

California Regional Water Quality Control Board, Colorado River Basin
Prosecution Team Evidence
on the matter of
Administrative Civil Liability Complaint R7-2014-0041
Exhibit 11



**CITY OF BRAWLEY
WASTEWATER TREATMENT
FACILITY
JANUARY 2003**

TOXICITY REDUCTION EVALUATION

Presented by

**Ruben Mireles
Superintendent of Operations
Public Works Department**

*File: City of Brawley WWTP
1A 13 0100 011*

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REGION 7

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The City initiated Phase I through 3 Toxicity Identification Evaluation (TIE) for the Wastewater Treatment Plant's (WWTP) effluent. This TIE testing was conducted in April of 2002. Results from these tests indicated that ammonia was the most likely toxicant for the bioassay failures.

On November 12, 2002, the regional board directed the City to conduct and submit by January 10, 2002, a Toxicity Reduction Evaluation (TRE).

Review of Effluent Toxicity Data

AMEC Earth & Environmental, Inc. of San Diego conducted a series of toxicity identification studies. The TIE studies were performed on effluent samples collected during the Spring of 2002. The following summarizes the findings and observations of the study. Graphs of total ammonia, unionized ammonia and percent survival are also included to review historical concentrations of the total ammonia and unionized ammonia.

Summary of Findings and Observations

- PH dependent toxicity observed in all tests is highly indicative of toxicity due to ammonia.
- Total and unionized concentrations of ammonia during the exposure period were consistently above levels found to cause toxicity to both *C. dubia* and *P. promelas*.
- Strong relationships between the concentration of unionized ammonia and survival were found for both test species.
- Toxicity was completely recovered after removal and re-addition of ammonia to its original concentration.
- LC 50 values based on the concentrations of unionized ammonia in all TIE treatments were within ranges expected to cause toxicity of both *C. dubia* and *P. promelas*.
- Despite levels of surfactants and copper at or above potential levels of concern confirmatory, TIE studies failed to relate toxicity to these constituents.
- Chronic toxicity in 21 of the last 23 tests performed for the City over the last two years has been greater to *P. promelas* than *C. dubia*.
- A historical evaluation of the total and unionized ammonia levels in WWTP effluent found concentrations that routinely exceed levels expected to cause toxicity to both *C. dubia* and *P. promelas*. (See Appendix A)

- The accumulated evidence from the combination of Phase 1 characterization, Phase 2 identification and Phase 3 confirmation. TIE studies performed on the City's WWTP effluent during this study concludes that all observed toxicity can be attributed to ammonia.

Current Operational Status

In response to an order from the California Regional Water Quality Control Board, the City of Brawley initiated a project to upgrade the capacity of the Wastewater Treatment Plant (WWTP) to provide increased plant treatment capacity to keep up with increased wastewater flows to the plant. The plant increased to 5.9 mgd from 3.9 mgd. The design of the improvements to the plant included a new headworks, an additional primary clarifier, clarifier sludge pumps, improvements to the egg-shaped digesters, additional aeration capacity in the wastewater pond system and an effluent disinfection facility. In order to be able to efficiently construct these improvements, the project was planned in two phases.

Phase 1 provided a new influent pipeline to carry the influent wastewater directly to the treatment ponds bypassing the clarifiers and sludge digesters to allow improvements to these facilities "in the dry". Increased mechanical aeration was placed in the ponds to provide adequate treatment in the ponds during the Phase 2 construction. Phase 2 included the new headworks and grit removal facility, new clarifier and sludge pumps, improvements to the egg-shaped digesters and the disinfection facility.

The planned digester work included improved heat exchange system, new methane gas piping, new digester sludge pumps, process and instrumentation, and tank thermal insulation if affordable. Structural repairs to the egg-shaped digesters were not included in the design because as far as could be determined from the outside of the digesters (with the digesters being full of sludge), the digester vessels were structurally sound.

Once the digesters were emptied in preparation for the phase 2 work, an interior inspection of the digesters was made. The review was limited to that area that could be readily seen from the access holes located at approximately the 1/3 height of the digester. No scaffolding was erected at that time. Evidence of interior corrosion was observed but the extent of the damage was not able to be determined without installation of scaffolding and more extensive cleaning of the interior and interior corrosion was noted. At that point, the Phase 2 work was being advertised for bids. As a result of the review, an addendum to the bid documents was issued to include sandblasting the interior of the digesters and repairing an estimated 200 square feet of the interior surface of the tanks with welded steel plate.

When the contractor initiated the sandblasting in preparation for the welded steel plate repair process, it became apparent that the interior corrosion of the digesters was so severe that the tanks were structurally unsound and the welded plate repair contemplated would be insufficient due to the great extent of the damage. This situation was deemed to be an emergency since the plant could not be restarted without a working sludge digestion system. After considerable deliberation by the design engineer and the construction manager, it was concluded that the only reasonable solution was emergency repair of the egg-shaped digesters by reconstructing the two vessels from the pedestal base up.

Researching the industry, it was found that Chicago Bridge and Iron (CBI) is the only firm in the country who has the capability of rebuilding the egg-shaped digesters and guaranteeing their function after re-construction. CBI provides both construction and process engineering. As a result, CBI was contracted to visit the Brawley plant and provide and estimate of the emergency repairs to the digesters. The CBI estimate for completing the rehabilitation of the two digesters is approximately \$1,200,000.

Considering the estimated cost of replacing the steel egg-shaped digesters and the fact that the steel vessels only lasted about 15 years, the recommendation of the design engineer, the construction manager and the program manager is to replace the existing digesters with new concrete digesters. The preliminary estimate for the replacement concrete digesters is also \$1,200,000, however, the life expectancy of the concrete digesters would be fifty years.

Since the design and construction of the new digesters will obviously extend the projected completion date of the WWTP upgrade, an interim operating procedure will have to be developed to maintain the plant's treatment process in a manner to satisfy the RWQCB's discharge permit requirements. This may include using the newly constructed headworks but by passing the influent from the new headworks directly to the treatment ponds or using the new clarifiers and discharging the settled solids into one of the aeration ponds for aerobic digestion. (See Appendix B)

The facility's aerated lagoons have exceeded our expectations in the removal of BOD and TSS. From October 2001 to September 2002, the percentage removal for BOD was 86% and percentage removal for TSS was 81%. However, the average ammonia concentration from September 2000 to October 2001 was 12.7 mg/l. The average ammonia concentration from November 2001 to September 2002 increased to 27.9 mg/l. (See Appendix C)

Pretreatment Program

The City adopted a pretreatment ordinance on November of 2001 for the prevention of the introduction of pollutants that will pass through this City's wastewater treatment facility.

During September of 2002, the Public Works Department interviewed two (2) candidates for "Water Distribution / Collection System Operator". However, the candidates did not meet the requirements to be successful for this position. The City will re-advertise in-house in January 2003.

Once this position is filled, a comprehensive survey will be conducted within the City to determine whether any industrial or commercial businesses are discharging prohibited wastewater into our collection system. The implementation of the Pretreatment Program and the regulation of industrial discharges will be a responsibility of the successful candidate.

The wastewater plant operators have monitored the following sewage main collectors for ammonia concentration. The central main and west main collectors have elevated ammonia levels. Central main ammonia levels were 75 NH₃. West main ammonia levels were 35 NH₃. The last main collector has not been tested.

The City has also identified an RV dumpsite as an area of illegal dumping. Agricultural companies have been observed emptying vessels of unknown liquids into the RV dumpsite.

The beef plant pretreatment lagoons have been monitored on a weekly basis and the ammonia discharge from that facility has been consistently above the permitted 40 mg/l.

A proposed digester utilizing the beef plant's waste to produce electricity is currently under review and the projected completion date is January 2004.

This project will eliminate Brawley Beef's wastewater discharge and will no longer impact the wastewater treatment facility.

Wastewater Optimization for Ammonia Reduction

The wastewater treatment operators have implemented the following operational changes to the five (5) aerated cells. Cells A1 and A2 are normally operated as parallel units, cells S1, S2 and S3 are operated in series.

During the inspection of the two (2) steel digesters, the sludge from these vessels was pumped to A1.

- A1 has been isolated from the treatment stream and will be used as an aerobic digester until the construction of the two (2) new concrete aerobic digesters are completed, which is anticipated to occur in June of 2003. This will also allow operations to activate Phase 2.
- A2 currently has 90 horsepower of aeration with 20 horsepower per million gallons. Staff is operating this cell as a complete mix system.

Toxicity Reduction Evaluation

- Effluent baffles on cells-A2, S1, S2 and S3 have been installed to reduce TSS and BOD at the effluent discharge.
- A 4' poly propylene fence with 4" x 4" square holes has been installed along the north-end of cells S2 and S3 to provide a habitat for nitrifying bacteria.
- Cells A2, S1, S2 and S3 were evaluated for short-circuiting. Results of testing were deemed negative.
- All cells are being monitored for ammonia concentration on a weekly basis.
- The City is currently evaluating the best location for a return line.

The Public Works Department has strong expectations that upon the completion of the Wastewater Treatment Plant expansion, the implementation of the pretreatment program and the removal of Brawley Beef Plant's wastewater stream, the ammonia toxicity will be reduced to acceptable levels.

Appendix A

Graphs of Total Ammonia, Unionized Ammonia and Test Dates

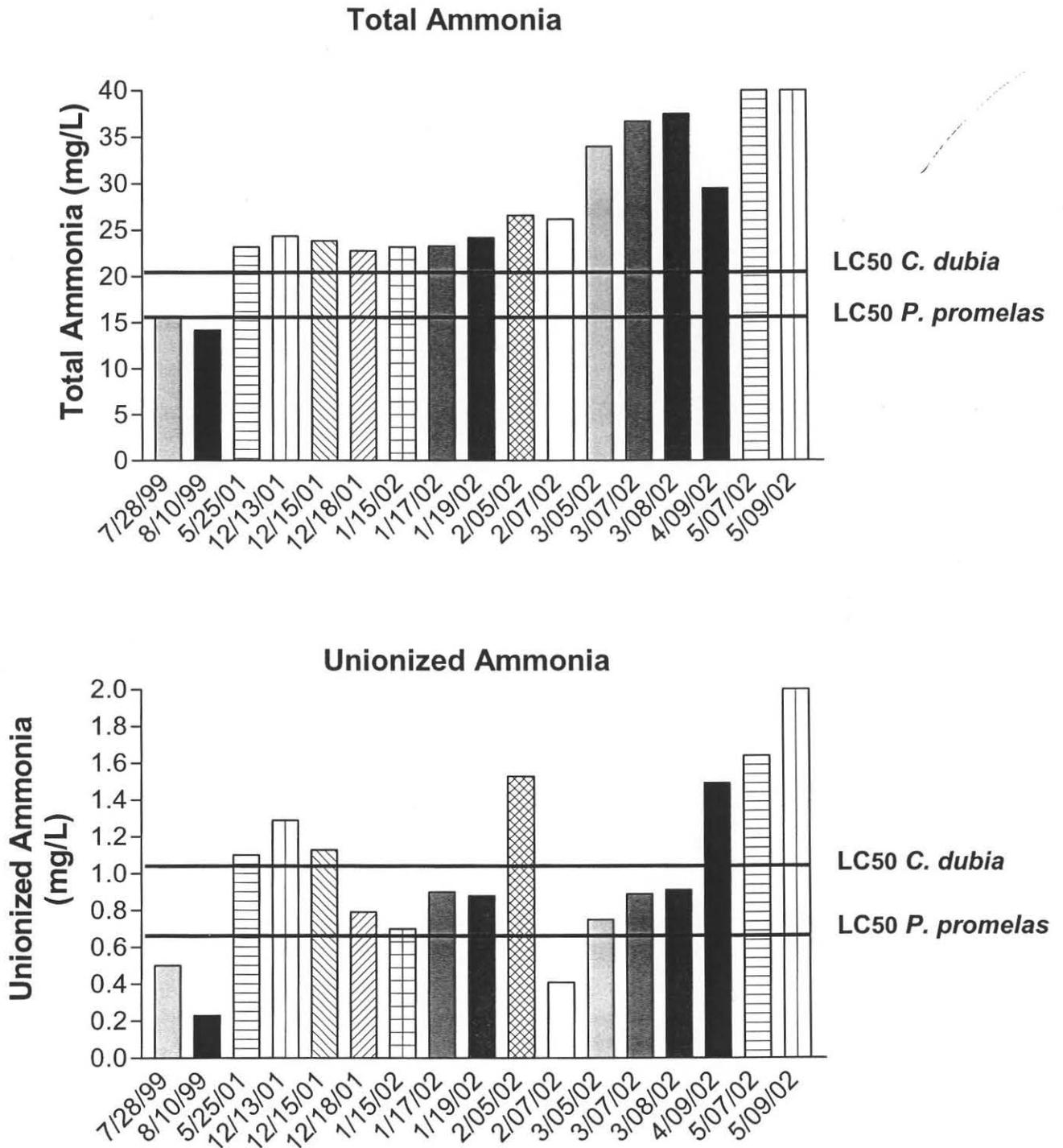


Figure 9. Historical concentrations of total and unionized ammonia in Brawley WWTP effluent. Mean LC50 values derived at AMEC for *C. dubia* and *P. promelas* are displayed for comparison purposes.

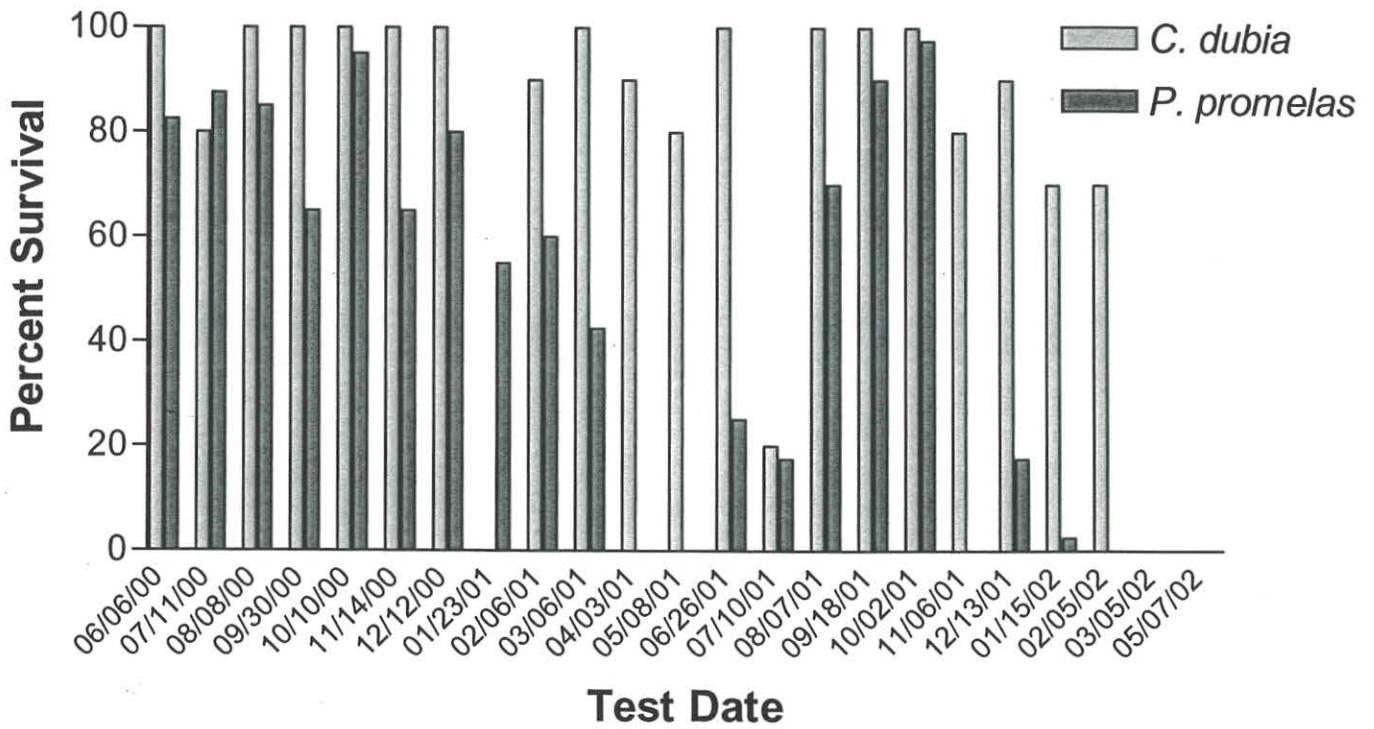


Figure 10. Historical toxicity over the last two years for Brawley WWTP effluent. Mean 7-day survival in 100 percent effluent is displayed for *C. dubia* and *P. promelas*.

Appendix B

City of Brawley Progress Report (November 2002) – Wastewater Treatment Plant Upgrades / Phase 2

CITY OF BRAWLEY PROGRESS REPORT
November 2002



CITY OF BRAWLEY

Wastewater Treatment Plant Upgrades
Phase 2

Progress Report – November 2002

Work Summary

Bid Schedule A – Economic Development Administration (EDA)

- The Contractor has completed the UV Structure to include all change orders.
- The Contractor has completed installation of the miscellaneous metals at the Primary Pump Station Structure.
- The Contractor has started installation of the new Clarifier mechanism.
- The Contractor has approval of the Progressive Cavity pumps.
- The Contractor has completed electrical duct banks and masonry screening wall at the stand-by generator.

Bid Schedule B – North American Development Bank (NADB)

- The Contractor has started the interior coating of the Headworks.
- The Contractor is working on the alignment of these mechanisms.
- The Contractor has installed the weir and launders in the existing clarifiers.
- The Engineer is reviewing the submittal received on the equipment for grit removal.
- The CM and the Ryan Company negotiated the Digester Demolition Change Order and the Contractor has started the demolition work.
- The Contractor should submit the proposal for the new Digester on December 16, 2002.
- The City is negotiating a Change Order with NAD Bank to fund the construction of the new Digesters.

CITY OF BRAWLEY PROGRESS REPORT

November 2002

Change Order Summary

Change Orders One (1) through Ten (10) have been issued by the City and executed by the Contractor.

Original Contract Amount for Schedule A: \$1,716,345.00
Total Amount for Schedule A Change Orders: \$136,935.00

Original Contract Amount for Schedule B: \$2,515,425.00
Total Amount for Schedule B Change Orders: \$277,792.28

Total Change Order Net Increase to Date is **\$414,727.28**.

Pending Change Orders

- New Concrete Digesters
- Control Room Roof

We have requested proposals on the changes listed above. These changes in scope will be negotiated in the month of December 2002.

Project Schedule

Contract Award Date: October 17, 2001.
Notice to Proceed Date: November 13, 2001.
Original Contract Duration: 360 Calendar Day.
Original Contract Completion Date: November 4, 2002.
Approved Time Extensions: 55 Calendar Days.
New Revised Contract Completion Date: December 24, 2002.

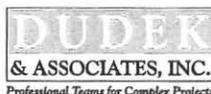
Progress Payments

Schedule A (EDA & Brawley)

To-date the Contractor has billed a total of \$1,637,730.00 out of Contract total of \$1,853,280.00.
EDA participation is \$1,555,000.00 recognized.

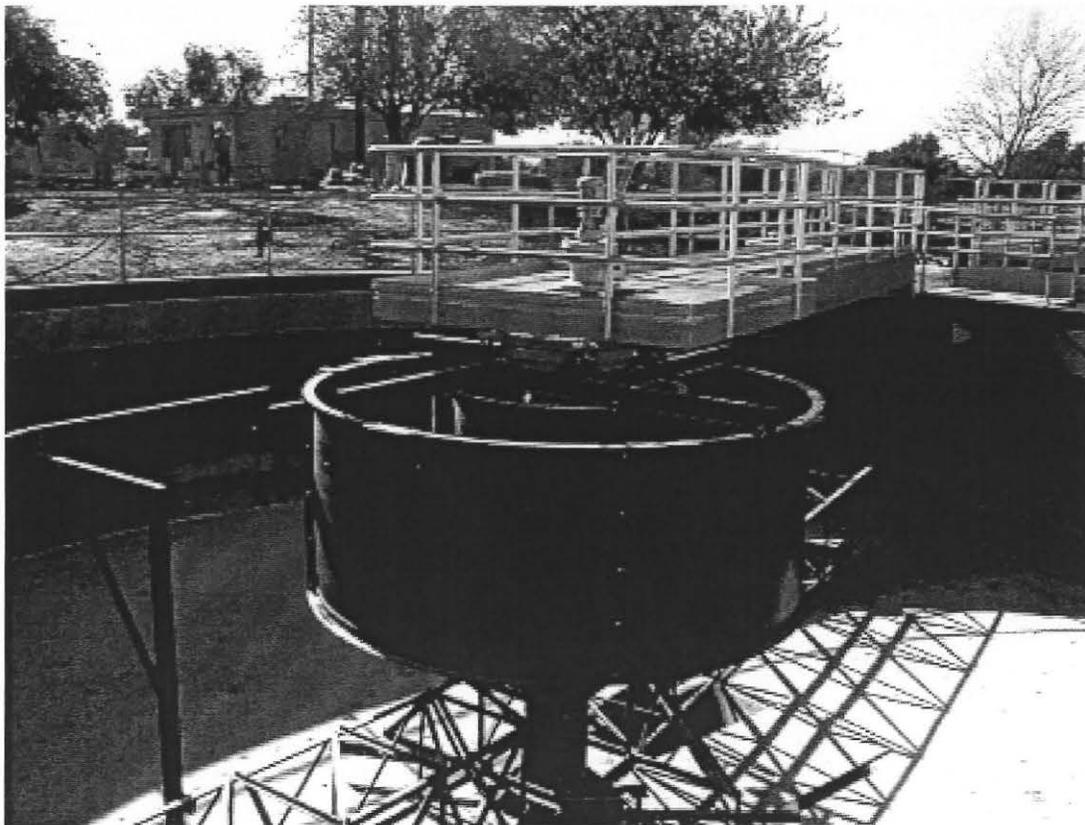
Schedule B (NADB)

To-date the Contractor has billed a total of \$1,828,472.78 out of Contract total of \$2,793,217.28.
NAD Bank participation is \$2,515,425.00 recognized.

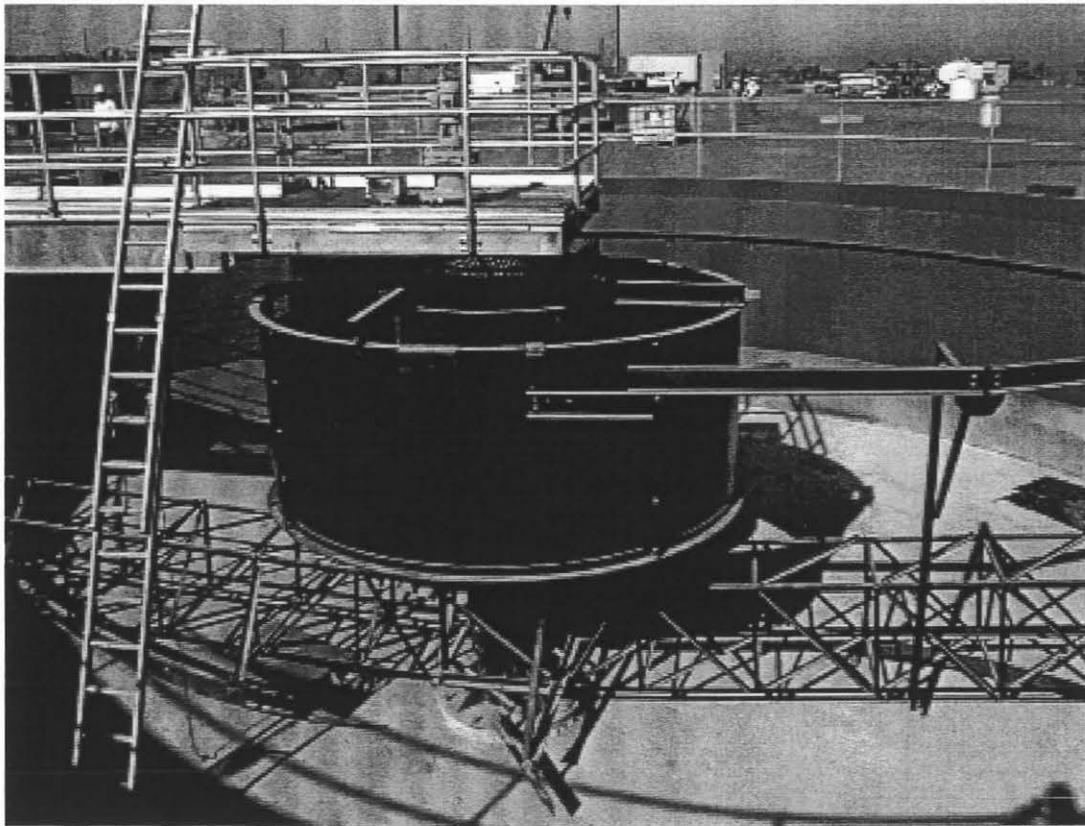




New Clarifier Mechanism



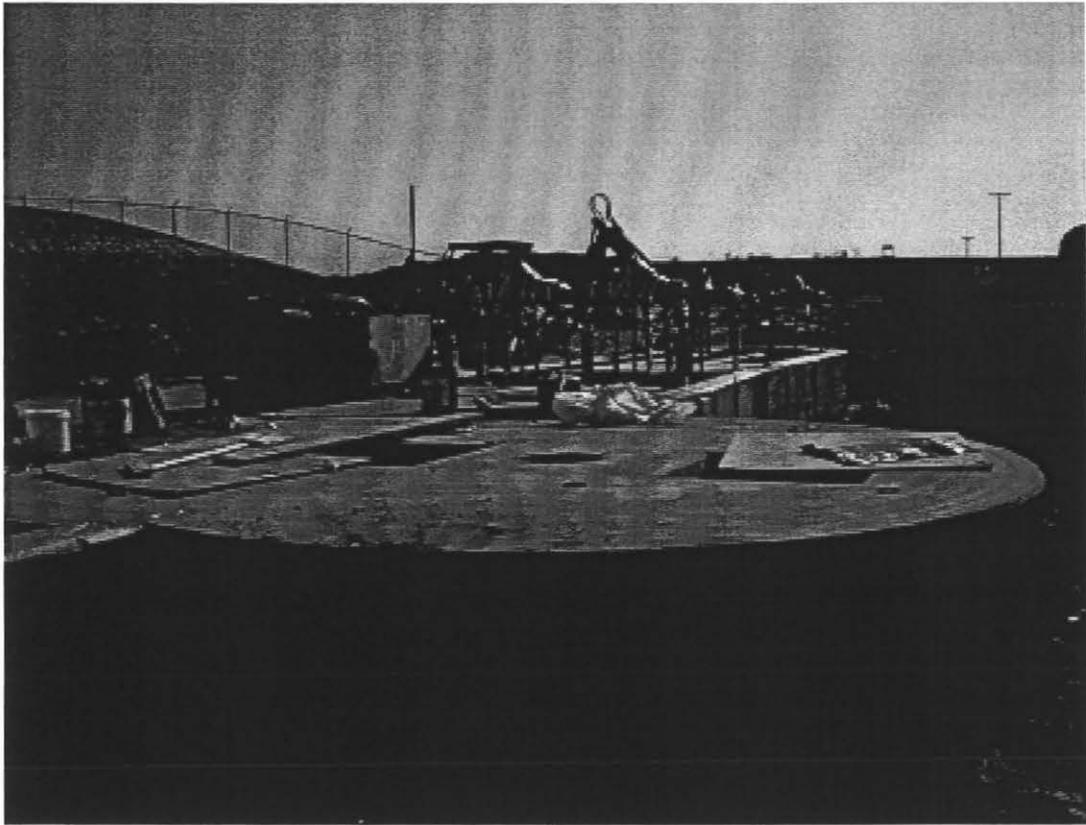
Clarifier Mechanism and Bridge Access



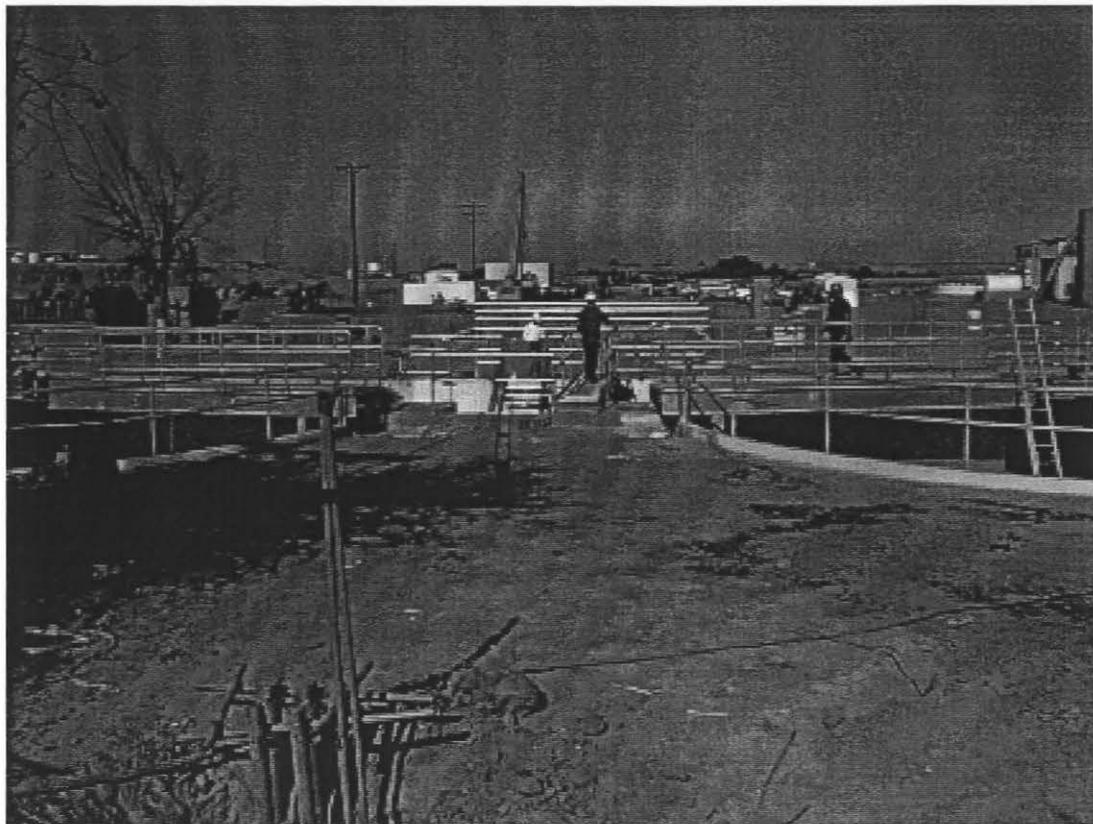
Clarifier Mechanism and Installed Coating



Headworks Weir and Launder



New Manhole and Headworks



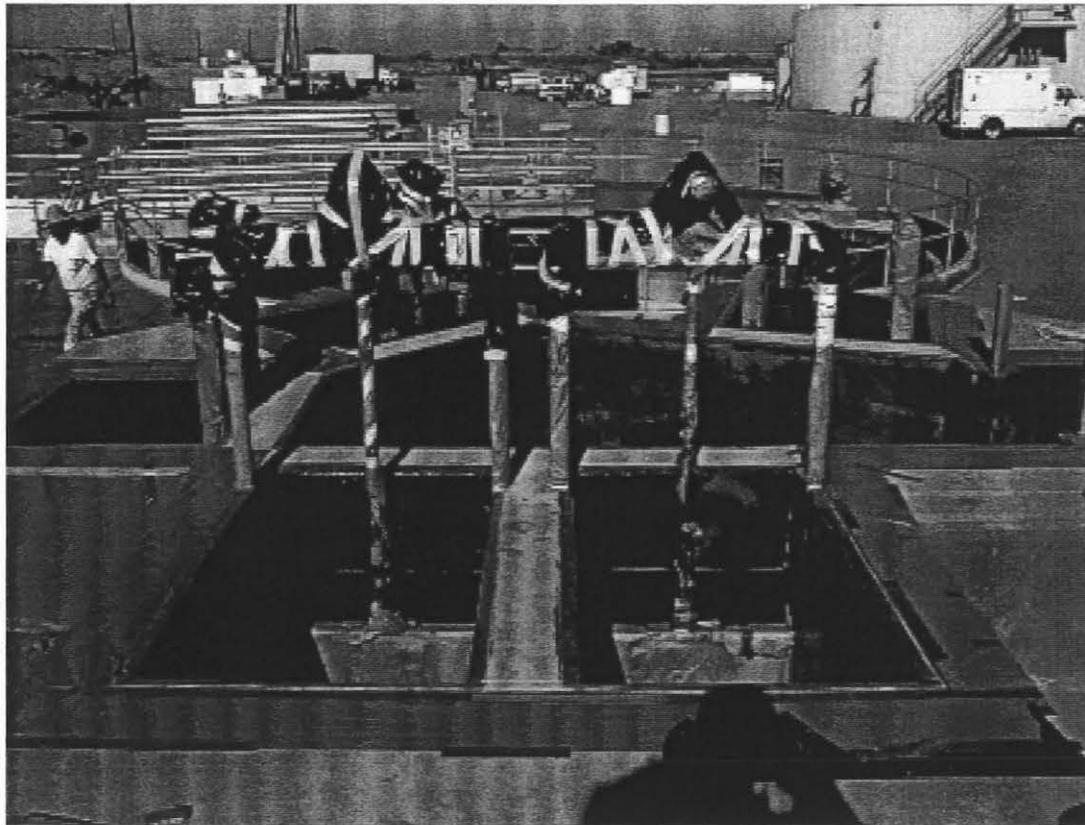
New Rails on Existing Primary Clarifiers



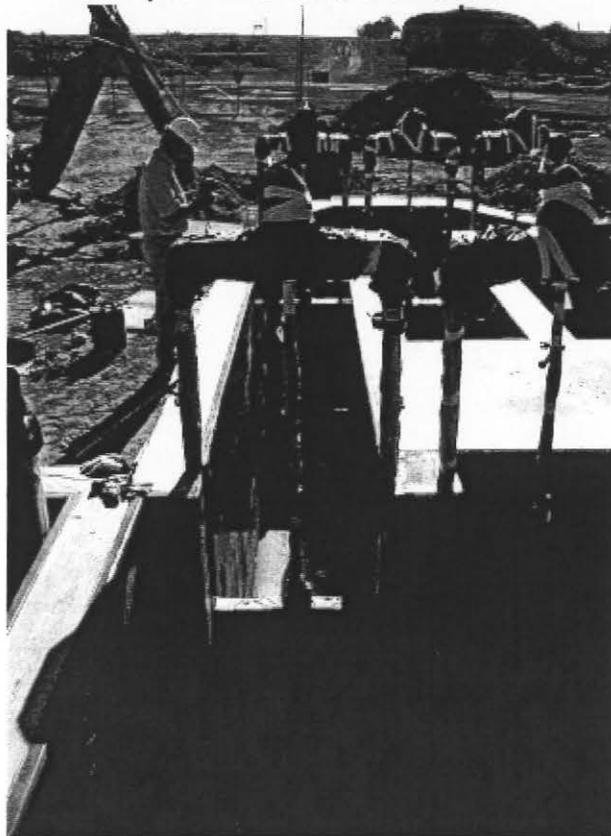
Grit Cleaner and Flow Splitter Box and Headworks



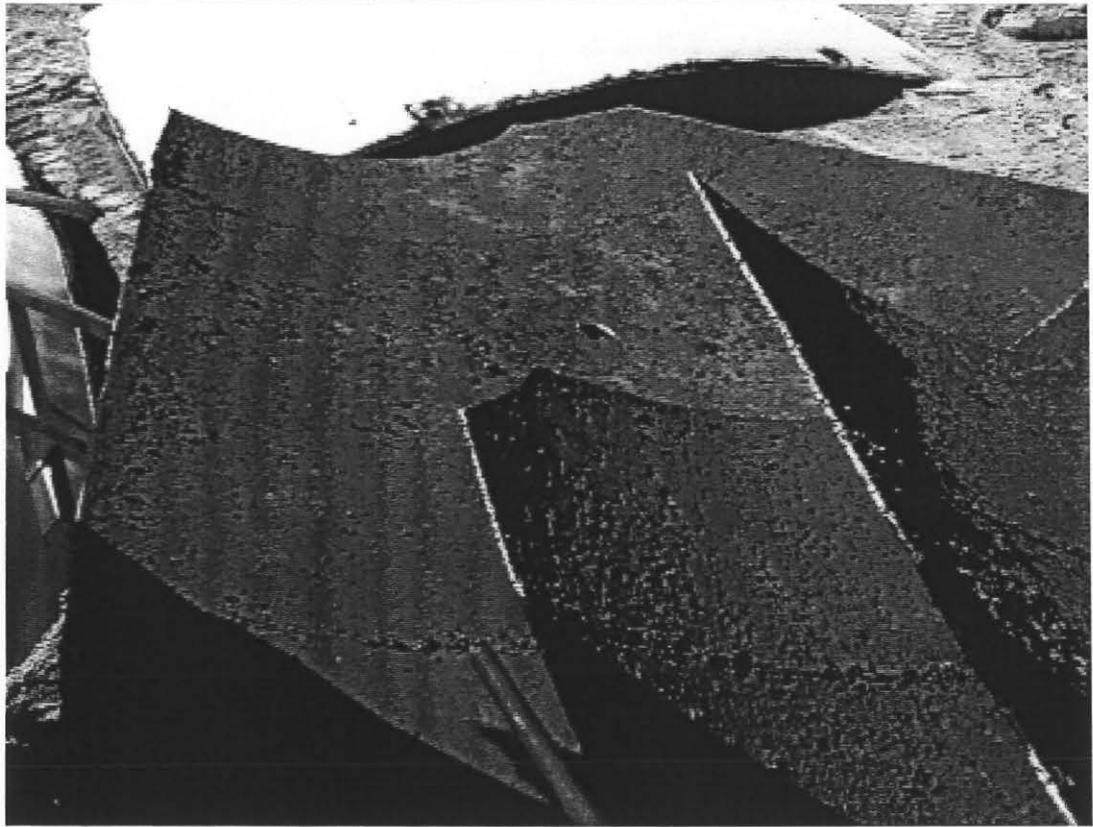
Headwork Area



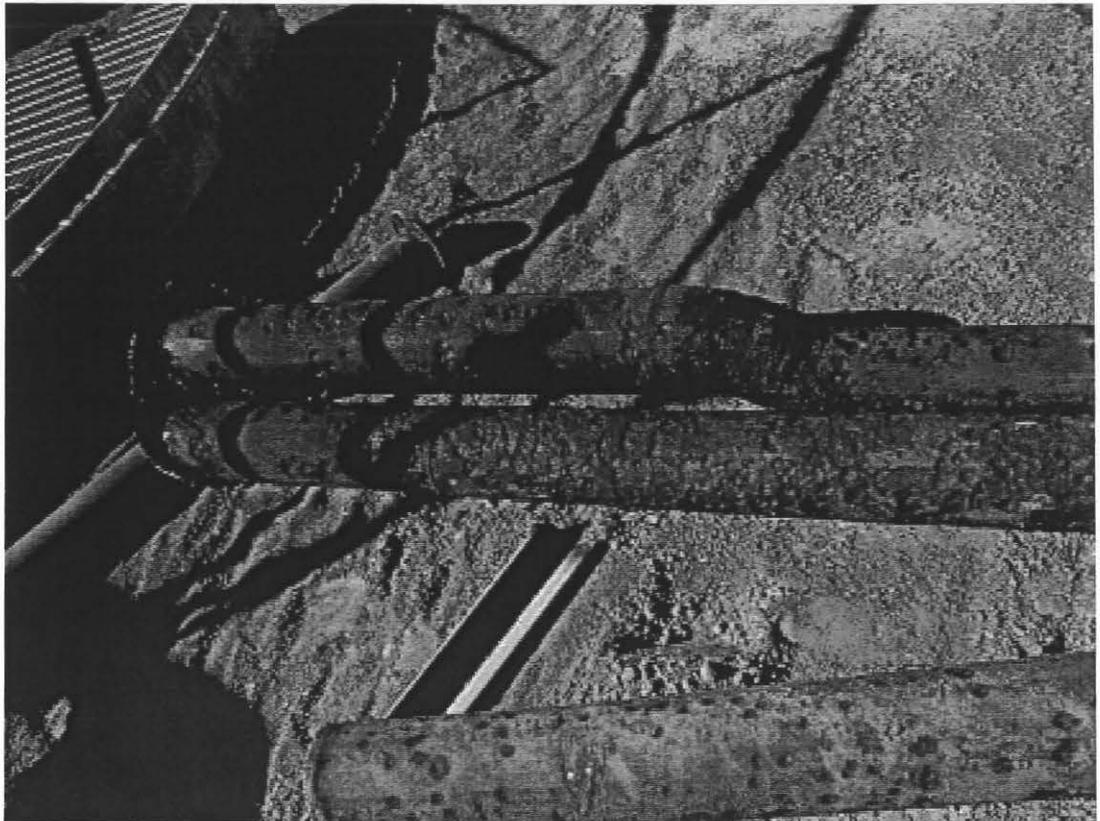
New Splitter Box and Weir Gates



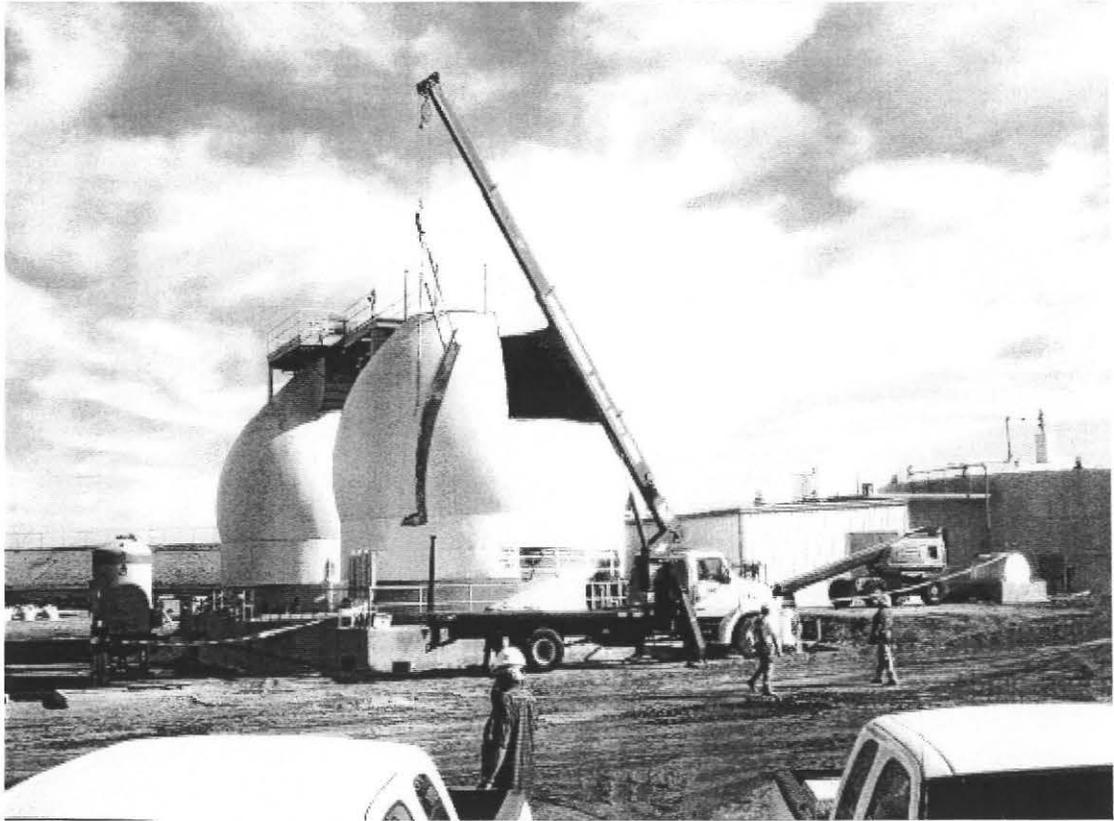
Headwork Coatings, Weirs and Launderers



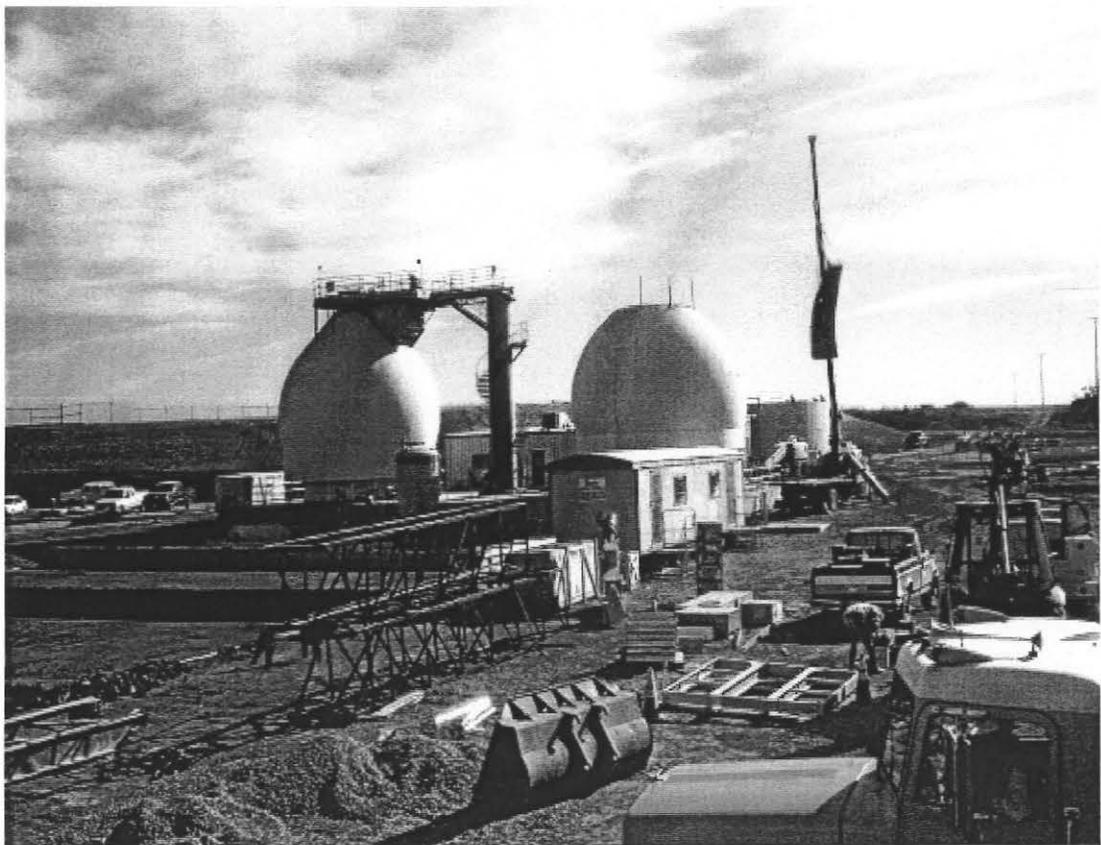
Old Anaerobic Digester Steel Shell Shows Pitting and Gouging



Old Interior Anaerobic Digester Piping



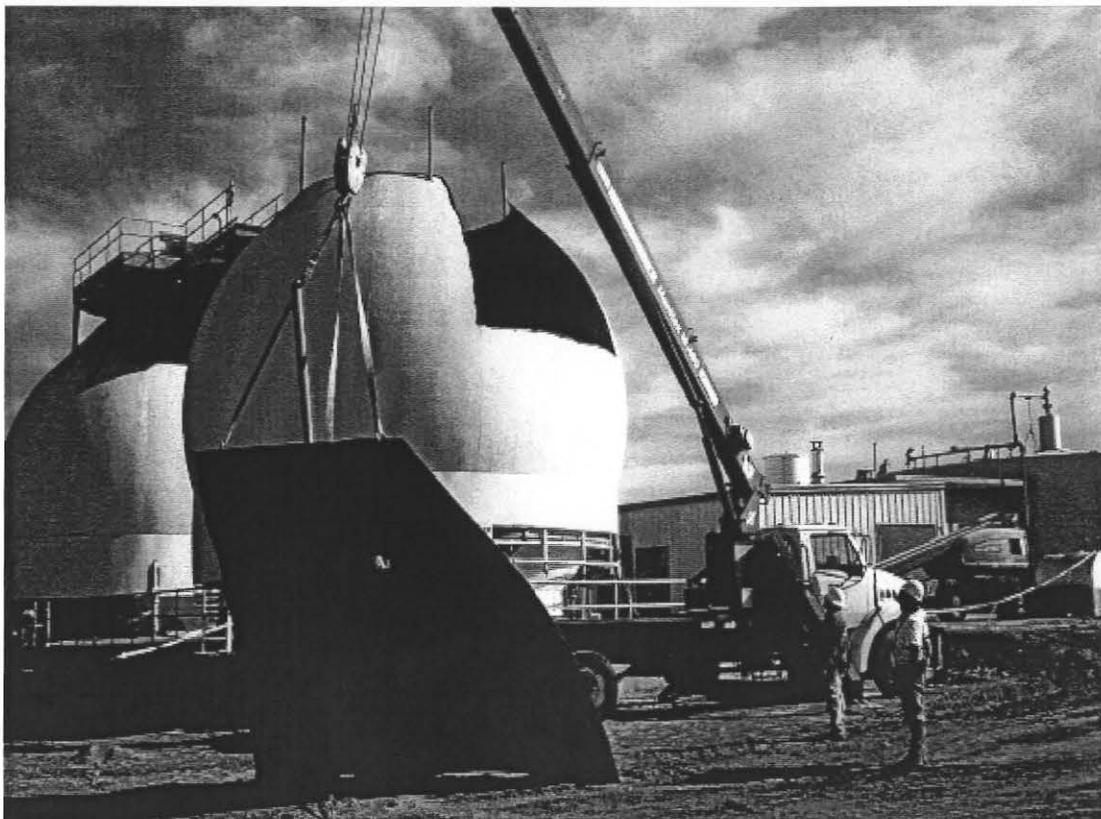
Anaerobic Digester Demolition



Anaerobic Digester Removal of the Center Catwalk



Anaerobic Digester Demolition



Digester Steel Plate Shell Removal

Appendix C

Spreadsheet from the California Regional Water Quality Control Board – Colorado River Basin Region (R-7) - City of Brawley POTW

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
 COLORADO RIVER BASIN REGION (R-7)
 CITY OF BRAWLEY POTW

Period	Flow, mgd	INFLUENT		EFFLUENT		% REMOVAL		EFFLUENT		
		BOD, mg/L	TSS, mg/L	BOD, mg/L	TSS, mg/L	% rem BOD	% rem TSS	pH	tds	Ammonia
Jun-00	3.33	119	127	44	46	63%	64%			
Jul-00	3.31	95.3	69.5	26.3	21.1	72%	70%	8.6	811	7.9
Aug-00	3.32	71	89.7	18.3	24.5	74%	73%	7.7	807	7.45
Sep-00	3.45	78.5	146.2	17.8	21.8	77%	85%	7.9	895	12
Oct-00	3.44	70	198.3	25	30.3	64%	85%	7.8		
Nov-00	3.26	102.5	92.6	29.3	32.9	71%	64%	7.7	828	14
Dec-00	3.25	97.3	104.9	34.3	27.3	65%	74%	7.7	834	15.7
Jan-01	3.08	110	138.8	29.3	28.6	73%	79%	7.6	818	21.4
Feb-01	3.15	106	135	35	37	67%	73%	7.6	847	17.4
Mar-01	3.15	107	115	35	35	67%	70%	7.5	745	17.1
Apr-01	3.06	124	131	38.8	27.2	69%	79%	7.6	832	16.2
May-01	3.1	167	215	36	23	78%	89%	7.6	852	19.3
Jun-01	3.04	155	115	46	26	70%	77%	7.7	803	14.9
Jul-01	3.02	112	101.5	46	48	59%	53%	7.7	789	12.2
Aug-01	3.2	151.9	78.7	38.6	35.1	75%	55%	7.7	790	7.3
Sep-01	3.3	108	97.3	40	35	63%	64%	7.5	825	12.2
Oct-01	3.24	132	111	24	27	82%	76%	7.6	904	11.6
Nov-01	3.08	120	84	15	11	88%	87%	7.9	912	15.8
Dec-01	3.12	153	152	21	21.4	86%	86%	7.9	892	19.6
Jan-02	3.19	131	117	16.2	19.4	88%	83%	7.8	936	20.6
Feb-02	2.73	208	160.7	20.3	31.8	90%	80%	7.8	962	20.8
Mar-02	2.66	218	155	27	31	88%	80%	7.7	991	33.8
Apr-02	2.63	215	106.6	42.9	34.6	80%	68%	7.6	1027	26.4
May-02	2.65	137	175.8	28.5	25.5	79%	85%	7.8	1094	40
Jun-02	2.66	217	188	14	16.7	94%	91%	7.9	1272	36.2
Jul-02	2.56	112.2	80.7	13.9	18.2	88%	77%	7.9	1211	34.1
Aug-02	3.81	103.6	85.6	13.6	11.2	87%	87%	8	1110	33.6
Sep-02	3.55	133.5	83.6	12.1	19.9	91%	76%	7.7	1197	26.8
max	3.81	218	215	46	48	94%	91%	8.6	1272	40
min	2.56	70	69.5	12.1	11	59%	53%	7.5	745	7.3
median	3.15	119.5	115	27.75	27.1	76%	77%	7.7	872	17.25
average	3.12	130.53	123.41	28.15	27.38	77%	76%	7.76	922.46	19.78
std dev	0.30	42.18	38.77	10.89	8.93	10%	10%	0.21	145.30	9.33
Ave + 2 std dev	3.72	214.88	200.95	49.93	45.23	97%	96%	8.19	1213.06	38.44