

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION



CONSTRUCTION PERMIT

The Missouri Department of Natural Resources hereby issues a permit to:

Missouri Biosolids LLC
2927 County Road 253
Columbia, MO 65202

for the construction of (described facilities):

See attached.

Permit Conditions:

See attached.

Construction of such proposed facilities shall be in accordance with the provisions of the Missouri Clean Water Law, Chapter 644, RSMo, and regulation promulgated thereunder, or this permit may be revoked by the Department of Natural Resources (Department).

As the Department does not examine structural features of design or the efficiency of mechanical equipment, the issuance of this permit does not include approval of these features.

A representative of the Department may inspect the work covered by this permit during construction. Issuance of a permit to operate by the Department will be contingent on the work substantially adhering to the approved plans and specifications.

This permit applies only to the construction of water pollution control components; it does not apply to other environmentally regulated areas.

August 29, 2014
Effective Date

Sara Parker Pauley
Sara Parker Pauley, Director, Department of Natural Resources

August 28, 2016
Expiration Date

John Madras
John Madras, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

Construction of one sludge holding basin and one associated solids drying pad.

II. FINDING OF AFFORDABILITY

The Finding of Affordability is not applicable. The permittee is not a combined or separate sanitary sewer system or a publicly owned treatment works.

III. CONSTRUCTION PERMIT CONDITIONS

The permittee is authorized to construct subject to the following conditions:

1. This construction permit does not authorize discharge.
2. All construction shall be in accordance with the plans and specifications submitted by Agricultural Engineering Associates on February 27, 2014.
3. The Department must be contacted in writing prior to making any changes to the approved plans and specifications that would directly or indirectly have an impact on the capacity, flow, system layout, or reliability of the proposed wastewater treatment facilities or any design parameter that is addressed by 10 CSR 20-8, in accordance with 10 CSR 20-8.110(8).
4. State and Federal Law does not permit bypassing of raw wastewater, therefore steps must be taken to ensure that raw wastewater does not discharge during construction. If a sanitary sewer overflow or bypass occurs, report the appropriate information to the Department's Northeast Regional Office per 10 CSR 20-7.015(9)(E)2.
5. This Construction Permit is invalid for projects required to comply with the requirements contained in 10 CSR 20-4, "Grants and Loans"
6. Protection of drinking water supplies shall be in accordance with 10 CSR 20-8.120(10). "There shall be no physical connections between a public or private potable water supply system and a sewer, or appurtenance thereto which would permit the passage of any wastewater or polluted water into the potable supply. No water pipe shall pass through or come in contact with any part of a sewer manhole."

7. Sewers in relation to water works structures shall meet the requirements of 10 CSR 23-3.010 with respect to minimum distances from public water supply wells or other water supply sources and structures.
 - A. Sewer mains shall be laid at least ten feet horizontally from any existing or proposed water main. The distances shall be measured edge-to-edge. In cases where it is not practical to maintain a ten foot separation, the Department may allow a deviation on a case-by-case basis, if supported by data from the design engineer. Such a deviation may allow installation of the sewer closer to a water main, provided that the water main is in a separate trench or on an undisturbed earth shelf located on either side of the sewer and at an elevation so the bottom of the water main is at least 18 inches above the top of the sewer. If it is impossible to obtain proper horizontal and vertical separation as described above for sewers, the sewer must be constructed of slip-on or mechanical joint pipe or continuously encased and be pressure tested to 150 pounds per square inch to assure water tightness.
 - B. Manholes should be located at least ten feet horizontally from any existing or proposed water main.
 - C. Sewers crossing water mains shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer. The crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints. Where a water main crosses under a sewer, adequate structural support shall be provided for the sewer to maintain line and grade. When it is impossible to obtain proper vertical separation as stipulated above, one of the following methods must be specified:
 - a. The sewer shall be designed and constructed equal to the water pipe and shall be pressure tested to assure water tightness prior to backfilling; or
 - b. Either the water main or sewer line may be continuously encased or enclosed in a watertight carrier pipe which extends ten feet on both sides of the crossing, measured perpendicular to the water main. The carrier pipe shall be of materials approved by the Department for use in water main construction.
8. In addition to the requirements for a construction permit, 10 CSR 20-6.200 requires land disturbance activities of one acre or more to obtain a Missouri State Operating Permit to discharge stormwater. The permit requires Best Management Practices sufficient to control runoff and sedimentation to protect waters of the state. Land disturbance permits will only be obtained by means of the Department's ePermitting system available online at www.dnr.mo.gov/env/wpp/epermit/help.htm. See www.dnr.mo.gov/env/wpp/stormwater/sw-land-disturb-permits.htm for more information.
9. A United States (U.S.) Army Corps of Engineers (COE) permit (404) and a Water Quality Certification (401) issued by the Department or permit waiver may be required for the activities described in this permit. This permit is not valid until these requirements are satisfied. If construction activity will disturb any land below the ordinary high water mark of Jurisdictional Waters of the U.S. then a 404/401 will be required. Since the COE makes determinations on what is jurisdictional, you must contact the COE to determine permitting requirements. You may call the Department's Water Protection Program at 573-751-1300 for more information. See www.dnr.mo.gov/env/wpp/401/ for more information.

10. A full closure plan shall be submitted to the Department's Northeast Regional Office for review and approval of any permitted wastewater treatment system being replaced. In accordance with 10 CSR 20-6.010(12), the closure plan must meet the requirements outlined in Standard Conditions Part III, Section I, of the Missouri State Operating Permit No. MO-0135801. Closure shall not commence until the submitted closure plan is approved by the Department. Form J – Request for Termination of a State Operating Permit, shall be submitted to the Department's Northeast Regional Office for termination of any existing Missouri State Operating Permit, once closure is completed in accordance with the approved closure plan.
11. Upon completion of construction;
 - A. Missouri Biosolids LLC will become the continuing authority for operation, maintenance, and modernization of these facilities;
 - B. Submit the enclosed form Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(D);
 - C. Submit an electronic copy of the as built's if the project was not constructed in accordance with previously submitted plans and specifications; and
 - D. Submit a Form B - Application for an Operating Permit for Domestic or Municipal
 - E. Wastewater ($\leq 100,000$ gallons per day) along with the modification fee.

IV. REVIEW SUMMARY

1. AMMONIA

The Water Protection Program is providing this notice to inform permittees that EPA's published ammonia criteria for aquatic life protection is lower than the current Missouri criteria. The department has initiated stakeholder discussions on this topic and at this time, there is no firm target date for starting the rulemaking to adopt new standards. More information can be found at <http://dnr.mo.gov/pubs/pub2481.pdf>.

Ammonia limits are not applicable for this no-discharge facility.

2. CONSTRUCTION PURPOSE

This construction is to expand the storage capacity at this storage and land application facility.

3. FACILITY DESCRIPTION

This is a modification to an existing storage and land application facility that receives pre-treated industrial sludge. It has one sludge holding basin with an adjacent solids drying pad and is constructing a second sludge holding basin and associated solids drying pad.

4. COMPLIANCE PARAMETERS

This construction is only for adding capacity to this no-discharge facility.

5. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

This is a storage and land application facility that receives pre-treated industrial wastes.

6. OPERATING PERMIT MODIFICATION

Operating permit MO-0135804 will require a modification to reflect the construction activities. Upon construction completion submit a modification fee and Forms A, R, and I - Application for an Operating Permits.

Review Engineer: Diane Reinhardt
Unit Chief Approval:
Date: August 19, 2014
Diane.Reinhardt@dnr.mo.gov



MISSOURI DEPARTMENT OF NATURAL RESOURCES
 WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH
**FORM A – APPLICATION FOR CONSTRUCTION OR OPERATING PERMIT
 UNDER MISSOURI CLEAN WATER LAW**

CP000127
 A12930 A217997

FOR AGENCY USE ONLY	
CHECK NUMBER	123
DATE RECEIVED	2/7/14
FEE SUBMITTED	\$750.00

Note ▶ PLEASE READ THE ACCOMPANYING INSTRUCTIONS BEFORE COMPLETING THIS FORM.

1. This application is for:

An operating permit and antidegradation review public notice

A construction permit following an appropriate operating permit and antidegradation review public notice

A construction permit and concurrent operating permit and antidegradation review public notice

A construction permit (submitted before Aug. 30, 2008 or antidegradation review is not required)

An operating permit for a new or unpermitted facility Construction Permit # _____

An operating permit renewal: permit # MO-_____ Expiration Date _____

An operating permit modification: permit # MO-_____ Reason: _____

1.1 Is the appropriate fee included with the application? (See instructions for appropriate fee) YES NO

2. FACILITY

NAME		TELEPHONE WITH AREA CODE	
Missouri Biosolids North Farms			
ADDRESS (PHYSICAL)		CITY	STATE ZIP CODE
County Road 285, 0.75 miles south of Route E		Auxvasse	MO 65231

3. OWNER

NAME		E-MAIL ADDRESS	TELEPHONE WITH AREA CODE
Missouri Biosolids LLC		mobiosolids@ktis.ne	(573) 592-0191
ADDRESS (MAILING)		CITY	STATE ZIP CODE
2927 County Road 253		Columbia	MO 65202

3.1 Request review of draft permit prior to public notice? YES NO

4. CONTINUING AUTHORITY

NAME		TELEPHONE WITH AREA CODE	
same as Owner above			
ADDRESS (MAILING)		CITY	STATE ZIP CODE

5. OPERATOR

NAME		CERTIFICATE NUMBER	TELEPHONE WITH AREA CODE
ADDRESS (MAILING)		CITY	STATE ZIP CODE

6. FACILITY CONTACT

NAME		TITLE	TELEPHONE WITH AREA CODE
Brett Shryock			(573) 219-6583
			FAX

7. ADDITIONAL FACILITY INFORMATION

7.1 Legal Description of Outfalls. (Attach additional sheets if necessary.)

001 SE 1/4 NE 1/4 Sec 19 T 49N R 10W Calla County
 UTM Coordinates Easting (X): _____ Northing (Y): _____
For Universal Transverse Mercator (UTM), Zone 15 North referenced to North American Datum 1983 (NAD83)

002 _____ 1/4 _____ 1/4 Sec _____ T _____ R _____ _____ County
 UTM Coordinates Easting (X): _____ Northing (Y): _____

003 _____ 1/4 _____ 1/4 Sec _____ T _____ R _____ _____ County
 UTM Coordinates Easting (X): _____ Northing (Y): _____

004 _____ 1/4 _____ 1/4 Sec _____ T _____ R _____ _____ County
 UTM Coordinates Easting (X): _____ Northing (Y): _____

7.2 Primary Standard Industrial Classification (SIC) and Facility North American Industrial Classification System (NAICS) Codes.

001 – SIC 4952 and NAICS 221320 002 – SIC 4953 and NAICS 562219
 003 – SIC _____ and NAICS _____ 004 – SIC _____ and NAICS _____

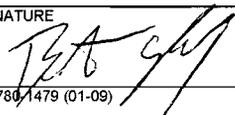
**8. ADDITIONAL FORMS AND MAPS NECESSARY TO COMPLETE THIS APPLICATION
(Complete all forms that are applicable.)**

A.	Is your facility a manufacturing, commercial, mining or silviculture waste treatment facility? If yes, complete Form C (unless storm water only, then complete U.S. Environmental Protection Agency Form 2F per Item C below).	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
B.	Is your facility considered a "Primary Industry" under EPA guidelines: If yes, complete Forms C and D.	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
C.	Is application for storm water discharges only? If yes, complete EPA Form 2F.	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
D.	Attach a map showing all outfalls and the receiving stream at 1" = 2,000' scale.		
E.	Is wastewater land applied? If yes, complete Form I.	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
F.	Is sludge, biosolids, ash or residuals generated, treated, stored or land applied? If yes, complete Form R.	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>

9. DOWNSTREAM LANDOWNER(S) Attach additional sheets as necessary. See Instructions.
(PLEASE SHOW LOCATION ON MAP. SEE 8.D ABOVE).

NAME Shryock Cousins			
ADDRESS 2600 County Road 240	CITY Columbia	STATE MO	ZIP CODE 65202

10. I certify that I am familiar with the information contained in the application, that to the best of my knowledge and belief such information is true, complete and accurate, and if granted this permit, I agree to abide by the Missouri Clean Water Law and all rules, regulations, orders and decisions, subject to any legitimate appeal available to applicant under the Missouri Clean Water Law to the Missouri Clean Water Commission.

NAME AND OFFICIAL TITLE (TYPE OR PRINT) Brett Shryock, Member	TELEPHONE WITH AREA CODE (573) 219-6583
SIGNATURE 	DATE SIGNED 2-21-2014

MO 780.1479 (01-09)

BEFORE MAILING, PLEASE ENSURE ALL SECTIONS ARE COMPLETED AND ADDITIONAL FORMS, IF APPLICABLE, ARE INCLUDED.

Submittal of an incomplete application may result in the application being returned.

HAVE YOU INCLUDED:

- Appropriate Fees?
- Map at 1" = 2000' scale?
- Signature?
- Form C, if applicable?
- Form D, if applicable?
- Form 2F, if applicable?
- Form I (Irrigation), if applicable?
- Form R (Sludge), if applicable?

**FORM R – PERMIT APPLICATION FOR LAND APPLICATION OF INDUSTRIAL WASTEWATER
BIOSOLIDS AND RESIDUALS**

1.00 FACILITY INFORMATION

- 1.10 Missouri Biosolids North Farm MO - 0135801
- 1.20 Application for Construction Permit and Operating Permit Renewal
Attached Engineering Report, Plans and Specifications from Agricultural Engineering Associates of Uniontown, Kansas (pg 7-8)
- 1.30 Sludge generated 12 months per year. Sludge is accepted at our facility on an as-space available basis.
- 1.40 1 Facility Outfall
This facility will consist of 2 liquid storage basins and 2 dry storage pads. The original sludge storage basin will be used as a settling basin. It will discharge through a pipe into the new second sludge storage basin. The original dry storage pad will be used to store dry materials hauled to our facility. The rainwater from that pad will drain into storage basin #1. A new dry storage pad will be constructed which will drain into basin #2. The new second sludge storage basin will have an emergency discharge spillway which will be the one and only outfall for this facility.
- Storage and Land Application Facility – SIC #4952 & #4953 – No Certified Operator Required
- We are requesting:
This facility is authorized to receive biosolids, sludge, septage, grease, and other domestic wastes.
This facility is authorized to receive approved sludge, residuals, and other industrial wastes as detailed in the application submitted, with special conditions.

2.00 STORAGE BASINS

- 2.10 2 storage basins: The current sludge storage basin and the proposed new earthen basin, both have clay earthen liners.
- 2.20 Attachment A: Profile Sketch (pg 9)
Basin #2: Length 240' Width 215'
Depth 16' Freeboard 2'
Berm Width 10' % slope 3 to 1
- 2.21 Storage Basin Volume:
Basin #1: Gallons: 121,000 Permanent Volume + 1,534,000 Storage = 1,655,000
Basin #2: Gallons: 273,000 Permanent Volume + 2,830,750 Storage = 3,103,750 gallons
- 2.30 Storage Basin Operating Levels:
Basin #2: Maximum water level 2 feet below emergency overflow level,
Minimum operating water level 14 feet below emergency overflow level.
- 2.40 Storage Basin Design Storage Capacity:
365 days for Basin #1 and #2 storage between minimum and maximum operating levels for 1-in 10 year storm water flows.

- 2.50 Water Balance Test results: Attached Engineer Geological Investigation (pg 10-16)
- 2.60 Sludge Management Plan for materials that are not land applied:
At any time sludge was deemed unsuitable for land application, the Department will be contacted for approval to haul the material to an approved land fill.
- 2.70 Closure Plan for Lagoons, Storage Basins and Treatment Units:
We will provide written notification 180 days prior to any lagoon closing. We will mix the biosolids and then land apply at agronomic rates. Upon clean out of the lagoon the banks will be leveled with a bull dozer, the area will be crowned to ensure proper drainage from the site, and the total disturbed area will be seeded and mulched.

3.00 LAND APPLICATION SYSTEM

- 3.10 10 Location Sites (pg 17)
1327 Total Available Acres
Minimum & Maximum % field slopes <3%
County Callaway

Location:		Sec	T	R	Acres
Hughes		SW ¼ 18	49N	10W	111
Linnenbringer		SE ¼ 18	49N	10W	150
Elaine		SW ¼ 17	49N	10W	79
Rumins		NW ¼ 19	49N	10W	250
Scanland		NE ¼ 19	49N	10W	240
Hovey		NW ¼ 20	49N	10W	216
Boulware	NW ¼ SE ¼	20	49N	10W	41
Sprock	N ½ SW ¼	19	49N	10W	95
Blansett	S ½ SW ¼	19	49N	10W	85
McCray	S ½ SE ¼	19	49N	10W	60

- 3.12 Type of Vegetation:
We typically land apply sludge before planting corn. We fertilize using a yield goal of 200 bushels/acre. With most of the application fields under center pivot irrigation we have seen a 5 year corn average of around 212 bushels/acre. A rotation of soybeans will follow the corn crop.
- 3.20 Annual Sludge Production:
We will empty the sludge storage basins twice annually, allowing for a maximum of 8,729,500 gallons of sludge to be land applied at an unknown percent solids (percent solids varies each year but we always follow our Nutrient Management Plan).
- 3.21 Sludge is land applied according to our Nutrient Management Plan, usually around 3 dry ton/year per acre. Land application occurs when the field conditions are suitable. Land application may occur any month suitable for field work.
- 3.22 Land Application Rate is based on Nutrient Management Plan.
Prior to land application, the sludge and soil is tested according to our permit requirements. The sludge is also tested for several things, including Nitrogen and Phosphorus. These levels are constantly changing.

This is an EXAMPLE of the sludge analyses and the rate applied:

Previous Crop: Soybeans

Proposed Crop: Corn

Sludge = 3.4% solids

$$\frac{2000 \text{ lb}}{3.4} = 588.23 \times 100 = 58823 \text{ lbs sludge} = 1 \text{ dry ton}$$

Nitrogen: 62 lbs PAN/ton dry material

Corn yield goal = 200 bu/acre

Crop needs 186 lbs/acre PAN to produce goal

Apply 3 dry tons of sludge/acre

3 dry ton = 176,470 lbs sludge

$$\frac{176,470 \text{ lbs}}{8.34 \text{ lbs/gal}} = 21,159 \text{ gal/acre to deliver nitrogen requirement}$$

$$\frac{2,295,013 \text{ gallons}}{21,159 \text{ gal/acre}} = 108.46 \text{ acres needed to empty basin}$$

Phosphorous: Do not apply biosolids to soil that contains more than 800 lbs/acre of available phosphorus.

55lbs P1/ton dry material

55 x 2.27 = 124.85 lbs P205/ton

124.85 x 3 ton/acre = 374.55 lbs P205/acre

200 bu corn requires 86 lbs P205

No additional P205 is needed

3.30 Equipment:

Land application is done with subsurface injection with a dragline and toolbar and also a slinger spreader. Biosolids are applied at agronomic rates based on a nutrient management plan, biosolids nature, and soil test results.

Liquid Application:

The lagoon will be mixed with lagoon pump agitators to ensure the biosolids are consistent as possible. The houle pumps are about 50 feet long and are powered by farm tractors. Once the lagoon is mixed, a hose is attached to the discharge port on the houle pump and connected to the intake side of the high pressure pump. The high pressure pump feeds the sludge through the manure drag line hose. The manure drag line hose is attached to the farm star injection toolbar. The toolbar is pulled back and forth by a farm tractor applying the biosolids at agronomic rates. It takes a minimum of four people to apply biosolids; one is at the lagoon operating the pumps, a second is monitoring the manure drag line hose, the third is operating the tractor and toolbar, and the fourth is sampling the biosolids every hour for percent solids. Using this information, as well as the analytical nutrient data the operator of the tractor and toolbar can accurately apply the biosolids. Once land application is complete, the hose is disconnected from the tractor and toolbar. A foam pig is inserted into the manure dragline hose and is blown through the line with a high volume air compressor. By doing this it pushes the biosolids that are still in the line back to the lagoon. After the

hose is clean, it is spooled on the hose reel. Using the umbilical hose system is a safe and efficient way of biosolids land application.

Dry Application:

Using the front end loader the biosolids will be transferred from the dry storage pad to a knight spreader. The operator will spread the biosolids at agronomic rates based on the nutrient management plan.

Equipment Capacity 60,000 gallons per hour; Unknown Total hours of operation per year

3.40 Public Use/Access Sites:

Public access to the application sites shall be restricted for 180 days unless the sludge is either subsurface injected or incorporated. If the sludge is subsurface injected or incorporated then public access to irrigation site(s) shall be restricted 60 days after application.

3.50 Separation Distance

There shall be no land application within 300 feet of any sinkhole, losing stream or other structure or physiographic feature that may provide direct connection between the ground water table and the surface, or water supply withdrawal; 300 feet of any lake or pond used for water supply; 100 feet of other ponds and lakes; 100 feet of gaining streams; 50 feet of intermittent or wet weather streams; 150 feet of dwelling or public use areas excluding roads or highways; or 50 feet inside the property line. For subsurface injection, buffer zones may be reduced to 25 feet from gaining streams (classified and unclassified) and property lines.

3.60 SOILS INFORMATION: Attached Engineer Geological Investigation (pg 10-16)

3.70 Nutrient Management Plan: Attached Operations & Maintenance Manual (pg 20-25)

3.80 Geologic Investigation: January 24, 2014. Project ID Number LWE14053 (pg 18-19)

3.81 Ground Water Monitoring Wells: None

3.90 Current Copy of Operation and Maintenance Plan, last updated 2014, attached. (pg 20-25)

3.91 Topography map (pg 17)

3.92 Facility Sketch (pg 7)

4.00 INDUSTRIAL PROCESS INFORMATION

4.10 This is a storage and land application facility. Materials are treated before they arrive as there is no treatment that takes place on site.

4.11 We currently have permission to receive industrial waste from the following in SIC Major Group 20:

- Dawn Foods,
- Cargill Turkey Products,
- Conagra Foods,
- Nestle Purina Pet Care Co,

Triumph Foods,
Tyson Foods

We request to add Unilever to this. Sludge test results included (pg 26-30).

We would like permission to take industrial waste from any SIC Major 20 food group, not limited to the above list, given we test the materials before application and follow our Nutrient Management Plan for land application.

Requesting to continue receiving industrial sludge from:

TEVA Pharmaceuticals USA in Mexico, Missouri - SIC Group 283: Drugs

with the following special conditions:

TEVA Requirements:

- (a) The permittee shall comply and/or require that sludge received from the TEVA Pharmaceuticals USA facility in Mexico, Missouri complies with the Water Protection Program's letter dated February 20, 2008 granting approval to land apply sludge generated during the manufacturing of antibiotics.
- (b) Antibiotic monitoring shall be conducted in accordance with test methods developed by TEVA Pharmaceuticals USA and approved by the Department of Natural Resources' Water Protection Program.
- (c) Copies of the approved test methods shall be placed in the operation and maintenance manual.
- (d) If additional antibiotics are to be produced that are not listed in Table A, the department shall be notified within 30 days of becoming aware of the production change. Notification shall include proposed monitoring test methods for the additional antibiotics for review and approval.
- (e) Sludge from the manufacture of antibiotics not listed in Table A shall not be land applied until the department is notified and a test method approved.
- (f) Industrial sludge received by the permittee from TEVA Pharmaceuticals USA shall be stabilized in the sludge storage basin(s) for a minimum of 14 days before land application. This will provide an additional margin of safety for the breakdown of any residual antibiotics present in the sludge.

Testing for Antibiotics, Methanol, Methylene Chlorine, Toluene, and Acetone shall only be conducted when the facility is land applying sludges from TEVA Pharmaceuticals USA facility in Mexico, Missouri, which have been stored for less than four weeks in the storage basin(s). If testing is not required, please report "Not Required" for those parameters on the Discharge Monitoring Report.

4.20 None used

4.31 Form F

4.32 No hazardous wastes in the material to be land applied.

4.40 A. NO Pollutants listed in 40 CFR 268.40 believed to be present in detectable concentrations.

B. NO Pollutants listed in 10 CSR 20-7.031 believed to be present in detectable concentrations.

C. NO Pollutants listed in EPA Process Design Manual for Land Treatment of Municipal Wastewater publication EPA-625/1-81-013, Table 4-5 and Table 4-16 believed present in detectable concentrations.

4.50 Environmental Assessment: No pollutants detected exceed the criteria in section 4.40

5.00 SOIL TESTING RESULTS

All soils have been tested according to DMR. Refer to latest submitted DMR with any questions.

6.00 LAND LIMITING CONSTITUENTS FOR LAND APPLICATION

All biosolids that we currently receive, and plan to receive in the future, have been tested according to our current permit. Refer to previous DMR with any questions.

Missouri Biosolids LLC currently has another state operating permit, MO-0131342. Both our facilities are operated in similar fashion and we feel the Home Place permit, that was renewed October 23, 2012, is doing a great job of protecting water quality. As we move forward, our goal is to word both our permits very close to the same with regards to reporting frequencies and testing that is required, specifically Effluent Limitations and Monitoring Requirements. This would create a situation easier to manage for Missouri Biosolids LLC and for the MO Department of Natural Resources.

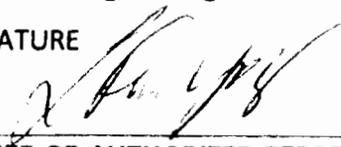
7.00 CERTIFICATION

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED IN THIS APPLICATION AND ALL ATTACHMENTS AND THAT BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THIS INFORMATION, I BELIEVE THAT THE INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE OR IMPRISONMENT.

CONSULTING ENGINEER—Name, Official Title and Engineering Firm PHONE NUMBER

L. Frank Young, P.E. Agricultural Engineering Associates (620) 756-1000

SIGNATURE



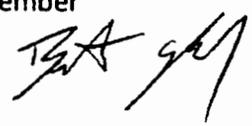
DATE SIGNED

2-21-2014

OWNER OR AUTHORIZED REPRESENTATIVE—Name and Official Title PHONE NUMBER

Brett Shryock, Member (573) 219-6583

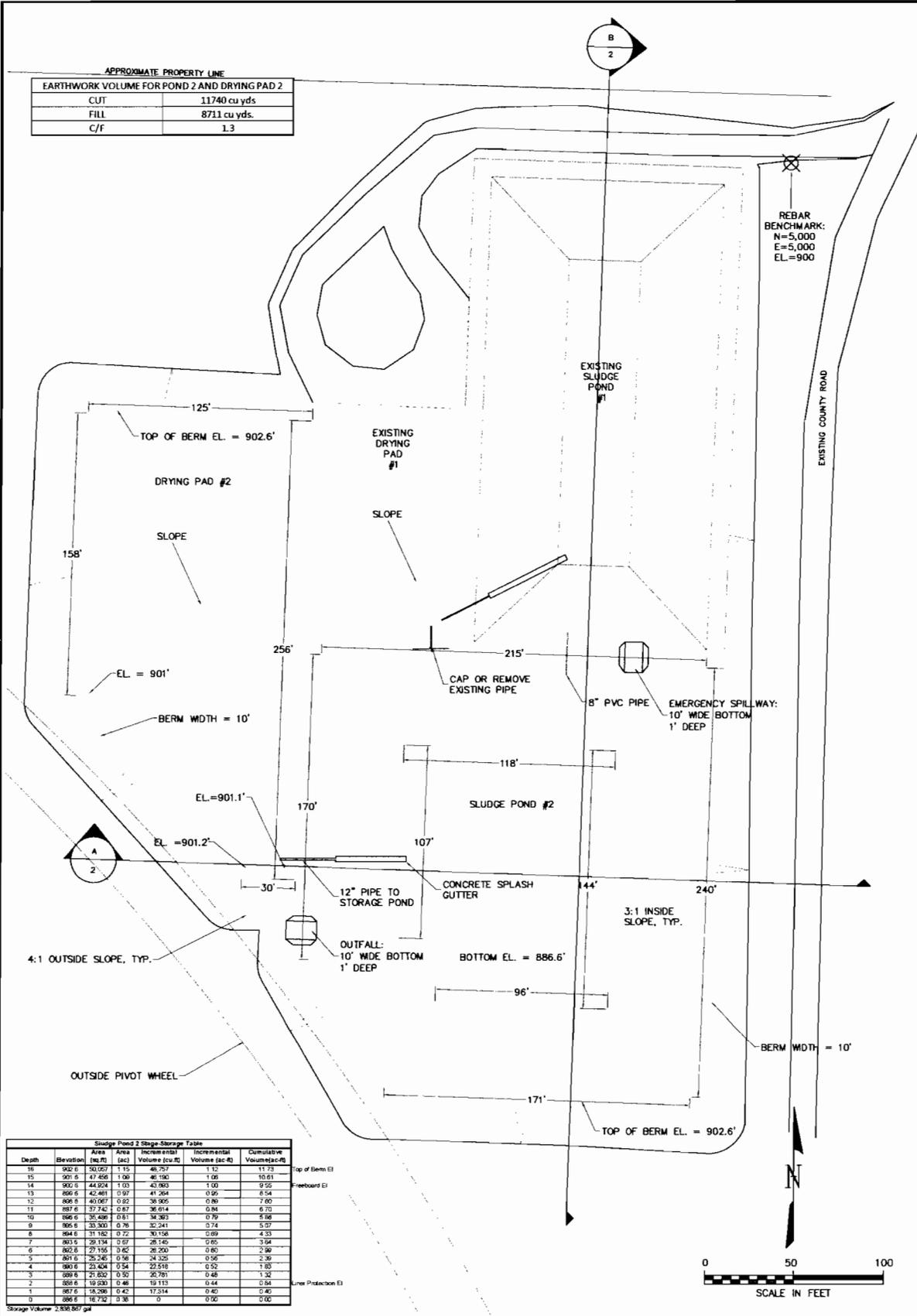
SIGNATURE



2-21-2014 DATE SIGNED

APPROXIMATE PROPERTY LINE

EARTHWORK VOLUME FOR POND 2 AND DRYING PAD 2	
CUT	11740 cu yds
FILL	8711 cu yds.
C/F	1.3



Sludge Pond 2 Storage Table

Depth	Elevation	Area (sq ft)	Area (ac)	Incremental Volume (cu ft)	Incremental Volume (ac-ft)	Cumulative Volume (cu ft)	Cumulative Volume (ac-ft)
16	902.0	50,057	1.15	48,757	1.12	11,73	Top of Berm El
15	901.5	47,846	1.08	48,130	1.08	10,63	
14	901.0	44,824	1.03	43,893	1.00	9,55	Freeboard El
13	899.5	42,461	0.97	41,264	0.95	8,54	
12	898.0	40,067	0.92	38,905	0.89	7,65	
11	897.0	37,742	0.87	36,914	0.84	6,79	
10	896.0	35,496	0.81	34,393	0.79	5,98	
9	895.0	33,333	0.76	32,241	0.74	5,27	
8	894.0	31,162	0.72	30,158	0.69	4,57	
7	893.0	29,114	0.67	28,140	0.65	3,84	
6	892.0	27,155	0.62	26,200	0.60	3,09	
5	891.0	25,245	0.58	24,325	0.56	2,36	
4	890.0	23,404	0.54	22,510	0.52	1,63	
3	889.0	21,632	0.50	20,761	0.48	0,92	
2	888.0	19,930	0.46	19,113	0.44	0,24	Lower Production El
1	887.0	18,298	0.42	17,514	0.40	0,40	
0	886.0	16,732	0.38	0	0,00	0,00	

Storage Volume: 2,530,807 gal



MISSOURI BIOSOLIDS
2927 COUNTY ROAD 253
COLUMBIA, MO 65202

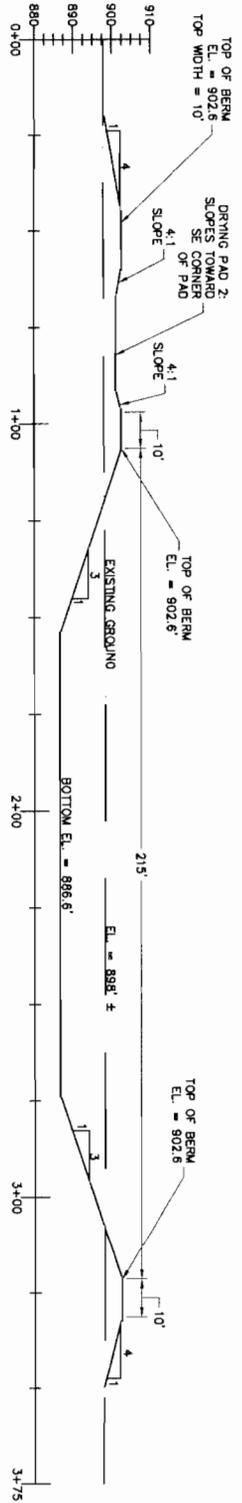
ENGINEER LFY
DATE 1/29/2014
DRWN BY KRN
CHK'D BY LFY
DATE 1/29/2014

SLUDGE POND 2
& DRYING PAD 2

REV#	DATE	DESCRIPTION

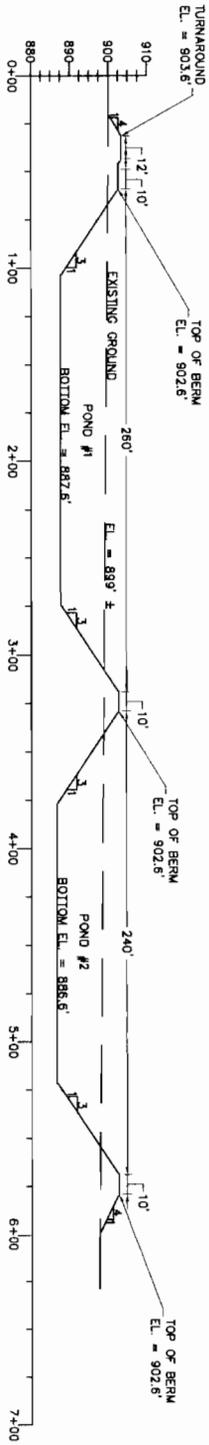
PROJECT NO.
3958
DRAWING NO.
1
Rev. # Date

ELEVATION



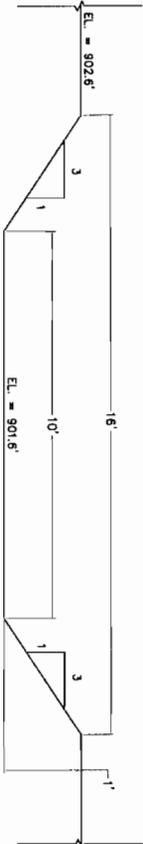
SECTION A
 DRYING PAD 2 & SLUDGE POND 2
 SCALE: 1" = 30'

ELEVATION



SECTION B
 SLUDGE POND 1 AND SLUDGE POND 2
 HORIZONTAL SCALE: 1" = 60'
 VERTICAL SCALE: 1" = 30'

DETAIL 1
 EMERGENCY SPILLWAY AND OUTFALL
 SCALE: 1" = 3'



REV	DATE	DESCRIPTION



MISSOURI BIOSOLIDS L.L.C.
 2827 COUNTY ROAD 253
 COLUMBIA, MO 65202

SECTIONS
 A & B
 AND
 EMERGENCY
 SPILLWAY DETAIL

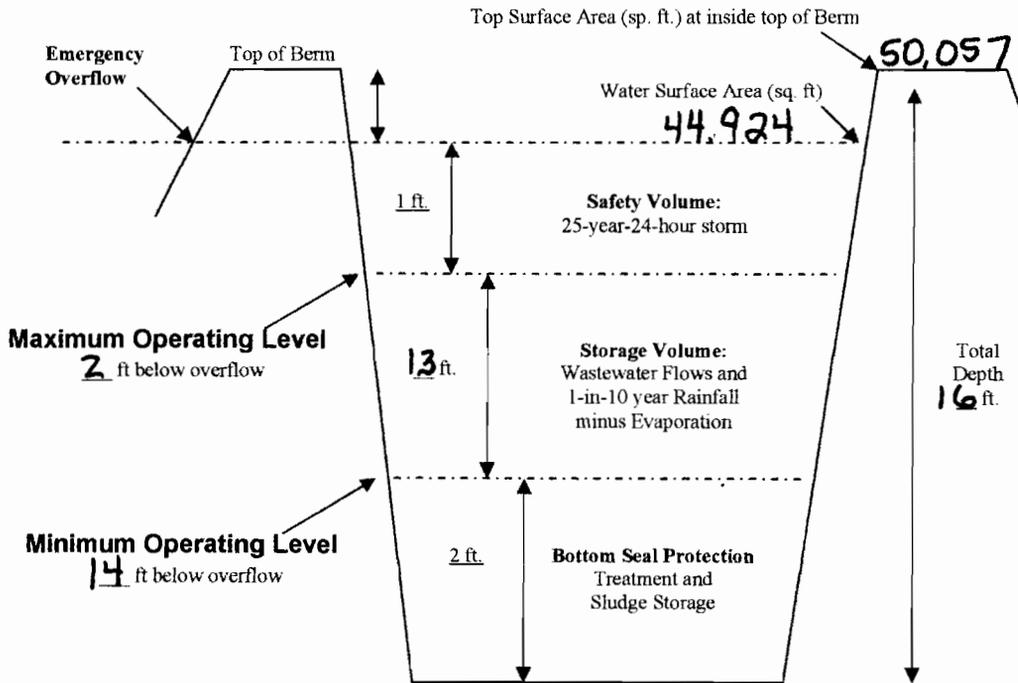
ENGINEER: LFY
 DATE: 1/30/2014
 DRAWN BY: KRN
 CHECK BY: LFY
 DATE: 1/30/2014

PROJECT NO.
3958
 DRAWING NO.
2
 Rev. # Date

ATTACHMENT A

(To be included with Form I and Form R)

**Lagoon or Storage Basin
PROFILE SKETCH**



DEFINITION OF TERMS (REFER TO THE PROFILE SKETCH ABOVE).

- a. Freeboard is depth from top of berm to emergency spillway (minimum 1 foot);
- b. Safety Volume is depth for 25-year, 24-hour storm (minimum of 1 foot);
- c. Maximum Operating Level is at bottom of the safety volume (minimum of 2 feet below top of berm).
- d. Minimum Operating Level is 2 feet above bottom of lagoon for seal protection per 10 CSR 20-8.
The minimum operating level may be greater than 2 feet when additional treatment volume is included.
- e. Storage Volume and days storage are based on the volume between Minimum and Maximum Operating Levels.
- f. Total Depth is from top of berm to bottom of basin including freeboard.

Geologic Investigation for Missouri Biosolids, LLC

January 31, 2014

Table of Contents

Project Description	1
In-Situ Soil Liner Analysis	1
Appendix	
Boring Location Map	2
Boring Log	3
Permeability Test Sheets	4

Project Description

The site of this investigation is located in the NE ¼ NE ¼ of Section 19, Township 49 North, Range 10 West, Callaway County, MO. The proposed action entails building a sludge pond with a soil liner. Samples were taken in July 2008 from an area adjacent to the lagoon site. Further sampling will be taken from constructed bottom of cell for as-built perms.

The soil investigation consisted of collecting in-situ soil, laboratory soils analysis, and data analysis.

In Situ Soil Liner Analysis

Two permeability tests were completed for Missouri Biosolids, LLC. The soil is described as a brown clay (CL) changing to a gray clay (CL) at deeper depths. Shelby tube samples were collected in accordance with ASTM D-1587 from the two different colored clays and preserved in accordance with ASTM D-4220. Permeability testing methods followed ASTM D-5084.

The permeability coefficients yielded were: 1.50×10^{-7} cm/s from the brown clay at a sample depth below grade of 7.0 to 8.0 feet and 2.31×10^{-8} cm/s from the gray clay at a sample depth of 9.5 to 11.0 feet below grade. Because the bottom of the proposed lagoon extends to a depth of 12.4 feet below grade, the lower permeability of 2.31×10^{-8} cm/s was used to calculate the daily seepage rate. For more details, see the attached permeability test sheets.

Utilizing the permeability coefficient at 11.0 feet below grade, assuming a 14' water depth at freeboard and a 1' soil liner thickness, the seepage rate yielded is: 0.012 in/day. This seepage rate is less than the maximum allowable seepage rate of 0.02 in/day for a soil liner. This calculation is shown below.

$$S = (K \times (D+d)) / d$$

$$S = \text{Seepage Rate (in/day)}$$

$$K = \text{Permeability coefficient (in/day)} = 2.31 \times 10^{-8} \text{ cm/s} = 7.86 \times 10^{-4} \text{ in/day}$$

$$D = \text{Water depth of pond (ft)} = 14 \text{ ft}$$

$$d = \text{Liner thickness (ft)} = 1 \text{ ft}$$

$$S = (7.86 \times 10^{-4} \text{ in/day} \times (14\text{ft} + 1\text{ft})) / 1\text{ft} = 0.012 \text{ in/day}$$

The assumed soil liner thickness of 1' is based on the equation given in Missouri CSR 20-8.200(6)(C)1. This calculation is shown below.

$$t = (H \times K) / 5.4 \times 10^{-7} \text{ cm/s} = (H \times K) / 1.53 \times 10^{-3} \text{ ft/d}$$

$$t = \text{thickness of the soil seal}$$

$$H = \text{the head of water in the lagoon} = 14 \text{ ft}$$

$$K = \text{permeability coefficient of the soil in question} = 2.31 \times 10^{-8} \text{ cm/s} = 6.55 \times 10^{-5} \text{ ft/d}$$

$$t = (14 \text{ ft} \times 6.55 \times 10^{-5} \text{ ft/d}) / 1.53 \times 10^{-3} \text{ ft/d} = 0.60 \text{ ft} = 7.2 \text{ in}$$

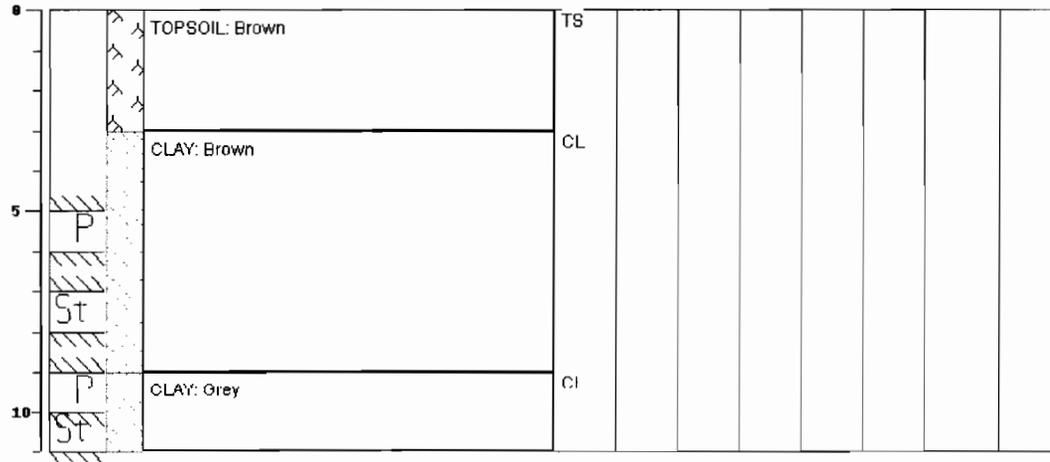
A liner thickness of 1 foot is assumed due to the equation yielding a value less than 12 inches.



Agricultural Engineering Associates
1000 Promontory Dr., Uniontown KS 66779 Phone: 620-756-1000

Project Shryock Sludge Pond NE 1/4 NE 1/4 S19 T49N R10W Callaway County, MO		Date: 7/15/08	Drilling Information Backhoe			Hole No. 1
LL - Liquid Limit		PL - Plastic Limit		PI - Plastic Index		Elevation 899.7
Sv - Sieve		PE-Permeability(cm/sec)		M% - Percent Moisture		Water Level
GROUP SYMBOL: Cs=Composite St=Shelby Tube Gr=Grabs P=Proctor Sample						Water = ∞

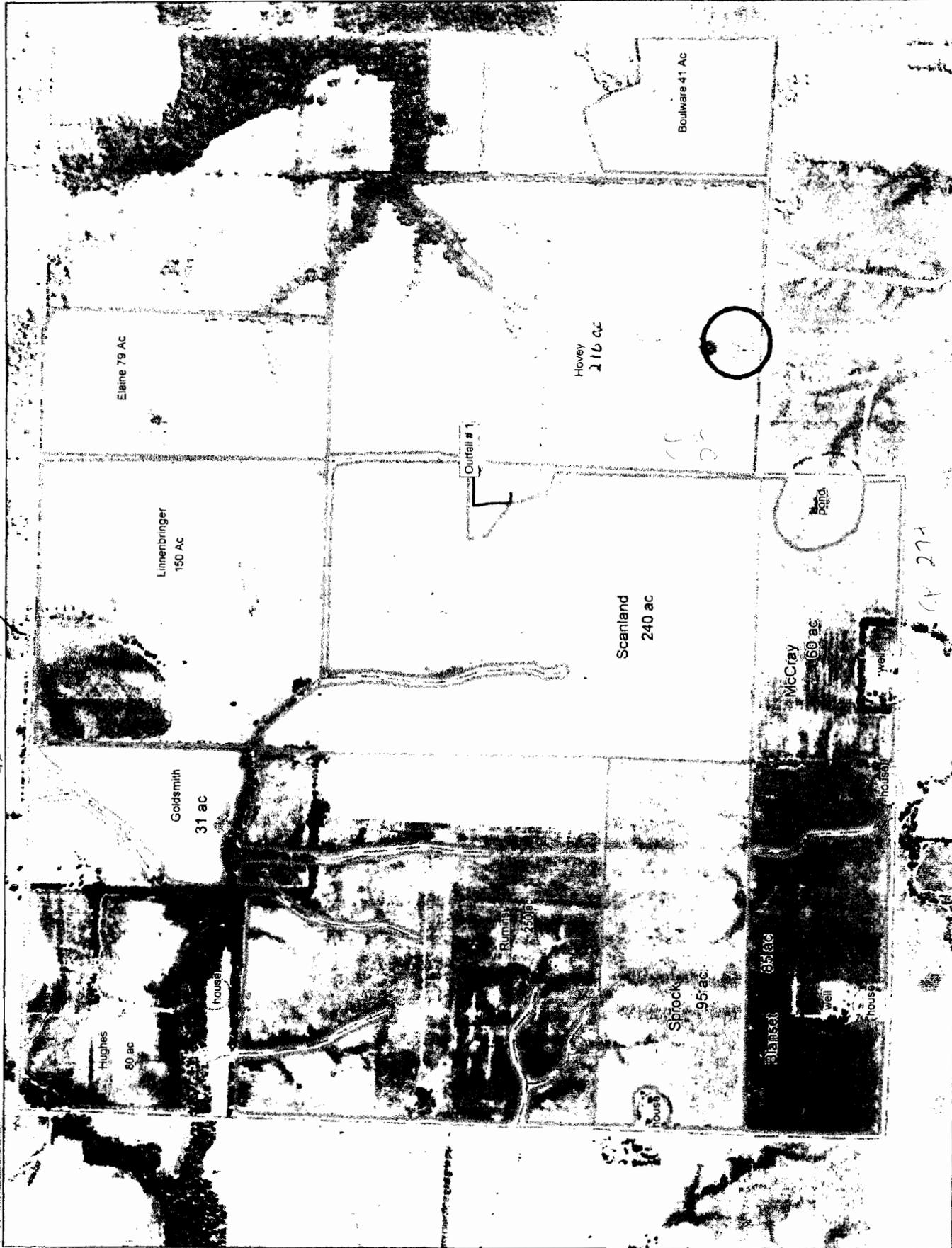
Depth	Group Symbol	Description of Material	USCS Class	Sample No.	LL	PL	PI	Sv	PE	M%
-------	--------------	-------------------------	------------	------------	----	----	----	----	----	----



PERMEABILITY TEST REPORT								
PROJECT DATA								
PROJECT NAME: Shryock				SITE LOCATION				
PROJECT NO: 3342				LEGAL: NE 1/4 NE 1/4 S 19 T 49N R 10W				
OWNER: Missouri Biosolids, LLC				COUNTY: Callaway		STATE: MO		
SAMPLE DATA								
Visual Description	brown clay			Percent Compaction	NA			
Sample Type	Shelby Tube			Liner Thickness	NA			
Sample Location	7' - 8' lagoon			Sampling Date				
PERMEABILITY TEST SPECIMEN DATA								
Specimen Parameters	Before Test	After Test	Specimen Parameters	Before Test	After Test	Note:		
Wt of compacted soil (g)	585.14	591.95	Specimen length (in)	2.84	2.84			
Tare can number	055	028	Specimen diameter (in)	2.86	2.85			
Wt of tare can (g)	55.05	54.35	Specimen volume (cm ³)	298.97	296.88			
Wt of wet sample + TC (g)	278.02	231.21	Dry density (g/cm ³)	1.58	1.60			
Wt of dry sample + TC (g)	235.61	196.56	Specific gravity (g/cm ³)	2.68	2.68			
Wt of water (g)	42.41	34.65	Void ratio	0.691	0.679			
Wt. of dry sample (g)	180.56	142.21	Porosity (0-1.0)	0.409	0.404			
Water content (%)	23.49	24.37	Saturation (%)	91.11	96.15			
FALLING HEAD PERMEABILITY TEST DATA								
Elapse time (sec.)	Gauge Pressure (psi)			Hydraulic Gradient	Burette Reading (cc)		Test Temp. (°C)	Permeability K ₂₀ (cm/sec)
	Cell	In (P _i)	Out (P _o)		In (V _i)	Out (V _o)		
0	75.1	70.2	68.1	20	23.2	1.9	20	//
14484	75.0	70.0	67.8	21	19.2	5.75	20	3.59e-07
66964	75.1	70.0	67.8	21	8.2	16.3	20	1.86e-07
77049	75.1	70.1	67.9	21	6.3	18.1	20	2.53e-08
91288	75.1	70.0	67.9	20	3.7	20.6	20	2.92e-08
Average	75.08	70.06	67.9	21			20	1.50e-07
Test Cell No.:		J		Start Test Date:		July 21, 2008		
Saturation Pressure (psi):				End Test Date:		July 22, 2008		
PERMEABILITY, DENSITY AND MOISTURE PARAMETERS								
K ₂₀ (cm/sec.)	K ₂₀ (in/day)		Dry Density (lbs/ft ³)		Moisture Content (dry wt. Basis)(%)			
1.50e-07	5.09e-03		98.95		23.49			
Agricultural Engineering Associates 1000 Promontory Drive, P O Box 4 Uniontown, KS 66779 Phone: (620) 756-1000 Fax: (620) 756-4600				Tested By:		Kara Niemeir		
				Checked By:				
				Test Date:		7/22/08		
				File No.:				

PERMEABILITY TEST REPORT								
PROJECT DATA								
PROJECT NAME: Shryock				SITE LOCATION				
PROJECT NO: 3342				LEGAL: NE 1/4 NE 1/4 S19 T49N R10W				
OWNER: Missouri Biosolids, LLC				COUNTY: Callaway		STATE: MO		
SAMPLE DATA								
Visual Description	grey clay			Percent Compaction	NA			
Sample Type	Shelby Tube			Liner Thickness	NA			
Sample Location	9.5'-11' lagoon			Sampling Date	NA			
PERMEABILITY TEST SPECIMEN DATA								
Specimen Parameters	Before Test	After Test	Specimen Parameters	Before Test	After Test	Note:		
Wt of compacted soil (g)	746.17	755.24	Specimen length (in)	3.46	3.45			
Tare can number	055	019	Specimen diameter (in)	2.87	2.88			
Wt of tare can (g)	55.06	54.33	Specimen volume (cm ³)	365.09	368.39			
Wt of wet sample + TC (g)	149.63	265.83	Dry density (g/cm ³)	1.68	1.67			
Wt of dry sample + TC (g)	132.96	228.14	Specific gravity (g/cm ³)	2.68	2.68			
Wt of water (g)	16.67	37.69	Void ratio	0.592	0.606			
Wt. of dry sample (g)	77.90	173.81	Porosity (0-1.0)	0.372	0.377			
Water content (%)	21.40	21.68	Saturation (%)	96.89	95.86			
FALLING HEAD PERMEABILITY TEST DATA								
Elapse time (sec.)	Gauge Pressure (psi)			Hydraulic Gradient	Burette Reading (cc)		Test Temp. (°C)	Permeability K ₂₀ (cm/sec)
	Cell	In (P _i)	Out (P _o)		In (V _i)	Out (V _o)		
0	75.1	70.1	68.0	17	23.2	0.9	20	
36610	75.1	70.1	68.0	17	23.0	1.0	20	7.05e-09
36610	75.0	69.9	67.7	18	19.0	1.2	20	9.41e-08
36610	75.1	70.0	67.7	18	18.8	1.35	20	7.30e-09
36610	74.9	69.9	67.6	18	18.7	1.5	20	5.07e-09
36610	74.9	69.7	67.5	18	18.9	1.8	20	2.08e-09
Average	75.04	70	67.8	18			20	2.31e-08
Test Cell No.:		A		Start Test Date:		July 29, 2008		
Saturation Pressure (psi):				End Test Date:		August 11, 2008		
PERMEABILITY, DENSITY AND MOISTURE PARAMETERS								
K ₂₀ (cm/sec.)	K ₂₀ (in/day)		Dry Density (lbs/ft ³)		Moisture Content (dry wt. Basis)(%)			
2.31e-08	7.85e-04		105.10		21.40			
Agricultural Engineering Associates 1000 Promontory Drive, P O Box 4 Uniontown, KS 66779 Phone: (620) 756-1000 Fax: (620) 756-4600				Tested By:		Kara Niemeir		
				Checked By:				
				Test Date:		7/28/08		
				File No.:				

Missouri Biosolids Facility





Missouri Department Of Natural Resources

Division of Geology and Land Survey
P.O. Box 250
Rolla, Missouri 65402-0250
Phone - 573.368.2161 Fax - 573.368.2111
E-mail - gspgeol@dnr.mo.gov

Project ID Number

LWE14053

County

CALLAWAY

Geohydrologic Evaluation of Liquid-Waste Treatment Site

Project Missouri Biosolids, LLC Quadrangle HATTON
Location NE1/4,SE1/4,NE1/4 Section 19 Township 49 N Range 10 W
Additional Location Information
Latitude 39 Deg 0 Min 55 Sec Longitude 92 Deg 4 Min 20 Sec

Owner Missouri Biosolids, LLC (573) 219-6583
2927 County Rd 253 Columbia MO 65202

Requestor Missouri Biosolids, LLC (573) 219-6583
2927 County Rd 253 Columbia MO 65202



1-27-2014

Previous Report Not Applicable
Date 05/02/2007
Identification Number 21907
Fiscal Year 14

Facility Type

- Mechanical treatment plant
Recirculating filter bed
Earthen lagoon with discharge
Earthen holding basin
Land application
Other type of facility

Type of Waste

- Animal
Human
Process or industrial
Leachate
Other waste type

Funding Source

- PPG
WWLF-SRF
Non-Point Source

Other Information

- Plans were submitted
Site was investigated by NRCS
Soil or geotechnical data were submitted

Date of Field Visit 01/14/2014

Stream Classification Gaining Losing No discharge

Overall Geologic Limitations

- Slight
Moderate
Severe

Collapse Potential

- Not applicable
Slight
Moderate
Severe

Topography

- < 4%
4% to 8%
8% to 15%
> 15%

Landscape Position

- Broad uplands
Floodplain
Ridgetop
Alluvial plain
Hillslope
Terrace
Narrow ravine
Sinkhole

Bedrock The uppermost bedrock at the site is low permeability, Pennsylvanian-age Cherokee and Marmaton Groups consisting of limestones, shales and sandstones.

Surficial Materials Surficial materials consist of approximately 50 feet of low to moderately permeable clayey glacial drift overlain by approximately 10 feet of low to moderately permeable silty-clay loess.

Recommended Construction Procedures

- Installation of clay pad
- Diversion of subsurface flow
- Rock excavation
- Compaction
- Artificial sealing
- Limit excavation depth

Required Geologic Exploration

(Missouri Clean Water Commission - 10 CSR 20 - 8.200 Wastewater Treatment Ponds)

Determine Overburden Properties

- Particle size analysis
- Standard Proctor density
- Permeability coefficient for undisturbed sample
- Atterburg limits
- Overburden thickness
- Permeability coefficient for remolded sample

Determine Hydrologic Conditions

- Groundwater elevation
- Direction of groundwater flow
- 25-year flood level
- 100-year flood level

Notify Geologist

- Before exploration
- During construction
- After construction
- Not necessary

Remarks

On January 14, 2014, a geohydrologic evaluation was conducted by the Missouri Geological Survey (MGS) for a proposed earthen holding basin and a 1,327 acre land application area for Missouri Biosolids, LLC in Callaway County, MO. This site had previously been evaluated in May of 2007 for an approximately 600 acre land application area and earthen storage basin.

The existing earthen holding basin is located west of and adjacent to County Road 285 approximately 2.5 miles southwest of Hatton, MO. The proposed earthen holding basin is located south of and adjacent to the existing earthen holding basin. The proposed land application area is south of and adjacent to MO Hwy E, bounded by County Road 274 to the south, MO Hwy P to the west and County Road 283 to the east. The existing earthen holding basin appears to be holding with no leaks in the berms observed.

No bedrock was observed onsite. However, a review of geologic maps, the previous May 2007 Geohydrologic Evaluation report of the site, and surficial materials observed indicate the uppermost bedrock as low permeability Pennsylvanian-age Cherokee and Marmaton Groups consisting of limestones, shales and sandstones. Surficial materials consist of approximately 55 feet of low to moderately permeable clayey glacial drift overlain by approximately 10 feet of low to moderately permeable silty-clay loess.

Any runoff from the western half of the proposed land application area will migrate west into one of several tributaries of Renfro Creek. Any runoff from the eastern half of the proposed land application area will migrate south into one of several tributaries of Fourmile Branch or Auxvasse Lick Branch. The site is in a gaining setting.

There are no known sinkholes, springs, losing streams, geologic structures or underground mines within 5.0 miles of the site. There are several private water wells and residential structures within the proposed land application area. The nearest public water supply well is located approximately 1.0 mile north of the site.

If the systems proposed were to function improperly, local groundwater could be adversely impacted as well as the surface waters of the unnamed tributaries of Renfro Creek, Renfro Creek, the unnamed tributaries of Fourmile Branch, Fourmile Branch, the unnamed tributaries of Auxvasse Lick Branch and Auxvasse Lick Branch.

There appears to be sufficient clay-rich materials on-site for adequate holding basin construction. However, coarser materials (sand, gravel, cobbles, etc.) may need to be separated from the clay rich materials, or over-excavation of any sandy or gravelly lenses encountered is highly recommended.

Based on geologic and hydrologic characteristics observed, the site receives a slight geologic limitations rating and a slight collapse potential rating.

To ensure the effectiveness of a wastewater treatment system which relies on land application and natural soils as a part of the wastewater treatment process, a performance monitoring requirement may be implemented. This requirement may include the design and implementation of a groundwater monitoring program and/or an engineered nutrient management plan which demonstrates compliance with the department's treatment standards. Please contact the MDNR Water Protection Program at 573-751-1300 for further information, or the local MDNR regional office. The location, phone number and address of the departments regional offices can be found on the departments web site at <http://www.dnr.mo.gov/regions/regions.htm>.

This document is a preliminary report. It is not a permit. Additional data may be required by the Department of Natural Resources prior to the issuance of a permit. This report is valid only at the above location and becomes invalid one year after the report date below.

2/1/2014

Operation & Maintenance Plan

We are currently receiving biosolids from Columbia WWTF and several other smaller WWTF in our area, as well as industrial biosolids from Teva Pharmaceuticals, Tyson foods, Triumph foods, Unilever & Darling as well as septage from local haulers. The biosolids are hauled in tanker trucks and dumped into our DNR permitted facility for temporary storage. While in storage the biosolids are mixed and tested in accordance with the 503 regulations. When field conditions are right the biosolids are land applied. We feel subsurface injection is the best method of land application, it minimizes odor and more importantly reduces the risk of nutrient loss. We subsurface apply the biosolids at agronomic rates based on our Nutrient Management Plan, Biosolids and Soil test results. This saves us the fertilizer value and provides local treatment plants with a safe and reliable way of biosolids disposal.

Biosolids Liquid Receiving

The tractor trailer trucks full of biosolids will pull into the drive located to the north of the lagoon and stop with the discharge valve on the tanker in close proximity to the dump station. The roadway is slightly higher under the tires on the tractor which allows for the tanker to have a downward slope to the rear discharge point on the tanker this allows for faster cleanout of the trucks. The driver will attach a 6'' hose to the discharge port on the tanker. The other end of the hose is attached to the intake side of the bar screen at the dump station. After ensuring that he has a good connection with the hose the driver will open the valve and dump the biosolids from the truck. The said biosolids will run into the dump pit and be filtered thru the bar screen. Once the biosolids are filtered they are discharged from the dump station and flow down the concrete ramp into the lagoon. After the truck is completely empty the driver will close the valve on the tanker and disconnect the hose from the discharge point. The driver will then ensure that the hose contains no biosolids by lifting the open end higher than the pit end to drain the biosolids from the hose. Before the driver leaves he will take a rake and clean the bar screen of debris, putting screenings into a dumpster to be hauled to the landfill.

Biosolids Dry Receiving

The tractor trailer trucks full of biosolids will pull into the drive located to the north of the lagoon and stop in a place where they can back onto the dry storage pad. They will then back their trucks onto the pad and dump the load in a pile. Once their truck is empty the drivers will check to ensure that all biosolids are removed from the tires on the truck and anywhere else on the truck before leaving the site.

Storage of Biosolids

Storage of the biosolids will consist of daily checks of the facility to ensure that no biosolids are in danger of being discharged from the facility. The entire facility will be checked visually and anything that looks abnormal will be address on a case by case basis.

Nutrient Management Plan

12/01/10

Prior to land application, the soil is tested for nutrient levels. The sludge is also tested for several things including Nitrogen and Phosphorus. These levels are constantly changing. This is an EXAMPLE of the sludge analyses and the rate applied.

Previous Crop: Soybeans
Proposed Crop: Corn

sludge = 3.4% solids

$$\frac{2000 \text{ lb}}{3.4} = 588.23 \times 100 = 58,823 \text{ lbs sludge} = 1 \text{ dry ton}$$

Nitrogen: 62 LBS PAN/ton dry material

Corn yield goal = 200 bu/acre
Crop needs 186 lbs/acre PAN to produce goal.
Apply 3 dry ton of sludge/acre.

$$3 \text{ dry ton} = 176,470 \text{ lbs sludge}$$
$$\frac{176,470}{8.34 \text{ lbs/gal}} = 21,159 \text{ gal/acre to deliver nitrogen requirement}$$

$$\frac{2,295,013 \text{ gallons}}{21,159 \text{ gal/acre}} = 108.46 \text{ acres needed to empty basin.}$$

Phosphorous: Do not apply biosolids to soil that contains more than 800 lbs/acre of available phosphorus.

$$55 \text{ lbs P1/ton dry material}$$
$$55 \times 2.27 = 124.85 \text{ lbs P205/ton}$$
$$124.85 \times 3 \text{ ton/acre} = 374.55 \text{ lbs P205/acre}$$

200 bu Corn requires 86 lbs P205
No additional P205 is needed

With the number of acres available, I expect each field will receive biosolids every third to fourth year.

Land Application of Liquid Biosolids

The equipment will include:

- Several Farm Tractors
- Four Lagoon Pumps
- Four High Pressure Pump
- Two Miles of Manure Drag Line Hose with reel
- Two Farm Star Sludge Injection Toolbar with Flow Meter
- Farm Tractor Equipped with GPS to pull tool bar.
- Mudcat dredge with floating hose
- Honey wagon w/toolbar
- Industrial Air Compressor

The lagoon will be mixed with lagoon pump agitators to ensure that the biosolids are as consistent as possible. The pumps are about 50ft long and are powered by farm tractors. One of the pumps is a houle lagoon pump and serves two purposes. Once the lagoon is mixed, a hose is attached to the discharge port on the houle pump and connected to the intake side of the high pressure pump. The high pressure pump feeds the sludge thru the manure drag line hose. The manure drag line hose is attached to the farm star injection toolbar. The toolbar is pulled back and forth by a farm tractor applying the biosolids at agronomic rates. When applying the biosolids it takes three men. One is at the lagoon, operating the pumps, a second man is on a four wheeler monitoring the manure drag line hose, and the third man is operating the tractor and toolbar. The man on the four wheeler samples the biosolids every hour for % solids. Using this information, as well as the analytical nutrient data the operator of the tractor and tool bar can accurately apply the biosolids. Once land application is complete, the hose is disconnected from the riser. A foam pig is inserted into the manure dragline hose and is blown thru the line with a high volume air compressor. By doing this it pushes the remaining biosolids that are still in the line through tool bar continuing subsurface injection until all sludge is removed from hoses. After the hose is clean it is spooled up on the hose reel. Using the umbilical hose system is a safe and efficient way of biosolids land application.

Land Application of Dry Biosolids

The equipment will include:

Front End Loader
Two Knight Pro Twin Manure Spreader
Disk
Farm Tractor Equipped with GPS to pull spreader
Farm tractor to pull Disk

Using the front end loader the biosolids will be transferred from the dry storage pad to the Knight spreader. The operator will spread the biosolids at agronomic rates based on our nutrient management plan.

Biosolids Sample Collection and Testing

% Solids:

Percent solids should be tested as often as possible. Take a clean bottle and collect a sample at the wet well. Use the IR-35 solids tester that is owned by Missouri Biosolids to test a two gram sample of the sludge. Record the result along with the Date and Time, and the field ID on the % solids sheet. This should be done once per hour, but twice a day at a minimum.

PAN Testing:

Plant Available Nitrogen should be tested Once for every 100 Dry tons of Biosolids that are land applied. Or any time that you feel the level of N in the sludge might have changed. The sample should be taking at the wet well in a clean bottle and delivered straight to a lab for analysis.

503 Testing

The Biosolids should be tested quarterly when land application occurs. A sample should be taken at the wet well in clean bottles and delivered to the Lab for testing.

Industrial Sludge Testing

The sludge should be tested quarterly according to the permit.

Sampling for the north lagoon needs be done quarterly (if land applying) and taken while land application is in progress.

Land Application Equipment

Land application equipment should be visually inspected daily. It should be run thru the shop once per month to be serviced and repaired. If at anytime during land application a machine is found to have a problem that could effect the quality of

land application of the Biosolids the machine should be shut down and taken out of service until the repairs can be completed. A shop repair invoice should be completed for each machine that gets worked on stating the problem and the parts needed to correct the problem. A copy of the repair invoice should be put in the O & M Manual.

Lagoon Structure and Land Application Pipelines

The Lagoons should be checked daily. Included on this manual is a Lagoon Checklist, as well as a Bar Screen Checklist with are good references to use when checking lagoons. The Irrigation pipelines should be checked daily during land application. If any leaks are detected land application should stop until the problem is fixed. If a line repair is needed it should be recorded with GPS and included in the operations manual.

Insuring Separation Distances

A list of the required separation distances is taped up on the window inside the sludge application tractor. The tractor also has a GPS unit with the field boundaries and the legal sludge boundaries installed on it. Each time a new field is used to land apply biosolids, the separation distances should be reviewed. It is also a good idea to walk the field to insure that the buffer zones are accurate and maintained.

Employee Training

At a minimum of once per year we will have an employee training day. This will include everything mentioned in the operations and O&M manual, as well as a facility walk around. Each time a new employee is hired they will be given training before they are allowed to work with the Biosolids.

Procedure to avoid application if there is a weather forecast for significant precipitation within 24 hours.

Each morning that land application is expected, the weather forecast will be monitored to ensure that a large rainfall event is not coming. If a large rain is forecasted land application will stop.

Number of Days suitable for field work

According to the University of Missouri's 29 year data. There is 171 days average suitable for field work in Central Missouri. We use the drag hose system to land apply our biosolids. We can pump 1,000 gallons per minute and we generally work about 12 hrs per

day when daylight permits. We can land apply all the biosolids that we receive in about 30 days. We have 7 employees.

Approved Antibiotic Testing Methods

Samples our pulled quarterly from the lagoon that is receiving sludge from Teva Pharmaceuticals. The samples our collected in a clean bottle and taken to Teva for testing of Antibiotic residuals according to our permit.

List of approved industry groups

2000 Food and Kindred Products
283 Drugs

Specific Industries Contact Information

Teva Pharmaceuticals
Andy Fecht 573-582-6221

Dawn Foods
John Wirts 573-230-8906

Coca Cola
Louis White 314-985-9937

Cargill Turkey Products
660-458-6537

Conagra Foods
660-359-3913

Nestle Purina Pet Care
314-982-1000

Triumph Foods
816-396-2700

Tyson Foods
660-826-9991



Water Analysis

Date: 16-Apr-13

To: Loren Hunt
 cc: T. Faulk E. Seals S. Bookout C. Garrick J. Faller
 Location: **Unilever / Jefferson City, MO**

Sample	Sample Description	Sample	Sample Description
1088	Sludge Sample		

Test Description	Sample Number							
	1088							
pH (pH Units)	7.04							
Total Solids (% weight)	5.76							
Volatile Solids (% weight)	65.98							
Ammonia Nitrogen	22.34							
Nitrate / Nitrite as Nitrogen	< 0.0625							
TKN	42297							
Phosphorus (P)	< 0.05							
Oil & Grease - HEM	1000.0							
Arsenic (As)	< 0.25							
Cadmium (Cd)	< 0.25							
Chromium (Cr)	< 0.25							
Copper (Cu)	1.87							
Lead (Pb)	< 0.25							
Molybdenum (Mo)	2.46							
Nickel (Ni)	< 0.25							
Report Prepared by: Technical Department	Results are expressed as ppm unless otherwise indicated							

Report Prepared by: *Keith [Signature]*

Approved by: *[Signature]*

The foregoing laboratory report is intended solely as the report of the results of the analytical laboratory procedures undertaken pursuant to the request for the laboratory work received. It is our intent to report the factual results and conclusions only. And no recommendation for action is intended or should be inferred. Our analysis warrants only that this report accurately reflects no other warranty or representation of any kind, express or implied concerning this report or the contents hereof, and no such warranty shall be implied by law.



Water Analysis

Date: 16-Apr-13

To: Loren Hunt
 cc: T. Faulk E. Seals S. Bookout C. Garrick J. Faller
 Location: Unilever / Jefferson City, MO

Sample	Sample Description	Sample	Sample Description
1088	Sludge Sample		

Test Description	Sample Number						
	1088						
Potassium (K)	128						
Selenium (Se)	< 0.25						
Mercury (Hg)	< 0.0008						
Zinc (Zn)	50.16						
Sodium (Na)	1615						
TCLP Metals							
TCLP Arsenic (As)	< 0.5						
TCLP Barium (Ba)	< 5						
TCLP Cadmium (Cd)	< 0.1						
TCLP Chromium (Cr)	< 0.5						
TCLP Selenium (Se)	< 0.1						
TCLP Silver (Ag)	< 0.5						
TCLP Mercury (Hg)	< 0.002						
TCLP Herbicides							
2,4,5-TP (Silvex)	< 0.5						
2,4-D	< 0.5						
Report Prepared by: Technical Department Results are expressed as ppm unless otherwise indicated							

Report Prepared by: *Keith [Signature]*

Approved by: *[Signature]*

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Water Analysis

Date: 16-Apr-13

To: Loren Hunt
 cc: T. Faulk E. Seals S. Bookout C. Garrick J. Faller
 Location: **Unilever / Jefferson City, MO**

Sample	Sample Description	Sample	Sample Description
1088	Sludge Sample		

Test Description	Sample Number						
	1088						
TCLP Pesticides							
Chlordane	< 0.01						
Endrin	< 0.01						
Heptachlor	< 0.005						
Heptachlor Epoxide	< 0.005						
Lindane	< 0.1						
Methoxychlor	< 1						
Toxaphene	< 0.1						
TCLP Semi-Volatiles							
2,4,5-Trichlorophenol	< 1						
2,4,6-Trichlorophenol	< 1						
2,4-Dinitrotoluene	< 0.05						
Hexachloro-1,3-Butadiene	< 0.1						
Hexachlorobenzene	< 0.05						
Hexachloroethane	< 0.5						
Report Prepared by: Technical Department	Results are expressed as ppm unless otherwise indicated						

Report Prepared by: *Keith Duffin*

Approved by: *[Signature]*

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Water Analysis

Date: 16-Apr-13

To: Loren Hunt
 cc: T. Faulk E. Seals S. Bookout C. Garrick J. Faller
 Location: **Unilever / Jefferson City, MO**

Sample	Sample Description	Sample	Sample Description
1088	Sludge Sample		

Test Description	Sample Number						
	1088						
TCLP Semi-Volatiles							
m-Cresol	< 1						
Nitrobenzene	< 1						
o-Cresol	< 1						
p-Cresol	< 1						
Pentachlorophenol	< 1						
Pyridine	< 2.5						
Total Cresols	< 1						
TCLP Volatiles							
1,1-Dichloroethylene	< 0.1						
1,2-Dichloroethane	< 0.1						
1,4-Dichlorobenzene	< 1						
Benzene	< 0.1						
Carbon Tetrachloride	< 0.1						
Chlorobenzene	< 10						
Report Prepared by: Technical Department	Results are expressed as ppm unless otherwise indicated						

Report Prepared by: *Keith DeFuria*

Approved by: *[Signature]*

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