



AQUATIC CONSULTING & TESTING, INC.

1525 W. University Drive, Suite 106
P.O. Box 1510
Tempe, Arizona 85281
Phone: (480) 921-8044 • Fax: (480) 921-0049

Lic. No. AZ0003

28 February 2017

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

Ref: Oasis Lake, January 2017

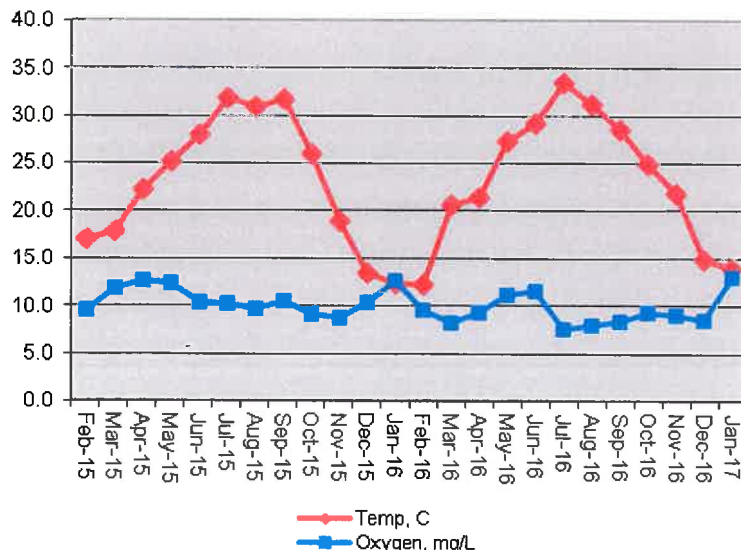
Dear Ms. Tribioli:

The following report summarizes water quality data collected for Oasis Lake on 04 January 2017. Similar data have been reported each month and are used in this report to generate the graphs that are used for tracking changes in water quality. The report includes field data sheets reflecting weekly lake and mechanical system conditions during the month.

Chemical and Physical Composition

Temperature, Oxygen, and pH: Water temperature decreased to 13.9 C (57 F) and the dissolved oxygen concentration increased to 13.0 mg/L. At the time of sampling, the oxygen saturation was >100 percent, indicating very good oxygenation and adequate operation of the aeration system. The dissolved oxygen content was also satisfactory for the fishery.

2015-2017 Temperature and Oxygen

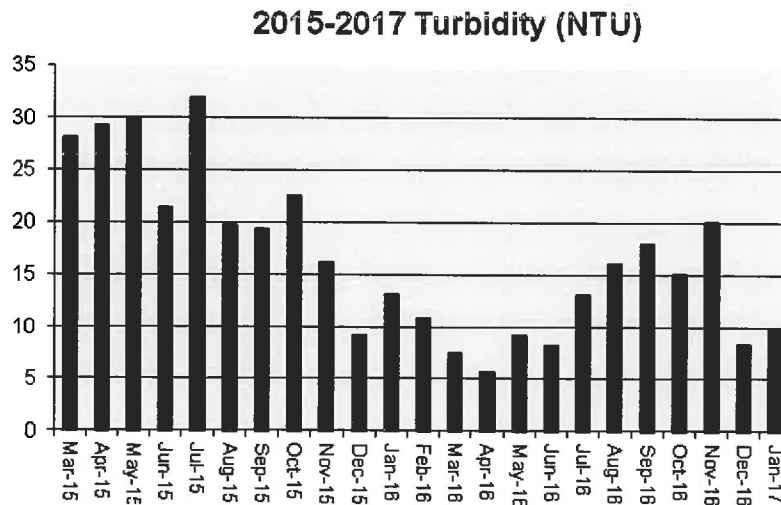


The table below shows the USEPA criteria for dissolved oxygen in warm water fisheries.

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 9.8 NTU. Water turbidity is impacted by dissolved and particulate matter in the water, including the dye that is now routinely added for algae and weed management. As turbidity increases, clarity decreases. Accordingly, water clarity declined during January.



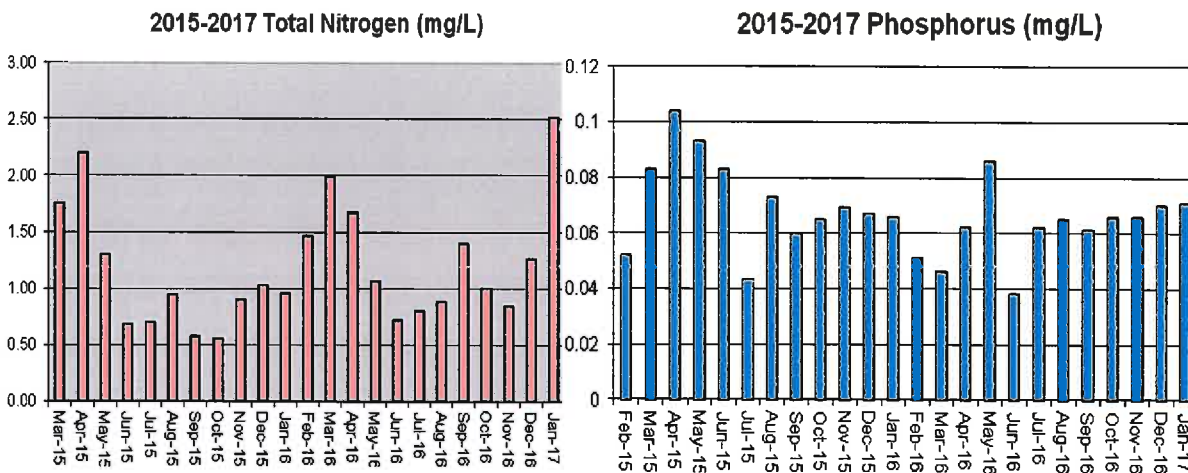
pH: The lake water pH increased to 8.6 SU. Water pH is influenced by the chemical makeup of the water and the amount of algae in the lake. In a very simplified explanation for the role of algae, carbonic acid in the water is formed from dissolution of carbon dioxide. Carbonic acid tends to make the water 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 that usually occurs.

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 and a water temperature increases, ammonia converts to the gas which is toxic to many aquatic organisms. At the measured pH and water temperature, toxicity would not be expected to develop. There were no signs of fish stress observed.

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.

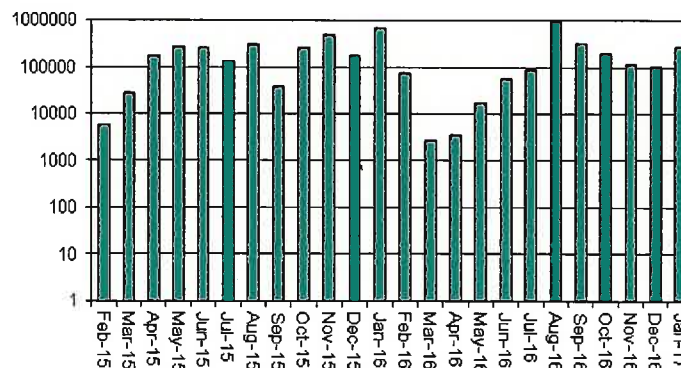
The total nitrogen concentration was slightly elevated and showed a significant increase at 2.52 mg/L as N. The increase may be related to receipt of storm water runoff during December. The phosphorus concentration remained relatively stable at 0.071 mg/L as P. These data indicate that the lake has sufficient nutrients to support a high-density algae population. The phytoplankton data presented below indicate an increase in algae cell density.



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.

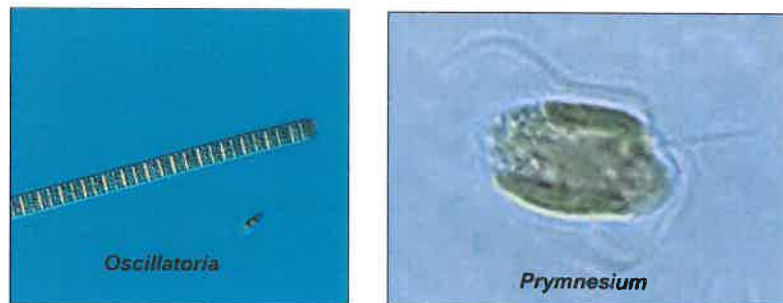
2015-2017 Algae Density (log-cells/mL)



The total algae density in the lake increased to 2.59×10^5 cells per mL, a density considered slightly elevated for an urban reservoir in metro-Phoenix. The cell density is due, in part, to the dominance of very small-celled algae dominating the phytoplankton.

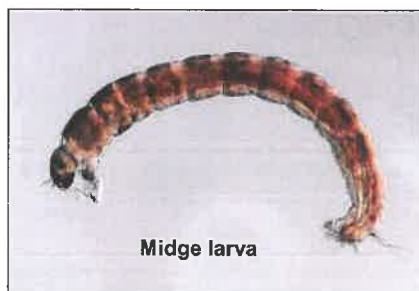
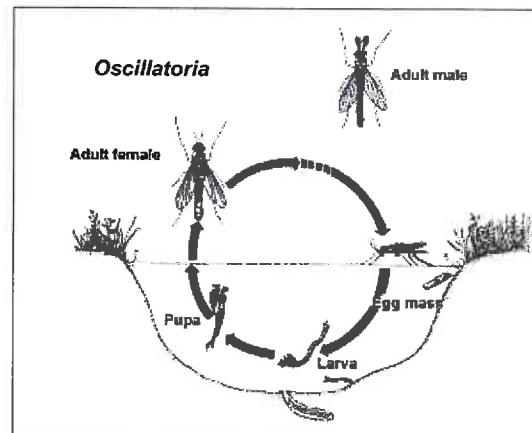
The dominant alga in Oasis Lake was *Oscillatoria*, a blue-green filament. This alga can become problematic, forming bottom or surface mats or stringers along the lake edge. However, these conditions were not observed.

The potentially toxic (to fish) alga, *Prymnesium parvum*, was not detected in the lake water.



Submerged weeds were not detected in the lake. No algaecide or herbicide applications were required during the month.

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.



With decreasing air and water temperatures, few adult midge flies 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. These problems are listed below.

- Bird wastes are unattractive and cause slippery conditions.
- Cleaning waste from sidewalks and turf is an additional maintenance item.
- Geese and other waterfowl can become aggressive toward humans.
- Waterfowl can damage turf areas.
- Waterfowl add nitrogen and phosphorus to the water.
- Bird wastes contain bacteria that are a health risk to humans and pets.
- Diving birds consume fish that are stocked in the lack for management purposes.

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 remained undesirable during January with about seven (7) ducks per acre. Cormorants were occasionally observed and several Canada geese were frequent visitors. Cormorants are diving birds that feed on small fish.



Canada geese destroy turf and contribute fecal matter to the common areas and water.

In terms of public health protection, the *E. coli* bacteria concentration remained low at 57 per 100 mL. The State swimming standard (full body contact) for *E. coli* is a maximum of 235 and the incidental or partial body contact standard is a maximum of 575 per 100 mL. The lake water met these standards, most likely due to the cold water temperature.



LABORATORY REPORTS



FIELD INSPECTION FORMS



PESTICIDE APPLICATION DOCUMENTS

Mechanical Systems and Field Observations

Weekly field inspection forms are attached to this report. No major lake-related mechanical issues were reported during the month. The south in-lake fountain was out of service for a brief period during the month.

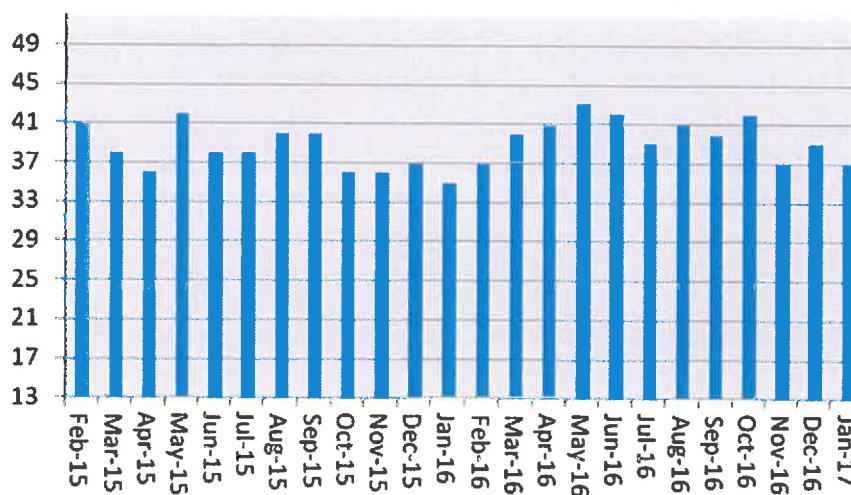
Chemical/Biological Product Applications

No herbicide or dye applications were made 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 quantitative comparison and tracking purposes. The overall rating fell to 37 for January 2017, primarily as a result of the large increase in nitrogen and the small increase in *E. coli* bacteria. The value still represents "good" conditions. Report card scores for the past two years are summarized below.

2015-2017 Report Card Scores



Respectfully,

AQUATIC CONSULTING & TESTING, INC.

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



OASIS LAKE REPORT CARD

DATE OF EVALUATION:

Jan-17 CONDITION **GOOD** SCORE **37**

PREVIOUS EVALUATION:

Dec-16 CONDITION **GOOD** SCORE **39**

CONDITION	RESULT	RATIONALE	4 pts EXCELLENT	3 pts GOOD	2 pts FAIR	1 pt POOR	SCORE
Turbidity (NTU)	9.8	aesthetics	<5	5-10	11-20	>20	3
Dissolved oxygen (mg/L)	13.0	aquatic life, sediment nutrient release, odors	>7.0	5.6-6.9	4.0-5.5	<4.0	4
Nitrogen, total (mg/L)	2.52	algae and macrophyte growth	<0.5	0.5-1.0	1.1-2.0	>2.0	1
Phosphorus, total (mg/L)	0.071	algae and macrophyte growth	<0.03	0.03-0.05	0.06-0.10	>0.10	2
Algae density (no./mL)	2.59 x 10 ⁵	aesthetics	<5 x 10 ⁴	5x10 ⁴ - 9x10 ⁴	1 x 10 ⁵ - 5x 10 ⁶	>5 x 10 ⁵	2
Algae form (dominant)	blue-green	aesthetics, treatability	greens; no floating mats	diatoms; no floating mats	blue-greens; no floating mats	blue-greens; floating mats common	2
Macrophytes (% cover)	<1	aesthetics, boating	none	<10%	11-20%	>20%	4
pH (SU) avg.	8.6	swimming, fishery, ammonia toxicity	6.5-8.0	8.0-8.5	8.6-9.0	>9.0	2
<i>E. coli</i> bacteria (#/100 mL) avg.	57	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)	7	nutrient and bacteria loading	<2	2-5	6-10	>10	2
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 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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LABORATORY REPORT

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

Date Submitted: 01/04/17
Date Reported: 02/06/17

Attn: Debbie Triboli

Project: Monthly Lake Monitoring

RESULTS

Client ID: Lake
ACT Lab No.: BY12290

Sample Type: Surface Water
Sample Time: 01/04/17 11:00

<u>Parameter</u>	<u>Analysis Date</u>		<u>Method No.</u>	<u>Result</u>	<u>Unit</u>
	<u>Start</u>	<u>End</u>			
Algae Count	01/11/17	01/11/17	SM 10200 F	See Attached	cells/mL
Algae Identification	01/11/17	01/11/17		See Attached	
Oxygen, Dissolved Field	01/04/17	01/04/17	SM4500 O G	13.0	mg/L as O2
pH, Field	01/04/17	01/04/17	SM4500H+ B	8.6	SU
Temperature, Field	01/04/17	01/04/17	SM2550 B	13.9	C
Nitrate + Nitrite - N	01/19/17	01/19/17	SM4500NO3 E	0.817	mg/L as N
Phosphorus, Total	01/11/17	01/11/17	365.3	0.071	mg/L as P
Total Kjeldahl Nitrogen	01/11/17	01/11/17	SMNorg C,NH3 C/D	1.7	mg/L as N
E. coli, Colilert	01/04/17	01/05/17	SM 9223 B	57	MPN/100 mL
Turbidity	01/04/17	01/04/17	180.1	9.8	NTU

Reviewed by:

Federick A. Amalfi, Ph.D.

Laboratory Director

ba

ALGAE IDENTIFICATION

AC&T Lab No.	BY12290	Date Collected	01/04/17
Client I.D.	Oasis	Collected By	AC&T

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
<i>Achnanthes</i>	bac-u	2	1882	0.73%	<i>Microcystis</i>	cyn-c			
<i>Anabaena</i>	cyn-f				<i>Microspora</i>	chl-f			
<i>Ankistrodesmus</i>	chl-u				<i>Mougeotia</i>	chl-f			
<i>Aphanocapsa</i>	cyn-c				<i>Navicula</i>	bac-u	2	1882	0.73%
<i>Asterionella</i>	bac-c				<i>Nitzschia</i>	bac-u			
<i>Botryococcus</i>	chl-c				<i>Oocystis</i>	chl-c			
<i>Carteria</i>	chl-ug				<i>Oscillatoria</i>	cyn-f	205	192882	74.55%
<i>Cephalomonas</i>	chl-ug				<i>Pandorina</i>	chl-cg			
<i>Ceratium</i>	pyr-ug				<i>Pediastrum</i>	chl-c			
<i>Chlamydomonas</i>	chl-ug				<i>Peridinium</i>	pyr-ug	3	2823	1.09%
<i>Chlorella</i>	chl-u				<i>Phacotus</i>	chl-ug			
<i>Chlorococcum</i>	chl-c				<i>Phacus</i>	chl-ug			
<i>Chroococcus</i>	cyn-c	32	30108	11.64%	<i>Pinnularia</i>	bac-u			
<i>Chroomonas</i>	crp-ug				<i>Pithophora</i>	chl-f			
<i>Closterium</i>	chl-u				<i>Prymnesium</i>	hap-ug			
<i>Cocconeis</i>	bac-u				<i>Rhizoclonium</i>	chl-f			
<i>Coelastrum</i>	chl-c				<i>Rhoicosphenia</i>	bac-u			
<i>Cosmarium</i>	chl-u				<i>Rhopalodia</i>	bac-u			
<i>Cosmocladium</i>	chl-c				<i>Scenedesmus</i>	chl-c	8	7527	2.91%
<i>Crucigenia</i>	chl-c				<i>Scytonema</i>	chl-f			
<i>Cryptomonas</i>	crp-ug				<i>Selanastrum</i>	chl-u			
<i>Cyclotella</i>	bac-u				<i>Sphaerocystis</i>	chl-c			
<i>Cymbella</i>	bac-u				<i>Spondylumorum</i>	chl-c			
<i>Diatoma</i>	bac-u				<i>Spirulina</i>	cyn-f	20	18818	7.27%
<i>Dinobryon</i>	bac-c				<i>Stauroneis</i>	bac-u			
<i>Dunaliella</i>	chl-u				<i>Stephanodiscus</i>	bac-u			
<i>Epithemia</i>	bac-u				<i>Stigeoclonium</i>	chl-f			
<i>Euglena</i>	eug-ug				<i>Surirella</i>	bac-u			
<i>Fragilaria</i>	bac-u				<i>Synechococcus</i>	cyn-u			
<i>Frustulia</i>	bac-u				<i>Synechocystis</i>	cyn-c			
<i>Glenodinium</i>	pyr-ug				<i>Synedra</i>	bac-u			
<i>Golenkinia</i>	chl-c				<i>Synura</i>	cry-cg			
<i>Gomphonema</i>	bac-u				<i>Tetraedron</i>	chl-u	3	2823	1.09%
<i>Gonium</i>	chl-cg				<i>Tetrastrum</i>	chl-c			
<i>Gonyaulax</i>	pyr-ug				<i>Trachelomonas</i>	eug-ug			
<i>Gyrosigma</i>	bac-u				<i>Vaucheria</i>	chl-f			
<i>Hydrodictyon</i>	chl-c				<i>Volvox</i>	chl-cg			
<i>Lyngbya</i>	cyn-f				<i>Zygnema</i>	chl-f			
<i>Melosira</i>	bac-f								
<i>Meridion</i>	bac-u								
<i>Merismopedia</i>	cyn-c								

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Count (cells/mL) <u>2.59E+05</u>

check 100.00%

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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, AZ 85283
 P: 480-820-3451
 E: debbie@kinneymanagement.com

AC&T Sampler: Andrew Murrett

Sample Location ID: Lake

Date: 1-4-17
 Time: 1100
 Month: SW

Sample Containers # / Preservation:		Page 1 of 1	
Non Preserved	1	2	1
Na2S2O3 (Sterile)			
HNO3 (Nitric)			
H2SO4 (Sulfuric)			
Lugols			
Other:			

AC&T Laboratory Sample Identification

BY-12290

Field Measurements:	Algae Count & ID	Golden Algae	pH, Temp, O2
NO3+NO2	X	X	X
Total Phosphorous (P-T)	X	X	X
Total Kjeldahl Nitrogen (TKN)	X	X	X
Total E.Coli-MPN	X	X	X
Turbidity	X	X	X
Algae Count & ID	X	X	X
Golden Algae	X	X	X
Field Measurements:	X	X	X

Project Location:	A C & T Sample Receipt:	1. RELINQUISHED BY:	2. RECEIVED BY:
Oasis at Anozira	Total # Containers: 5	Signature: Andrew Murrett	Signature: J. Johnson
POF:	Custody Seals: YES NO	Print Name: Andrew Murrett	Print Name:
Lake Contract	Samples Intact: YES NO	Date: 1/4/17	Date: 1-4-17
Notes:	Samples On Ice: YES NO	Time: 1420	Time: 14:20
IPres@P.W.	Ice Type: WEF BLUE	3. RELINQUISHED BY:	
	Sample Receipt Temperature: 18	Signature: Andrew Murrett	
		4. RECEIVED BY:	
		Signature:	Signature:
		Print Name:	Print Name:
		Date:	Date:
		Time:	Time:

OASIS AT ANOZIRA FIELD INSPECTION FORM (

wpdoc/lists&forms)

Date: 1/4/2017
By: Am

Aeration System Operation

operational Problem

Details: _____

Lake Surface

Lake surface cleaning

Floating Fountains West East South

operational Problem Details: _____

Pump house housekeeping leaks ventilation lighting Notes _____

Compressors operational Problem Details: Good

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 13.0
- Temperature 13.9
- pH 8.6
- Algae ID and count
- Ammonia-N
- Organic N (TKN)
- Phosphorus
- Turbidity
- E. coli
- Golden algae (seasonal)



OASIS AT ANOZIRA FIELD INSPECTION FORM (

wpdoc/lists&forms)

Date: 11/11/17
By: Amh

Aeration System Operation

operational Problem

Details: _____

Lake Surface

Lake surface cleaning

Floating Fountains West East South

operational Problem Details: _____

Pump house housekeeping leaks ventilation lighting Notes _____

Compressors operational Problem Details: _____

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 13.9
- pH 8.5
- Algae ID and count
- Ammonia-N
- Organic N (TKN)
- Phosphorus
- Turbidity
- E. coli
- Golden algae (seasonal)



OASIS AT ANOZIRA FIELD INSPECTION FORM (

wpdoc/lists&forms)

Date: 1/19/17
By: [Signature]

Aeration System Operation

operational Problem

Details: _____

Lake Surface

Lake surface cleaning

Floating Fountains West East South

operational Problem Details: South out

Pump house housekeeping leaks ventilation lighting Notes _____

Compressors operational Problem Details: _____

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 10.0
- Temperature 13.2
- pH 8.3
- Algae ID and count
- Ammonia-N
- Organic N (TKN)
- Phosphorus
- Turbidity
- E. coli
- Golden algae (seasonal)



OASIS AT ANOZIRA FIELD INSPECTION FORM (

wpdoc/lists&forms)

Date: 1/25/17
By: [Signature]

Aeration System Operation

Operational Problem

Details: _____

Lake Surface

Lake surface cleaning

Floating Fountains West East South

Operational Problem Details: _____

Pump house housekeeping leaks ventilation lighting Notes _____

Compressors Operational Problem Details: _____

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 10.3
- Temperature 12.0
- pH 8.6
- Algae ID and count
- Ammonia-N
- Organic N (TKN)
- Phosphorus
- Turbidity
- E. coli
- Golden algae (seasonal)

