



AQUATIC CONSULTING & TESTING, INC.

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P.O. Box 1510
Tempe, Arizona 85281
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Lic. No. AZ0003

16 December 2015

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

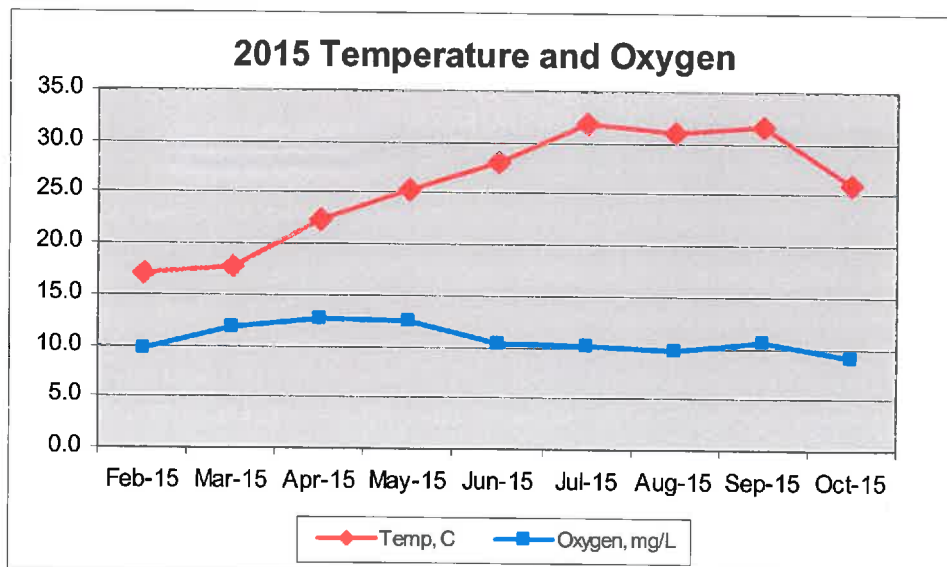
Ref: Oasis Lake, November 2015

Dear Ms. Tribioli:

The following report summarizes water quality data collected for Oasis Lake on 05 November 2015. Similar data have been reported each month and are used in this report to generate the graphs that will be used for tracking changes in water quality. The report also 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 18.9 C (66 F) and the dissolved oxygen concentration was 8.7 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 94 percent, indicating near maximum oxygenation and adequate operation of the aeration system.

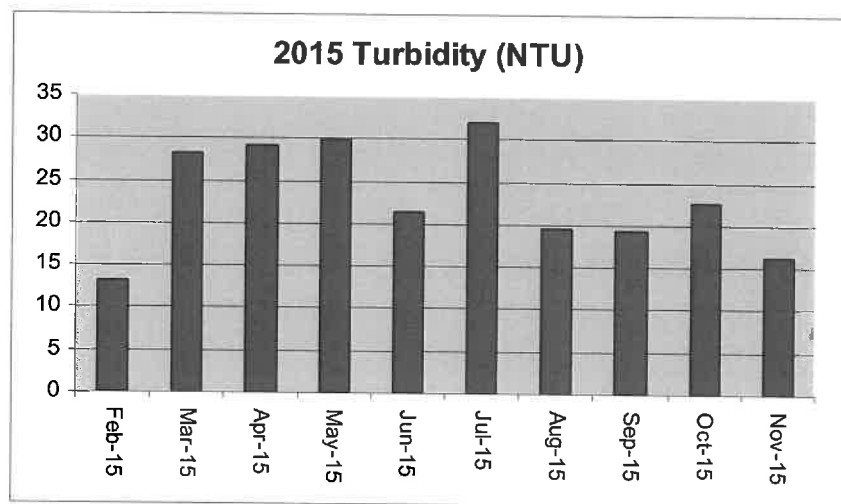


The dissolved oxygen content was also satisfactory for the fishery. The table below shows the USEPA criteria for dissolved oxygen in warm water fisheries.

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 decreased to 16.1 NTU. Water turbidity is impacted by dissolved and particulate matter in the water. As turbidity increases, clarity and aesthetic quality decreases.

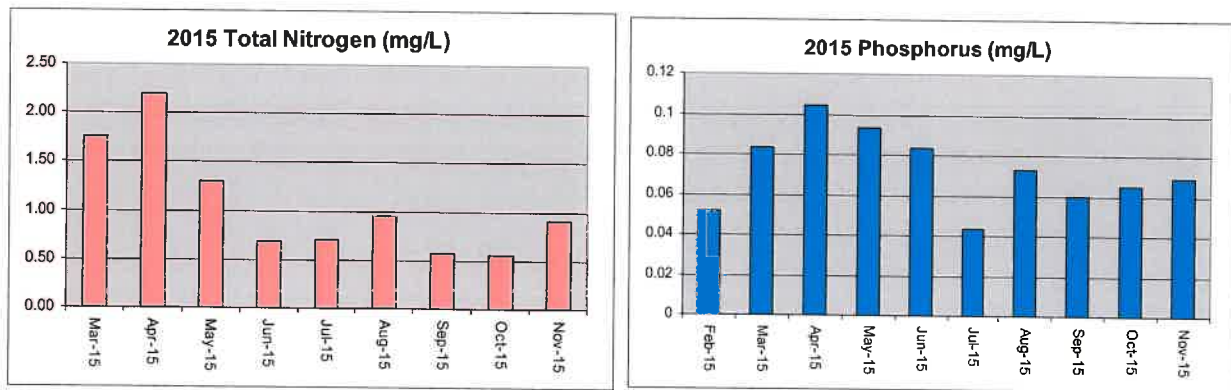


pH: The lake water pH decreased to a more reasonable 8.8 SU. Water pH is influenced by the chemical makeup of the water and the amount of algae in the lake. In a very simplified explanation for the role of algae, carbonic acid in the water is formed from dissolution of carbon dioxide. Carbonic acid tends 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, ammonia converts to the gas which is toxic to many aquatic organisms. At pH 8.0, ammonia would not have a significant adverse impact on the fishery. Despite the measured high pH, no signs of fish stress were 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 mg/L) is typically needed to support algal growth.

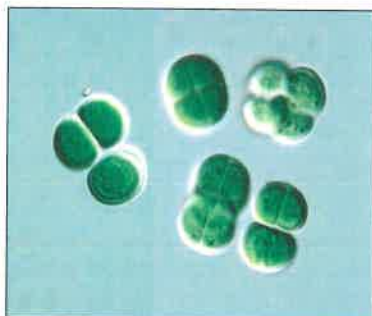
The total nitrogen concentration increased to 0.90 mg/L as N. The phosphorus concentration was stable at 0.069 mg/L as P. These data indicate that the lake still has sufficient nutrients to support a high density algae population. The phytoplankton data, below, indicate increased numbers of algae cells.

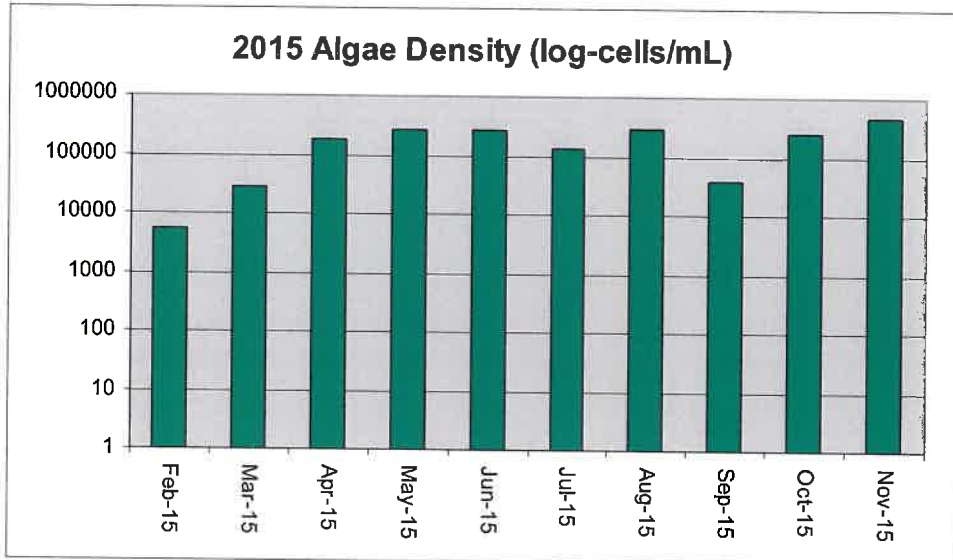


Biological Composition

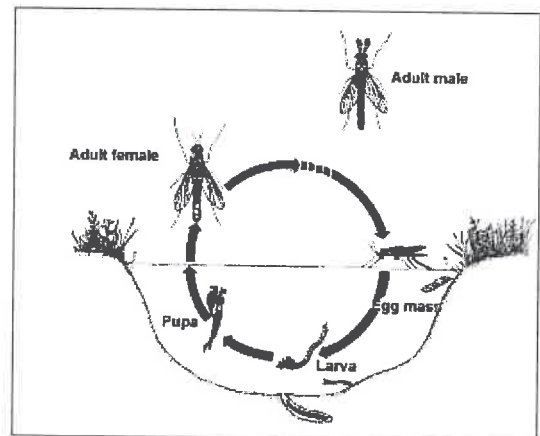
Phytoplankton (algae): The amount and types of algae in a lake dictate the aesthetic and operational quality of the water. Algae density affects the clarity and color of the water, two very important aesthetic criteria. The species composition dictates the form of growth observed; floating mats, suspended 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 4.70×10^5 cells per mL; considered in the elevated category for an urban reservoir in metro-Phoenix. The dominant alga in Oasis Lake remained *Chroococcus*, a colonial blue-green (Cyanophyta) form. This alga can become problematic and cause lake water to become very green, turbid, and sometimes form surface swirls. Turbidity and color resulted in the lake, but surface swirls were essentially absent. 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 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.



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 poor during the month (7 per acre). A significant change in variety and number of ducks was observed. A few geese (Canada geese, shown at right) were still occasionally observed during routine inspections. Canada geese consume grass and deposit fecal matter on land and water. American widgeons became the most common bird. Cormorants were not observed. The increase in numbers is likely associated with migratory patterns.

In terms of public health protection, the *E. coli* bacteria concentration was 461 per 100 mL. The State swimming standard (full body contact) for *E. coli* is 235 and the incidental or partial body contact standard is 575 per 100 mL. The lake water met the partial body contact standard.

Mechanical Systems and Field Observations

Weekly field inspection forms are attached to this report. The lake was cleaned of surface debris weekly.

- The Elliot south fountain was down for repair the first week of November.

Chemical/Biological Product Applications

No chemical or biological 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, 36, was unchanged compared to last month. The value represents "good" conditions. The greatest positive changes were improved pH and turbidity. Adverse changes included increased nitrogen and waterfowl. Report card scores for the year are summarized below.



Respectfully,

AQUATIC CONSULTING & TESTING, INC.

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





LABORATORY REPORTS



FIELD INSPECTION FORMS



PESTICIDE APPLICATION DOCUMENTS



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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 Triboli

Date Submitted: 11/05/15
Date Reported: 12/04/15

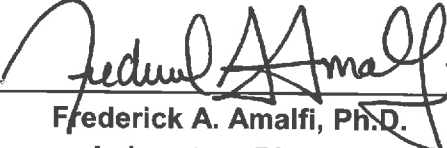
Project: Monthly Lake Monitoring

RESULTS

Client ID: Lake
ACT Lab No.: BX10640

Sample Type: Surface Water
Sample Time: 11/05/15 08:30

<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	11/20/15	11/20/15	SM 10200 F	See Attached	cells/mL
Algae Identification	11/20/15	11/20/15		See Attached	
Oxygen, Dissolved Field	11/05/15	11/05/15	SM4500 O G	8.7	mg/L as O ₂
pH, Field	11/05/15	11/05/15	SM4500H+ B	8.8	SU
Temperature, Field	11/05/15	11/05/15	SM2550 B	18.9	C
Nitrate + Nitrite - N	11/25/15	11/25/15	SM4500NO ₃ E	0.20	mg/L as N
Phosphorus, Total	11/05/15	11/05/15	365.3	0.069	mg/L as P
Total Kjeldahl Nitrogen	11/07/15	11/07/15	SMNorg C,NH ₃ C/D	0.7	mg/L as N
E. coli, Colilert	11/05/15	11/06/15	SM 9223 B	461	MPN/100 mL
Turbidity	11/05/15	11/05/15	180.1	16.1	NTU

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

ALGAE IDENTIFICATION

AC&T Lab No.	BX10640	Date Collected	11/05/15
Client I.D.	Oasis at Anozira	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
<i>Achnanthes</i>	bac-u				<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	3	2823	0.60%
<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	60	56453	12.02%
<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			
<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	310	291676	62.12%	<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	1.60%
<i>Crucigenia</i>	chl-c				<i>Scytonema</i>	chl-f			
<i>Cryptomonas</i>	crp-ug	3	2823	0.60%	<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	110	103498	22.04%
<i>Dinobryon</i>	bac-c				<i>Staurastrum</i>	chl-u	1	941	0.20%
<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	4	3764	0.80%
<i>Golenkinia</i>	chl-c				<i>Synura</i>	cry-cg			
<i>Gomphonema</i>	bac-u				<i>Tetraedron</i>	chl-u			
<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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check 100.00%

Count (cells/mL) <u>4.70E+05</u>

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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 Marrett

Sample Location ID: _____ Date: 11-5-15 Time: 8:30 Matrix: SW

Sample Containers # / Preservation		Page 1 of 1	
Non Preserved	1	<p>AC&T Laboratory Sample Identification</p> <p>Other: _____</p> <p>Lugols: _____</p> <p>H2SO4 (Sulfuric): 1</p> <p>HNO3 (Nitric): _____</p> <p>Na2S2O3 (Sulfite): _____</p>	<p>Ex-10640</p>
NASZ03 (Sterile)	2		
HNO3 (Nitric)	_____		
H2SO4 (Sulfuric)	_____		
Other	_____		

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

461 MAX/ROOM 11-6-15 @ 1430

Project Location:	A C & T Sample Receipt:	1. RELINQUISHED BY:
Oasis at Anozira	Total # Containers: 5	Signature: Andrew Marrett
PO#: _____	Custody Seals: YES <input checked="" type="checkbox"/> NO <input checked="" type="checkbox"/>	Print Name: Andrew Marrett
Lake Contract	Samples Intact: YES <input checked="" type="checkbox"/> NO <input checked="" type="checkbox"/>	Date: 11-5-15 Time: 1405
Notes:	Samples On Ice: YES <input checked="" type="checkbox"/> NO <input checked="" type="checkbox"/>	4. RECEIVED BY:
	Ice Type: WET <input checked="" type="checkbox"/> DRY <input checked="" type="checkbox"/>	Signature: _____
	Sample Receipt Temperature: 21°C	Print Name: _____
		Date: _____ Time: _____

OASIS LAKE REPORT CARD

DATE OF EVALUATION:

Nov-15
 CONDITION
 GOOD
 SCORE
 36

PREVIOUS EVALUATION:

Oct-15
 CONDITION
 GOOD
 SCORE
 36

CONDITION	RESULT	RATIONALE	4 pts EXCELLENT	3 pts GOOD	2 pts FAIR	1 pt POOR	SCORE
Turbidity (NTU)	16.1	aesthetics	<5	5-10	11-20	>20	2
Dissolved oxygen (mg/L)	8.7	aquatic life, sediment nutrient release, odors	>7.0	5.6-6.9	4.0-5.5	<4.0	4
Nitrogen, total (mg/L)	0.90	algae and macrophyte growth	<0.5	0.5-1.0	1.0-2.0	>2.0	3
Phosphorus, total (mg/L)	0.069	algae and macrophyte growth	<0.03	0.03-0.05	0.06-0.10	>0.10	2
Algae density (no./mL)	4.7 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 colonies	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.	8.8	swimming, fishery, ammonia toxicity	6.5-8.0	8.0-8.5	8.5-9.0	>9.0	2
<i>E. coli</i> bacteria (#/100 mL) avg.	461	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)	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.

OASIS AT ANOZIRA FIELD INSPECTION FORM (

wpdoc/lists&forms)

Date: 11/5/15
By: AM

Aeration System Operation

operational Problem

Lake Surface

Lake surface cleaning

Details: 2 weak ones
water green & turbid some microcystis

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: Off Chuck
repairing

Los Feliz: operational Screens cleared Problem Details: _____

Monthly Chemistry & Biology

- Dissolved oxygen 8.7
- Temperature 18.9
- pH ~~7.8~~ 8.0
- 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: 11/12/14
By: HR

Aeration System Operation

operational Problem

Details: 2 week

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

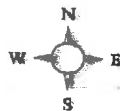
Elliot North: operational Screens cleared Problem Details: _____

Elliot South: operational Screens cleared Problem Details: _____

Los Feliz: operational Screens cleared Problem Details: _____

Monthly Chemistry & Biology

- Dissolved oxygen 9.2
- Temperature 17.2
- pH 8.7
- 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: 11/19/15
By: Am

Aeration System Operation

operational Problem

Details: 2 poorly

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

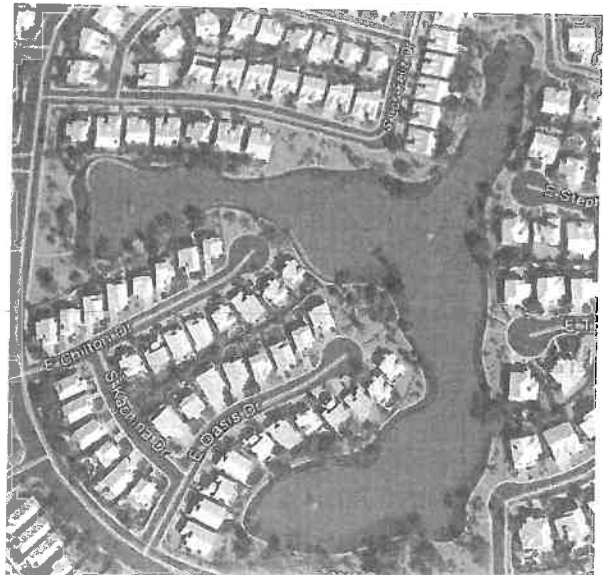
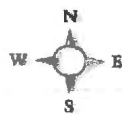
Elliot North: operational Screens cleared Problem Details: _____

Elliot South: operational Screens cleared Problem Details: _____

Los Feliz: operational Screens cleared Problem Details: _____

Monthly Chemistry & Biology

- Dissolved oxygen 9.6
- Temperature 16.2
- 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: 11/25/15
By: RA

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 9.8
- Temperature 15.1
- pH 8.7
- Algae ID and count
- Ammonia-N
- Organic N (TKN)
- Phosphorus
- Turbidity
- E. coli*
- Golden algae (seasonal)

