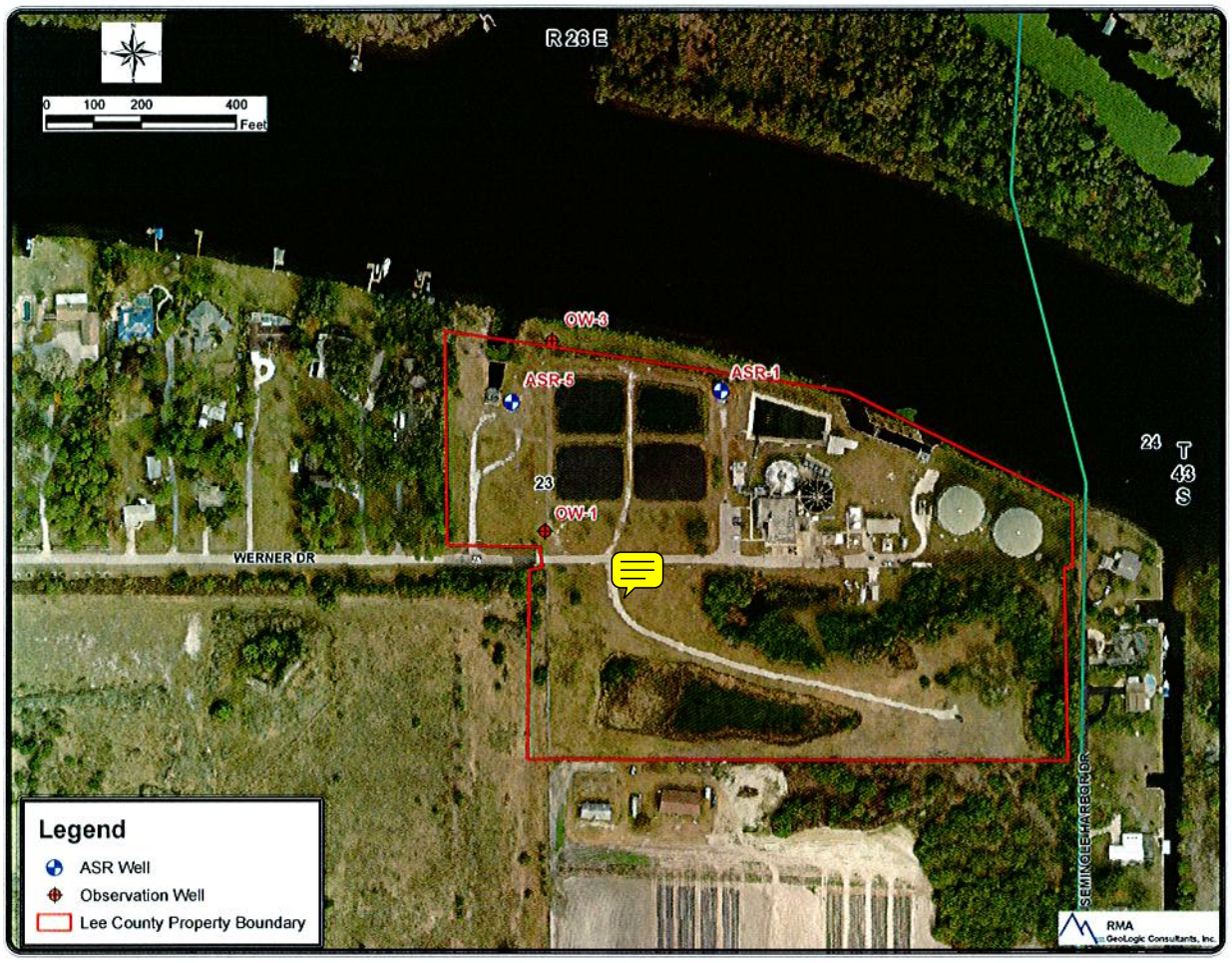
LEE COUNTY
SOUTHWEST FLORIDA

CORRECTIVE ACTION PLAN FOR LEE COUNTY UTILITIES OLGA WATER TREATMENT PLANT AQUIFER STORAGE AND RECOVERY SYSTEM, LEE COUNTY, FLORIDA



April, 2011

Prepared by:

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CORRECTIVE ACTION PLAN FOR
LEE COUNTY UTILITIES
OLGA WATER TREATMENT PLANT
AQUIFER STORAGE AND RECOVERY SYSTEM,
LEE COUNTY, FLORIDA

Prepared for:

Lee County Utilities
1500 Monroe Street, Third Floor
Ft. Myers, FL 33901

April, 2011

Project # 10-547

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I. INTRODUCTION

A. Background

The Olga aquifer storage and recovery (ASR) system is located at the Lee County Utilities Olga water treatment plant (WTP) in north central Lee County, Florida (Figures 1-1 and 1-2). The Olga ASR system is permitted by Florida Department of Environmental Protection (FDEP) underground injection control (UIC) construction permit 125120-180-UC. This construction permit was issued on October 2, 2009 in conjunction with an Administrative Order (AO-051-SD-UIC09) to establish a compliance schedule for the Olga ASR system. A copy of the UIC construction permit for the Olga ASR system is included in Appendix A. A copy of the Administrative Order is provided in Appendix B.

The initial three wells for the Olga ASR system, comprised of an exploratory well (subsequently converted to storage zone monitoring well (OW-1)), a pilot ASR well (ASR-1), and a second storage zone monitoring well (OW-3), were installed in 1999. In 2006 a second ASR well (ASR-5) was installed at the site.

Four complete operational cycles have been conducted for well ASR-1, no water has been injected into ASR-5 to date. Injection and recovery operations of the Olga ASR system ceased after Cycle 4 in July, 2006.

The only noncompliance issue related to the operational testing of well ASR-1 has been arsenic concentrations in the recovered water that have exceeded regulatory criteria and slightly elevated arsenic concentrations in the storage zone observation wells after cessation of operations of the last cycle (i.e. Cycle 4). The slightly elevated arsenic concentrations after Cycle 4 (i.e. during storage mode) in the observation wells are believed to be the result of pumping from well OW-3 for drilling mud make-up water supply during construction of well ASR-5 and the continued purging of the observation wells for storage period sampling. This continued sampling likely facilitated the movement of the mixing zone towards the observation wells (RMA GeoLogic Consultants, 2010). The arsenic concentrations are higher in well OW-3 (i.e. about 39 ug/l in

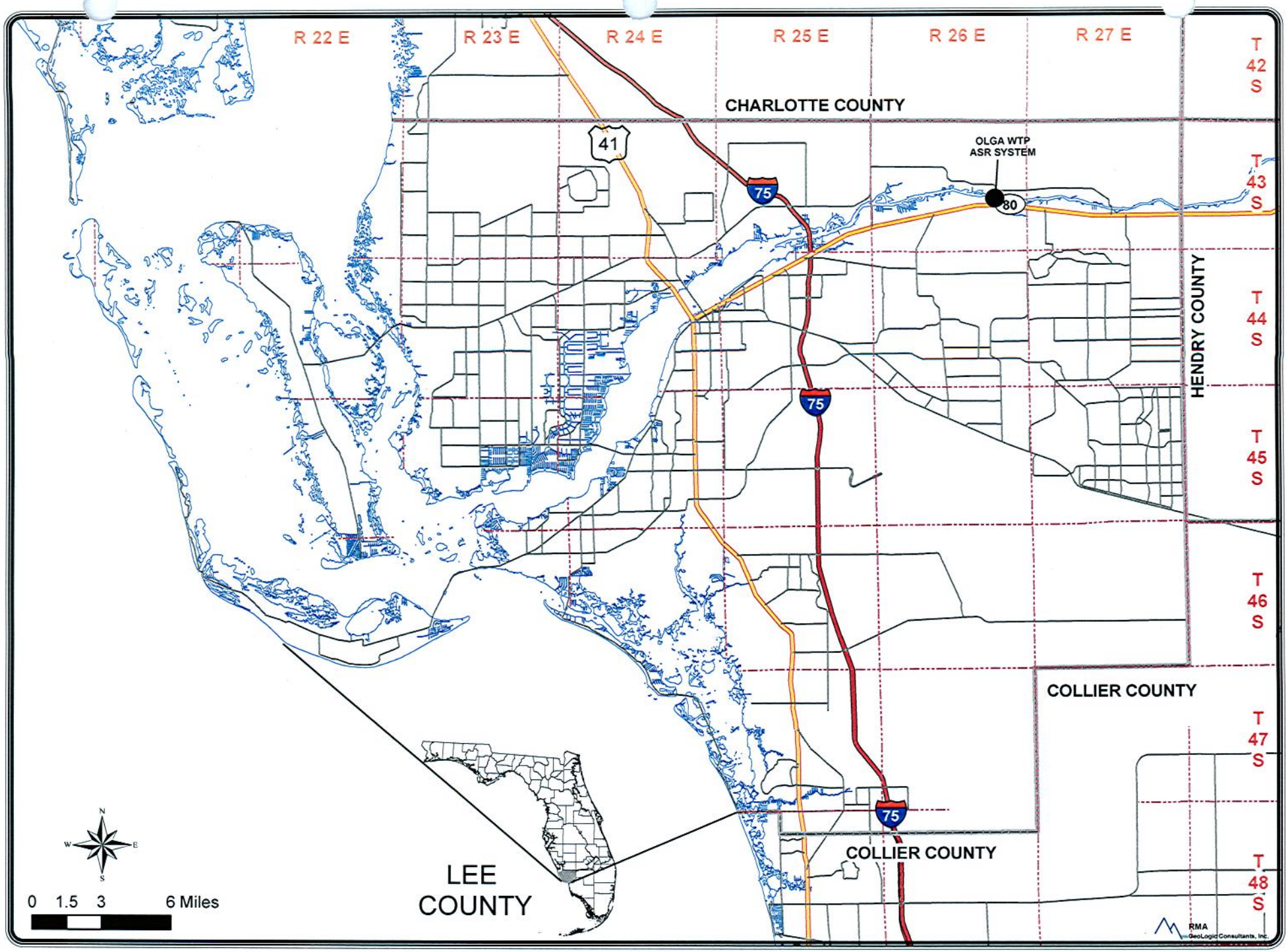


FIGURE 1-1. GENERAL SITE LOCATION MAP.

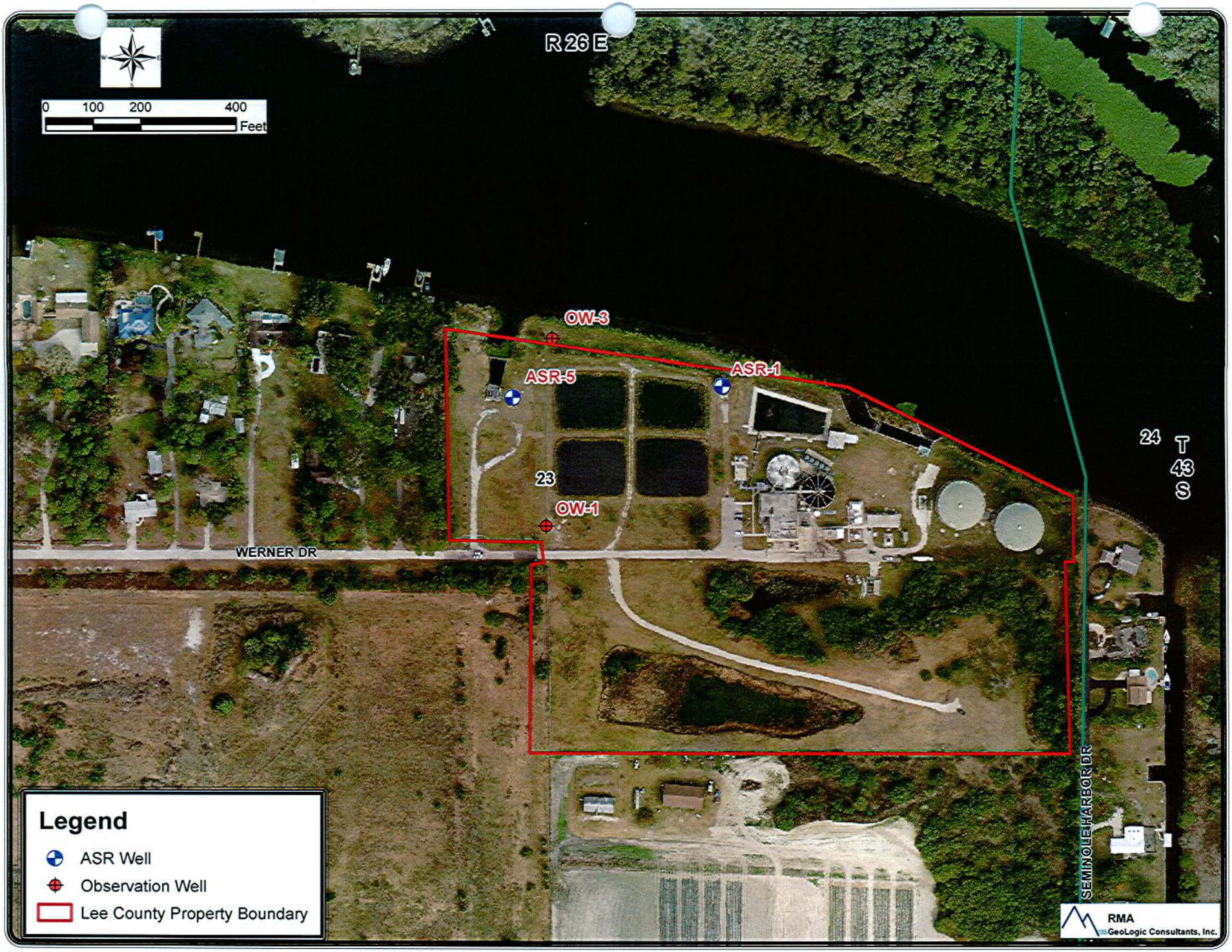


FIGURE 1-2. AERIAL PHOTO SHOWING LOCATION OF OLGA ASR SYSTEM WELLS.

January, 2011) than in well OW-1 (i.e. about 12 ug/l in January, 2011). Wells OW-3 and OW-1 are located approximately 300 and 500 feet from well ASR-1, respectively.

B. Purpose of Investigation

As part of the compliance schedule included in the AO, an assessment plan (AP) was provided to the FDEP (RMA GeoLogic Consultants, 2010). The AP provided a detailed analysis of the operational data, modeled the injected water through each operational cycle, determined an optimal storage volume, provided operational protocols, evaluated the effectiveness of the monitoring system, and provided recommendations for the future operation of the Olga ASR system in compliance with FDEP regulations. After review of the AP, the FDEP requested that a Corrective Action Plan (CAP) be prepared and submitted for review and approval.

The CAP was required in the AO issued in conjunction with the construction permit for Olga ASR system (Appendix B). The purpose of the CAP is to set forth a detailed approach and schedule for conducting the remediation and conditioning of the storage zone for future operation of the system in full regulatory compliance.

C. Scope of Investigation

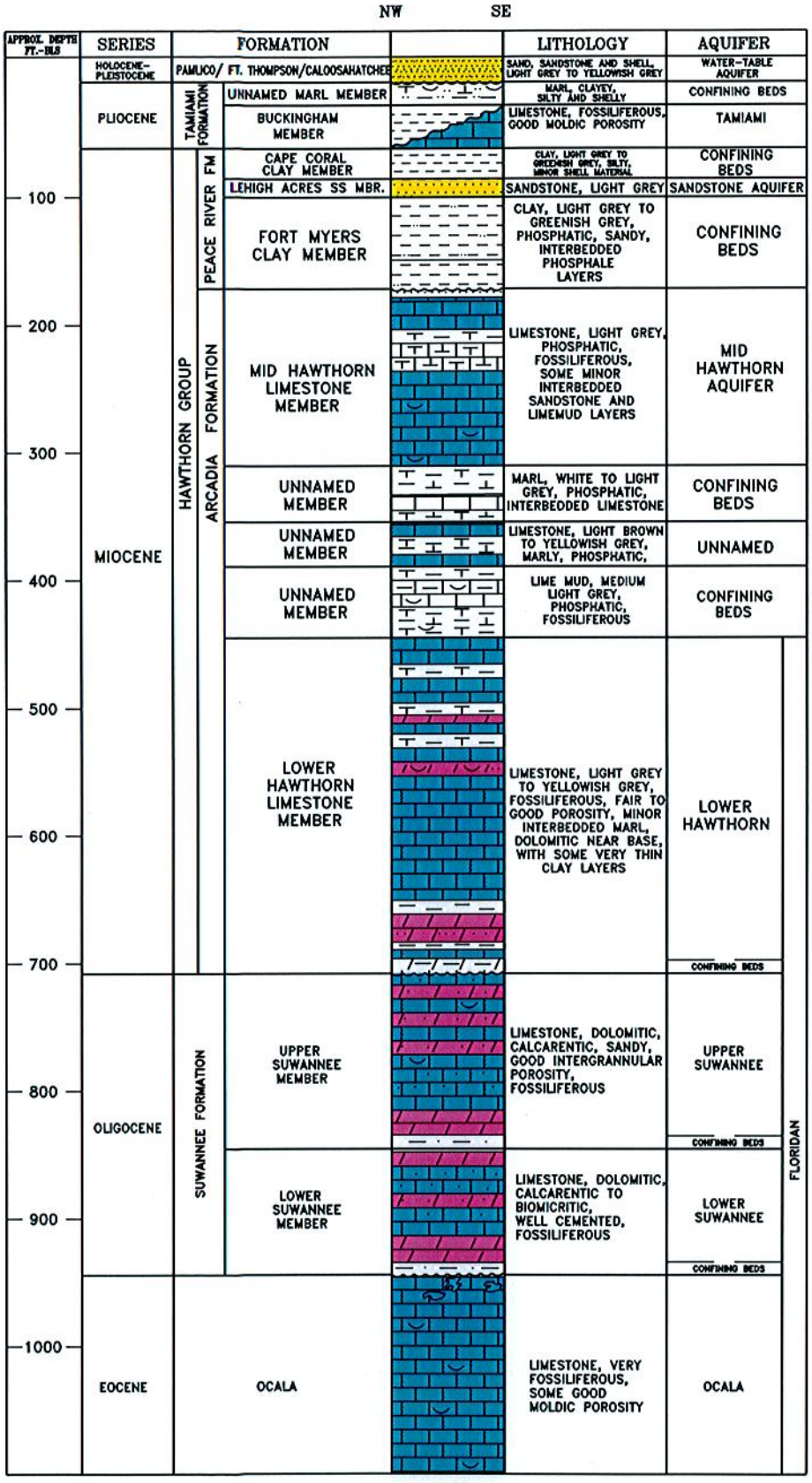
The scope of the present investigation was to provide a response to the FDEP request for additional information (Appendix C) consisting of developing a CAP in accordance with Item 7 of the AO. The CAP includes: (1) evaluation of background water quality (i.e. prior to ASR operations) and injected water quality; (2) documentation of current volumes of injected water in storage and extent of arsenic mobilization; (3) utilization of the previously developed calibrated groundwater flow and solute transport model to determine optimum pumping rates and durations from each well to reach background conditions in the storage zone; (4) preparation of a plan describing the proposed disposition of the recovered water during remediation operations, and (5) preparation of a post-recovery operational testing plan.

II. BACKGROUND WATER QUALITY IN THE STORAGE ZONE

The Olga ASR storage zone is a limestone interval in the lower part of the Suwannee formation portion of the Upper Floridan aquifer system between the approximate depths of 850 and 920 feet below land surface (Figure 2-1). Confining units are present above and below this interval which serve to isolate it from other portions of the aquifer.

Background groundwater quality in the ASR storage zone is brackish, with dissolved chloride concentrations ranging from 1,000 to 1,100 milligrams per liter (mg/l) in the groundwater initially sampled from wells ASR-1, OW-1, and OW-3 (Table 2-1). The arsenic concentrations in the produced water from the storage zone were below the detection limit of 3 ug/l prior to ASR operations. It should be noted that the water quality obtained from the water produced from well ASR-5 after installation is not representative of the background conditions of the storage zone. That well is located within the area of the injected water of well ASR-1. Well ASR-5 was constructed in 2006 after completion of Cycle 4 in well ASR-1.

GENERAL HYDROSTRATIGRAPHIC COLUMN FOR OLGA AREA



RMA GeoLogic Consultants, Inc.

PROJECT NAME: OLGA ASR

PROJECT NUMBER: 10-547

DATE: 03/11/11

FIGURE 2-1. GENERALIZED HYDROSTRATIGRAPHIC COLUMN FOR THE OLGA AREA.

TABLE 2-1

SUMMARY OF INITIAL WATER QUALITY COLLECTED IN OLGA ASR SYSTEM WELLS

Well No.	Dissolved Chlorides (mg/)	Arsenic (ug/l)	Sample Date
ASR-1	1,000	<3.0	November 9, 1999
ASR-5*	432*	9.3*	October 10, 2006
OW-1	1,100	<3.0	February 4, 1999
OW-3	1,030	<3.0	March 25, 1999

* = Not representative of background conditions in storage zone

III. INJECTED WATER QUALITY

The injected water in the Olga ASR system is potable water from the Olga WTP. In compliance with the FDEP UIC permit for the Olga ASR system, the injected water was sampled and analyzed on a weekly basis during the four operational cycles. The injected water was fresh with an average dissolved chloride concentration of approximately 75 milligrams per liter (mg/l), during the four operational cycles conducted in well ASR-1. A plot of dissolved chloride concentrations for the injected water is provided as Figure 3-1.

The arsenic concentrations in the injected water were consistently below 3 micrograms per liter (ug/l) during the four operational cycles conducted in well ASR-1. A plot of arsenic concentrations for the injected water is provided as Figure 3-2.

The field-measured dissolved oxygen concentrations in the injected water varied by cycle, with a range of dissolved oxygen concentrations from 4 to 7 mg/l during Cycles 1 through 3 and about 9 mg/l in Cycle 4. The higher dissolved oxygen concentrations during Cycle 4 were due to a change in the Olga water treatment plant process. A plot of dissolved oxygen concentrations for the injected water is provided as Figure 3-3.

FIGURE 3-1. PLOT OF DISSOLVED CHLORIDE CONCENTRATIONS IN INJECTED WATER.

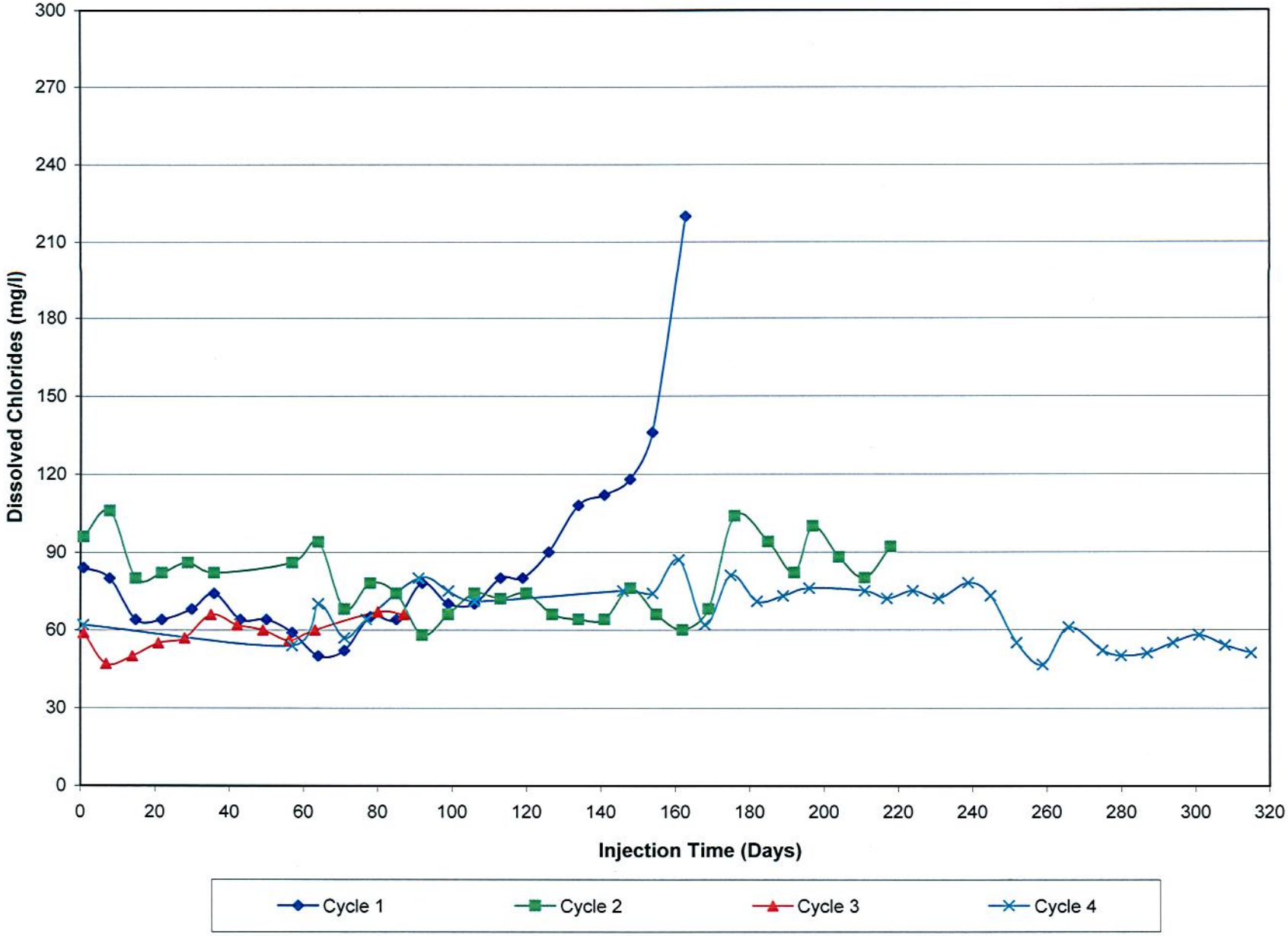


FIGURE 3-2. PLOT OF ARSENIC CONCENTRATIONS IN INJECTED WATER.

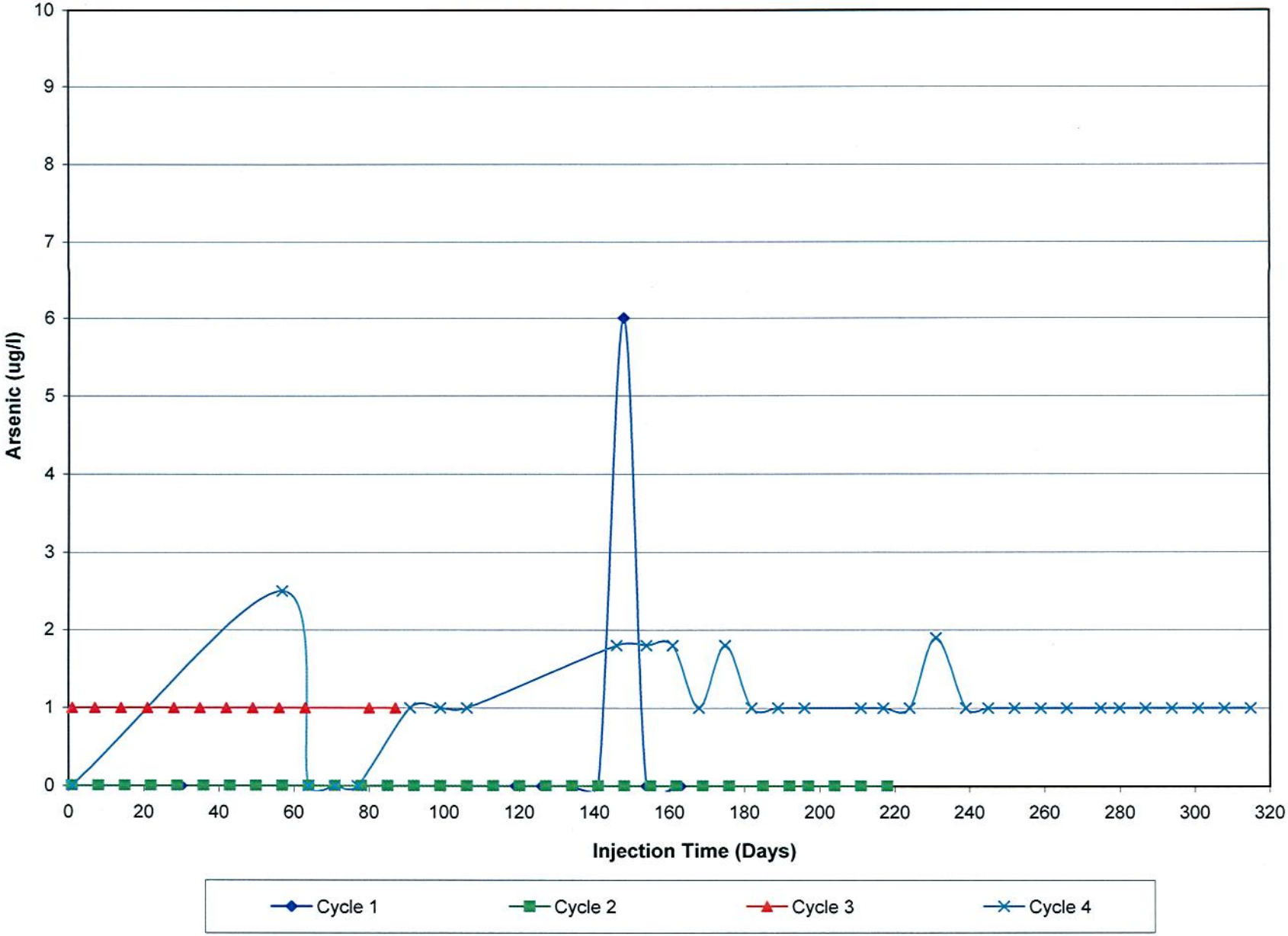
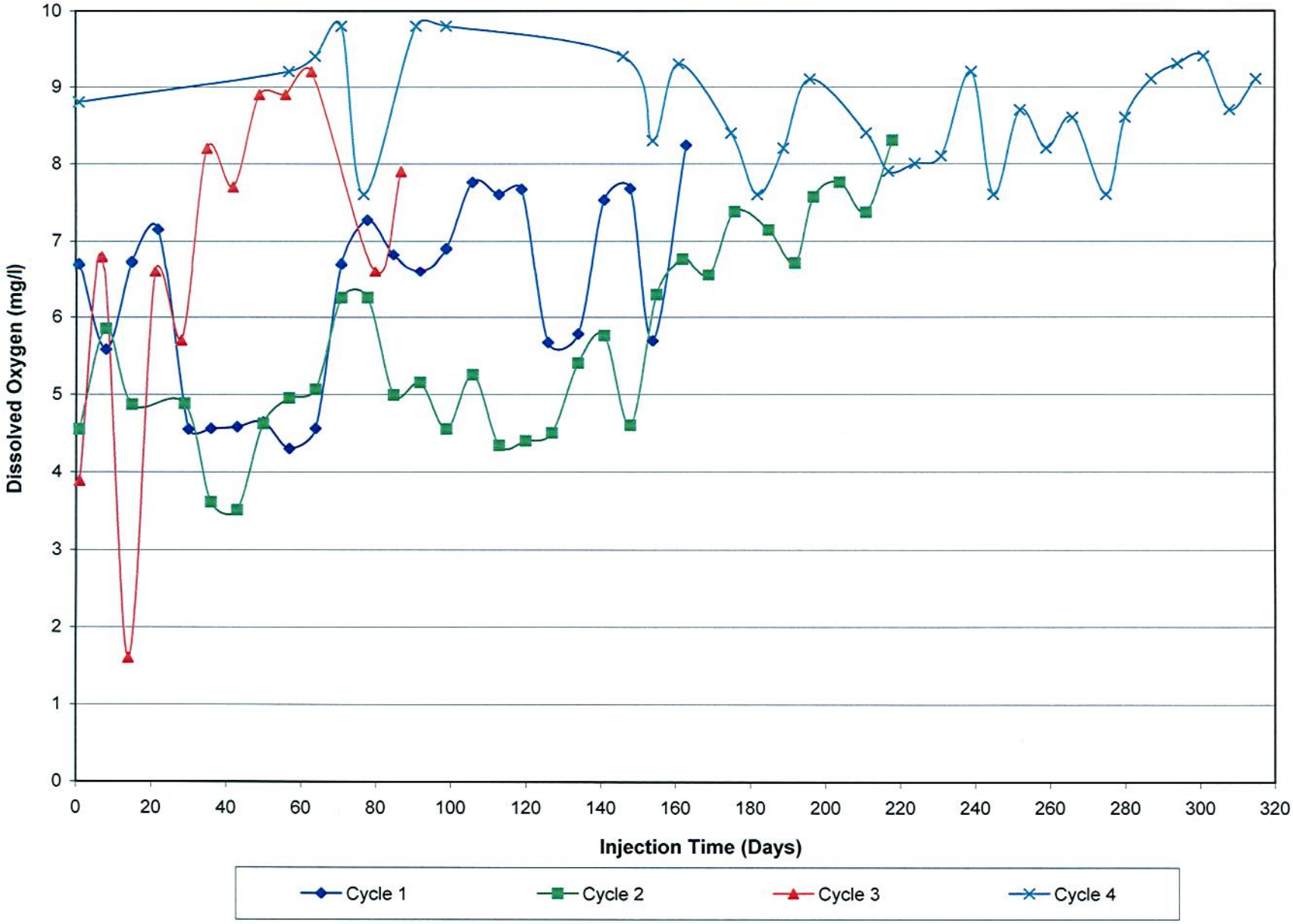


FIGURE 3-3. PLOT OF DISSOLVED OXYGEN CONCENTRATIONS IN INJECTED WATER.



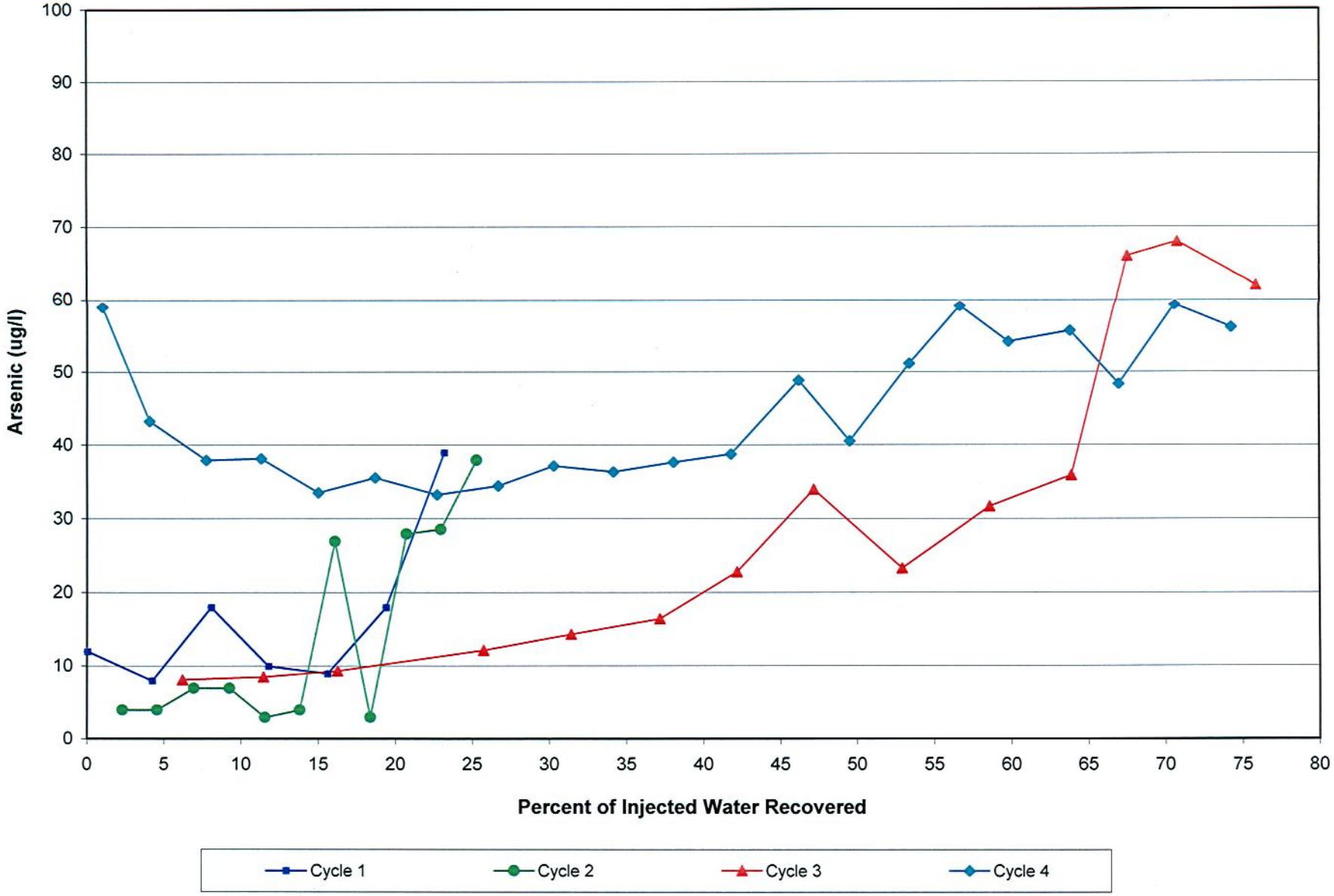
IV. DOCUMENTED EXTENT OF ARSENIC MOBILIZATION

Arsenic concentrations in recovered water from well ASR-1 have reached the current FDEP maximum contaminant limit (MCL) of 10 ug/l during recovery operations for each cycle. The maximum values for any of the four cycles were recorded in the latter part of Cycle 3 (i.e. about 69 ug/l) when recovery operations from the ASR system extended to close to 76 percent of the volume of injected water. That represented a 50% increase compared to Cycle 2 (i.e. recovery of 25%). The combination of this extended recovery, followed by a long period of intermittent injection (i.e. close to one year of injection) during Cycle 4, and high dissolved oxygen concentrations in the injected water during Cycle 4 (Figure 3-3) facilitated the leaching of arsenic proximal to the borehole of well ASR-1. This resulted in maximum arsenic concentrations of about 60 ug/l during the early portion of recovery in Cycle 4. The arsenic concentration in well ASR-1 at the end of recovery operations in Cycle 4 was 56 ug/l. A plot of arsenic concentrations in recovered water in well ASR-1 for each cycle is provided as Figure 4-1.

The monitoring data collected in the storage zone observation wells during four complete operational cycles indicate that arsenic concentrations exceeded the maximum contaminant limit (MCL) established by the FDEP only once during recovery of Cycle 4 with 10.5 ug/l in well OW-3, which is located approximately 370 feet from well ASR-1. At that time that well was used to supply water for the drilling of well ASR-5. Therefore, the groundwater with elevated arsenic concentrations is restricted to the area between well ASR-1 and the storage zone observations wells. Well OW-1, located 473 feet from well ASR-1, did not detect arsenic concentrations above 10 ug/l during the four operational cycles. Therefore, the extent of arsenic mobilization at Olga ASR system is within approximately 450 feet of well ASR-1.

It should be noted that after cessation of operations of Cycle 4, continued water quality testing of the two storage zone monitoring wells during the extended storage period from August, 2006 to present have indicated arsenic concentrations higher than the MCL of 10 ug/l. This is likely the result of drawing the fresh water with elevated arsenic concentrations toward the observations wells due to pumpage from well OW-3 to supply make-up water for drilling mud during drilling of well ASR-5 and the subsequent regular pumpage from both observation wells during purging prior to the weekly sampling after cessation of Cycle 4 operations. The weekly sampling of the

FIGURE 4-1. PLOT OF ARSENIC CONCENTRATIONS IN ASR-1 RECOVERED WATER FOR EACH CYCLE.



observation wells was changed to monthly, as specified in the FDEP permit issued in October, 2009. After changing the sampling frequency to monthly, arsenic concentrations in well OW-1 have stabilized at approximately 12 ug/l (Figure 4-2). Arsenic concentrations in well OW-3 continued increasing to a maximum of 49 ug/l from where they have subsequently declined to the most recent available (i.e. January, 2011) value of 38 ug/l (Figure 4-3). The arsenic concentrations show a strong inverse correlation with dissolved chloride concentrations. The decrease in dissolved chloride concentrations in well OW-3 corresponds with an increase in arsenic concentrations and vice versa which corroborates that the groundwater with high arsenic is restricted between well OW-3 and well ASR-1. Similarly, dissolved chloride concentrations in well OW-1 remained fairly constant corresponding with fairly constant arsenic concentrations.

FIGURE 4-2. PLOT OF WATER QUALITY IN STORAGE ZONE OW-1 AFTER CESSATION OF CYCLE 4

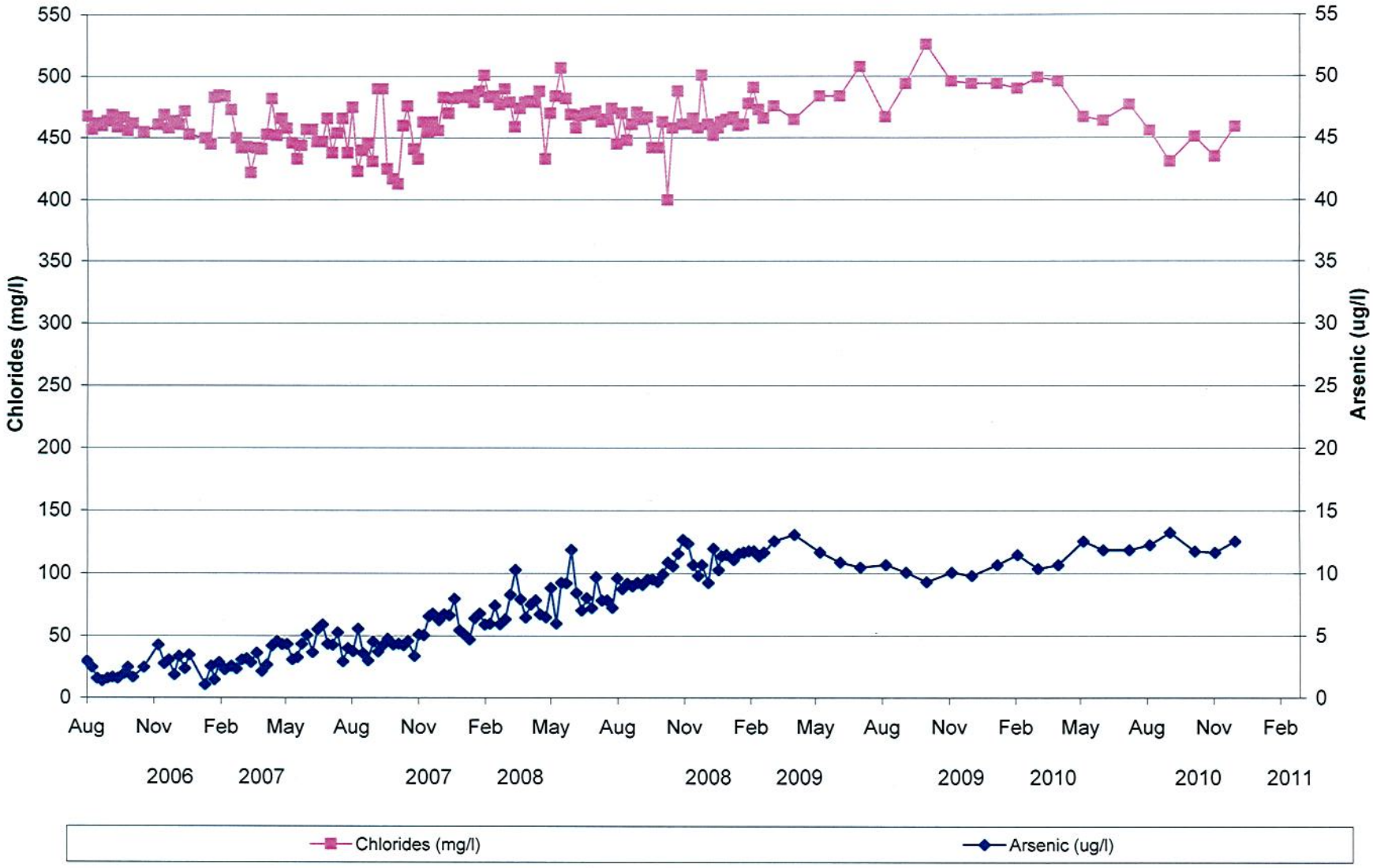
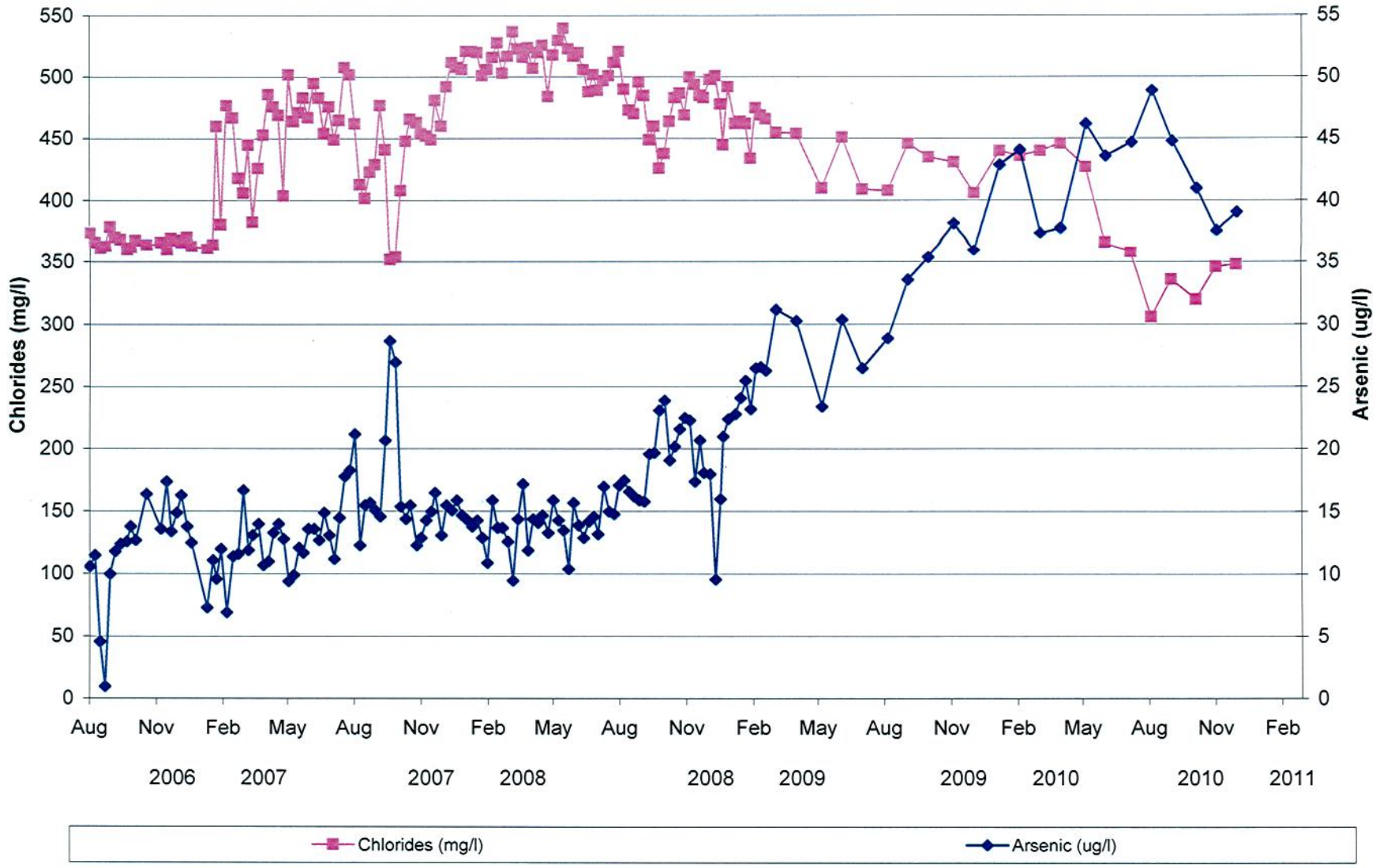


FIGURE 4-3. PLOT OF WATER QUALITY IN STORAGE ZONE OW-3 AFTER CESSATION OF CYCLE 4



V. CURRENT VOLUME IN STORAGE AFTER 4 CYCLES

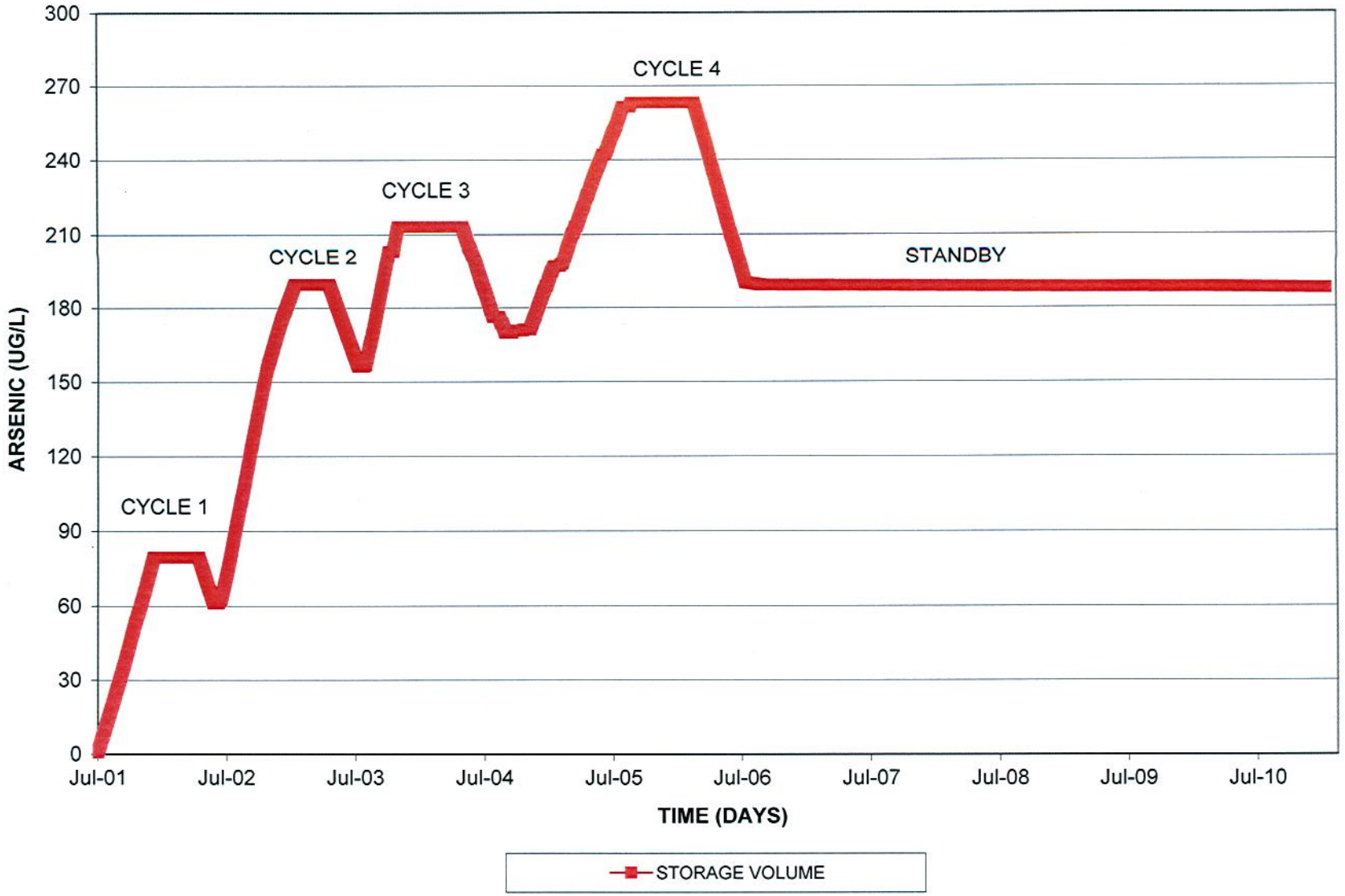
As previously discussed, four complete operational cycles has been conducted using well ASR-1. A total of 358.7 million gallons (MG) were injected into well ASR-1 with 169.1 MG recovered from that well. In order to obtain a more accurate estimate of the current volume in storage, additional injected water volumes that has been pumped out of the storage zone during purging of the observation wells for sampling and during drilling and testing of well ASR-5 were also considered in the calculations. The water purged from the observation wells during sampling was calculated based on purge volumes indicated by the County Consultant for Cycles 1 and 2 and by the laboratory for Cycles 3, 4, and the extended subsequent standby period and number of sampling events. The water pumped from well ASR-5 during drilling and testing was calculated based on well flow and time of duration of reverse air drilling, well development, step drawdown pumping test, and constant-rate pumping test.

Based on injected water volumes, recovered water volumes, and pumped water volumes, a total of 186.6 MG are estimated to remain in the Olga ASR storage zone. A summary of injected, recovered, and pumped water volumes from the ASR storage zone is provided on Table 5-1. A plot showing cumulative storage volume in Olga ASR system is provided as Figure 5-1.

TABLE 5-1. SUMMARY OF INJECTION AND PUMPING OPERATIONS FOR THE OLGA ASR SYSTEM.

Cycle #	INJECTION		STORAGE		RECOVERY		Volume Injected in ASR-1 (MG)	Volume Recovered from ASR-1 (MG)	Estimated Injected Water Purged from Observation Wells and ASR-5 (MG)	Injected Water Remaining in Storage (MG)
	Begins	Ends	Begins	Ends	Begins	Ends				
1	7/17/2001	12/27/2001	12/27/2001	4/29/2002	4/29/2002	6/12/2002	79.7	18.9	0.20	60.6
2	6/24/2002	1/28/2003	1/28/2003	5/7/2003	5/7/2003	7/28/2003	128.6	35.1	0.29	93.2
3	7/29/2003	11/20/2003	11/20/2003	5/19/2004	5/19/2004	9/16/2004	56.9	43.2	0.07	13.7
4	10/5/2004	9/9/2005	9/9/2005	3/7/2006	3/7/2006	7/31/2006	93.5	71.9	0.13	21.5
DRILLING AND TESTING OF WELL ASR-5 (2006)							0.0	0.0	1.98	-2.0
Standby	NA	NA	8/1/2006	Present	NA	NA	0.0	0.0	0.38	-0.4
						Total:	**358.7**	**169.1**	**3.05**	**186.6**

FIGURE 5-1. PLOT OF CUMULATIVE VOLUME IN STORAGE FOR OLGA ASR SYSTEM



VI. METHOD OF RECOVERY FOR ENTIRE STORED WATER VOLUME

During the three operational cycles conducted for well ASR-1, mobilization of arsenic occurred in the storage zone due to injection of water with high dissolved oxygen concentrations. In order to remove that stored water with high arsenic concentrations and to restore native background conditions in the storage zone, the concept of pumping from the Olga ASR system wells (i.e. wells ASR-1, ASR-5, OW-1, and OW-3) until arsenic concentrations in the recovered water fall below 10 ug/l has been previously proposed by LCU and approved by the FDEP. The present document provides the proposed details for the recovery operations.

The method of recovery of the entire stored water volume will be by pumping from the two ASR wells and from the two observation wells. Withdrawal rates from the ASR wells will be limited to the maximum permitted rate of 1.0 MGD (694 gpm). Withdrawal rates from the observation wells will be limited by the maximum artesian flow that can be obtained through a temporary 3-inch diameter valve which is to be installed on those wells. That artesian flow is estimated to be about 100 gpm (0.144 MGD).

In order to determine optimum withdrawal rates from each well the groundwater flow and solute transport model previously developed and calibrated was utilized. The model was utilized iteratively using dissolved chlorides as a pseudomorph for arsenic concentrations to optimize the volumetric recovery of stored water with elevated arsenic concentrations while also limiting pumpage of groundwater with arsenic concentrations above 50 ug/l. This should allow for sufficient dilution of the pumped groundwater by surface water in the diversion canal from the River to assure that treated water produced by the Olga WTP will meet the arsenic Drinking Water Standard.

Based on the data collected through the four operational cycles, arsenic mobilization occurred in the area between the observation wells and well ASR-1 (i.e. in the area currently characterized by dissolved chloride concentrations below 500 mg/l). The analytical results of the recovered water from well ASR-1 during the four operational cycles and from observation well OW-3 during the long storage period after Cycle 4 indicated that the highest arsenic concentrations (i.e. between 40 and 60 ug/l) correspond with dissolved chloride concentrations between 200 and 400 mg/l. This was used as a basis for modeling of the pumpage of the remaining volumes of injected

water in storage. Dissolved chloride concentrations above 500 mg/l correspond with arsenic concentrations of less than 10 ug/l. An aerial photo showing current dissolved chloride concentrations in the storage zone and estimated areas of arsenic mobilization is provided as Figure 6-1.

The solute transport model was run iteratively to determine pumpage volumes from each well and sequencing of well combinations to maintain arsenic concentrations in the recovered water between 10 and 50 ug/l (i.e. corresponding with dissolved chloride concentrations between 400 and 600 mg/l). A summary of the recovery operations is provided on Table 6-1. Pumping and flowing will commence from the wells with the current highest dissolved chloride concentrations (ASR-5 and OW-1) and relatively low arsenic concentrations (i.e. between 10 and 30 ug/l). Thereafter, when monitored dissolved chloride concentrations reach 400 mg/l in wells OW-3 and ASR-1, those wells will be incorporated into the pumpage operations until recovered water from all wells reaches a dissolved chloride concentration higher than 500 mg/l (i.e. corresponding to an arsenic concentration below 10 ug/l). Based on the model results, the first stage (Figure 6-2) will consist of recovering 34.3 MG from wells ASR-5 and OW-1 for 30 days; the second stage (Figure 6-3) will consist of recovering 83.7 MG from wells ASR-5, OW-1, and OW-3 for 65 days; and the third stage (Figure 6-4) will include recovering 30 MG from well ASR-1 for 30 days.

Based on the computer modeling, a total of 148.0 MG will be needed to be pumped from the storage zone to remove the groundwater with arsenic concentrations above 10 ug/l (i.e. dissolved chlorides above 500 mg/l). Sampling from each well should be conducted weekly as specified in the FDEP permit. At the end of the recovery operations each well should be sampled to confirm that the arsenic concentrations are below 10 ug/l.

The duration and sequencing of the recovery operations may need to be adjusted to integrate public water supply (PWS) demands from the Olga WTP and seasonal dissolved chloride concentrations in the River. This may be necessary in order that sufficient volumes of River water are available to provide dilution to assure that the finished water from the Olga WTP meets the Primary Drinking Water Standard for arsenic during the recovery period.

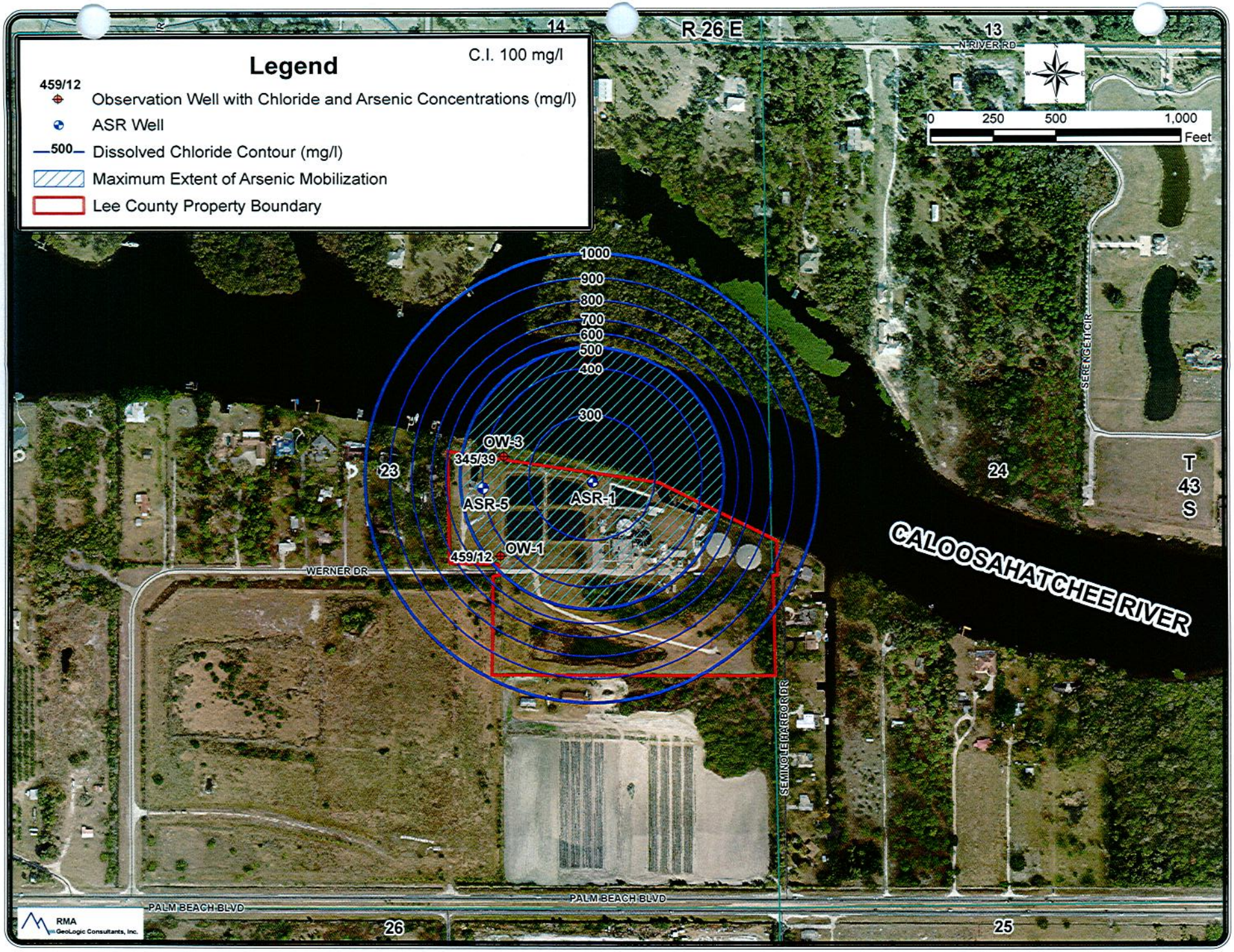


FIGURE 6-1. AERIAL PHOTO SHOWING CURRENT EXTENT OF INJECTED WATER AND AREA OF ARSENIC MOBILIZATION.

TABLE 6-1. SUMMARY OF ESTIMATED PUMPING VOLUMES FOR REMEDIATION OF OLGA ASR SYSTEM.

Description	ASR-1 Pumpage (MG)	ASR-5 Pumpage (MG)	OW-1 Pumpage (MG)	OW-3 Pumpage (MG)	Total Pumpage (MG)	Duration (Days)
Stage 1	0.0	30.0	4.3	0.0	34.3	30
Stage 2	0.0	65.0	9.4	9.4	83.7	65
Stage 4	30.0	0.0	0.0	0.0	30.0	30
Total =	**30.0**	**95.0**	**13.7**	**9.4**	**148.0**	**125**

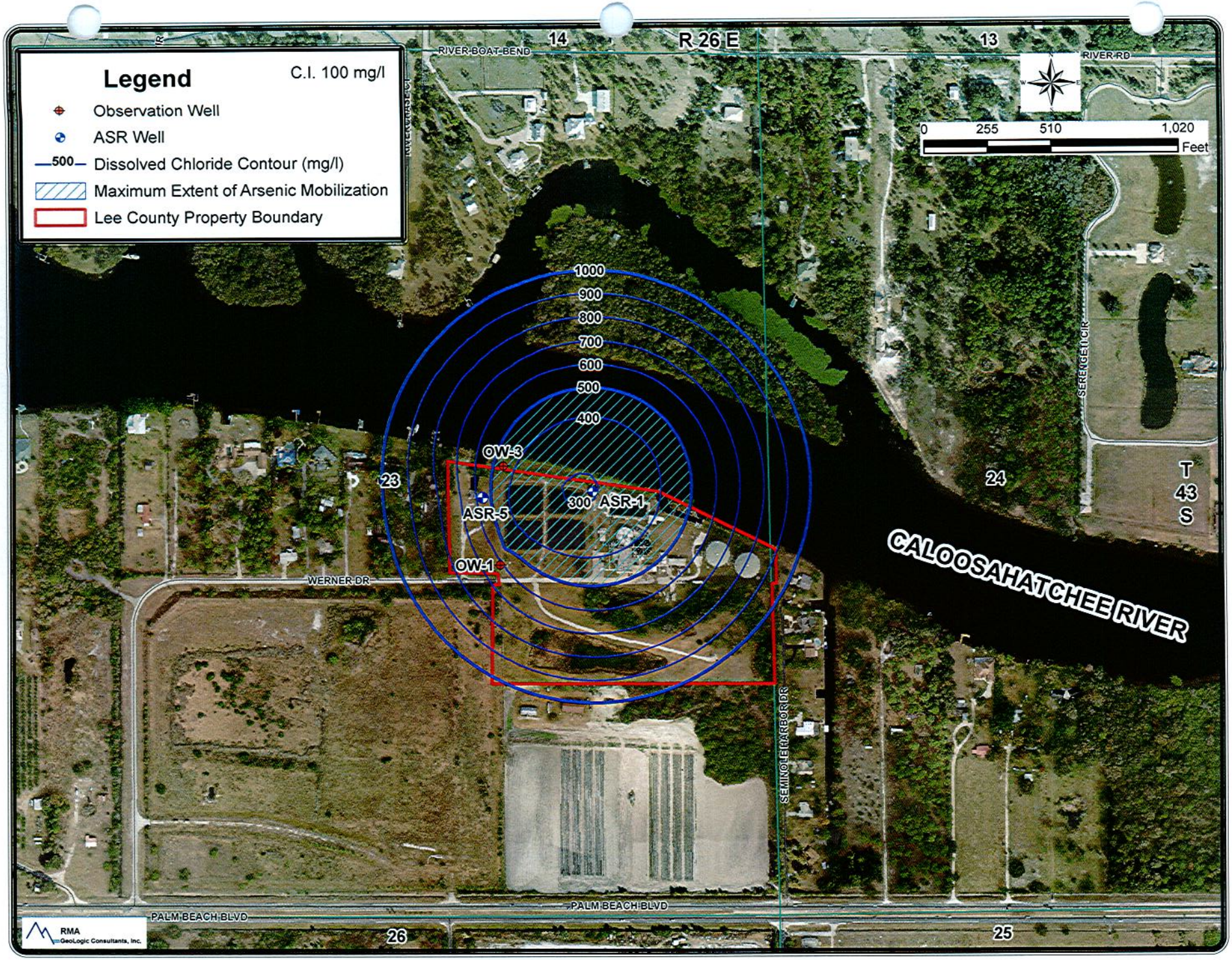


FIGURE 6-2. AERIAL PHOTO SHOWING EXTENT OF INJECTED WATER AND AREA OF ARSENIC MOBILIZATION AT THE END OF STAGE 1 RECOVERY.

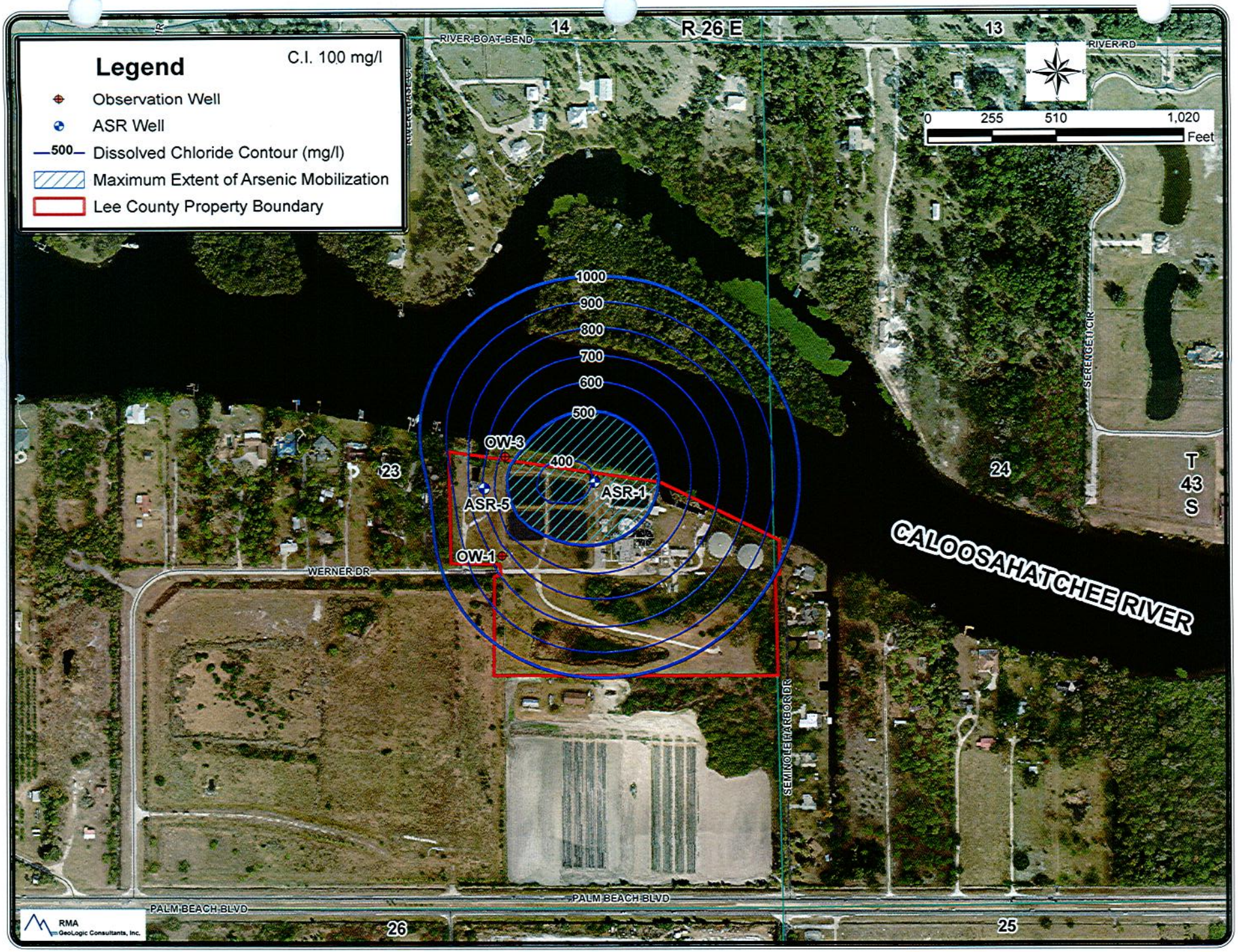


FIGURE 6-3. AERIAL PHOTO SHOWING EXTENT OF INJECTED WATER AND AREA OF ARSENIC MOBILIZATION AT THE END OF STAGE 2 RECOVERY.

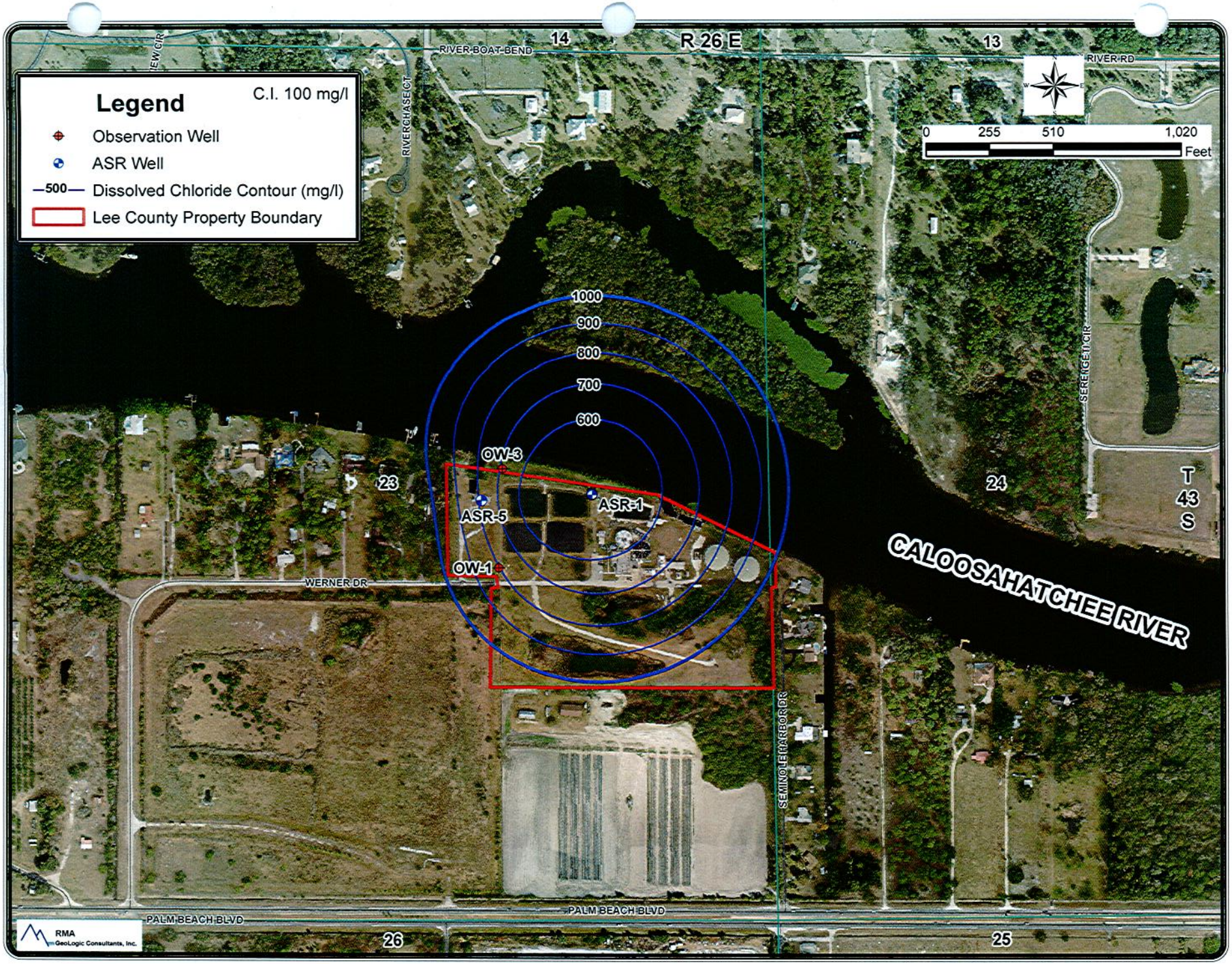


FIGURE 6-4. AERIAL PHOTO SHOWING EXTENT OF INJECTED WATER AND AREA OF ARSENIC MOBILIZATION AT THE END OF STAGE 3 RECOVERY.

VII. DISPOSITION OF RECOVERED WATER

The groundwater pumped from the wells during Olga ASR storage zone corrective action activities will be directed to the intake canal from the River to a discharge point at the WTP intake. An NPDES permit will be obtained from the FDEP for this discharge. An NPDES permit for this discharge point for recovered water was in place during the ASR cycles 1 through 3. An aerial photo showing the location of the discharge point and piping is provided as Figure 7-1. A site map showing pipeline for recovery operations is provided as Figure 7-2.

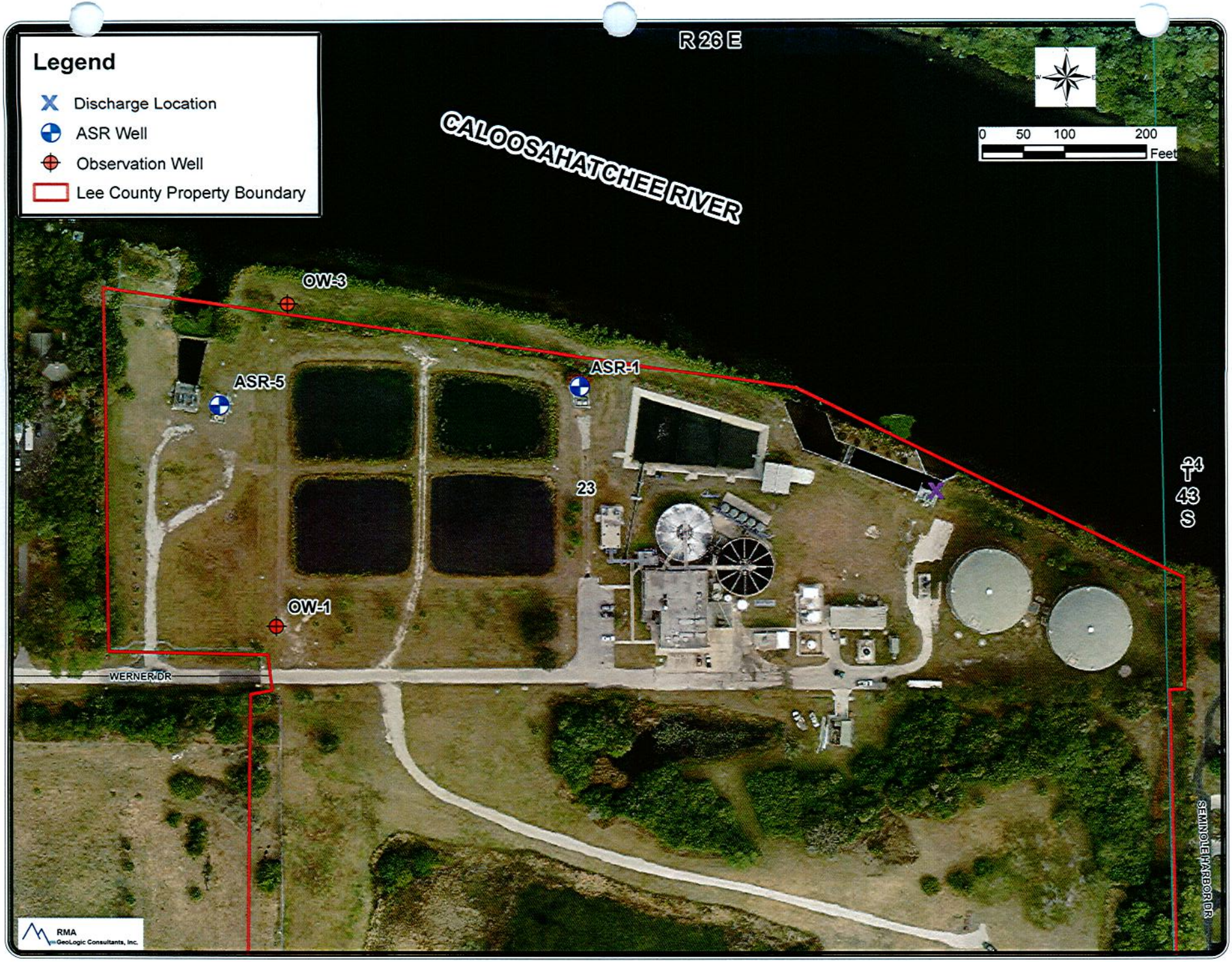


FIGURE 7-1. AERIAL PHOTO SHOWING LOCATION OF DISCHARGE POINT FOR RECOVERED GROUNDWATER.

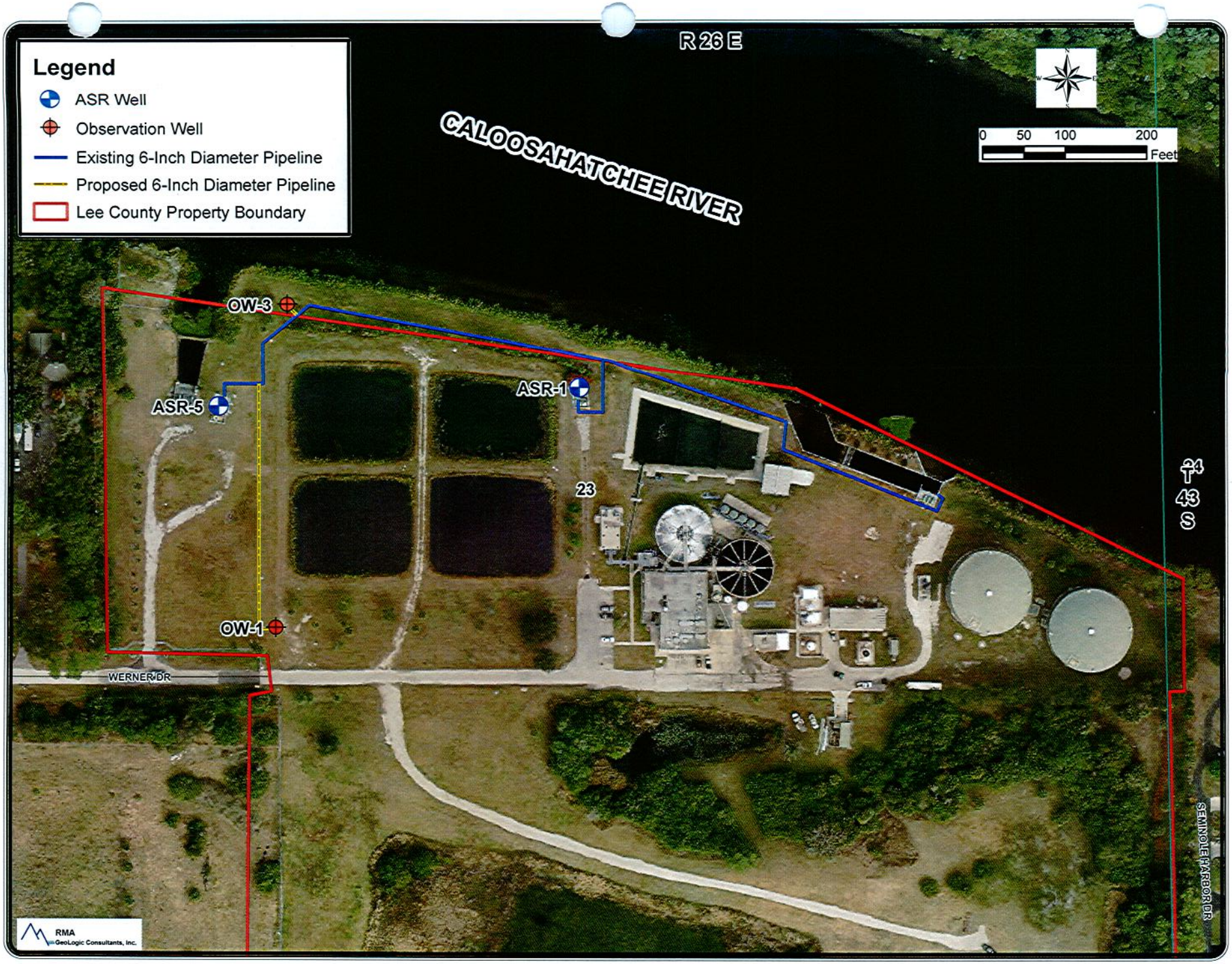


FIGURE 7-2. AERIAL PHOTO SHOWING LOCATION OF DISCHARGE PIPELINE FOR RECOVERED GROUNDWATER.

VIII. POST-REMEDIATION OPERATION TESTING PLAN

After the storage zone is remediated by pumping the portion of the stored injected water with elevated arsenic concentrations, as recommended in Section VII of this document, three complete operational testing cycles using wells ASR-1 and ASR-5 should be conducted. Prior to the three operational testing cycles, the storage zone should be conditioned by injecting a non-recoverable cushion of 400 MG. It is very important that the dissolved oxygen of the injectate be less than 5.0 mg/l. The three operational cycles should inject approximately 100 MG into each ASR well per cycle. Recovery operations from the two ASR wells should cease when arsenic concentrations approach 10 ug/l as determined by the pseudomorph chloride concentration. The pseudomorph concentration will need to be adjusted for each cycle since it represents a percent of native water in the recovered water and is related to arsenic concentrations in the recovered water resulting from a specific average dissolved oxygen concentration in the injected water. Based on statistical analyses of the four initial cycles (RMA GeoLogic Consultants, 2010), the dissolved chloride concentration during recovery in well ASR-1 of 160 mg/l was determined to be a pseudomorph for a 10 ug/l concentration of arsenic.

After each complete operational testing cycle, the system should be reevaluated by integrating all of the data collected during the operational testing period into the groundwater flow and solute transport computer model. If it is determined that compliance for arsenic concentrations in the recovered water cannot be obtained through operational management of the system, technological methods should be implemented.

IX. REFERENCES

RMA GeoLogic Consultants, 2010, Assessment, Evaluation, Computer Modeling, and Operation and Management Plan to Attain Regulatory Compliance for Lee County Utilities Olga Water Treatment Plant Aquifer Storage and Recovery System, 134 p.

APPENDIX A
COPY OF CONSTRUCTION PERMIT FOR
OLGA ASR SYSTEM

Florida Department of Environmental Protection

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

SENT VIA ELECTRONIC MAIL

October 2, 2009

In the Matter of an
Application for Permit by:

Mr. Douglas Meurer, P.E., Director,
Lee County Utilities
1500 Monroe Street, 3rd Floor
Fort Myers, FL 339901
Email: meurerDL@leegov.com

Lee County - UIC
File Number: 125120-180 and 182-UC/5X and
AO-051-SD/UIC09
Lee County Utilities Olga WTP ASR
Class V, Group 7, ASR Wells ASR-1 and ASR-5

PERMIT

Enclosed are Administrative Order, AO-051-SD-UIC09, and Permit Numbers 125120-180 and 182-UC/5X to renew construction permits for two, (2), Class V, Group Seven, Aquifer Storage and Recovery, (ASR), injection wells and associated monitor wells, issued pursuant to Section(s) 403.087, Florida Statutes.

Any party to this Order (permit) has the right to seek judicial review of the permit pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000; and by filing a copy of the Notice of appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date this Notice is filed with the Clerk of the Department.

Executed in Lee County, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

Jon M. Iglehart
Director of
District Management

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this PERMIT and all copies were mailed before the close of business on October 2, 2009 to the listed persons.

Clerk Stamp

FILING AND ACKNOWLEDGMENT

FILED, on this date, pursuant to Section 120.52, Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Clerk

10/02/09
Date

JMI/DR/mac

Enclosures

cc

Dan Aquaviva, P.G. (Daquaviva@rma-geologic.com)
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Florida Department of Environmental Protection

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

PERMIT

PERMITTEE:
Mr. Douglas Meurer, P.E., Director,
Lee County Utilities
1500 Monroe Street, 3rd Floor
Ft Myers, FL 33901
Email: MeurerDL@leegov.com

Permit/Cert. No:125120-180 and 182-UC/5X
Date of Issue: **October 2, 2009**
Expiration Date: **October 1, 2014**
County: Lee
Latitude: Various N
Longitude: - Various W
Lee County Utilities Olga WTP ASR
Class V, Group 7 Injection Wells ASR-1 and ASR-5

This permit is issued under the provisions of Chapter 403 of the Florida Statutes (F.S.) and rules 62-4, 62-520, 62-528, and 62-550 of the Florida Administrative Code. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents, attached hereto or on file with the Department and made a part hereof and specifically described as follows:

In accordance with this permit and Administrative Order AO-051-SD/UIC09 continue operational testing of two (2) Class V, Group 7, Aquifer Storage and Recovery (ASR) injection wells with two (2) existing storage zone monitoring wells, . The purpose is to store, in the lower Suwannee Formation of the Upper Floridian Aquifer, water from the Olga Water Treatment Plant (WTP) treated to meet potable standards to meet the seasonal demands of a potable water system. The ASR wells are designed to inject a maximum of 694 gpm, (1 MGD, (million gallons per day)). This project is depicted on the Lee County Utilities Olga WTP ASR applications and associated documents submitted in support of this project. The location for this project is at the Lee County Utilities Olga WTP, 1450 Werner Road, Alva, Lee County, Florida.

Subject to Specific Conditions 1-14.

1. General Criteria:

   a. The terms, conditions, requirements, limitations and restrictions set forth in this permit are "permit conditions" and are binding and enforceable pursuant to section 403.141, F.S.

   b. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action.

   c. As provided in subsection 403.087(7), F.S., the issuance of this permit does not convey any vested rights or exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor infringement of federal, state, or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in this permit.

   d. This permit conveys no title to land, water, does not constitute State recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

   e. This permit does not relieve the permittee from liability for harm to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefrom; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

   f. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed and used by the permittee to achieve compliance with the conditions of this permit, or are required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

   g. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at reasonable times, access to the premises where the permitted activity is located or conducted to:

      (1) Have access to and copy any records that must be kept under conditions of this permit;

      (2) Inspect the facility, equipment, practices, or operations regulated or required under this permit; and

(3) Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

(4) Reasonable time will depend on the nature of the concern being investigated.

h. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee should immediately provide the Department with the following information:

(1) A description of and cause of noncompliance; and

(2) The period of noncompliance, including dates and times; or, if not corrected the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent the recurrence of the noncompliance. The permittee shall be responsible for any and all damages that may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

i. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is proscribed by sections 403.111 and 403.73, F.S. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

j. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance; provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

k. This permit is transferable only upon Department approval in accordance with rules 62-4.120 and 62-528.350, F.A.C. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

l. This permit or a copy thereof shall be kept at the work site of the permitted activity.

m. The permittee shall comply with the following;

(1) Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records shall be extended automatically unless the Department determines that the records are no longer required.

(2) The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three

years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

(3) Records of monitoring information shall include:

(a) the date, exact place, and time of sampling or measurements;

(b) the person responsible for performing the sampling or measurements;

(c) the dates analyses were performed;

(d) the person responsible for performing the analyses;

(e) the analytical techniques or methods used;

(f) the results of such analyses.

(4) The permittee shall furnish to the Department, within the time requested in writing, any information which the Department requests to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit.

(5) If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

n. All applications, reports, or information required by the Department shall be certified as being true, accurate, and complete

o. Reports of compliance or noncompliance with, or any progress reports on, requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each scheduled date

p. Any permit noncompliance constitutes a violation of the Safe Drinking Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application

q. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit

r. The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.

s. This permit may be modified, revoked and reissued, or terminated for cause, as provided in 40 C.F.R. sections 144.39(a), 144.40(a), and 144.41 (1998). The filing of a request by the

permittee for a permit modification, revocation or reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition

t. The permittee shall retain all records of all monitoring information concerning the nature and composition of injected fluid until five years after completion of any plugging and abandonment procedures specified under rule 62-528.435, F.A.C. The permittee shall deliver the records to the Department office that issued the permit at the conclusion of the retention period unless the permittee elects to continue retention of the records.

u. The permittee shall notify the Department as soon as possible of any planned physical alterations or additions to the permitted facility. In addition, prior approval is required for activities described in rule 62-528.410(1)(h).

v. The permittee shall give advance notice to the Department of any planned changes in the permitted facility or injection activity that may result in noncompliance with permit requirements.

w. The permittee shall report any noncompliance which may endanger health or the environment including:
   (1) Any monitoring or other information which indicates that any contaminant may cause an endangerment to an underground source of drinking water; or

   (2) Any noncompliance with a permit condition or malfunction of the injection system that may cause fluid migration into or between underground sources of drinking water.

   (3) Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause, the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

x. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures.

y. No underground injection is allowed that causes or allows movement of fluid into an underground source of drinking water if such fluid movement may cause a violation of any primary drinking water standard or may otherwise adversely affect the health of persons.

2. Signatories and Certification Requirements.

   All reports and other submittals required to comply with this permit shall be signed by a person authorized under Rules 62-528.340(1) or (2), F.A.C. In accordance with Rule 62-528.340(4), F.A.C., all reports shall contain the following certification:

   > "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

3. Drawings, plans, documents or specifications submitted by the Permittee, not attached hereto, but retained on file at the South Florida District Office, are made a part hereof. Any changes, except as provided elsewhere in this permit, must be approved by the Department before implementation.

4. The injection and monitor wells at the site shall be abandoned when posing a potential threat to the quality of the waters of the State. In the event a well must be plugged or abandoned, the permittee shall obtain a permit from the Department as required by Chapter 62-528, F.A.C. The permittee shall notify the Department and obtain approval prior to any well work or modification.

5. The permittee shall notify the Department in the event that any of the conditions of the permit cannot be met, including an emergency discharge, due to breakdown of equipment, power outages or damages by hazard of fires, wind or other causes in accordance with the following:

   a. Notification shall be made in person, email, or by telephone within 24 hours of the event.

   b. A written report shall be submitted within 5 days which describes the nature and cause of the breakdown or malfunction, the steps being taken to correct the problem and prevent its recurrence, emergency procedures in use pending correction of the problem and the time when the facility will again be operating in compliance with permit conditions.

6. Prior to the commencement of any work, the name of the Florida-registered driller(s) supervising the drilling operations and the driller's registration number shall be submitted to the Department. The permittee or the engineer of record shall provide the Department with copies of all required federal, state or local permits prior to spudding the wells.

7. The permittee shall retain the engineer of record or obtain the services of any professional engineer registered in the State of Florida for the inspection of the construction of this project.

Upon completion the engineer shall inspect for conformity to construction permit applications and associated documents. The Department shall be notified immediately of any change of engineer.

8. The specifications for a temporary containment structure around the borehole during the drilling of the ASR well shall be submitted to and approved by the Department prior to the ASR well construction.

9. Pumping fluids other than the potable water from the Olga WTP into the injection well will constitute a violation of this permit and shall constitute cause for revocation.

10. Operational Testing

a. The following table lists the major milestones for facility improvements required by AO-050-SD/UIC09, the administrative order, accompanying this permit.

Milestones	TimeFrame
Submit Assessment Plan, (AP)	Within 90 days of issuance of the permits
FDEP review of submittal and written response	Within 30 days of receipt
County's submittal of written response to FDEP inquiries	Within 30 days of receipt of FDEP responses
Implement AP	Upon FDEP approval
Based on findings of AP submit Corrective Action Plan, CAP	Within 30 days of completion of AP activities
FDEP review of submittal and written response	Within 30 days of receipt
County's submittal of written response to FDEP inquiries	Within 30 days of receipt of FDEP responses
If necessary, implement Corrective Action Plan to remove Arsenic Contamination from the USDW	Within 30 days of FDEP approval
Submit Corrective Action Report	Within 90 days of completion of FDEP approved AP, CAP, and Remdial activities

b. Operational Testing Conditions - ASR Wells

Class V Injection Wells

Well Number	Casing Diameter (OD)	Depth Cased	Open Hole (bls)
ASR-1	16" OD Sch 80 PVC	850'	850' to 920'
ASR-5	16" OD Sch 80 PVC	864'	864' to 925'

The injection well system shall be monitored in accordance with rule 62-528.615, F.A.C. The following injection well performance data shall be recorded and reported from the injection well instrumentation in the Monthly Operating Report as indicated below during each recharge and recovery cycle. Sampling of ASR wells during storage cycles is not required. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

ASR-1 and ASR-5

Reporting	
Parameter	**Frequency**
Maximum Injection Pressure (psi)	Daily/Monthly
Minimum Injection Pressure (psi)	Daily/Monthly
Average Injection Pressure (psi)	Daily/Monthly
Maximum Flow Rate	Daily/Monthly
Minimum Flow Rate	Daily/Monthly
Average Flow Rate	Daily/Monthly
Total Volume Recharged (Gals)	Daily/Monthly
Total Volume Recovered (Gals)	Daily/Monthly
Net Storage (MG)	Monthly
Gross Alpha (pCi/L)	Monthly
Total Trihalomethanes (mg/L)	Weekly
Dissolved Oxygen (mg/L)	Weekly
Total Dissolved Iron (mg/L)	Weekly
Total Dissolved Sulfide (mg/L)	Weekly
Arsenic (µg/L)	Weekly
Total Dissolved Solids (mg/L)	Weekly
Specific Conductivity (µmhos/cm)	Weekly
Total Alkalinity (mg/L)	Weekly
pH (SU)	Weekly
Chloride (mg/L)	Weekly
Sulfate (mg/L)	Weekly
Field Temperature (°C)	Weekly
Oxidation-Reduction Potential (ORP)	Weekly
Primary and Secondary Drinking Water Standards (Recharge Water Only)	Annually***

*** Asbestos, acrylamide, epichlorohydrin, and dioxin are excluded.

c. Operational Testing Conditions - Monitor Well System Monitor Wells

Well Number	Casing Diameter (OD)	Depth (bls) Cased/Total	Group or Formation	Monitoring Interval (bls)
OW-1	8" Sch 40 PVC	850'	Lower Suwannee	850'-895'
OW-3	4" Sch 40 PVC	864'	Lower Suwannee	864'-945'

All monitor wells shall be monitored in accordance with Rule 62-528.615, F.A.C. The following monitor well performance data shall be recorded and reported from the monitor well instrumentation in the Monthly Operating Report as indicated below during all recharge, storage and recovery cycles of the injection/production wells. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

During extended storage periods (greater than 30 days), the monitor well water quality parameters listed below may be sampled and analyzed monthly.

OW-1 and OW-3

Reporting	
Parameter	**Frequency**
Maximum Water Level or Pressure (feet NVGD or psi)	Daily/Monthly
Minimum Water Level or Pressure (feet NVGD or psi)	Daily/Monthly
Average Water Level or Pressure (feet NVGD or psi)	Monthly
Gross Alpha (pCi/L)	Upon Initiation of Recovery and Upon Cessation of Recovery (See Note Below*)
Total Trihalomethanes (mg/L)	Weekly
Dissolved Oxygen (mg/L)	Weekly
Total Iron (mg/L)	Weekly
Total Dissolved Sulfide (mg/L)	Weekly
Arsenic (µg/L)	Weekly
Total Dissolved Solids (mg/L)	Weekly
Specific Conductivity (µmhos/cm)	Weekly
Total Alkalinity (mg/L)	Weekly
pH (SU)	Weekly
Chloride (mg/L)	Weekly
Sulfate (mg/L)	Weekly
Field Temperature (°C)	Weekly
Oxidation-Reduction Potential (ORP)	Weekly

*Beginning and end of each recovery cycle.

11. The permittee shall calibrate all pressure gauge(s), flow meter(s), chart recorder(s), and other related equipment associated with the injection well system on a semi-annual basis. The permittee shall maintain all monitoring equipment and shall ensure that the monitoring equipment is calibrated and in proper operating condition at all times. Laboratory equipment, methods, and quality control will follow EPA guidelines as expressed in Standard Methods for the Examination of Water and Wastewater. The pressure gauge(s), flow meter(s), and chart recorder(s) shall be calibrated using standard engineering methods.

12. The permittee shall submit monthly to the Department the results of all injection well and monitor well data required by this permit no later than the last day of the month immediately

following the month of record. The results shall be sent to the Department of Environmental Protection, P.O. Box 2549, Fort Myers, Florida 33902-A copy of this report shall also be sent to the Department of Environmental Protection, Underground Injection Control Program, MS 3530, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.

13. If injection is to continue beyond the expiration date of this permit, the permittee shall apply for and obtain a construction or operation permit. If necessary to complete the operational testing period, the permittee shall apply for renewal of the construction permit at least 60 days prior to the expiration date of this permit.

14. The permittee is reminded of the necessity to comply with the pertinent regulations of any other regulatory agency, as well as any county, municipal, and federal regulations applicable to the project. These regulations may include, but are not limited to, those of the Federal Emergency Management Agency in implementing flood control measures. This permit should not be construed to imply compliance with the rules and regulations of other regulatory agencies.

Note: In the event of an emergency the permittee shall contact the Department by calling Ph. (800) 320-0519. During normal business hours, the permittee shall call (239) 332-6975.

Issued this 2nd day of October 2009.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

Jon M. Iglehart
Director of
District Management

JMI/DR/mac

APPENDIX B
COPY OF ADMINISTRATIVE ORDER

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

IN THE MATTER OF:	IN THE OFFICE OF THE SOUTH DISTRICT
Lee County Board Of County Commissioners C/O Mr. Douglas Muerer, P.E., Director, Lee County Utilities Department, 1500 Monroe Street, Ft Myers, Florida 33902	Order No.: AO-051-SD/UIC09 Lee County Utilities Injection Well Facility DEP Permit Nos. 125120-180-UC/5X and 125120-182-UC/5X

ADMINISTRATIVE ORDER ESTABLISHING COMPLIANCE SCHEDULE UNDER SECTION 403.088(2)(f), F.S.

STATUTORY AUTHORITY

The Department of Environmental Protection (Department) issues this order under the authority of section 403.088(2)(f) of the Florida Statutes in conjunction with Department permit Nos. 125120-180-UC/5X and 125120-182-UC/5X. The Secretary of the Department has delegated this authority to the Director of District Management, who issues this order and makes the following findings of fact.

I. FINDINGS OF FACT

1. The Lee County Board of County Commissioners is a person under Section 403.031 of the Florida Statutes. The Lee County Board of County Commissioners owns and operates a potable water production facility, located at the Olga WTP ASR Wellfield, a Five, (5), MGD potable Water Treatment and Production facility ("Facility") with a Groundwater Type aquifer storage and recovery ("ASR") system. The WTP Facility is located at 1450 Werner Road, Ft Myers, Florida 33913. The ASR system is located at: 26° 43' 11.8" N. Latitude and -81° 40' 56.4" W Longitude ASR Well-1, 26° 43' 11.6" N. Latitude and -81° 41' 01.3" W Longitude, ASR Well-5.

2. A part of that system currently consists of Aquifer Storage and Recovery, (ASR), wells which inject potable water into waters of the state, (via the ASR wells), as defined in Section 403.031 of the Florida Statutes.

3. The County had applied for a renewal of one construction permit and modification of four construction permits under Section 403.088(2) of the Florida Statutes. The purpose of these five applications was to continue

operational testing of ASR-1, initiate operational testing of ASR-5, and to modify the permit to construct additional well nos. ASR-2, ASR-3, and ASR-4.

4. The Department has reviewed and determined with the County the following direction with respect to all the applications: the modification of three construction permits will be withdrawn, (permit application numbers 125120-177-178-179-UC/M5). Permits to continue operational testing of ASR-1 and permission to initiate operational testing of ASR-5 for a five year period to run concurrently with this Order will be granted under permit application numbers 125120-180 and 182 UC/5X. The Department and the County acknowledge that the water quality data from the recovered water and the monitor wells provide specific data trends indicating the possibility of Arsenic migration within the USDW as a result of the operation of this system.

5. The Facility constructed and conducted operational testing of its ASR system under Permit Nos. 125120-098-UC/5X, (ASR-1) and 125120-103-106-UC/5X, (ASR-2, ASR-3, ASR-4 and ASR-5). These permits were issued prior to January 26, 2006, the date the federal primary drinking water standard for arsenic decreased from 50 µg/L to 10 µg/L. During operational testing the facility generally complied with the applicable arsenic standard of 50 µg/L. However, the facility continues to measure arsenic values greater than 10 µg/L in the recovered water and monitoring wells.

6. Section 403.088(2)(e) and (f) of the Florida Statutes and Rule 62-528.300(e)(7), of the Florida Administrative Code, (F.A.C.), authorize the Department to issue permits, for the injection of potable water into waters of the state for the specific period of time necessary to conduct additional cycle testing, an assessment of the groundwater for potential Arsenic contamination, an assessment of the system operational model for determination of improvements to prevent potential groundwater contamination, and determine the necessity of any additional technological treatment additions to the system, said permits being accompanied by an order establishing a schedule for achieving compliance with all permit conditions if the specified criteria are met.

7. The Department finds that:

   (a) Presently, there are monitoring well and recovered water quality data trends that indicate Arsenic mobilization may be occurring as a result of injection activities related to the operational testing of the ASR wellfield. Accordingly, the Department and the County acknowledge that certain steps are necessary to resolve this issue. The Department and the County agree that implementing specific changes as set forth in this document would be the most beneficial and cost effective approach to resolution of the issue of Arsenic mobilization.

(b) The granting of the permit for ASR-1 to continue operational testing and the granting of the permit for initiation of operational testing of ASR-5 together with this attached Administrative Order will be in the best public interest; and

(c) The permittee should be allowed a specified period of time to develop and implement the necessary changes proposed as resolution to this issue.

II ORDER

Based on the foregoing findings of fact,

IT IS ORDERED,

1. The County shall operationally test the injection well system under the conditions of this Administrative Order and under the conditions of the attached Construction Permit Nos. 125120-180-UC/5X and 125120-182-UC/5X for up to 5 years from the effective date of this Administrative Order and Permit issuance. The County shall apply for or, modify, or renew any permits necessary for the ASR wells in this system in the event that it becomes necessary to prevent offsite mobilization of any contaminant plume or to facilitate remediation of any contaminant plume that may be migrating offsite or outside an area of institutional control.

2. Within ninety, (90), days of issuance of these permits and this order: Respondent shall submit to the Department, an assessment plan, (AP), under sign and seal of the appropriate Professional Engineer and/or Professional Geologist registered within the State of Florida that recommends methods/tasks (along with reasonable time schedule) to achieve the following objectives:

    A. Objectives shall be:

        (1) Reduce potential for injectate to generate arsenic exceedances,
        (2) Reduce arsenic levels for ground water within the storage zone, and
        (3) Identify the adequacy of the County's current Wellhead Protection Ordinance relative to the ASR protection zone contained in the Ordinance or recommend changes to the Ordinance.
        (4) Ensure contaminated groundwater does not migrate outside the area of institutional control.
        (5) Remediate water which may have migrated outside the area of

institutional control or institute risk-based corrective action under Chapter 62-780, Fla. Admin. Code.

B. Methods/Tasks to achieve objectives shall include but not be limited to:

(1) An evaluation/recommendation as to whether additional cycle testing would decrease ASR arsenic levels;
(2) An evaluation of the Facility's monitor plan adequacy including recommendations for additional monitoring wells, a revised parameter list or data set, and an increase in monitoring frequency and reporting;
(3) An evaluation of the Facility's treatment system and any proposed technical modifications that will ensure the ASR system will function in full and consistent compliance with the arsenic standard of 10 µg/L;
(4) An estimate of the vertical and lateral extent of arsenic concentration exceeding 10 µg/L; and
(5) A field-verified inventory of all water wells within the area determined by best professional judgment to include the area potentially affected by the discharge plus a safety factor of 50%, or a one-mile radius, whichever is larger (area of review).

3. The Department will review any assessment plan, (AP), submitted pursuant to this Administrative Order. In the event additional information, modifications or specifications are necessary to evaluate the AP, the Department shall issue a written request for additional information. The County shall submit all required additional information within 30 days after receipt of each request. The option to request additional information notwithstanding, the Department reserves all legal rights to enforce compliance with the terms of this Administrative Order, or to file suit to recover civil penalties and damages separate and apart from the terms of this Administrative Order.

4. The Department shall review the AP and provide Respondent with written responses. Any action taken by the Respondent with regard to implementation of the AP prior to receiving Department approval shall be at Respondent's own risk.

5. If the Department determines upon review of the AP that it adequately addresses the objectives set forth in paragraph 2, then the Department shall approve the AP for implementation.

6. Upon approval of the AP, (assessment plan), by the Department, the terms, conditions, and timeframes contained in the approved report become a part of this Administrative Order and are enforceable as such.

7. Upon Department approval of the AP, the County shall begin any required assessment plan activities in accordance with the time frames specified in the approved AP. Within 90 days of the completion of tasks contained in the AP, the County shall submit a plan for corrective action (corrective action plan or CAP), based on a public health risk assessment, to address any public health concerns identified in the AP. Upon Department approval of the CAP the County shall begin any required corrective actions in accordance with the time frames specified in the approved CAP.

8. This report may include, as necessary corrective actions, proposals to perform pumpage from the ASR wells as a part of the contamination cleanup. The report shall be prepared by a Florida licensed Professional Engineer or Professional Geologist, as applicable. The report shall describe and summarize all corrective actions planned and/or completed and provide conclusions and recommendations.

9. The Department will review the CAP submitted pursuant to this Administrative Order. In the event additional information, modifications or specifications are necessary to evaluate the report, the Department shall issue a written request for additional information. The County shall revise the report and submit the revised version in writing to the Department within 30 days after receipt of the request.

10. Upon Department approval of the CAP, the County shall begin any required assessment plan activities in accordance with the time frames specified in the approved CAP. Upon approval of the CAP the terms, conditions, and timeframes contained in the approved plan become a part of this Administrative Order and are enforceable as such.

11. The Department and TAC members will review any permit application(s) and supporting documentation submitted pursuant to this Administrative Order. In the event additional information, modifications or specifications are necessary to process the application(s), the Department shall issue a written request for additional information. The County shall submit all required additional information within 30 days after receipt of each request.

12. The Lee County Wellfield Protection Ordinance currently provides for an ASR protection zone consisting of a 500-foot radius around an ASR well, and prohibiting installation of water wells in the ASR storage zone aquifer. This Ordinance may require modification based upon information and water

quality data obtained during the assessment performed pursuant to paragraph 2 previously which may/or may not show the 500-foot radius to be sufficient. In the event that information obtained during the assessment indicates the need for modification to the referenced Ordinance the County shall prepare a draft County Wellhead Protection Ordinance within 30 days and a schedule for obtaining passage of the revised Ordinance via the administrative processes within County government.

13. The Department will review the draft modifications to the County Wellhead Protection Ordinance submitted pursuant to this Administrative Order. In the event additional information, modifications or specifications are necessary to evaluate the report, the Department shall issue a written request for additional information. The County shall revise the report and submit the revised version in writing to the Department within 30 days after receipt of the request. Once the County and the Department agree on draft language, the County shall pursue the changes to the Ordinance through the County's administrative process as quickly as possible. However, if the agreed upon draft is not approved by the County, any off-site arsenic exceedances over the 10 mg/L standard will have to be remediated in a Department-approved manner, or using institutional controls described in the Department's Division of Waste Management's Institutional Controls Procedures Guidance, November 2004, as adopted under Chapter 62-780, F.A.C .

14. The County shall achieve compliance with all applicable state statutes and Department Rules including but not limited to Underground Injection Control Program statutes, rules, and permits within the time frame specified in Permit, but no more than 5 years from the effective date of this Administrative Order and issuance of these Permits. Otherwise the County shall request renewal of and any necessary modifications to, this Administrative Order and associated permits.

III. NOTICE OF RIGHTS

A person whose substantial interests are affected by this Order may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received by the clerk) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000.

Under Rule 62-110.106(4), Florida Administrative Code, a person may request enlargement of the time for filing a petition for an administrative hearing. The request must be filed (received by the clerk) in the Office of General Counsel before the end of the time period for filing a petition for an administrative

hearing.

Petitions by the applicant or any of the persons listed below must be filed within fourteen days of receipt of this written notice. Petitions filed by any persons other than those entitled to written notice under Section 120.60(3), Florida Statutes, must be filed within fourteen days of publication of the notice or within fourteen days of receipt of the written notice, whichever occurs first. Under Section 120.60(3), Florida Statutes, however, any person who has asked the Department for notice of agency action may file a petition within fourteen days of receipt of such notice, regardless of the date of publication.

The petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within fourteen days of receipt of notice shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57, Florida Statutes. Any subsequent intervention (in a proceeding initiated by another party) will be only at the discretion of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205, Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information:

(a) The name, address, and telephone number of each petitioner; the name, address, and telephone number of the petitioner's representative, if any; the Department permit identification number and the county in which the subject matter or activity is located;
(b) A statement of how and when each petitioner received notice of the Department action;
(c) A statement of how each petitioner's substantial interests are affected by the Department action;
(d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;
(e) A statement of facts that the petitioner contends warrant reversal or modification of the Department action;
(f) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief and
(g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wants the Department to take.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any such final decision of the

Department have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

Mediation under Section 120.573, Florida Statutes, is not available for this proceeding.

This Order is final and effective on the date filed with the clerk of the Department unless a petition is filed in accordance with the above. Upon the timely filing of a petition this Order will not be effective until further order of the Department.

Any party to the permit has the right to seek judicial review of the Order under Section 120.68, Florida Statutes, by the filing of a notice of appeal under Rules 9.110 and 9.190, Florida Rules of Appellate Procedure, with the clerk of the Department in the Office of General Counsel, Mail Station 35, 3900 Commonwealth Boulevard, Tallahassee, Florida, 32399-3000; and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate district court of appeal. The notice of appeal must be filed within 30 days from the date when this Order is filed with the clerk of the Department.

DONE AND ORDERED on this 2nd day of October, 2009 in Ft Myers, Florida.

STATE OF FLORIDA DEPARTMENT
OF
ENVIRONMENTAL PROTECTION

Jon M. Iglehart
Director of
District Management

FILED AND ACKNOWLEDGED on this date, under section 120.52(11) of the Florida Statutes, with the designated Department Clerk, receipt of which is acknowledged.

Clerk

10/02/09
Date

JMI/DR/mac

Copies furnished to:
Technical Advisory Committee

CERTIFICATE OF SERVICE

The undersigned hereby certifies that this Order and all copies were mailed before the close of business on 10/02/09, 2009 to the listed persons.

APPENDIX C

COPY OF RESPONSE TO FDEP

REQUEST FOR ADDITIONAL INFORMATION

RMA
GeoLogic Consultants, Inc.

12771 World Plaza Lane, Building 87, Suite 1
Fort Myers, FL 33907
(239) 415-1818 | Fax: (239) 415-1919
www.rma-geologic.com | e-mail: info@rma-geologic.com

February 4, 2011

Mr. David Rhodes, P.G.
UIC/GW Technical Support Supervisor
Water Facilities
Florida Department of Environmental Protection
P.O. Box 2549
2295 Victoria Avenue
Fort Myers, FL 33901

Re: LCU Olga ASR System
FDEP Permit # 125120-080 and 082-UC and Administrative Order

Dear Mr. Rhodes:

On behalf of Lee County Utilities (LCU), we are herein providing a response to your e-mail of November 15, 2010 (copy attached) which addressed the Assessment Plans for both the Corkscrew and Olga aquifer storage and recovery (ASR) systems. This letter is restricted to items that relate to the Olga ASR system. Those items related to the Corkscrew ASR system are addressed in a separate letter.

It is our understanding from your e-mail that the Department is seeking additional information for the items which are addressed below.

1. ***The solute transport models will require continuous updating and calibration with respect to the chloride/arsenic ratio and the geochemical relationship defined in the submittal. This may require sampling of these and other parameters at regularly scheduled points as opposed to the sampling being solely related to injection and recovery. Please propose a plan to continually update and calibrate the geochemical models.***

Recovery of injected water for each Olga ASR cycle typically ends in late May of each year. Therefore, all of the water level, water quality, pressure, and injected volume data for the two ASR wells and the water level, water quality, and pressure data for the two existing and two proposed observation wells will be assimilated and integrated into the previously prepared hydraulic (water level) and solute transport (water quality) computer model. The model will be recalibrated after each cycle. A report will be prepared detailing the cycle data and computer modeling. It will identify relevant trends, address regulatory compliance issues, and provide predictions for future cycle recoveries. The report will be prepared and submitted to the FDEP by October 15 of each year.

2. ***The Department is requesting the models and the overall submittal documents be transmitted electronically. The Department is making this request so as to obtain peer review on the modeling effort and any ways to improve the models.***

Please find enclosed a CD containing the requested documents in electronic format.

3. ***The County's supplemental submittal for the Olga ASR site provided an updated figure relating the overall storage volume size with all ASR wells in operation and the determination that the storage volume sizing is such that the County ordinance will require revision to accommodate the storage volume zone of exclusion. Please provide a schedule for revision of the County ordinance.***

It is anticipated that the necessary legal work, documentation, public noticing, and other related activities for a modification of the County's Wellfield Protection Ordinance will take approximately 12 months. Therefore, we would anticipate the modified Wellfield Protection Ordinance will be in place by February 15, 2012.

4. ***The Department is requesting that the existing monitor wells at the Olga site be included in the groundwater arsenic remediation effort. This will, in our opinion, allow for the most complete restart of the site with recognized background conditions in all wells.***

A Corrective Action Plan (CAP) will be prepared and submitted to the FDEP for consideration and approval prior to implementation of remediation efforts, in accordance with Item 7 of the Administrative Order. Based on the capture zones determined by modeling conducted for the CAP, and the method utilized for recovered water disposal, the optimum configuration of wells and flow rates will be used for arsenic recovery.

5. ***Additionally a surface water discharge permit to discharge the recovered water to the river will be necessary. A plan of operation for recovery, sampling, and ultimate discharge of the recovered water will be necessary – the plan should focus on maintaining compliance with the 50 ug/l surface water compliance limit for arsenic concentrations.***

A detailed CAP for conducting the remediation is being prepared and will be submitted as a separate document in the near future, consistent with item 7 of the Administrative Order. Computer modeling will be utilized in the preparation of the plan to delineate optimum pumping rates and durations from each well.

An NPDES permit application will also be submitted in the near future. Please note that, consistent with the previous NPDES permit for the system, the discharge of recovered water will not be to the Caloosahatchee River, but rather to either the diversion canal from the River to the plant or to the plant intake.

6. ***The Department is requesting clarification as to paragraph 4 top of page 111. Specifically, clarification of the time periods of aquifer conditioning, rates of injection, storage periods, and sampling with respect to verifying the arsenic/chloride ratio.***

As indicated in response to item 5 above, the CAP is currently being prepared and will be submitted as a separate document to the FDEP for review and approval, consistent with the requirements of the Administrative Order. We anticipate submittal of the CAP by March 31, 2011.

7. ***Clarification of the technical thesis for mobilization of arsenic is needed. Is it the County's theory that the arsenic formation is limited to the area immediately proximal to the injection wells? If so then the monitor well network should be revised to validate this theory by placement of the monitor wells within and at the boundary of the area suspected to be the limit of the arsenic mobilization zone.***

Yes. The evidence from the first 4 cycles, clearly indicates that arsenic mobilization has only occurred in close proximity to well ASR-1. There are currently two existing storage zone observation wells located proximal to well ASR-1. OW-1 is located 475 feet from well ASR-1 and OW-3 is located 370 feet from well ASR-1. Arsenic concentrations above the regulatory limit of 10 micrograms per liter (ug/l) were not recorded in either of the monitoring wells during Cycles 1 through 4, although the injected fresh water clearly passed those wells during each cycle. It was only after completion of Cycle 4, during the use of well OW-3 as a makeup water supply well during the construction of well ASR-5 and during the prolonged (i.e. several year) period of nonuse of the system, during which purging and sampling of the monitoring wells has continued, that arsenic levels above 10 ug/l have were detected in the two monitoring wells.

8. ***The Department notes that comparing and contrasting water quality results and well construction steps at both Olga and Corkscrew site may result in findings that will improve future well installation.***

The two referenced ASR systems are completed in different aquifers. The Corkscrew system is completed in a 60 feet thick unit of the Mid Hawthorn aquifer system that varies, depending on location, between the approximate depths of 250 feet and 400 feet below land surface (BLS). The Olga ASR system is completed in the Suwannee aquifer between the approximate depths of 850 feet and 920 feet BLS.

The Mid Hawthorn aquifer system in Lee County is typically composed of several distinct, relatively thin and areally restricted limestone units with thick intervening clay sections. The overall thickness of the entire unit is about 350 feet, but the individual limestone units are typically only about 20 feet thick. Transmissivities of the limestone units are typically low, usually well below the criteria for use as an ASR storage zone. At Corkscrew a relatively thick Mid Hawthorn unit was encountered with a transmissivity at the low end of the range considered

useable for ASR purposes. In the ASR exploratory well drilled at the site other zones were tested, but the Mid Hawthorn was considered to have the best potential for a successful demonstration ASR project.

At Olga, again several zones were tested in the ASR exploratory well and the Suwannee was selected as having the best potential for a successful demonstration ASR project. The Suwannee is the aquifer most often used in southwest Florida for ASR. This is because it has a relatively consistent transmissivity in the range needed for ASR. Native water quality in the Suwannee ranges from fresh in the north (i.e. in DeSoto County) to very brackish in the south (i.e. in Collier County). The Suwannee is used as an ASR storage zone at the Peace River site in DeSoto County, where the native groundwater in that zone is fresh, at the City of Punta Gorda, at Olga, and at the City of Naples, where native groundwater in the Suwannee has TDS concentrations greater than 10,000 mg/l (i.e. it is below the base of the Underground Source of Drinking Water (USDW)). At Olga, as evidenced by the very low yield of the lower monitoring zone of the dual zone monitoring well for the North Lee County injection well system, the zones below the base of the USDW have very low transmissivities and are not considered useable for ASR purposes for that reason.

Thank you in advance for your attention to this matter. Do not hesitate to call or e-mail should you have any questions or comments regarding any aspect of this matter.

Sincerely,

Daniel J. Acquaviva, P.G.
Vice President
Licensed Professional Geologist # 1066

encl (2).

pc: J. Haberfeld, FDEP-Tallahassee
S. Anderson, SFWMD-West Palm Beach
R. Reese, USGS-Miami
T. Cichy, LCU
J. Alexander, FDEP-Tallahassee
N. Marsh, EPA-Atlanta
R. Edelstein, LCU

Dan Acquaviva

From: "Rhodes, David" <David.Rhodes@dep.state.fl.us>
To: "Haberfeld, Joe" <Joe.Haberfeld@dep.state.fl.us>; "Alexander, James" <James.Alexander@dep.state.fl.us>; "Hill, Thomas" <THill@leegov.com>; "Mamott, Thomas" <TMamott@leegov.com>; "Barroso, Henry" <HBarroso@leegov.com>; "DiPiero, Patricia" <PDiPiero@leegov.com>; "Denney, Chad" <CDenney@leegov.com>; "Cichy, Todd" <TCichy@leegov.com>; "Lindner, Eric" <ELindner@leegov.com>; "Dan Acquaviva" <dacquaviva@rma-geologic.com>; "Omar Rodriguez" <orodriguez@rma-geologic.com>; "'Edelstein, Rand '" <REdelstein@leegov.com>
Sent: Monday, November 15, 2010 1:28 PM
Subject: Olga and Corkscrew ASR submittal comments

Tom,

Please find following the department's comments related to the recent submittals for each of these ASR sites. Should there be any questions please contact me directly.

Comments:

The department has reviewed the submittals provided in response to the referenced Administrative Orders and has the following findings:

The solute transport models will require continuous updating and calibration with respect to the chloride/arsenic ratio and the geochemical relationship defined in the submittal. This may require sampling of these and other parameters at regularly scheduled points as opposed to the sampling being solely related to injection and recovery. Please propose a plan to continually update and calibrate the geochemical models.

The Department is requesting the models and the overall submittal documents be transmitted electronically. The Department is making this request so as to obtain peer review on the modeling effort and any ways to improve the models.

The County's supplemental submittal for the Olga ASR site provided an updated figure relating the overall storage volume size with all ASR wells in operation and the determination that the storage volume sizing is such that the County ordinance will require revision to accommodate the storage volume zone of exclusion. Please provide a schedule for revision to the County ordinance.

The Department is requesting that the existing monitor wells at the Olga site be included in the groundwater arsenic remediation effort. This will, in our opinion, allow for the most complete restart of the site with recognized background conditions existing in all wells. Additionally a surface water discharge permit to discharge the recovered water to the river will be necessary. A plan of operation for recovery, sampling, and ultimate discharge of the recovered water will be necessary - the plan should focus on maintaining compliance with the 50 µg/L surface water compliance limit for arsenic concentrations. (Additional Note: The Department is currently revising the rules for the General Permits to discharge groundwater to surface waters, therefore the County should apply for the permits to discharge the remediation water from the Olga Wellfield as soon as possible).

The Department is requesting clarification as to paragraph 4 top of page 111. Specifically, clarification of the time periods of aquifer conditioning, rates of injection, storage periods, and sampling with respect to verifying the arsenic/chloride ratio.

Clarification of the technical thesis for mobilization of arsenic is needed. Is it the County's theory that the arsenic formation is limited to an area immediately proximal to the injection wells? If so then the monitor well network should be revised to validate this theory by placement of the monitor wells within and at the boundary of the area suspected to be the limit of the arsenic mobilization zone.

The Department notes that comparing and contrasting water quality results and well construction steps at both the Olga and Corkscrew site may result in findings that will improve future well installation procedures.

Thanks

David Rhodes, P.G.
UIC Program Manager/Groundwater
Technical Support Supervisor
FDEP South District Office
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239/332-6975 Ext 125

Cover Florida, **developed by Governor Charlie Crist and the Florida Legislature, gives Floridians access to more affordable health insurance options. To learn more or to sign up for email updates, visit www.CoverFloridaHealthCare.com.**

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