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ENVIRONMENTAL ISSUES SURROUNDING

THE OLD CROSS CUT CANAL IMPROVEMENT PROJECT ALONG 48TH STREET FROM INDIAN SCHOOL ROAD TO MCDOWELL ROAD PHOENIX, ARIZONA

WTEC JOB NO. FCD018

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SUMMARY REPORT ON ENVIRONMENTAL ISSUES SURROUNDING THE OLD CROSS CUT CANAL IMPROVEMENT PROJECT

LOCATED ALONG 48TH STREET FROM
INDIAN SCHOOL ROAD TO MCDOWELL ROAD
PHOENIX, ARIZONA

Prepared for:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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ENVIRONMENTAL ISSUES SURROUNDING THE OLD CROSS CUT CANAL IMPROVEMENT PROJECT ALONG 48TH STREET FROM INDIAN SCHOOL ROAD TO McDOWELL ROAD PHOENIX, ARIZONA

WTEC JOB NO. FCD018

SECTION 1.0
INTRODUCTION

This report discusses environmental issues surrounding the Old Cross Cut Canal Improvement Project along 48th Street from Indian School Road to McDowell Road, in Phoenix Arizona.

1.1 PROJECT AUTHORIZATION

WT Environmental Consultants Inc. (WTEC) was retained by the Flood Control District of Maricopa County (FCDMC) to perform the project according to FCDMC Contract No. 90-70, dated May 29, 1991 and WTEC cost estimate CE-19, dated March 19, 1992. WTEC received written authorization to proceed from Ms. Catesby Moore of FCDMC on March 19, 1992.

1.2 BACKGROUND INFORMATION

On March 12, 1992, Adel Assaf and David Regonini of WTEC met with Catesby Moore, Olin Sutton, and Don Rerick of FCDMC to discuss potential environmental considerations of the Old Cross Cut Canal improvement project. FCDMC in conjunction with the Salt River Project (SRP) plans to install a new concrete-lined channel at the Old Cross Cut Canal along 48th Street from Indian School Road to McDowell Road. The project would involve the widening and deepening of the existing earthen canal.

The canal had been used to transfer water from the Arizona Canal on the north to the Grand Canal on the south. Currently, the canal receives and carries storm water run-off from a series of drains along the canal embankments.

From existing data generated by Thomas-Hartig Associates, Exceltech, Dames & Moore, and others, depth to groundwater in the vicinity of the canal ranges from 15 feet to 25 feet below ground surface (bgs). Currently, the canal is considered to be in hydraulic connection to the uppermost aquifer. FCDMC anticipates encountering groundwater during excavation activities along the canal.

Also, groundwater quality studies in the area by Exceltech (1991) and Dames & Moore (1990) suggest that groundwater quality has been degraded with organic contaminants, most notably from the Motorola 56th Street facility.

WTEC understands that excavation and construction activities will be accomplished from the south to the north in segments. Flows shall be retained with the use of coffer dams in the canals. FCDMC intends to pump the retained water around the coffer dam, back into the canal on the downstream side. In addition, since groundwater is expected to be encountered in the excavation, FCDMC intends to create a 2-foot gravel floor in the work area. Collection sumps shall be installed at the south end of the work areas to collect accumulating groundwater. FCDMC intends to pump this accumulated water into the canal on the south end of the work area.

FCDMC has expressed general concern about three environmental issues surrounding this project: 1) are there environmental permitting requirements for the excavation and construction activities since groundwater is anticipated; (2) are there potential groundwater impacts or remedial action requirements associated with the potential presence of volatile organics in the groundwater, and; (3) are there potential worker exposure issues regarding the disturbance of potentially contaminated soil and/or groundwater issues.

1.3 PROJECT OBJECTIVE AND PURPOSE

The objectives of this project were to evaluate previous environmental reports pertaining to the Old Cross Cut Canal and review State of Arizona permitting requirements that may be applicable to the project.

The purpose of the project was to advise FCDMC about the environmental issues of the project for the purposes of project management, scheduling and specification development.

1.4 SCOPE OF WORK

The scope of work for this project included the following tasks:

- Review and evaluate environmental reports of the Old Cross Cut Canal prepared by Exceltech
- Contact the Arizona Department of Transportation about a similar improvement project they undertook on the Old Cross Cut Canal south of Van Buren Street

- Evaluate the potential permitting requirements of the Arizona Departments of Environmental Quality (ADEQ) and Water Resources (ADWR) as they pertain to the Old Cross Cut Canal improvement project

- Issue a professional opinion on the upward migration of groundwater within the vicinity of the Old Cross Cut Canal.

SECTION 2.0
ENVIRONMENTAL REPORT EVALUATION

FCDMC provided WTEC with three reports prepared by Exceltech which discussed environmental conditions along the Cross Cut Canal. The reports are as follows:

- Phase I Environmental Site Assessment, Cross Cut Canal, ExcelTech Project No. 5-50057-51, dated December, 1990
- Phase II Environmental Site Assessment, Cross Cut Canal, Exceltech Project No. 5-50063-51, dated February, 1991
- Phase II Environmental Site Assessment: Soil and Groundwater Sampling, Cross Cut Canal, Exceltech Project No. 5-50077-51, dated May 29, 1991

WTEC presents a summary of each report in the following sections.

2.1 EXCELTECH PHASE I ENVIRONMENTAL SITE ASSESSMENT

Exceltech performed a Phase I environmental site assessment (ESA) of the Cross Cut Canal to evaluate potential environmental liabilities that may be associated with the canal. The phase I ESA included a review of environmental records and a site visit. While the report mentions the locale of the site in relation to two State of Arizona Water Quality Assurance Revolving Fund (WQARF) sites, no discussion of groundwater quality in the vicinity of the canal was made. Also, there was no mention of the Motorola 56th Street facility which is located approximately 1 mile east of the canal and is a known source of groundwater contamination.

Exceltech noted one area of potential soil contamination based on visual observation of staining at the discharge point of a pvc pipe into the canal. Exceltech believed that the pipe originated from the service bay area of the Safeguard Security Company, which was located approximately 100 yards south of Indian School Road along the east bank of the canal. Exceltech surmised that the material was a petroleum-based contaminant based on the dark oil-like appearance of the stain and recommended sampling and testing of this stained area.

2.2 EXCELTECH PHASE II ENVIRONMENTAL SITE ASSESSMENT, FEBRUARY 1991

The Exceltech Phase II ESA, dated February 1991, involved soil sample collection and analytical chemistry as recommended in the December 1990 Phase I ESA. A total of two soil samples had been collected. One sample served as a background sample and the second was collected from the visibly impacted area at the PVC discharge pipe. Both samples were chemically tested for halogenated and aromatic volatile organics, polychlorinated biphenyls (PCBs), total petroleum hydrocarbons (TPHC), and the eight toxic heavy metals according to the toxicity characteristic leaching procedure (TCLP metals). The TPAC procedure was performed according to a protocol established by the California Department of Health Services and the remaining constituents were tested with methods referenced from EPA SW-846.

Exceltech reported the measured concentration of TPHC in the target sample as 65 milligrams per kilogram (mg/kg) which was above the method detection limit (10 mg/kg), but below the ADEQ suggested soil action level (100 mg/kg). Exceltech also reported total xylenes in the target sample at 1.6 micrograms per kilogram (ug/kg) which was above the method detection limit (1.0 ug/kg) and below the ADEQ suggested soil action level (44,000 ug/kg). No other constituents were reported above method detection limits in the background or target sample.

Exceltech did not recommend further actions in this report.

2.3 EXCELTECH PHASE II ENVIRONMENTAL SITE ASSESSMENT, MAY 1991

Exceltech prepared a second phase II ESA during May 1991 at the request of FCDMC. The stated purpose of the project was to evaluate potential health and safety hazards posed to FCDMC employees performing excavation and construction work during the canal improvement project.

This project involved the sampling and testing of both soil and groundwater from the Old Cross Cut Canal site. During a geotechnical study along the canal, Thomas-Hartig Associates (February 1991) installed five piezometers for monitoring depth to groundwater along the canal. Exceltech planned to sample groundwater from these piezometers.

Piezometer construction was documented in the Thomas-Hartig report (Project No. 90-0863). The piezometers were installed to 25 feet bgs. A 2-inch diameter slotted, fabric-wrapped PVC casing was installed in the bottom 10 feet, followed by an approximate 4.5-foot section of 2-inch diameter PVC casing,

followed by a 5-foot section of 4-inch diameter steel surface casing. The piezometer was finished in a subgrade vault with a total depth of 1 foot and a depth to the lip of the casing of approximately 6 inches. Backfill around the piezometer consisted of 15 feet of sand or pea gravel, a 1-foot bentonite plug installed at the anticipated water level, followed by 8 feet of grout to the base of the vault.

2.3.1 Soil Assessment

A total of five soil samples were collected from 4 feet below the base of the canal. The 4-foot depth was selected because Exceltech believed this depth was the maximum excavation depth planned for the project. The soil samples were placed in approximately one-half mile increments along the canal.

The soil samples were chemically tested according to procedures established in EPA SW-846, "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods" 3rd Edition. The following parameters were tested: total metals (boron, iron, zinc) by EPA 3050/6010, TCLP metals (arsenic, barium, cadmium, chromium, lead, mercury selenium and silver) by EPA 1311/7000, and halogenated and aromatic volatile organic compounds by EPA 8010 and 8020. Soil sample identification numbers were 50077-313-1 through 50077-313-5.

No TCLP metals concentrations were reported above the method detection limits in the 5 soil samples.

No halogenated or aromatic volatile organics were reported above the method detection limits for Sample No. 50077-313-1. Exceltech stated in the text of the report that no halogenated or aromatic volatile organics were reported above method detection limits for Sample Nos. 50077-313-2 through 5. However, no analytical reports for the 8010 or 8020 analyses supporting these assertions were attached to the report.

No total boron was reported above the method detection limit of 10 mg/kg in the five soil samples. Total iron concentrations were reported in the range of 4,350 mg/kg to 8,410 mg/kg. Total zinc concentrations were reported in the range of 13 mg/kg to 25 mg/kg. Exceltech did not collect or analyze background samples.

WTEC has recently measured background concentrations of iron and zinc within one-mile of the Cross Cut canal. Those values were 11,000 mg/kg iron and 41 mg/kg zinc.

2.3.2 Groundwater Assessment

A total of four groundwater samples were collected from the piezometers along the canal. A fifth sample was not obtained because one of the piezometers was dry at the time of sample collection. Groundwater samples were identified with the numbers 50077-314-1 through 50077-314-6. Sample Nos. 1 through 4 were the groundwater samples, and Sample Nos. 5 and 6 were the equipment blank and field blank, respectively.

Prior to sample collection, each well was purged of three to five well-casing volumes using a portable pump. Field measurements for pH, specific conductance, and temperature were made during the purging. Once these values equilibrated, groundwater samples were collected using a teflon bailer.

Groundwater samples were tested according to methods referenced in EPA SW-846 and "Methods of Chemical Analysis of Water and Wastes" EPA -600/4-79-02. The following parameters were tested: halogenated and aromatic volatile organics and total metals (arsenic, barium, boron, cadmium, iron, lead, mercury, selenium, silver and zinc). A travel blank and equipment decontamination blank were tested in conjunction with the groundwater samples.

Chloroform (a halogenated volatile organic compound) was reported in one of the groundwater samples (Sample No. 50077-314-2) at 9.4 micrograms per liter (ug/l). Chloroform was not detected in the travel or equipment blanks. No other halogenated volatile organic compounds were detected in the samples.

Toluene was reported in the equipment blank (Sample No. 50077-314-5) at 1.1 ug/l, but was not detected in any other samples. Exceltech attributed the presence of toluene to laboratory cross-contamination. No other aromatic volatile organic compounds were detected in the samples.

Total metal concentrations for the four groundwater samples are tabulated below. All data are expressed in milligrams per liter (mg/l).

TABLE 1
TOTAL METAL CONCENTRATIONS IN EXCELTECH GROUNDWATER SAMPLES

Metal	Sample No. 1	Sample No. 2	Sample No. 3	Sample No. 4
Arsenic	0.015	0.009	0.02	0.01
Barium	<0.20	<0.20	<0.20	0.7
Boron	2.4	0.4	3.3	0.5
Cadmium	<0.005	<0.005	<0.005	<0.005
Chromium	0.02	<0.01	0.02	0.09
Iron	8.0	2.7	16.0	51.0
Lead	0.01	<0.003	0.006	0.005
Mercury	<0.0002	<0.0002	<0.0002	<0.0002
Selenium	<0.01	<0.01	<0.01	0.02
Silver	<0.01	<0.01	<0.01	<0.01
Zinc	0.06	0.09	0.07	0.18

2.3.3 Exceltech Conclusions

Based on the data, Exceltech concluded that high levels of iron existed in the soil and elevated levels of iron were in the groundwater. Exceltech expressed a concern about employee exposure to iron. Also stated in the report was an opinion by Exceltech that the groundwater analytical results suggested that groundwater beneath the Cross Cut canal apparently had not been impacted by known existing sources of groundwater degradation in the area.

2.4 REPORT EVALUATION

The following comments represent WTEC's opinions of the previously discussed reports.

- Soil sample analyses for the inorganic constituents seem inappropriate. In particular, the TCLP testing of the eight metals does not provide the correct data. The TCLP procedure simply evaluates leachable values of metals for determining hazardous waste characteristics. The correct data would have been obtained through a total metals analysis. It is WTEC's opinion that no employee risk evaluation can be made from this data.

- The selection of iron, boron and zinc as analytes is not well understood. No protocol or rationale addressing the selection of these constituents was provided. These constituents are considered secondary drinking water parameters which primarily address aesthetic qualities where public health is not necessarily threatened, such as odor, taste, and appearance. These constituents are not generally considered toxic.

- No consideration was given to ambient concentrations of the metallic analytes. Exceltech did not collect background samples for comparison. Therefore, conclusions that elevated levels of metals were identified are not founded. WTEC has measured background concentrations for iron and zinc at nearby sites and has found those background concentrations to be higher than the

concentrations measured in the Cross Cut Canal soil samples. Since these metals are typical constituents in soil, and these metals are not typically considered toxic, there does not appear to be a founded exposure or risk concern with regards to these metals.

- The organic analysis showed the presence of chloroform in one of the tested piezometers. Although there did not appear to be significant concentrations of volatile organic compounds in the tested wells, the following two facts need to be considered: (1) The Dames & Moore Stage III Report on the Motorola 56th Street facility has documented VOC contamination in groundwater at well sites upgradient in the aquifer, within one-quarter mile of the canal; and (2) since the canal is suspected to be in hydraulic connection with the water table, it is likely that the canal flows act as a groundwater recharge, and cause slight southerly groundwater flow direction shifts along the canal. It is possible that the restriction of the canal flow with the use of coffer dams may diminish this groundwater flow direction shift and carry VOC contaminants within the excavation area.

- Since the likely exposure pathway for VOCs will be through airborne transport, an evaluation of the airborne concentrations of VOCs may be necessary to evaluate potential employee exposure.

- Based on the presented data, WTEC does not agree that the measured iron levels present a potential iron exposure risk above baseline or background levels.

SECTION 3.0
PERMITTING ISSUES

3.1 ARIZONA DEPARTMENT OF TRANSPORTATION INTERVIEWS

Mr. Bill Belt, Manager of Environmental Plan Services with ADOT was contacted by WTEC and questioned about the similar improvement project they conducted on the Old Cross Cut Canal south of Van Buren Street.

Mr. Belt stated ADOT was not required to obtain an Aquifer Protection Permit (APP) through ADEQ or a National Pollution Elimination Discharge Elimination System (NPDES) Permit through the Federal Government. However, Mr. Belt stated the current NPDES program was not in place at the time of the project. He felt that a NPDES permit would be required if the improvement activities took place today.

During excavation, Mr. Belt indicated that a variety of hazardous materials were encountered. The hazardous materials were associated with underground storage tanks, old railroad cars used as underground storage tanks, and various processes and storage areas of the past Cudahy Slaughter House and the Tovrea Feed lot. A remedial action plan for the area was reportedly submitted to ADEQ in October 1990. To date, there has been no response from ADEQ.

Finally, a wide variety of Indian artifacts were also encountered during excavation activities. Mr. Belt stated various archaeological concerns had to be addressed and satisfied. The artifacts appeared to be associated with the past Hohokam civilization.

3.2 ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY PERMITTING CONCERNS

An evaluation was performed by WTEC to determine the applicability of the Aquifer Protection Permits (APP) Program administered by ADEQ.

The APP is contained in the Arizona Revised Statues (A.R.S.). Title 49, Chapter 2, Article 3, Section 241 through 251. (A.R.S. 49-241 through 49-251). ADEQ has also promulgated rules for the APP program in the Arizona Administrative Code (A.A.C), Title 18, Chapter 9, Article 1 (A.A.C. R18-9-101 through 130).

WTEC reviewed one exemption that may be applicable to the Old Cross Cut Canal project. A.R.S. 49-250.B.6 states "Facilities used solely for surface transportation of storage of waters for beneficial use or pumped from the groundwater if effluent from any waste treatment facility is not added after the original point of diversion." It is WTEC's opinion that the type of activities to be performed as part of the improvement project on the Old Cross Cut Canal would be classified under the above exemption.

Mr. Ed Pond, of the ADEQ Water Permits Unit, was consulted about the applicability of the APP, specifically, the exemption found in A.R.S. 49-250. Mr. Pond stated he believed WTEC's conclusion was accurate. However, Mr. Pond felt the Federal NPDES Permitting requirements may be applicable. Mr. Pond provided WTEC with an APP Determination of Applicability form to be completed and submitted to his attention (Refer to attachment) for an official declaration.

YES ? NO

The scope of work for this project did not include a review of potential federal permitting requirements. However, WTEC believes NPDES and Section 401 and 404 under the Clean Water Act may be applicable to the improvement project, and advises FCDMC to further evaluate this program.

3.3 ARIZONA DEPARTMENT OF WATER RESOURCES

WTEC reviewed information from the ADWR pertaining to this project. The purpose of the review was to evaluate potential ADWR permit requirements that may be applicable to the Canal project since excavation would penetrate the aquifer and the project location is within the Phoenix Active Management Area. A.R.S. Title 45 contains statutes addressing "Water", and Chapter 2 specifically refers to the Groundwater Code. Article 7 of Title 45 (A.R.S. 45-511 et seq.) contains Groundwater Withdrawal Permit requirements.

Ms. Rosemary Hester with the ADWR was contacted concerning possible permitting requirements. Ms. Hester stated that due to the fact that construction activities are expected to encounter groundwater and that the activities will be performed in the Phoenix Active Management area, a temporary dewatering permit would be needed.

Based on this information, WTEC reviewed the temporary dewatering permit requirements contained at A.R.S. 45-518. A dewatering permit is believed to be needed. Subsection A states that the Director may issue a temporary permit to a person to withdraw groundwater for dewatering purposes if the director determines that: "Dewatering is necessary for the construction or the structural integrity of improvements

or the land from which the groundwater is proposed to be withdrawn." It should be noted, the groundwater displaced needs to be put to "beneficial use". This is indicated in A.R.S. 45-518.A.2, which states that the dewatering is consistent within the management plan for the active management area.

ADWR has indicated that pumping the collected groundwater into the canal would be considered recharge, thus, a beneficial use.

An application for a dewatering permit shall be made on a form provided by ADWR. The information required on the application is specified in A.R.S. 45-521. WTEC has attached a copy of the form to this report in Appendix B.

SECTION 4.0
GROUNDWATER ISSUES

The FCDMC has expressed concern about the potential for contaminated groundwater to enter the canal during construction and excavation activities. This concern is primarily two-fold: (1) management and handling of the groundwater, if contaminated; and (2) potential worker exposure due to the presence of contaminants in the groundwater. This section will discuss these issues.

4.1 SURFACE AND SUBSURFACE GEOLOGY

4.1.1 Regional Geology

The Phoenix area is located in the Salt River Valley Basin, which lies within the Basin and Range Physiographic Province as described by Fenneman (1931). The Salt River Valley Basin is a structural depression formed by Cenozoic crustal extension and is characterized by broad sloping valleys bounded by generally northwesterly trending mountain ranges (Kleinfelder, 1989).

The Salt River Basin lies within a broad alluvial valley composed of Cenozoic (Oligocene to Holocene) sedimentary deposits. The alluvial valley extends to a maximum projected depth of approximately 10,000 feet (Oppenheimer and Sumner, 1981) and predominantly consists of consolidated to unconsolidated sands and gravels, with local discontinuous clays and silts. Basin elevations range from a minimum of 800 feet in the southwest to a maximum of 2,000 feet in the northeast. The sedimentary deposits are underlain by a basement complex consisting of crystalline and volcanic formations of late Cretaceous to early Tertiary age.

The basin fill materials can be divided into four general stratigraphic units. These are the Red Unit (Oligocene-Miocene); the Lower unit (Miocene-Pliocene); the Middle unit (Pliocene-Pleistocene); and the Upper unit (Holocene). Detailed descriptions of these stratigraphic units are given in Kleinfelder (1988).

4.1.2 Local Geology

The geologic structure in the Phoenix area is predominantly associated with the Basin and Range crustal extension. Based on cross-cutting relationships, the age of the normal faults is early Tertiary. Broad alluvial valleys, which have been down thrown along high angle normal faults, separate large mountain blocks. Pre-basin and range sediments (Red Unit) and the older basin-fill deposits are offset by these high

angle normal faults. No evidence of displacement is detected in basin-fill deposits younger than Middle Miocene and alluvial deposits above the basal portion of the Lower Unit (Brown and Pool, 1989).

The Phoenix area is underlain by a thick sequence of Cenozoic sedimentary deposits that form the major aquifer units of the Salt River Valley Basin. Although the basin locally exceeds a thickness of 10,000 feet, the Middle and Upper units typically form the primary aquifers (Kleinfelder, 1989). The Upper unit is a highly productive aquifer in the central portion of the basin and along the Salt River (Brown and Pool, 1989).

Sedimentary deposits primarily consist of unconsolidated to semi-consolidated silts, sands, and gravels that yield substantial quantities of water. Local semi-confined conditions may occur due to both interbedded clay layers within the Middle unit, and basalt and pyroclastic layers within the Lower unit (Brown and Pool, 1989).

The Upper unit is the most productive aquifer and it is observed at the surface at the site. Its thickness increases in a westerly direction and is approximately 200 feet thick in the vicinity of the site.

Dames & Moore (Motorola 56th Street Stage III Report, 1991) reports that a bedrock high exists within the area of 52nd Street and Thomas Road. Data from the Motorola 56th Street studies (Stage I, II, and III reports), ADWR, and ADEQ files were used to identify the bedrock high, which appears to extend from 56th Street to 51st Street, between Earll Drive and Virginia Avenue. Dames & Moore has theorized that groundwater flows may be influenced to a more westerly direction to the north of and around this bedrock high.

4.1.3 Hydrogeologic Conditions

Water-bearing deposits that form the major aquifer units in the Phoenix area include the basin-fill sediments observed in the central portion of the valley. The largely unconfined aquifers are primarily composed of unconsolidated, medium- and coarse-grained sediments. Perched and semi-confined conditions may be locally present due to interfingering fine-grained deposits (Kleinfelder, 1989). Non-water-bearing formations comprise the mountain ranges bounding the alluvial valleys and smaller isolated mountains within the central basin outcropping on the valley floor. According to Kleinfelder (1989), these geologic units include

igneous, metamorphic and consolidated sedimentary rocks ranging from Precambrian through Tertiary in age.

Groundwater recharge to the basin aquifers is derived from infiltration of precipitation, infiltration of runoff from the adjacent mountains, infiltration of controlled releases from upstream reservoirs along the Salt River, return flow from agricultural irrigation, canal seepage, and subsurface groundwater inflow from adjacent areas. Studies by Brown and Pool (1989) and Graf (1986) show that recharge rates in the wetted portion of the Salt River channel (when it is flowing) in the site vicinity can be as high as one foot per day.

Dames & Moore reported in the Motorola 56th Street Stage III report (1990) that Salt River Project (SRP) had installed a "drain field" during the 1920's to alleviate high groundwater conditions that affected citrus groves in the area. Reportedly, the drain field was installed in the area generally bounded by 56th Street on the east, the Old Cross Cut Canal on the west, the Arizona Canal on the north, and Earll Drive on the south. The drain field is reported to consist of four buried parallel pipes running from east to west and discharging into the Old Cross Cut Canal. Dames & Moore reported that according to SRP personnel, the drains consist of 8 to 10-inch diameter perforated pipe, packed in gravel at approximately 12 to 14 feet bgs.

4.1.4 Aquifer Characteristics

The uppermost aquifer at the site is part of the Upper unit. According to Kleinfelder (1989), the Upper unit near the site includes fluvial deposits of the Salt River Channel and associated terrace deposits. Wellendorf and others (1986) identifies the site as underlain by basin floor sediments of alluvium from the nearby Papago Park pediment over Mesa Terrace deposits. The scarp has been obscured. Groundwater levels at the site are 45 feet, and the extrapolated saturated thickness is 25 feet. A buried pediment is believed to underlie the saturated sediments. It is likely that the bedrock is a weathered granite covered by strongly calcified colluvial - alluvial debris.

According to Reeter and Remick (1986), groundwater flows to the west - northwest. Based on ongoing hydrogeologic assessments at nearby sites by WTEC and others, groundwater in the uppermost aquifer flows to the southwest. When the Salt River is running, rapid aquifer recharge causes flow directions to shift to more nearly westerly (Graf, 1986).

Aquifer hydraulic characteristics of the Upper Alluvial Unit sediments underlying the site can be approximated from known values at nearby sites. Data are available from long-term pump tests conducted near the Motorola 56th Street Facility (Well No. DM-12 located at 5045 East Thomas Road), the Motorola 52nd Street Facility (Well No. DM-202, near 52nd Street and McDowell Road), and the Texaco service station on the southeast corner of 52nd Street at Thomas Road. The pertinent data are summarized in Table 4.

TABLE 4
AQUIFER CHARACTERISTICS

	52nd Street **Motorola #1 (DM-202)**	56th Street **Motorola (DM-12)**	**Texaco**
Transmissivity (gpd/ft)	20,000	14,400	7,500
Saturated Thickness (ft)	55	45	20
Hydraulic Conductivity (ft/day)	48.8	44.0	50.1
Specific Yield (dimensionless)	UNK	0.019	0.067
Test Duration (hours)	UNK	52.5	74.7
Pumping Rate (gpm)	UNK	28	UNK
Data Source:	(a)	(a)	(b)

References

(a) Dames & Moore, 1990, Stage III Ground-Water Quality Investigation, 56th Street Facility, Phoenix, Arizona.

(b) Groundwater Technology, Inc., 1989, Assessment and Remediation Report of the Fourth Quarter, 1988 for the Texaco Station located at 5201 East Thomas Road, Phoenix, Arizona.

4.2 AQUIFER WATER QUALITY

Regional groundwater quality in the Salt River Valley is controlled by the natural geologic formations and infiltration of recharge water derived from precipitation, runoff, and irrigation return flow. Calcium and sodium are the predominant cations, and chloride and bicarbonate are the most common anions in groundwater in the Phoenix region. Historic groundwater quality data indicate a broad overall change in groundwater chemistry in recent years from calcium bicarbonate water to sodium chloride water. This change is reported to be attributable to return flow of applied irrigation in excess of the consumptive use of the vegetation (Brown and Pool, 1989).

Total dissolved solids (TDS) concentrations from wells in the Salt River Valley range from a reported minimum of approximately 200 mg/L near Sun City, Arizona, northwest of the study area, to 7,000 mg/L near Buckeye, west of the Washington WQARF study area. Most wells using high TDS concentrations are perforated within the Upper unit. Groundwater samples from wells within the study area generally exceed the EPA recommended drinking water standard of 500 mg/L TDS. Increased recharge from above average precipitation in recent years has resulted in a decline in TDS concentrations in aquifers near the Salt River, but concentrations generally remain above the recommended standards (Brown and Pool, 1989).

Elevated nitrate concentrations in groundwater samples obtained from wells in the Phoenix area have been linked to nitrate fertilizers applied in the agricultural areas and naturally occurring organic material in the alluvial deposits (USGS, 1988). Nitrate concentrations in the Phoenix area locally exceed the EPA recommended drinking water standard of 10 mg/L (as nitrogen) in areas north of Sky Harbor Airport. Other locations within the Valley also contain elevated concentrations of nitrate, but are typically localized and encountered at concentrations below the recommended levels.

Elevated fluoride concentrations in the Phoenix area are typically associated with wells perforated in the Lower unit. Groundwater obtained from wells near the Phoenix Mountains and along the eastern boundary of the study area have occasionally exceeded the Federal secondary limit of 2.0 mg/L, but rarely exceed the MCL of 4.0 mg/L.

Volatile organic compounds (VOCs) have been measured in the groundwater upgradient of the Old Cross Cut Canal. The primary VOCs detected are the halogenated VOCs, trichloroethylene (TCE), tetrachloethylene (PCE), trichlorethane (TCA), 1,1 Dichloroethene (1,1-DCE), chloroform and trichloroflouroethane (Freon 113). The highest concentration of VOCs appear to have been measured along 52nd Street from Thomas Road to Earll Drive. Exceltech has also measured chloroform in an on-site well.

4.3 CONTAMINANT MOVEMENT

Since groundwater contamination exists upgradient from the Old Cross Cut Canal, and since contamination of the aquifer beneath the canal is suspected, WTEC reviewed potential contaminant pathways into the canal that may exist during the canal improvement project.

4.3.1 Groundwater Infiltration

Groundwater is expected to infiltrate the excavation areas of the canal during construction activities. Since known groundwater contamination exists upgradient from the Old Cross Cut Canal, it is possible that similar contamination could migrate with groundwater into the excavation areas.

This condition, typically referred to as a groundwater discharge, is different from the currently suspected condition of groundwater recharge. While water flows through the canal, seepage from the unlined canal can cause localized linear recharge of the aquifer along the canal. This recharge could inhibit the migration of contaminants from the aquifer to the canal. However, once the recharge ability has been removed through the use of coffer dams, it is possible that groundwater flows could shift to a more westerly direction, and flow into the open excavation area.

4.3.2 Upward Migration

Some concern has been expressed that excavation and construction activities within the Old Cross Cut Canal may disrupt the underlying aquifer causing an upward migration of contaminants.

Dames & Moore (1990) has estimated the saturated thickness of the aquifer in the vicinity of the canal at approximately 100 feet. Aquifer conditions in the area are generally unconfined.

Based on this information, it is WTEC's opinion that contaminants will not migrate upward through the aquifer, into the excavation area.

4.3.3 SRP Drain Field

The SRP drain field previously mentioned, drains the aquifer to the northeast of the Old Cross Cut Canal. Since known groundwater contamination exists in this general drain area, primarily attributable to the Motorola 52nd Street Facility, it is possible that the drain may discharge dissolved pollutants into the canal.

SECTION 5.0

CONCLUSIONS AND RECOMMENDATIONS

Based on our data review for this project, WTEC recommends the following:

- Submit a Determination of Applicability of the APP program to ADEQ concerning the Cross Cut Canal project. ADEQ has verbally indicated that the APP program will not apply and WTEC recommends obtaining formal written notification.

- Prepare and submit the necessary information for a temporary dewatering permit to ADWR. WTEC has attached a copy of the application form supplied by ADWR.

- Evaluation of the NPDES program. Individuals contacted by WTEC during this project have expressed opinions that the NPDES program may apply to this project. An evaluation of NPDES was not a part of this project. However, WTEC recommends addressing the applicability of NPDES.

- Contact ADEQ regarding recent developments with the Motorola 56th Street Facility to determine if a better definition of groundwater contamination in the vicinity of the Old Cross Cut Canal has been made. WHY?

- WHY? Consider a hydrological study of the Old Cross Cut Canal and the underlying aquifer to allow a better prediction of potential contaminant pathways if groundwater beneath the canal has been impacted by VOCs.

- If FCDMC wishes to define potential pollutants or exposure, WTEC recommends performing more extensive soil testing, including background testing of soils for total concentrations of the eight toxic heavy metals. However, WTEC has found no evidence to suggest that metals pose a risk for this project. YES OR NO?

- Trace quantities of volatile organic compounds may be present in both groundwater and the canal water during this project. However, insufficient data has been generated to confirm or deny that possibility. Therefore, WTEC recommends the following language for notification to contractors. DO MORE TESTING?

  "The project location is within the East Central Phoenix and East Washington study areas under the State of Arizona Water Quality Assurance Revolving Fund (WQARF). The WQARF program is designed to study and clean-up areas of degraded groundwater. FCDMC has commissioned environmental assessments of the project location. These studies have not confirmed or denied the presence of degraded groundwater beneath or in the project location. The contractor shall include provisions for employee monitoring, as required under OSHA 1910.120, to be implemented if degraded groundwater is in fact encountered during construction activities."

SECTION 6.0
PROJECT LIMITATIONS

The scope of this project is limited to: interviews with knowledgeable persons; interviews with public agency personnel; reviews of reports provided by the Client, and published and unpublished reports and literature readily available to the public. As a result, the conclusions and recommendations are based on information supplied by others, professional expertise, and interpretations by qualified personnel. WTEC makes no representation as to the accuracy or correctness of the work performed by others and discussed by WTEC.

The focus of the project was to evaluate specific concerns expressed by Client. As a result, this project does not address current physical conditions of the site, nor make projections about future environmental issues. Site inspection and chemical testing were not a part of this project.

There is no evaluation which is thorough enough to absolutely exclude the presence of hazardous substances at any site. Therefore, if none are identified as part of a limited scope of work, such a conclusion should not be construed as a guaranteed absence of such materials.

We have performed our services for this project in accordance with our agreement and understanding with our client. This document and the information contained herein have been prepared solely for the use of our client and their assigned parties. WTEC assumes no responsibility for conditions that we did not specifically evaluate or conditions that were not generally recognized as environmentally unacceptable at the time this report was prepared.

A

Arizona Department of Environmental Quality

AQUIFER PROTECTION PERMITS DETERMINATION OF APPLICABILITY

OLD CROSS CUT CANAL IMPROVEMENT PROJECT
NAME OF THE OPERATION

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY/SALT RIVER PROJECT
NAME OF OWNER

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY/SALT RIVER PROJECT
NAME OF OPERATOR

48TH STREET AND ARIZONA CANAL TO MCDOWELL ROAD
LOCATION OF OPERATION (STREET ADDRESS)

LATITUDE AND LONGITUDE

TOWNSHIP 2 NORTH, RANGE 4 EAST, SECTION 19, 20, 29, 30, 31, 32
TOWNSHIP, RANGE, SECTION, QUARTER SECTION

MAILING ADDRESS

FLOOD CONTROL DISTRICT MARICOPA COUNTY
NAME

2801 W. DURANGO STREET
NUMBER, STREET OR POST OFFICE BOX NUMBER

PHOENIX, ARIZONA 85260
CITY, STATE, ZIP CODE

OLIN SUTTON 602/506-1501
CONTACT PERSON NAME AND TELEPHONE NUMBER

Provide a description of the operation (the nature of the business or activity), noting any discharges. See attached definitions.

The old Cross Cut Canal presently collects storm water run-off. The canal was formerly used to divert water from the Arizona Canal. The Cross Cut Canal eventually discharges to the Salt River. Improvements are to be made to the Old Cross Cut Canal. The improvements consist of the construction of a new concrete box culvert. Groundwater is expected to be encountered during construction activities. All water displaced, will be collected and diverted back into the Canal.

Return to: **Arizona Department of Environmental Quality**
Water Permits Unit, Room 202
2005 N. Central Avenue
Phoenix, Arizona 85004

The purpose of this form is to help enable the staff of the Water Permits Unit of the Arizona Department of Environmental Quality to determine which, if any, regulatory programs may apply to an activity in which you are engaged or in which you may become engaged. The Department regulates many kinds of activities; therefore, many of the kinds of facilities or activities listed below may not apply to your operation or property. None of the questions below pertain to non-commercial use of products generally available to the public. Please answer all questions and where applicable, explain with sufficient detail in the requested description. Attach additional sheets and reference sheets as needed. Please attach any design plans, site plans, maps etc., that may assist in this review.

Is the operation involved in any of the following?

		If yes, Describe. Attach additional sheets as needed.
Industrial Wastewater Disposal	~~Yes~~ No	
Industrial Wastewater Treatment	~~Yes~~ No	
Sanitary Wastewater Disposal	~~Yes~~ No	
Sanitary Wastewater Treatment	~~Yes~~ No	
Settling, Flocculation or Filtration	~~Yes~~ No	
Release or Storage of Liquids or Semi-liquids to a Ditch, Pit, Pond, or Land Surface	~~Yes~~ No	
Disposal of Waste Solvents or Oil to a Ditch, Pit, Pond, or Land Surface	~~Yes~~ No	
Reuse of Industrial or Commercial Process Wastewater	~~Yes~~ No	
Reuse of Sanitary Wastewater	~~Yes~~ No	
Discharge to a Community Sewer System	~~Yes~~ No	
Pre-Treatment of Wastewater before Discharge to Sewer	~~Yes~~ No	
Release of Water or Wastewater to a Lake, Stream, River, Dry Wash or other Surface Water Body	Yes ~~No~~	During construction activities, displaced groundwater and canal flow will be placed ~~back into the canal at a down gradient~~ point.
Groundwater Recharge Project	~~Yes~~ No	
Underground Storage and Recovery Project	~~Yes~~ No	
Operations that Add a Pollutant to a Salt Dome or Salt Bed Formation	~~Yes~~ No	
Operations that Add a Pollutant to a Drywell	~~Yes~~ No	
Operations that Add a Pollutant to an Underground Cave or Mine	~~Yes~~ No	
Bioremediation	~~Yes~~ No	
Application of Materials to the Land Surface	~~Yes~~ No	

		If yes, describe. Attach additional sheets as needed.
Land Treatment of Wastewater	~~Yes~~ No	
Burying of Wastes	~~Yes~~ No	
Disposal of Garbage, Trash, Refuse, Manure, Process Waste, Rubbish, Construction Debris, or other Solid Waste	~~Yes~~ No	
Sludge Disposal	~~Yes~~ No	
Mining	~~Yes~~ No	
Milling	~~Yes~~ No	
Ore Processing	~~Yes~~ No	
Leaching Operations	~~Yes~~ No	
Placer Mining	~~Yes~~ No	
Sand and Gravel Extraction or Washing	~~Yes~~ No	
Chemical Use	~~Yes~~ No	
Chemical Storage	~~Yes~~ No	
Chemical Production	~~Yes~~ No	
Fuel Storage	~~Yes~~ No	
Use of Hazardous Substances	~~Yes~~ No	
Storage of Hazardous Substances	~~Yes~~ No	
Generation of Hazardous Wastes	~~Yes~~ No	
Treatment, Storage, or Disposal of Hazardous Wastes	~~Yes~~ No	
Dust Control	~~Yes~~ No	
Truck or Car Washing	~~Yes~~ No	
Aircraft or Automobile Servicing	~~Yes~~ No	
Printing	~~Yes~~ No	
Waste Recycling	~~Yes~~ No	
Manufacturing	~~Yes~~ No	
Parts Assembly	~~Yes~~ No	
Photographic Processing	~~Yes~~ No	
Drilling	~~Yes~~ No	
Well Development	~~Yes~~ No	

If yes, describe. Attach additional sheets as needed.

Groundwater or Vadose Zone Monitoring	~~Yes~~ No	
Agricultural Production	~~Yes~~ No	
Tree Farming	~~Yes~~ No	
Horticulture	~~Yes~~ No	
Silviculture	~~Yes~~ No	
Aquaculture	~~Yes~~ No	
Animal Feeding Operations	~~Yes~~ No	
Raising Livestock	~~Yes~~ No	
Agricultural Application of Sludge	~~Yes~~ No	
Irrigation	~~Yes~~ No	
Boarding Animals	~~Yes~~ No	
Tick-Dipping of Animals	~~Yes~~ No	
Food Preparation	~~Yes~~ No	
Dry Cleaning	~~Yes~~ No	
Painting	~~Yes~~ No	
Paint Stripping	~~Yes~~ No	
Medical, Dental or Veterinary Services	~~Yes~~ No	
Mortician Services	~~Yes~~ No	
Other Activity (Other than Household Activity)	~~Yes~~ No	Describe:

If you answered yes to any of the above please provide a brief description of the type, composition, quantity of any materials used, stored, handled or disposed of. (Attach additional sheets and reference sheets as needed)

N/A

Does the Operation include any of the following features?

		Indicate number and type of features and describe briefly
Surface Impoundments	~~Yes~~ No	
Evaporation Ponds	~~Yes~~ No	
Holding, Storage or Retention Basins or Ponds	~~Yes~~ No	
Treatment or Disposal Pits	~~Yes~~ No	
Sewage Treatment Ponds or Lagoons	~~Yes~~ No	
Settling Ponds	~~Yes~~ No	
Percolation Ponds	~~Yes~~ No	
Sludge Ponds	~~Yes~~ No	
Sludge Drying Beds	~~Yes~~ No	
Evapotranspiration Beds	~~Yes~~ No	
Wisconsin Mounds (Mound Disposal Systems)	~~Yes~~ No	
Septic Tanks	~~Yes~~ No	
On-Site Sewage Disposal System	~~Yes~~ No	
Leach Lines/Leach Field	~~Yes~~ No	
Disposal or Seepage Pits	~~Yes~~ No	
Wastewater Treatment Plant	~~Yes~~ No	
Storm Sewer	~~Yes~~ No	
Storm Water Impoundments or Containment Features	Yes ~~No~~	-Coffer dams are to be used to divide the canal into segments for construction purposes. The exact number of dams is unknown.
Storm Water Diversion Features	Yes ~~No~~	-Storm water collected in the canal will be redirected around construction activities via a mechanical pump apparatus.
Canals, Ditches of Other Facilities for Surface Transportation of Water	Yes ~~No~~	-The purpose of the Old Cross Cut Canal is for the surface transportation of water. In addition to the canal itself a mechanical pump apparatus will be used to direct displaced water around the construction activities.
Swimming Pool	~~Yes~~ No	
Drywell Which Receives Storm Water Runoff	~~Yes~~ No	
Drywell Which Receives Storm Water in an Area Where Chemicals are Used, Stored, Treated, Handled, or Manufactured	~~Yes~~ No	
Injection Wells	~~Yes~~ No	
Water Wells	~~Yes~~ No	
Monitor Wells	~~Yes~~ No	

Indicate number and type of features and describe briefly.

Oil, Gas, Geothermal or Helium Wells	~~Yes~~ No	
Mine Tailings Piles	~~Yes~~ No	
Mine Tailings Pads	~~Yes~~ No	
Mine Tailings Ponds	~~Yes~~ No	
Mine Leaching Pads	~~Yes~~ No	
Mine Leaching Ponds	~~Yes~~ No	
Above Ground Storage Tanks	~~Yes~~ No	
Underground Storage Tanks	~~Yes~~ No	
Landfill or Solid Waste Disposal Facility	~~Yes~~ No	

Are there any wastes or by-products created in the operation or activity? NO

a. If yes, what are they?

b. How are they discharged or disposed?

c. Where is the location of the discharge?

d. What is the frequency and volume of discharge?

e. Is there any treatment before discharge? If yes, describe.

Do you own or operate any land, building, installation, structure, conveyance, area or source associated with the discharging or disposal activity, operation, or facility in question? No. The U.S. Bureau of Reclamation. SRP under agreement administers the old cross cut canal.

If yes, a. When was it constructed?

b. Have there been any modifications since the original construction?

c. If yes, when?

d. What was the nature of the change? (provide details regarding changes in quality or quantity)

e. Are there any wastes or by-products that resulted from the modification?

f. How are they disposed?

Are there any wastes or by-products stored on-site? NO

a. If yes, describe type, quantity and nature of storage.

Does the operation or activity involve sewage disposal or reuse of reclaimed wastewater? NO

a. If yes, describe. Attach additional sheets as needed.

b. Attach copies of an Approval to Construct and Approval to Operate from authorized agency.

Are there any industrial or non-domestic sources of sewage or wastewater? NO

a. If yes, describe

How long has the facility operation or activity been at it's present location? ~~+ 50~~ 100± years

Is the facility in operation now? The proposed improvement project has not yet been initiated.

a. If no, when did operations cease?

or: b. When are operations expected to begin? Summer ~~92~~ 93

List any environmental permits held by the operation, facility or activity. Provide the permit number and the name of the issuing entity. None.

What is the depth to groundwater beneath the operation or activity? Approximately 15 to 25 feet.

a. Source and date of data: ADWR Report #12

Does the operation involve any groundwater monitoring or environmental remediation? NO

a. If yes, describe

b. Attach most recent groundwater analyses

c. Attach any wastewater or effluent analyses, waste characterization studies or ambient groundwater analyses.

I Todd Tiffany, certify that the information provided in this form is true to the best of my knowledge.

Todd Tiffany 4/28/92 Property Assessor

Signature, Date, Title

Return to: Mr. Ed Pond

Evaluator's Name

B

15 SOUTH 15TH AVENUE
PHOENIX, ARIZONA 85007

APPLICATION FOR PERMIT TO WITHDRAW GROUNDWATER FOR TEMPORARY DEWATERING PURPOSES WITHIN AN ACTIVE MANAGEMENT AREA

I. INSTRUCTIONS

1. COMPLETE ALL APPROPRIATE ITEMS ON THIS APPLICATION AND SIGN IN DESIGNATED PLACE.
2. Mail to 15 South 15th Avenue, Phoenix, Arizona 85007.
3. Application fee is $50.00.
4. Permit fee of $50.00 will be requested prior to issuance of permit.
5. USE EXPLANATORY SECTION ON BACK FOR CLARIFICATION.

DO NOT WRITE IN THIS SPACE
OFFICE RECORD
Application No. _____
Permit No. _____
File No. _____
Filed by _____ By _____
Input _____ By _____
Duplicate
Mailed _____ By _____
AMA _____ S/B ___ W/S ___

II. GENERAL DATA

1. NAME OF APPLICANT _____

   Mailing address _____

   _____
   City State Zip Telephone number

2. TYPE OF TEMPORARY DEWATERING PERMIT (check only one box)

   ☐ 1 year dewatering permit necessary for the construction or structural integrity of improvements on the land from which the groundwater is proposed to be withdrawn. (This dewatering must be consistent within the AMA Management Plan.) A.R.S. 45-518.A.

   ☐ An extension of a dewatering permit of the type above. The conditions of the original permit must still apply and the water withdrawn pursuant to this extension must be used beneficially by persons who would otherwise be permitted to use groundwater legally. Continued dewatering must not harm any person permitted to withdraw or use groundwater. A.R.S. 45-518 B and C.

   ☐ An emergency dewatering permit to avoid property damage or inordinate expense or delay. A dewatering permit of the first type above must be on file with the Department and under consideration. This emergency permit will terminate if the conditions that gave rise to its issuance no longer apply or if the above mentioned dewatering permit is issued or denied. - A.R.S. 45-518 D.

3. Groundwater will be withdrawn within the _____ sub-basin of the _____ Active Management Area.

4. State your plan for disposing of the groundwater withdrawn PLACE BACK INTO OCC

5. The specific purpose of the dewatering is FOR CONSTRUCTION

6. Total amount of groundwater for which application is being made: ? acre feet. If this application is approved and a permit is granted, accurate and current records of groundwater withdrawal must be maintained, annual pumping reports must be submitted and annual withdrawal fees must be paid to DWR. (A.R.S. 45-632)

7. Proposed duration of the dewatering: _____ Days 12-15 Months

8. If this is an extension of a previous dewatering permit or an emergency permit, fill in that application or permit number in the space provided here _____.

9. Groundwater to be withdrawn by means of:

A. Existing wells: NO

Registration No.	Location	Depth	Casing	Case Type
55-_____	_____	_____	_____	_____
55-_____	_____	_____	_____	_____

B. New wells: NO

Registration No. (Dept. to Complete)	Location	Depth	Casing	Case Type
55-_____	_____	_____	_____	_____
55-_____	_____	_____	_____	_____
55-_____	_____	_____	_____	_____

C. Trench or Sand Point: (describe here)

_____

_____

_____

10. State your plans for the dewatering facilities (wells, etc.) after dewatering is completed: If a well is to be abandoned, this must be done by a licensed driller and the DWR license number MUST be listed here.

REMOVE DAMS AND PUMPS

_____

_____

11. If new well(s) is to be drilled, complete the following information relating to the driller: (a licensed driller is required.) The DWR license number must be indicated below: N/A

Driller's name_____ DWR License No._____

Address_____

_____

EXPLANATORY:

_____

_____

_____

_____

It is understood that the Permit, if granted, will be in accordance with the Groundwater Management Code, (Title 45, Chapter 2). The permittee will be bound by the provisions of such law and the provisions of the Permit issued.

Signature of Applicant_____ Date_____