AQUATIC CONSULTING & TESTING, INC.

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Lic. No. AZ0003

18 May 2015

Ms. Debbie Tribioli
The Oasis at Anozira
c/o Kinney Management Services
6303 South Rural Road
Tempe, Arizona 85283

Ref: Oasis Lake, April 2015

Dear Ms. Tribioli:

The following report summarizes initial water quality data collected for Oasis Lake on 09 April 2015. Similar data will be reported each month and, once sufficient data has been collected, will be used to generate graphs to track changes in water quality. This report also includes field data sheets reflecting lake and mechanical system conditions each week during the month.

Chemical and Physical Composition

Temperature, Oxygen, and pH: Water temperature was 22.3 C (72 F) and the dissolved oxygen concentration was 12.6 mg/L. The amount of oxygen that can dissolve in water is temperature dependent; colder water can hold more oxygen than warmer water. At the time of sampling, the oxygen saturation was over 100 percent, indicating maximum oxygenation content and adequate operation of the aeration system. The dissolved oxygen content was also satisfactory for the fishery. The table below shows the USEPA criteria for dissolved oxygen in warm water fisheries.

Criterion	Early life stages	Other life stages
Daily mean	>6.0	>4.0
Daily minimum	>5.0	>3.0

Water temperature tolerance varies among fish species. However, the maximum weekly temperature tolerance of most common urban lake fish species is 32 to 35 C.

Turbidity: The turbidity of the lake water increased slightly to 29.2 NTU. Water turbidity is impacted by dissolved and particulate matter in the water. As turbidity increases, clarity and aesthetic quality decreases.

pH: The lake water pH increased to 9.3, above the desired range. Water pH is influenced by the amount of algae in the lake. In a very simplified explanation, carbonic acid in the water is formed from dissolution of carbon dioxide. Carbonic acid tends to make the water more acidic and pH decreases. However, algae utilize carbon dioxide during photosynthesis during daylight, making less carbon dioxide available to form carbonic acid, and pH increases. The more algae present, the greater the increase in pH. The pH data is consistent with the measured increase in algae (see below).

High pH can be problematic in terms of toxicity if high concentrations of ammonia are present in the water. Ammonia is in equilibrium between two forms; ammonium ion and ammonia gas. At pH concentrations above 9.0 SU, ammonia converts to the gas which is toxic to many aquatic organisms. At pH 9.3 any ammonia present could have a significant impact on the fishery. However, no signs of fishery problems were apparent.

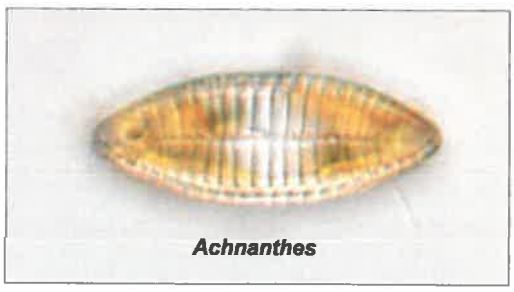
Nutrients: Nitrogen and phosphorus are the primary nutrients that stimulate algae and submerged plant growth. Phosphorus is typically the nutrient that dictates how much plant growth can be sustained in a lake. Usually if the total phosphorus concentration is below 0.030 mg/L, low levels of suspended algae occur. A nitrogen concentration of about 10 times the phosphorus (0.30 m/L) is typically needed to support algal growth.

The total nitrogen concentration increased to 2.20 mg/L as N. The phosphorus concentration also increased to 0.104 mg/L as P. These data indicate that the lake has sufficient nutrients to support a high density algae population which is reflected in the phytoplankton data.

Biological Composition

Phytoplankton (algae): The amount and types of algae in a lake dictate the aesthetic and operational quality of the water. Algae density affects the clarity and color of the water, two very important aesthetic criteria. The species composition dictates the form of growth observed; floating mats, suspended cells, stringy attached filaments, etc. It also impacts the choice, frequency, and dosage of herbicides used for water quality management.

The total algae density in the lake increased to 1.73×10^5 cells per mL; considered in the elevated category for an urban reservoir in metro-Phoenix. The increase in nutrients are likely responsible for the increase, along with increased day length and solar intensity. The dominant alga in Oasis Lake was *Achnanthes*, a unicellular diatom (Bacillariophyta). Diatoms are not usually problematic, but their dominance of golden to brown colored pigments gives the water a murky appearance. The potentially toxic (to fish) alga, *Prymnesium parvum*, was not detected in the lake water.



No submerged weeds were detected in the lake.

Midge flies: Midge flies are common inhabitants of most lakes. Adult females lay hundreds of eggs on the water surface. The eggs settle to the lake bottom and hatch in a few days. Larvae develop and grow in the superficial sediments over a three to four week period. In about 30 days the insect larvae become pupae, rise in the water column, and emerge as adult flies. The life cycle is shown diagrammatically below. The adults tend to swarm at dusk and dawn and become a nuisance. They fly into residents' eyes and mouths, congregate under eaves of houses, and leave a sticky messy residue when they die. Management techniques may include stocking of bottom-feeding fishes to consume the larvae and/or application of bacterial or chemical larvicides.

Minimal midge fly adults were detected during the month.

Fishery: Fish activity appeared normal. No dead fish were observed or reported during the month.

Waterfowl: Ducks and geese can be a beautiful sight on a small urban pond or lake. They seem to make the lake look more like a natural lake than an artificial reservoir. They are fascinating creatures. However, when ducks and geese become too numerous, several lake management and aesthetic problems can develop.

Bird droppings can be a nuisance and aesthetic detraction along the shoreline. The droppings create slippery conditions along the shoreline and certainly are not attractive in appearance. Because the droppings must be physically washed from the lake edge, they create an additional maintenance task. Some waterfowl, as geese can become aggressive to humans, especially after they have become accustomed to being fed human food. They can do significant damage to turf areas, ripping up and consuming grass. Water fowl are also a source of nitrogen and phosphorus; nutrients that stimulate algae growth in a lake and cause the water to turn green. Ducks like to forage vegetation from the land. They convert it to water-soluble forms of nitrogen and phosphorus during digestion. The wastes are then deposited in the lake while they swim. Bird wastes contain fecal bacteria. Because we sometimes fish and our children often play along the water's edge, hands or feet somehow find their way into the water. Thus, the waste material can pose a health risk. Finally, some diving birds as cormorants are excellent fishermen. These birds have reduced the fish populations in some nearby lakes, consuming game fish and reducing recreational benefits. They have also removed fish that had been added for weed and insect control. Frequent fish restocking increases operational costs for the lake owner.

Arizona Game and Fish Department has developed the following criteria for waterfowl on small urban lakes.

Excellent	<3/acre
Good	3-4/acre
Fair	5-6/acre
Poor	>6/acre

Based on the Arizona Game & Fish Department scale, the lake condition in terms of waterfowl was good during the month. A reduced variety and number of geese and ducks visited the lake on a daily basis. Cormorants were not observed. In terms of public health protection, the *E. coli* bacteria concentration was 73 per 100 mL. The State swimming standard for *E. coli* is 235 and the secondary (partial body contact) standard is 575 per 100 mL. The lake water meets both of these criteria.

Mechanical Systems and Field Observations

Weekly field inspection forms are attached to this report. Familiarization with the lake and its mechanical equipment continued. The lake was cleaned of surface debris weekly.

- The south water fountain remained out of service during most of the month, but was repaired by month's end.
- Two (2) aerator diffuser stations continued to work poorly, suggesting thorough cleaning or replacement of the membranes may be required. In place cleaning did not improve operation significantly.

Chemical/Biological Product Applications

No applications were made to the lake during the month.

Lake Report Card

The water quality data are summarized on the attached Oasis Lake Report Card. Each salient parameter has been qualitatively evaluated and then assigned a numeric value for comparison and tracking purposes. The overall rating decreased from 38 to 36, primarily as a result of increased nutrients and greater algae density. However, the lake remained in the "Good" category for April 2015.

Respectfully,

AQUATIC CONSULTING & TESTING, INC.

Frederick A. Amalfi, Ph.D., C.L.M.
Laboratory Director

LABORATORY REPORTS

FIELD INSPECTION FORMS

PESTICIDE APPLICATION DOCUMENTS

OASIS LAKE REPORT CARD

DATE OF EVALUATION: **Apr-15** CONDITION **GOOD** SCORE **36**

PREVIOUS EVALUATION: **Mar-15** CONDITION **GOOD** SCORE **38**

			4 pts	3 pts	2 pts	1 pt	
CONDITION	RESULT	RATIONALE	EXCELLENT	GOOD	FAIR	POOR	SCORE
Turbidity (NTU)	**29.2**	aesthetics	<5	5-10	11-20	>20	**1**
Dissolved oxygen (mg/L)	**12.6**	aquatic life, sediment nutrient release, odors	>7.0	5.6-6.9	4.0-5.5	<4.0	**4**
Nitrogen, total (mg/L)	**2.20**	algae and macrophyte growth	<0.5	0.5-1.0	1.0-2.0	>2.0	**1**
Phosphorus, total (mg/L)	**0.104**	algae and macrophyte growth	<0.03	0.03-0.05	0.06-0.10	>0.10	**1**
Algae density (no./mL)	**1.7×10^5**	aesthetics	$<5 \times 10^4$	$5x10^4$ - $9x10^4$	1×10^5 -$5x\ 10^6$	$>5 \times 10^5$	**3**
Algae form (dominant)	**diatoms**	aesthetics, treatability	greens; no floating mats	diatoms; no floating mats	blue-greens; no floating mats	blue-greens; floating mats common	**3**
Macrophytes (% cover)	**<1**	aesthetics, boating	none	<10%	11-20%	>20%	**4**
pH (SU) avg.	**9.3**	swimming, fishery, ammonia toxicity	6.5-8.0	8.0-8.5	8.5-9.0	>9.0	**1**
E. coli bacteria (#/100 mL) avg.	**73**	public health protection	<20	21-80	81-125	>125	**3**
Midge flies	**no nuisances**	quality of life	no nuisances	minor nuisances	moderate nuisances	significant nuisances	**4**
Waterfowl (no. per acre)	**3**	nutrient and bacteria loading	<2	2-5	6-10	>10	**3**
Fishery	**normal**	recreation, aesthetics	no fish piping; no fish kills	some fish piping, gulping; no fish kills	fish piping before dawn; occasional fish kills	fish piping common; fish kills common	**4**
Shoreline/banks	**no edge growths**	aesthetics	no evidence of salt crusts or algal scums	some white deposits and scums	numerous patches of salt deposits and algae scums	most of lake shore covered with crusts or scums	**4**

SCORING KEY:

Excellent	Good	Fair	Poor
42-48	36-41	30-35	<30

Definitions: Ratings

Excellent: Lake aesthetic and operational conditions above level of expectation.
Good: Lake aesthetic and operational conditions at le level of expectation.
Fair: Lake aesthetic and operational conditions slightly below level of expectation.
Poor: Lake aesthetic and operational conditions considerably below level of expectation.

Definitions: Terms

Macrophyte: Large plant, observable without the aid of a microscope, that may be floating, submerged or emergent.
Midge: Small, flying, non-biting "gnat-like" insect whose larval stage exists in the lake sediments (bloodworm).
N/A: not applicable; insufficient data or too early in development of lake (an arbitrary 3 rating is provided for these items).
pH: -log hydrogen ion conc.; amount of acid in the water identified on scale 1-14; 1 being most acid, 7 neutral, and 14 being most caustic.
Phytoplankton (algae): Microscopic plant fraction of the plankton community.
Piping: Act of fish coming to surface of water and capturing a bubble of air in their mouth; a sign of low oxygen concentrations.
Plankton: Organisms of relatively small size that have relatively small powers of locomotion or that drift in the water.
Turbidity: Degree to which particles and color in the water scatter light; the "cloudiness" of the water.

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Lic. No. AZ0003

LABORATORY REPORT

Client: Oasis at Anozira
c/o Kinney Management Services
6303 S. Rural Road
Tempe, Arizona 85283
Attn: Debbie Tribioli

Date Submitted: 04/09/15
Date Reported: 05/14/15

Project: Monthly Lake Monitoring

RESULTS

Client ID: Lake
ACT Lab No.: BX03227

Sample Type: Surface Water
Sample Time: 04/09/15 12:15

Parameter	Analysis Date Start	Analysis Date End	Method No.	Result	Unit
Algae Count	04/21/15	04/21/15	SM 10200 F	See Attached	cells/mL
Algae Identification	04/21/15	04/21/15		See Attached	
Golden Algae	04/09/15	04/09/15	P/C Microscopy	Absent	Pres/Abs
Oxygen, Dissolved Field	04/09/15	04/09/15	SM4500 O G	12.6	mg/L as O2
pH, Field	04/09/15	04/09/15	SM4500H+ B	9.3	SU
Temperature, Field	04/09/15	04/09/15	SM2550 B	22.3	C
Nitrate + Nitrite - N	05/05/15	05/05/15	SM4500NO3 E	<0.05	mg/L as N
Phosphorus, Total	04/27/15	04/27/15	365.3	0.104	mg/L as P
Total Kjeldahl Nitrogen	04/10/15	04/10/15	SMNorg C,NH3 C/D	2.2	mg/L as N
E. coli, Colilert	04/09/15	04/10/15	SM 9223 B	73	MPN/100 mL
Turbidity	04/09/15	04/09/15	180.1	29.2	NTU

Reviewed by: Frederick A. Amalfi, Ph.D.
Laboratory Director

ALGAE IDENTIFICATION

AC&T Lab No.	BX03227	Date Collected	04/09/15
Client I.D.	Lake	Collected By	A. Murrett

Divisions: bac=Bacillariophyta; chl=Chlorophyta; cry=Chrysophyta; cyn=Cyanophyta; eug=Euglenophyta; hap=Haptophyta; pyr=Pyrrhophyta Forms: u=unicell; c=colony; f=filament; g= flagellate

Genus	Div.-Form	Rel. Count	Total per mL	Comp.	Genus	Div.-Form	Rel. Count	Total per mL.	Comp
Achnanthes	bac-u	98	92207	53.26%	*Microcystis*	cyn-c			
Anabaena	cyn-f				*Microspora*	chl-f			
Ankistrodesmus	chl-u				*Mougeotia*	chl-f			
Aphanocapsa	cyn-c				*Navicula*	bac-u			
Asterionella	bac-c				*Nitzschia*	bac-u			
Botryococcus	chl-c				*Oocystis*	chl-c			
Carteria	chl-ug	2	1882	1.09%	*Oscillatoria*	cyn-f			
Cephalomonas	chl-ug				*Pandorina*	chl-cg			
Ceratium	pyr-ug				***Pediastrum***	chl-c	8	7527	4.35%
Chlamydomonas	chl-ug				***Peridinium***	pyr-ug	7	6586	3.80%
Chlorella	chl-u				*Phacotus*	chl-ug			
Chlorococcum	chl-c				*Phacus*	chl-ug			
Chroococcus	cyn-c	18	16936	9.78%	*Pinnularia*	bac-u			
Chroomonas	crp-ug				*Pithophora*	chl-f			
Closterium	chl-u				*Prymnesium*	hap-ug			
Cocconeis	bac-u				*Rhizoclonium*	chl-f			
Coelastrum	chl-c				*Rhoicosphenia*	bac-u			
Cosmarium	chl-u				*Rhopalodia*	bac-u			
Cosmocladium	chl-c				***Scenedesmus***	chl-c	24	22581	13.04%
Crucigenia	chl-c				*Scytonema*	chl-f			
Cryptomonas	crp-ug				*Selanastrum*	chl-u			
Cyclotella	bac-u				*Sphaerocystis*	chl-c			
Cymbella	bac-u				*Spondylumorum*	chl-c			
Diatoma	bac-u				***Spirulina***	cyn-f	20	18818	10.87%
Dinobryon	bac-c				*Stauroneis*	bac-u			
Dunaliella	chl-u				*Stephanodiscus*	bac-u			
Epithemia	bac-u				*Stigeoclonium*	chl-f			
Euglena	eug-ug				*Surirella*	bac-u			
Fragilaria	bac-u				*Synechococcus*	cyn-u			
Frustulia	bac-u				*Synechocystis*	cyn-c			
Glenodinium	pyr-ug				***Synedra***	bac-u	4	3764	2.17%
Golenkinia	chl-c				*Synura*	cry-cg			
Gomphonema	bac-u				***Tetraedron***	chl-u	3	2823	1.63%
Gonium	chl-cg				*Tetrastrum*	chl-c			
Gonyaulax	pyr-ug				*Trachelomonas*	eug-ug			
Gyrosigma	bac-u				*Vaucheria*	chl-f			
Hydrodictyon	chl-c				*Volvox*	chl-cg			
Lyngbya	cyn-f				*Zygnema*	chl-f			
Melosira	bac-f								
Meridion	bac-u								
Merismopedia	cyn-c								

check 100.00%

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Count (cells/mL) 1.73E+05

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Chain of Custody

Client Project Info:
Monthly Lake Monitoring
Oasis at Anozira

AC&T Client Reporting Information:

Oasis at Anozira
c/o Kinney Management Services
Attn: Debbie Tribioli
6303 South Rural Road
Tempe, AAZ 85283
P: 480-820-3451
E: debbie@kinneymanagement.com

AC&T Sampler: Andrew Murrett

Page1 of 1

Sample Location ID:	Date:	Time:	Matrix:	NO3+NO2	Total Phosphorous (P-T)	Total Kjeldahl Nitrogen (TKN)			Total E.Coli -MPN			Turbidity			Algae Count & ID	Golden Algae	Field Measurements: pH, Temp, O2	Sample Containers # / Preservation: Non Preserved	Na2S2O3 (Sterile)	HNO3 (Nitric)	H2SO4 (Sulfuric)	Lugols	Other:	AC&T Laboritory Sample Identification
Lake	4-9-15	1215	SW	X	X	X			X			X			X	X	X	2	2		1	1		BX03227

Location:	A C & T Sample Receipt:			1. RELINQUISHED BY:	2. RECEIVED BY:
Oasis at Anozira	Total # Containers:	6		Signature: Andrew Murrett	Signature: T. B
PO# Lake Contract	Custody Seals:	YES	NO	Print Name: Andrew Murrett	Print Name: T. B
	Samples Intact:	YES	NO	Date: 4/9/15 Time: 1335	Date: 4-9-15 Time: 1335
Notes:	Samples On Ice:	YES	NO	3. RELINQUISHED BY:	4. RECEIVED BY:
	Ice Type:	WET	BLUE	Signature:	Signature:
	Sample Receipt Temperature:	26°C		Print Name:	Print Name:
				Date: Time:	Date: Time:

1-09-15 Rev-01

025

OASIS AT ANOZIRA
FIELD INSPECTION FORM (

wpdoc/lists&forms)

Date: 4/1/15
By: AM

Aeration System Operation

☑ operational ☐ Problem

Details: 2 working poorly
Aerator

Lake Surface

☑ Lake surface cleaning

Floating Fountains ☐ West ☑ East ☐ South

☐ operational ☐ Problem Details: On shore not working

Pump house ☐ housekeeping ☐ leaks ☐ ventilation ☐ lighting Notes

Compressors ☐ operational ☐ Problem Details: No Key!!

Pumps ☐ operational ☐ Problem Details:

Entry Fountains

Elliot North: ☑ operational ☑ Screens cleared ☐ Problem Details:

Elliot South: ☑ operational ☐ Screens cleared ☐ Problem Details:

Los Feliz: ☑ operational ☐ Screens cleared ☐ Problem Details:

Monthly Chemistry & Biology

- ☐ Dissolved oxygen 10.4
- ☐ Temperature 23.2
- ☐ pH 8.6
- ☐ Algae ID and count
- ☐ Ammonia-N
- ☐ Organic N (TKN)
- ☐ Phosphorus
- ☐ Turbidity
- ☐ *E. coli*

OASIS AT ANOZIRA
FIELD INSPECTION FORM (

wpdoc/lists&forms)

Date: 4/9/15
By: JM

Aeration System Operation

☑ operational ☐ Problem

Details: Water turbid & green

Lake Surface

☐ Lake surface cleaning

Floating Fountains ☐ West ☑ East ☐ South

☑ operational ☐ Problem Details: being repaired

Pump house ☐ housekeeping ☐ leaks ☐ ventilation ☐ lighting Notes

Compressors ☐ operational ☐ Problem Details: Need Key

Pumps ☐ operational ☐ Problem Details:

Entry Fountains

Elliot North: ☑ operational ☑ Screens cleared ☐ Problem Details:

Elliot South: ☑ operational ☑ Screens cleared ☐ Problem Details:

Los Feliz: ☑ operational ☑ Screens cleared ☐ Problem Details:

Monthly Chemistry & Biology

- ☐ Dissolved oxygen 12.6
- ☐ Temperature 22.3
- ☐ pH 9.3
- ☐ Algae ID and count
- ☐ Ammonia-N
- ☐ Organic N (TKN)
- ☐ Phosphorus
- ☐ Turbidity
- ☐ *E. coli*

OASIS AT ANOZIRA
FIELD INSPECTION FORM (

wpdoc/lists&forms)

Date: 4/16/15
By: AM

Aeration System Operation

☑ operational ☐ Problem

Details: 2 running poorly

Lake Surface

☐ Lake surface cleaning

Floating Fountains ☑ West ☐ East ☐ South

☑ operational ☐ Problem Details: off for repair

Pump house ☐ housekeeping ☐ leaks ☐ ventilation ☐ lighting Notes

Compressors ☐ operational ☐ Problem Details: No Key!!

Pumps ☐ operational ☐ Problem Details:

Entry Fountains

Elliot North: ☑ operational ☑ Screens cleared ☐ Problem Details:

Elliot South: ☑ operational ☑ Screens cleared ☐ Problem Details:

Los Feliz: ☑ operational ☑ Screens cleared ☐ Problem Details:

Monthly Chemistry & Biology

- ☐ Dissolved oxygen 12.3
- ☐ Temperature 21.5
- ☐ pH 9.2
- ☐ Algae ID and count
- ☐ Ammonia-N
- ☐ Organic N (TKN)
- ☐ Phosphorus
- ☐ Turbidity
- ☐ *E. coli*

OASIS AT ANOZIRA
FIELD INSPECTION FORM (

wpdoc/lists&forms)

Date: 4/22/15
By: AM

Aeration System Operation

☑ operational ☐ Problem

Details: _____

Lake Surface

☑ Lake surface cleaning

Floating Fountains ☑ West ☑ East ☐ South

☑ operational ☐ Problem Details: Under repair

Pump house ☐ housekeeping ☐ leaks ☐ ventilation ☐ lighting Notes _____

Compressors ☐ operational ☐ Problem Details: No Key !!

Pumps ☐ operational ☐ Problem Details: _____

Entry Fountains

Elliot North: ☑ operational ☑ Screens cleared ☐ Problem Details: _____

Elliot South: ☑ operational ☑ Screens cleared ☐ Problem Details: _____

Los Feliz: ☑ operational ☑ Screens cleared ☐ Problem Details: _____

Monthly Chemistry & Biology

- ☑ Dissolved oxygen 14.5
- ☑ Temperature 22.0
- ☑ pH 9.0
- ☐ Algae ID and count
- ☐ Ammonia-N
- ☐ Organic N (TKN)
- ☐ Phosphorus
- ☐ Turbidity
- ☐ *E. coli*

OASIS AT ANOZIRA
FIELD INSPECTION FORM (

wpdoc/lists&forms)

Date: 4/29/15
By: [illegible]

Aeration System Operation

☑ operational ☐ Problem
Details: All aerators working. 2 weak

Lake Surface

☑ Lake surface cleaning

Floating Fountains ☑ West ☑ East ☑ South

☑ operational ☐ Problem Details:

Pump house ☐ housekeeping ☐ leaks ☐ ventilation ☐ lighting Notes

Compressors ☐ operational ☐ Problem Details: No Key!!!

Pumps ☐ operational ☐ Problem Details:

Entry Fountains

Elliot North: ☑ operational ☑ Screens cleared ☐ Problem Details:

Elliot South: ☐ operational ☑ Screens cleared ☑ Problem Details: OFF

Los Feliz: ☑ operational ☑ Screens cleared ☐ Problem Details:

Monthly Chemistry & Biology

- ☐ Dissolved oxygen 15.4
- ☐ Temperature 30.1
- ☐ pH 9.4
- ☐ Algae ID and count
- ☐ Ammonia-N
- ☐ Organic N (TKN)
- ☐ Phosphorus
- ☐ Turbidity
- ☐ *E. coli*