (MEK): A substance used in many industrial, commercial, and household products.

Methylene chloride: A chemical that does not occur naturally in the environment and is used as an industrial solvent, paint stripper, and in the manufacture of photographic film and may also be found in some aerosol and pesticide products.

Site Contacts



If you have questions or comments regarding the Tucson International Airport Area Superfund Site, please contact

Matthew Jefferson
Remedial Project Manager
U.S. EPA, Region 9
75 Hawthorne St. (SFD-8-2)
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p (415) 972-3331
f (415) 947-3528

You may also call EPA's toll-free Superfund hotline and leave a message that will be forwarded to the appropriate EPA staff. The hotline number is **1-800-231-3075.**

Glossary *(Continued)*

National Priorities List: The U.S. EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under Superfund law. The list is based primarily on the score a site receives from the Hazard Ranking System. U.S. EPA is required to update the NPL at least once a year and a site must be on the NPL to receive money from the Trust Fund for remedial action.

Operable Unit (OU): A project or project area at an U.S. EPA Superfund site.

Oxidation: The chemical addition of oxygen to break down pollutants or organic waste; e.g., destruction of chemicals such as cyanides, phenols, and organic sulfur compounds in sewage by bacterial and chemical means.

Parts per billion: Units commonly used to express contamination ratios, as in establishing the maximum permissible amount of a contaminant in water, land, or air.

Persistent organic pollutants: Toxic chemicals that adversely affect human health and the environment around the world.

Plume:. A visible or measurable discharge of a contaminant from a given point of origin, such as in groundwater.

Polychlorinated biphenyls (PCB's): A group of toxic, persistent chemicals used in electrical transformers and capacitors for insulating purposes, and in gas pipeline systems as lubricant. The sale and new use of these chemicals, also known as PCBs, were banned by law in 1979.

Perchloroethylene (PCE): Also known as tetrachloroethylene, is a VOC used primarily as a solvent and for dry cleaning; probable human carcinogen.

Plume:. A visible or measurable discharge of a contaminant from a given point of origin, such as in groundwater.

Potassium Permanganate: Chemical used in in-situ chemical oxidation to clean pollutants from the water.

Solvent: A liquid or gas substance that is used for industrial, commercial, and household products, such as paint thinners, nail polish, dry cleaning, and detergents.

Technical Impracticability (TI) Zone: An area at a Superfund site where the regulators have agreed that restoration to typical clean up standards cannot be achieved using available technology, permitting the owner/operators of the Site to clean up to alternative remedial goals.

Trichloroethane (TCA): A chemical that does not occur naturally in the environment; no longer produced in the U.S.A. because it affects the ozone layer; has many industrial and household uses.

Trichloroethylene (TCE): A VOC used primarily as a solvent to remove grease from metal parts; a probable human carcinogen.

Volatile Organic Compounds (VOC): Primarily solvents most commonly used in dry cleaning, machinery degreasing, and metal plating industries.

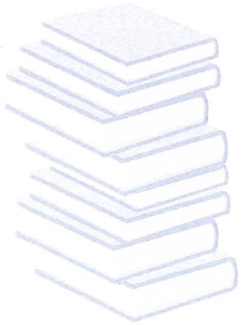
Site Repositories

El Pueblo Library
101 W. Irvington Rd.
Tucson, AZ 85714
(520) 791-4733

Hours: Mon, Tues: 9 a.m. - 6 p.m.
Wed, Thurs: 10 a.m. - 6 p.m.
Friday: 10 a.m. - 5 p.m.

EPA Superfund Records Center
95 Hawthorne St., 4th Floor
San Francisco, CA 94105
(415) 536-2000

Hours: Mon-Fri : 8 a.m. - 5 p.m.



Visit EPA's web page for the Tucson International Airport Area Site: **www.epa.gov/region09/TucsonAirport**

Tucson International Airport Area Superfund Site

U.S. Environmental Protection Agency • Region 9 • San Francisco, CA • September 2008

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United States Environmental Protection Agency
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San Francisco, CA 94105
Attn: José García (TIAA 9/08)

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Sitio del Superfund en el Aeropuerto de Tucson

Agencia de Protección Ambiental de EE.UU. • Región 9 • San Francisco, CA • Septiembre 2008

Antecedentes del Sitio del Superfund en el Aeropuerto de Tucson (Tucson Airport Superfund Site)

En 1981, la Agencia de Protección Ambiental de E.U. (U.S. EPA por sus siglas en inglés) y la Ciudad de Tucson realizaron un muestreo y análisis de datos de aguas subterráneas en los pozos de agua municipales dentro del área del Aeropuerto Internacional de Tucson (TIAA por sus siglas en inglés), el cual cubre aproximadamente un área de 10 millas cuadradas. La investigación, que comenzó en 1982, reveló altos niveles de **compuestos orgánicos volátiles (VOCs por sus siglas en inglés)***, incluyendo **tricloroetileno (TCE)** y **percloroetileno (PCE)**, en varios pozos del lado sur de la Ciudad. Como resultado, estos pozos dejaron de ser utilizados para el consumo público de agua potable. La TIAA fue incluida en la lista de sitios de Superfund Federales en 1983.

Muestreos posteriores identificaron una columna principal de contaminantes en aguas subterráneas de aproximadamente media milla de ancho y cinco millas de largo (ver mapas 2 y 3). La U.S. EPA y el Departamento de Calidad Ambiental de Arizona (ADEQ por sus siglas en inglés) se han involucrado en investigaciones y actividades de limpieza en TIAA desde el descubrimiento inicial de VOCs en el agua subterránea. Sitio TIAA (conocido como 'el Sitio') esta dividido en siete áreas (ver mapa 1 para los áreas). Once pozos de agua potable de la ciudad y varios pozos de uso privado han sido cerrados (el último fue cerrado en 1983) como resultado de la contaminación. Puede encontrarse más información sobre el sitio TIAA en la Biblioteca Pública de Tucson, El Pueblo Branch, 101 W. Irvington Road, Tucson, AZ

Air Force Plant 44:

Decreto de Ley para Agua Potable Segura

Air Force Plant 44 es una planta del gobierno operada por el contratista Raytheon Missile Systems Company (antes Hughes Missile Systems Company).

En el pasado, la planta utilizó una variedad de químicos en sus procesos industriales, los cuales incluían TCE (hasta el 1971), como un limpiador de grasa para los metales, así como cromo en la galvanoplastia. Las sustancias peligrosas generadas por las actividades de la planta incluían las siguientes: TCE, **dicloroetileno (1,1-DCE)**, **tricloroetano (TCA)** (**hasta el 1994**), y **1,4-dioxano**, el cual era un aditivo estabilizador para el TCA. Otros desechos peligrosos eran alcoholes, **metil etil cetona (MEK)**, y otros **solventes**; aceites y lubricantes usados; pinturas y aguas residuales; y residuos de agua de tratamientos industriales que contenían metales como **cromo**, **cadmio** y **cianuro**.

Mejoramientos en tecnología han permitido la detección de 1,4-dioxano a niveles de 1 parte por billón. Siguiendo investigaciones adicionales, el químico se descubrió en la planta del Proyecto de Eliminación de

Por Favor Venga:

El Consejo Consultivo Unificado de la Comunidad (o UCAB por sus siglas en inglés) albergará una junta pública para compartir información reciente acerca del químico 1,4-dioxano y sus impactos en el suministro de agua pública.

La compañía Ecology and Economics Inc., el Departamento de Agua de la Ciudad de Tucson, la Agencia de Protección Ambiental de los Estados Unidos, y miembros del UCAB haran presentaciones.

Martes,
octubre 14, 2008
6:00pm – 7:45pm

Santa Rosa
Neighborhood Center
1080 S. 10th Ave
Tucson, AZ 85701

Foto 1: Instalación del avanzado sistema de proceso de oxidación en el Air Force Plant 44

*Las palabras en **negrita** se definen en el Glosario en la página 8

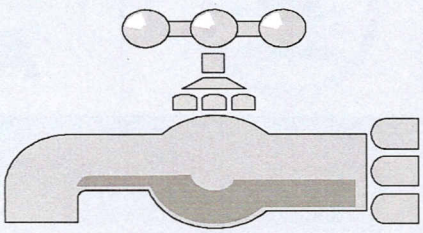
Contaminación en el Aeropuerto de Tucson (TARP por sus siglas en inglés) y después en Air Force Plant 44 y la Propiedad del Aeropuerto. En julio de 2007, el U.S. EPA ordenó que Raytheon Company y la Fuerza Aérea de los E.U. limpiaran la creciente columna de agua subterránea contaminada con 1,4-dioxano en Air Force Plant 44.

Conforme a la orden, se le exigió a Raytheon y a la Fuerza Aérea de E.U. actualizar su planta de tratamiento de TCE e instalar y operar un avanzado sistema de proceso de oxidación (AOP por sus suglas en inglés) para tratar el 1,4-dioxano (ver fotografía 1). La contaminación por 1,4-dioxano está entrando las aguas subterráneas y proviene de su planta de 1,365 acres Air Force Plant 44, la cual es parte de y está localizada en el extremo sur del sitio de Superfund en TIAA.

En julio de 2008, la Fuerza Aérea instaló un nuevo sistema para tratar el 1,4-dioxano utilizando un AOP. El sistema AOP inyecta peróxido de hidrógeno (H_2O_2) y ozono (O_3) en varios puntos de la cámara mezcladora con el agua contaminada. El agua y los químicos pasan a lo largo de la mezcladora para asegurar que estén completamente combinados. La reacción del agua y de los químicos libera al agua contaminada del 1,4-dioxano y de TCE, y la convierte en dióxido de carbono y agua (ver figura 1). El sistema comenzará a funcionar este año.

El actual sistema de extracción y tratamiento no está conteniendo efectivamente la columna de agua subterránea contaminada de la planta Air Force Plant 44, permitiendo que el TCE y el 1,4-dioxano se expandan al norte y se mezclen con otra columna de contaminación en el Aeropuerto Internacional de Tucson. Sin el trabajo dirigido por el Orden, los contaminantes en expansión pudieran afectar la capacidad del TARP, de continuar exitosamente tratando TCE y manejando 1,4-dioxano. TARP trata el agua que se sirve a aproximadamente 50,000 residentes en el norte de Tucson.

¿Es mi agua segura?



Su agua potable es segura. Toda el agua potable que viene de los proveedores de agua pública de Tucson cumple por requisito los estándares de agua potable Estatales y Federales.

Raytheon y la Fuerza Aérea esperan tener las modificaciones a su planta de tratamiento listas y funcionando para finales de 2008. La tecnología del avanzado sistema de oxidación ha sido utilizada en otros sitios de Superfund para tratar contaminación por 1,4-dioxano. La adición de este sistema asegurará que la planta de tratamiento del TARP continúe cumpliendo su meta de no más de 3 **ppb** de 1,4-dioxano en el agua potable y reducir el uso de electricidad en la planta. Contener el área fuente en Air Force Plant 44 ayudará al TARP para que siga manteniendo el 1,4-dioxano debajo de las 3 ppb y el TCE debajo de las 1.5 ppb.

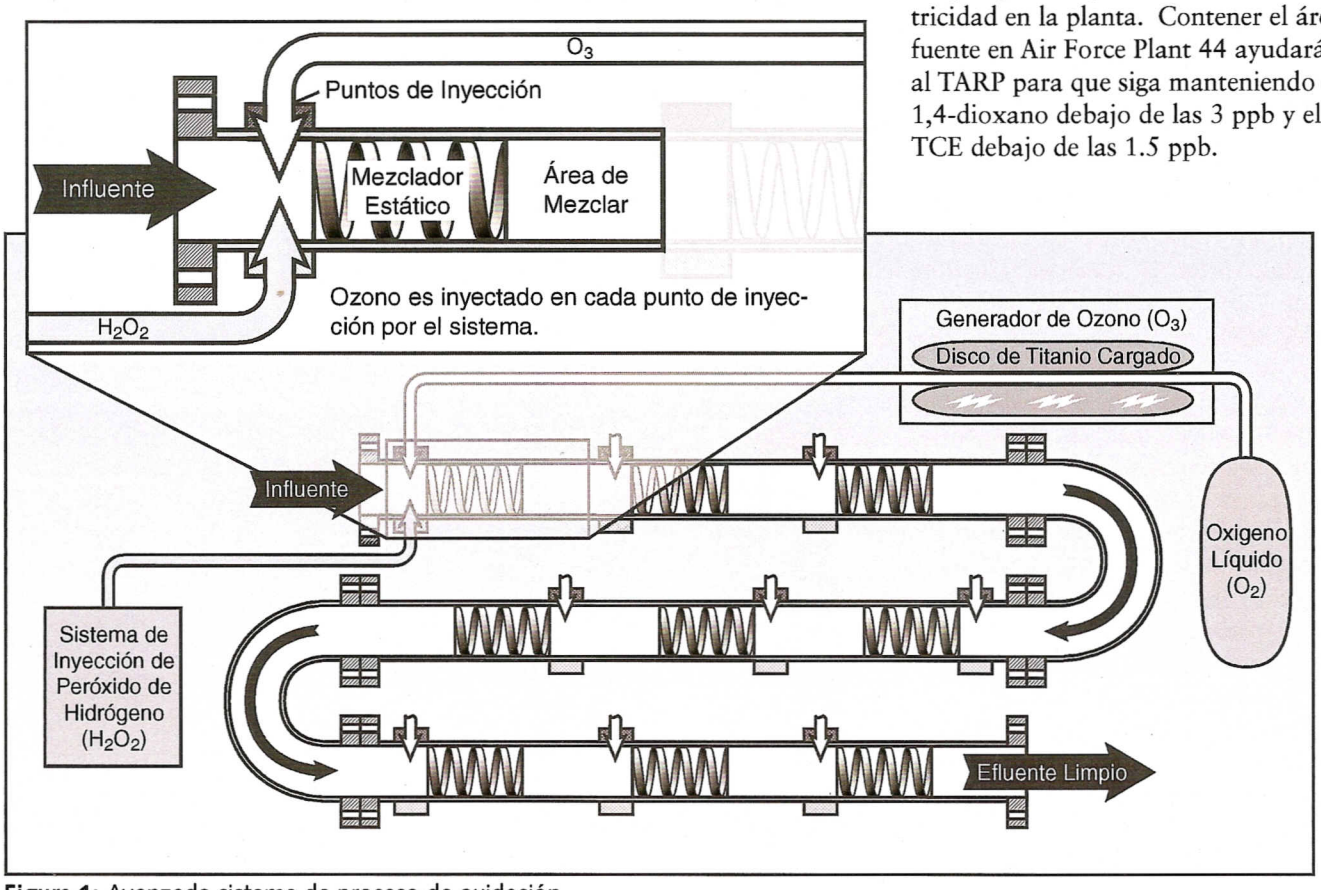


Figura 1: Avanzado sistema de proceso de oxidación

Proyecto de Recuperación del Área de Tucson (Tucson Area Reclamation Project: TARP)

TARP es una planta de tratamiento responsable de un área de proyecto de 4 millas de largo y 1 milla de ancho, en la que la mayoría de la contaminación del Sitio está concentrada. La contaminación proviene de Air Force Plant 44 y de la propiedad del Aeropuerto Internacional de Tucson. TARP no trata contaminación del suelo asociado con el Sitio.

La planta de tratamiento ha estado en operación desde 1994. Para marzo de 2008, 29.5 mil millones de galones de agua habían sido limpiados y 3,557 libras de TCE habían sido eliminadas (ver fotografía 2). Este sistema provee agua potable limpia a 50,000 residentes de Tucson (cerca del 9% del abastecimiento municipal de agua).

Foto 2: Instalación de Tratamiento de TARP

Aeropuerto Internacional de Tucson (Tucson International Airport)

En la propiedad del Aeropuerto Internacional de Tucson (Tucson International Airport) (en especial el Área de los Tres Hangares del Aeropuerto saliendo de South Susana St.), se utilizaron químicos para las modificaciones de aviones y el desengrasado de las piezas de los motores de aviones desde 1942 hasta 1958. Durante ese periodo, se utilizaron y desecharon VOCs en la propiedad del aeropuerto. Aunque el principal VOC utilizado era el TCE, otros VOCs incluían el **cloruro de metileno, cloroformo, tetracloruro de carbono** y **benceno.** También se utilizaron en el sitio químicos orgánicos persistentes, como los **bifenilos policlorados (PCB's).**

El Programa de Investigación Básica de Superfund de la Universidad de Arizona (UA SBRP por sus siglas en inglés) y el Centro de Estudios Ambientales y Toxicología Binacional EUA-México (Centro Binacional)

Desde octubre de 2006, U.S. EPA ha colaborado con miembros del UA SBRP y del Centro Binacional para proveer información y responder a las preguntas de la comunidad con respecto a las estrategias de limpieza en el Sitio del Superfund TIAA y las repercusiones en la salud del TCE y del 1,4-dioxano. También apoyan las actividades de alcance a la comunidad del Consejo Comunitario Unificado (Unified Community Advisory Board: UCAB).

El UA SBRP ha desarrollado materiales informativos sobre el TCE y el 1,4-dioxano, así como otros materiales sobre contaminantes que en la actualidad se encuentran en la región Suroeste de los Estados Unidos. Los materiales están disponibles tanto en inglés como en español, y hay una versión para personas con antecedentes técnicos (Comunicados científicos) y otra para personas sin antecedentes técnicos (Materiales informativos).

Para obtener más información sobre el UA SBRP, visite: http://superfund.pharmacy.arizona.edu/prof_comm_info.php, o contacte a Monica Ramirez al (520) 260-6620 ó escriba a ramirez@pharmacy.arizona.edu

Para obtener más información sobre el Centro Binacional, visite http://binational.pharmacy.arizona.edu/outreach.php, o contacte a Denise Moreno al (520) 429-1428.

Foto 3: Sistema de Bombeo y Tratamiento en el Aeropuerto Internacional de Tucson

continuación de Aeropuerto Internacional de Tucson...
En noviembre de 2007, la Autoridad del Aeropuerto Internacional de Tucson (Tucson International Airport Authority) terminó el quinto y último componente importante de tratamiento en el Sitio de Superfund del Aeropuerto de Tucson (Tucson Airport Superfund Site). La planta de tratamiento de agua subterránea y de suelo que tiene un costo de $5.5 millones de dólares, se ubica en el extremo sur del sitio de los tres hangares (ver fotografía 3 y 4).

La planta utilizará 11 pozos de extracción para tratar aproximadamente 34 millones de galones de agua subterránea contaminada con TCE cada año. Este sistema de tratamiento disminuirá los niveles de TCE de 1600 ppb a aproximadamente 0.5 ppb. Un pozo de re-inyección bombeará hasta 100 galones por minuto de agua tratada para que regrese a la **reserva acuífera**. Además, siete pozos de extracción de vapor del suelo fueron instalados y pasarán el aire extraído a través de tres filtros de carbono continuos. Se espera que cerca de 30,000 libras de contaminantes sean eliminadas el primer año.

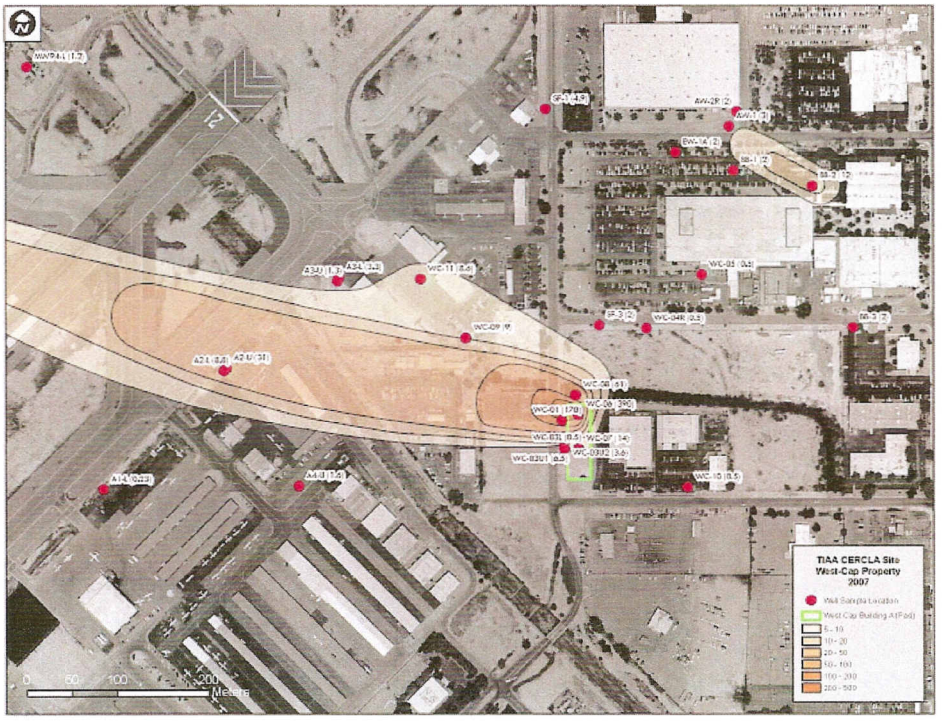
Recientemente el programa de investigación ambiental del Departamento de Defensa le concedió a la Universidad de Arizona (University of Arizona) un financiamiento por $900,000 para que lleve a cabo un proyecto de investigación de cuatro años en la zona de dos acres de **Impracticabilidad Técnica (Technical Impracticability: TI)** de la propiedad del Aeropuerto. En 1997 la zona TI fue considerada como muy complicada para ser tratada, permitiendo que la Autoridad del Aeropuerto contuviera los contaminantes en esa zona. La Universidad de Arizona investigará esta Zona TI para determinar cómo y dónde fluyen los contaminantes en esta área. Se espera que esta investigación conduzca a mejoras formas de contener y tratar la zona TI.

West Cap

El sitio West Cap era una manufacturera de magnetos y capacitores de mica, que operó desde principios de los 1960s hasta finales de los 1980s. Se cree que solventes industriales que contenían VOCs y otros contaminantes fueron liberados a través de desagües inadecuados en el suelo y tuberías con fugas. Estas prácticas de desecho produjeron la contaminación actual en el subsuelo en la **Unidad Operable (Operable Unit: OU)** de West Cap. El tamaño de la columna es de aproximadamente 400 pies de ancho y media milla de largo y se extiende debajo de la pista de aterrizaje del aeropuerto con concentraciones en la columna que van desde 530 ppb hasta 49 ppb.

Con base en un muestro extensivo de pozos, la U.S. EPA ha determinado que el agua subterránea en el sitio West Cap está contaminada en la Zona Superior de la reserva regional acuífera. El uso del suelo alrededor de la OU de West Cap incluye el residencial, militar, de aviación, industrial/comercial, espacios abiertos sin desarrollos y arroyos secos (Ver Mapa 1). Ninguna porción del agua subterránea contaminada está siendo utilizada como agua potable o para aplicaciones industriales.

Foto 4: Sistema SVE en el Aeropuerto Internacional de Tucson



Mapa 1: Columna de Contaminación en West Cap

continuación de West Cap...
La U.S. EPA continúa su trabajo en el desarrollo de una estrategia de limpieza para el tratamiento del agua subterránea contaminada en la OU de West Cap. Un estudio de seis meses sobre tratamiento se está diseñando con un comienzo propuesto para noviembre de 2008. Este estudio evaluará el potencial de la **oxidación química in situ** utilizando **permanganato de potasio** para eliminar el TCE y el PCE. Actualmente, la columna de contaminantes se mezcla con la columna subterránea de la Guardia Aérea Nacional en Arizona (AZ National Air Guard) y está siendo capturada por su planta de tratamiento al noroeste del sitio. Utilizar la oxidación química in situ acortará el tiempo estimado para la limpieza y disminuirá la **huella de carbono** total creada por el proceso de eliminación de contaminación al ahorrar la energía que sería necesaria para bombear los pozos de extracción, alimentar la planta de tratamiento, y operar el pozo de re-inyección. El proceso de oxidación química completará el proceso de eliminación de contaminación en el subsuelo casi sin requerimientos de energía eléctrica.

Arizona Air National Guard

Desde 1956, el Grupo Táctico de Combate 162° de la Guardia Área Nacional en Arizona (AANG por sus sigas en inglés) ha servido para entrenar pilotos de los E.U. y de otros países. Las operaciones incluyen actividades de mantenimiento y de abastecimiento de combustible para los aviones. Estas actividades resultaron en la liberación de desperdicios contaminantes peligrosos en el suelo y en el agua de la superficie . El sistema de extracción del suelo fue apagado en 1997, después de alcanzar las metas de desempeño. El sistema de bombeo y tratamiento aún está en operación con once pozos de extracción que bombean 116 galones por minuto con la mayor concentración de TCE en 8.2 ppb. El agua contaminada es tratada utilizando **carbono activado granulado** (ver foto 5) en cantidades no detectables y luego re-inyectada en la reserva acuífera de la región.

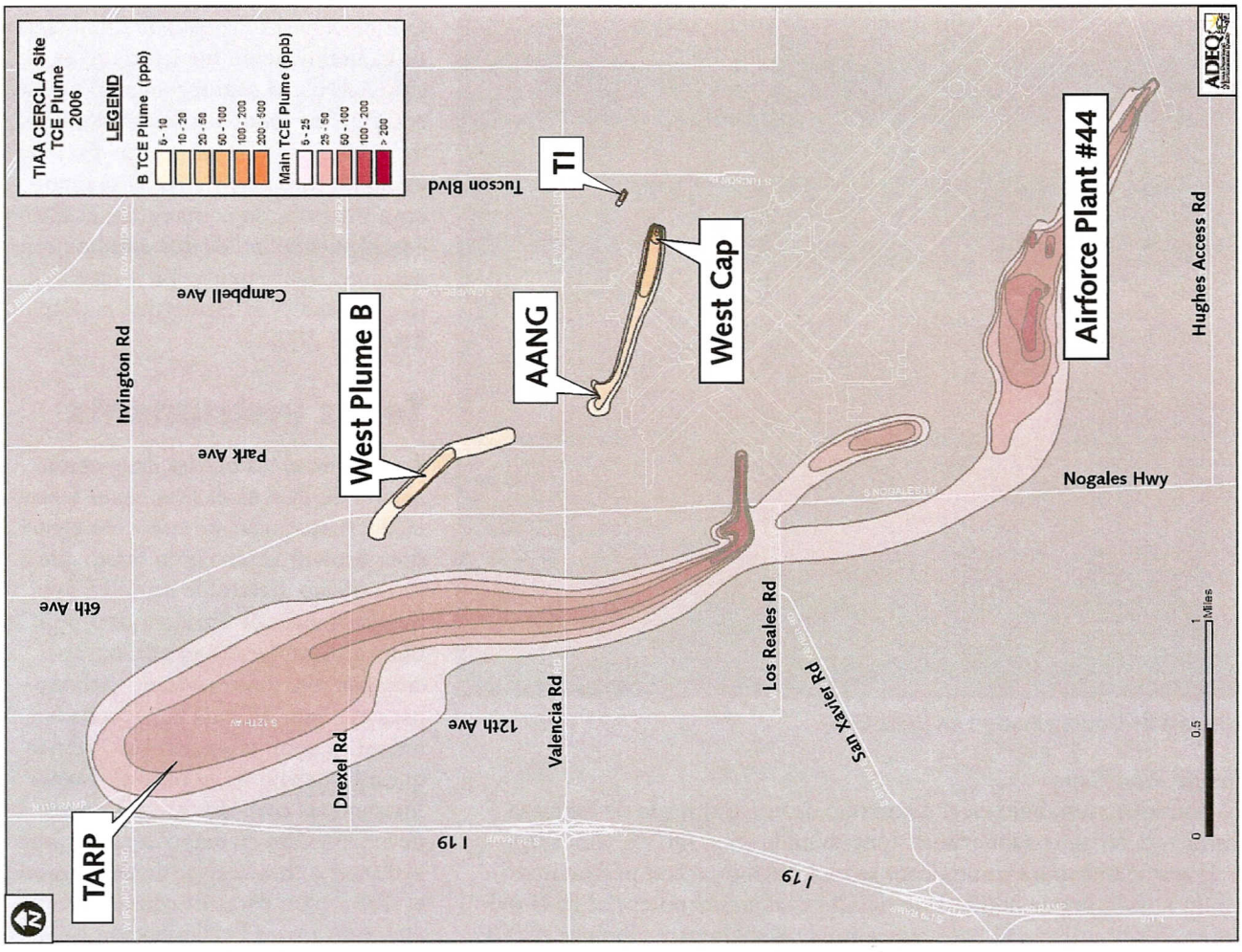
Desde 2006, la AANG instaló ocho nuevos pozos de monitoreo que serán utilizados para monitorear y asegurar que toda la contaminación esté siendo capturada por el sistema de bombeo y tratamiento existente. En 2007, un estudio de Optimación del Proceso de Eliminación de Contaminación fue realizado en el sitio AANG, el cual recomendó que se realizara un estudio sobre tratamiento de oxidación química in situ. En julio de 2008, U.S. EPA y AANG se reunieron y acordaron cooperar en el diseño e implementación de dos estudios concurrentes sobre oxidación química in situ, los cuales se espera que inicien a finales de 2008.

Texas Instruments

Actualmente, los niveles de contaminación de TCE en el sitio Texas Instruments (anteriormente conocido como Burr Brown), están en un rango que va desde no detectable hasta 15 ppb, siendo la meta de limpieza de 5 ppb. Ellos utilizan **tecnología de extracción con aire** y filtración de carbono para eliminar TCE de la pequeña columna de contaminación subterránea que está debajo de su planta. Texas Instruments cavó dos nuevos pozos de exploración en mayo de 2008 para ayudarse a caracterizar de mejor modo el sitio y para permitir considerar una alternativa para la eliminación de la contaminación.

Texas Instruments informó a U.S. EPA en diciembre de 2007 que terminarían sus actividades de producción en el área de Tucson durante el transcurso de 2009. La Agencia trabaja con ellos para desarrollar un plan para tratamiento continuo del resto del agua subterránea contaminada en el sitio.

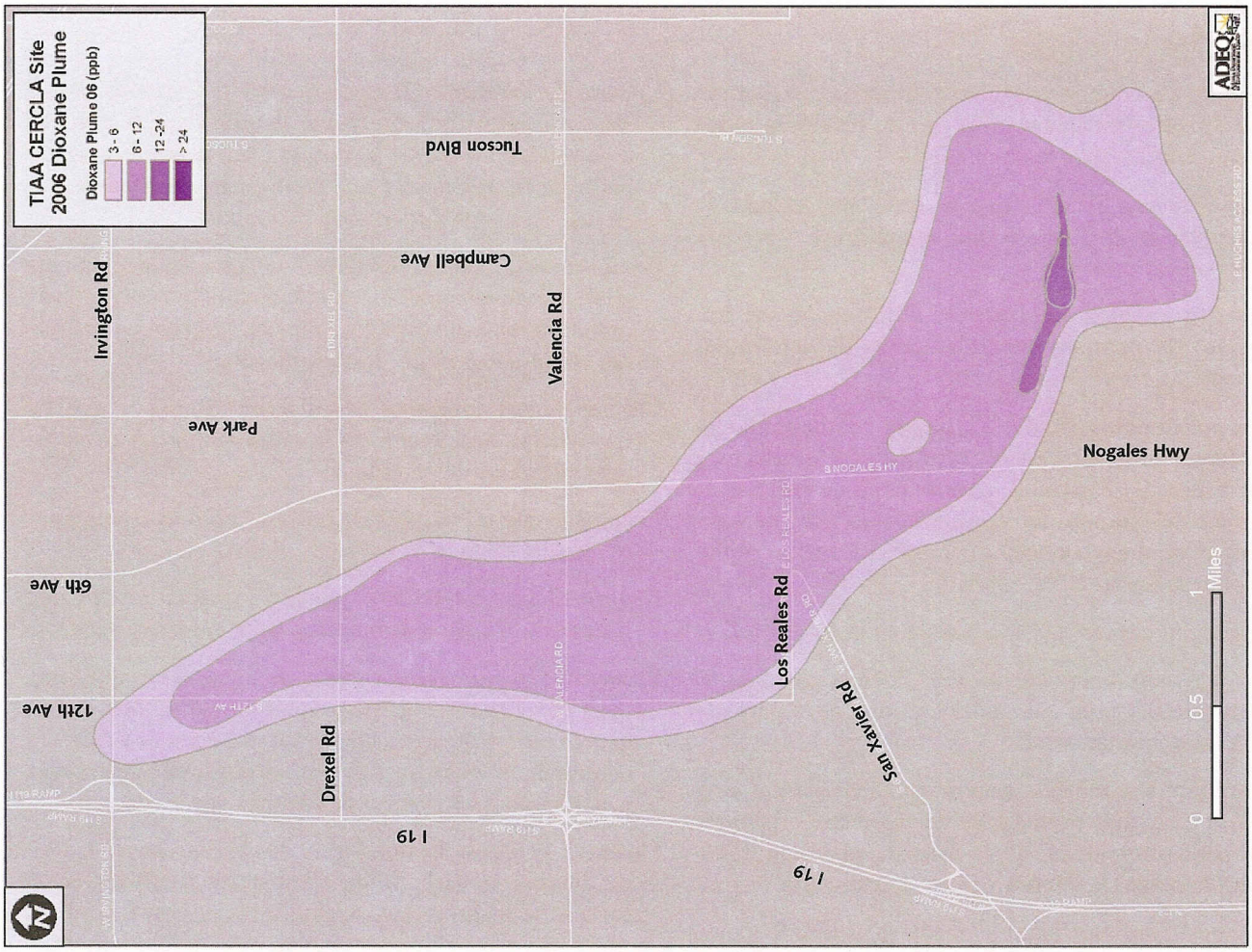
Foto 5: Sistema de Tratamiento de AANG



Mapa 2: Columna de TCE (2006)

Posponga 1: Gráfico de Progreso de Sitio del Superfund en el Aeropuerto de Tucson

		Evaluación Preliminar/ Investigación del Sitio (PA/SI)	Investigación Correctiva (RI)	Estudio Sobre Viabilidad (FS)	Registro de la Decisión (ROD)	Diseño Correctivo (RD)	Acción Correctiva (RA)	Operación y Mantenimiento (O&M)
AFP # 44 / Raytheon	TCE	12/01/82	11/19/85	11/19/85	11/19/85	3/1987	3/1987	en camino
	1, 4-dioxane	———	7/13/07	7/13/07	7/13/07	8/11/08	en camino	———
TARP	TCE	12/01/82	8/22/88	8/22/88	8/22/88	6/05/91	11/07/95	en camino
	1, 4-dioxane	en camino	———	———	———	———	———	———
Tucson International Airport (3 Hangars)		12/01/82	9/30/97	9/30/97	9/30/97	4/28/05	en camino	———
West Cap		12/01/82	9/30/97	9/30/97	9/08/04	10/17/03	en camino	———
Arizona Air National Guard (AANG)		12/01/82	———	———	———	5/12/97	9/30/97	en camino
Tucson International Airport/ Burr-Brown (Texas Instruments)		12/01/82	8/22/88	8/22/88	3/16/90	9/12/91	11/09/92	en camino
West Plume B		12/01/82	9/08/04	9/08/04	9/08/04	en camino	———	———



Mapa 3: Columna de 1,4-dioxano (2006)

¡Oportunidades para la participación comunitaria!

Alentamos a los miembros de la comunidad interesados en ser participantes activos del Consejo Comunitario Unificado (UCAB, por sus siglas en inglés) para que asistan a las juntas. UCAB es un programa único de alcance comunitario que involucra y capacita a la comunidad local como una parte importante en la toma de decisiones ambientales. Estos principales involucrados (el público en general, los activistas comunitarios, la Universidad de Arizona, el Aeropuerto Internacional de Tucson, la Fuerza Aérea, Raytheon, ADEQ, y U.S. EPA) trabajan juntos para resolver problemas, y participan en el proceso de limpieza del Área del Sitio del Superfund del Aeropuerto Internacional de Tucson. También son un medio en el intercambio de información con los miembros de la comunidad local.

Las juntas de UCAB están abiertas al público y son de 6:30-8:30 p.m. el tercer miércoles del mes en enero, abril, julio, y octubre en El Pueblo Center, 101 W. Irvington Rd. en Tucson. No se requieren habilidades especiales para participar y la membresía es gratuita.

U.S. EPA y ADEQ seguirán actualizando a los residentes sobre el sitio del Superfund en el Aeropuerto de Tucson con hojas de información, reuniones públicas, y las reuniones programas del UCAB. Por favor siéntase libre de llamar o escribir a U.S. EPA o ADEQ utilizando la información de contacto en esta hoja de información.

Para obtener más información sobre cómo participar en UCAB, contacte a José García o a Matthew Jefferson. (La información de contacto está al reverso de esta hoja de información)

Glosario

1,4-dioxano: Un químico orgánico utilizado como estabilizador de solventes y para otros propósitos; es un probable cancerígeno para los humanos.

Agua subterránea: El agua que se encuentra debajo de la superficie de la Tierra y que abastece a los pozos y manantiales.

Benceno: Un químico ampliamente utilizado que se forma tanto de procesos naturales como de actividades humanas.

Bifenilos policlorados (PCB's): Grupo de químicos tóxicos persistentes utilizados en transformadores eléctricos y capacitores como aislantes, y en sistemas de tuberías de gas como lubricantes. La venta y nuevos usos de estos químicos, también conocidos como PCBs, fueron prohibidos por la ley en 1979.

Cadmio: Metal pesado que se acumula en el ambiente.

Carbón Activado Granular (GAC): Tecnología para el tratamiento del agua que utiliza carbono puro para absorber los contaminantes.

Cianuro: Químico utilizado generalmente en plantas eléctricas, metalurgia, producción de químicos orgánicos, desarrollo fotográfico, fabricación de plásticos, fumigación de barcos y algunos procesos de minería.

Cloroformo: Líquido volátil e incoloro utilizado como solvente, y en la fabricación de refrigerantes de fluorocarbono y plásticos; un probable cancerígeno para los humanos.

Cloruro de metileno: Químico que no se encuentra naturalmente en el ambiente y que se utiliza como solvente industrial, solvente de pinturas, y en la fabricación de películas fotográficas y que también puede encontrarse en los productos de aerosol y pesticidas.

Compuestos Orgánicos Volátiles (VOC por sus siglas en inglés): Principalmente solventes más comúnmente utilizados en la limpieza en seco, limpieza de grasa en máquinas y en las industrias de galvanizado.

Contaminantes orgánicos persistentes: Químicos tóxicos que afectan negativamente la salud humana y el ambiente alrededor del mundo.

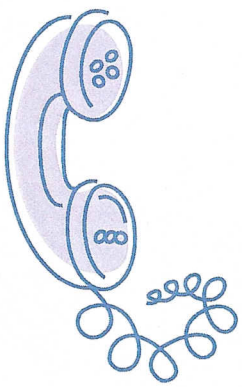
Cromo: Elemento natural encontrado en rocas, animales, plantas, el suelo, y en polvo y gases volcánicos.

Dicloroetileno (1,1-DCE): Químico orgánico volátil utilizado como agente de limpieza en la industria química.

Extracción con aire: Una sistema de tratamiento que remueve compuestos orgánicos volátiles (VOC por sus siglas en inglés) del agua subterráneas o agua de superficie contaminado por forzando una corriente de aire a través el agua, causando los contaminantes que se evaporen.

Huella de carbono: Es una forma de calcular las emisiones de dióxido de carbono de diferentes actividades, entre las que se incluyen las emisiones por quemar combustibles fósiles para obtener energía y del paso de materias primas a la manufactura final del producto.

Para contactarnos



Si tiene preguntas o comentos acerca el Sitio del Superfund en el Aeropuerto de Tucson, por favor contacte:

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También puede llamar a la línea de asistencia gratuita del Superfund de la EPA y dejar un mensaje que se hará llegar al personal pertinente de la EPA. El número de la línea de asistencia es el 1-800-231-3075.

Glosario *(Continued)*

Lista de Prioridades Nacionales (National Priorities List): Lista publicada por la U.S. EPA sobre los sitios peligrosos que están fuera de control o abandonados y que han sido identificados como posibles sujetos a acciones de eliminación de contaminación de largo término según la ley de Superfund (Superfund law). La lista se basa principalmente en el puntaje que el sitio recibe del Sistema de Clasificación de Peligros (Hazard Ranking System). Se le solicita a la U.S. EPA actualizar la lista al menos una vez por año y un sitio debe estar en dicha lista para recibir dinero del Fideicomiso para acciones de eliminación de contaminación.

Metil etil cetona (MEK): Sustancia utilizada en muchos productos industriales, comerciales y del hogar.

Oxidación: La adición química de oxígeno para disolver los contaminantes o los desechos orgánicos; por ejemplo, la destrucción de químicos como cianuros, fenoles y compuestos orgánicos azufrosos en el sistema de desagüe a través de métodos químicos y bacterianos.

Oxidación Química In Situ: La introducción de ciertos químicos en la tierra para hacer menos dañinos a los contaminantes del agua subterránea o del suelo.

Partes por billón: Unidades comúnmente utilizadas para expresar tasas de contaminación y establecer una cantidad máxima permisible de un contaminante en el agua, la tierra o el aire.

Permanganato de Potasio: Químico utilizado en la oxidación química in situ para limpiar contaminantes del agua.

Reserva acuífera: Formación geológica subterránea que contiene agua.

Solvente: Sustancia líquida o gaseosa utilizada en productos industriales, comerciales y domésticos, como en rebajadores, esmaltes para uñas, limpiadores en seco y detergentes.

Percloroetileno (PCE): También conocido como tetracloroetileno, es un VOC utilizado principalmente como solvente y para limpiar en seco; es un probable cancerígeno para los humanos.

Tetracloruro de carbono: Es un VOC utilizado como solvente de limpieza y para otros propósitos.

Tricloroetano (TCA): Químico que no se presenta de forma natural en el ambiente; ya no se produce en los E.U.A. debido a sus efectos en la capa de ozono; tiene muchos usos industriales y domésticos.

Tricloroetileno (TCE): Un VOC utilizado principalmente como solvente para eliminar grasas de partes de metal; es un probable cancerígeno para los humanos.

Unidad Operable (OU): Un proyecto o área de proyecto en un sitio de Superfund de la U.S. EPA.

Zona de Impracticabilidad Técnica (Technical Impracticability (TI): Un área de un sitio de Superfund sobre la que los reguladores han acordado que sería imposible una restauración al grado de los estándares de una limpieza típica utilizando la tecnología disponible, permitiendo que el propietario o los operadores del Sitio lo limpien hasta lograr metas alternativas de eliminación de contaminación.

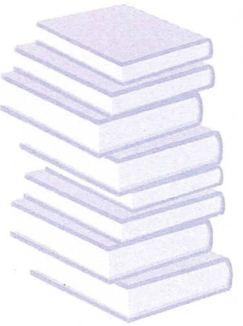
Depósito de documentos del Sitio

Biblioteca El Pueblo
101 W. Irvington Rd.
Tucson, AZ 85714
(520) 791-4733

Hoario: Lunes, Martes: 9 a.m. - 6 p.m.
Miercoles, Jueves: 10 a.m. - 6 p.m.
Viernes: 10 a.m. - 5 p.m.

Centro de Registros del Superfund
95 Hawthorne St., 4th Floor
San Francisco, CA 94105
(415) 536-2000

Horario: lunes-viernes: 8:00 am 5:00 pm



Para más información del sitio, visite la página web para Sitio del Superfund en el Aeropuerto de Tucson al: **www.epa.gov/region09/TucsonAirport**

Sitio del Superfund en el Aeropuerto de Tucson

Agencia de Protección Ambiental de EE.UU. • Región 9 • San Francisco, CA • Septiembre 2008

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United States Environmental Protection Agency
Region 9
75 Hawthorne Street (SFD-3)
San Francisco, CA 94105
Attn: José García (TIAA 9/08)

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