Exhibit No.:
Issue: Facility Capacity
Witness: Robert O. Gaebe
Sponsoring Party: Aqua Missouri
Type of Exhibit: Direct Testimony
Case No.: SC-2007-0044, et al.
Date Testimony Prepared: November 29, 2006

MISSOURI PUBLIC SERVICE COMMISSION

AQUA MISSOURI, INC.

DIRECT TESTIMONY OF ROBERT O. GAEBE

BECKER v. AQUA MISSOURI, INC.

CASE NO. SC-2007-0044

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF MISSOURI

Jason Becker, Becker Development Company, Complainant, vs. Aqua Missouri, Inc., Respondent.	))))))))))	Case No. SC-2007-0044

AFFIDAVIT OF ROBERT O. GAEBE

STATE OF MISSOURI)
)
COUNTY OF MONTGOMERY)

Robert O. Gaebe, being of lawful age, on his oath states: that he has participated in the preparation of the foregoing Direct Testimony in question and answer form, consisting of 2 pages to be presented in the above case; that the answers in the foregoing Direct Testimony were given by him; that he has knowledge of the matters set forth in such answers; and that such matters are true and correct to the best fo his knowledge and belief.

Robert O. Gaebe

Before me personally appeared Robert O. Gaebe, who being duly sworn stated that the foregoing is true and correct.

Notary Public

My Commission Expires: _____

Notary Public Notary Seal State of Missouri

F. RANDALL WALTZ, III
Cole County
My Commission Expires
January 22, 2007

DIRECT TESTIMONY

OF

ROBERT O. GAEBE

BECKER v. AQUA MISSOURI, INC.

CASE NO. SC-2007-0044

Q. State your name and business address.

A. My name is Robert O. Gaebe. My business address is 108 North Sturgeon, Montgomery City, Missouri, 63361.

Q. By whom are you employed and in what capacity?

A. I am the lead civil engineer for the Lewis-Bade Group in its Montgomery City office. I provide design, evaluation, and consulting services regarding site design, storm water management and sanitary sewer systems and treatment.

Q. Please state your educational background and experience.

A. My educational program and experience are set forth in Schedule ROG-1 attached to this testimony.

Q. On whose behalf are you submitting testimony in this proceeding?

A. I am appearing on behalf of Aqua Missouri, Inc. Aqua Missouri, Inc. is the owner and operator of the Lake Carmel Sewer Treatment Facility which is in question in this matter.

Q. Please state the basis of your involvement in the incident case.

A. Aqua Missouri, Inc. received two complaints filed against it by Jason Becker and Becker Development, LLC. The complaints related to the Lake Carmel Sewer Treatment Facility and the complainant's's lots held for development within the borders of the area treated by the Lake Carmel

Sewer Treatment Facility. Aqua Missouri, Inc. requested that I review the existing treatment facility, review the complaint and documents relating to the facility, previously provided by the Complainant, and determine the capacity of the existing treatment facility. Aqua Missouri, Inc. requested that I submit testimony and testify on its behalf with respect to the complaint filed by Becker.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to present observations, conclusions and recommendations relating to the Lake Carmel Sewer Treatment Facility and its capacity. More specifically, I will address the existing size and capacity of the Lake Carmel Sewer Treatment Facility, the current flows into and out of that treatment facility and the number of connections which the current treatment facility may handle. Finally, I will testify as to my professional opinion as to whether the Lake Carmel Sewer Treatment Facility may handle the extra connections which Mr. Becker seeks to connect to the Lake Carmel Sewer Treatment Facility.

Q. Please state your conclusions, opinions, and recommendations with regard to the instant proceeding.

A. Based upon my independent review and analysis of the Lake Carmel Sewer Treatment Facility, along with the information and reports provided by Aqua Missouri, Inc. which had originally been provided by Becker, I have reached the conclusions and opinions regarding the Lake Carmel Sewer Treatment Facility, which are contained in Exhibit ROG-2 attached to this testimony.

Q. Does that conclude your direct testimony?

A. Yes.

ROBERT OLIVER GAEBE **RESUME OF QUALIFICATIONS**

OBJECTIVE

A responsible and challenging **Professional Engineering** role in and organization that relies heavily on cost control and the on-time completion of its design activities.

SUMMARY OF QUALIFICATIONS

Experience:

- **Thirty+ years** of professional engineering and construction experience.
- Background which covers engineering, management, and construction.
- Heavy involvement in site development, sewage treatment, and subdivisions.
- In depth involvement with computer applications.
- Accustomed to both positions and demands of responsibility, and comfortable with results accountability.

Education:

Bachelor of Civil Engineering Construction Degree, NORTH CAROLINA STATE UNIVERSITY, Raleigh, NC. Graduated in 1971

Training:

Completed post-baccalaureate studies in Form work Design at North Carolina State University in 1983. Self taught BASIC, LISP, DOS, WINDOWS, as well in depth uses of spreadsheet and CAD program applications.

Licenses:

Registered Professional Engineer:	Missouri Reg. No. E-22613
(Lapsed)	North Carolina Reg. No. 11821
Registered Land Surveyor:	Missouri Reg. No. LS-2287

Strengths:

Well trained and educated ... very experienced ... management approach ... strong project background ... stable ... engineering professional ... results oriented.

Design Areas:

Civil Site Design, Stormwater Management, Sanitary Sewer Systems & Treatment.

Projects:

Hundreds of large to small projects including subdivisions, site plans, sanitary sewage conveyance & treatment, and stormwater detention systems for private and governmental institutions amongst them are:

- Redfield Development – Eugene, MO. A golf course/subdivision with sewage treatment, wells and irrigation integral with stormwater detention.
- Wildwood Crossings – Jefferson City, MO. A shopping center including stormwater detention, sewer and water main extensions.
- Faith Christian Fellowship – Truesdale, MO. A church expansion site plan involving well evaluation, parking, and sewage treatment.
- Governors Mansion – Jefferson City, MO. Sewer evaluation and redesign.

ROBERT OLIVER GAEBE **RESUME OF QUALIFICATIONS**

EMPLOYMENT HISTORY

Feb. 2004 to Present	Lead Civil, Lewis Bade Group, Montgomery City office.
Oct. 2002 to Feb. 2004	Lead Civil, Lewis Bade Group, Fulton office.
1992 to Sep. 2002	**Lead Civil**, Central Missouri Professional Services, Inc. Projects too numerous to mention either done personally or supervised the efforts of others. Project size has ranged from small office building sites to 100+ acre developments. Specific details available upon request.
May 1988 to 1992	**Civil Engineer,** MARTELL & ASSOCIATES P.A., Kansas City, Kansas. Responsible for the design and development of the civil plans and specifications for numerous engineering projects
Apr. 1987 to May 1988	**Private Practice,** Fulton, MO. Various surveying and engineering projects.
Oct. 1975 to Apr. 1987	**Construction and Construction Management Positions,** DANIEL INTERNATIONAL CORPORATION. Various Locations, with the exception of occasional breaks between projects. Initially part of the survey department but primarily engaged full time as an engineer with this major company in some of its biggest and most prestigious projects, details of which are available upon request.

Mar. 1986 to Apr. 1987	**G.E. Lexan Plastic Plant Project,** Burkeville, AL.
Oct. 1985 to Mar. 1986	**ARCO Lisburne Facilities Project**, Portland, OR.
July 1983 to June 1985	**Tanajib Marine Facility Project,** Tanajib, Saudi Arabia..
Oct. 1982 to July 1983	On break between projects, conducted post baccalaureate studies in Form work Design at North Carolina State University.
July 1981 to Oct. 1982	**ARCO CO_2 PROJECT,** Walsenburg, CO.
Apr. 1979 to Apr. 1981	**Haj Terminal Project**, Jeddah, Saudi Arabia $10 billion airport project.
Oct. 1975 to Apr. 1979	**Callaway Nuclear Project,** Callaway Co., MO,

May 1972 to Oct. 1975	**Southern Mapping & Engineering Co.**, Greensboro, NC. Acquired first professional engineering and surveying experience with this company.

PERSONAL DATA	BIRTH DATE	April 6, 1949
	HEALTH	Excellent
	MARITAL STATUS	Married

REFERENCES Numerous references available upon request.

Lewis-Bade Inc.

108 North. Sturgeon, Montgomery City, Mo 63361 Ph. (573) 564-8108, Fax (573) 564-8108
Corporate Headquarters: 101 E. Walton, Warrenton, MO 63383, Ph. (636) 456-2615
Registered Land Surveyors & Professional Engineers

Lake Carmel Three Cell Sewage Lagoon
Sewage Capacity Analysis
November 2006

LOCATION

The Lake Carmel Three Cell Sewage Lagoon is located east of Old Forge R. approximately ½ mile south of the intersection with Old Brazito Rd. To the west is the Lake Carmel Subdivision which the lagoon serves.

CONDITIONS

This analysis will address four sewage loading conditions. The first condition is based on the Missouri State Operating Permit MO-0088986. The second is based on the existing housing utilizing the lagoon. The third is based on a proposed increase in housing utilizing the lagoon. The fourth is a reverse engineering of flows based on the asbuilt conditions of the lagoon. All conditions will use use the upper value (100) of the 75-100 gal/day sewage flow per person per day as given in DNR Chapter 8 – Design Guides 10 CSR 20-8.020 (11) (B) 3. Table I. The 3.7 persons per household from the design guide will also be used. This results in a design assumption of 370 gallons per household per day.

ATTACHMENTS

Attached to this analysis are several attachments which will be referenced in the course of this document. There are three similar spreadsheet showing the permitted, existing, and proposed sewage flow calculations. Also included is a "Three Cell Lagoon – Asbuilt" drawing showing lagoon measurements and a sheet of corresponding "Volume Calculations". There are eight pages of sewage flow measurements during March and June of 2006. The March measurements were made during a period of normal lake level. At this time there was considerable spring action of groundwater below the dam. The June measurements were made after repairs to some of the manholes. At this time there had been a long dry period. The lake was down and there was little or no spring action of groundwater. Finally attached is a copy of the operating permit.

PERMIT CONDITION

The operation permit gives a design flow of 12,600 gal./ day and a design population equivalent of 126. The permit reflects the 100 gallons per day per person. 126 persons x 100 gal./ person = 12,600 gallons. 126 persons is the equivalent of 34 single family residences as can be seen on the permit conditions attachment. This shows the operation permit used the 3.7 PE/household & 100 gal/person or 370 gpd/household figures.

EXISTING CONDITION

There are currently 49 single family residences utilizing the lagoon. The attachment for existing conditions shows this results in a design flow of 18,130 gal./day. An measured average flow of 17,836 gal./day was made over a 10 day period in June 2006. See "Lake Carmel – Sewage Flow Rates" attachment. (Note: this is after a long dry period) These figures also support the 3.7 PE/household & 100 gal/person figures. These flow measurements also show that the design capacity of the existing lagoon (12,000 gpd) is exceeded. There are 13 additional lots that have no homes on them. These results in a potential of 62 homes attached to the system.

Exhibit ROG-2

Lewis-Bade Inc.

108 North. Sturgeon, Montgomery City, Mo 63361 Ph. (573) 564-8108, Fax (573) 564-8108
Corporate Headquarters: 101 E. Walton, Warrenton, MO 63383, Ph. (636) 456-2615
Registered Land Surveyors & Professional Engineers

PROPOSED CONDITION

There is a proposal to add another 32 lots to the subdivision which would increase the potential houses contributing sewage to 94. Using the 3.7 PE/household & 100 gal/person figures, this will result in a projected daily flow of 35,520 gallons.

ASBUILT CONDITION

Measurements of the existing lagoon were made in October 2006. Both horizontal layout and numerous effluent depths in each of the cells were measured. The results of these measurements can be seen in the "Three Cell Lagoon – Asbuilt" attachment. Depth contours for each of the three cells are shown. These measurements are used in the "Asbuilt Calculations" attachment which gives the volumes and areas of the lagoon system. The reversed calculated "Daily flow based on 120 day storage" of 5,554 gpd is of interest. If this were a newly designed lagoon this would be the factor that would regulate design flow. Accumulation of sludge is expected in a lagoon and will reduce the effective volume. The "BOD Loading based on 34 lb/acre surface area" results in a population equivalent (PE) of 119 . This figure is very close to the permit conditions. The accuracy of these measurements is estimated to result in a possible 20% variation in the calculated quantities.

CONCLUSION

The problem is sewage volume not BOD or TSS loading.

The "Existing Condition" design flow (18,130 gpd) and measured sewage flows (17,836 gpd) exceed the capacities of the permitted DNR design parameters (12,600 gpd) by approximately 40%.

The test results of the effluent discharge of this existing condition are within the required limits. This is in part due to the large infiltration of groundwater (INI) to the collection system "thinning" the effluent. The field measurements of June 2006 sewage flow of 17,836 gpd for 49 homes result in 364 gpd/household. The 170gpd/person by THHinc based on water records indicate that (364-170= 194) approximately 194 gallons of flow per household or a total of 9,600 gallons is from infiltration. This is almost 4 times the infiltration estimated by THHinc using 30% of design flow or 51 gpd per house or 221gpd total. This could result in as much as 60% reduction in test results (221/364= 60.7%).

I recommend that further investigation be made to locate and remove sources of ground water infiltrating into the sewage system prior to further development. If the actual flows can be lowered to below the design limits then testing of the effluent would indicate the advisability of adding additional loading to the system.

Robert O. Gaebe P.E.

Project: Lake Carmel

PERMIT CONDITIONS

Ref Handbook of Applied Hyd. - Davis - 2nd Edition - McGraw-Hill - p892

2/7/2006 <Start date

Hazen-Williams - Circular pipe formulas

11/16/2006 <Print date

h=kQ^1.85 h=head loss in feet k=constant Q=quantity gpm

1:51 PM <Print Time

k=(3.55 /C)^1.85 * (L/d^4.87) L=pipe length in feet d=pipe dia. In inches

QUANTITY ESTIMATE CALCULATOR

SOURCE	Units	People /Unit	Gal./ Person	Total gpd	BOD/ Person	BOD lb	BOD mg/l	max gpd	TSS .2LB/PE
Residential									
Single family dwellings	34	3.7	100	12580	0.17	21.39	203.706	100	25.16
TOTALS =				12,580		21.39	203.706		

ESTIMATED QUANTITIES TO BE USED

(If other method is used for ADF & BOD, insert values below)

ADF gpd	BOD lb.	POP. EQUAV, by BOD	POP. EQUAV, by ADF	Dry Sludge ton/year	**BOD** mg/l	-65% **BOD** mg/l	Flow **Peak** Factor
12,580	**21.39**	**126**	**126**	**1.887**	**204**	**71**	**4.21**

Project: Lake Carmel

EXISTING CONDITIONS FEB 2006

2/7/2006 <Start date
11/16/2006 <Print date
1:48 PM <Print Time

Ref Handbook of Applied Hyd. - Davis - 2nd Edition - McGraw-Hill - p892
Hazen-Williams - Circular pipe formulas
h=kQ^1.85 h=head loss in feet k=constant Q=quantity gpm
k=(3.55 /C)^1.85 * (L/d^4.87) L=pipe length in feet d=pipe dia. In inches

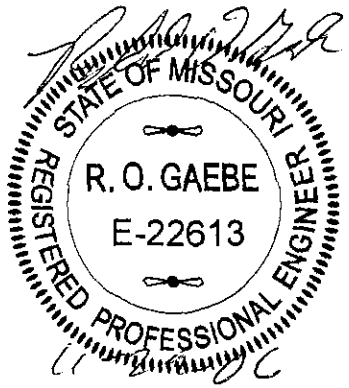
QUANTITY ESTIMATE CALCULATOR

SOURCE	*Units*	*People /Unit*	*Gal./ Person*	*Total gpd*	*BOD/ Person*	*BOD lb*	BOD mg/l	max gpd	*TSS .2LB/PE*
Residential									
Single family dwellings	49	3.7	100	18130	0.17	30.82	203.706	100	36.26
TOTALS =				18,130		30.82	203.706		

ESTIMATED QUANTITIES TO BE USED

(If other method is used for ADF & BOD, insert values below)

ADF gpd	BOD lb.	POP. EQUAV, by BOD	POP. EQUAV, by ADF	Dry Sludge ton/year	**BOD** mg/l	-65% **BOD** mg/l	Flow **Peak** Factor
18,130	**30.82**	**181**	**181**	**2.720**	**204**	**71**	**4.16**



Project: Lake Carmel

PROPOSED CONDITIONS

Ref Handbook of Applied Hyd. - Davis - 2nd Edition - McGraw-Hill - p892

2/7/2006 <Start date

11/16/2006 <Print date

4:41 PM <Print Time

Hazen-Williams - Circular pipe formulas

h=kQ^1.85 h=head loss in feet k=constant Q=quantity gpm

k=(3.55 /C)^1.85 * (L/d^4.87) L=pipe length in feet d=pipe dia. In inches

QUANTITY ESTIMATE CALCULATOR

SOURCE	Units	People /Unit	Gal./ Person	Total gpd	BOD/ Person	BOD lb	BOD mg/l	max gpd	TSS .2LB/PE
Residential									
Single family dwellings	96	3.7	100	35520	0.17	60.38	203.706	100	71.04
TOTALS =				35,520		60.38	203.706		

ESTIMATED QUANTITIES TO BE USED

(If other method is used for ADF & BOD, insert values below)

ADF gpd	BOD lb.	POP. EQUAV, by BOD	POP. EQUAV, by ADF	Dry Sludge ton/year	**BOD** mg/l	Flow **Peak** Factor
35,520	**60.38**	**355**	**355**	**5.328**	**204**	**4.05**

LAKE CARMEL THREE CELL SEWAGE LAGOON - ASBUILT CALCULATIONS
PRISMATIC EQUATION - VOLUME CALCULATIONS OCT, 2006
Q=h/6*(A1+A2+(A1^.5+A2^.5)^2) Q=h/3*(A1+A2+(A1*A2)^.5)

PRIMARY CELL

SECTION ELEV.	SECTION AREA	SECTION VOLUME	SUB TOTAL VOLUME CF		GAL
-3.50	2683.00			Measured	
-3.00	9574.00	2,888	2,888	Cal	21599
-3.00	9574.00	0	2,888	Measured	21599
-2.50	13014.89	5,625	8,513	Cal	63676
-2.00	16983.00	7,478	15,990	Measured	119607
-1.50	19020.20	8,996	24,986	Cal	186897
0.00	25824.00	33,503	58,490	Measured	437503
	Volume % of total=		66%		
	Area % of total =		56%		

2 ND CELL

SECTION ELEV.	SECTION AREA	SECTION VOLUME	SUB TOTAL VOLUME CF		GAL
-2.50	3718.00			Measured	
-2.00	6013.41	2,410	2,410	Cal	18027
-1.50	8858.00	3,695	6,105	Measured	45665
-1.00	10847.88	4,918	11,023	Cal	82452
0.00	15432.00	13,073	24,096	Measured	180237
	Volume % of total=		27%		
	Area % of total =		34%		

3 RD CELL

SECTION ELEV.	SECTION AREA	SECTION VOLUME	SUB TOTAL VOLUME CF		GAL
-2.50	203.00			Measured	
-2.00	1638.00	403	403	Cal	3014
-2.00	1638.00	0	403	Measured	3014
-1.50	2263.74	971	1,374	Cal	10279
0.00	4747.00	5,144	6,519	Measured	48759
	Volume % of total=		7%		
	Area % of total =		10%		

TOTAL SURFACE= 46,003 SF
TOTAL VOLUME = 89,104 cf

			PE	Home
Daily flow based on 120 day storage =	5,554	gpd	56	15.0
BOD Loading based on 34lb/acre surface area =	20.2	lb	119	32.0

10 CSR 20-8.020 (13) (A)

Three Cell Lagoon – Asbuilt

Lake Carmel Treatment Facility

Prepaired by Lewis–Bade Inc. – October, 2006

Measured at lagoon discharge point

Date of Flow	(gpd)
3/22/2006	22,170
3/22/2006	21,436
3/22/2006	28,454
3/22/2006	22,850
3/22/2006	22,850
3/22/2006	24,675
3/22/2006	25,120
3/22/2006	20,677
3/22/2006	28,469
3/22/2006	22,668
3/22/2006	23,639
3/22/2006	25,041
3/22/2006	26,902
3/22/2006	28,335
3/22/2006	22,207
3/22/2006	27,542
3/22/2006	27,055
3/22/2006	29,801
3/22/2006	29,801
3/22/2006	22,548
3/22/2006	22,270
3/22/2006	25,848
3/22/2006	27,307
3/22/2006	29,138
3/22/2006	27,885
3/22/2006	30,604
3/22/2006	27,885
3/22/2006	26,390
3/22/2006	26,390
3/22/2006	27,789
3/22/2006	27,789
3/22/2006	24,806
3/22/2006	24,806
3/22/2006	24,410
3/22/2006	24,806
3/22/2006	24,806
3/22/2006	26,784
3/22/2006	26,784
Daily Average	25,756
3/23/2006	26,784
3/23/2006	28,172
3/23/2006	27,987
3/23/2006	27,987
3/23/2006	25,721
3/23/2006	27,058
3/23/2006	33,284
3/23/2006	35,627
3/23/2006	33,284
3/23/2006	34,737
3/23/2006	32,452
3/23/2006	29,786
3/23/2006	29,786
3/23/2006	29,632
3/23/2006	29,632
3/23/2006	24,392
3/23/2006	22,037
3/23/2006	22,037
3/23/2006	23,339
3/23/2006	27,367
3/23/2006	25,993
3/23/2006	27,584
3/23/2006	28,203
3/23/2006	26,206
3/23/2006	23,475
3/23/2006	25,206
3/23/2006	29,021
3/23/2006	29,021
3/23/2006	31,958
3/23/2006	27,728
3/23/2006	26,602
3/23/2006	22,829
3/23/2006	20,156
3/23/2006	28,831
3/23/2006	26,183
3/23/2006	26,183
3/23/2006	26,183
3/23/2006	20,581
3/23/2006	21,109
3/23/2006	19,757
3/23/2006	19,757
3/23/2006	15,898
3/23/2006	16,702
3/23/2006	12,311
3/23/2006	11,900
3/23/2006	19,574
3/23/2006	11,791
3/23/2006	15,615
3/23/2006	14,490
3/23/2006	12,269
3/23/2006	17,952
3/23/2006	17,952
3/23/2006	19,418
3/23/2006	19,418
3/23/2006	18,324
3/23/2006	10,198
3/23/2006	17,983
3/23/2006	17,983
3/23/2006	17,016
3/23/2006	13,503
3/23/2006	15,788
3/23/2006	15,788
3/23/2006	15,788
3/23/2006	20,743
3/23/2006	20,864
3/23/2006	23,767
3/23/2006	27,626
3/23/2006	20,132
3/23/2006	21,419
3/23/2006	22,716
3/23/2006	26,244
3/23/2006	27,996
3/23/2006	20,530
3/23/2006	21,922
3/23/2006	21,569
3/23/2006	22,963
3/23/2006	28,720
3/23/2006	20,306
3/23/2006	20,114
3/23/2006	24,238
3/23/2006	23,804
3/23/2006	24,238
3/23/2006	26,448
3/23/2006	27,122
3/23/2006	27,122
3/23/2006	27,379
3/23/2006	28,117
3/23/2006	29,839
3/23/2006	32,229
3/23/2006	32,229
3/23/2006	29,019
3/23/2006	28,715
3/23/2006	27,837
3/23/2006	27,837
3/23/2006	27,094
3/23/2006	27,094
Daily Average	23,847
3/24/2006	22,181

3/24/2006	20,553	3/24/2006	25,669		
3/24/2006	29,357	3/24/2006	22,452	3/25/2006	23,881
3/24/2006	29,357	3/24/2006	23,701	3/25/2006	27,562
3/24/2006	27,227	3/24/2006	23,701	3/25/2006	28,459
3/24/2006	29,480	3/24/2006	24,421	3/25/2006	21,648
3/24/2006	29,480	3/24/2006	24,421	3/25/2006	28,887
3/24/2006	29,480	3/24/2006	24,421	3/25/2006	28,887
3/24/2006	29,480	3/24/2006	21,903	3/25/2006	27,078
3/24/2006	26,863	3/24/2006	26,312	3/25/2006	23,419
3/24/2006	30,419	3/24/2006	26,517	3/25/2006	22,131
3/24/2006	30,419	3/24/2006	27,865	3/25/2006	23,608
3/24/2006	30,718	3/24/2006	28,153	3/25/2006	22,317
3/24/2006	29,349	3/24/2006	27,865	3/25/2006	24,485
3/24/2006	28,272	3/24/2006	26,769	3/25/2006	28,792
3/24/2006	29,349	3/24/2006	23,263	3/25/2006	28,792
3/24/2006	22,511	3/24/2006	23,027	3/25/2006	28,792
3/24/2006	24,239	3/24/2006	22,269	3/25/2006	27,708
3/24/2006	23,176	3/24/2006	23,514	3/25/2006	23,703
3/24/2006	23,176	3/24/2006	23,754	3/25/2006	23,703
3/24/2006	31,113	3/24/2006	23,754	3/25/2006	23,277
3/24/2006	31,766	3/24/2006	26,700	3/25/2006	22,409
3/24/2006	30,917	3/24/2006	27,999	3/25/2006	22,409
3/24/2006	30,851	3/24/2006	28,942	3/25/2006	23,277
3/24/2006	30,851	3/24/2006	25,969	3/25/2006	20,550
3/24/2006	34,084	3/24/2006	22,947	3/25/2006	20,550
3/24/2006	33,888	3/24/2006	26,139	3/25/2006	23,091
3/24/2006	32,450	3/24/2006	29,396	3/25/2006	25,694
3/24/2006	32,450	3/24/2006	29,396	3/25/2006	23,091
3/24/2006	33,268	3/24/2006	29,396	3/25/2006	27,961
3/24/2006	32,549	3/24/2006	29,807	3/25/2006	20,721
3/24/2006	33,408	3/24/2006	21,100	3/25/2006	21,282
3/24/2006	33,973	3/24/2006	21,100	3/25/2006	32,668
3/24/2006	33,408	3/24/2006	23,432	3/25/2006	34,061
3/24/2006	26,399	3/24/2006	23,432	3/25/2006	30,832
3/24/2006	25,104	3/24/2006	28,201	3/25/2006	27,225
3/24/2006	25,104	3/24/2006	23,671	3/25/2006	27,225
3/24/2006	21,263	3/24/2006	24,239	3/25/2006	25,945
3/24/2006	27,989	3/24/2006	23,671	3/25/2006	23,990
3/24/2006	24,345	3/24/2006	22,615	3/25/2006	23,990
3/24/2006	27,913	3/24/2006	24,228	3/25/2006	20,071
3/24/2006	26,616	3/24/2006	22,615	3/25/2006	18,044
3/24/2006	26,616	3/24/2006	22,158	3/25/2006	15,832
3/24/2006	29,156	3/24/2006	22,615	3/25/2006	15,224
3/24/2006	21,303	3/24/2006	28,658	3/25/2006	13,176
3/24/2006	26,729	3/24/2006	29,900	3/25/2006	17,038
3/24/2006	29,235	3/24/2006	29,900	3/25/2006	10,523
3/24/2006	22,383	3/24/2006	23,881	3/25/2006	16,375
3/24/2006	23,700	Daily Average	26,769	3/25/2006	12,128

3/25/2006	12,376	3/25/2006	37,354	3/26/2006	19,694
3/25/2006	16,979	Daily Average	23,843	3/26/2006	19,694
3/25/2006	14,972			3/26/2006	10,304
3/25/2006	11,063	3/26/2006	39,813	3/26/2006	17,849
3/25/2006	15,442	3/26/2006	31,893	3/26/2006	17,256
3/25/2006	16,212	3/26/2006	36,285	3/26/2006	15,269
3/25/2006	16,212	3/26/2006	37,772	3/26/2006	14,290
3/25/2006	17,148	3/26/2006	37,772	3/26/2006	16,368
3/25/2006	16,228	3/26/2006	37,772	3/26/2006	15,340
3/25/2006	17,144	3/26/2006	37,733	3/26/2006	19,204
3/25/2006	18,071	3/26/2006	37,030	3/26/2006	10,484
3/25/2006	12,281	3/26/2006	31,100	3/26/2006	14,051
3/25/2006	14,738	3/26/2006	31,100	3/26/2006	12,688
3/25/2006	14,177	3/26/2006	31,100	3/26/2006	18,506
3/25/2006	15,971	3/26/2006	30,605	3/26/2006	12,403
3/25/2006	19,489	3/26/2006	31,100	3/26/2006	11,448
3/25/2006	10,749	3/26/2006	34,884	3/26/2006	13,900
3/25/2006	13,474	3/26/2006	36,367	3/26/2006	16,392
3/25/2006	17,254	3/26/2006	34,884	3/26/2006	15,891
3/25/2006	23,750	3/26/2006	34,884	3/26/2006	15,891
3/25/2006	28,493	3/26/2006	32,827	3/26/2006	18,854
3/25/2006	27,761	3/26/2006	32,827	3/26/2006	24,022
3/25/2006	23,562	3/26/2006	36,987	3/26/2006	23,415
3/25/2006	22,093	3/26/2006	34,260	3/26/2006	25,338
3/25/2006	23,446	3/26/2006	38,330	3/26/2006	26,849
3/25/2006	27,126	3/26/2006	38,330	3/26/2006	28,610
3/25/2006	20,054	3/26/2006	37,433	3/26/2006	29,930
3/25/2006	20,054	3/26/2006	37,433	3/26/2006	22,595
3/25/2006	21,337	3/26/2006	33,648	3/26/2006	25,141
3/25/2006	23,924	3/26/2006	29,942	3/26/2006	25,141
3/25/2006	26,998	3/26/2006	29,903	3/26/2006	26,499
3/25/2006	26,998	3/26/2006	31,123	3/26/2006	21,666
3/25/2006	30,145	3/26/2006	31,123	3/26/2006	24,234
3/25/2006	32,254	3/26/2006	39,708	3/26/2006	30,134
3/25/2006	32,822	3/26/2006	39,708	3/26/2006	29,019
3/25/2006	32,822	3/26/2006	31,050	3/26/2006	30,134
3/25/2006	34,633	3/26/2006	34,029	3/26/2006	38,073
3/25/2006	38,934	3/26/2006	32,361	3/26/2006	38,073
3/25/2006	30,367	3/26/2006	32,361	3/26/2006	31,992
3/25/2006	30,367	3/26/2006	30,100	3/26/2006	33,374
3/25/2006	31,808	3/26/2006	34,211	3/26/2006	33,305
3/25/2006	33,747	3/26/2006	35,636	3/26/2006	33,305
3/25/2006	32,764	3/26/2006	34,233	3/26/2006	34,763
3/25/2006	35,210	3/26/2006	23,884	3/26/2006	37,801
3/25/2006	35,210	3/26/2006	14,572	3/26/2006	38,290
3/25/2006	32,764	3/26/2006	10,107	3/26/2006	39,780
3/25/2006	39,813	3/26/2006	11,575	3/26/2006	31,243
3/25/2006	39,813	3/26/2006	12,063	3/26/2006	31,207

3/26/2006	30,305	3/27/2006	45,887	3/27/2006	47,594
3/26/2006	38,321	3/27/2006	47,934	3/27/2006	48,228
3/26/2006	36,905	3/27/2006	35,101	3/27/2006	49,110
Daily Average	28,095	3/27/2006	33,542	3/27/2006	48,397
		3/27/2006	30,158	3/27/2006	41,541
3/27/2006	35,007	3/27/2006	34,508	Daily Average	37,763
3/27/2006	31,935	3/27/2006	29,524		
3/27/2006	35,007	3/27/2006	27,499	3/28/2006	40,950
3/27/2006	36,585	3/27/2006	25,867	3/28/2006	48,096
3/27/2006	36,585	3/27/2006	20,050	3/28/2006	42,627
3/27/2006	36,585	3/27/2006	28,621	3/28/2006	40,950
3/27/2006	36,585	3/27/2006	29,999	3/28/2006	43,644
3/27/2006	29,166	3/27/2006	29,999	3/28/2006	43,921
3/27/2006	29,166	3/27/2006	25,528	3/28/2006	43,644
3/27/2006	29,166	3/27/2006	34,490	3/28/2006	43,644
3/27/2006	32,458	3/27/2006	34,527	3/28/2006	45,484
3/27/2006	33,052	3/27/2006	37,892	3/28/2006	45,048
3/27/2006	32,618	3/27/2006	34,910	3/28/2006	42,988
3/27/2006	32,858	3/27/2006	34,910	3/28/2006	38,279
3/27/2006	34,164	3/27/2006	31,867	3/28/2006	36,785
3/27/2006	34,164	3/27/2006	32,253	3/28/2006	36,785
3/27/2006	30,073	3/27/2006	32,253	3/28/2006	39,321
3/27/2006	31,573	3/27/2006	35,388	3/28/2006	39,321
3/27/2006	31,294	3/27/2006	31,679	3/28/2006	38,098
3/27/2006	38,116	3/27/2006	39,976	3/28/2006	38,098
3/27/2006	35,830	3/27/2006	36,255	3/28/2006	40,262
3/27/2006	38,892	3/27/2006	31,051	3/28/2006	40,262
3/27/2006	44,469	3/27/2006	34,237	3/28/2006	40,262
3/27/2006	49,999	3/27/2006	35,638	3/28/2006	38,586
3/27/2006	49,999	3/27/2006	35,638	3/28/2006	38,586
3/27/2006	44,075	3/27/2006	37,458	3/28/2006	38,586
3/27/2006	43,332	3/27/2006	39,187	3/28/2006	38,586
3/27/2006	44,182	3/27/2006	38,833	3/28/2006	38,586
3/27/2006	49,537	3/27/2006	42,464	3/28/2006	39,182
3/27/2006	41,159	3/27/2006	42,464	3/28/2006	33,483
3/27/2006	41,159	3/27/2006	40,263	3/28/2006	34,974
3/27/2006	42,788	3/27/2006	37,981	3/28/2006	36,078
3/27/2006	44,175	3/27/2006	40,263	3/28/2006	37,629
3/27/2006	49,848	3/27/2006	39,577	3/28/2006	37,629
3/27/2006	42,873	3/27/2006	36,655	3/28/2006	37,629
3/27/2006	42,873	3/27/2006	37,347	3/28/2006	36,222
3/27/2006	43,455	3/27/2006	32,187	3/28/2006	34,679
3/27/2006	43,455	3/27/2006	33,512	3/28/2006	34,679
3/27/2006	41,783	3/27/2006	38,754	3/28/2006	36,561
3/27/2006	40,858	3/27/2006	44,262	3/28/2006	37,662
3/27/2006	40,858	3/27/2006	44,262	3/28/2006	38,904
3/27/2006	44,718	3/27/2006	47,413	3/28/2006	40,515
3/27/2006	44,718	3/27/2006	49,107	3/28/2006	37,662

3/28/2006	36,568
3/28/2006	36,568
3/28/2006	36,568
3/28/2006	33,748
3/28/2006	33,748
3/28/2006	30,650
3/28/2006	38,258
3/28/2006	33,973
3/28/2006	37,926
3/28/2006	37,926
3/28/2006	36,435
3/28/2006	34,953
3/28/2006	34,953
3/28/2006	37,136
3/28/2006	32,627
3/28/2006	30,132
3/28/2006	28,692
3/28/2006	25,838
3/28/2006	24,424
3/28/2006	24,848
3/28/2006	24,848
3/28/2006	29,615
3/28/2006	29,615
3/28/2006	32,502
3/28/2006	31,968
3/28/2006	31,968
3/28/2006	28,823
3/28/2006	31,968
3/28/2006	33,807
3/28/2006	33,807
3/28/2006	35,235
3/28/2006	36,672
3/28/2006	36,672
3/28/2006	38,939
3/28/2006	38,939
3/28/2006	30,805
3/28/2006	33,808
3/28/2006	35,415
3/28/2006	37,056
3/28/2006	38,656
3/28/2006	37,910
3/28/2006	38,656
3/28/2006	39,505
3/28/2006	34,715
3/28/2006	36,511
3/28/2006	37,809
3/28/2006	35,316
3/28/2006	38,363

3/28/2006	44,365
3/28/2006	42,909
3/28/2006	46,038
3/28/2006	46,038
3/28/2006	47,641
3/28/2006	48,639
3/28/2006	48,639
Daily Average	37,240
3/29/2006	48,598
3/29/2006	48,218
3/29/2006	46,520
3/29/2006	45,071
3/29/2006	43,375
3/29/2006	43,375
3/29/2006	43,375
3/29/2006	43,375
3/29/2006	46,485
3/29/2006	47,997
3/29/2006	46,485
3/29/2006	47,997
3/29/2006	47,997
3/29/2006	44,257
3/29/2006	37,282
3/29/2006	37,282
3/29/2006	37,282
3/29/2006	35,325
3/29/2006	42,402
3/29/2006	49,607
3/29/2006	49,607
3/29/2006	49,607
3/29/2006	40,267
3/29/2006	40,267
3/29/2006	48,376
3/29/2006	45,485
3/29/2006	48,584
3/29/2006	48,584
3/29/2006	47,646
3/29/2006	43,123
3/29/2006	44,619
3/29/2006	49,053
3/29/2006	43,123
3/29/2006	41,633
3/29/2006	45,609
3/29/2006	45,609
3/29/2006	44,068
3/29/2006	41,008
3/29/2006	37,976

3/29/2006	34,518
3/29/2006	23,289
3/29/2006	21,144
3/29/2006	29,929
3/29/2006	20,311
3/29/2006	28,895
3/29/2006	22,818
3/29/2006	29,234
3/29/2006	26,459
3/29/2006	19,359
3/29/2006	17,147
3/29/2006	11,438
3/29/2006	14,221
3/29/2006	10,940
3/29/2006	13,746
3/29/2006	12,553
3/29/2006	12,553
3/29/2006	18,842
3/29/2006	18,842
3/29/2006	10,077
3/29/2006	13,847
3/29/2006	20,341
Daily Average	35,525

SUMMATION

3/22/06	25,756
3/23/06	23,847
3/24/06	26,769
3/25/06	23,843
3/26/06	28,095
3/27/06	37,763
3/28/06	37,240
3/29/06	35,525
Total Average	29,904
Maximum	49,999
Minimum	10,077

Measured at lagoon discharge point

Date of Flow	(gpd)
06/08/06	11,202
06/08/06	11,331
06/08/06	12,015
06/08/06	12,015
06/08/06	12,644
06/08/06	13,376
06/08/06	13,617
06/08/06	13,617
06/08/06	14,502
06/08/06	14,307
06/08/06	13,773
06/08/06	13,773
06/08/06	14,428
06/08/06	14,011
06/08/06	14,428
06/08/06	14,428
06/08/06	14,011
06/08/06	14,011
06/08/06	14,428
06/08/06	13,690
06/08/06	14,428
06/08/06	14,428
06/08/06	14,086
06/08/06	14,086
06/08/06	14,086
06/08/06	14,086
06/08/06	14,086
06/08/06	14,790
06/08/06	13,981
Day avg.	13,713
06/09/06	11,476
06/09/06	11,896
06/09/06	11,896
06/09/06	11,485
06/09/06	10,713
06/09/06	11,485
06/09/06	11,485
06/09/06	11,897
06/09/06	11,897
06/09/06	12,115
06/09/06	12,115
06/09/06	11,493
06/09/06	11,493
06/09/06	10,873
06/09/06	11,493
06/09/06	10,537
06/09/06	12,280
06/09/06	11,108
06/09/06	12,280
06/09/06	12,594
06/09/06	12,594
06/09/06	12,594
06/09/06	12,594
06/09/06	12,545
06/09/06	12,545
06/09/06	12,545
06/09/06	12,328
06/09/06	11,485
06/09/06	10,895
06/09/06	10,142
Day avg.	11,763
06/10/06	10,153
06/10/06	10,722
06/10/06	10,834
06/10/06	11,420
06/10/06	11,420
06/10/06	12,298
06/10/06	11,666
06/10/06	11,666
06/10/06	11,504
06/10/06	11,504
06/10/06	10,725
06/10/06	11,002
06/10/06	11,002
06/10/06	11,002
06/10/06	11,002
06/10/06	11,002
06/10/06	10,748
06/10/06	10,660
06/10/06	10,660
06/10/06	10,112
06/10/06	10,023
06/10/06	10,112
06/10/06	9,941
06/10/06	10,112
06/10/06	10,206
06/10/06	10,945
06/10/06	10,982
06/10/06	10,982
06/10/06	11,199
06/10/06	10,096
Day avg.	10,857
06/11/06	12,165
06/11/06	12,330
06/11/06	16,852
06/11/06	18,793
06/11/06	26,501
06/11/06	32,915
06/11/06	35,989
06/11/06	35,989
06/11/06	36,534
06/11/06	37,418
06/11/06	39,113
06/11/06	37,987
06/11/06	35,483
06/11/06	31,951
06/11/06	31,951
06/11/06	30,959
06/11/06	31,719
06/11/06	32,998
06/11/06	32,430
06/11/06	34,281
06/11/06	30,788
06/11/06	31,381
06/11/06	29,771
06/11/06	29,152
06/11/06	24,359
06/11/06	22,046
06/11/06	19,604
06/11/06	20,968
06/11/06	21,883
06/11/06	24,048
Day avg.	28,612
06/12/06	27,684
06/12/06	28,182
06/12/06	28,182
06/12/06	24,778
06/12/06	24,778
06/12/06	25,774
06/12/06	25,377
06/12/06	26,483
06/12/06	26,483
06/12/06	25,208
06/12/06	24,575

06/12/06	25,699	06/13/06	20,529	06/15/06	16,622
06/12/06	24,793	06/13/06	18,866	06/15/06	15,976
06/12/06	23,590	06/13/06	18,126	06/15/06	16,623
06/12/06	24,187	Day avg.	22,939	06/15/06	16,604
06/12/06	24,267			06/15/06	16,623
06/12/06	23,372	06/14/06	17,051	06/15/06	15,060
06/12/06	22,029	06/14/06	14,542	06/15/06	14,648
06/12/06	23,506	06/14/06	15,128	06/15/06	15,209
06/12/06	21,197	06/14/06	15,722	06/15/06	14,648
06/12/06	19,465	06/14/06	14,993	06/15/06	15,209
06/12/06	20,351	06/14/06	16,623	06/15/06	13,746
06/12/06	18,869	06/14/06	16,958	06/15/06	15,448
06/12/06	19,108	06/14/06	14,868	06/15/06	15,996
06/12/06	20,348	06/14/06	13,114	06/15/06	15,405
06/12/06	21,114	06/14/06	15,438	06/15/06	15,948
06/12/06	21,943	06/14/06	14,126	06/15/06	15,284
06/12/06	25,780	06/14/06	20,714	06/15/06	14,325
06/12/06	24,287	06/14/06	18,638	06/15/06	13,818
06/12/06	25,174	06/14/06	18,143	06/15/06	14,325
Day avg.	23,886	06/14/06	18,143	Day avg.	15,255
		06/14/06	18,089		
06/13/06	22,728	06/14/06	17,735	06/16/06	13,196
06/13/06	24,971	06/14/06	18,099	06/16/06	13,235
06/13/06	23,301	06/14/06	19,362	06/16/06	14,399
06/13/06	24,971	06/14/06	19,972	06/16/06	14,399
06/13/06	26,426	06/14/06	19,362	06/16/06	13,620
06/13/06	23,301	06/14/06	20,054	06/16/06	13,620
06/13/06	23,751	06/14/06	19,308	06/16/06	13,620
06/13/06	26,426	06/14/06	19,239	06/16/06	13,921
06/13/06	25,495	06/14/06	17,116	06/16/06	14,063
06/13/06	24,500	06/14/06	18,590	06/16/06	14,063
06/13/06	20,026	06/14/06	18,174	06/16/06	14,482
06/13/06	19,994	06/14/06	18,752	06/16/06	14,482
06/13/06	20,741	06/14/06	18,091	06/16/06	13,891
06/13/06	21,473	06/14/06	17,429	06/16/06	14,437
06/13/06	25,796	Day avg.	17,452	06/16/06	13,735
06/13/06	23,546			06/16/06	15,242
06/13/06	25,619	06/15/06	13,924	06/16/06	14,715
06/13/06	24,368	06/15/06	14,531	06/16/06	15,242
06/13/06	22,914	06/15/06	13,763	06/16/06	14,715
06/13/06	24,264	06/15/06	14,348	06/16/06	15,865
06/13/06	23,989	06/15/06	15,293	06/16/06	14,715
06/13/06	23,748	06/15/06	15,925	06/16/06	13,559
06/13/06	22,193	06/15/06	15,304	06/16/06	13,034
06/13/06	21,384	06/15/06	15,145	06/16/06	13,034
06/13/06	22,193	06/15/06	15,755	06/16/06	12,517
06/13/06	21,284	06/15/06	15,757	06/16/06	12,318
06/13/06	21,262	06/15/06	16,391	06/16/06	12,555

06/16/06	12,669
06/16/06	11,850
06/16/06	12,374
Day avg.	13,786
06/17/06	11,542
06/17/06	11,828
06/17/06	11,828
06/17/06	11,449
06/17/06	11,820
06/17/06	12,889
06/17/06	13,437
06/17/06	13,437
06/17/06	13,471
06/17/06	13,530
06/17/06	13,471
06/17/06	12,671
06/17/06	14,090
06/17/06	14,090
06/17/06	12,502
06/17/06	12,502
06/17/06	14,473
06/17/06	14,473
06/17/06	14,980
06/17/06	14,482
06/17/06	14,473
06/17/06	14,150
06/17/06	14,307
06/17/06	14,054
06/17/06	15,866
06/17/06	16,460
06/17/06	18,069
06/17/06	19,311
06/17/06	20,348
06/17/06	21,500
Day avg.	14,383
06/18/06	23,754
06/18/06	24,020
06/18/06	23,001
06/18/06	23,259
06/18/06	22,791
06/18/06	22,624
06/18/06	23,163
06/18/06	24,346
06/18/06	24,346
06/18/06	24,251
06/18/06	24,251

06/18/06	21,379
06/18/06	19,742
06/18/06	22,188
06/18/06	22,452
06/18/06	21,694
06/18/06	21,650
06/18/06	20,929
06/18/06	20,419
06/18/06	20,419
06/18/06	20,841
06/18/06	20,419
06/18/06	20,841
06/18/06	19,981
06/18/06	21,488
06/18/06	21,602
06/18/06	19,698
06/18/06	21,561
06/18/06	18,550
06/18/06	18,928
Day avg.	21,820
06/19/06	19,072
06/19/06	19,723
06/19/06	20,668
06/19/06	20,443
06/19/06	20,058
06/19/06	19,909
06/19/06	19,533
06/19/06	18,635
06/19/06	16,650
06/19/06	17,232
06/19/06	19,389
06/19/06	21,901
06/19/06	20,788
06/19/06	19,351
06/19/06	20,395
06/19/06	20,616
06/19/06	20,395
06/19/06	20,616
06/19/06	21,391
06/19/06	21,391
06/19/06	20,205
06/19/06	20,205
06/19/06	19,251
Day avg.	19,905

Period 6/08/06-6/19/06

All avg.	17,836
Max	39,113
Min.	9,941

Daily Averages

06/08/06	13,713
06/09/06	11,763
06/10/06	10,857
06/11/06	28,612
06/12/06	23,886
06/13/06	22,939
06/14/06	17,452
06/15/06	15,255
06/16/06	13,786
06/17/06	14,383
06/18/06	21,820
06/19/06	19,905

Period 3/22/06-3/29/06

Total Average	29,904
Maximum	49,999
Minimum	10,077

CMPS Project # 06048

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

MISSOURI STATE OPERATING PERMIT

In compliance with the Missouri Clean Water Law, (Chapter 644 R.S. Mo. as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

Permit No.	MO-0088986
Owner:	AquaSource Services LP (ASSLP)
Address:	PO Box 7017, Jefferson City, MO 65102
Continuing Authority:	Same as above
Address:	Same as above
Facility Name:	ASSLP, Lake Carmel Wastewater Treatment Facility
Address:	West Brazito Road, Jefferson City, MO 65102
Legal Description:	NE ¼, NW ¼, NE ¼, Sec. 33, T43N, R13W, Cole County
Receiving Stream:	Unnamed tributary to Clark Fork (U)
First Classified Stream and ID:	Clark Fork (C) (01000)
USGS Basin & Sub-watershed No.:	(10300102-210003)

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein:

FACILITY DESCRIPTION

Outfall #001 - Subdivision - SIC #4952

Three-cell lagoon/sludge is retained in lagoon.
Design population equivalent is 126. 34 homes
Design flow is 12,600 gallons per day.
Actual flow is 10,400 gallons per day.
Design sludge production is 1.9 dry tons/year.

This permit authorizes only wastewater discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System; it does not apply to other regulated areas. This permit may be appealed in accordance with Section 644.051.6 of the Law.

December 12, 2003
Effective Date

Stephen M. Mahfood, Director, Department of Natural Resources
Executive Secretary, Clean Water Commission

December 11, 2008
Expiration Date

G. Irene Crawford, Director, Northeast Regional Office

MO 780-0041 (10-93)