



---

# MEMORANDUM

---

Date: September 10, 2013

To: The Honorable Chairman and Members  
Pima County Board of Supervisors

From: C.H. Huckelberry  
County Administrator

A handwritten signature in black ink, appearing to read "CHH", is written over the printed name "C.H. Huckelberry".

Re: Tucson Drainage/Arroyo Chico - Scheduled Flood Control Improvements from  
Campbell Avenue East to Park Terrace Place

The Pima County Regional Flood Control District (RFCD) has been working with the US Army Corps of Engineers to implement the Arroyo Chico Flood Control project. The project is largely complete with the development of the flood detention basins on the Del Ulrich Golf Course, Cherry Field/Park Avenue, and between Campbell and Park Avenues. Three detention basins substantially and significantly reduce adjacent flood damage.

Two projects remain to be completed. One is the High School Wash storm drain and the other is channel work on Arroyo Chico from Campbell to Park Terrace Place. We had been preparing to make the channel improvement on Arroyo Chico when it was brought to our attention the site is the location of a past tritium release by the American Atomic Company.

When concern was expressed about the residual effects and contamination from this tritium release, we reexamined the need for channel modifications and flood control improvements. These modifications disturb soils and remove significant amounts of riparian vegetation.

Based on the most current floodplain mapping, the existing conditions allow most flood flows to remain in Arroyo Chico with very little adjacent flooding; hence, the need for the flood control project is minimal. Given the potential issue of unknown contamination, as well as the removal of riparian vegetation, this project has been cancelled.

A public meeting has already been scheduled to discuss the project, and it is too late to cancel this meeting. Staff will attend the public meeting and indicate the County does not intend to proceed with any modifications to Arroyo Chico between Campbell and Park.

The attached memorandum from RFCD Director Suzanne Shields discusses this issue in detail. I have directed Ms. Shields to proceed as recommended on Page 2 of her memorandum.

CHH/mjk  
Attachment

c: John Bernal, Deputy County Administrator for Public Works  
Suzanne Shields, Director, Regional Flood Control District  
Christopher Cawein, Deputy Director, Regional Flood Control District  
William Zimmerman, Deputy Director, Regional Flood Control District



---

# MEMORANDUM

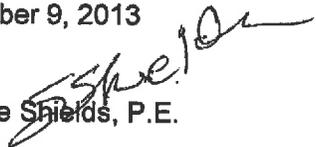
Director's Office  
Regional Flood Control District

---



DATE: September 9, 2013

TO: C.H. Huckelberry  
County Administrator

FROM: Suzanne Shields, P.E.  
Director 

SUBJECT: Tucson Drainage/Arroyo Chico – Upstream Channel Work from Campbell Avenue East to Park Terrace Place

---

The planning and design of the Tucson Drainage, or Arroyo Chico project, began in the 1980s which included planning studies by the U.S. Army Corps of Engineers (Corps) in 1986. Most of the focus of the planning and design work was devoted to the two main flood detention areas at the Del Ulrich Golf Course at Alvernon Way and the Cherry Field/Park Avenue complex between Campbell Avenue and Park Avenue.

At this time, the Corps is getting ready to complete two remaining segments of the project which include the High School Wash storm drain at 8<sup>th</sup> Street between 3<sup>rd</sup> and 4<sup>th</sup> Avenue and the upstream channel work on the Arroyo Chico from Campbell Avenue to Park Terrace Place.

This week a resident of Park Terrace Place contacted Pima County about her concerns over construction of the Arroyo Chico channel in an area that had experienced release of tritium in the 1970s at the American Atomic Company's plant at 425 S. Plumer Avenue along the Arroyo Chico (see location map). She was concerned that channel work could potentially release contaminants within her area as well as the loss of riparian habitat along the Arroyo Chico which is quite lush in the Park Terrace Area.

I was not aware of this environmental issue, however in talking with my staff early environmental due diligence conducted by the Corps in the early 1990s did discover the issue. We have contacted the Corps, but have yet to receive any information on their earlier findings or any testing they may have conducted.

In an attempt to learn more about the reported spill, I have found two articles. One is from the Arizona Daily Star about the 1979 closure because of problems with the operation and safety of the American Atomics Company plant which refers to a spill inside the plant and release of tritium from ventilation stacks. The second article makes it clear that there were continuous problems at this location and not just one release (see attached articles).

I have spoken with Aubrey Godwin of the Arizona Radiation Regulatory Agency who informed me that his agency still has files on the closure and decommissioning of American Atomics. I have sent him our construction drawings and he will review the plans as well as information in their files. He indicated that tritium has a half-life of 12 years; therefore, about 25% of the tritium could still be in place, but it is hard to measure within soils. I also asked him for a recommendation and assistance on how to conduct testing for tritium in soils.

C.H. Huckelberry , County Administrator

**Tucson Drainage/Arroyo Chico – Upstream Channel Work from Campbell Avenue East to Park Terrace Place**

September 9, 2013

Page 2

Separately, I also reviewed the construction plans with my engineers. The current plans would remove a significant area of vegetation and soil which would be replaced by a five-foot deep concrete channel. I also asked them to review some just completed remapping of the FEMA 100-year floodplain which we began this spring with the completion of the Cherry Field/ Park Avenue complex.

The original hydraulic floodplain models prepared in the 1990s used topographic maps which are not as accurate as the mapping used today. The floodplain model and assumptions followed the Corps' standards for floodplain mapping which are not the same as what is currently used today by the District and FEMA.

The results of our just completed floodplain mapping shows only minor flooding outbreaks along the upstream channel for Arroyo Chico (see attached map comparing earlier mapping to work that was just completed). The existing channel has not been well maintained and it would appear that maintenance along the channel would provide the necessary flow enhancement without the need for reconstructing and lining the channel with concrete.

We have a public meeting scheduled for September 11, 2013 for this project. It is too late to cancel this meeting and a cancellation would only lead to more citizen questions and concerns. I recommend that we do the following:

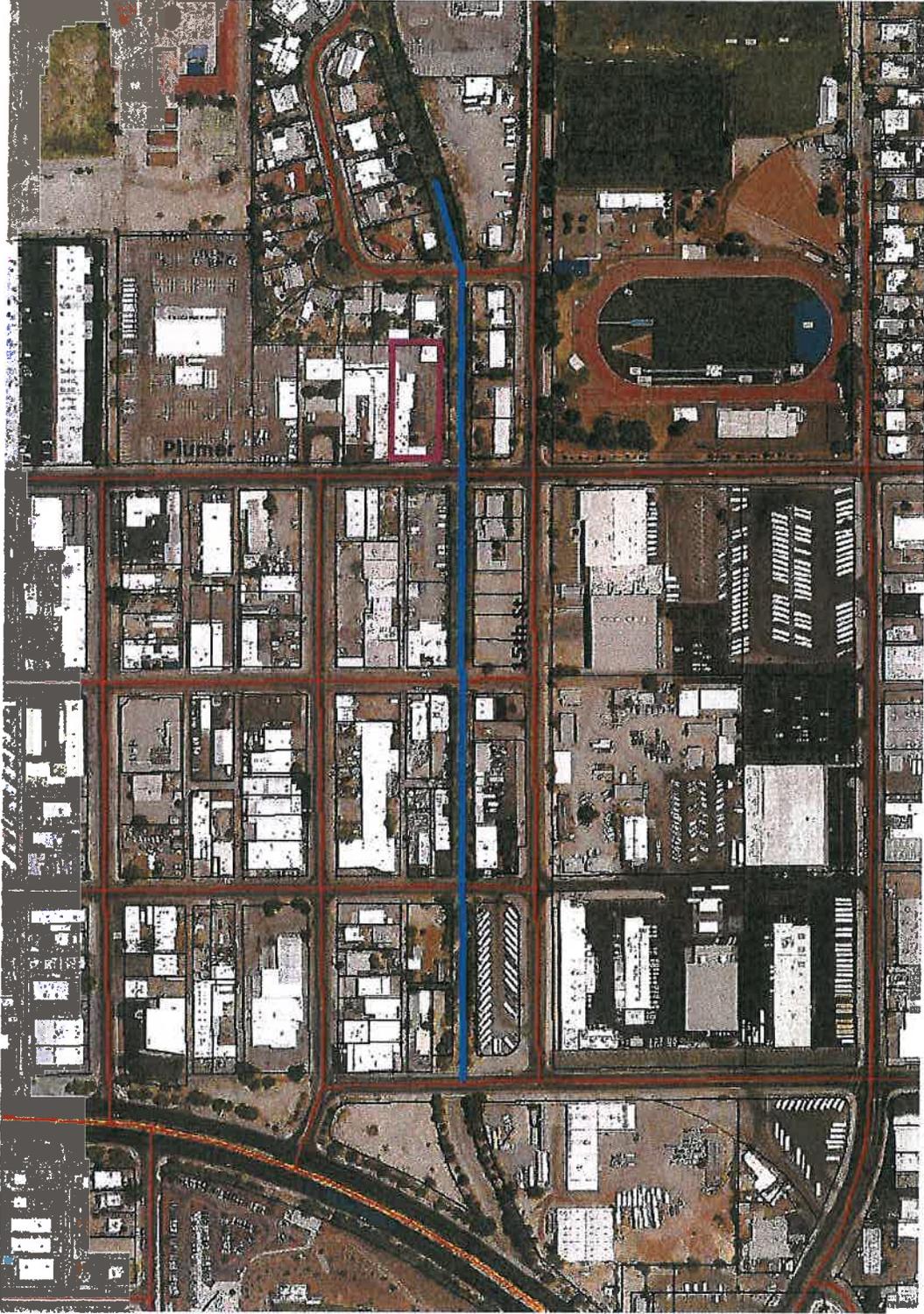
- Formally contact the Corps with the information we have concerning the health issue, need for flood control improvements and preservation of riparian habitat, requesting the channelization project be placed on hold.
- Provide information at the public meeting concerning our evaluation of their concerns and the project need and get public input.
- Continue working with the Arizona Radiation Regulatory Agency to provide information to the public and, if recommended by the Agency, conduct testing.

With your concurrence, I will proceed with these recommendations.

SS/tj

**Attachments**

c: The Honorable Ramón Valadez, Chairman – Pima County Board of Supervisors  
John Bernal, Deputy County Administrator – Public Works  
Chris Cawein, Deputy Director – Regional Flood Control District  
Bill Zimmerman, Deputy Director – Regional Flood Control District



American Atomic's  
Address 425 S Plumer



Project Area



## The tritium problem at American Atomics



SEPTEMBER 27, 2009 6:00 PM • ELAINE RAINES  
ARIZONA DAILY STAR

It all started with a workplace accident. But, before it was over, the tritium leakage at American Atomics Corp. led to the closure of the plant, nearly half a million dollars of food destroyed and neighbors who feared for their health.

[photo moved to image asset]

1979 Star files

An American Atomics worker and glass tubes containing tritium.

Tritium is a radioactive form of hydrogen. Founded in the early 1960s, the American Atomics plant, at 425 S. Plumer Ave., produced tritium filled tubes for hand held military devices like compasses and gun sights. It employed about 15 people until 1976.

In 1976, a way to use tiny tritium-filled tubes for back-lighting watches was devised. The company took off growing to about 200 employees by 1978. Sales were expected to hit around \$10 million. But, the rapid growth that followed outpaced the company's safety controls.

It all began to unravel when a worker at the plant, in 1978, spilled tritium-laced oil over himself. He was fired about six weeks later and he then complained to the state. That brought in an inspector from the Arizona Atomic Energy Commission. Concerned over the loss of large amounts of tritium, the inspector suspended the company's license.

[photo moved to image asset]

1979 Star files

A neighbor looks over his wall to the American Atomics plant.

By early March 1979, further inspection confirmed that conclusion. An estimated 300,000 curies of tritium had been lost, emitted as a cancer-causing gas through the plants stacks. It also revealed that contamination in the surrounding neighborhood was intense and widespread.

This included the nearby TUSD kitchen. The district had to destroy \$300,000 worth of fresh food and \$270,000 worth of canned goods. The kitchen remained closed for over a year. Also nearby was Senior Now Generation which prepared lunches for 1,400 elderly people a day. All of their food also had to be destroyed.

High levels of radioactivity were found in neighbors' lawns, fruit trees, swimming pools, food — and urine.

[photo moved to image asset]

1979 Star files

A guard stands watch after the plant was shut down.

Following the suspension of their license, in Sept. 1979, Gov. Bruce Babbitt seized about 550,000 curies of tritium still stored at the site. It was taken to Flagstaff and ultimately back to where it came from — Oak Ridge National Laboratory in Tennessee.

The company tried to reopen in other states, but failed. They filed for bankruptcy. Lawsuits were settled out of court for a total of more than \$235,000 in cash.

[Next](#) | [ToC](#) | [Prev](#)

---

## 10

### Tritium in Tucson, Wastes Worldwide

Like Agnes Engel of Canonsburg, Tom Charlie downriver from Church Rock, and the Haag and Mixon families near Rocky Flats, radiation has affected the life of Rita Linzy. A mother of two and a lifelong resident of Tucson, Linzy knew little of the intricacies of atomic power until one of her near neighbors accidentally leaked radioactive tritium, introducing it into food being served to forty thousand local schoolchildren. It happened in the summer of 1979. During the incident--which Linzy called "our Three Mile Island"--her hair fell out and scores of her neighbors began wondering if their health had been damaged.[1]

The source of the contamination was American Atomics, a ten-million-dollar-a-year operation employing some two hundred workers in midtown Tucson. The company made a business of buying tritium from the federal weapons program and inserting it into thin glass slivers used in digital watches. The tritium makes the slivers glow without electricity.

As it functioned quietly in Tucson, American Atomics was just one of seventeen thousand medical, academic, industrial, and military organizations licensed to handle radioactive isotopes in the United States. Those licensees range in size from megacorporations like General Electric and Westinghouse to small colleges and hospitals that handle tiny quantities of isotopes for research and medical purposes.[2] Literally hundreds of millions of items containing some quantity of radioactivity are produced in the U.S. each year, including luminous timepieces, static eliminators, false teeth, welding rods, eyeglasses, electron tubes, fluorescent lamp starters, ceramic tableware, and some smoke detectors.[3]

Many of the factories that produce these items are legally permitted to release large quantities of radiation in the course of normal operations. Cobalt 60 fabrication plants, for example, are allowed to expose the public to twenty times more radiation than a commercial reactor.[4]

Many of the small radiation by-product plants are also located in thickly populated areas. American Atomics sat just a few hundred yards from a trailer park, a church, a day-care center, a potato chip warehouse, several homes, and the central kitchen for the Tucson public school system. The plant regularly leaked large quantities of tritium gas into the atmosphere--285,000 curies of it in 1978 alone, according to company records. In September of that year a maintenance worker opened the wrong valve and sent into the Tucson air a single "puff" of twenty-one thousand curies, a sizable dose. The public was not informed.[5]

But tritium can be deadly. A radioactive form of hydrogen, it has a half-life of twelve years. Because it gives off relatively small amounts of beta (electron) radiation, it is considered less dangerous than many other isotopes. However tritium behaves chemically and biochemically like ordinary hydrogen. When ingested, it can incorporate itself into all forms of body cells, including those of the reproductive system. Researchers theorize that because of its ability to

act like regular water, tritium can incorporate with the DNA in living cells, multiplying the prospects for damage leading to genetic mutations and cancer[6]

- 
1. *Arizona Daily Star*, June 3, 1979.
  2. Clair Miles, NRC, interview, February 1981.
  3. Buckley, et al., *Environmental Assessment of Consumer Products Containing Radioactive Material*, NUREG CR-1755 (Washington, D.C.: NRC).
  4. 10 Code of Federal Regulations, Part 40. As of December 1979 the public exposure limit at "nuclear fuel cycle" facilities such as power reactors and fabrication plants was set at twenty-five mrem. But the limits at "by-product" facilities, waste dumps, weapons plants, and certain industrial facilities was set twenty times higher--at five hundred millirem.
  5. *Arizona Daily Star*, April 15, 1979, and January 4, 1981.
  6. H. Kasche, et al., "Dose Estimations for Tritium and C-14 Released in the Nuclear Fuel Cycle--A Biological and Radiobiological Evaluation," University of Bremen, SAIU, available through Environmental Policy Center.
- 

### Tritium in the Cake

In addition to tritium, at least one worker at American Atomics was also contaminated with "hot" oil. Other workers charged the company regularly falsified quality-control data and deliberately mislabeled radioactive cargo to avoid air-freight restrictions. In all, the company seemed a tragic throwback to the days of radium-dial painting--a practice tritium slivers made obsolete.[7]

Finally, American Atomics employee Elaine Hunter blasted the company in a letter printed in the local *Arizona Daily Star*. She was quitting work at American Atomics, she said, "not in fear of radioactivity," but "in disgust and anger that those greedy men were making a fast buck while jeopardizing the physical and emotional well-being of those involved with the fabrication of their product.[8]

Meanwhile plant neighbors complained of emission alarms that rang constantly. In August of 1978 the Arizona Atomic Energy Commission (AAEC) inspected American Atomics and warned of large losses of tritium because of sloppy handling. The findings were delivered to AAEC director Donald C. Gilbert, who let them sit on his desk for seven months. The reason for the inaction, Gilbert later told *Daily Star* reporter Jane Kay, was that he had been assured by Harry H. Dooley, Jr., that the situation was being corrected. Dooley was an AAEC commissioner--and a vice-president of American Atomics. The obvious conflict of interest apparently bothered no one at the AAEC. Only when Director Gilbert was fired in March of 1979 during a commission shake-up did the report find its way to the public.[9]

Four days after Gilbert's departure AAEC inspector Lynn FitzRandolph was sent to American Atomics. He cited the company with four counts of violating state regulations, and recommended that the plant be closed. The company was "out of control," FitzRandolph later explained. "I came away with pretty good ideas the tritium was going up the stacks and into the sewer." FitzRandolph was scorned at the time by some of his scientific peers, who told him his demands for strict enforcement were "ridiculous." [10]

But in the spring of 1979 the *Star* also reported the company had been dumping radioactive liquid "down the drain," directly into the city sewer system, without filtration or monitoring. American Atomics replied that the total radioactive content was "very low." [11]

But routine tests in early June at the Tucson school system's central kitchen, near the plant, found food with radiation counts 2.5 times above permissible levels. The kitchen regularly fed approximately forty thousand students. Water in cake that had been served to twenty-eight thousand pupils contained fifty-six thousand picocuries per liter; federal standards allowed only twenty-thousand picocuries. Vegetation outside the kitchen tested at levels thirty-six times the legal limit. Radiation, said acting AAEC director Kenneth Geiser, was "in the humidity in the air. Everywhere. And all the time. Cake or bread left on a table gets kind of soggy; it picks up moisture like a sponge--and tritium with it."

Tucson was shocked. The school board was soon forced to bury seventeen thousand cases of food. In all some \$300,000 in perishables and \$90,000 in canned goods were destroyed, at taxpayer expense. [12]

Meanwhile urine tests of people living near the plant revealed at least six cases of abnormal levels of tritium. Six-year-old Tony Bruckmeier tested at 89,100 picocuries per liter, a level termed by Gail Schmidt of the Bureau of Radiation Health as "small but not negligible." [13] Though federal officials emphasized the levels were not likely to be harmful, local residents had their doubts. Mrs. Gloria Mendoza, who had lived in the neighborhood more than a quarter century, showed levels of 71,700 picocuries per liter. The AAEC, she told the *Star*, "told us to see our own physicians or call the Health Department. They told me it was nothing to be alarmed about. But I've had blisters inside my mouth, and the doctors say they haven't seen anything like it since World War II. It's all cracked and constantly purplish red."

"They told us they were making little components," said Joe Valenzuela, a grandfather and amateur gardener who lived in the same house for thirty years. "They never said they were using radioactive materials. No one knew. . . . The prevailing winds are south to southwest, and we're right here," he continued. "We have no defense against this. The employees work eight hours and wear coats and gloves. But my wife is here 24 hours. What about her kitchen?" [14]

When news of the contamination became public, parents began forbidding their children to come into the area--even to visit grandparents. Neighbors began leaving fruit on trees they had tended for years rather than risk eating radiation. Backyard swimming pools were also abandoned when they showed high tritium levels--one with 413,000 picocuries per liter, twenty times EPA drinking standards. But American Atomics continued to manufacture tritium slivers. "The safeguards are there," said company president Peter J. Biehl. "The performance here is super, and we're within the established standards. If we were a safety hazard we'd shut down." [15]

They did. Faced with the possibility of an official hearing, American Atomics surrendered its licenses to handle radioactive materials. The Tucson City Council and Pima County had already voted to deny the company permission to relocate within their borders.

The company then abandoned its factory, leaving behind tritium and other contaminated wastes. A break-in, fear of fire, and other problems at the deserted site brought on still more anger and anxiety in Tucson. Finally, on September 26, Arizona governor Bruce Babbitt used emergency powers to seize the leftover tritium. The American Atomics experience, he

said, had been "a complete failure of regulation." [16] On September 28, six National Guardsmen packed several hundred thousand tiny glass vials filled with tritium into thirty-eight barrels and trucked them to a former military depot at Flagstaff, where they were buried.

The experience left bitter memories in Tucson--and more. During the height of the crisis health officials assured local residents any ingested tritium would be eliminated from the human system in three to six months.

But in the spring of 1981 a study of fifty former American Atomics workers showed a majority with tritium levels still ten times above normal. The ex-employees had not been exposed to high tritium concentrations for at least twenty-one months.

Dr. Michael Gray of the Arizona Center for Occupational Safety and Health reported that a survey showed a "long residency period in the system of very low concentrations of tritium." Some of the workers, he said, produced urine samples containing tritium levels twenty times above normal. Rates of decay found in the survey suggested that tritium "can reside in the body" not just for the three to six months promised during the crisis, but "for up to ten years." [17]

That was bad news for the people of Tucson, who banned all radioactive production from their town in the wake of the scandal. "It never entered my mind that they would even think of putting a plant in this area when they knew it could contaminate a neighborhood," Rita Linzy told the *Star* at the height of the American Atomics crisis. She was then suffering from an undiagnosed ailment that left her feeling tired and feverish, and made her hair fall out. Her dog's hair was also falling out.

When we interviewed her eighteen months later, she told us she was feeling better, and that there was no firm evidence that her ailment--or her dog's--had been caused by radiation. But she was still worried. "I don't know if the illness was from the plant or not," she said. "If any damage was done, we won't know for twenty years. And there won't be anything we can do about it." [18]

---

7. *Arizona Daily Star*, July 18 and July 20, 1979.

8. Elaine Hunter, letter to the *Arizona Daily Star*, April 15, 1979.

9. Jane Kay, *Arizona Daily Star*, interview, January 1981.

10. *Arizona Daily Star*, February 11, 1980, and October 4, 1979.

11. *Ibid.*, May 14, 1979.

12. *Ibid.*, June 2, 1979; and Associated Press, October 25, 1979, as seen in *New York Times*, October 26, 1979.

13. Gail Schmidt, interview, June 1981. Dr. Schmidt told us that EPA standards for tritium in drinking water are twenty thousand picocuries per liter, constant intake of which could result in a whole-body dose of four millirems a year. The NRC standard for tritium in urine among nuclear workers is twenty-eight million picocuries per liter. Schmidt calculated that if the tritium levels in Tony Bruckmeier's urine had come from a single exposure, they would reflect a whole-body dose of roughly 0.37 millirems. If they reflected a whole year's constant exposure, Schmidt estimated the dose at roughly 8.9 millirems. In a June 1981 interview Dr. Alan Moghissi, principal adviser for Radiation and Hazardous Materials to the EPA's Office of Research and

Development, told us that if he were the parent of a child who had suffered such exposure, he "would not be concerned." Moghissi, who worked extensively on the Arizona Atomics case, said the highest environmental doses were estimated at ten to seventeen millirems. "There is no such thing as zero danger," he told us. But Tony Bruckmeier's apparent dose was "comparable to what one would receive on a round-trip air flight from New York to Tucson."

14. *Arizona Daily Star*, June 3, 1979, and June 12, 1979.

15. *Ibid.*, April 15, 1979.

16. U.S. Congress, House Committee on Interior and Insular Affairs, Subcommittee on Energy and the Environment, *Nuclear Regulatory Commission's Agreement States Program*, 96th Cong., 1st sess., July 19, 1977, pp. 2-6 (hereafter cited as *Agreement States Hearings*).

17. *Arizona Daily Star*, March 5, 1981.

18. *Ibid.*, June 3, 1979, and Rita Linzy, interview, January 1981.

### A World of Waste

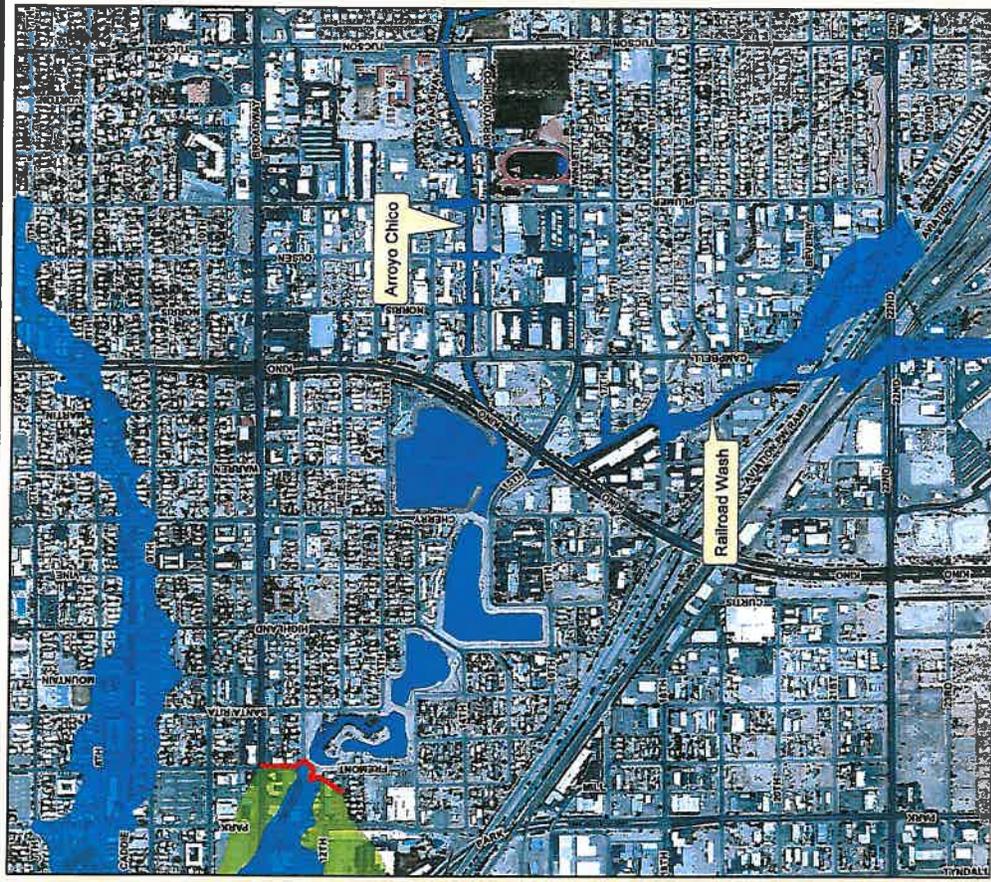
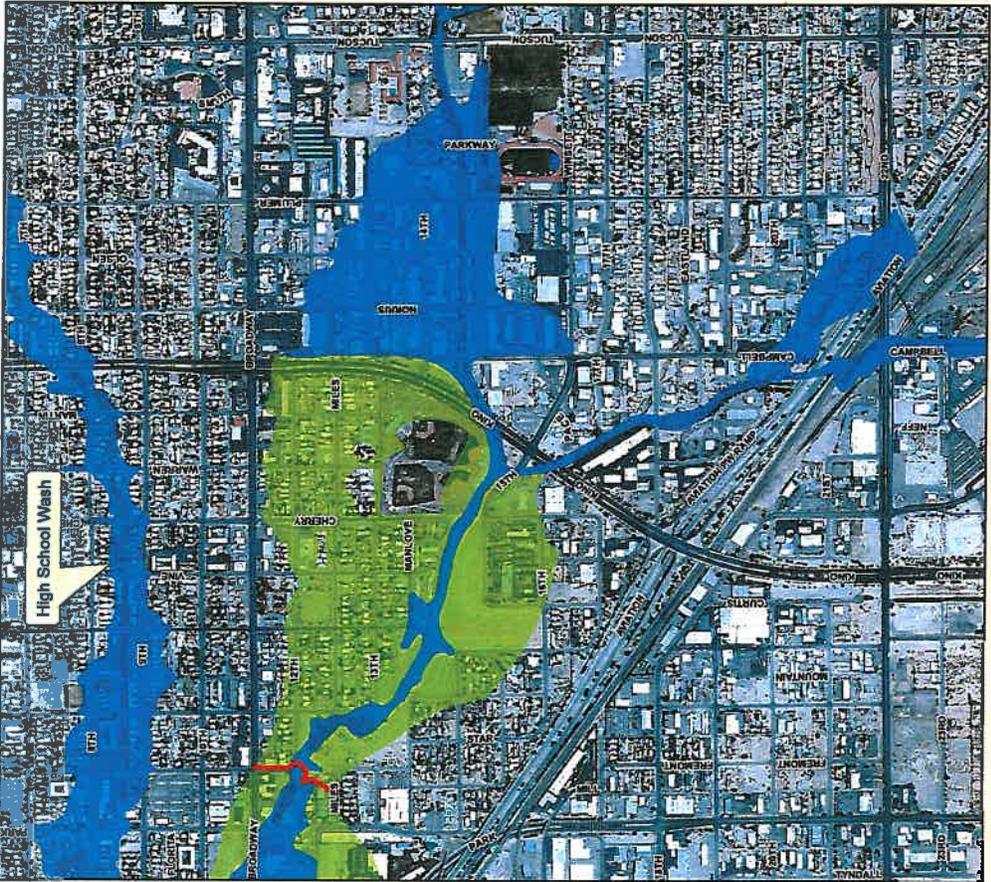
The closing of American Atomics in Tucson did not end the problems it created. The leftover tritium had to be trucked to a burial ground. Though no accidents marred that particular trip, other shipments haven't fared so well. Every year the NRC and Department of Transportation (DOT) log several thousand movements of radioactive wastes, fuel, ore, medical isotopes, and the like over American roads, rails, waterways, and airways. In 1979, when the American Atomics tritium was moved to Flagstaff, 122 nuclear-related transport accidents were reported, including at least seventeen that resulted in environmental contamination.[19]

How many more went unreported remains unknown. But in November of 1980 the GAO warned that with DOT's "limited staffing and funding resources" the agency could not "determine the extent of problems involved in transporting hazardous materials" let alone solve them.[20]

The problems seemed epidemic, from faulty vehicles and untrained drivers to inadequate safeguards and sloppy packaging. Nevada's governor Robert List, for example, complained to a 1979 House Interior Committee hearing that "simple tape" had been used to seal a metal container carrying liquid wastes from a Michigan reactor into his state. The tape had been painted over to conceal the problem. But the cask was dripping and may have contaminated roads for more than a thousand miles. Three months earlier hospital wastes being trucked into Nevada caught fire.[21]

These incidents and scores like it prompted List and the governors of South Carolina and Washington to announce they would accept no more low-level wastes into their states after 1987. Numerous municipal governments--such as New York City--have banned the transport of radioactive material through their streets altogether.

No such problems existed for the Tucson tritium, which got to its burial ground under the aegis of a state emergency. But once there it became part of a much bigger problem--the disposal of atomic wastes, generally considered the Achilles' heel of the nuclear industry. The issue has become so hard-fought that in 1980 the voters of Washington State overwhelmingly approved a referendum to ban all further shipments of radioactive waste

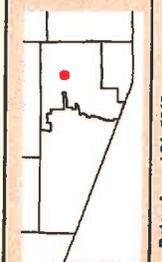


**Existing FEMA Floodplain Maps**

**Arroyo Chico  
Flood Control Detention Basin  
Floodplain Mapping  
Draft Maps**

Prima County Regional Flood Control District  
 87 E Congress - 3rd Floor  
 Tucson, AZ 85701  
 (520) 724-4000, FAX: (520) 724-4021  
<http://www.flood.pima.gov>

100-yr Floodplain  
 Shallow 100-yr Floodplain  
 Downstream end of mapping



Date: August 21, 2013

**Proposed Floodplain Maps**



The information depicted on this display is the result of digital analysis performed on a variety of databases provided and maintained by several governmental agencies. The accuracy of the information presented is limited to the accuracy of the source data. The Prima County Regional Flood Control District makes no claims regarding the accuracy of the information depicted herein.

The product is subject to the GIS Division Disclaimer and User Restrictions.