AQUATIC CONSULTING & TESTING, INC.

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Lic. No. AZ0003

31 March 2015

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

Ref: Oasis Lake, February 2015

Dear Ms. Tribiolo:

The following report summarizes initial water quality data collected for Oasis Lake on 05 February 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. The 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 17.0 C (63 F) and the dissolved oxygen concentration was 9.6 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 99 percent, indicating near 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 was moderate, at 13.1 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 was slightly elevated at 8.9 SU. 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.

High pH is 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.

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 was moderate (0.91 mg/L as N). The phosphorus concentration was also moderate at 0.052 mg/L as P. These data indicate that the lake has sufficient nutrients to support a moderate algae population.

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 was only 5.55 x 10^3 cells per mL; considered lowfor an urban reservoir in metro-Phoenix. The dominant alga in Oasis Lake was *Chlorella*, a unicellular green (Chlorophyta) form. This type of algae rarely causes aesthetic or operational issues. Problematic blue-green algae (Cyanophyta) made up only 12.5 percent of the population. The toxic alga, *Prymnesium parvum*, was not observed. This alga has been responsible for many fish kills in central Arizona. The alga produces two toxins that destroy gill cells, leading to asphyxiation of exposed fish.

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 is poor to fair. A variety of geese and ducks visit the lake daily. Cormorants have been rarely observed. In terms of public health protection, the *E. coli* bacteria concentration was 133 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 these criteria.

Mechanical Systems and Field Observations

Weekly field inspection forms are attached to this report. Much of the work during February consisted of staff becoming familiar with the lake and its mechanical equipment.

The south water fountain was not in service during the month. The west fountain was off line briefly, the second week of the month. All air compressors were out of service for a short time in mid-February, but were repaired and returned to by the end of the month. However, two diffuser stations were generating sub-optimal air flows as indicated by the lack of a vigorous boil pattern on the water surface.

A small leak on the Elliot south entry feature was detected and reported.

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 for the lake was "Good" for February 2015.

Respectfully,

AQUATIC CONSULTING & TESTING, INC.

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

OASIS LAKE REPORT CARD

DATE OF EVALUATION: **Feb-15** CONDITION **GOOD** SCORE **41**

PREVIOUS EVALUATION: CONDITION SCORE

CONDITION	RESULT	RATIONALE	4 pts EXCELLENT	3 pts GOOD	2 pts FAIR	1 pt POOR	SCORE
Turbidity (NTU)	**13.10**	aesthetics	<5	5-10	11-20	>20	**3**
Dissolved oxygen (mg/L)	**9.6**	aquatic life, sediment nutrient release, odors	>7.0	5.6-6.9	4.0-5.5	<4.0	**4**
Nitrogen, total (mg/L)	**0.91**	algae and macrophyte growth	<0.5	0.5-1.0	1.0-2.0	>2.0	**3**
Phosphorus, total (mg/L)	**0.052**	algae and macrophyte growth	<0.03	0.03-0.05	0.06-0.10	>0.10	**3**
Algae density (no./mL)	**5.5×10^3**	aesthetics	$<5 \times 10^4$	$5x10^4$ - $9x10^4$	1×10^5 -$5x\ 10^6$	$>5 \times 10^5$	**4**
Algae form (dominant)	**green unicells**	aesthetics, treatability	greens; no floating mats	diatoms; no floating mats	blue-greens; no floating mats	blue-greens; floating mats common	**4**
Macrophytes (% cover)	**<1**	aesthetics, boating	none	<10%	11-20%	>20%	**4**
pH (SU) avg.	**8.9**	swimming, fishery, ammonia toxicity	6.5-8.0	8.0-8.5	8.5-9.0	>9.0	**2**
E. coli bacteria (#/100 mL) avg.	**184**	public health protection	<20	21-80	81-125	>125	**1**
Midge flies	**no nuisances**	quality of life	no nuisances	minor nuisances	moderate nuisances	significant nuisances	**4**
Waterfowl (no. per acre)	**14**	nutrient and bacteria loading	<2	2-5	6-10	>10	**1**
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.

LABORATORY REPORTS

FIELD INSPECTION FORMS

PESTICIDE APPLICATION DOCUMENTS

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LABORATORY REPORT

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

Date Submitted: 02/05/15
Date Reported: 03/30/15

Project: Monthly Lake Monitoring

RESULTS

Client ID: Lake
ACT Lab No.: BX01075

Sample Type: Surfacewater
Sample Time: 02/05/15 10:00

Parameter	Analysis Date Start	Analysis Date End	Method No.	Result	Unit
Algae Count	03/15/15	03/15/15	SM 10200 F	See Attached	cells/mL
Algae Identification	03/15/15	03/15/15		See Attached	
Golden Algae	02/05/15	02/05/15	P/C Microscopy	Absent	Pres/Abs
Oxygen, Dissolved Field	02/05/15	02/05/15	SM4500 O G	9.6	mg/L as O2
pH, Field	02/05/15	02/05/15	SM4500H+ B	8.9	SU
Temperature, Field	02/05/15	02/05/15	SM2550 B	17.0	C
Nitrate + Nitrite - N	02/27/15	02/27/15	SM4500NO3 E	0.21	mg/L as N
Phosphorus, Total	02/26/15	02/27/15	365.3	0.052	mg/L as P
Total Kjeldahl Nitrogen	02/13/15	02/13/15	SMNorg C,NH3 C/D	0.7	mg/L as N
E. coli, Colilert	02/05/15	02/06/15	SM 9223 B	133	MPN/100 mL
Turbidity	02/05/15	02/05/15	180.1	13.1	NTU

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

Town Lake Algae Identification

AC&T Lab No.	BX01075	Date Collected	02/05/15
Client I.D.	Oasis at Anozira	Collected By	AC&T

Divisions: bac-Bacillariophyta chl-Chlorophyta; cry-Chrysophyta; crp-Cryptophyta ; 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	16	1111	20.00%	*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*	cry-u			
Botryococcus	chl-c				***Oocystis***	chl-c	3	208	3.75%
Carteria	chl-ug	8	555	10.00%	***Oscillatoria***	cyn-f	10	694	12.50%
Cephalomonas	chl-ug				*Pandorina*	chl-cg			
Ceratium	pyr-uf				*Pediastrum*	chl-c			
Chlamydomonas	chl-ug				*Peridinium*	pyr-ug			
Chlorella	chl-u	19	1319	23.75%	*Phacotus*	chl-ug			
Chlorococcum	chl-c				*Phacus*	chl-ug			
Chroococcus	cyn-c	2	139	2.50%	*Pinnularia*	bac-u			
Chroomonas	crp-ug	1	69	1.25%	*Pithophora*	chl-f			
Closterium	chl-u				*Planktosphaeria*	chl-c			
Cocconeis	cry-u				*Rhizoclonium*	chl-f			
Coelastrum	chl-c				*Rhoicosphenia*	bac-u			
Cosmarium	chl-u				*Rhopalodia*	bac-u			
Cosmocladium	chl-c				***Scenedesmus***	chl-c	4	278	5.00%
Crucigenia	chl-c				*Scytonema*	chl-f			
Cryptomonas	crp-ug	2	139	2.50%	*Selanastrum*	chl-u			
Cyclotella	bac-c				*Sphaerocystis*	chl-c			
Cymbella	bac-c				*Spirogyra*	chl-f			
Diatoma	bac-c				***Spirulina***	cyn-f	10	694	12.50%
Dinobryon	bac-c				*Staurastrum*	chl-u			
Dunaliella	chl-u				*Stephanodiscus*	bac-u			
Epithemia	bac-c				*Stigeoclonium*	chl-f			
Euglena	eug-g				*Surirella*	bac-u			
Fragilaria	bac-c				*Synechococcus*	cyn-u			
Franceia	chl-u				*Synechocystis*	cyn-c			
Glenodinium	pyr-ug	2	139	2.50%	***Synedra***	bac-u	2	139	2.50%
Golenkinia	chl-u				*Synura*	cry-cg			
Gomphonema	bac-c				***Tetraedron***	chl-u	1	69	1.25%
Gonium	chl-cg				*Tetrastrum*	chl-c			
Gonyaulax	pyr-ug				*Trachelomonas*	eug-ug			
Gyrosigma	cry-u				*Vaucheria*	chl-f			
Hydrodictyon	chl-c				*Volvox*	chl-cg			
Lagerhemia	chl-u				*Zygnema*	chl-f			
Melosira	bac-f								
Merismopedia	cyn-c								
Micrasterias	chl-u								

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Count (cells/mL) 5.55E+03

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Chain of Custody

Client Project Info:

AC&T Client Reporting Information:

Oasis at Anozira

AC&T Sampler: Andrew Murrett

Page 1 of 1

Sample Location ID:	Date:	Time:	Matrix:	TKN	Nitrogen (NO3+NO2)	Phosphorus Total (P-T)	Turbidity		E.Coli bacteria						Algae ID +#	Gloden Alae	Field Measurements: pH, Temp, O2	Sample Containers # / Preservation: None Preserved	Na2S2O3	HNO3 (Nitric)	H2SO4 (Sulfuric)	Lugols	Other:	AC&T Laboratory Sample Identification
Lake	2/5/15	1000	SW	X	X	X	X		X						X	X	X	2	2		1	1		BX01075
			SW																				
			SW																				
			SW																				

Location:

PO #:

Notes:

A C & T Sample Receipt:

Total # Containers:	6	
Custody Seals:	YES	NO
Samples Intact:	YES	NO
Samples On Ice:	YES	NO
Ice Type:	WET	BLUE
Sample Receipt Temperature:	21°C	

1 pkg ice

1. RELINQUISHED BY:
Signature: Andrew Murrett
Print Name: Andrew Murrett
Date: 2/5/15 Time: 1209

2. RECEIVED BY:
Signature:
Print Name: T. Kuc
Date: 2-5-15 Time: 1209

3. RELINQUISHED BY:
Signature:
Print Name:
Date: Time: ~~1209~~

4. RECEIVED BY:
Signature:
Print Name:
Date: Time:

-025

OASIS AT ANOZIRA
FIELD INSPECTION FORM (

wpdoc/lists&forms)

Date: 7-5-15
By: AM

Aeration System Operation

☐ operational ☑ Problem

Details: All off or out

Lake Surface

☑ Lake surface cleaning

Floating Fountains ☑ West ☑ East ☐ South

☑ operational ☐ Problem Details: south off

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 9.6
- ☐ Temperature 17.0
- ☐ pH 8.9
- ☐ Algae ID and count
- ☐ Ammonia-N
- ☐ Organic N (TKN)
- ☐ Phosphorus
- ☐ Turbidity
- ☐ *E. coli*

OASIS AT ANOZIRA
FIELD INSPECTION FORM (

wpdoc/lists&forms)

Date: 2/12/15
By: AM

Aeration System Operation

□ operational ☑ Problem
Details: All out

Lake Surface

□ Lake surface cleaning

Floating Fountains □ West ☒ East □ South

☑ operational □ Problem Details: West & South OFF

Pump house □ housekeeping □ leaks □ ventilation □ lighting Notes

Compressors □ operational □ Problem Details: No Key

Pumps □ operational □ Problem Details:

Entry Fountains

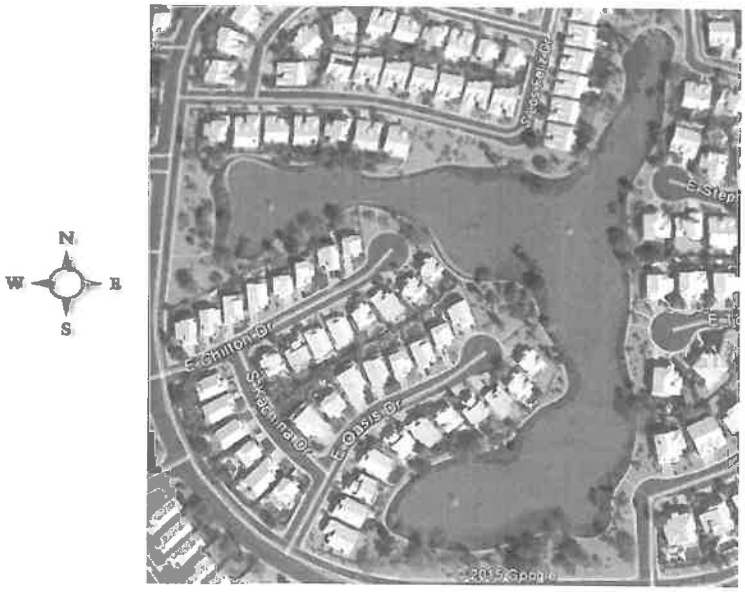
Elliot North: ☑ operational ☑ Screens cleared □ Problem Details:

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

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

Monthly Chemistry & Biology

- □ Dissolved oxygen 9.5
- □ Temperature 18.3
- □ pH 8.18
- □ Algae ID and count
- □ Ammonia-N
- □ Organic N (TKN)
- □ Phosphorus
- □ Turbidity
- □ *E. coli*



OASIS AT ANOZIRA
FIELD INSPECTION FORM (

wpdoc/lists&forms)

Date: 2/19/15
By: Ad

Aeration System Operation

☑ operational ☐ Problem

Details: 2 out

Lake Surface

☑ Lake surface cleaning

Green water

Floating Fountains ☑ West ☑ East ☐ South

☐ operational ☐ Problem Details: Out

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: Water low leak

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

Monthly Chemistry & Biology

- ☐ Dissolved oxygen 9.0
- ☐ Temperature 19.7
- ☐ pH 8.5
- ☐ Algae ID and count
- ☐ Ammonia-N
- ☐ Organic N (TKN)
- ☐ Phosphorus
- ☐ Turbidity
- ☐ *E. coli*

OASIS AT ANOZIRA
FIELD INSPECTION FORM (

wpdoc/lists&forms)

Date: 2/28/15
By: mn

Aeration System Operation

☑ operational ☐ Problem

Details: 2 Working poorly
Water turbid & green

Lake Surface

☑ Lake surface cleaning

Floating Fountains ☑ West ☑ East ☐ South

☐ operational ☐ Problem Details: Out

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 _____
- ☐ Temperature _____
- ☐ pH _____
- ☐ Algae ID and count
- ☐ Ammonia-N
- ☐ Organic N (TKN)
- ☐ Phosphorus
- ☐ Turbidity
- ☐ *E. coli*