

APPENDIX O

**REVISED DRAFT FINAL LETTER REPORT – REMEDIAL INVESTIGATION,
BROADWAY-PANTANO WQARF REGISTRY SITE, DATED APRIL 4, 2012**

VIA HAND DELIVERY

April 4, 2012

Ana I. Vargas, Manager
Legal Support Unit
Arizona Department of Environmental Quality
1110 W. Washington Street
Phoenix, Arizona 85007

**Re: Revised Draft Final Letter Report – Remedial Investigation
Broadway-Pantano WQARF Registry Site
Contract No. 07-0046, ADEQ Task Assignment No. EV07-0148
HGL Project No. ARI005-002**

Dear Ms. Vargas:

On August 17, 2011, Arizona Department of Environmental Quality (ADEQ) requested that HydroGeoLogic, Inc. (HGL) provide support in the preparation of the remedial investigation report for the Broadway-Pantano Water Quality Assurance Revolving Fund (WQARF) Registry Site (site) groundwater operable unit. ADEQ tasked HGL to draft a letter report that summarizes the history of the WQARF site, including landfill ownership and operational history, usage, and waste stream.

This letter report is divided into multiple sections. The first section provides a general overview of the Broadway-Pantano WQARF site. The second section contains information regarding Broadway South Landfill (BSLF) and Broadway North Landfill (BNLF), which operated within the site. The third section contains information regarding the types of waste disposed of at the landfills and the types of industries involved in arranging and transporting the waste.

Documents obtained during the WQARF site investigation have been assigned a six-character alpha code according to the source from which they were obtained and have been numbered sequentially within each source. When a document consisted of more than one page, each page rather than each document has been numbered. These alpha codes and numbers follow a statement or group of statements and designate the source document(s) from which the information was extracted. The source documents and an index of the source documents can be found on the enclosed CD-ROM (Enclosure 1).

GENERAL OVERVIEW

The Broadway-Pantano WQARF site is located in east-central Tucson, Arizona, and is approximately bounded by Speedway Boulevard to the north, Pantano Wash to the east, Calle Madero to the south (south of Broadway Boulevard), and Van Buren Avenue to the west (west of Wilmot Road).¹ The site is located in the eastern portion of the city of Tucson's (COT) Central Well Field, within a heavily urbanized area that is characterized by residential development between the major north-south and east-west thoroughfares and light commercial development along the major road corridors. The site is located in parts of Sections 7, 8, and 17, Township 14 South, Range 15 East, and the northeastern portion of Section 12, Township 14 South, Range 14 East.

The site consists of BSLF, BNLF, and the associated groundwater contamination. The following sections provide a history of both BSLF and BNLF.

Broadway South Landfill

According to a June 30, 1995, ADEQ preliminary assessment/site inspection (PA/SI) report, the BSLF site is located on approximately 40 acres in a mixed residential and commercial area.² It is bordered on the north by Broadway Boulevard, on the west by Prudence Road, on the south by Broadway Proper Apartments and Gollob Park, and on the east by the Pantano Wash. It is located southeast of Broadway Boulevard and Prudence Road in Tucson, Arizona [BPDEQT 456].

Operational History

The precise date on which BSLF began operations is unknown. However, aerial photographs show that by 1953 the southeastern part of the BSLF property had been graded and the remainder of it was disturbed, indicating that landfill operations had begun. A 1958 aerial photograph indicates that most of the pits at BSLF had been filled and graded, but that the final cover had not been completed [BPPCSW 964, 967]. Analysis of a 1962 photograph shows no areas that might represent a continuation of excavation or landfilling, and the areas where landfilling had occurred appear to have been smoothed and regraded [BPDEQT 2715-2716]. This information demonstrates that the BSLF property was operated as a landfill from approximately 1953 to 1962. A March 5, 2004, report titled *Historical Summary Report: Prudence Landfill and Gollob Park Area* completed by URS on behalf of COT also indicates that BSLF was operated between 1953 and 1962 for the disposal of garbage, trash, refuse, and waste material [BPDEQT 2714-2715].

Prior to 1953, Stefan and Magdalena Gollob, the owners of the BSLF property, used the property for agriculture and then leased the property for sand and gravel quarrying [BPDEQT 2714]. Portions of the BSLF property were then operated as an open dump and municipal landfill from

¹ This information has not been processed into the PRP site file, and, as a result, no citation is currently available.

² A February 1997 Pima Association of Governments report on landfills operated by Pima County states that the BSLF was located on approximately 32 acres [BPPCSW 964].

1953 to about 1962 by Pima County and Sanitary District No. 1 of Pima County. Landfilling operations began in 1953 at the north end of BSLF along East Broadway Boulevard, and progressed southward, ending in 1961 or 1962. In a January 13, 1993, deposition, Eugene William Dooley, former Sanitary District No. 1 of Pima County chief engineer, stated that BSLF was developed at the request of the owner to “preclude further wildcat dumping over which he had absolutely no control...” and “to restore the appearance of the land so that it no longer constituted attractive nuisance to the neighborhood” [BPPIRR 11874].

A March 25, 1953, newspaper article indicates that land on Broadway Boulevard, west of the Pantano Wash, had been leased by Pima County as a garbage disposal site to serve the northeast section of the community. The “pit” was to begin operations as soon as equipment could be purchased. Pima County was already operating two other landfills in the Tucson area. The article further indicates that Pima County had recently concentrated efforts on private land dumping and had posted signs at many locations prohibiting dumping [BPASCL 278].

A March 26, 1953, agreement between Stefan and Magdalena Gollob and Pima County notes that the Gollobs “do hereby grant, convey, release to, and permit the County of Pima...the exclusive easement and right to deposit refuse, garbage, and debris...” on about 10 acres located in the northernmost section of the BSLF property. The lease was for a period of 2 years or until all pits or holes at the property had been completely filled. The property described in the agreement included the northwest quarter of the northeast quarter of Section 17, Township 14 South, Range 15 East [BPDEQT 2714; BPPCSW 924].

An August 3, 1956, license and easement agreement between the Gollobs and Sanitary District No. 1 of Pima County granted Sanitary District No. 1 of Pima County “the exclusive right, license and easement to deposit garbage, trash, and waste material...” in the “South one-half of the Northwest Quarter of the Northeast Quarter of Section 17, Township 14 South, Range 15 East” and the “North 700 feet of Lot 2 of the Northeast Quarter of Section 17, Township 14 South, Range 15 East.” The term of the license and easement was for 3 years or until completion of the fill in the area that Sanitary District No. 1 of Pima County would use as a landfill [BPDEQT 2714-2715].

An August 5, 1956, agreement between Pima County and Sanitary District No. 1 of Pima County indicates that Pima County “is presently engaged in the disposal of garbage, trash, rubbish and waste material for residents of Pima County...” and that Sanitary District No. 1 of Pima County “is authorized by law to also dispose of garbage, trash, rubbish and waste material within or without the district....” The agreement further explains that it would be beneficial for Pima County if Sanitary District No. 1 of Pima County “undertook to dispose of all garbage, trash, rubbish and waste material...by residents of or inhabitants of Pima County, including private collectors and industries...” [BPPCSW 932].

In addition, a newspaper article dated October 5, 1956, states that Sanitary District No. 1 of Pima County had to clean up the landfill formerly operated by Pima County “on Broadway near the Pantano Wash.” The article indicates that the area referenced had been “used for some years as a dump and sanitary fill by the county,” and had been turned over to Sanitary District No. 1 of Pima County for operation [BPPCAO 182]. Based on the above-mentioned information, it is

believed that Pima County operated BSLF from approximately 1953 until 1956, when Sanitary District No. 1 of Pima County began operating the landfill.

A June 4, 1958, license and easement agreement between the Gollobs and Sanitary District No. 1 of Pima County granted Sanitary District No. 1 of Pima County the “exclusive right...to deposit garbage, trash, refuse and waste material...” in “Lot 2 of the Northeast Quarter of Section 17, Township 14 South, Range 15 East...EXCEPT the North 700 feet thereof and Lot 5 of the Southeast quarter of Section 17, Township 14 South, Range 15 East....” The term of the license and easement was for 3 years or until completion of the fill in the area that Sanitary District No. 1 of Pima County was to use as a landfill [BPDEQT 2714-2715]. In a May 11, 1984, deposition, Ken Scharman, former manager of both Pima County Sanitation Department and Sanitary District No. 1 of Pima County, stated that a June 10, 1958, license and easement was executed for additional property to be used as a landfill. The property lay immediately south of the area that was already being used as a landfill [BPPCAO 2].

A June 30, 1958, agreement between Pima County and Sanitary District No. 1 of Pima County notes that “[t]he county should have an undivided interest in the sanitary fill site now operated by the district on East Broadway near Pantano Wash...and shall have an undivided interest in all sites acquired for sanitary fill purposes by the district....” The interest would be for residents and “carriers” of Pima County living outside the boundaries of COT and Sanitary District No. 1 of Pima County to use the landfill without charge [BPPIRR 788-789]. The term of the contract would be from July 1, 1958, to June 30, 1959, and would be renegotiated on a fiscal year basis [BPDEQT 2715].

Table 1 below provides the name of the former BSLF owner, time frames of ownership, and property parcel numbers. See the enclosed Figure 1 for a parcel map of BSLF (Enclosure 2). Similarly, Table 2 provides the names of former BSLF operators. No information has been found to date regarding entities that may have conducted sand and gravel quarrying at BSLF prior to and during operations as a landfill.

Table 1
BSLF Owner

Party Name	Time Frame	Property Parcel Numbers
Stefan and Magdalena Gollob	1939–1972	134-27-0010, 134-27-0020, 134-27-0030, 134-27-0040, 134-27-0050, 134-27-0060, 134-27-0070, 134-27-0080, 134-27-0090, and 134-27-0100
	1944–1965	134-14-010A
	1944–1965	134-14-011A
	1944–1962	134-14-016C
	1944–1962	134-17-434

Table 1
BSLF Owner (concluded)

Party Name	Time Frame	Property Parcel Numbers
Stefan and Magdalena Gollob	1944–1962	134-17-4350*
	1944–1962	134-14-8250

*Parcel 134-17-4350 was subdivided for residential use after the BSLF operational period.

Table 2
BSLF Operators

Party Name	Time Frame	Property Parcel Numbers
Pima County	1953–1956	134-27-0020 and 134-27-0030; a portion of 134-27-0010, 134-27-0040, and 134-27-0100
	1958–1962	A portion of 134-14-010A, 134-14-011A; 134-17-4340, and 134-14-8250
Sanitary District No. 1 of Pima County	1956–1958	134-27-0050, 134-27-0070, and 134-27-0080; a portion of 134-27-0010, 134-27-0040, 134-27-0060, 134-27-0100, 134-14-010A, and 134-14-011A
	1958–1962	A portion of 134-14-010A, 134-14-011A, 134-14-016C, 134-17-434, and 134-14-825

BSLF Management

According to the March 26, 1953, lease between the Gollobs and Pima County, the Gollobs requested that Pima County build a fence protecting the area where it was permitted to deposit refuse, garbage, and debris, which was located on about 10 acres on the northernmost section of the BSLF property [BPPCSW 924]. In addition, Mr. Scharman noted in an October 9, 1991, interview that the state health department required that the landfill be fenced because of blowing papers [BPPCAO 178-181].

A February 1997 report titled *Broadway South Landfill Section of the LESP IV, Preliminary Assessment of Fourteen County-Operated Landfills, Pima County, Arizona* shows that green waste and debris were separated from garbage and trash and placed in a separate part of the landfill. Pima County employees also recalled that three operators were on site and that they covered the waste on an as-needed basis. The report indicates that garbage and trash were deposited on the site at a rate of 200 tons per day [BPPCSW 964-965].

According to an October 23, 1992, document regarding the history of BSLF, the landfill was considered an “open dump,” meaning that there was little control and that no records were maintained. The document states that there were no restrictions on the type of waste deposited at the landfill and that many hazardous or toxic substances now classified as contaminants were in common use at the time BSLF was in operation [BPPCSW 707-708].

Mr. Dooley indicated in a January 13, 1993, deposition that at the time he was hired by Sanitary District No. 1 of Pima County in the late 1950s, BSLF was the only landfill operated by Sanitary District No. 1 of Pima County [BPPCSW 734-735]. He stated that it was the most significant landfill in Pima County and was the largest landfill operation for that time [BPPCSW 771]. Mr. Dooley stated that each place used for landfilling activities was temporarily fenced to keep waste from escaping the “pit to which it was consigned.” He indicated that this practice was not used to keep people from entering the landfill and recalled that BSLF accepted any waste that was dumped there [BPPCSW 739].

BSLF Closure

A 1958 aerial photograph indicates that most of the pits at BSLF had been filled and graded, but that the final cover had not been completed [BPPCSW 964, 967]. A March 28, 1961, newspaper article indicates that Sanitary District No. 1 of Pima County closed BSLF as BNLF operations began [BPASCL 310]. Analysis of a 1962 aerial photograph shows no areas that might represent a continuation of excavation or landfilling, and the areas of former landfilling appear to have been smoothed and regraded [BPDEQT 2715-2716]. This information demonstrates that the BSLF property was operated as a landfill from approximately 1953 to 1962.

According to an excerpt from an October 23, 1992, court document related to the history of BSLF, the property remained vacant for approximately 23 years after the Sanitary District No. 1 of Pima County had ceased operation of the landfill [BPPCSW 708]. However, it is believed that “wildcat” dumping continued at BSLF after it was considered closed because a March 28, 1961, newspaper article states that the Sanitary District No. 1 of Pima County would place warning signs at the landfill to keep dumpers out and direct them to the [BPASCL 310]. Additionally, a July 24, 1964, newspaper article notes that illegal dumping was a problem in the Tucson area [BPSPIN 1004].

Since closure, BSLF has remained undeveloped, except in the northeastern portion, where a Hilton Hotel property was developed. YMCA and Stephan Gollob Park located at 401 S. Prudence Road and Broadway Proper Retirement Community located at 400 S. Prudence Road are located just southwest of the former BSLF boundaries. There is no fencing along the former BSLF [BPDEQT 456].

Broadway North Landfill

According to a June 30, 1995, ADEQ PA/SI report, the BNLF site is located on approximately 130 acres in a mixed residential and commercial area. It is bordered on the north by a shopping center and office buildings, on the west by a Tucson Electric substation and single-family homes, on the south by homes and commercial facilities, and on the east by the Pantano Wash. It is located northeast of Broadway Boulevard and Kolb Road in Tucson, Arizona [BPDEQT 594].

Operational History

BNLF was originally a sand and gravel mining operation that began in the mid-1940s [BPCTSW 138]. A 1988 site assessment, July 25, 1989, letter transmitting a draft site remedial investigation

report, and a 1989 conversation with a consulting firm suggest that the BNLF property was used as an illegal dumping ground or “wildcat” dump prior to 1959 [BPCTEM 204, 268; BPPIRR 10343]. From approximately 1959 to 1972, various portions of the former gravel pits were operated as municipal solid waste landfills by Sanitary District No. 1 of Pima County, Pima County, and COT [BPDEQT 594; BPPCSW 520, 579]. After closure, the BNLF property was covered with soil, and, with the exception of a strip mall and parking lot constructed at its far southeastern edge, it has been left undeveloped [BPDEQT 623, 1727].³

On November 12, 1959, and August 16, 1961, Stefan and Magdalena Gollob, the BNLF property owners, granted easements to Sanitary District No. 1 of Pima County for use of eight parcels located south of the Fifth Street alignment. The easements allowed Sanitary District No. 1 of Pima County use of the property for garbage, trash, refuse, and waste disposal for periods of 5 years per a November 12, 1959, lease and 7 years per an August 16, 1961, lease from the execution date or until the completion of the fill in the leased area. At such time, Sanitary District No. 1 of Pima County agreed to cover or dispose of exposed garbage, trash, refuse, and waste material [BPNETR 216-219].

Conflicting information exists regarding the year that BNLF began operations. Some records indicate that BNLF began operation in approximately 1961, while others indicate it began operations as early as 1959 [BPDEQT 436, 594, 2054; BPCTEM 110; BPCTSW 138; BPPCSW 306, 480, 600]. Sanitary District No. 1 of Pima County continued to operate the southern portion of BNLF until 1968, when it dissolved and transferred operation of the landfill to Pima County [BPDEQT 290-292; BPPIRR 573].

Resolution No. 357, signed by Sanitary District No. 1 of Pima County on August 15, 1968, indicates that Pima County agreed to assume the duties and responsibilities of Sanitary District No. 1 of Pima County in regard to “each and every contract of whatsoever nature and description” upon Sanitary District No. 1 of Pima County’s dissolution [BPDEQT 290-292]. When Pima County took over operations at BNLF, COT was engaged in landfill activities on adjacent property [BPPCAO 86]. COT Resolution Nos. 4172, 4463, and 4861 demonstrate that COT paid a percentage of the cost of operating Sanitary District No. 1 of Pima County’s landfills during fiscal years 1959 to 1960, 1960 to 1961, and 1961 to 1962 [BPCTCC 16, 18-21; BPPCSW 119-121, 122-126]. Sanitary District No. 1 of Pima County meeting minutes from 1959 to 1962 also show discussions of agreements with COT and payment with regard to landfill operations [BPPCAO 248, 252, 263; BPPCWM 318, 321, 322, 325, 327, 334].

On May 14, 1965, and April 1, 1968, Tucson Rock and Sand Co., Inc., and the Martin family, respectively, signed agreements with COT by which COT was granted exclusive use and possession of excavations on portions of the BNLF property to operate a landfill north of the Fifth Street alignment. The agreements allowed for the disposal of trash, refuse, garbage, tree trimmings, dirt, debris, and other waste material. The duration of the agreements was until the excavations were filled in, and no later than June 1, 1970, for the May 14, 1965, agreement

³ The Pima County Assessor’s Office website shows the development of a strip mall and parking lot on Parcel 133-23-110C at the far southeastern edge of the BNLF property.

[BPCTSW 16-19]. According to a May 1965 letter from Sanitary District No. 1 of Pima County, COT was already active in the area north of its landfill operation [BPPCWM 313].

According to a November 1993 Pima Association of Governments report titled *Environmental Assessment of Ten City-Operated Landfills*, the COT-operated portion of BNLF was located just west of the Pantano Wash, approximately 1,500 feet east of Kolb Road, 1,200 feet south of Speedway Boulevard, and 2,600 feet north of Broadway Boulevard [BPPAGT 58]. Landfill operations were first evident in the COT-operated portion of BNLF in 1967. However, the 1967 aerial photograph shows that a large pit visible in earlier photographs had been filled with refuse and the area mounded above the general ground surface [BPPAGT 61-62].

Table 3 below provides the names of former BNLF owners, time frames of ownership, and property parcel numbers. See the enclosed Figure 2 for a parcel map of BNLF (Enclosure 3). Similarly, Table 4 provides the names of former BNLF operators. With the exception of the Tucson Rock & Sand Company, Inc., no information has been found to date regarding entities that may have conducted sand and gravel quarrying at the BNLF prior to and during operations as a landfill.

Table 3
BNLF Owners

Party Name	Time Frame	Property Parcel Numbers
Stefan and Magdalena Gollob	1939–1945	A portion of 133-23-1530
	1939–1969	133-23-110C, 133-23-1570, and a portion of 133-23-1580 and 133-23-1590
	1945–1959	A portion of 133-23-1550, 133-23-1560, 133-23-1580, and 133-23-1590
	1945–1969	133-23-1520, 133-23-1530, and 133-23-1540
	1945/1963–1969	A portion of 133-23-1550, 133-23-1560, 133-23-1580 and 133-23-1590
Zora Zemsky and Donna Star	Partial interest owner 1969–1974	133-23-110C, 133-23-1520, 133-23-1540, 133-23-1530, 133-23-1550, 133-23-1560, 133-23-1570, 133-23-1580, and 133-23-1590
Stefan Gollob Trust	Partial interest owner 1969–1974	133-23-110C, 133-23-1520, 133-23-1540, 133-23-1530, 133-23-1550, 133-23-1560, 133-23-1570, 133-23-1580, and 133-23-1590
Tucson Rock and Sand Company, Inc.	1959–1972	133-23-1500, 133-23-1510
	1959–1963	133-23-098B

Table 3
BNLF Owners (concluded)

Party Name	Time Frame	Property Parcel Numbers
Alice J. Martin, et al.	1959–1976	133-23-0970
Tucson Gas, Electric Light and Power Company (now Tucson Electric Power Company)	1963–present	133-23-098B

Table 4
BNLF Operators

Party Name	Time Frame	Property Parcel Numbers
Sanitary District No. 1 of Pima County	1959–1964	133-23-110C, 133-23-1520, 133-23-1530, 133-23-1550, 133-23-1560, 133-23-1570, 133-23-1580, and 122-23-1590
	1964–1968	133-23-110C, 133-23-1520, 133-23-1530, 133-23-1550, 133-23-1560, 133-23-1570, 133-23-1580, and 122-23-1590
City of Tucson	1965–1970	133-23-1510
	1968–until excavation was filled	133-23-0970
	1968–unknown	133-23-098B
Pima County	1968–1971	133-23-110C, 133-23-1530, 133-23-1550, 133-23-1560, 133-23-1570, 133-23-1580, and 133-23-1590

BNLF Management

BNLF was one of the major landfill operations in the Tucson area and was often referred to as the “eastside landfill” [BPDEQT 332, 334]. Sanitary District No. 1 of Pima County landfills including BNLF were open at all times with no charge imposed for disposal of “any kind of material.” No distinction was made as to whether the material was disposed of by COT or Pima County residents because the “operational costs [were] shared by the respective government agencies” [BPPCWM 312]. According to an October 9, 1991, interview with Mr. Sharman, when Sanitary District No. 1 of Pima County attempted to implement closing hours at BNLF, people began dumping outside of the gates, so the gates were finally left open [BPPCAO 180]. Records indicate that BNLF had two zones for waste material: a solid waste area and an area where any remaining waste was deposited. The solid waste material was disposed of in an area parallel to the Pantano Wash and acted as a dike to prevent the wash from flooding the landfill [BPPCAO 46-48].

In an October 17, 1979, letter to Cienega Corporation, Mr. Dooley stated that BNLF served as the principal landfill for both COT and Pima County refuse operations from 1963 to about 1966.

He recalled that all types of residential, commercial, and industrial wastes were buried at the landfill. Waste included “dead animals, hospital wastes, chemical(s), tires, building debris, and any other material for disposal.” Disposal of waste ranged from an initial few tons a day to more than 300 tons per day at the highest use [BPCTSW 147-148]. There were no restrictions on the types of waste accepted at BNLF [BPCTSW 147; BPDEQT 1622]. Refuse thickness varied from zero to a maximum reported depth of 35.3 feet. The total waste quantity is estimated to be approximately 2.6 million tons or 5.2 million cubic yards [BPDEQT 1623].

Mr. Scharman stated in a May 11, 1984, deposition that when Sanitary District No. 1 of Pima County began leasing BNLF from the Gollobs, Mr. Gollob “allowed contractors and other people” to dispose of waste that was not paper or decomposable. BNLF had natural drainage down Prudence Road to the wash, so Sanitary District No. 1 of Pima County tried to maintain that drainage pattern while it filled the property [BPPCAO 7]. Mr. Gollob owned the land that extended to the wash, and this allowed Sanitary District No. 1 of Pima County to access silt, a cover material that could be used at the landfill [BPPCAO 38-39].

Pima County’s standard operating procedure for landfills in the 1960s and 1970s was to maintain an employee presence on site for 9 hours a day. However, landfills were open 24 hours a day, which Pima County notes, led to “uncontrolled scavenging and dumping” [BPPCAO 208]. The COT Attorney’s Office stated that the COT-operated portion of BNLF was enclosed by fencing, which prohibited non-city vehicles from entering the landfill; however, correspondence between COT and Sanitary District No. 1 of Pima County indicates that the COT-operated portion of BNLF was accessible to both Pima County and COT residents [BPDEQT 1973; BPPAGT 61].

Camp Dresser & McKee, Inc., a contractor selected by COT and Pima County to complete the remedial investigation and develop the scope of work for the feasibility study at the BNLF site, estimated that the Sanitary District No. 1 of Pima County-operated portion of the landfill consisted of 68 acres, the Pima County-operated portion of BNLF consisted of 14.2 acres, and the COT-operated portion consisted of about 24 acres. The acreage estimates were based on aerial photographs, historical maps, title reports, Pima County records, and ADEQ investigations [BPDEQT 281].

BNLF Closure

According to an analysis by GRC Consultants, Inc., of an aerial photograph taken on March 18, 1969, landfill operations appeared to be substantially complete at that time [BPPCSW 309]. However, a second interpretation of the March 18, 1969, aerial photograph indicates that COT was actively working the area north of the Fifth Street alignment and west of the Pantano Wash at the time [BPPCSW 632].⁴ The precise closure date of BNLF is unclear as there are many discrepancies in available source documents. Mr. Dooley stated in an October 17, 1979, letter to Cienega Corporation that the landfill stopped accepting waste in 1970 or 1971 [BPPCAO 191]. Other records indicate that COT and Pima County continued to operate their respective portions of BNLF until 1971. Both portions of the landfill were then closed, graded, and capped with 2 feet of soil [BPCTSW 138].

⁴ The source document does not indicate who conducted the second interpretation.

Little information is known regarding COT operations at BNLF after the landfill closed. A 1971 aerial photograph analysis conducted by the Pima Association of Governments found that operation of the COT portion of the landfill had been completed and that the property had been graded and shaped into its current configuration. The Pima Association of Governments report also notes that there was extensive “wildcat” dumping on the landfill property and in the adjacent sand and gravel pit just northwest of the landfill in 1993 [BPPAGT 62].

Pima County continued to work on the property after BNLF closed. In accordance with the landowner’s wishes, Pima County sought to level the land and engaged in such activities for a period after landfilling ceased. Stephen Gollob, the property owner, was concerned about ensuring that the property was level and suitable for future use after being used as a landfill [BPPCAO 39-40, 55, 67]. Between 1971 and 1973, Pima County used more than 100,000 cubic yards of soil to grade the landfill property [BPPCSW 268]. Although the landfill was officially closed, an April 24, 1974, memorandum from the Pima County Solid Waste Control Department to the Pima County Sanitation Department director indicates that wildcat dumping was occurring at the former BNLF property and that the “No Dumping” signs had been removed [BPDEQT 359]. In December 1974, Pima County indicated that it was ending its lease to the landfill property and that it was being returned to the landowners [BPPCAO 130]. Also in December 1974, Pima County stated in a letter that landfill activities ceased prior to the terms of a 1971 lease and that Pima County had ceased grading and surface contour activities within the last 2 months [BPPCSW 116].

After closure, the BNLF property was covered with soil, and, with the exception of a strip mall and parking lot constructed at its far southeastern edge, it has been left undeveloped [BPDEQT 623, 1727].⁵

LANDFILL WASTE STREAMS

BSLF and BNLF received waste from a variety of sources, including private and municipal waste haulers collecting waste from residential and industrial/commercial areas.

Groundwater Contamination

In July 1987, one COT municipal supply well was taken out of service due to the presence of tetrachloroethene (PCE) ranging from 4.9 to 13.5 parts per billion. When the well was closed, analytical results at two additional COT wells were beginning to show trace amounts of PCE, which increased by the later part of 1988 [BPCTSW 209]. Between 1987 and 1991 all three of the COT water wells were abandoned due to the presence of contaminants in excess of maximum contaminant levels [BPDEQT 1633]. By 1998, a fourth COT water well had been shut down due to PCE contamination [BPDEQW 3]. The Broadway-Pantano WQARF site was placed on the WQARF priority list on September 14, 1990 [BPDEQT 597].

⁵ The Pima County Assessor’s Office website shows the development of a strip mall and parking lot on Parcel 133-23-110C at the far southeastern edge of the BNLF property.

According to June 30, 1995, ADEQ PA/SI reports on BSLF and BNLF, PCE and trichloroethene (TCE) were first detected in wells downgradient of both BSLF and BNLF in January 1983 [BPDEQT 455-456, 459-460; 598; BPPCAO 199-203; BPPCSW 707-708]. In 1988, PCE was detected in two other downgradient municipal wells within 1 mile of BNLF [BPDEQT 598]. In November 2004, groundwater monitoring results indicated that the BSLF PCE plume might be merging with the BNLF PCE plume. Subsequent sampling events in 2005 confirmed that the BSLF PCE plume was merged with the BNLF PCE plume. Therefore, ADEQ expanded its remedial investigation to include characterization of BSLF [BPDEQW 28].

As of 2007, the contaminants of concern (COC) in the groundwater at the WQARF site that exceeded Aquifer Water Quality Standards (AWQS) were PCE, TCE, and vinyl chloride. Methylene chloride and cis-1,2-dichloroethene, which were historically considered groundwater COCs, have not been detected in site groundwater at a level exceeding AWQS since 2005 [BPDEQW 41].

Industrial/Commercial Operations

Table 5 below presents an overview of the types of industrial operations that generated waste containing site COCs. It provides a sample of the types of chemicals used in such industries. HGL obtained this information through general research on industrial operations and chemical use. These types of industrial waste were disposed of at BSLF and BNLF. Specific information about businesses that generated these wastes and disposed of them at BSLF and BNLF are considered privileged at this time in the investigation and, as a result, are excluded from this letter report.

Table 5
Industries and Chemicals

Industry	Chemical(s) Used
Air Conditioning Manufacturing	TCE
Aircraft Repair, including military and defense contractors	TCE, methylene chloride, and PCE*
Auto Body Repair	Methylene chloride and TCE
Auto Painting Operations	Methylene chloride and TCE
Auto Repair	TCE and PCE**
Chemical Manufacturing and Distribution	Methylene chloride, TCE, and PCE
Dry Cleaning	PCE
Fleet Maintenance, including Utility Companies	TCE, PCE, and methylene chloride
Manufacturing Operations	TCE
Miscellaneous Degreasing Operations	TCE and PCE
Missile Maintenance, including military and defense contractors	TCE and PCE*
Paint Manufacturing	Methylene chloride and TCE
Plastic Manufacturing	TCE
Railroad	TCE and PCE
Semiconductors	TCE and PCE
Varnish Productions	Methylene chloride and TCE

*Some U.S. Air Force technical orders mandated the use of PCE and TCE for aircraft and missile cleaning during the time that BSLF and BNLF were operational [BPTMML 385].

** Brake and carburetor cleaners may contain TCE and PCE [BPHLLN 9; BPINET 216, 232-238].

According to a June 25, 2009, amended petition for the perpetuation of testimony of a solvent collector and recycler, waste solvents and other chemicals from industrial, aeronautical, semiconductor, governmental, retail, educational, and military organizations were disposed of at the “Broadway Pantano Landfills” before, during, and after their operational periods [BPDEPO 7215-7228].⁶

In addition, historical records suggest that municipal and private waste haulers collected waste from businesses and not just from residents. Records also indicate that commercial and industrial businesses disposed of waste at BSLF and BNLF.

Private Waste Haulers

ADEQ conducted an investigation to identify potential sources of contamination outside the vicinity of the site because historical records indicate that BSLF and BNLF had no restrictions on the type of waste disposed of at the landfills. To identify off-site commercial and industrial businesses that could have contributed to contamination at the site, ADEQ reviewed records available through the former landfill operators, which included Pima County and Sanitary District No. 1 of Pima County for BSLF and Pima County, COT, and Sanitary District No. 1 of Pima County for BNLF.

ADEQ found, through a review of the records, that private waste haulers such as Arizona Transport Agency (ATA) and Garbage Service Company of Tucson, Arizona, Inc. (GSC) collected waste in the Tucson area for Pima County, Sanitary District No. 1 of Pima County, and COT [BPASCL 367; BPCTCC 14; BPCTSW 22; BPDEQT 300; BPPIRR 14141].

Arizona Transport Agency

Several documents and newspaper articles indicate that ATA had an agreement with COT to transport waste in the Tucson area during the life of BNLF [BPASCL 290, 358-359; BPPIRR 13919-13930]. A May 22, 1963, *Arizona Daily Star* article notes that ATA was collecting approximately \$32,000 a month from COT for waste collection services [BPASCL 363].

A November 1963 tabulation sheet states that ATA was a private waste hauling company collecting waste within both the city and county limits [BPCTSW 22; BPDEQT 300, 302-303]. In a 1-week period during 1963, ATA hauled 66 loads that originated from COT and 16 that originated from Pima County. ATA is one of two private waste collection agencies known to have transported waste in the Tucson area and deposited such waste at BNLF [BPCTSW 22; BPDEQT 300].

A July 6, 1965, letter from an attorney for ATA to COT proposes that ATA is awarded a contract for all large volume commercial refuse collection in COT and requests that COT withdraw from providing such service. According to the letter, “the city does not now collect refuse generated from manufacturing or industrial enterprises.” However, due to the rapid annexation, COT

⁶ The amended petition refers to BSLF and BNLF as the “Broadway Pantano Landfills” [BPDEPO 7215].

conducted both domestic and commercial trash and refuse collection in areas that ATA had previously been serving [BPPIRR 13938-13940].

An *Arizona Daily Star* article, dated September 30, 1966, indicates that the last of COT's contracts for garbage and trash pickups by private firms would expire on November 30, 1966. After that time, all refuse was to be removed by COT [BPASCL 525].

Garbage Service Company of Tucson, Arizona, Inc.

A November 1963 tabulation sheet states that GSC was a private waste hauling company collecting waste within both the city and county limits [BPCTSW 22; BPDEQT 300, 302-303]. In a 1-week period during 1963, GSC hauled 45 loads from COT and 8 from Pima County [BPDEQT 302; BPPCAO 123]. GSC is one of two private waste collection agencies known to have transported waste in the Tucson area and deposited such waste at BNLF [BPCTSW 22; BPDEQT 300].

Letters between GSC, ATA, and Sanitary District No. 1 of Pima County indicate that GSC collected waste from Davis-Monthan Air Force Base (AFB) and Hughes Aircraft Company [BPDEQT 1979; BPPIRR 770-772].

An *Arizona Daily Star* article, dated September 30, 1966, indicates that the last of COT contracts for garbage and trash pickups by private firms would expire on November 30, 1966. After that time, all refuse was to be removed by COT [BPASCL 525].

Solvent Collector/Recycler

An April 21, 1983, newspaper article identifies a Tucson-area solvent collector and recycler who collected "dirty solvents," including TCE and carbon tetrachloride, to recycle and sell [BPASCL 33-34]. According to a June 25, 2009, amended petition for the perpetuation of testimony of the solvent collector and recycler, he and several associates collected spent solvent and other chemicals from Tucson-area, Phoenix-area, southeastern Arizona, and San Diego, California, entities during the BSLF and BNLF operational periods. The solvent collector and recycler filtered the solvents and chemicals at various locations in Tucson, sold the filtered solvents and chemicals to Tucson businesses, and disposed of the still bottoms and other residues resulting from the filtering processes in, among other areas, locations and landfills adjacent to Broadway Boulevard along the Pantano Wash in Tucson, Arizona. If the solvents were too contaminated to recycle, the solvent collector and recycler disposed of such spent solvents directly into the "Broadway Pantano landfills" [BPDEPO 7207, 7215-7228].

The solvent collector and recycler favored disposing of spent solvents at the "Broadway Pantano landfills" because these landfills were open to the general public and had no gate fees. Landfill employees occasionally directed him where to dispose of solvent wastes, including certain locations within the "Broadway Pantano landfills," and along roads leading to the landfills for dust control [BPDEPO 7215].

Municipal Waste Haulers

City of Tucson Sanitation Department

Of the three governmental entities that operated various portions of BNLF, COT is the only BNLF operator that also transported waste to the landfill. According to a 1973 report, while other public entities engaged solely in disposal operations, COT was the only public enterprise in the Tucson area that engaged in both waste collection and disposal operations [BPPCWM 175]. COT had a sanitation department that was equipped with its own fleet of trucks and employees [BPPCWM 185-186].

A report titled *Refuse Collection and Disposal Division Report* states that refuse collection in COT was performed as a section function of the streets division prior to January 1961. After a series of annexations were undertaken beginning in December 1955, garbage and trash collection as a municipal function expanded. As a result, personnel and equipment from the sanitation division were transferred to the COT Public Works Department [BPPIRR 14086]. A study titled *Garbage & Trash Disposal Survey*, compiled by Sanitary District No. 1 of Pima County during the period from June 19 to June 25, 1956, indicates that COT disposed of 27.55 tons of garbage and trash per day at BSLF [BPPIRR 5254-5255]. Mr. Dooley recalled that COT operated other landfills during the BSLF period, but that the other COT-operated landfills were further out from the city center and, as a result, COT disposed of nearly all of its waste at BSLF [BPPCSW 771]. In 1964, waste collection frequency was reduced from three to two times weekly. Waste collection by private contractors was phased out in stages and, in November 1966, all refuse collection became an exclusively municipal function [BPPIRR 14086, 14088].

Resolution No. 5615 between COT and the U.S. Government shows that COT agreed to provide waste collection services or pick up of “certain garbage” at Davis-Monthan AFB. The resolution, which was executed on October 28, 1963, was for a period from August 1, 1963, to July 31, 1964. The document indicates that daily pickup would occur on the base and would include pickup points such as the dining halls and officer’s club [BPPIRR 13836-13844].

A July 1965 *Arizona Daily Star* article confirms that COT collected waste from retail stores and “other businesses,” but indicates that COT did not collect manufacturing and industrial waste [BPSPIN 1010]. However, a 1973 regional waste management plan outlines procedures for industrial waste collection and indicates that COT collected commercial and industrial refuse one to six times each week. The report states that most area industry hauled and disposed of waste independently, but also clearly outlines industrial waste collection practices employed by COT [BPPCWM 166, 177, 180].

Sanitary District No. 1 of Pima County conducted a study of operations at the BNLF from June 12, 1967, through July 11, 1967. The survey determined that a total of 5,746 vehicles deposited waste at BNLF. Of these vehicles, 3,770 vehicles were from COT. On average, 85.3 tons of waste per day was deposited at the BNLF [BPPCWM 272]. In November 1967, Sanitary District No. 1 of Pima County completed a study of tonnage handled and the origin of material at three area landfills, including BNLF. The study showed that for every one Pima County vehicle, two COT vehicles entered BNLF. The study also demonstrated that although most of the loads

coming from COT were brought by private rather than COT vehicles, the three landfills studied were handling nearly 1,400 tons of COT refuse each month [BPPCWM 268].

Resolution No. 7627, dated July 21, 1969, authorizes an amendment to an agreement between Pacific Fruit Express and COT for waste collection services. The document demonstrates that COT had a contractual agreement with Pacific Fruit Express as early as 1967 and shows that it was collecting waste from the repair yards and shops at Pacific Fruit Express multiple times each week [BPPIRR 14054-14068]. COT meeting minutes concerning the agreement with Pacific Fruit Express show that the company asked for extra services not typically covered under COT's refuse collection ordinance [BPPIRR 14072]. These documents demonstrate that COT Sanitation Department made exceptions in specific instances and hauled waste from large industrial customers such as Davis-Monthan AFB and Pacific Fruit Express.

City of South Tucson

An unsigned agreement titled Resolution No. 3379 shows that COT agreed to allow the city of South Tucson to use the COT "landfill site dump for disposal of garbage and refuse." The draft agreement was reviewed by the COT mayor and signed on April 16, 1956 [BPPIRR 14011-14015]. This information demonstrates that the city of South Tucson was using both Pima County and COT waste disposal areas before Sanitary District No.1 of Pima County assumed responsibility for waste disposal operations in the Tucson area.

A study titled *Garbage & Trash Disposal Survey*, compiled by Sanitary District No. 1 of Pima County during the period from June 19 to June 25, 1956, indicates that the city of South Tucson disposed of 8.60 tons of garbage and trash per day at BSLF [BPPIRR 5254-5255].

For the first and third quarters of fiscal year 1962/1963, the city of South Tucson paid \$1,950 in BNLF operating fees [BPDEQT 336; BPPCAO 125]. In addition, Sanitary District No. 1 of Pima County operating fund logs for 1962 through 1965 indicate that the following income was received from the city of South Tucson for refuse and trash disposal operations: \$647 in 1962, \$4,082 in 1963, \$1,549 in 1964, and \$2,158 in 1965 [BPPIRR 5080-5089].

In addition, Sanitary District No. 1 of Pima County correspondence dated October 5, 1961, confirms that the city of South Tucson used BSLF on a consistent basis during 1959 and 1960 [BPPIRR 5078-5079]. This information demonstrates that the city of South Tucson used BSLF and BNLF for waste disposal throughout the life of the landfills.

Unrestricted Landfill Use

A January 7, 1958, letter from Mr. Scharman to Davis-Monthan AFB indicates that for almost a year, Davis-Monthan AFB had been using the landfill on East Broadway "...for the disposal of trash, garbage and debris of all kinds...." The letter indicates that Davis-Monthan AFB disposed of an average of 9 tons per day, 6 days a week, which averaged to about 2,808 tons annually. The letter further indicates that the landfill operated by the Sanitary District No. 1 of Pima County was located on East Broadway Boulevard [BPPCAO 96]. Based on the date of the letter, it is believed that the landfill referenced was BSLF.

Minutes from Pima County Board of Supervisors meetings held in 1959 and 1962 confirm that Pima County agreed to pay up to 50 percent of the operating cost of the BNLF operation in exchange for the right of unrestricted use of the landfill by Pima County residents, including private haulers [BPDEQT 277; BPPCAO 258, 263; BPPCWM 318, 321, 324, 327, 334].

Various records provide evidence that COT and its residents were disposing of waste at both the COT-operated and Sanitary District No. 1 of Pima County-operated portions of BNLF from 1965 through 1967 [BPCTEM 109; BPCTSW 147; BPPCSW 103-105, 115, 600]. A January 16, 1968, Sanitary District No. 1 of Pima County response to a resident complaint related to BNLF further indicates that residents of both Pima County and COT were permitted to dispose of waste in either portion of the landfill [BPPCSW 103-105].

A February 26, 1966, letter from COT to the Sanitary District No. 1 of Pima County regarding BNLF indicates that it had not found "...evidence of anyone being turned away from the City site." The letter further states that COT had seen private trucks and trailers at the landfill [BPDEQT 1974].

CONCLUSION

Liquid wastes, including site COCs that private and municipal entities disposed of at BSLF and BNLF, appear to have contributed to contamination at the Broadway-Pantano WQARF site. Municipal and private waste haulers collected waste from both residents and businesses, allowing for a variety of contamination sources. Records also indicate that commercial and industrial businesses disposed of waste at BSLF and BNLF.

Historical records indicate that there were no restrictions on the types of waste deposited at either BSLF or BNLF. Many hazardous or toxic substances now listed as contaminants were commonly used during the operational periods of both landfills.

Through interviews of former employees of private and municipal waste haulers, ADEQ has identified a number of businesses in the Tucson area whose wastes were disposed at BSLF and BNLF.

If you have any questions about this letter report, please contact me by telephone at (602) 476-5301 or by email at ilewisbravo@hgl.com.

Sincerely,



Irma Lewis Bravo
Assistant Project Manager

Enclosures (3)

cc: Chris Roman, HGL (w/ enclosures)

ENCLOSURE 1

SOURCE DOCUMENTS AND INDEX

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ENCLOSURE 1

SOURCE DOCUMENTS AND INDEX



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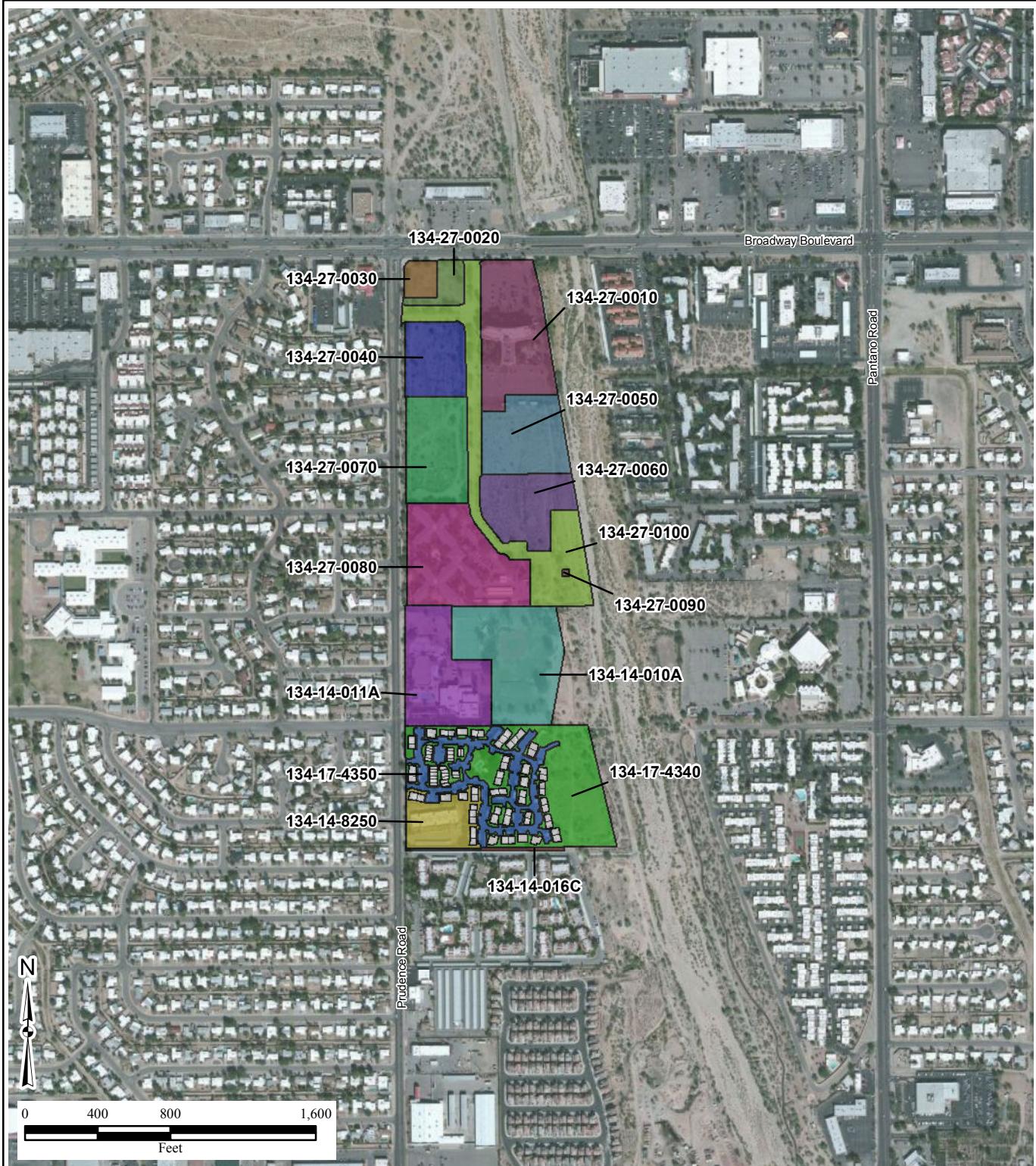
**Revised Draft Final Letter Report - Remedial
Investigation
Broadway-Pantano WQARF Registry Site
Tucson, Arizona**

**April 4, 2012
CD 1 of 1**

ENCLOSURE 2

**FIGURE 1
PARCEL MAP
BROADWAY SOUTH LANDFILL**

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9/6/2011 rbemrich
Map Source: Pima Department of Transportation; HGL

Legend

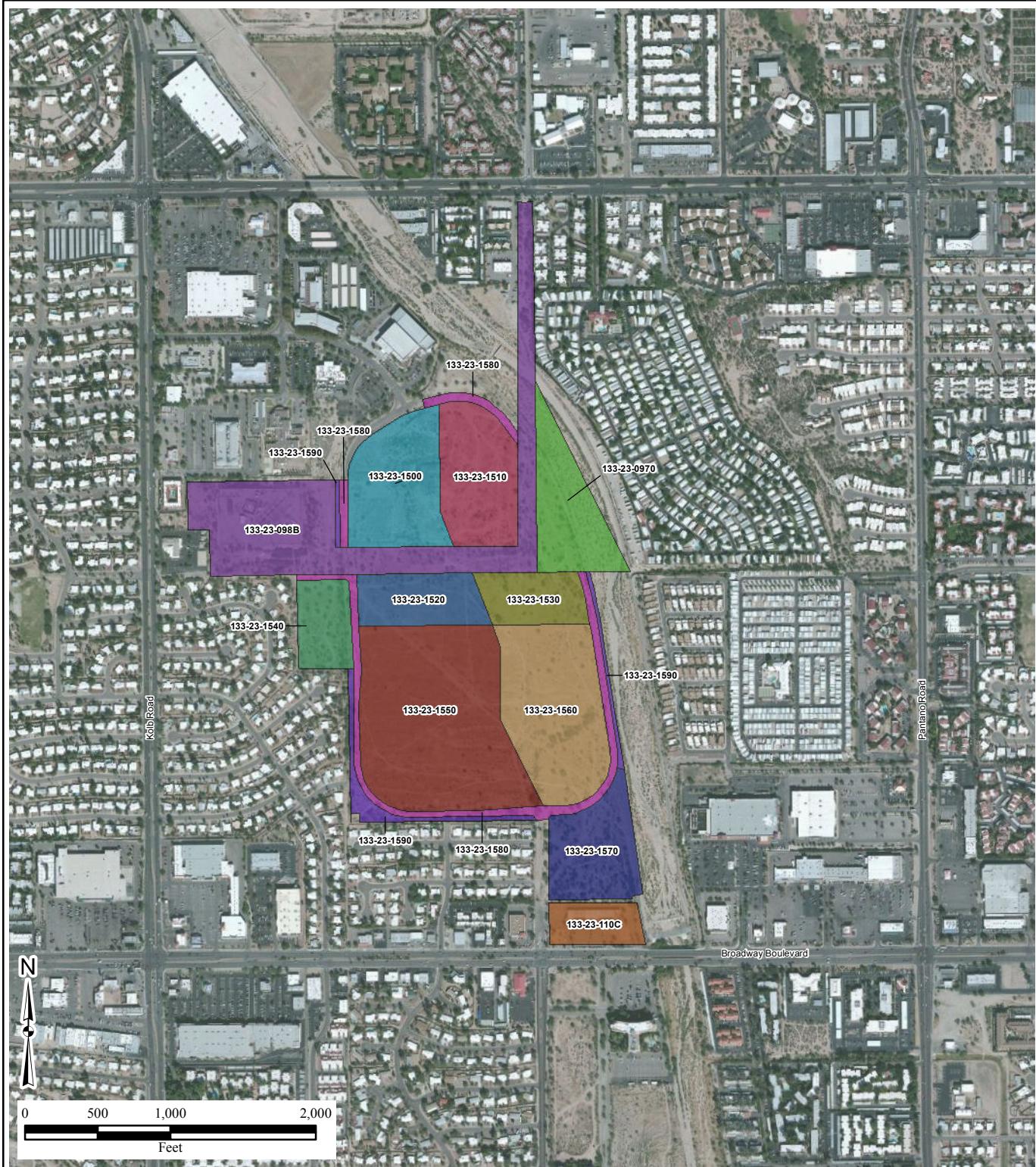
- Parcel Boundary (Multi-Colored to Differentiate Parcels)
- Residential Parcel Subdivided Post BSLF Time Frame

Figure 1
Parcel Map
Broadway South Landfill
Broadway-Pantano
WQARF Registry Site

ENCLOSURE 3

**FIGURE 2
PARCEL MAP
BROADWAY NORTH LANDFILL**

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RI Letter Report\BNLF_Parcel_Map.mxd
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Map Source: Pima Department of Transportation; HGL



Legend

Parcel Boundary (Multi-Colored to Differentiate Parcels)

Figure 2
Parcel Map
Broadway North Landfill
Broadway-Pantano
WQARF Registry Site