CASA

Community Assist of Southern Arizona

PROGRESS REPORT
FISCAL YEAR 2003-2004

Grant #1 R25 ES11-080-01

Consortium Member

Sonora Environmental Research Institute, Inc.

3202 E Grant, Tucson, Arizona, 85716

14 June 2004

PROGRESS REPORT
FISCAL YEAR 2003-2004
Community Assist of Southern Arizona
Grant #1 R25 ES11-080-01

Consortium Member
Sonora Environmental Research Institute, Inc.
3202 E Grant, Tucson, Arizona, 85716

TABLE OF CONTENTS

PROGRESS REPORT
FISCAL YEAR 2003-2004
Community Assist of Southern Arizona (CASA)

I. Executive Summary

Year three was an exciting year for CASA highlighted by a new partnership with Rose Family Resource and Wellness Center (the Center). As a local resource and education center in southern metropolitan Tucson, the Center added a new dimension to our existing collaboration between Sonora Environmental Research Institute, Inc. (SERI), Child & Family Resources, Inc. (CFR), the University of Arizona and Southeast Arizona Area Health Education Center (SEAHEC). Through this collaboration, we trained nineteen women in the promotora method and environmental health issues who subsequently conducted over 240 home visits. We formed a Community Advisory Team who identified air quality as the residents' number one environmental health concern and directed us to look at the effect of air toxics in southern metropolitan Tucson. Our preliminary data indicate that two potential air toxics hot spots are located in the low-income, minority neighborhoods in this area. These are the neighborhoods with the least power and the fewest resources to address environmental and health issues; they are already under economic, environmental and health stress. Current programs do not address the disproportionate risks in these localized areas and the potential for greater exposure to toxics. In year three, through CASA, we at SERI attempted to address these issues, conduct research to help answer the community's concerns and develop educational material specific to the community's needs.

In summary, our major accomplishments this year are:

- partnering with the Center and financing a new promotora program in southern metropolitan Tucson;
- developing a strong community team that now oversees much of SERI's research programs;
- addressing the community's number one identified environmental issue, air quality, by identifying potential air toxics hot spots and obtaining funding to begin monitoring in these hot spots in the fall of 2004; and
- continuing the testing of folk remedies for heavy metals.

II. Background

Fiscal year 2003/2004 was the third year of the NIEHS funded CASA program. This program was an outgrowth of the Child Health Champion Campaign (CHCC), an existing partnership between CFR, SERI and SEAHEC and SERI's existing CASA program in Nogales and Douglas, Arizona. These were community directed, EPA funded programs that assisted families in evaluating environmental risks to their children and in making informed health improvement choices. The programs focused on educating and training the community on indoor air quality and asthma related illness through in-home visitations as well as school and home based education.

Through these programs the team recognized that CHCC and the existing CASA program were only small albeit important steps in alleviating the environmental health crisis in southern Arizona. All the residents of southern Arizona deserve knowledge about environmental pollutants that affect their families lives and ways to reduce exposure. All residents deserve information that is relevant, easy to understand and presented to them in a familiar fashion. All residents deserve to have input into programs in their community that affect their lives. All residents deserve to be told the results of research conducted in their communities. We assembled a team to address these concerns and implement real change by expanding upon the successful model of the CHCC and the original CASA. The specific aim of this project is to expand the programs in four ways: (1) to include all border regions of southern Arizona where CFR has an office (Nogales, Douglas, southern metropolitan Tucson and Yuma); (2) to include additional information on mitigation measures and to assist with families mitigation efforts; (3) to expand the program to include additional environmental health areas of concern to the communities, in particular childhood lead poisoning; and (4) to further act as a liaison between the community and researchers and government agencies.

The specific goals of this expanded CASA are to:

- reduce the community's exposure to environmental pollutants;
- link members of the community who are affected by adverse environmental conditions with health care providers;
- provide relevant and culturally sensitive information about environmental pollutants;
- promote a community-wide interest in the project; and
- act as a liaison between researchers and the communities and help disseminate research results in an easy to understand format.

We are now completing year three, bringing the program to Nogales, Douglas and southern metropolitan Tucson. Next fiscal year the team moves to Yuma to continue working on community concerns.

III. Implementing a Promotora Program at Rose Family Resource and Wellness Center

The inclusion of the Center in the partnership promotes collaboration and local decision-making. The Center is a school-linked, “one-stop shopping” resource for families in the Tucson metropolitan area. Its primary mission is to improve educational achievement by facilitating the delivery of community-assessed educational, health, social, recreational, and mental health services to children, youth, and families in the Tucson metropolitan area, thereby removing the barriers to success. The Center’s vision is to empower individuals through the discovery of self and sharing of abilities. Families come to the Center to share time and ideas, for friendship and learning experiences, to develop individual talents, to motivate each other and to serve the community. As a collaborative effort between the school district and governmental and community agencies, the Center promotes and exhibits decision-making at the local level in all of its programs.

The Center believes that the participants living in the affected community are better able to identify the particular needs of their own neighborhoods. Promotoras at the Center are adolescents, young mothers, mothers of elementary, middle and high school students and nanas who have identified themselves as leaders and teachers and who are seeking to increase their knowledge on environmental and health issues. They visit homes and schools and teach others the skills, information, training and connections that result in true differences in their own neighborhoods. They build the capacity of neighborhoods one by one with the people who reside there. Through CASA, they received specific training on environmental health issues. They identified community concerns and coordinated with the team to identify responses to those questions and concerns, enabling the team to better meet community needs by responding to actual concerns in a one-on-one manner.

Steps to Implementing the Promotora Program at the Center

Figure 1: Rose Family Resource and Wellness Center

The new partnership with the Center was an outgrowth of our Community Advisory Team. Rosalva Bullock, Coordinator of the Center, is a member of the advisory team; she recognized the fit with her existing programs and the need for more education on environmental health issues in her community. The participants in her Leadership Training Class were invited to participate in the promotora program. Notices were also placed in community newsletters to ensure a broad participation.

A Week Long Training: Initially the nineteen women received a week long training. Topics included air quality, water quality, asthma, childhood lead poisoning, household hazardous material, valley fever, the promotora method and conducting surveys. The women received continuing education credits for the portion of the training provided by SEAHEC. Throughout the program the new promotoras continued to receive training and had mentors from CFR and SERI to assist them with the initial home visits and completing the paperwork.

Targeted Neighborhoods: The Community Advisory Team identified six zip codes as the neighborhoods to target for home visits: 85701, 85705, 85706, 85713, 85714 and 85719. Nearly 60 percent of the residents in the target area are members of sensitive populations. Approximately, 12 percent of the population are over 65, and 46 percent of the residents are under age 18. The elderly are a susceptible subpopulation whose lungs are differentially affected by poor air quality. In addition, the childhood asthma rates are higher than the national average at 13-25 percent, depending on how asthma is defined compared to 8 percent. Home visits are a proven method of targeting these sensitive populations.

In the target area, approximately 32% of the families live below the poverty level, compared with 10% for all of Pima County.

Home Visits: The promotoras conducted 240 home visits in the target area. Two of the promotoras took on extra duties and became team leaders to assist the other women. At the completion of the project, the promotoras received certification from SERI, SEAHEC and CFR and a small stipend and gift from SERI. US Congressman Raúl Grijalva and Pima County Supervisor Richard Elías came to help us celebrate on graduation day and gave the women their awards. Congressman Grijalva and Supervisor Elías are strong supporters of the program. (Figures 2 and 3.)

Community Advisory Team:: The advisory team was essential to the success of this new promotora program. It recognized that the target area is under economic, environmental and health stress. The project helped determine the risks to which the community is exposed and allowed for actions to be taken to reduce those risks. A better understanding of the possible environmental health risks in this community is the first step to taking action to reduce exposure for the sensitive populations. The team continues to strive to reduce or eliminate these risks by continuing to work together, refining and expanding the promotora program, integrating the education materials into other aspects of their work and seeking additional funding for specific tasks.

The project promoted multi-stakeholder collaboration through the use of the Community Advisory Team. The team provided meaningful public participation throughout the decision-making process to assure proper consideration of residents' concerns. The team continues to advise SERI on it's research activities.

Figure 2: US Congressman Raúl Grijalva and Pima County Supervisor Richard Elías Give Out Certificates to the Promotoras.

Figure 3: Graduation Day at Rose Family Resource and Wellness Center.

IV. Presence of Lead in Homes

Border community members, especially children are at risk for lead exposure. Determining the routes of exposure assists in informing communities about the dangers associated with lead and what can be done to reduce exposure. Hazards associated with lead include nervous system and kidney damage, learning disabilities, slowed growth, poor muscle coordination, speech and language problems, vomiting and headaches, coma and death. Sources of lead in the home include household dust, plumbing, lead paint, ceramics, glassware, plastic blinds and folk remedies.

During the home visits promotoras check items for lead content using Lead Checks™, easy to use swabs that change color in the presence of lead. Data have been collected from southern metropolitan Tucson (as of 6/11/04), Nogales, AZ, Douglas, AZ and Aqua Prieta, Sonora. The results are summarized in Table 1. Lead check results are summarized here from CASA years 1-3 and compared with previous results from Nogales (2000/2001), Aqua Prieta (2001/2002) and Douglas (2001/2002).

Differences between year and location may result from differences in homes, year of construction and income of residents. Lower results in Aqua Prieta were correlated to the lower income and brick construction of many of the homes; brick construction homes were not painted. The higher results in Nogales 2000/2001 may be related to a much higher incidence of testing in every home.

Differences in survey results may also be linked to improvements made in the later surveys and differences in sample size. Particular lead concerns in homes leads to testing of different items between homes. For example, if concern is focused on ceramics and paint, pipes may not be tested. To get an accurate result of the number of

Table 1: Summary of results between communities.

	Aqua Prieta (01/02)	Douglas (01/02)	Douglas (02/03)	Nogales (00/01)	Nogales (01/02)	Tucson (03/04)
Number of homes surveyed	103	105	132	51	211	330
% positive	13	8	12	67	25	27
Where focused	None	None	Ceramics	Paint	Paint	Ceramics
% in focus	-	-	63	47	60	46

homes containing each source of lead, a routine number of items to be tested needs to be observed, and a notation made on the surveys when the item is not found in the home. For the surveys conducted in southern metropolitan Tucson, promotoras were trained on proper techniques and showed a marked improvement over past years on valid data collection.

Specific results for southern metropolitan Tucson: Figure 4 gives the specific results for the year four target area. Tucson showed similar results to other communities with a high percentage of the positive lead checks being positive for ceramics.. The results for paint were unusually low, while the results for glassware were unusually high, the highest of any community surveyed to date. Not all of the surveys have been tallied. These trends may change. Even if the trends do change the results confirm that several routes of potential exposure exist in southern metropolitan Tucson. Determining the routes of exposure will help to inform border communities about the dangers associated with lead and other heavy metals and what can be done to reduce exposure. Families need to be aware of the potential routes and provided with educational material addressing the issue.

Over 12% of the homes visited in Tucson had ceramics containing lead!

V. Use of Folk Remedies

Children living along the US/Mexico border are exposed to a variety of environmental pollutants including folk remedies contaminated with heavy metals. Metals may end up in folk remedies in a variety of ways including uptake from contaminated soil or air or contamination during processing, shipping and handling. Examples of metal contamination include industry contamination of the soil that may be taken up by the plant or processing in a metal contaminated area or equipment. The packaging might be contaminated as well as the folk remedy presenting another possible route of exposure.

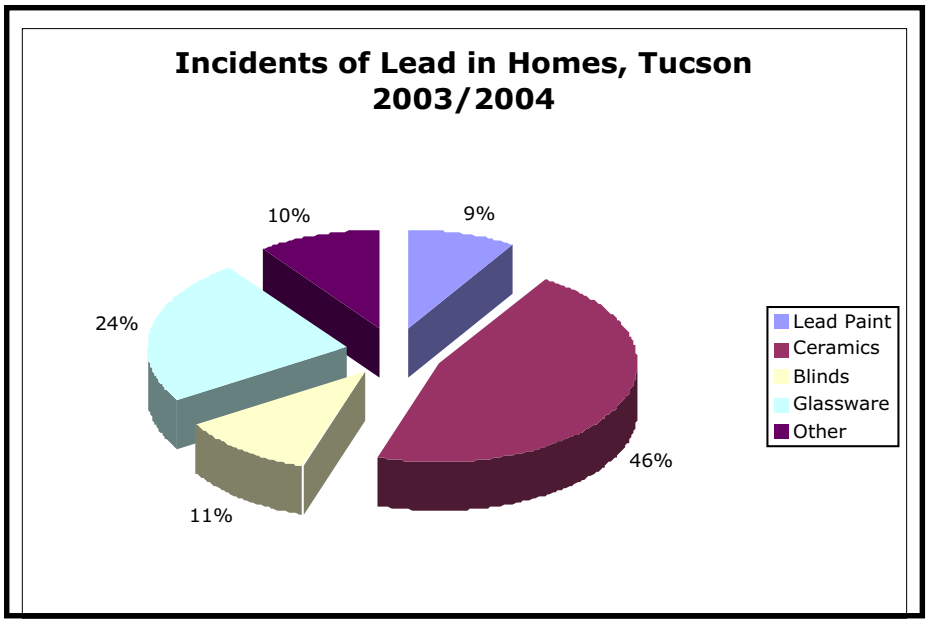

Figure 4: Specific Results for Positive Lead Checks in Southern Metropolitan Tucson.

Promotoras completed over 1,100 questionnaires during home visits in Nogales, Douglas and Tucson, Arizona and Agua Prieta, Sonora. Questionnaires asked about usage, preparation, amounts, reason for use and frequency of use of folk remedies with data collected by adults and children.

Data Analysis: We input all results into our database designed with FileMaker Pro. An input screen shot is shown is Figure 5. We utilize a systematic procedure for all data collected for research purposes which consists of the following steps.

1. Development and refinement of data collection forms.
2. Design and construction of computer databases, based on the forms.
3. Creation of editing procedures, error correction procedures and data quality control procedures.
4. Creating and maintaining programs for merging new data.
5. Creating and maintaining programs for data quality checks.
6. Creating programs for operational reporting (accrual, randomization, data completeness); production of reports on a regular basis.
7. Creating system logs for data modification.
8. Producing written system documentation, including description of all databases and keying to individual form items, description of all programs assessing databases, all coding procedures, all data entry procedures, and all data flow procedures. This includes both a historical record, and as well as updating to current procedures.
9. Procedures for altering databases and data flow, responsive to changes in data collection forms or procedures.
10. Procedures and records for producing analytical data sets.

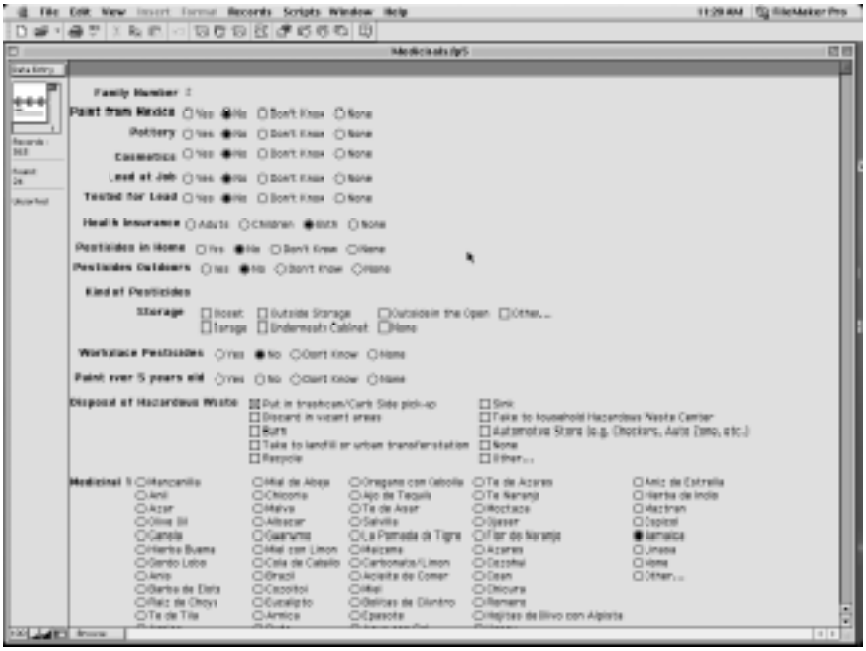

Figure 5: Screen Shot for Data Entry.

All data are collected on hard copy forms and sent to the SERI staff for computerization and inclusion in the study database. Quality control procedures include double entry of the data and editing checks both prior to and after the data have been converted to data sets. To help ensure the consistency of the data collection, data collection forms are periodically reviewed with the promotoras to determine whether the information is being collected similarly. Discussion about how questions are posed, the amount of prompting and interpretation of responses is undertaken to help promote understanding among the promotoras. The intent is to reinforce data collection methods to ensure the most consistent and comparable data collection for the study.

Results: The most frequently used folk remedies are given in Table 2. The percent of families using folk remedies is given in Table 3. The frequency of use for families using folk remedies is summarized in Table 4 and by specific folk remedy in Table 5. Over 65% of the families surveyed used folk remedies at least once, and over sixty folk remedies were used. Manzanilla is used most frequently with 6% of adults reporting daily use. Hierba buena is also used frequently with 2% of adults reporting daily use. Results for southern metropolitan Tucson show similar trends as for other communities. Again, these results are based on surveys provided to SERI through 6/11/04. *The most alarming discovery was that 2% of parents are giving their children azul añil at least once per week and of those using azul añil, 15% use it daily. Our preliminary studies indicate that azul añil contains elevated levels of lead and arsenic.*

These results indicate widespread usage of folk remedies amongst families living along the border. Even contaminants in a small percentage of the folk remedies have the potential to affect a significant portion of the population.

Table 2: Top five used folk remedies.

ADULT	CHILDREN
Manzanilla	Manzanilla
Hierba buena	Hierba buena
Canela	Azul añil
Azahar	Canela
Azul añil	Gordo lobo

Table 3: Percent of families using folk remedies.

COMMUNITY	PERCENT
Nogales, Arizona	73
Douglas, Arizona	51
Agua Prieta, Sonora	91
Tucson, Arizona	66
TOTAL	65

Table 4: Frequency of use by those using folk remedies

FREQUENCY	PERCENT
Daily	14
Weekly	7
Monthly	21
Other	58

Table 5: Frequency of use of specific folk remedy by those using folk remedies.

	PERCENT OF PARTICIPANTS			
FOLK REMEDY	DAILY	WEEKLY	MONTHLY	OTHER
Manzanilla	12	8	24	56
Hierba buena	10	6	23	61
Canela	16	6	7	71
Azahar	11	20	7	62
Gordo lobo	8	0	0	92
Azul añil	15	15	4	66
Arnica	0	0	0	100

VI. Analysis of Folk Remedies

We are analyzing twenty-four folk remedies for metals using Inductively Coupled Plasma-Mass Spectroscopy (Table 6). Nine of the folk remedies are being tested as teas (Table 7). Specific metals were chosen based on health concerns and preliminary mass scans. The results are summarized in Table 8. Of the folk remedies tested, fifteen have metal concentrations higher than those expected for uncontaminated plant material, and seven of those fifteen have concentrations above levels of health concern (Table 9).

Table 6: Folk remedies undergoing testing.

Abango	Gordo lobo (Punchon, mullein)
Albacar (basil)	Hierba buena (spearmint)
Arnica (leopard's bane)	Hierba de manza
Azahar (orange blossom)	Hierba del pasmo (seep willow)
Azul añil	Manzanilla (chamomile)
Barba de elote (corn silk)	Oregano
Canela (cinnamon)	Pasionaria (passiflora, passionflower)
Canutillo (mormon tea)	Pionia (peony)
Cholla	Ruda (rue)
Chuchupate (oshá)	Salvia (garden sage)
Damiana	Valerian (valeriana)
Epazote (mexican tea, american wormseed)	
Cordón (25% salvia, 25% anis verde, 25% perejil, 25% manzanilla)	

Table 7: Folk remedies undergoing testing as teas.

Albacar	Barba de elote	Gordo lobo
Arnica	Canela	Hierba buena
Azahar	Cordón	Manzanilla

Comparison to plants grown in uncontaminated areas: A thorough discussion of trace elements in soils and plants is given by Kabata-Pendias (1). Fifteen of the folk remedies have metal concentrations above the range for plants growing in uncontaminated areas (shaded in the Table 8). *Kabata-Pendias suggests that plants obtain higher levels through contamination from uptake or handling.*

Comparison to health standards: Reference dose levels for chronic exposure are given in the EPA Integrated Risk Information System (IRIS) and EPA Health Effects Assessment Summary Tables (HEAST) levels for As, Cr(VI) and Cu and are given

below. Comparing these values to the experimental values and assuming that the folk remedies were taken daily gave levels of concern for three folk remedies, two azul añil samples and azahar.

Metal	Reference Dose (mg/kg/d)	Reference
Arsenic	0.0003	IRIS
Chromium VI	0.003	IRIS
Copper	0.04	HEAST

The lead values were compared to the Food and Drug Administration tolerable Intake Levels or Action Level of 0.025mg/p/d. Using this value and assuming that the folk remedies were taken daily gave levels of concern for five samples: the three azul añil samples, azahar and hierba buena. According to the World Health Organization, permissible limits for folk remedy plants, based on average daily intake for Cd is 0.3 ppm respectively. One azul añil samples, damiano and hierba del pasmo have values above these levels. The metals above the standards are summarized below and are bordered in Table 8.

Seven of the tested folk remedies contained metals above health standards.

Table 9: Folk remedies containing metal concentrations above health standards.

Folk remedy	Metals Above Standards
Azahar	Arsenic, Lead
Azul añil (A)	Arsenic, Lead
Azul añil (B)	Arsenic, Lead
Azul añil (C)	Cadmium, Lead
Damiana	Cadmium
Hierba buena	Lead
Hierba del pasmo	Cadmium

Azahar, azul añil and hierba buena are all frequently used. Of interest is the fact that high concentrations of copper were found in azul añil, yet levels were not above standards. Not all metals are of concern even at high concentrations. However, when looking at these results, one must remember that border residents are exposed to multiple sources of metals. Even metals at low concentrations may be a concern because of multiple sources.

These results demonstrate the need for further analysis and investigation of the health effects. Unfortunately, the samples tested in this pilot study had heavy metal contamination above the standards and are given to children as home remedies. Remedies families are giving to their children to help may actually be hurting.

VII. Air Quality in Southern Metropolitan Tucson

We have spent the last year developing a strong Community Advisory Team and implementing community outreach activities throughout Pima County. Community meetings held in the southern metropolitan Tucson determined that air quality was the number one environmental health issue, with the greatest concern being the lack of an air toxics program in the State. The team identified three neighborhoods to target, produced four air quality brochures (general, particulate matter, beryllium and indoor air) developed maps of sources by census track for use at community events, attended community events and gave two presentations to the Pima County Board of Health. The committee continues to take an advisory role on our projects as well. Throughout the first two years of CASA, community members consistently asked about potential sources of hazardous air pollutants (HAPs) in their community. During year two we began to collect information on the potential sources of HAPs in southern metropolitan Tucson and the Yuma area with the goal of identifying possible hot spots. During year three we completed the analysis for Tucson and identified three potential hot spots. Two of the hot spots are in southern metropolitan Tucson as shown in Figure 6. We have recently obtained funding from the Environmental Protection Agency (EPA) to begin preliminary air quality monitoring in these hot spots.

Southern metropolitan Tucson has two potential air toxics hot spots.

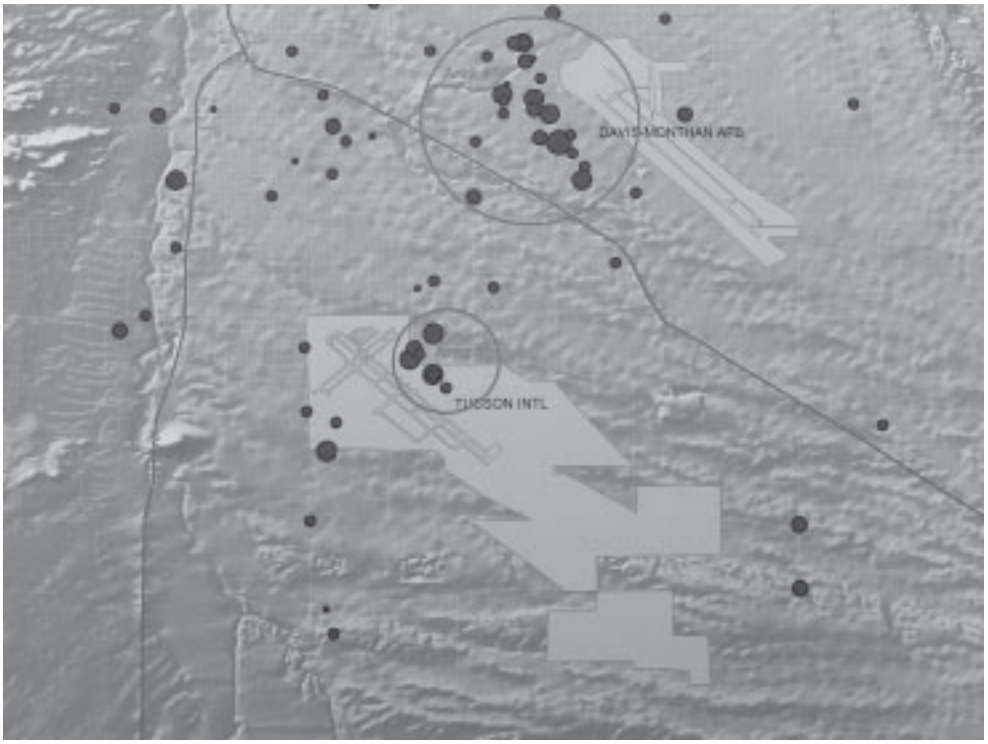

Figure 5: Two Possible Hot Spots in Southern Metropolitan Tucson Identified by GIS Software Analysis.

VIII. Plans For Year Four

During year four we will accomplish the following:

- Complete education material for the Yuma area based on specific community concerns;
- Complete the analysis of folk remedies and teas and write up the results for publication;
- Begin monitoring of air toxics in the identified potential hot spots in southern metropolitan Tucson with funding from the EPA;
- Evaluate potential air toxics hot spots in the Yuma area;
- Complete data analysis of home survey questionnaires; and
- Respond to community research concerns in Yuma as needed and as feasible.

IX. Conclusion

During year two we learned about the need for additional community input and direction and developed the Community Advisory Team to meet that need. This fiscal year we saw the strength of having a community team through the formation of new partnerships, increased number of home visits and true community input. For the first time we responded to specific environmental issues requested by citizens through research, education and participation. The programs that were started this year under CASA will continue when the grant period ends. The partnerships that were formed are strong, and the personnel are committed to future success and implementing real change in their neighborhoods. Thus one of the main goals of CASA has been accomplished.

X. Reference

Kabata-Pendias, A. (2001) Trace Elements in Soils and Plants, 3rd Edition, CRC Press.