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-0136034
Owner:	City of Columbia Water and Light
Address:	P.O. Box 6015, Columbia, MO 65206
Continuing Authority:	Same as above
Address:	Same as above
Facility Name:	City of Columbia Water Treatment Plant
Facility Address:	6851 West Route K, Columbia, MO 65203
Legal Description:	See page two
UTM Coordinates:	See page two
Receiving Stream:	Perche Creek (P) 1005
First Classified Stream and ID:	Perche Creek (P) 1005
USGS Basin & Sub-watershed No.:	10300102-0709

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

FACILITY DESCRIPTION

Drinking Water Treatment Plant – SIC #4941
This is a drinking water treatment plant that produces and distributes potable water to the City of Columbia, Missouri.

This permit authorizes only wastewater and stormwater 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 Sections 640.013, 621.250, and 644.051.6 of the Law.

February 1, 2017
Effective Date

Harry D. Bozoian, Director, Department of Natural Resources

September 30, 2019
Expiration Date

David J. Lamb, Acting Director, Water Protection Program

FACILITY DESCRIPTION (CONTINUED)

OUTFALL #001

No-discharge four-cell sludge storage lagoon, sludge is stored on site just north of the lagoons in a grassy area prior to land applied on property not owned or operated by the City of Columbia Water and Light. Water is decanted from the lagoons into a reclaim well and eventually back to the headworks of the water treatment plant. This is a no-discharge operation with 100% recycling of water.
Design lagoon capacity is 4.46 million gallons per day (MGD), based on 7.5% WTP flow to the sludge lagoons and a 10-year, 24-hour rainfall event of 4.5 inches onto a lagoon area of approximately 16.8 acres.
Actual flow is dependent upon precipitation.
Design sludge production is unknown.
Actual sludge production is dependent upon community water usage (~ 6890 dry tons/year).
Legal Description: SW¼, SE¼, Sec.01, T47N, R14W, Boone County
UTM Coordinates: X= 547959, Y= 4304715

OUTFALL #002

Stormwater from the northeastern sediment trap and spillway.
Design flow is 0.55 MGD, based on a 10-year, 24-hour rainfall event of 4.5 inches onto a sludge storage area of approximately 4.5 acres.
Actual flow is dependent upon precipitation.
Legal Description: NE¼, SE¼, Sec.01, T47N, R14W, Boone County
UTM Coordinates: X= 548281, Y= 4304918

OUTFALLS #003

Stormwater from the northeastern sediment trap and spillway.
Design flow is 0.55 MGD, based on a 10-year, 24-hour rainfall event of 4.5 inches onto a sludge storage area of approximately 4.5 acres.
Actual flow is dependent upon precipitation.
Legal Description: NE¼, SE¼, Sec.01, T47N, R14W, Boone County
UTM Coordinates: X= 548204, Y= 4304868

OUTFALL # 004

Stormwater from the northeastern sediment trap and spillway.
Design flow is 0.55 MGD, based on a 10-year, 24-hour rainfall event of 4.5 inches onto a sludge storage area of approximately 4.5 acres.
Actual flow is dependent upon precipitation.
Legal Description: SW¼, SE¼, Sec.01, T47N, R14W, Boone County
UTM Coordinates: X= 548000, Y= 4304725

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FOR WASTEWATER AND STORMWATER

OUTFALL #002, #003 & #004
stormwater outfalls from sludge storage area

TABLE A-1
FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective on **February 1, 2017** and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:

Effluent Parameters (Note 1)	Units	Final Effluent Limitations			Monitoring Requirements	
		Daily Maximum	Weekly Average	Monthly Average	Measurement Frequency	Sample Type
Physical						
Flow	MGD	*			once/quarter ◊	24 hr. estimate
Hardness	mg/L	*			once/quarter ◊	grab
Precipitation ***	Inches	*			once/quarter ◊	measured
Conventional						
Chemical Oxygen Demand	mg/L	**			once/quarter ◊	grab
Chlorine, Total Residual (Note 2)	µg/L	17 (130ML)			once/quarter ◊	grab
Cyanide, Amenable to Chlorine	µg/L	*			once/quarter ◊	grab
Oil & Grease	mg/L	10			once/quarter ◊	grab
pH ∞	SU	6.5 to 9.0			once/quarter ◊	grab
Settleable Solids	mL/L/hr	1.0			once/quarter ◊	grab
Total Suspended Solids	mg/L	**			once/quarter ◊	grab
Metals						
Aluminum, Total Recoverable	µg/L	750			once/quarter ◊	grab
Beryllium, Total Recoverable	µg/L	*			once/quarter ◊	grab
Cadmium, Total Recoverable	µg/L	*			once/quarter ◊	grab
Chromium (VI), Dissolved	µg/L	*			once/quarter ◊	grab
Copper, Total Recoverable	µg/L	*			once/quarter ◊	grab
Iron, Total Recoverable	µg/L	1,639			once/quarter ◊	grab
Lead, Total Recoverable	µg/L	*			once/quarter ◊	grab
Mercury, Total Recoverable	µg/L	*			once/quarter ◊	grab
Selenium, Total Recoverable	µg/L	*			once/quarter ◊	grab
Silver, Total Recoverable	µg/L	*			once/quarter ◊	grab
Thallium, Total Recoverable	µg/L	*			once/quarter ◊	grab
Nutrients						
Ammonia as N (April 1 – Sept 30) (Oct 1 – March 31)	mg/L	* *			once/quarter ◊	grab
Nitrogen, Total (TN)	mg/L	*			once/quarter ◊	grab
Phosphorus, Total (TP)	mg/L	*			once/quarter ◊	grab
Other						
Fluoride	mg/L	*			once/quarter ◊	grab

Monitoring Reports Shall Be Submitted Quarterly; The First Report Is Due April 28, 2017.
There Shall Be No Discharge Of Floating Solids Or Visible Foam In Other Than Trace Amounts.

* Monitoring requirement only.
** Monitoring requirement associated with a benchmark value. See Special Condition #21.
*** The total 24 hour precipitation accumulation shall be reported for the day that sampling was conducted for all other parameters at each outfall. If all outfalls are sampled on the same day, report just one precipitation value. If one or more outfalls are sampled on separate days within a reporting period, report one or more precipitation values coinciding with those sampling events. The reporting precipitation gauging station, if possible, should be within one (1) mile of the sampled outfall and shall be capable of providing precipitation measurements in at least tenths of an inch. Precipitation shall be monitored daily in accordance with SWPPP requirements in Special Condition #20.
∞ The facility will report the minimum and maximum values. pH is not to be averaged.
◊ Quarterly sampling.

MINIMUM QUARTERLY SAMPLING REQUIREMENTS

QUARTER	MONTHS	EFFLUENT PARAMETERS	REPORT IS DUE
First	January, February, March	Sample at least once during any month of the quarter	April 28th
Second	April, May, June	Sample at least once during any month of the quarter	July 28th
Third	July, August, September	Sample at least once during any month of the quarter	October 28th
Fourth	October, November, December	Sample at least once during any month of the quarter	January 28th

Note 1 - All samples shall be collected within the first 60 minutes of a discharge resulting from a precipitation event greater than 0.1 inches in magnitude and that occurs at least 72 hours from the previously measurable precipitation event. If a discharge resulting from a precipitation event as defined above does not occur within the reporting period, report as no discharge. Precipitation event means rainfall or runoff from snow melt or other forms of precipitation. The total amount of precipitation should be noted from the event from which the samples were collected.

Note 2 - This permit contains a Total Residual Chlorine (TRC) limit.
This effluent limit is below the minimum quantification level (ML) of the most common and practical EPA approved CLTRC methods. The Department has determined the current acceptable ML for total residual chlorine to be 130 µg/L when using the DPD Colorimetric Method #4500 – CL G. from Standard Methods for the Examination of Waters and Wastewater. The permittee will conduct analyses in accordance with this method, or equivalent, and report actual analytical values. Measured values greater than or equal to the minimum quantification level of 130 µg/L will be considered violations of the permit and values less than the minimum quantification level of 130 µg/L will be considered to be in compliance with the permit limitation. The minimum quantification level does not authorize the discharge of chlorine in excess of the effluent limits stated in the permit.
(a) If no chlorine was used in a given sampling period, an actual analysis is not necessary. Simply report as “0 µg/L” TRC.

B. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FOR SLUDGE

OUTFALL #001
sludge

TABLE B-1
FINAL SLUDGE LIMITATIONS AND MONITORING REQUIREMENTS

The permittee is authorized to operate the outfall(s) with serial number(s) as specified in the application for this permit. The final monitoring requirements shall become effective on **February 1, 2017** and remain in effect until expiration of the permit. Such operations shall be controlled, limited and monitored by the permittee as specified below:

EFFLUENT PARAMETERS (Note 1)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
SLUDGE CHARACTERISTICS						
pH	SU	*			once/year	composite ¥
Total Kjeldahl Nitrogen	mg/Kg	*			once/year	composite ¥
Ammonia Nitrogen as N	mg/Kg	*			once/year	composite ¥
Nitrate Nitrogen as N	mg/Kg	*			once/year	composite ¥
Total Phosphorus as P	mg/Kg	*			once/year	composite ¥
Aluminum	mg/Kg	*			once/year	composite ¥
Arsenic	mg/Kg	*			once/year	composite ¥
Cadmium	mg/Kg	*			once/year	composite ¥
Chromium	mg/Kg	*			once/year	composite ¥
Copper	mg/Kg	*			once/year	composite ¥
Lead	mg/Kg	*			once/year	composite ¥
Mercury	mg/Kg	*			once/year	composite ¥
Molybdenum	mg/Kg	*			once/year	composite ¥
Nickel	mg/Kg	*			once/year	composite ¥
Selenium	mg/Kg	*			once/year	composite ¥
Zinc	mg/Kg	*			once/year	composite ¥
SOIL CHARACTERISTICS						
pH	SU	*			once/year	(Note 2)
Total Kjeldahl Nitrogen	mg/Kg	*			once/year	
Ammonia Nitrogen as N	mg/Kg	*			once/year	
Nitrate Nitrogen as N	mg/Kg	*			once/year	
Total Phosphorus as P	mg/Kg	*			once/year	
Aluminum	mg/Kg	*			once/year	
Arsenic	mg/Kg	*			once/year	
Cadmium	mg/Kg	*			once/year	
Chromium	mg/Kg	*			once/year	
Copper	mg/Kg	*			once/year	
Lead	mg/Kg	*			once/year	
Mercury	mg/Kg	*			once/year	
Molybdenum	mg/Kg	*			once/year	
Nickel	mg/Kg	*			once/year	
Selenium	mg/Kg	*			once/year	
Zinc	mg/Kg	*			once/year	

MONITORING REPORTS SHALL BE SUBMITTED ANNUALLY; THE FIRST REPORT IS DUE JANUARY 28, 2018.
THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

¥ A composite sample shall be made up of one grab sample from each sludge storage lagoon. The combined grab samples will be analyzed for the parameters listed in Table B-1 as a single composite sample.

Note 1 - Sludges land applied and the soils which the sludges are land applied to shall be tested at least once per year during land application periods for the parameters listed in Table B-1. Report results for all parameters, except ENM and pH, as mg/Kg on dry weight basis. Please see Special Conditions #1-9 for further information.

Note 2 - Sample the upper 6 to 8 inches of soil. Composite samples shall be collected from each permitted land application site.
(a) Soil sampling shall be in accordance with University of Missouri (MU) Guides G9215, Soil Sampling Pastures or G9217, Soil Sampling Hayfields and Row Crops or other methods approved by the department. The recommendation of one composite sample per 20 acres in G9215 and G9217 is not required by this permit, however, this is a useful method to identify soil fertility fluctuations in large fields due to past management practices, soil type, and variability of crop yields. There shall be at least one composite sample per 80 acres.
(b) Testing shall conform to Recommended Chemical Soil Testing Procedures for North Central Region (North Central Regional Research Publication 221 Revised), or Soil Testing in Missouri (MU Extension Guide EC923), or other methods approved by the department.

C. STANDARD CONDITIONS

In addition to specified conditions stated herein, this permit is subject to the attached Part I and Part III standard conditions dated August 1, 2014 and March 1, 2015, respectively, and hereby incorporated as though fully set forth herein.

D. SPECIAL CONDITIONS

1. This site-specific operating permit shall be maintained by the City of Columbia and the Columbia Water and Light Department until the sludge storage area has been completely stabilized and/or restored to the satisfaction of the Department. Written approval of project completion must be obtained from the Department's Solid Waste Management Program prior to requesting operating permit termination and obtaining a general operating permit. To request the general permit, the city must submit the SWMP approval letter along with a Form E for the general permit and a Form J for termination of the site-specific operating permit.

2. Land application of sludge shall not exceed the most restrictive of the following criteria:
   (a) Crop nitrogen fertilizer requirements (http://extension.missouri.edu/p/WQ430)
   (b) Effective Neutralizing Material (ENM) amount to raise soil pH per soil test recommendations for crop needs (http://extension.missouri.edu/p/G9102 ; http://extension.missouri.edu/p/G9107)
   (c) Metal limitations in University Extension publication WQ 425, Tables 3 & 4 (http://extension.missouri.edu/p/WQ425)
   (d) Pesticides amount not to exceed 10 percent of the application rate on the pesticide label

3. In addition to the parameters listed in Table B-1, sludges land applied shall be tested at least once per year during land application periods for any pesticides or other significant contaminants present in the raw water supply.

4. Sludge tests and soil tests shall be maintained by the permittee for at least five years.

5. Lime sludge shall not be land applied if the soil pH exceeds pH 7.5 (salt based test) or pH 8.0 (water based test).

6. Land application of sludges containing aluminum additives (alum sludge, lime/alum sludge, etc.) shall meet the following additional requirements:
   (a) During years that sludge is land applied, sludge and soil must be tested at least once per year for total aluminum concentration on a dry weight basis and for soil pH.
   (b) Land application sites shall be maintained at a soil pH between pH 5.5 to 7.5 based on the salt based pH test or 6.0 to 8.0 for water based test.
   (c) Land application of sludge shall not exceed cumulative aluminum loadings of 4,000 pounds aluminum per acre above soil background levels. Background soil levels of aluminum shall be based on soil testing of the site prior to sludge application or testing of similar soils in the immediate vicinity.
   (d) Sludge that contains more than 40,000 ppm total aluminum on a dry weight basis may be applied to land with established vegetation, or to land without established vegetation but with less than a 5% slope, or shall be incorporated into the ground by discing, plowing, or equivalent methods within two weeks after land application. Under no circumstances shall application result in sludge entering waters of the state.

7. Land application shall not occur within 300 feet of a well, sinkhole, or losing stream; 150 feet from dwellings; and 50 feet from the property line, drainage ditch, watercourse, or stream bank, including intermittently flowing streams.

8. An **annual report** shall be submitted by January 28 of each year, and shall cover the reporting period of January 1 to December 31 of the previous calendar year. The annual report shall include the following:
   (a) A summary of progress towards stabilizing/restoring the 13-acre sludge storage area, which is to the north of the water treatment plant's sludge lagoons, as per the Solid Waste Management Program's November 16, 2015, letter of approval for Alternate Closure Plan (see Appendix A).
   (b) A summary of all sludge disposal activities, including the amount of sludge generated, the amount stored, the amount disposed, and the disposal method.

(c) If sludge is land applied, indicate the number of acres used, the application rate in dry tons/acre, the soil pH, and the pounds of ENM per ton of sludge. If sludge containing aluminum, metals, or pesticides is land applied, also indicate the concentration in sludge and soil in ppm dry weight for each field, including the background soil concentration.
(d) Any testing results or other submittals required by Special Conditions of this permit shall also be submitted with the annual report.
(e) In addition, the permittee shall include a current copy of the SWPPP.

9. With respect to the sludge storage lagoons, the permittee shall comply with the requirements of 10 CSR 20-7.015(9)(H).

10. This permit may be reopened and modified, or alternatively revoked and reissued, to:
(a) Comply with any applicable effluent standard or limitation issued or approved under Sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a) (2) of the Clean Water Act, if the effluent standard or limitation so issued or approved:
(1) contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or
(2) controls any pollutant not limited in the permit.
(b) Incorporate new or modified effluent limitations or other conditions, if the result of a waste load allocation study, toxicity test or other information indicates changes are necessary to assure compliance with Missouri's Water Quality Standards.
(c) Incorporate new or modified effluent limitations or other conditions if, as the result of a watershed analysis, a Total Maximum Daily Load (TMDL) limitation is developed for the receiving waters which are currently included in Missouri's list of waters of the state not fully achieving the state's water quality standards, also called the 303(d) list.
The permit as modified or reissued under this paragraph shall also contain any other requirements of the Clean Water Act then applicable.

11. All outfalls and permitted features must be clearly marked in the field.

12. Water Quality Standards
(a) To the extent required by law, discharges to waters of the state shall not cause a violation of water quality standards rule under 10 CSR 20-7.031, including both specific and general criteria.
(b) General Criteria. The following general water quality criteria shall be applicable to all waters of the state at all times including mixing zones. No water contaminant, by itself or in combination with other substances, shall prevent the waters of the state from meeting the following conditions:
(1) Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses;
(2) Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses;
(3) Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses;
(4) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life;
(5) There shall be no significant human health hazard from incidental contact with the water;
(6) There shall be no acute toxicity to livestock or wildlife watering;
(7) Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community;
(8) Waters shall be free from used tires, car bodies, appliances, demolition debris, used vehicles or equipment and solid waste as defined in Missouri's Solid Waste Law, section 260.200, RSMo, except as the use of such materials is specifically permitted pursuant to section 260.200-260.247.

13. Changes in Discharges of Toxic Pollutant
In addition to the reporting requirements under §122.41(1), all existing manufacturing, commercial, mining, and silvicultural dischargers must notify the Director as soon as they know or have reason to believe:
(a) That an activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following notification levels:
(1) One hundred micrograms per liter (100 µg/L);
(2) Two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile;
(3) Five hundred micrograms per liter (500 µg/L) for 2,4-dinitrophenol and for 2-methyl-4, 6-dinitrophenol;
(4) One milligram per liter (1 mg/L) for antimony;
(5) Five (5) times the maximum concentration value reported for the pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or
(6) The notification level established by the department in accordance with 40 CFR 122.44(f).
(b) That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":
(1) Five hundred micrograms per liter (500 µg/l);
(2) One milligram per liter (1 mg/l) for antimony;

(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with §122.21(g)(7).
(4) The level established by the Director in accordance with §122.44(f).

14. Report as no-discharge when a discharge does not occur during the report period.

15. Electronic Discharge Monitoring Report (eDMR) Submission System.
The permittee shall submit an eDMR Permit Holder and Certifier Registration form within **90 days** of the effective date of this permit. Per 40 CFR Part 127 National Pollutant Discharge Elimination System (NPDES) Electronic Reporting Rule, reporting of effluent limits and monitoring shall be submitted by the permittee via an electronic system to ensure a timely, complete, accurate, and nationally-consistent set of data. Visit http://dnr.mo.gov/pubs/pub2474.pdf to access the Facility Participation Package which contains the eDMR Permit Holder and Certifier Registration form.

Once the permittee is activated in the eDMR system:
(a) Discharge Monitoring Reporting Requirements. The permittee must electronically submit compliance monitoring data via the eDMR system. In regards to Standard Conditions Part I, Section B, #7, the eDMR system is currently the only Department approved reporting method for this permit.
(b) Programmatic Reporting Requirements. The following reports (if required by this permit) must be electronically submitted as an attachment to the eDMR system until such a time when the current or a new system is available to allow direct input of the data:
(1) Sludge Annual Reports;
(2) Any additional report required by the permit excluding bypass reporting.
After such a system has been made available by the department, required data shall be directly input into the system by the next report due date.
(c) Other actions. The following shall be submitted electronically after such a system has been made available by the department:
(1) General Permit Applications/Notices of Intent to discharge (NOIs); and
(2) Notices of Termination (NOTs).
(d) Electronic Submissions. To access the eDMR system, use the following link in your web browser: https://edmr.dnr.mo.gov/edmr/E2/Shared/Pages/Main/Login.aspx .
(e) Waivers from Electronic Reporting. The permittee must electronically submit compliance monitoring data and reports unless a waiver is granted by the department in compliance with 40 CFR Part 127. The permittee may obtain an electronic reporting waiver by first submitting an eDMR Waiver Request Form: http://dnr.mo.gov/forms/780-2692-f.pdf . The department will either approve or deny this electronic reporting waiver request within 120 calendar days. Only permittees with an approved waiver request may submit monitoring data and reports on paper to the Department for the period that the approved electronic reporting waiver is effective.

16. Reporting of Non-Detects
(a) An analysis conducted by the permittee or their contracted laboratory shall be conducted in such a way that the precision and accuracy of the analyzed result can be enumerated.
(b) The permittee shall not report a sample result as “Non-Detect” without also reporting the detection limit of the test. Reporting as “Non-Detect” without also including the detection limit will be considered failure to report, which is a violation of this permit.
(c) The permittee shall report the “Non-Detect” result using the less than sign and the minimum detection limit (e.g. <10).
(d) Where the permit contains a Minimum Level (ML) and the permittee is granted authority in the permit to report zero in lieu of the < ML for a specified parameter (conventional, priority pollutants, metals, etc.), then zero (0) is to be reported for that parameter.
(e) See Standard Conditions Part I, Section A, #4 regarding proper detection limits used for sample analysis.
(f) When calculating monthly averages, one-half of the minimum detection limit (MDL) should be used instead of a zero. Where all data are below the MDL, the “<MDL” shall be reported as indicated in item (C).

17. It is a violation of the Missouri Clean Water Law to fail to pay fees associated with this permit (644.055 RSMo).

18. Any pesticide discharge from any point source shall comply with the requirements of Federal Insecticide, Fungicide and Rodenticide Act, as amended (7 U.S.C. 136 ET. SEQ.) and the use of such pesticides shall be in a manner consistent with its label.

19. The purpose of the SWPPP and the BMPs listed herein is the prevention of pollution of waters of the state. A deficiency of a BMP means it was not effective in preventing pollution [10 CSR 20-2.010(56)] of waters of the state, and corrective actions means the facility took steps to eliminate the deficiency.

20. The permittee shall implement a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP must be prepared and implemented upon permit issuance. The SWPPP must be kept on-site and should not be sent to the department unless specifically requested. The SWPPP must be reviewed and updated, if needed, every five (5) years or as site conditions change. The permittee shall select, install, use, operate, and maintain the Best Management Practices prescribed in the SWPPP in accordance with the concepts and methods described in the following document: *Developing Your Stormwater Pollution Prevention Plan, A Guide for Industrial Operators*, (Document number EPA 833-B-09-002) published by the United States Environmental Protection Agency (USEPA) in February 2009.
    The SWPPP must include the following:
    (a) A listing of specific Best Management Practices (BMPs) and a narrative explaining how BMPs will be implemented to control and minimize the amount of potential contaminants that may enter stormwater. The BMPs at the facility should be designed to meet this value during rainfall event up to the 10 year, 24 hour rain event.
    (b) The SWPPP must include a schedule for once per month site inspections and brief written reports. The inspection report must include precipitation information for the entire period since last inspection, as well as observations and evaluations of BMP effectiveness. Deficiencies must be corrected within seven (7) days and the actions taken to correct the deficiencies shall be included with the written report, including photographs. Inspection reports must be kept on site with the SWPPP and maintained for a period of five (5) years. These must be made available to department personnel upon request.
    (c) A provision for designating an individual to be responsible for environmental matters.
    (d) A provision for providing training to all personnel involved in material handling and storage, and housekeeping of maintenance and cleaning areas. Proof of training shall be submitted on request of the department.

21. This permit stipulates pollutant benchmarks applicable to your discharge. The benchmarks do not constitute direct numeric effluent limitations; therefore, a benchmark exceedance alone is not a permit violation. Benchmark monitoring and visual inspections shall be used to determine the overall effectiveness of SWPPP and to assist you in knowing when additional corrective action may be necessary to protect water quality. If a sample exceeds a benchmark concentration you must review your SWPPP and your BMPs to determine what improvements or additional controls are needed to reduce that pollutant in your stormwater discharge(s).

OUTFALL #002, #003, #004	
PARAMETER	**BENCHMARK**
Chemical Oxygen Demand	50 mg/L
Total Suspended Solids	90 mg/L

Any time a benchmark exceedance occurs a Corrective Action Report (CAR) must be completed. A CAR is a document that records the efforts undertaken by the facility to improve BMPs to meet benchmarks in future samples. CARs must be retained with the SWPPP and available to the department upon request. If the efforts taken by the facility are not sufficient and subsequent exceedances of a benchmark occur, the facility must contact the department if a benchmark value cannot be achieved. Failure to take corrective action to address a benchmark exceedance and failure to make measureable progress towards achieving the benchmarks is a permit violation.

22. Permittee shall adhere to the following minimum Best Management Practices (BMPs):
    (a) Prevent the spillage or loss of fluids, oil, grease, fuel, etc. from vehicle maintenance, equipment cleaning, or warehouse activities and thereby prevent the contamination of stormwater from these substances.
    (b) Provide collection facilities and arrange for proper disposal of waste products including but not limited to petroleum waste products, and solvents.
    (c) Store all paint, solvents, petroleum products and petroleum waste products (except fuels), and storage containers (such as drums, cans, or cartons) so that these materials are not exposed to stormwater or provide other prescribed BMPs such as plastic lids and/or portable spill pans to prevent the commingling of stormwater with container contents. Commingled water may not be discharged under this permit. Provide spill prevention control, and/or management sufficient to prevent any spills of these pollutants from entering waters of the state. Any containment system used to implement this requirement shall be constructed of materials compatible with the substances contained and shall also prevent the contamination of groundwater.
    (d) Provide good housekeeping practices on the site to keep trash from entry into waters of the state.
    (e) Provide sediment and erosion control sufficient to prevent or control sediment loss off of the property. This could include the use of straw bales, silt fences, or sediment basins, if needed, to comply with effluent limits or benchmarks.
    (f) Ensure that adequate provisions are provided to prevent surface water intrusion into the storage basin, to divert stormwater runoff around the storage basin, and to protect embankments from erosion.

23. To protect the general criteria found at 10 CSR 20-7.031(4), before releasing water accumulated in secondary containment areas, it must be examined for hydrocarbon odor and presence of sheen. If the presence of odor or sheen is indicated, the water shall be treated using an appropriate method or disposed of in accordance with legally approved methods, such as being sent to a wastewater treatment facility. Following treatment, the water shall be tested for oil and grease, benzene, toluene, ethylbenzene, and xylene using 40 CFR part 136 methods. All pollutant levels must be below the most protective, applicable standards for the receiving stream, found in 10 CSR 20-7.031 Table A. Records of all testing and treatment of water accumulated in secondary containment shall be stored in the SWPPP to be available on demand to MDNR and EPA personnel.

24. Release of a hazardous substance must be reported to the department in accordance with 10 CSR 24-3.010. A record of each reportable spill shall be retained with the SWPPP and made available to the department upon request.

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FACT SHEET
FOR THE PURPOSE OF RENEWAL OF
MO-0136034
CITY OF COLUMBIA WATER TREATMENT PLANT

The Federal Water Pollution Control Act ("Clean Water Act" Section 402 Public Law 92-500 as amended) established the National Pollution Discharge Elimination System (NPDES) permit program. This program regulates the discharge of pollutants from point sources into the waters of the United States, and the release of stormwater from certain point sources. All such discharges are unlawful without a permit (Section 301 of the "Clean Water Act"). After a permit is obtained, a discharge not in compliance with all permit terms and conditions is unlawful. Missouri State Operating Permits (MSOPs) are issued by the Director of the Missouri Department of Natural Resources (Department) under an approved program, operating in accordance with federal and state laws (Federal "Clean Water Act" and "Missouri Clean Water Law" Section 644 as amended). MSOPs are issued for a period of five (5) years unless otherwise specified for less.

As per [40 CFR Part 124.8(a)] and [10 CSR 20-6.020(1)2.] a factsheet shall be prepared to give pertinent information regarding the applicable regulations, rationale for the development of effluent limitations and conditions, and the public participation process for the Missouri State Operating Permit (MSOP or operating permit) listed below. A factsheet is not an enforceable part of an operating permit.

Part I. FACILITY INFORMATION

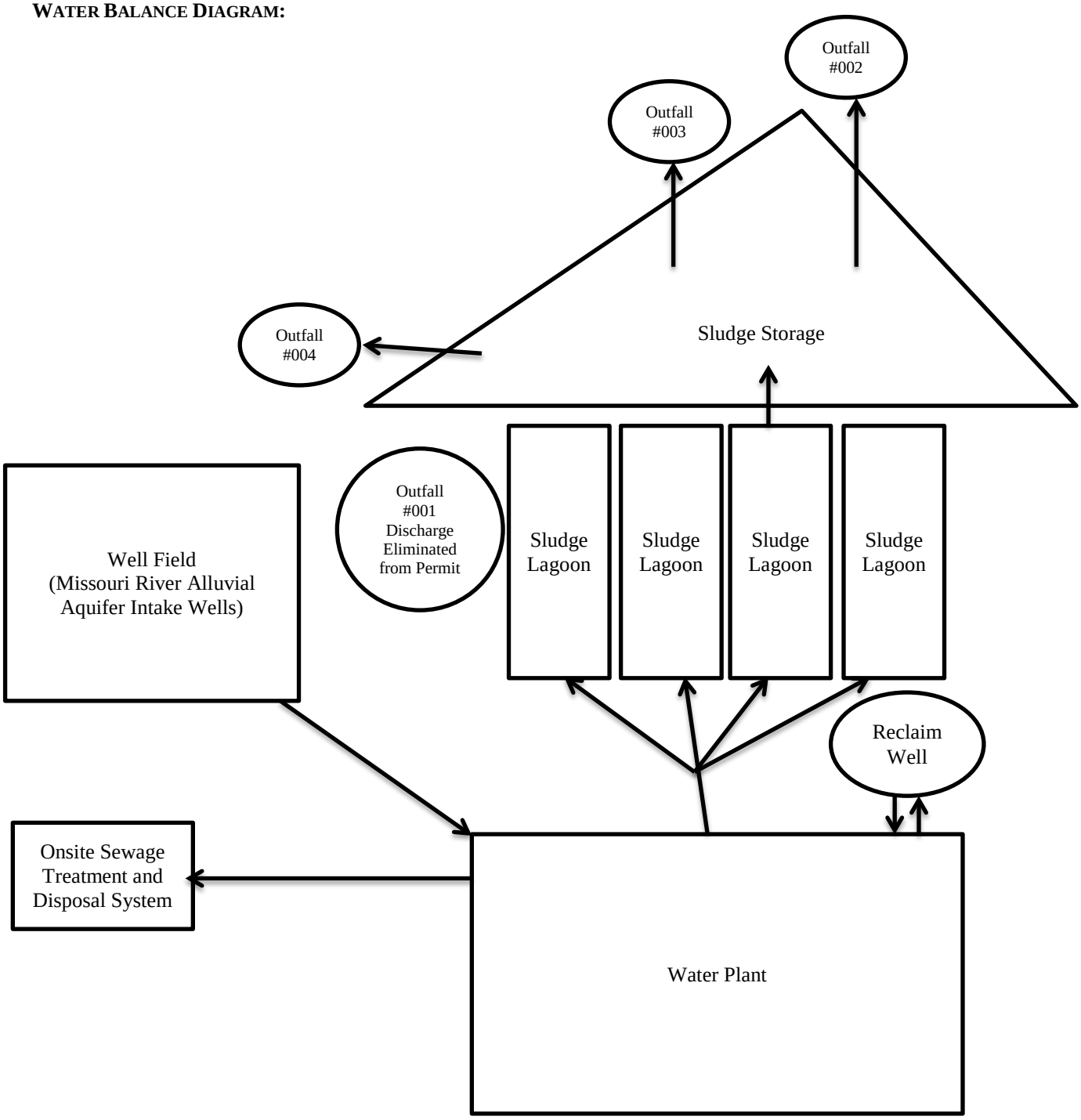
Facility Type:	Industrial
Facility SIC Code(s):	4941
Application Date:	09/23/2014
Expiration Date:	03/18/2015 (of previous permit)
Last Inspection:	11/03/2010 Not in Compliance

FACILITY DESCRIPTION:
This is a drinking water treatment plant that produces and distributes potable water to the City of Columbia, Missouri. The facility consists of a well field to the west of the processing site, the water plant, a reclaim well, sludge lagoons for wasted lime solids and filter backwash, sludge storage, and sludge land application fields. The water plant consists of aeration basins, lime softening units, and filters (anthracite coal and sand). Groundwater from the Missouri River Alluvial Aquifer is pumped from the well field to the water treatment plant, where it is first aerated to remove iron, carbon dioxide and hydrogen sulfide. Then lime is introduced to the aerated water to remove calcium and magnesium from the water (reducing hardness). The limed water is then filtered to remove additional solids from the water. The final step involves chlorinating the water for distribution to customers. Lime sludge and filter backwash are piped to sludge lagoons settling and drying. Sludge is moved to a storage area just north of the lagoons prior to land application. The sludge is land applied on contract fields or farmland in and around the City of Columbia. Application occurs once per year per field. Domestic wastewater is treated on site with a subsurface treatment and disposal system, under the jurisdiction of the Department of Health and Senior Services or the Boone County Health Department.

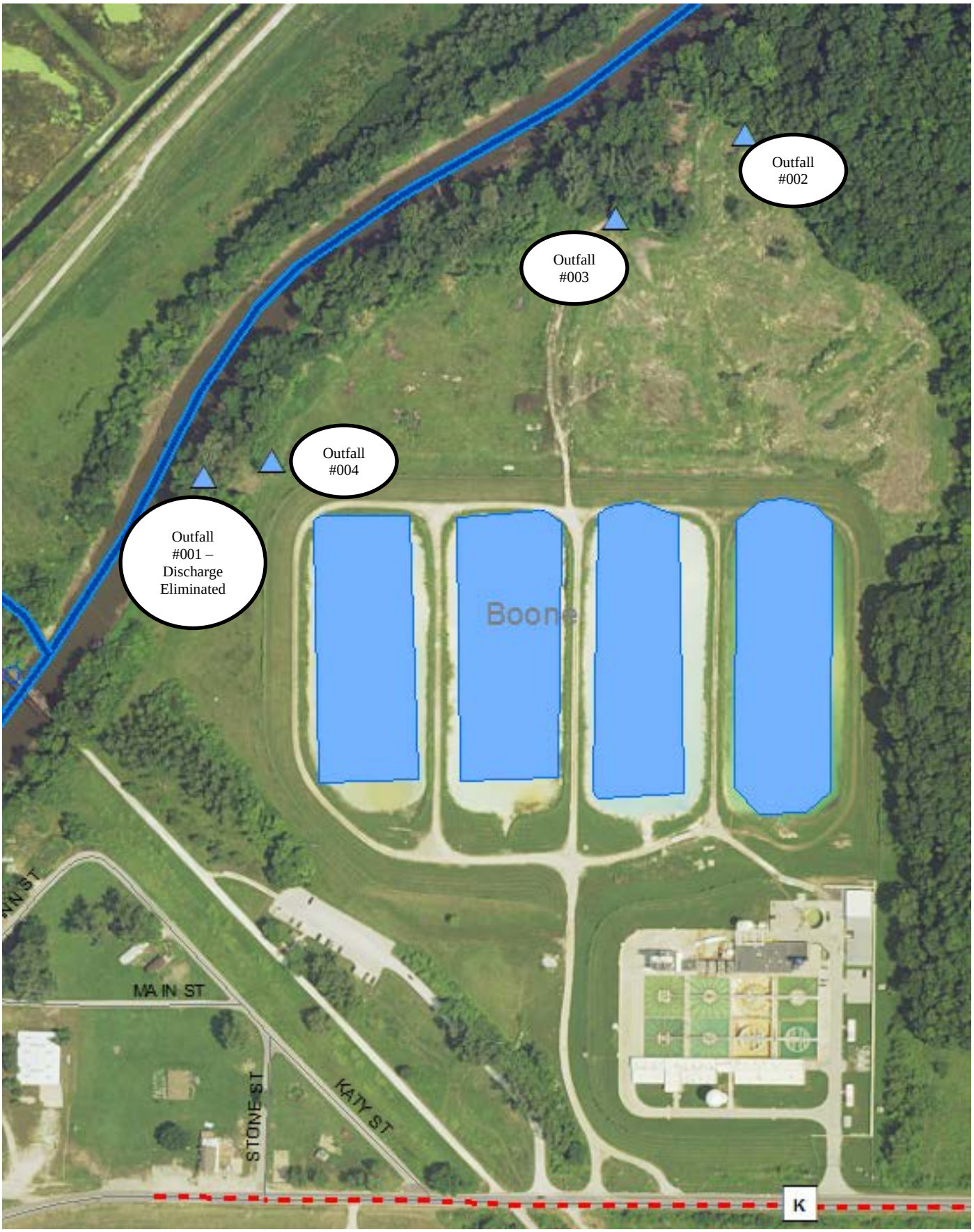
The facility has seven outfalls. Outfall #001 is associated with the sludge lagoons. Outfall #002, #003, and #004 are associated with the sludge storage directly north of the sludge lagoons.

There have not been any changes to this facility or in the receiving water body that effects effluent limit derivation.

WATER BALANCE DIAGRAM:



FACILITY MAP:



PERMITTED FEATURES TABLE:

OUTFALL	AVERAGE FLOW (MGD)	DESIGN FLOW (MGD)	TREATMENT LEVEL	EFFLUENT TYPE
#001	Dependent upon water demand	4.46	No-Discharge, Settling and Land Application	Lime Sludge
	Discharge Requirements Eliminated from Permit – Only No-Discharge Requirements Remain for Lime Sludge and Soils Testing			
#002	Dependent upon precipitation	0.55	Best Management Practices (BMPs)	Stormwater
#003		0.55	BMPs	Stormwater
#004		0.55	BMPs	Stormwater

FACILITY PERFORMANCE HISTORY & COMMENTS:
The most recent site inspection to determine compliance with MSOP MO-0136034 was conducted on November 03, 2010. The facility was found to be in non-compliance during the time of the inspection. The inspection was conducted as a result of a complaint regarding odorous water discharging through a storm sewer. The City of Columbia also notified the department of the discharge, stating that the Ash Street reservoir was being drained for cleaning and the pump hose was accidentally routed to the storm sewer instead of the sanitary sewer leading to the City of Columbia's wastewater treatment facility. The drained water was entering Harmony Creek. The water treatment plant operators placed absorbent booms and sand bags in the receiving stream to prevent the flow of lime solids further downstream. Vacuum trucks were used to spot clean the stream and remove as much lime sludge as possible. The department's Northeast Regional Office staff conducted follow-up visits to observe progress in cleaning the stream. It was noted that a small amount of lime solids were observed in a culvert beneath a road but the rest of the stream did not appear to have any lime solids remaining.

A Notice of Violation (NOV) was issued to the facility for the incident described above. The facility took corrective action and complied with the NOV in order to return to compliance on January 20, 2011.

Discharge monitoring report (DMR) data for the past five years was reviewed in order to adequately assess current effluent limitations and monitoring requirements and determine performance of best management practices being used at the facility. The facility reported "no discharge" for all outfalls (#001-#004) during every DMR submittal.

Historical Comments Pertinent to Current Operations:
The four sludge lagoons operate as no-discharge settling basins. Sludge and water are gravity fed into the lagoons. Water is decanted from the lagoons into a reclaim well south of the lagoons (which can be seen on the diagram above). The reclaim water is pumped back to the headworks for further treatment and distribution. Sludge is left in the lagoons to dry and eventually is transferred to the sludge storage area, and then on to land application sites. A site inspection conducted on February 10, 2009 documents that the discharge pipe referred to as Outfall #001 has been disconnected and the valve associated with that pipe is no longer in use. Outfall #001 was originally designed as an overflow discharge for the sludge holding basins. Since then, an earthen flood wall has been constructed around all four lagoons in order to prevent water from discharging to Perche Creek. Now, all water is decanted into the reclaim well and there is no discharge from Outfall #001.

With respect to the current operation of the facility described above, the discharge requirements associated with Outfall #001 have been eliminated from the permit. All effluent discharge monitoring and limitations will be removed from the permit. However, the permittee still conducts land application of lime sludge. Therefore, all sludge monitoring and soils testing requirements will remain in the permit to ensure appropriate land application of the sludge occurs throughout the permit cycle.

Part II. RECEIVING STREAM INFORMATION

RECEIVING WATER BODY'S WATER QUALITY:
There are no streams surveys noted in the department's water quality assessment database. Perche Creek (P) 1005 is not listed on the 2014 Missouri 303(d) list of impaired waters nor has an associated total maximum daily load (TMDL) report for any pollutant impairments.

303(D) LIST:
Section 303(d) of the federal Clean Water Act requires that each state identify waters that are not meeting water quality standards and for which adequate water pollution controls have not been required. Water quality standards protect such beneficial uses of water as whole body contact (such as swimming), maintaining fish and other aquatic life, and providing drinking water for people, livestock and wildlife. The 303(d) list helps state and federal agencies keep track of waters that are impaired but not addressed by normal water pollution control programs. http://dnr.mo.gov/env/wpp/waterquality/303d/303d.htm
✓ Not applicable; this facility does not discharge to an impaired segment of a 303(d) listed stream.

TOTAL MAXIMUM DAILY LOAD (TMDL):
A TMDL is a calculation of the maximum amount of a given pollutant that a body of water can absorb before its water quality is affected; hence, the purpose of a TMDL is to determine the pollutant loading a specific waterbody can assimilate without exceeding water quality standards. If a water body is determined to be impaired as listed on the 303(d) list, then a watershed management plan will be developed that shall include the TMDL calculation. http://dnr.mo.gov/env/wpp/tmdl/
✓ Not applicable; this facility is not associated with a TMDL.

APPLICABLE DESIGNATIONS OF WATERS OF THE STATE:
✓ As per Missouri's Effluent Regulations [10 CSR 20-7.015(1)(B)], the waters of the state are divided into the following seven categories. Each category lists effluent limitations for specific parameters, which are presented in each outfall's Effluent Limitation Table and further discussed in the Derivation & Discussion of Limits section.

- Missouri or Mississippi River: ☐
- Lake or Reservoir: ☐
- Losing: ☐
- Metropolitan No-Discharge: ☐
- Special Stream: ☐
- Subsurface Water: ☐
- All Other Waters: ☒

RECEIVING STREAMS TABLE:

OUTFALL	WATERBODY NAME	CLASS	WBID	DESIGNATED USES	DISTANCE TO CLASSIFIED SEGMENT	12-DIGIT HUC
#001	Discharge Requirements Eliminated from Permit – Only No-Discharge Requirements Remain for Lime Sludge and Soils Testing					
#002	Perche Creek	P	1005	AQL, GEN, HHP, IRR, LWW, SCR, WBC-B	0.00 mi	10300102-0709
#003						
#004						

n/a not applicable
WBID = Waterbody IDentification: Missouri Use Designation Dataset 8-20-13 MUDD V1.0 data can be found as an ArcGIS shapefile on MSDIS at ftp://msdis.missouri.edu/pub/Inland_Water_Resources/MO_2014_WQS_Stream_Classifications_and_Use_shp.zip
* As per 10 CSR 20-7.031 Missouri Water Quality Standards, the department defines the Clean Water Commission's water quality objectives in terms of "water uses to be maintained and the criteria to protect those uses." The receiving stream and 1st classified receiving stream's beneficial water uses to be maintained are in the receiving stream table in accordance with [10 CSR 20-7.031(1)(C)].

Uses which may be found in the receiving streams table, above:
10 CSR 20-7.031(1)(C)1.:
AQL = Protection of aquatic life (Current narrative use(s) are defined to ensure the protection and propagation of fish shellfish and wildlife, which is further subcategorized as: WWH = Warm Water Habitat; CLH = Cool Water Habitat; CDH = Cold Water Habitat; EAH = Ephemeral Aquatic Habitat; MAH = Modified Aquatic Habitat; LAH = Limited Aquatic Habitat. This permit uses AQL effluent limitations in 10 CSR 20-7.031 Table A for all habitat designations unless otherwise specified.)
10 CSR 20-7.031(1)(C)2.: Recreation in and on the water
WBC = Whole Body Contact recreation where the entire body is capable of being submerged;
WBC-A = Whole body contact recreation supporting swimming uses and has public access;
WBC-B = Whole body contact recreation supporting swimming;
SCR = Secondary Contact Recreation (like fishing, wading, and boating).
10 CSR 20-7.031(1)(C)3. to 7.:
HHP (formerly HHF) = Human Health Protection as it relates to the consumption of fish;

IRR = Irrigation for use on crops utilized for human or livestock consumption;
LWW = Livestock and wildlife watering (Current narrative use is defined as LWP = Livestock and Wildlife Protection);
DWS = Drinking Water Supply;
IND = Industrial water supply
10 CSR 20-7.031(1)(C)8-11.: Wetlands (10 CSR 20-7.031 Table A currently does not have corresponding habitat use criteria for these defined uses)
WSA = Storm- and flood-water storage and attenuation; WHP = Habitat for resident and migratory wildlife species;
WRC = Recreational, cultural, educational, scientific, and natural aesthetic values and uses; WHC = Hydrologic cycle maintenance.
10 CSR 20-7.031(6): GRW = Groundwater

RECEIVING STREAM LOW-FLOW VALUES:

OUTFALL	RECEIVING STREAM (C, P)	LOW-FLOW VALUES (CFS)		
		1Q10	7Q10	30Q10
#001	Discharge Requirements Eliminated from Permit – Only No-Discharge Requirements Remain for Lime Sludge and Soils Testing			
#002	Perche Creek (P)	0.1	0.1	1.0
#003				
#004				

MIXING CONSIDERATIONS: FOR THE TRIBUTARY TO PERCHE CREEK (OUTFALLS #005, #006, #007)
Mixing Zone: Not Allowed [10 CSR 20-7.031(5)(A)4.B.(I)(a)].
Zone of Initial Dilution: Not Allowed [10 CSR 20-7.031(5)(A)4.B.(I)(b)].

MIXING CONSIDERATIONS TABLE: FOR PERCHE CREEK (OUTFALLS #002, #003, #004)

ZONE OF INITIAL DILUTION (CFS) (ACUTE) [10 CSR 20-7.031(5)(A)4.B.(II)(b)]			MIXING ZONE (CFS) (CHRONIC) [10 CSR 20-7.031(5)(A)4.B.(II)(a)]		
1Q10	7Q10	30Q10	1Q10	7Q10	30Q10
0.025	0.025	n/a	0.0025	0.0025	0.25

RECEIVING STREAM MONITORING REQUIREMENTS:
No receiving water monitoring requirements are recommended at this time.

Part III. RATIONALE AND DERIVATION OF EFFLUENT LIMITATIONS & PERMIT CONDITIONS

ALTERNATIVE EVALUATIONS FOR NEW FACILITIES:
As per [10 CSR 20-7.015(4)(A)], discharges to losing streams shall be permitted only after other alternatives including land application, discharges to a gaining stream and connection to a regional wastewater treatment facility have been evaluated and determined to be unacceptable for environmental and/or economic reasons.

- ✓ Not applicable; the facility does not discharge to a losing stream as defined by [10 CSR 20-2.010(36)] & [10 CSR 20-7.031(1)(N)], or is an existing facility.

ANTI-BACKSLIDING:
A provision in the Federal Regulations [CWA §303(d)(4); CWA §402(c); 40 CFR Part 122.44(I)] that requires a reissued permit to be as stringent as the previous permit with some exceptions.

- ✓ Limitations in this operating permit for the reissuance of this permit conform to the anti-backsliding provisions of Section 402(o) of the Clean Water Act, and 40 CFR Part 122.44.
- ✓ Information is available which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of a less stringent effluent limitation at the time of permit issuance. The discharge requirements associated with Outfall #001 have been removed from the permit. The permittee has disconnected the discharge pipe and the valve associated with that outfall is no longer in use. The sludge lagoons that originally discharged wastewater through Outfall #001 now operate with 100% recycling of water back through the treatment plant. The discharge has been eliminated, thus discharge requirements are no longer necessary. The outfall will remain in the permit as a permitted feature in order to address sludge handling and land application requirements.
- ✓ The Department determines that technical mistakes or mistaken interpretations of law were made in issuing the permit under section 402(a)(1)(b). The effluent limitations and monitoring requirements for the stormwater discharges from Outfalls #002, #003 and #004 were separated from the effluent limitations and monitoring requirements for the process wastewater per the permit writer's best professional judgement. It was determined that the stormwater discharges do not have reasonable potential to exceed temperature criteria. For this reason, monitoring for temperature was removed from the permit for Outfall #002, #003, and

#004. Furthermore, the monthly average limits and monitoring requirements for all other parameters listed for Outfalls #002, #003 and #004 were removed. Due to the nature of stormwater being acute events, monthly averages have been determined to not be representative of the discharge.

ANTIDEGRADATION:
In accordance with Missouri's Water Quality Standard [10 CSR 20-7.031(2)], the Department is to document by means of Antidegradation Review that the use of a water body's available assimilative capacity is justified. Degradation is justified by documenting the socio-economic importance of a discharging activity after determining the necessity of the discharge.
✓ Renewal no degradation proposed and no further review necessary.

BENCHMARKS:
When a permitted feature or outfall consists of only stormwater, a benchmark may be implemented at the discretion of the permit writer. Benchmarks require the facility to monitor, and if necessary, replace and update stormwater control measures. Benchmark concentrations are not effluent limitations. A benchmark is a technology-based threshold. A benchmark exceedance, therefore, is not a permit violation; however, failure to take corrective action is a violation of the permit. Benchmark monitoring data is used to determine the overall effectiveness of control measures and to assist the permittee in knowing when additional corrective actions may be necessary to comply with the technology based effluent limitations (TBEL).

Because of the fleeting nature of stormwater discharges, the department, under the direction of EPA guidance, has determined monthly averages are capricious measures of stormwater discharges. The *Technical Support Document for Water Quality Based Toxics Control* (EPA/505/2-90-001; 1991) Section 3.1 indicates most procedures within the document apply only to water quality based approaches, not end-of-pipe technology-based controls. Hence, stormwater outfalls will only contain a maximum daily limit (MDL), benchmark, or monitoring requirement determined by the site specific conditions including the receiving water's current quality. While inspection of the stormwater BMPs occur monthly, facilities with no compliance issues are usually expected to sample stormwater quarterly.

Numeric benchmark values are based on other stormwater permits including the Environmental Protection Agency's (EPA's) *Multi-Sector General Permit For Stormwater Discharges Associated With Industrial Activity* (MSGP) or water quality standards. Because precipitation events are sudden and momentary, benchmarks based on state or federal standards or recommendations use the Criteria Maximum Concentration (CMC) value, or acute standard. The CMC is the estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed briefly without resulting in an unacceptable effect. The CMC for aquatic life is intended to be protective of the vast majority of the aquatic communities in the United States.
✓ Applicable; this facility has benchmark constraints. The benchmarks listed in the derivation discussion have been determined to be feasible, affordable, and protective of water quality and aquatic life.

BIOSOLIDS & SEWAGE SLUDGE:
Biosolids are solid materials resulting from domestic wastewater treatment that meet federal and state criteria for beneficial uses (i.e. fertilizer). Sewage sludge is solids, semi-solids, or liquid residue generated during the treatment of domestic sewage in a treatment works; including but not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment process; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in a treatment works. Additional information regarding biosolids and sludge is located at the following web address: http://extension.missouri.edu/main/DisplayCategory.aspx?C=74, items WQ422 through WQ449.
✓ Not applicable; this condition is not applicable to the permittee for this facility.

COMPLIANCE AND ENFORCEMENT:
Enforcement is the action taken by the Water Protection Program (WPP) to bring an entity into compliance with the Missouri Clean Water Law, its implementing regulations, and/or any terms and conditions of an operating permit. The primary purpose of the enforcement activity in the WPP is to resolve violations and return the entity to compliance.
✓ Not applicable; the permittee/facility is not currently under Water Protection Program enforcement action.

GROUNDWATER MONITORING:
Groundwater is a water of the state according to 10 CSR 20-7.015(7) and 10 CSR 20-7.031(6) and must be protected accordingly.
✓ This facility is not required to monitor groundwater.

INDUSTRIAL SLUDGE:
Industrial sludge is solids, semi-solids, or liquid residue generated during the treatment of industrial process wastewater in a treatment works; including but not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment process; scum and solids filtered from water supplies and backwashed; and a material derived from industrial sludge.

- ✓ Permittee land applies industrial sludge (lime solids and filter backwash) in accordance with Standard Conditions III. Though Standard Condition Part III is geared towards domestic sludge, the methods for handling and treating sludge applies to lime sludge from the water treatment plant.

REASONABLE POTENTIAL ANALYSIS (RPA):
Federal regulation [40 CFR Part 122.44(d)(1)(i)] requires effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause or contribute to an in-stream excursion above narrative or numeric water quality standard. In accordance with [40 CFR Part 122.44(d)(1)(iii)] if the permit writer determines that any give pollutant has the reasonable potential to cause, or contribute to an in-stream excursion above the WQS, the permit must contain effluent limits for that pollutant.

- ✓ Not applicable; a RPA was not conducted for this facility. There was insufficient data to conduct RPA's.

SCHEDULE OF COMPLIANCE (SOC):
A schedule of remedial measures included in a permit, including an enforceable sequence of interim requirements (actions, effluent limits, operations, or milestone events) leading to compliance with the Missouri Clean Water Law, its implementing regulations, and/or the terms and conditions of an operating permit. SOCs are allowed under 40 CFR 122.47 providing certain conditions are met.

- ✓ Not applicable; this permit does not contain a SOC.

SPILL REPORTING:
Per 10 CSR 24-3.010, any emergency involving a hazardous substance must be reported to the department's 24 hour Environmental Emergency Response hotline at (573) 634-2436 at the earliest practicable moment after discovery. The department may require the submittal of a written report detailing measures taken to clean up a spill. These reporting requirements apply whether or not the spill results in chemicals or materials leaving the permitted property or reaching waters of the state. This requirement is in addition to the noncompliance reporting requirement found in Standard Conditions Part I. http://dnr.mo.gov/env/esp/spillbill.htm

STORMWATER POLLUTION PREVENTION PLAN (SWPPP):
In accordance with 40 CFR 122.44(k) *Best Management Practices (BMPs)* to control or abate the discharge of pollutants when: (1) Authorized under section 304(e) of the Clean Water Act (CWA) for the control of toxic pollutants and hazardous substances from ancillary industrial activities: (2) Authorized under section 402(p) of the CWA for the control of stormwater discharges; (3) Numeric effluent limitations are infeasible; or (4) the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA. In accordance with the EPA's *Developing Your Stormwater Pollution Prevention Plan, A Guide for Industrial Operators*, (Document number EPA 833-B-09-002) [published by the United States Environmental Protection Agency (USEPA) in February 2009], BMPs are measures or practices used to reduce the amount of pollution entering (regarding this operating permit) waters of the state. BMPs may take the form of a process, activity, or physical structure. Additionally in accordance with the Stormwater Management, a SWPPP is a series of steps and activities to (1) identify sources of pollution or contamination, and (2) select and carry out actions which prevent or control the pollution of storm water discharges.

The purpose of a SWPPP is to comply with all applicable stormwater regulations by creating an adaptive management plan to control and mitigate pollution of stormwater runoff. Developing a SWPPP provides opportunities to employ appropriate BMPs to minimize the risk of pollutants being discharged with during storm events. The following paragraph outlines the general steps the permittee should take to determine which BMPs will work to achieve the benchmark values discussed in Part V above. This section is not intended to be all encompassing or restrict the use of any physical BMP or operational and maintenance procedure that will assist in pollution control. Additional steps or revisions to the SWPPP may be required to meet the requirements of the permit. Additional information can be found in EPA's *Developing Your Stormwater Pollution Prevention Plan, A Guide for Industrial Operators*, (Document number EPA 833-B-09-002) [published by the United States Environmental Protection Agency (USEPA) in February 2009].

Areas which should be included in the SWPPP are identified in 40 CFR 122.26(b)(14). Once the potential sources of stormwater pollution have been identified, a plan should be formulated to best control the amount of pollutant being released and discharged by each activity or source. This should include, but is not limited to, minimizing exposure to stormwater, good housekeeping measures, proper facility and equipment maintenance, spill prevention and response, vehicle traffic control, and proper materials handling. Once a plan has been developed the facility will employ the control measures that have been determined to be adequate to achieve the benchmark values discussed above. The facility will conduct monitoring and inspections of the BMPs to ensure they are working properly and re-evaluate any BMP not achieving compliance with permitting requirements. For example, if sample results from an outfall show values of TSS above the benchmark value, the BMP being employed is deficient in controlling stormwater pollution. Corrective action should be taken to repair, improve, or replace the failing BMP. This internal evaluation is required at least once per month but should be continued more frequently if BMPs continue to fail. If failures do occur, continue this trial and error process until appropriate BMPs have been established.

If failures continue to occur and the permittee feels there are no practicable or cost-effective BMPs that will sufficiently reduce a pollutant concentration in the discharge to the benchmark values established in the permit, the permittee can submit a request to re-evaluate the benchmark values. This request needs to include 1) a detailed explanation of why the facility is unable to comply with the permit conditions and unable to establish BMPs to achieve the benchmark values; 2) financial data of the company and documentation of cost associated with BMPs for review and 3) the SWPPP, which should contain adequate documentation of BMPs employed, failed BMPs, corrective actions, and all other required information. This will allow the department to conduct a cost analysis on control measures and actions taken by the facility to determine cost-effectiveness of BMPs. The request shall be submitted in the form of an operating permit modification; the application is found at: http://dnr.mo.gov/forms/index.html .

✓ Applicable; a SWPPP shall be developed and implemented for each area and shall incorporate required practices identified by the Department with jurisdiction, incorporate erosion control practices specific to site conditions, and provide for maintenance and adherence to the plan.

VARIANCE:

As per the Missouri Clean Water Law § 644.061.4, variances shall be granted for such period of time and under such terms and conditions as shall be specified by the commission in its order. The variance may be extended by affirmative action of the commission. In no event shall the variance be granted for a period of time greater than is reasonably necessary for complying with the Missouri Clean Water Law §§644.006 to 644.141 or any standard, rule or regulation promulgated pursuant to Missouri Clean Water Law §§644.006 to 644.141.

✓ Not applicable; this operating permit is not drafted under premises of a petition for variance.

WASTELOAD ALLOCATIONS (WLA) FOR LIMITS:

As per [10 CSR 20-2.010(78)], the WLA is the amount of pollutant each discharger is allowed to release into a given stream after the department has determined total amount of pollutant that may be discharged into that stream without endangering its water quality.

✓ Applicable; wasteload allocations were calculated where relevant using water quality criteria or water quality model results and by applying the dilution equation below:

$$C = \frac{(Cs \times Qs) + (Ce \times Qe)}{(Qe + Qs)}$$ (EPA/505/2-90-001, Section 4.5.5)

Where C = downstream concentration
Cs = upstream concentration
Qs = upstream flow
Ce = effluent concentration
Qe = effluent flow

- Chronic wasteload allocations were determined using applicable chronic water quality criteria (CCC: criteria continuous concentration) and stream volume of flow at the edge of the mixing zone (MZ). Acute wasteload allocations were determined using applicable water quality criteria (CMC: criteria maximum concentration) and stream volume of flow at the edge of the zone of initial dilution (ZID).
- Water quality based maximum daily and average monthly effluent limitations were calculated using methods and procedures outlined in USEPA's *Technical Support Document For Water Quality-based Toxics Control* or TSD EPA/505/2-90-001; March 1991.
- Number of Samples "n": In accordance with the TSD for water quality-based permitting, effluent quality is determined by the underlying distribution of daily values, which is determined by the Long Term Average (LTA) associated with a particular Wasteload Allocation (WLA) and by the Coefficient of Variation (CV) of the effluent concentrations. Increasing or decreasing the monitoring frequency does not affect this underlying distribution or treatment performance which should be, at a minimum, targeted to comply with the values dictated by the WLA. Therefore, it is recommended that the actual planned frequency of monitoring normally be used to determine the value of "n" for calculating the AML. However, in situations where monitoring frequency is once per month or less, a higher value for "n" must be assumed for AML derivation purposes. Thus, the statistical procedure being employed using an assumed number of samples is "n = 4" at a minimum. For Total Ammonia as Nitrogen, "n = 30" is used.

WLA MODELING:

There are two general types of effluent limitations, technology-based effluent limits (TBELs) and water quality based effluent limits (WQBELs). If TBELs do not provide adequate protection for the receiving waters, then WQBEL must be used.

✓ Not applicable; a WLA study was either not submitted or determined not applicable by Department staff.

WATER QUALITY STANDARDS:
Per [10 CSR 20-7.031(4)], general criteria shall be applicable to all waters of the state at all times including mixing zones. Additionally, [40 CFR 122.44(d)(1)] directs the Department to establish in each NPDES permit to include conditions to achieve water quality established under Section 303 of the Clean Water Act, including State narrative criteria for water quality.

WHOLE EFFLUENT TOXICITY (WET) TEST:
A WET test is a quantifiable method of determining if a discharge from a facility may be causing toxicity to aquatic life by itself, in combination with or through synergistic responses when mixed with receiving stream water.

- ✓ Not applicable; at this time, the permittee is not required to conduct WET test for this facility. This facility operates as a no-discharge land application system. Process wastewater and sludge is not discharged.

Part IV. EFFLUENT LIMITS DETERMINATION

OUTFALL #001 – SLUDGE AND SOIL MONITORING REQUIREMENTS

Sludge and soil limitations and monitoring requirements derived and established in the below Limitations and Monitoring Table are based on current operations of the facility. Future permit action due to facility modification may contain new operating permit terms and conditions that supersede the terms and conditions, including effluent limitations, of this operating permit.

The previous permit listed the parameters required for annual testing in a narrative condition. In order to conform to formatting of current permits for monitoring requirements, the permit writer has used best professional judgment to place the sludge and soil parameters in a limitations and monitoring requirements table. The current formatting is displayed below.

LIMITATIONS AND MONITORING TABLE:

PARAMETERS OUTFALL #001	UNIT	BASIS FOR LIMITS	DAILY MAX	MONTHLY AVG	PREVIOUS PERMIT LIMITS	MINIMUM SAMPLING FREQUENCY	MINIMUM REPORTING FREQUENCY	SAMPLE TYPE
SLUDGE CHARACTERISTICS								
EFFECTIVE NEUTRALIZING MATERIAL (ENM)	LBS/TON	6	ANNUAL REPORT			ONCE/YEAR	ONCE/YEAR	COMPOSITE
PH	SU	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
TOTAL KJELDAHL NITROGEN	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
AMMONIA NITROGEN AS N	MG/KG	6	*		NEW	ONCE/YEAR	ONCE/YEAR	COMPOSITE
NITRATE NITROGEN AS N	MG/KG	6	*		NEW	ONCE/YEAR	ONCE/YEAR	COMPOSITE
TOTAL PHOSPHORUS AS P	MG/KG	6	*		NEW	ONCE/YEAR	ONCE/YEAR	COMPOSITE
ALUMINUM, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
ARSENIC, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
CADMIUM, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
CHROMIUM, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
COPPER, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
LEAD, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
MERCURY, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
MOLYBDENUM, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
NICKEL, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
SELENIUM, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
ZINC, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
SOIL CHARACTERISTICS								
EFFECTIVE NEUTRALIZING MATERIAL (ENM)	LBS/TON	6	ANNUAL REPORT			ONCE/YEAR	ONCE/YEAR	COMPOSITE
PH	SU	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
TOTAL KJELDAHL NITROGEN	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
AMMONIA NITROGEN AS N	MG/KG	6	*		NEW	ONCE/YEAR	ONCE/YEAR	COMPOSITE
NITRATE NITROGEN AS N	MG/KG	6	*		NEW	ONCE/YEAR	ONCE/YEAR	COMPOSITE
TOTAL PHOSPHORUS AS P	MG/KG	6	*		NEW	ONCE/YEAR	ONCE/YEAR	COMPOSITE
ALUMINUM, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
ARSENIC, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
CADMIUM, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
CHROMIUM, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
COPPER, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
LEAD, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
MERCURY, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
MOLYBDENUM, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
NICKEL, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
SELENIUM, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE
ZINC, TR	MG/KG	6	*		*	ONCE/YEAR	ONCE/YEAR	COMPOSITE

* - Monitoring requirement only
ǂ The facility will report the minimum and maximum pH values; pH is not to be averaged.
NEW - Parameter not previously established in previous state operating permit.
TR- Total Recoverable

Basis for Limitations Codes:

1. State or Federal Regulation/Law
2. Water Quality Standard (includes RPA)
3. Water Quality Based Effluent Limits
4. Antidegradation Review/Policy
5. Water Quality Model
6. Best Professional Judgment
7. TMDL or Permit in lieu of TMDL
8. WET Test Policy

The previous permit required sludge and soil sampling of the parameters listed in the table above. These parameters represent sludge and soil characteristics used to properly manage land application of this type of material, drinking water treatment plant lime sludge and filter backwash residuals. The permit writer has used best professional judgment to continue monitoring requirements from the previous permits with respect to the land application practice. In addition, the permit writer has used best professional judgment to include other nitrogen species as well as total phosphorus monitoring. The University of Missouri Extension document titled "Crop/Nutrient Consideration for Biosolids" was consulted for these additional parameters. Plant available nitrogen (PAN) will play a key role in application rates of the sludge. Please see the list below for all applicable guidance documents regarding land application of sludge.

- Brown, James R. "Crop/Nutrient Consideration for Biolsolids". *University of Missouri Extension*, December 1994. http://extension.missouri.edu/p/WQ430
- Arnold, Ken., Dunn, John H., Sievers, Dennis., "Biosolids Standards for Metals and Other Trace Substances". *University of Missouri Extension*, April 1995. http://extension.missouri.edu/p/WQ425
- Scharf, Peter C. "Liming Missouri Soils". *University of Missouri Extension*, February 2000. http://extension.missouri.edu/p/G9102
- Buchholz, Daryl D. "Missouri Limestone Quality: What is ENM?. *University of Missouri Extension*, October 1993. http://extension.missouri.edu/p/G9107.

OUTFALL #002, #003 AND #004 – STORMWATER OUTFALLS FROM SLUDGE STORAGE SITE

Effluent limitations derived and established in the below Effluent Limitations Table are based on current operations of the facility. Future permit action due to facility modification may contain new operating permit terms and conditions that supersede the terms and conditions, including effluent limitations, of this operating permit.

Effluent limitations and monitoring requirements for all stormwater outfalls from the sludge storage site have been revised in this permit. Due to the nature of the discharges from these outfalls being stormwater, only a maximum daily limit (MDL) or monitoring requirement will be implemented for many of the parameters listed below. Stormwater events are acute occurrences that result in the greatest concentrations of pollutants being discharged in the first part of the runoff. This first flush can best be represented by a grab sample within the first hours of runoff. Additionally, stormwater events are highly variable. Recording an average monthly limit (AML) is not representative of the nature of these discharges. The MDL for each pollutant of concern discussed above for Outfall #001 will be applied to these outfalls. Please see the derivations above for a narrative discussion for continuing limits or monitoring for these parameters.

EFFLUENT LIMITATIONS TABLE:

PARAMETERS OUTFALL #002, #003, & #004	UNIT	BASIS FOR LIMITS	DAILY MAX	MONTHLY AVG	PREVIOUS PERMIT LIMITS	MINIMUM SAMPLING FREQUENCY	MINIMUM REPORTING FREQUENCY	SAMPLE TYPE
PHYSICAL								
FLOW	MGD	1	*	REMOVED	*/*	ONCE/DAY	ONCE/QUARTER	24 HR. TOT
HARDNESS	mg/L	6	*	REMOVED	*/*	ONCE/QUARTER	ONCE/QUARTER	GRAB
PRECIPITATION	INCHES	6	*	REMOVED	*/*	ONCE/DAY	ONCE/QUARTER	TOTAL
TEMPERATURE	°F	1, 6	REMOVED	REMOVED	*/*	ONCE/QUARTER	ONCE/QUARTER	GRAB
CONVENTIONAL								
COD	MG/L	6	*	REMOVED	*/*	ONCE/QUARTER	ONCE/QUARTER	GRAB
CHLORINE, TOTAL RESIDUAL	µg/L	1, 3	17	REMOVED	17/8	ONCE/QUARTER	ONCE/QUARTER	GRAB
CYANIDE, AMENABLE TO CHLORINATION	µg/L	1, 3	*	REMOVED	*/*	ONCE/QUARTER	ONCE/QUARTER	GRAB
OIL & GREASE	MG/L	1, 3	10	REMOVED	15/10	ONCE/QUARTER	ONCE/QUARTER	GRAB
pH ǂ	SU	1, 3	6.5-9.0	REMOVED	6.5-9.0	ONCE/QUARTER	ONCE/QUARTER	GRAB
SETTLEABLE SOLIDS	ML/L/HR	6	1.0	REMOVED	1.0/1.0	ONCE/QUARTER	ONCE/QUARTER	GRAB
TSS	MG/L	1, 4	*	REMOVED	*/*	ONCE/QUARTER	ONCE/QUARTER	GRAB
METALS								
ALUMINUM, TR	µg/L	1, 2, 3, 6	750	REMOVED	750/374	ONCE/QUARTER	ONCE/QUARTER	GRAB
BERYLLIUM, TR	µg/L	1, 6	*	REMOVED	*/*	ONCE/QUARTER	ONCE/QUARTER	GRAB
CADMIUM, TR	µg/L	1, 6	*	REMOVED	*/*	ONCE/QUARTER	ONCE/QUARTER	GRAB
CHROMIUM (VI), DISSOLVED	µg/L	1, 6	*	REMOVED	*/*	ONCE/QUARTER	ONCE/QUARTER	GRAB
COPPER, TR	µg/L	1, 6	*	REMOVED	*/*	ONCE/QUARTER	ONCE/QUARTER	GRAB
IRON, TR	µg/L	1, 2, 3, 6	1639	REMOVED	1639/817	ONCE/QUARTER	ONCE/QUARTER	GRAB
LEAD, TR	µg/L	1, 6	*	REMOVED	*/*	ONCE/QUARTER	ONCE/QUARTER	GRAB
MERCURY, TR	µg/L	1, 6	*	REMOVED	*/*	ONCE/QUARTER	ONCE/QUARTER	GRAB
SELENIUM, TR	µg/L	1, 6	*	REMOVED	*/*	ONCE/QUARTER	ONCE/QUARTER	GRAB
SILVER, TR	µg/L	1, 6	*	REMOVED	*/*	ONCE/QUARTER	ONCE/QUARTER	GRAB
THALLIUM, TR	µg/L	1, 6	*	REMOVED	*/*	ONCE/QUARTER	ONCE/QUARTER	GRAB
NUTRIENTS								
AMMONIA AS N (APR 1 – SEPT 30)	MG/L	2, 3, 5	*	REMOVED	*/*	ONCE/QUARTER	ONCE/QUARTER	GRAB
AMMONIA AS N (OCT 1 – MARCH 31)	MG/L	2, 3, 5	*	REMOVED	*/*	ONCE/QUARTER	ONCE/QUARTER	GRAB
NITROGEN, TOTAL N (TN)	MG/L	1, 6	*	-	NEW	ONCE/QUARTER	ONCE/QUARTER	GRAB
PHOSPHORUS, TOTAL P (TP)	MG/L	1, 6	*	-	NEW	ONCE/QUARTER	ONCE/QUARTER	GRAB
OTHER								
FLUORIDE	mg/L	1,6	*	REMOVED	*/*	ONCE/QUARTER	ONCE/QUARTER	GRAB

* - Monitoring requirement only
ǂ The facility will report the minimum and maximum pH values; pH is not to be averaged.
NEW - Parameter not previously established in previous state operating permit.
TR- Total Recoverable

Basis for Limitations Codes:

1. State or Federal Regulation/Law
2. Water Quality Standard (includes RPA)
3. Water Quality Based Effluent Limits
4. Antidegradation Review/Policy
5. Water Quality Model
6. Best Professional Judgment
7. TMDL or Permit in lieu of TMDL
8. WET Test Policy

PHYSICAL:

Flow

In accordance with [40 CFR Part 122.44(i)(1)(ii)] the volume of effluent discharged from each outfall is needed to assure compliance with permitted effluent limitations. If the permittee is unable to obtain effluent flow, then it is the responsibility of the permittee to inform the department, which may require the submittal of an operating permit modification. The facility will report the total flow in millions of gallons per day (MGD).

Hardness

Monitoring only requirement; measuring the hardness will allow the permittee to characterize the wastewater as it pertains to influence on hardness based parameters. Hardness in water provides binding sites for certain pollutants to adsorb to, thus reducing the amount of dissolved pollutant in the discharge. Dissolved phases of pollutants are more readily available for uptake in aquatic life. The department can use the data during permit renewals to calculate site-specific effluent limitations with respect to site-specific water hardness.

Precipitation

Monitoring only requirement; measuring the amount of precipitation [(10 CSR 20-6.200(2)(C)1.E(VI)] during an event is necessary to ensure adequate stormwater management exists at the site. Knowing the amount of potential stormwater runoff can provide the permittee a better understanding of specific control measure that should be employed to ensure protection of water quality. The facility will provide the 24 hour accumulation value of precipitation from the day of sampling the other parameters. It is not necessary to report all days of precipitation during the quarter because of the readily available on-line data.

Temperature

In accordance with 10 CSR 20-7.031(5)(D), water contaminant sources shall not cause or contribute to stream temperature in excess of ninety degrees Fahrenheit (90 °F) or thirty-two and two-ninths degrees Celsius (32 2/9 °C). In order to reduce confusion and duplicative monitoring or reporting requirements, the permit will only require that temperature be monitored and reported in degrees Celsius. It is not necessary to report in both Celsius and Fahrenheit.

CONVENTIONAL:

Chemical Oxygen Demand (COD)

Monitoring is included using the permit writer's best professional judgment. There is no water quality standard for COD; however, increased oxygen demand may impact instream water quality. COD is also a valuable indicator parameter. COD monitoring allows the permittee to identify increases in COD that may indicate materials/chemicals coming into contact with stormwater that cause an increase in oxygen demand. Increases in COD may indicate a need for maintenance or improvement of BMPs. The previous permit established a benchmark value of 90 mg/L for this pollutant, stating that the benchmark value was taken from the general stormwater permit MO-R22A. The MO-R22A permit addresses stormwater runoff from lumber and wood product operations. It is unclear why this permit was referenced in this permit. However, in order to conform to the federal regulations on anti-backsliding, the benchmark value will remain in the permit. The facility operates as a no-discharge land application system, thus is able to comply with the current conditions.

Chlorine, Total Residual (TRC)

Effluent limitations of 17 µg/L as a daily maximum and 8 µg/L as a monthly average have been reassessed and determined to be protective of water quality. Thus, the current limits will be carried over from the previous permit. Additionally, the facility chlorinates the water either before or after filtration. Warm-water Protection of Aquatic Life CCC = 10 µg/L, CMC = 19 µg/L [10 CSR 20-7.031, Table A]. Background = 0 µg/L.

Acute WLA:	$C_e = ((6.9 + 0.0)19 – (0.0 * 0.0))/6.9$	C_e = 19 µg/L
Chronic WLA:	$C_e = ((6.9 + 0.0)10 – (0.0 * 0.0))/6.9$	C_e = 10 µg/L
$LTA_a = 19 (0.321) = 6.1$ µg/L		[CV = 0.6, 99th Percentile]
$LTA_c = 10 (0.527) =$ **5.3** µg/L		[CV = 0.6, 99th Percentile]
Use most protective number of LTA_a or LTA_c.		
MDL = 5.3 (3.11) = 16.5 µg/L	= 17 µg/L	[CV = 0.6, 99th Percentile]
AML = 5.3 (1.55) = 8.2 µg/L	= 8 µg/L	[CV = 0.6, 95th Percentile, n = 4]

Cyanide, Amenable to Chlorination (CN-AC)
Monitoring only has continued from the previous permit using the permit writer's best professional judgment. There is insufficient data to make a reasonable potential determination. This effluent limit is below the accepted minimum quantification level (ML). The department has determined the current acceptable minimum level (ML) of cyanide amenable to chlorination to be 5 µg/L when using Method #9102A from the U.S. EPA National Exposure Research Laboratory. This method is used to determine the concentration of inorganic cyanide that is present as either soluble salts or complexes in wastes or leachate. The permittee will conduct analyses in accordance with this method, or equivalent, and report actual analytical values. Measured values greater than or equal to the minimum quantification level of 5 µg/L will be considered violations of the permit and values less than the minimum quantification level of 5 µg/L will be considered to be in compliance with the permit limitation. The minimum quantification level does not authorize the discharge of cyanide in excess of the effluent limits stated in the permit.

Oil & Grease
Conventional pollutant, in accordance with 10 CSR 20-7.031 Table A: *Criteria for Designated Uses*; 10 mg/L. The water quality standard will be applied as a daily maximum limit and a monthly average limit. The value of 10 mg/L represents the concentration at which a sheen can observed on the water, which is a violation of general criteria 10 CSR 20-7.031(4)(B).

pH
6.5 to 9.0 SU. The Water Quality Standard at 10 CSR 20-7.031(5)(E) states water contaminants shall not cause pH to be outside the range of 6.5 to 9.0 standard pH units.

Settleable Solids (SS)
Effluent limitations of 1.0 mL/L/hr as a daily maximum and monthly average will continue using the permit writer's best professional judgment. There is no water quality standard for SS; however, sediment discharges can negatively impact aquatic life habitat. Settleable solids are also a valuable indicator parameter. Solids monitoring allows the permittee to identify increases in sediment and solids that may indicate uncontrolled materials leaving the site. Additionally, the value of 1.0 mL/L/hr represents the rate at which bottom deposits form in the receiving stream from settling of solids, including lime and filter backwash sludge, which is a violation of general criteria 10 CSR 20-7.031(4)(A).

Total Suspended Solids (TSS)
Monitoring only has continued from the previous permit using the permit writer's best professional judgment. There is no water quality standard for TSS; however, sediment discharges can negatively impact aquatic life habitat. TSS is also a valuable indicator parameter. TSS monitoring allows the permittee to identify increases in TSS that may indicate uncontrolled materials leaving the site. The previous permit established a benchmark value of 50 mg/L for this pollutant, stating that the benchmark value was taken from the general stormwater permit MO-R22A. The MO-R22A permit addresses stormwater runoff from lumber and wood product operations. It is unclear why this permit was referenced in this permit. However, in order to conform to the federal regulations on anti-backsliding, the benchmark value will remain in the permit. The facility operates as a no-discharge land application system, thus is able to comply with the current conditions.

METALS:

Metals
Effluent limitations for total recoverable metals were developed using methods and procedures outlined in the *Technical Support Document For Water Quality-based Toxic Controls* (EPA/505/2-90-001) and *The Metals Translator: Guidance For Calculating A Total Recoverable Permit Limit From A Dissolved Criterion* (EPA 823-B-96-007). General warm-water habitat criteria apply (WWH) designated as AQL in 10 CSR 20-7.031Table A; and a water hardness of 193 mg/L is used in the conversion below. A hardness value of 193 mg/L is applied to stormwater discharges. The permit writer has used best professional judgment to use this default value for effluent calculations from Outfall #001 as well. Discharge of wastewater with lime solids and filter backwash solids is likely to have a higher concentration of hardness than other types of discharges. Therefore, it is appropriate to apply a higher hardness value.

Due to the absence of contemporaneous effluent and instream data for total recoverable metals, dissolved metals, hardness, and total suspended solids with which to calculate metals translators, partitioning between the dissolved and absorbed phases was assumed to be minimal (Section 5.7.3, EPA/505/2-90-001). Freshwater criteria conversion factors for dissolved metals were used as the metals translator as recommended in guidance (Section 1.3, 1.5.3, and Table 1, EPA 823-B-96-007). If concurrent site-specific data for total recoverable metals, dissolved metals, hardness, and total suspended solids are provided to the department, partitioning evaluations may be considered and site-specific translators developed.

METAL	CONVERSION FACTORS	
	ACUTE	CHRONIC
Aluminum	N/A	N/A
Beryllium	N/A	N/A
Cadmium	0.916	0.881
Chromium VI	N/A	N/A
Copper	0.960	0.960
Iron	N/A	N/A
Lead	0.695	0.695
Mercury	0.85	N/A
Selenium	N/A	N/A
Silver	0.850	N/A
Thallium	N/A	N/A

Conversion factors for Cd and Pb are hardness dependent. N/A = not applicable.
Values calculated using equation found in Section 1.3 of EPA 823-B-96-007 and hardness = 193 mg/L.

Aluminum, Total Recoverable

Effluent limitations of 750 µg/L as a daily maximum and 374 µg/L as a monthly average will continue in this permit. A reasonable potential analysis was not conducted due to insufficient data. However, the permittee submitted a value of 3,250 mg/L (3,250 mg/Kg) on the permit application for sludge concentrations. The permit writer has used best professional judgment to determine that, with lack of proof otherwise, the facility has potential to exceed water quality standards during a discharge. Continuing implementation of the established effluent limitations also conforms to federal regulations regarding anti-backsliding.

Acute WQS = 750 µg/L
Acute WLA: $C_e = ((6.9 + 0.0)750 – (0.0 * 0.0))/6.9$ $C_e = 750$ µg/L
$LTA_a = 750\ (0.321) =$ **240.81** µg/L [CV = 0.6, 99th Percentile]
MDL = 240.81 (3.11) = 750 µg/L [CV = 0.6, 99th Percentile]
AML = 240.81 (1.55) = 374 µg/L [CV = 0.6, 95th Percentile, n = 4]

Beryllium, Cadmium, Chromium VI, Copper, Lead, Mercury, Selenium, Silver, Thallium (all Total Recoverable)

Monitoring only will continue in this permit. A reasonable potential analysis was not conducted due to insufficient data. The permit writer has used best professional judgment to continue monitoring in order to collect sufficient data to make a determination.

Iron, Total Recoverable

Effluent limitations of 1,639 µg/L as a daily maximum and 817 µg/L as a monthly average will continue in this permit. A reasonable potential analysis was not conducted due to insufficient data. However, the permittee submitted a value of 11,100 mg/L (11,100 mg/Kg) on the permit application for sludge concentrations. The permit writer has used best professional judgment to determine that, with lack of proof otherwise, the facility has potential to exceed water quality standards during a discharge. Continuing implementation of the established effluent limitations also conforms to federal regulations regarding anti-backsliding.

Chronic WQS = 1,000 µg/L
Chronic WLA: $C_e = ((6.9 + 0.0)1{,}000 – (0.0 * 0.0))/6.9$ $C_e = 1{,}000$ µg/L
$LTA_c = 1{,}000\ (0.527) =$ **527** µg/L [CV = 0.6, 99th Percentile]
MDL = 527 (3.11) = 1,639 µg/L [CV = 0.6, 99th Percentile]
AML = 527 (1.55) = 817 µg/L [CV = 0.6, 95th Percentile, n = 4]

NUTRIENTS:

Ammonia, Total as Nitrogen

Monitoring only has continued from the previous permit using the permit writer's best professional judgment. A reasonable potential analysis was not conducted due to insufficient data. The permit writer has used best professional judgment to determine that, with lack of proof otherwise, the facility has potential to exceed water quality standards during a discharge. Continuing implementation of the monitoring requirements also conforms to federal regulations regarding anti-backsliding.

Nitrogen, Total N (TN)

Per 10 CSR 20-7.015(9)(D)7, nutrient monitoring shall be instituted on a quarterly basis for facilities with a design flow greater than 0.1 MGD.

Phosphorous, Total P (TN)
Per 10 CSR 20-7.015(9)(D)7, nutrient monitoring shall be instituted on a quarterly basis for facilities with a design flow greater than 0.1 MGD.

OTHER:

Fluoride
Monitoring only will continue in this permit. A reasonable potential analysis was not conducted due to insufficient data. The permit writer has used best professional judgment to continue monitoring in order to collect sufficient data to make a determination. Additionally, the facility fluoridates the water either before or after filtration. There is a potential for fluoride to be in the discharge.

s in COD that may indicate materials/chemicals coming into contact with stormwater that cause an increase in oxygen demand. Increases in COD may indicate a need for maintenance or improvement of BMPs.

Oil & Grease
Monitoring is included using the permit writer's best professional judgment. Stormwater runoff from the water treatment area may contain petroleum products for fuel or lubricants that can contribute to increased oils and greases in the receiving stream. This may cause a violation of the general criteria 10 CSR 20-7.031(4)(B). Monitoring for oil and grease will indicate uncontrolled materials leaving the site and can also help identify leaks or spills that may have occurred onsite that need to be cleaned appropriately.

Part V. SAMPLING AND REPORTING REQUIREMENTS:

Refer to each outfall's derivation and discussion of limits section to review individual sampling and reporting frequencies and sampling type.

ELECTRONIC DISCHARGE MONITORING REPORT (EDMR) SUBMISSION SYSTEM:
The U.S. Environmental Protection Agency (EPA) promulgated a final rule on October 22, 2015, to modernize Clean Water Act reporting for municipalities, industries, and other facilities by converting to an electronic data reporting system. This final rule requires regulated entities and state and federal regulators to use information technology to electronically report data required by the National Pollutant Discharge Elimination System (NPDES) permit program instead of filing paper reports. To comply with the federal rule, the Department is requiring all permittees to begin submitting discharge monitoring data and reports online.

Per 40 CFR 127.15 and 127.24, permitted facilities may request a temporary waiver for up to 5 years or a permanent waiver from electronic reporting from the Department. To obtain an electronic reporting waiver, a permittee must first submit an eDMR Waiver Request Form: http://dnr.mo.gov/forms/780-2692-f.pdf. A request must be made for each facility. If more than one facility is owned or operated by a single entity, then the entity must submit a separate request for each facility based on its specific circumstances. An approved waiver is non-transferable.

The Department must review and notify the facility within 120 calendar days of receipt if the waiver request has been approved or rejected [40 CFR 124.27(a)]. During the Department review period as well as after a waiver is granted, the facility must continue submitting a hard-copy of any reports required by their permit. The Department will enter data submitted in hard-copy from those facilities allowed to do so and electronically submit the data to the EPA on behalf of the facility.

- ✓ The permittee/facility is not currently using the eDMR data reporting system. The permittee shall submit an eDMR Permit Holder and Certifier Registration form within **90 days** of the effective date of this permit.

SAMPLING FREQUENCY JUSTIFICATION:
Sampling and reporting frequencies were generally retained from previous permit. All parameters for all outfalls, except for flow and precipitation from Outfall #001, will still be required to have a quarterly sample and a quarterly report. Since the facility operates as a non-discharging system and the stream does not appear to be impaired as a result of discharges from this facility, the quarterly frequencies have been determined to be adequate to protect water quality. The new stormwater outfalls will have the same frequencies.

Sludge and soil monitoring will be conducted once per year during land application. Reports will be submitted once per year on the 28th day of the following calendar year.

SAMPLING TYPE JUSTIFICATION:
Sampling type was continued from the previous permit. The sampling types are representative of the discharges, and are protective of water quality. Discharges with altering effluent should have composite sampling; discharges with uniform effluent can have grab samples. Grab samples are usually appropriate for stormwater.

Sludge samples shall be collected as a composite sample made up of one grab sample from each sludge lagoon. Soil samples shall be collected as composite sample in accordance with the following soil sampling guidance:

- Lory, John and Steve Cromley. "Soil Sampling Pastures". *University of Missouri Extension*, February 2005. http://extension.missouri.edu/p/G9215
- Lory, John and Steve Cromley. "Soil Sampling Hayfields and Row Crops". *University of Missouri Extension*, February 2005. http://extension.missouri.edu/p/G9217

Part VI. COST ANALYSIS FOR COMPLIANCE

Pursuant to Section 644.145, RSMo, when issuing permits under this chapter that incorporate a new requirement for discharges from publicly owned combined or separate sanitary or storm sewer systems or publicly owned treatment works, or when enforcing provisions of this chapter or the Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq., pertaining to any portion of a publicly owned combined or separate sanitary or storm sewer system or [publicly owned] treatment works, the Department of Natural Resources shall make a "finding of affordability" on the costs to be incurred and the impact of any rate changes on ratepayers upon which to base such permits and decisions, to the extent allowable under this chapter and the Federal Water Pollution Control Act. This process is completed through a cost analysis for compliance. Permits that do not include new requirements may be deemed affordable.

☒ - The Department is required to determine "findings of affordability" because the permit applies to a combined or separate sanitary sewer system for a publically-owned treatment works.

Cost Analysis for Compliance - The Department has made a reasonable search for empirical data indicating the permit is affordable. The search consisted of a review of Department records that might contain economic data on the community, a review of information provided by the applicant as part of the application, and public comments received in response to public notices of this draft permit. If the empirical cost data was used by the permit writer, this data may consist of median household income, any other ongoing projects that the Department has knowledge, and other demographic financial information that the community provided as contemplated by Section 644. 145.3. See **Appendix – Cost Analysis for Compliance.**

Part VII. ADMINISTRATIVE REQUIREMENTS

On the basis of preliminary staff review and the application of applicable standards and regulations, the Department, as administrative agent for the Missouri Clean Water Commission, proposes to issue a permit(s) subject to certain effluent limitations, schedules, and special conditions contained herein and within the operating permit. The proposed determinations are tentative pending public comment.

PERMIT SYNCHRONIZATION:
The Department of Natural Resources is currently undergoing a synchronization process for operating permits. Permits are normally issued on a five-year term, but to achieve synchronization many permits will need to be issued for less than the full five years allowed by regulation. The intent is that all permits within a watershed will move through the Watershed Based Management (WBM) cycle together will all expire in the same fiscal year. http://dnr.mo.gov/env/wpp/cpp/docs/watershed-based-management.pdf. This will allow further streamlining by placing multiple permits within a smaller geographic area on public notice simultaneously, thereby reducing repeated administrative efforts. This will also allow the department to explore a watershed based permitting effort at some point in the future. Renewal applications must continue to be submitted within 180 days of expiration, however, in instances where effluent data from the previous renewal is less than three years old, that data may be re-submitted to meet the requirements of the renewal application. If the permit provides a schedule of compliance for meeting new water quality based effluent limits beyond the expiration date of the permit, the time remaining in the schedule of compliance will be allotted in the renewed permit. *This permit will become synchronized by expiring at the end of the third calendar quarter of 2019.*

PUBLIC NOTICE:
The Department shall give public notice that a draft permit has been prepared and its issuance is pending. http://dnr.mo.gov/env/wpp/permits/pn/index.html Additionally, public notice will be issued if a public hearing is to be held because of a significant degree of interest in and water quality concerns related to a draft permit. No public notice is required when a request for a permit modification or termination is denied; however, the requester and permittee must be notified of the denial in writing.

The Department must issue public notice of a pending operating permit or of a new or reissued statewide general permit. The public comment period is the length of time not less than 30 days following the date of the public notice which interested persons may submit written comments about the proposed permit.

For persons wanting to submit comments regarding this proposed operating permit, then please refer to the Public Notice page located at the front of this draft operating permit. The Public Notice page gives direction on how and where to submit appropriate comments.

☒ - The Public Notice period for this operating permit began on November 10, 2016 and ended on December 12, 2016. No comments were received during this Public Notice period. The permit writer noticed several minor items that needed correcting or revising prior to issuance. The first was clarification that the sludge is stored on site prior to hauling off site for land application. The facility description has been updated. The second is removing the note associate with cyanide. There is no effluent limitation for cyanide so the note regarding analytical detection limits is not necessary. The third is related to the sludge and soil parameter Effective Neutralizing Material (ENM). There is no parameter or code remotely resembling this parameter in the Department's compliance tracking database. Thus, the monitoring condition was converted from table format, typically associated with numeric values, to a narrative reporting condition. This way, the permittee can still report this value in the database as an attachment. And finally in the permit, the eDMR condition was updated to current language. This does not have any additional requirements from the old language used during the Public Notice period; however, it clarifies the requirements associated with eDMR. Additionally, the factsheet was updated and revised to reflect appropriate conditions at the site and appropriate requirements on those conditions. These minor revisions do not require an additional Public Notice because there are no added or removed requirements/conditions.

DATE OF FACT SHEET: DECEMBER 19, 2016

COMPLETED BY:

LOGAN COLE, ENVIRONMENTAL SPECIALIST
MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
OPERATING PERMITS SECTION - INDUSTRIAL UNIT
(573) 751-5827
logan.cole@dnr.mo.gov

APPENDIX A – SOLID WASTE MANAGEMENT PROGRAM'S NOVEMBER 16, 2015 LETTER OF APPROVAL FOR ALTERNATE CLOSURE PLAN FOR LIME SOFTENING RESIDUALS DISPOSAL AREA

STATE OF MISSOURI
Jeremiah W. (Jay) Nixon, Governor • Sara Parker Pauley, Director
DEPARTMENT OF NATURAL RESOURCES
www.dnr.mo.gov

NOV 16 2015

David O. Storvick, P.E.
City of Columbia
Water and Light Department
105 East Ash Street, P.O. Box 6015
Columbia, MO 65205-6015

RE: City of Columbia Water Treatment Plant, Beneficial Use Request for Lime Softening Residuals – Alternate Closure Plan, Boone County

Dear Mr. Storvick:

This letter is in response to your letter regarding an alternate closure plan for the Lime Softening Residuals (LSRs) area located immediately north of the Columbia Water Treatment Plant. The letter was dated September 6, 2013, and received by the Department of Natural Resources' Solid Waste Management Program (SWMP) on September 9, 2013. The alternate closure plan was submitted on your behalf by Lindsey R. Henry, P.E., of Midwest Environmental Consultants. The letter presents findings from the approved LSR sampling plan, including figures delineating the areas found to exceed the Lowest Default Target Levels (LDTLs) for arsenic and lead. The alternate closure plan proposes to cap only the areas that exceed the LDTLs, approximately only 1/3 of the site, leaving 8.6 acres that have received LSRs to be undisturbed.

The SMWP has further reviewed the alternate closure plan and after further deliberation has determined that this plan is acceptable. The SWMP hereby approves the request to employ an alternate closure plan. Please provide a new submittal that reflects the closure grading plan and drainage improvements. Specifications that support this construction must also be submitted with this proposal and must comply with the following conditions:

CONDITIONS:

1. The design plan must be prepared by a professional engineer registered in the state of Missouri.

2. Submit the enclosed "Statement of Beneficial Use Closure" form, describing the location, type, quantity, and depth of material used to complete the project, which shall also be recorded on the property deed of the site. We also recommend that a notice be attached to the deed advising against any type of activity that would disturb the fill material, such as, but not limited to, construction of residences or buildings of any kind, wells, utility

6. The department's SWMP must be notified in writing at least 7 days prior to commencing site grading and capping activities so we may have the opportunity to observe grading and cap placement.

7. The department's SWMP shall be notified within seven (7) days of completing the placement of cap and vegetative soil layer.

Please submit three (3) copies of the closure plan (one (1) original and two (2) copies of the original), to the SWMP for review within 120 days of receipt of this letter.

This letter corrects and supersedes our prior letter to you dated May 27, 2015.

If you have any questions or comments, please contact Darrell G. Hartley, P.E. of my staff at (573) 526-3940 or at P.O. Box 176, Jefferson City, MO 65102-0176.

Sincerely,

SOLID WASTE MANAGEMENT PROGRAM

Charlene S. Fitch, P.E.
Chief, Engineering Section

CSF:dpl

Enclosure

c: Lindsey Henry, P.E., President, Midwest Environmental Consultants
Mr. Larry Lehman, Chief, Compliance/Enforcement Section, SWMP
Mr. Chris Nagel, Director, SWMP
Northeast Regional Office via Electronic Shared File

STATE OF MISSOURI
Jeremiah W. (Jay) Nixon, Governor • Sara Parker Pauley, Director
DEPARTMENT OF NATURAL RESOURCES
www.dnr.mo.gov

MAR 29 2016

David O. Storvick, P.E.
City of Columbia
Water and Light Department
105 East Ash Street, P.O. Box 6015
Columbia, MO 65205-6015

RE: City of Columbia Water Treatment Plant, Time Extension Request for Beneficial Use Request for Lime Softening Residuals, Alternate Closure Plan, Boone County

Dear Mr. Storvick:

This letter is in response to your time extension request letter dated March 15, 2016, and received by the Department of Natural Resources' Solid Waste Management Program (SWMP) on March 18, 2016. The letter was in response to a previous SWMP conditional approval letter dated November 16, 2015, that approved an alternate closure plan for the beneficial use of lime softening residuals, which required a response within 120 days.

The SMWP has reviewed your time extension request and hereby grants a ninety (90) day extension for the submittal of the alternate closure plan that must abide by all the conditions stated in the November 16, 2015, letter. The closure plan must be submitted within ninety (90) days of receipt of this letter.

If you have any questions or comments, please contact Darrell G. Hartley, P.E. of my staff at (573) 526-3940 or at P.O. Box 176, Jefferson City, MO 65102-0176.

Sincerely,

SOLID WASTE MANAGEMENT PROGRAM

Charlene S. Fitch

Charlene S. Fitch, P.E.
Chief, Engineering Section

CSF:dpl

c: Mr. Larry Lehman, Chief, Compliance/Enforcement Section, SWMP
Northeast Regional Office via Electronic Shared File

APPENDIX B – COST ANALYSIS FOR COMPLIANCE:

Missouri Department of Natural Resources
Water Protection Program
Cost Analysis for Compliance
(In accordance with RSMo 644.145)

City of Columbia Water Treatment Plant
City of Columbia
Missouri State Operating Permit #MO-0136034

Section 644.145 RSMo requires the Department of Natural Resources (DNR) to make a "finding of affordability" when "issuing permits under" or "enforcing provisions of" state or federal clean water laws "pertaining to any portion of a combined or separate sanitary sewer system for publicly-owned treatment works."

This cost analysis is based on data available to the Department as provided by the permittee and data obtained from readily available sources. For the most accurate analysis, it is essential that the permittee provides the Department with current information about the City of Columbia's financial and socioeconomic situation. The financial questionnaire available to permittees on the DNR website (http://dnr.mo.gov/forms/780-2511-f.pdf) should have been submitted with the permit renewal application. If it was not received with the renewal application, the Department sent a request to complete it with the welcome letter.

The Department is required to issue a permit with final effluent limits in accordance with 644.051.1.(1) RSMo, 644.051.1.(2) RSMo, and the Clean Water Act. The practical result of this analysis is to incorporate a compliance schedule into the permit in order to mitigate adverse impact to distressed populations resulting from new costs for the wastewater treatment facility.

Facility Description:

Residential Connections:	Not Provided
Commercial Connections:	Not Provided
Industrial Connections:	Not Provided
Total Connections for this facility:	48,000

The permittee did not provide any information on the number of customers or types of customers serviced by the drinking water treatment plant. The number 48,000 was found on the City of Columbia's website discussing their Water Resource Plan. Towards the bottom of the webpage reads the following statement: "We rely on the City's water system to treat and transport water to 48,000 customers (a population of over 115,000 people) residing and working in our 89 square mile service area." You can view the information at the following link: https://www.como.gov/WaterandLight/Water/WaterIntegratedResourcePlan.php.

New Permit Requirements:

The permit requires compliance with new monitoring requirements for the existing outfalls and new monitoring requirements associated with new outfalls listed in the permit. The new monitoring requirements are itemized by outfall below:

- Outfall #001: Annual Sludge Testing – ammonia nitrogen as N, nitrate nitrogen as N, and total phosphorus as P
- Outfall #001: Annual Soil Testing – ammonia nitrogen as N, nitrate nitrogen as N, and total phosphorus as P
- Outfall #002: Quarterly Stormwater Testing – total nitrogen as N, total phosphorus as P
- Outfall #003: Quarterly Stormwater Testing – total nitrogen as N, total phosphorus as P
- Outfall #004: Quarterly Stormwater Testing – total nitrogen as N, total phosphorus as P

Anticipated Costs Associated with Complying with the New Requirements:

The total cost estimated for new monitoring requirements is $1,292 annually. This cost, if financed through user fees, might cost each customer an extra $0.0022[1] per month. This value was calculated using the total connections of 48,000 discussed above. However, it appears that the City of Columbia uses a usage-based system to determine fees with different schedules for residential, industrial, and commercial facilities. It is unknown how the City of Columbia will re-distribute the estimated costs associated with the new monitoring requirements to its customers. The percentage of the current user rate that is available to cover new debt is also unknown to the Department.

(1) A community's financial capability and ability to raise or secure necessary funding;

Due to the minimal cost associated with this new permit requirement, the Department anticipates the City of Columbia has the means to raise $1,292 annually.

(2) Affordability of pollution control options for the individuals or households at or below the median household income level of the community;

The total cost estimated for the new monitoring requirements is $1,292 annually. This cost, if financed through user fees, might cost each customer an extra $0.0022 per month. This would make the additional cost per customer as a percent of median household income (MHI) 0.0001%[2] based on the City of Columbia's MHI of $44,840. Please note that this is not an accurate determination of cost burden to the community. Not all customers are residential and thus are not subject to the same MHI evaluation. However, with lack of any other information or way to determine cost burden, the permit writer will utilize this method to assist in determining the overall financial burden the new permit will place on the community. Due to the minimal cost associated with this new requirement, the Department anticipates an extremely low to no rate increase will be necessary that could impact individuals or households of the community.

(3) An evaluation of the overall costs and environmental benefits of the control technologies;

Outfall #001, Sludge and Soil testing: Ammonia nitrogen as N, nitrate nitrogen as N, and total phosphorus as P are limiting pollutants in land application systems. Monitoring these pollutants in the treatment plant sludge and the soil will assist the permittee in proper operations and maintenance of the onsite land application activity. Concentrations of these pollutants can impact loading rates and ability of soils to effectively treat the wastewater.

Outfalls #002, #003, and #004: Total nitrogen as N and total phosphorus as P are pollutants of concern in stormwater runoff from the onsite sludge application area. These pollutants can deplete dissolved oxygen available to aquatic life and can support growth of algal blooms that can contribute to foul tastes and odors in the drinking water, unsightly appearance, and fish mortality in the waterbody.

Monitoring all these pollutants will improve the facilities operations and discharge performance, which will ultimately mitigate environmental degradation.

(4) Inclusion of ongoing costs of operating and maintaining the existing wastewater collection and treatment system, including payments on outstanding debts for wastewater collection and treatment systems when calculating projected rates:

The community did not provide the Department with information, nor could it be found through readily available data.

(5) An inclusion of ways to reduce economic impacts on distressed populations in the community, including but not limited to low and fixed income populations. This requirement includes but is not limited to:

(a) Allowing adequate time in implementation schedules to mitigate potential adverse impacts on distressed populations resulting from the costs of the improvements and taking into consideration local community economic considerations.
(b) Allowing for reasonable accommodations for regulated entities when inflexible standards and fines would impose a disproportionate financial hardship in light of the environmental benefits to be gained.

Socioeconomic Data[3-6]:

Potentially Distressed Populations – City of Columbia	
Total Population	111,145
Unemployment	2.8%
Adjusted Median Household Income (MHI)	$44,840
Percent Change in MHI (2000-2012)	+32.9%
Percent Population Growth/Decline (2000-2012)	+26.9%
Median Age in Years	26.9
Percent of Households in Poverty	24.5%
Percent of Households Relying on Food Stamps	10.9%

(6) An assessment of other community investments and operating costs relating to environmental improvements and public health protection;

The community did not report any other investments relating to environmental improvements.

(7) An assessment of factors set forth in the United States Environmental Protection Agency's guidance, including but not limited to the "Combined Sewer Overflow Guidance for Financial Capability Assessment and Schedule Development" that may ease the cost burdens of implementing wet weather control plans, including but not limited to small system considerations, the attainability of water quality standards, and the development of wet weather standards;

The new sampling requirements associated with this permit will not impose a financial burden on the community, nor will the new requirements require the City of Columbia to seek funding from an outside source.

(8) An assessment of any other relevant local community economic condition.

The community did not report any other relevant local economic conditions.

The Department contracted with Wichita State University to complete an assessment tool that would allow for predictions on rural Missouri community populations and future sustainability. The purpose of the study is to use a statistical modeling analysis in order to determine factors associated with each rural Missouri community that would predict the future population changes that could occur in each community. A stepwise regression model was applied to 19 factors which were determined as predictors of rural population change in Missouri. The model established a hierarchy of the predicting factors which allowed the model to place a weighted value on each of the factors. A total of 745 rural towns and villages in Missouri received a weighted value for each of the predicting factors. The weighted values for each town / village were then added together to determine an overall decision score. The overall decision scores were then divided into five categories and each town was assigned to a different categorical group based on the overall decision score.

The categorical groups were developed from the range of overall scores across all rural towns and villages within Missouri. The range covers 1,191 score points (-245 to 946).

Based on the assessment tool, the City of Columbia has been determined as a category 2 community. This means that the City of Columbia could potentially face more challenging socioeconomic circumstances over time and may have significant declines in population in the future. Since the new requirements are monitoring only requirements associated with some new pollutants of concern, the Department has not included a schedule of compliance in the permit. Not only is a schedule of compliance not required under environmental regulations dictating permit conditions, but the new requirements will not, at this time, cause financial burdens the City of Columbia. However, if the City of Columbia experiences a decline in population which results in the inability to secure the necessary funding to support the analytical sampling and testing necessary to comply with new permit requirements within this permit, a modification to the schedule of compliance may be necessary. At that time, please contact the Department and send an application for a modification to the schedule of compliance with justification for the time necessary to comply with this permit.

Conclusion and Finding

The Department is proposing modifications to the current operating permit that will require the permittee sample new parameters not previously listed in the permit. The Department identified the actions for which cost analysis for compliance is required under Section 644.145 RSMo.

The Department estimates the cost for new monitoring requirements is $1,292 per year. Should these additional costs be financed through user fees, it may require an increase in user fees of 0.0001% of the community's MHI.

The Department considered the eight (8) criteria presented in subsection 644.145.3 when evaluating the cost associated with the relevant actions. Taking into consideration these criteria, this analysis examined whether the above referenced permit modifications affects the ability of an individual customer or household to pay a utility bill without undue hardship or unreasonable sacrifice in the essential lifestyle or spending patterns of the individual or household. As a result of reviewing the above criteria, the Department hereby finds that the action described above may result in a low burden with regard to the community's overall financial capability and a low financial impact for most individual customers/households; therefore, the new permit requirements are affordable.

References:

1. ((Estimated cost for sampling annually/Total connections)/12 months) = Cost per household per month
   (($1,292/48,000)/12 months) = $0.0022
2. (Cost per household per month/(MHI/12))*100 = Cost per household as a percent of MHI
   ($0.0022/($44,840/12))*100 = 0.0001%
3. Unemployment data was obtained from Missouri Department of Economic Development (July 2014) – http://www.missourieconomy.org/pdfs/urel1407.pdf
4. Median Household Income data from American Community Survey – Median income in the past 12 months – http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?fpt=table
5. Population trend data was obtained from online at: 2012 Census Bureau Population Data - http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?fpt=table, 2000 Census Bureau Population Data - http://www.census.gov/popest/data/cities/totals/2009/tables/SUB-EST2009-04-29.xls, 1990 Census Bureau Population Data - http://www.census.gov/prod/cen1990/cp1/cp-1-27.pdf
6. Poverty data – American Community Survey- http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t

STANDARD CONDITIONS FOR NPDES PERMITS
ISSUED BY
THE MISSOURI DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION
REVISED
AUGUST 1, 2014

These Standard Conditions incorporate permit conditions as required by 40 CFR 122.41 or other applicable state statutes or regulations. These minimum conditions apply unless superseded by requirements specified in the permit.

Part I – General Conditions
Section A – Sampling, Monitoring, and Recording

1. **Sampling Requirements.**
   a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
   b. All samples shall be taken at the outfall(s) or Missouri Department of Natural Resources (Department) approved sampling location(s), and unless specified, before the effluent joins or is diluted by any other body of water or substance.

2. **Monitoring Requirements**.
   a. Records of monitoring information shall include:
      i. The date, exact place, and time of sampling or measurements;
      ii. The individual(s) who performed the sampling or measurements;
      iii. The date(s) analyses were performed;
      iv. The individual(s) who performed the analyses;
      v. The analytical techniques or methods used; and
      vi. The results of such analyses.
   b. If the permittee monitors any pollutant more frequently than required by the permit at the location specified in the permit using test procedures approved under 40 CFR Part 136, or another method required for an industry-specific waste stream under 40 CFR subchapters N or O, the results of such monitoring shall be included in the calculation and reported to the Department with the discharge monitoring report data (DMR) submitted to the Department pursuant to Section B, paragraph 7.

3. **Sample and Monitoring Calculations.** Calculations for all sample and monitoring results which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in the permit.

4. **Test Procedures**. The analytical and sampling methods used shall conform to the reference methods listed in 10 CSR 20-7.015 unless alternates are approved by the Department. The facility shall use sufficiently sensitive analytical methods for detecting, identifying, and measuring the concentrations of pollutants. The facility shall ensure that the selected methods are able to quantify the presence of pollutants in a given discharge at concentrations that are low enough to determine compliance with Water Quality Standards in 10 CSR 20-7.031 or effluent limitations unless provisions in the permit allow for other alternatives. A method is "sufficiently sensitive" when; 1) the method minimum level is at or below the level of the applicable water quality criterion for the pollutant or, 2) the method minimum level is above the applicable water quality criterion, but the amount of pollutant in a facility's discharge is high enough that the method detects and quantifies the level of pollutant in the discharge, or 3) the method has the lowest minimum level of the analytical methods approved under 10 CSR 20-7.015. These methods are also required for parameters that are listed as monitoring only, as the data collected may be used to determine if limitations need to be established. A permittee is responsible for working with their contractors to ensure that the analysis performed is sufficiently sensitive.

5. **Record Retention.** Except for records of monitoring information required by the permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five (5) years (or longer as required by 40 CFR part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Department at any time.

6. **Illegal Activities.**
   a. The Federal Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under the permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two (2) years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four (4) years, or both.
   b. The Missouri Clean Water Law provides that any person or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than six (6) months, or by both. Second and successive convictions for violation under this paragraph by any person shall be punished by a fine of not more than $50,000 per day of violation, or by imprisonment for not more than two (2) years, or both.

Section B – Reporting Requirements

1. **Planned Changes.**
   a. The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility when:
      i. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); or
      ii. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42;
      iii. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan;
      iv. Any facility expansions, production increases, or process modifications which will result in a new or substantially different discharge or sludge characteristics must be reported to the Department 60 days before the facility or process modification begins. Notification may be accomplished by application for a new permit. If the discharge does not violate effluent limitations specified in the permit, the facility is to submit a notice to the Department of the changed discharge at least 30 days before such changes. The Department may require a construction permit and/or permit modification as a result of the proposed changes at the facility.

2. **Non-compliance Reporting.**
   a. The permittee shall report any noncompliance which may endanger health or the environment. Relevant information shall be provided orally or via the current electronic method approved by the Department, within 24 hours from the time the permittee becomes aware of the circumstances, and shall be reported to the appropriate Regional Office during normal business hours or the Environmental Emergency Response hotline at 573-634-2436 outside of normal business hours. A written submission shall also be provided within five (5) business days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

b. The following shall be included as information which must be reported within 24 hours under this paragraph.
   i. Any unanticipated bypass which exceeds any effluent limitation in the permit.
   ii. Any upset which exceeds any effluent limitation in the permit.
   iii. Violation of a maximum daily discharge limitation for any of the pollutants listed by the Department in the permit required to be reported within 24 hours.

c. The Department may waive the written report on a case-by-case basis for reports under paragraph 2. b. of this section if the oral report has been received within 24 hours.

3. **Anticipated Noncompliance**. The permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements. The notice shall be submitted to the Department 60 days prior to such changes or activity.

4. **Compliance Schedules.** Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of the permit shall be submitted no later than 14 days following each schedule date. The report shall provide an explanation for the instance of noncompliance and a proposed schedule or anticipated date, for achieving compliance with the compliance schedule requirement.

5. **Other Noncompliance.** The permittee shall report all instances of noncompliance not reported under paragraphs 2, 3, and 6 of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph 2. a. of this section.

6. **Other Information**. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information.

7. **Discharge Monitoring Reports.**
   a. Monitoring results shall be reported at the intervals specified in the permit.
   b. Monitoring results must be reported to the Department via the current method approved by the Department, unless the permittee has been granted a waiver from using the method. If the permittee has been granted a waiver, the permittee must use forms provided by the Department.
   c. Monitoring results shall be reported to the Department no later than the 28th day of the month following the end of the reporting period.

Section C – Bypass/Upset Requirements

1. **Definitions.**
   a. *Bypass*: the intentional diversion of waste streams from any portion of a treatment facility, except in the case of blending.
   b. *Severe Property Damage*: substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
   c. *Upset*: an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

2. **Bypass Requirements.**
   a. Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 2. b. and 2. c. of this section.
   b. Notice.
      i. Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least 10 days before the date of the bypass.
      ii. Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Section B – Reporting Requirements, paragraph 5 (24-hour notice).
   c. Prohibition of bypass.
      i. Bypass is prohibited, and the Department may take enforcement action against a permittee for bypass, unless:
         1. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
         2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
         3. The permittee submitted notices as required under paragraph 2. b. of this section.
      ii. The Department may approve an anticipated bypass, after considering its adverse effects, if the Department determines that it will meet the three (3) conditions listed above in paragraph 2. c. i. of this section.

3. **Upset Requirements.**
   a. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph 3. b. of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.
   b. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
      i. An upset occurred and that the permittee can identify the cause(s) of the upset;
      ii. The permitted facility was at the time being properly operated; and
      iii. The permittee submitted notice of the upset as required in Section B – Reporting Requirements, paragraph 2. b. ii. (24-hour notice).
      iv. The permittee complied with any remedial measures required under Section D – Administrative Requirements, paragraph 4.
   c. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

Section D – Administrative Requirements

1. **Duty to Comply.** The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Missouri Clean Water Law and Federal Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.
   a. The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Federal Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.
   b. The Federal Clean Water Act provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $25,000 per day for each violation. The Federal Clean Water Act provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement

imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than one (1) year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than two (2) years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than three (3) years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than six (6) years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

c. Any person may be assessed an administrative penalty by the EPA Director for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.

d. It is unlawful for any person to cause or permit any discharge of water contaminants from any water contaminant or point source located in Missouri in violation of sections 644.006 to 644.141 of the Missouri Clean Water Law, or any standard, rule or regulation promulgated by the commission. In the event the commission or the director determines that any provision of sections 644.006 to 644.141 of the Missouri Clean Water Law or standard, rules, limitations or regulations promulgated pursuant thereto, or permits issued by, or any final abatement order, other order, or determination made by the commission or the director, or any filing requirement pursuant to sections 644.006 to 644.141 of the Missouri Clean Water Law or any other provision which this state is required to enforce pursuant to any federal water pollution control act, is being, was, or is in imminent danger of being violated, the commission or director may cause to have instituted a civil action in any court of competent jurisdiction for the injunctive relief to prevent any such violation or further violation or for the assessment of a penalty not to exceed $10,000 per day for each day, or part thereof, the violation occurred and continues to occur, or both, as the court deems proper. Any person who willfully or negligently commits any violation in this paragraph shall, upon conviction, be punished by a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than one year, or both. Second and successive convictions for violation of the same provision of this paragraph by any person shall be punished by a fine of not more than $50,000 per day of violation, or by imprisonment for not more than two (2) years, or both.

2. **Duty to Reapply.**
   a. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit.
   b. A permittee with a currently effective site-specific permit shall submit an application for renewal at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Department. (The Department shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)
   c. A permittees with currently effective general permit shall submit an application for renewal at least 30 days before the existing permit expires, unless the permittee has been notified by the Department that an earlier application must be made. The Department may grant permission for a later submission date. (The Department shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)

3. **Need to Halt or Reduce Activity Not a Defense.** It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

4. **Duty to Mitigate.** The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

5. **Proper Operation and Maintenance**. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

6. **Permit Actions.**
   a. Subject to compliance with statutory requirements of the Law and Regulations and applicable Court Order, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:
      i. Violations of any terms or conditions of this permit or the law;
      ii. Having obtained this permit by misrepresentation or failure to disclose fully any relevant facts;
      iii. A change in any circumstances or conditions that requires either a temporary or permanent reduction or elimination of the authorized discharge; or
      iv. Any reason set forth in the Law or Regulations.
   b. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

7. **Permit Transfer.**
   a. Subject to 10 CSR 20-6.010, an operating permit may be transferred upon submission to the Department of an application to transfer signed by the existing owner and the new owner, unless prohibited by the terms of the permit. Until such time the permit is officially transferred, the original permittee remains responsible for complying with the terms and conditions of the existing permit.
   b. The Department may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Missouri Clean Water Law or the Federal Clean Water Act.
   c. The Department, within 30 days of receipt of the application, shall notify the new permittee of its intent to revoke or reissue or transfer the permit.

8. **Toxic Pollutants.** The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Federal Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the Federal Clean Water Act within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.

9. **Property Rights.** This permit does not convey any property rights of any sort, or any exclusive privilege.

10. **Duty to Provide Information.** The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Department upon request, copies of records required to be kept by this permit.

11. **Inspection and Entry.** The permittee shall allow the Department, or an authorized representative (including an authorized contractor acting as a representative of the Department), upon presentation of credentials and other documents as may be required by law, to:
    a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of the permit;
    b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
    c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
    d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Federal Clean Water Act or Missouri Clean Water Law, any substances or parameters at any location.

12. **Closure of Treatment Facilities.**
    a. Persons who cease operation or plan to cease operation of waste, wastewater, and sludge handling and treatment facilities shall close the facilities in accordance with a closure plan approved by the Department.
    b. Operating Permits under 10 CSR 20-6.010 or under 10 CSR 20-6.015 are required until all waste, wastewater, and sludges have been disposed of in accordance with the closure plan approved by the Department and any disturbed areas have been properly stabilized. Disturbed areas will be considered stabilized when perennial vegetation, pavement, or structures using permanent materials cover all areas that have been disturbed. Vegetative cover, if used, shall be at least 70% plant density over 100% of the disturbed area.

13. **Signatory Requirement.**
    a. All permit applications, reports required by the permit, or information requested by the Department shall be signed and certified. (See 40 CFR 122.22 and 10 CSR 20-6.010)
    b. The Federal Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six (6) months per violation, or by both.
    c. The Missouri Clean Water Law provides that any person who knowingly makes any false statement, representation or certification in any application, record, report, plan, or other document filed or required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than ten thousand dollars, or by imprisonment for not more than six months, or by both.

14. **Severability.** The provisions of the permit are severable, and if any provision of the permit, or the application of any provision of the permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of the permit, shall not be affected thereby.

STANDARD CONDITIONS FOR NPDES PERMITS
ISSUED BY
THE MISSOURI DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION
March 1, 2015

PART III – SLUDGE AND BIOSOLIDS FROM DOMESTIC AND INDUSTRIAL WASTEWATER TREATMENT FACILITIES

SECTION A – GENERAL REQUIREMENTS

1. This permit pertains to sludge requirements under the Missouri Clean Water Law and regulation for domestic wastewater and industrial process wastewater. This permit also incorporates applicable federal sludge disposal requirements under 40 CFR 503 for domestic wastewater. The Environmental Protection Agency (EPA) has principal authority for permitting and enforcement of the federal sludge regulations under 40 CFR 503 for domestic wastewater. EPA has reviewed and accepted these standard sludge conditions. EPA may choose to issue a separate sludge addendum to this permit or a separate federal sludge permit at their discretion to further address the federal requirements.
2. These PART III Standard Conditions apply only to sludge and biosolids generated at domestic wastewater treatment facilities, including public owned treatment works (POTW), privately owned facilities and sludge or biosolids generated at industrial facilities.
3. Sludge and Biosolids Use and Disposal Practices:
    a. The permittee is authorized to operate the sludge and biosolids treatment, storage, use, and disposal facilities listed in the facility description of this permit.
    b. The permittee shall not exceed the design sludge volume listed in the facility description and shall not use sludge disposal methods that are not listed in the facility description, without prior approval of the permitting authority.
    c. The permittee is authorized to operate the storage, treatment or generating sites listed in the Facility Description section of this permit.
4. Sludge Received from other Facilities:
    a. Permittees may accept domestic wastewater sludge from other facilities including septic tank pumpings from residential sources as long as the design sludge volume is not exceeded and the treatment facility performance is not impaired.
    b. The permittee shall obtain a signed statement from the sludge generator or hauler that certifies the type and source of the sludge
5. These permit requirements do not supersede nor remove liability for compliance with county and other local ordinances.
6. These permit requirements do not supersede nor remove liability for compliance with other environmental regulations such as odor emissions under the Missouri Air Pollution Control Law and regulations.
7. This permit may (after due process) be modified, or alternatively revoked and reissued, to comply with any applicable sludge disposal standard or limitation issued or approved under Section 405(d) of the Clean Water Act or under Chapter 644 RSMo.
8. In addition to STANDARD CONDITIONS, the Department may include sludge limitations in the special conditions portion or other sections of a site specific permit.
9. Alternate Limits in the Site Specific Permit.
   Where deemed appropriate, the Department may require an individual site specific permit in order to authorize alternate limitations:
    a. A site specific permit must be obtained for each operating location, including application sites.
    b. To request a site specific permit, an individual permit application, permit fee, and supporting documents shall be submitted for each operating location. This shall include a detailed sludge/biosolids management plan or engineering report.
10. Exceptions to these Standard Conditions may be authorized on a case-by-case basis by the Department, as follows:
    a. The Department will prepare a permit modification and follow permit notice provisions as applicable under 10 CSR 20-6.020, 40 CFR 124.10, and 40 CFR 501.15(a)(2)(ix)(E). This includes notification of the owner of the property located adjacent to each land application site, where appropriate.
    b. Exceptions cannot be granted where prohibited by the federal sludge regulations under 40 CFR 503.

SECTION B – DEFINITIONS

1. Best Management Practices include agronomic loading rates, soil conservation practices and other site restrictions.
2. Biosolids means organic fertilizer or soil amendment produced by the treatment of domestic wastewater sludge.
3. Biosolids land application facility is a facility where biosolids are spread onto the land at agronomic rates for production of food or fiber. The facility includes any structures necessary to store the biosolids until soil, weather, and crop conditions are favorable for land application.
4. Class A biosolids means a material that has met the Class A pathogen reduction requirements or equivalent treatment by a Process to Further Reduce Pathogens (PFRP) in accordance with 40 CFR 503.
5. Class B biosolids means a material that has met the Class B pathogen reduction requirements or equivalent treatment by a Process to Significantly Reduce Pathogens (PFRP) in accordance with 40 CFR 503.
6. Domestic wastewater means wastewater originating from the sanitary conveniences of residences, commercial buildings, factories and institutions; or co-mingled sanitary and industrial wastewater processed by a (POTW) or a privately owned facility.
7. Industrial wastewater means any wastewater, also known as process water, not defined as domestic wastewater. Per 40 CFR Part 122, process water means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.
8. Mechanical treatment plants are wastewater treatment facilities that use mechanical devices to treat wastewater, including septic tanks, sand filters, extended aeration, activated sludge, contact stabilization, trickling filters, rotating biological discs, and other similar facilities. It does not include wastewater treatment lagoons and constructed wetlands for wastewater treatment.
9. Operating location as defined in 10 CSR 20-2.010 is all contiguous lands owned, operated or controlled by one (1) person or by two (2) or more persons jointly or as tenants in common.
10. Plant Available Nitrogen (PAN) is the nitrogen that will be available to plants during the growing seasons after biosolids application.
11. Public contact site is land with a high potential for contact by the public. This includes, but is not limited to, public parks, ball fields, cemeteries, plant nurseries, turf farms, and golf courses.
12. Sludge is the solid, semisolid, or liquid residue removed during the treatment of wastewater. Sludge includes septage removed from septic tanks or equivalent facilities. Sludge does not include carbon coal byproducts (CCBs)
13. Sludge lagoon is part of a mechanical wastewater treatment facility. A sludge lagoon is an earthen basin that receives sludge that has been removed from a wastewater treatment facility. It does not include a wastewater treatment lagoon or sludge treatment units that are not a part of a mechanical wastewater treatment facility.
14. Septage is the material pumped from residential septic tanks and similar treatment works (with a design population of less than 150 people). The standard for biosolids from septage is different from other sludges.

SECTION C – MECHANICAL WASTEWATER TREATMENT FACILITIES

1. Sludge shall be routinely removed from wastewater treatment facilities and handled according to the permit facility description and sludge conditions of this permit.
2. The permittee shall operate the facility so that there is no sludge discharged to waters of the state.
3. Mechanical treatment plants shall have separate sludge storage compartments in accordance with 10 CSR 20, Chapter 8. Failure to remove sludge from these storage compartments on the required design schedule is a violation of this permit.

SECTION D – SLUDGE DISPOSED AT OTHER TREATMENT FACILITY OR CONTRACT HAULER

1. This section applies to permittees that haul sludge to another treatment facility for disposal or use contract haulers to remove and dispose of sludge.
2. Permittees that use contract haulers are responsible for compliance with all the terms of this permit including final disposal, unless the hauler has a separate permit for sludge or biosolids disposal issued by the Department; or the hauler transports the sludge to another permitted treatment facility.
3. Haulers who land apply septage must obtain a state permit.
4. Testing of sludge, other than total solids content, is not required if sludge is hauled to a municipal wastewater treatment facility or other permitted wastewater treatment facility, unless it is required by the accepting facility.

SECTION E – INCINERATION OF SLUDGE

1. Sludge incineration facilities shall comply with the requirements of 40 CFR 503 Subpart E; air pollution control regulations under 10 CSR 10; and solid waste management regulations under 10 CSR 80.
2. Permittee may be authorized under the facility description of this permit to store incineration ash in lagoons or ash ponds. This permit does not authorize the disposal of incineration ash. Incineration ash shall be disposed in accordance with 10 CSR 80; or if the ash is determined to be hazardous with 10 CSR 25.
3. In addition to normal sludge monitoring, incineration facilities shall report the following as part of the annual report, quantity of sludge incinerated, quantity of ash generated, quantity of ash stored, and ash used or disposal method, quantity, and location. Permittee shall also provide the name of the disposal facility and the applicable permit number.

SECTION F – SURFACE DISPOSAL SITES AND SLUDGE LAGOONS

1. Surface disposal sites of domestic facilities shall comply with the requirements in 40 CFR 503 Subpart C; air pollution control regulations under 10 CSR 10; and solid waste management regulations under 10 CSR 80.
2. Sludge storage lagoons are temporary facilities and are not required to obtain a permit as a solid waste management facility under 10 CSR 80. In order to maintain sludge storage lagoons as storage facilities, accumulated sludge must be removed routinely, but not less than once every two years unless an alternate schedule is approved in the permit. The amount of sludge removed will be dependent on sludge generation and accumulation in the facility. Enough sludge must be removed to maintain adequate storage capacity in the facility.
    a. In order to avoid damage to the lagoon seal during cleaning, the permittee may leave a layer of sludge on the bottom of the lagoon, upon prior approval of the Department; or
    b. Permittee shall close the lagoon in accordance with Section H.

SECTION G – LAND APPLICATION

1. The permittee shall not land apply sludge or biosolids unless land application is authorized in the facility description or the special conditions of the issued NPDES permit.
2. Land application sites within a 20 miles radius of the wastewater treatment facility are authorized under this permit when biosolids are applied for beneficial use in accordance with these standard conditions unless otherwise specified in a site specific permit. If the permittee's land application site is greater than a 20 mile radius of the wastewater treatment facility, approval must be granted from the Department.
3. Land application shall not adversely affect a threatened or endangered species or its designated critical habitat.
4. Biosolids shall not be applied unless authorized in this permit or exempted under 10 CSR 20, Chapter 6.
    a. This permit does not authorize the land application of domestic sludge except for when sludge meets the definition of biosolids.
    b. This permit authorizes "Class A or B" biosolids derived from domestic wastewater and/or process water sludge to be land applied onto grass land, crop land, timber or other similar agricultural or silviculture lands at rates suitable for beneficial use as organic fertilizer and soil conditioner.
5. Public Contact Sites:

    Permittees who wish to apply Class A biosolids to public contact sites must obtain approval from the Department after two years of proper operation with acceptable testing documentation that shows the biosolids meet Class A criteria. A shorter length of testing will be allowed with prior approval from the Department. Authorization for land applications must be provided in the special conditions section of this permit or in a separate site specific permit.
    a. After Class B biosolids have been land applied, public access must be restricted for 12 months.
    b. Class B biosolids are only land applied to root crops, home gardens or vegetable crops whose edible parts will not be for human consumption.
6. Agricultural and Silvicultural Sites:

    Septage – Based on Water Quality guide 422 (WQ422) published by the University of Missouri
    a. Haulers that land apply septage must obtain a state permit
    b. Do not apply more than 30,000 gallons of septage per acre per year.
    c. Septage tanks are designed to retain sludge for one to three years which will allow for a larger reduction in pathogens and vectors, as compared to other mechanical type treatment facilities.
    d. To meet Class B sludge requirements, maintain septage at 12 pH for at least thirty (30) minutes before land application. 50 pounds of hydrated lime shall be added to each 1,000 gallons of septage in order to meet pathogen and vector stabilization for septage biosolids applied to crops, pastures or timberland.
    e. Lime is to be added to the pump truck and not directly to the septic tanks, as lime would harm the beneficial bacteria of the septic tank.

Biosolids - Based on Water Quality guide 423, 424, and 425 (WQ423, WQ424, WQ425) published by the University of Missouri;

a. Biosolids shall be monitored to determine the quality for regulated pollutants

b. The number of samples taken is directly related to the amount of sludge produced by the facility (See Section I of these Standard Conditions). Report as dry weight unless otherwise specified in the site specific permit. Samples should be taken only during land application periods. When necessary, it is permissible to mix biosolids with lower concentrations of biosolids as well as other suitable Department approved material to reach the maximum concentration of pollutants allowed.

c. Table 1 gives the maximum concentration allowable to protect water quality standards

TABLE 1

Biosolids ceiling concentration [1]	
Pollutant	Milligrams per kilogram dry weight
Arsenic	75
Cadmium	85
Copper	4,300
Lead	840
Mercury	57
Molybdenum	75
Nickel	420
Selenium	100
Zinc	7,500

[1] Land application is not allowed if the sludge concentration exceeds the maximum limits for any of these pollutants

d. The low metal concentration biosolids has reduced requirements because of its higher quality and can safely be applied for 100 years or longer at typical agronomic loading rates. (See Table 2)

TABLE 2

Biosolids Low Metal Concentration [1]	
Pollutant	Milligrams per kilogram dry weight
Arsenic	41
Cadmium	39
Copper	1,500
Lead	300
Mercury	17
Nickel	420
Selenium	36
Zinc	2,800

[1] You may apply low metal biosolids without tracking cumulative metal limits, provided the cumulative application of biosolids does not exceed 500 dry tons per acre.

e. Each pollutant in Table 3 has an annual and a total cumulative loading limit, based on the allowable pounds per acre for various soil categories.

TABLE 3

Pollutant	CEC 15+		CEC 5 to 15		CEC 0 to 5	
	Annual	Total [1]	Annual	Total [1]	Annual	Total [1]
Arsenic	1.8	36.0	1.8	36.0	1.8	36.0
Cadmium	1.7	35.0	0.9	9.0	0.4	4.5
Copper	66.0	1,335.0	25.0	250.0	12.0	125.0
Lead	13.0	267.0	13.0	267.0	13.0	133.0
Mercury	0.7	15.0	0.7	15.0	0.7	15.0
Nickel	19.0	347.0	19.0	250.0	12.0	125.0
Selenium	4.5	89.0	4.5	44.0	1.6	16.0
Zinc	124.0	2,492.0	50.0	500.0	25.0	250.0

[1] Total cumulative loading limits for soils with equal or greater than 6.0 pH (salt based test) or 6.5 pH (water based test)

TABLE 4 - Guidelines for land application of other trace substances [1]

Cumulative Loading	
Pollutant	Pounds per acre
Aluminum	4,000[2]
Beryllium	100
Cobalt	50
Fluoride	800
Manganese	500
Silver	200
Tin	1,000
Dioxin	(10 ppt in soil)[3]
Other	[4]

[1] Design of land treatment systems for Industrial Waste, 1979. Michael Ray Overcash, North Carolina State University and Land Treatment of Municipal Wastewater, EPA 1981.)

[2] This applies for a soil with a pH between 6.0 and 7.0 (salt based test) or a pH between 6.5 to 7.5 (water based test). Case-by-case review is required for higher pH soils.

[3] Total Dioxin Toxicity Equivalents (TEQ) in soils, based on a risk assessment under 40 CFR 744, May 1998.

[4] Case by case review. Concentrations in sludge should not exceed the 95th percentile of the National Sewage Sludge Survey, EPA, January 2009.

Best Management Practices – Based on Water Quality guide 426 (WQ426) published by the University of Missouri

a. Use best management practices when applying biosolids.
b. Biosolids cannot discharge from the land application site
c. Biosolid application is subject to the Missouri Department of Agriculture State Milk Board concerning grazing restrictions of lactating dairy cattle.
d. Biosolid application must be in accordance with section 4 of the Endangered Species Act.
e. Do not apply more than the agronomic rate of nitrogen needed.
f. The applicator must document the Plant Available Nitrogen (PAN) loadings, available nitrogen in the soil, and crop removal when either of the following occurs: 1) When biosolids are greater than 50,000 mg/kg TN; or 2) When biosolids are land applied at an application rate greater than two dry tons per acre per year.
    i. PAN can be determined as follows and is in accordance with WQ426
    (Nitrate + nitrite nitrogen) + (organic nitrogen x 0.2) + (ammonia nitrogen x volatilization factor[1]).
    [1] Volatilization factor is 0.7 for surface application and 1 for subsurface application.
g. Buffer zones are as follows:
    i. 300 feet of a water supply well, sinkhole, lake, pond, water supply reservoir or water supply intake in a stream;
    ii. 300 feet of a losing stream, no discharge stream, stream stretches designated for whole body contact recreation, wild and scenic rivers, Ozark National Scenic Riverways or outstanding state resource waters as listed in the Water Quality Standards, 10 CSR 20-7.031;
    iii. 150 feet if dwellings;
    iv. 100 feet of wetlands or permanent flowing streams;
    v. 50 feet of a property line or other waters of the state, including intermittent flowing streams.
h. Slope limitation for application sites are as follows;
    i. A slope 0 to 6 percent has no rate limitation
    ii. Applied to a slope 7 to 12 percent, the applicator may apply biosolids when soil conservation practices are used to meet the minimum erosion levels
    iii. Slopes > 12 percent, apply biosolids only when grass is vegetated and maintained with at least 80 percent ground cover at a rate of two dry tons per acre per year or less.
i. No biosolids may be land applied in an area that it is reasonably certain that pollutants will be transported into waters of the state.
j. Do not apply biosolids to sites with soil that is snow covered, frozen or saturated with liquid without prior approval by the Department.
k. Biosolids / sludge applicators must keep detailed records up to five years.

SECTION H – CLOSURE REQUIREMENTS

1. This section applies to all wastewater facilities (mechanical, industrial, and lagoons) and sludge or biosolids storage and treatment facilities and incineration ash ponds. It does not apply to land application sites.
2. Permittees of a domestic wastewater facility who plan to cease operation must obtain Department approval of a closure plan which addresses proper removal and disposal of all residues, including sludge, biosolids. Mechanical plants, sludge lagoons, ash ponds and other storage structures must obtain approval of a closure plan from the Department. Permittee must maintain this permit until the facility is closed in accordance with the approved closure plan per 10 CSR 20 – 6. 010 and 10 CSR 20 – 6.015.
3. Residuals that are left in place during closure of a lagoon or earthen structure or ash pond shall not exceed the agricultural loading rates as follows:
    a. Residuals shall meet the monitoring and land application limits for agricultural rates as referenced in Section H of these standard conditions.
    b. If a wastewater treatment lagoon has been in operation for 15 years or more without sludge removal, the sludge in the lagoon qualifies as a Class B biosolids with respect to pathogens due to anaerobic digestion, and testing for fecal coliform is not required. For other lagoons, testing for fecal coliform is required to show compliance with Class B biosolids limitations. In order to reach Class B biosolids requirements, fecal coliform must be less than 2,000,000 colony forming units or 2,000,000 most probable number. All fecal samples must be presented as geometric mean per gram.
    c. The allowable nitrogen loading that may be left in the lagoon shall be based on the plant available nitrogen (PAN) loading. For a grass cover crop, the allowable PAN is 300 pounds/acre.
        i. PAN can be determined as follows:

        (Nitrate + nitrite nitrogen) + (organic nitrogen x 0.2) + (ammonia nitrogen x volatilization factor[1]).

        [1] Volatilization factor is 0.7 for surface application and 1 for subsurface application.
4. When closing a domestic wastewater treatment lagoon with a design treatment capacity equal or less than 150 persons, the residuals are considered "septage" under the similar treatment works definition. See Section B of these standard conditions. Under the septage category, residuals may be left in place as follows:
    a. Testing for metals or fecal coliform is not required
    b. If the wastewater treatment lagoon has been in use for less than 15 years, mix lime with the sludge at a rate of 50 pounds of hydrated lime per 1000 gallons (134 cubic feet) of sludge.
    c. The amount of sludge that may be left in the lagoon shall be based on the plant available nitrogen (PAN) loading. 100 dry tons/acre of sludge may be left in the basin without testing for nitrogen. If 100 dry tons/acre or more will be left in the lagoon, test for nitrogen and determine the PAN using the calculation above. Allowable PAN loading is 300 pounds/acre.
5. Residuals left within the domestic lagoon shall be mixed with soil on at least a 1 to 1 ratio, the lagoon berm shall be demolished, and the site shall be graded and contain ≥70% vegetative density over 100% of the site so as to avoid ponding of storm water and provide adequate surface water drainage without creating erosion.
6. Lagoons and/or earthen structure and/or ash pond closure activities shall obtain a storm water permit for land disturbance activities that equal or exceed one acre in accordance with 10 CSR 20-6.200
7. When closing a mechanical wastewater and/or industrial process wastewater plant; all sludge must be cleaned out and disposed of in accordance with the Department approved closure plan before the permit for the facility can be terminated.
    a. Land must be stabilized which includes any grading, alternate use or fate upon approval by the Department, remediation, or other work that exposes sediment to stormwater per 10 CSR 20-6.200. The site shall be graded and contain ≥70% vegetative density over 100% of the site, so as to avoid ponding of storm water and provide adequate surface water drainage without creating erosion.
    b. Per 10 CSR 20-6.015(4)(B)6, Hazardous Waste shall not be land applied or disposed during industrial and mechanical plant closures unless in accordance with Missouri Hazardous Waste Management Law and Regulations under 10 CSR 25.
    c. After demolition of the mechanical plant / industrial plant, the site must only contain clean fill defined in RSMo 260.200 (5) as uncontaminated soil, rock, sand, gravel, concrete, asphaltic concrete, cinderblocks, brick, minimal amounts of wood and metal, and inert solids as approved by rule or policy of the Department for fill or other beneficial use. Other solid wastes must be removed.
8. If sludge from the domestic lagoon or mechanical treatment plant exceeds agricultural rates under Section G and/or H, a landfill permit or solid waste disposal permit must be obtained if the permittee chooses to seek authorization for on-site sludge disposal under the Missouri Solid Waste Management Law and regulations per 10 CSR 80, and the permittee must comply with the surface disposal requirements under 40 CFR 503, Subpart C.

SECTION I – MONITORING FREQUENCY

1. At a minimum, sludge or biosolids shall be tested for volume and percent total solids on a frequency that will accurately represent sludge quantities produced and disposed. Please see the table below.

TABLE 5

Design Sludge Production (dry tons per year)	Monitoring Frequency (See Notes 1, 2, and 3)			
	Metals, Pathogens and Vectors	Nitrogen TKN [1]	Nitrogen PAN [2]	Priority Pollutants and TCLP [3]
0 to 100	1 per year	1 per year	1 per month	1 per year
101 to 200	biannual	biannual	1 per month	1 per year
201 to 1,000	quarterly	quarterly	1 per month	1 per year
1,001 to 10,000	1 per month	1 per month	1 per week	--[4]
10,001 +	1 per week	1 per week	1 per day	--[4]

[1] Test total Kjeldahl nitrogen, if biosolids application is 2 dry tons per acre per year or less.

[2] Calculate plant available nitrogen (PAN) when either of the following occurs: 1) when biosolids are greater than 50,000 mg/kg TN; or 2) when biosolids are land applied at an application rate greater than two dry tons per acre per year.

[3] Priority pollutants (40 CFR 122.21, Appendix D, Tables II and III) and toxicity characteristic leaching procedure (40 CFR 261.24) is required only for permit holders that must have a pre-treatment program.

[4] One sample for each 1,000 dry tons of sludge.

Note 1: Total solids: A grab sample of sludge shall be tested one per day during land application periods for percent total solids. This data shall be used to calculate the dry tons of sludge applied per acre.
Note 2: Total Phosphorus: Total phosphorus and total potassium shall be tested at the same monitoring frequency as metals.
Note 3: Table 5 is not applicable for incineration and permit holders that landfill their sludge.

2. If you own a wastewater treatment lagoon or sludge lagoon that is cleaned out once a year or less, you may choose to sample only when the sludge is removed or the lagoon is closed. Test one composite sample for each 100 dry tons of sludge or biosolids removed from the lagoon during the year within the lagoon at closing. Composite sample must represent various areas at one-foot depth.
3. Additional testing may be required in the special conditions or other sections of the permit. Permittees receiving industrial wastewater may be required to conduct additional testing upon request from the Department.
4. At this time, the Department recommends monitoring requirements shall be performed in accordance with, "POTW Sludge Sampling and Analysis Guidance Document," United States Environmental Protection Agency, August 1989, and the subsequent revisions.

SECTION J – RECORD KEEPING AND REPORTING REQUIREMENTS

1. The permittee shall maintain records on file at the facility for at least five years for the items listed in these standard conditions and any additional items in the Special Conditions section of this permit. This shall include dates when the sludge facility is checked for proper operation, records of maintenance and repairs and other relevant information.
2. Reporting period
    a. By January 28th of each year, an annual report shall be submitted for the previous calendar year period for all mechanical wastewater treatment facilities, sludge lagoons, and sludge or biosolids disposal facilities.
    b. Permittees with wastewater treatment lagoons shall submit the above annual report only when sludge or biosolids are removed from the lagoon during the report period or when the lagoon is closed.
3. Report Forms. The annual report shall be submitted on report forms provided by the Department or equivalent forms approved by the Department.
4. Reports shall be submitted as follows:

Major facilities (those serving 10,000 persons or 1 million gallons per day) shall report to both the Department and EPA. Other facilities need to report only to the Department. Reports shall be submitted to the addresses listed as follows:

DNR regional office listed in your permit
(see cover letter of permit)
ATTN: Sludge Coordinator

EPA Region VII
Water Compliance Branch (WACM)
Sludge Coordinator
11201 Renner Blvd.
Lenexa, KS 66219

5. Annual report contents. The annual report shall include the following:
    a. Sludge and biosolids testing performed. Include a copy or summary of all test results, even if not required by the permit.
    b. Sludge or biosolids quantity shall be reported as dry tons for quantity generated by the wastewater treatment facility, the quantity stored on site at the end of the year, and the quantity used or disposed.
    c. Gallons and % solids data used to calculate the dry ton amounts.
    d. Description of any unusual operating conditions.
    e. Final disposal method, dates, and location, and person responsible for hauling and disposal.
        i. This must include the name, address for the hauler and sludge facility. If hauled to a municipal wastewater treatment facility, sanitary landfill, or other approved treatment facility, give the name of that facility.
        ii. Include a description of the type of hauling equipment used and the capacity in tons, gallons, or cubic feet.
    f. Contract Hauler Activities:
    If contract hauler, provide a copy of a signed contract from the contractor. Permittee shall require the contractor to supply information required under this permit for which the contractor is responsible. The permittee shall submit a signed statement from the contractor that he has complied with the standards contained in this permit, unless the contract hauler has a separate sludge or biosolids use permit.
    g. Land Application Sites:
        i. Report the location of each application site, the annual and cumulative dry tons/acre for each site, and the landowners name and address. The location for each spreading site shall be given as a legal description for nearest ¼, ¼, Section, Township, Range, and county, or UTM coordinates. The facility shall report PAN when either of the following occurs: 1) When biosolids are greater than 50,000 mg/kg TN; or 2) when biosolids are land applied at an application rate greater than two dry tons per acre per year.
        ii. If the “Low Metals” criteria are exceeded, report the annual and cumulative pollutant loading rates in pounds per acre for each applicable pollutant, and report the percent of cumulative pollutant loading which has been reached at each site.
        iii. Report the method used for compliance with pathogen and vector attraction requirements.
        iv. Report soil test results for pH, CEC, and phosphorus. If none was tested during the year, report the last date when tested and results.

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
FORM A – APPLICATION FOR NONDOMESTIC PERMIT UNDER MISSOURI CLEAN WATER LAW

FOR AGENCY USE ONLY	
CHECK NUMBER	
DATE RECEIVED 9/23/14	FEE SUBMITTED

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

1. This application is for:

- ☐ An operating permit for a new or unpermitted facility:
  Please indicate the original Construction Permit # _____
- ☑ An operating permit renewal:
  Please indicate the permit # MO- 0136034 Expiration Date March10,2015
- ☐ An operating permit modification:
  Please indicate the permit # MO-_____ Modification Reason: _____

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

2. FACILITY

NAME		TELEPHONE NUMBER WITH AREA CODE
City of Columbia Water Treatment PLant		(573) 445-3517
		FAX (573) 445-7994
ADDRESS (PHYSICAL) 6851 West Route K	CITY Columbia	STATE MO / ZIP CODE 65203

3. OWNER

NAME	EMAIL ADDRESS	TELEPHONE NUMBER WITH AREA CODE
City of Columbia Water and Light	rpwillia@gocolumbiamo.com	(573) 874-7325
		FAX (573) 443-6875
ADDRESS (MAILING) P.O. Box 6015	CITY Columbia	STATE MO / ZIP CODE 65205

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

4. CONTINUING AUTHORITY

NAME	EMAIL ADDRESS	TELEPHONE NUMBER WITH AREA CODE
City of Columbia	mayor@gocolumbiamo.com	(573) 874-7222
		FAX (573) 442-8828
ADDRESS (MAILING) P.O. Box 6015	CITY Columbia	STATE MO / ZIP CODE 65205

5. OPERATOR

NAME	CERTIFICATE NUMBER	TELEPHONE NUMBER WITH AREA CODE
James Fisher	Water Treatment Operator A Cert. No. 203	(573) 445-3517
		FAX (573) 445-7994
ADDRESS (MAILING) 6851 West Route K	CITY Columbia	STATE MO / ZIP CODE 65203

6. FACILITY CONTACT

NAME	TITLE	TELEPHONE NUMBER WITH AREA CODE
Mike Anderson	Manager of Operations	(573) 445-3517
	E-MAIL ADDRESS mra@gocolumbiamo.com	FAX (573) 445-7994

7. ADDITIONAL FACILITY INFORMATION

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

001 SW ¼ SE ¼ Sec 1 T 47N R 14W Boone County
UTM Coordinates Easting (X): +3853240 Northing (Y): -9226492
For Universal Transverse Mercator (UTM), Zone 15 North referenced to North American Datum 1983 (NAD83)

002 NE ¼ SE ¼ Sec 1 T 47N R 14W Boone County
UTM Coordinates Easting (X): +3853305 Northing (Y): -09226358

003 NE ¼ SE ¼ Sec 1 T 47N R 14W Boone County
UTM Coordinates Easting (X): Northing (Y):

004 SW ¼ SE ¼ Sec 1 T 47N R 14W Boone 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 4941 and NAICS 221310
002 – SIC 4941 and NAICS 221310
003 – SIC 4941 and NAICS 221310
004 – SIC 4941 and NAICS 221310

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 or 2F. (2F is the U.S. EPA's Application for Storm Water Discharges Associate with Industrial Activity.)	YES ☐	NO ■
B.	Is application for storm water discharges only? If yes, complete Form C or 2F.	YES ■	NO ☐
C.	Is your facility considered a "Primary Industry" under EPA guidelines: If yes, complete Forms C or 2F and D.	YES ☐	NO ■
D.	Is wastewater land applied? If yes, complete Form I.	YES ☐	NO ■
E.	Is sludge, biosolids, ash or residuals generated, treated, stored or land applied? If yes, complete Form R.	YES ■	NO ☐

F. If you are a Class IA CAFO, please disregard part D and E of this section. However, please attach any revision to your Nutrient Management Plan.

F. Attach a map showing all outfalls and the receiving stream at 1" = 2,000' scale.

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

NAME
Outfall #4 Katy Trail, MDNR Outfall #2 Dierik Leonard,202 S. Garth, Columbia, MO 65203

ADDRESS	CITY	STATE	ZIP CODE
West Route K	Columbia	MO	65203

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)	TELEPHONE NUMBER WITH AREA CODE
Tad Johnsen, Water and Light Director	(573) 874-7300
SIGNATURE	DATE SIGNED
Tad Johnsen	9/17/14

MO 780-1479 (07-14)

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 or 2F, if applicable?
- ☐ Form D, if applicable?
- ☐ Form I (Irrigation), if applicable?
- ☐ Form R (Sludge), if applicable?
- ☐ Revised Nutrient Management Plan, if applicable?

CITY OF COLUMBIA, MISSOURI

WATER AND LIGHT DEPARTMENT
COLUMBIA TERMINAL RAILROAD

September 17, 2014

Amanda Sappington
Missouri Department of Natural Resources
Solid Waste Management Program
P.O. Box 176
Jefferson City, MO 65102-0176

Re: City of Columbia Water Treatment Plant
Permit Renewal Request of Permit MO-0136034
Storm Water Pollution Prevention Plan and Land Application of Lime Solid Residuals
At the City of Columbia Water Treatment Plant PWS ID# MO 3010181

Dear Ms. Sappington:

The City of Columbia is submitting the attached applications for permit renewal of Permit # MO-0136034. Enclosed are Forms A, C and R for the permit renewal request for Management of Lime Solids Residuals at the Columbia Water Treatment Plant. We have an additional sludge analysis for 2014 due soon from Inovatia Laboratories in Fayette to include with this request which we will forward to you.

If you have any questions please direct them to either David Mathon, P. E., Engineering Supervisor, 573-874-7794 or Blaise Brazos, Water Quality Compliance Officer, 573-874-6312.

Sincerely,

Tad Johnsen
Director
Water and Light Department
PWS ID# MO 3010181

CC: Irene Crawford, Regional Director
Northeast Regional Office

701 E. BROADWAY • P.O. BOX 6015 • COLUMBIA, MISSOURI 65205-6015
(573) 874-7325 • FAX (573) 443-6875 • TTY (573) 874-7698

	2011-2012	6695 E. Gilmore Ln.	Ashland	MO	573-657-4238
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Allen, Joe Site-#16	AL-HU FARMS LLC	00000 HUBBARD	COLUMBIA	MO	
	CITY OF COLUMBIA	00000 E RTE H	COLUMBIA	MO	
	MARY ANN SHAW & BOB G & HAZEL J WOODS TR	00000 E RTE H	COLUMBIA	MO	
	HUDSON GARY-HAZEL TRUST	9601 S RANGELINE RD	COLUMBIA	MO	
	MISSOURI LINDA A TRUST	00000 S RANGELINE RD	COLUMBIA	MO	
	DENNIS SAPP TRUST	7949 E HUBBARD RD	COLUMBIA	MO	
	2011-2012	County Road 351	Fulton	MO	573-808-1402
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Allen, John - Site #4	JANICE KAYE SCHWEIKERT REVOCABLE TRUST	00000 E VEMERS FORD RD	COLUMBIA	MO	
	JANICE KAYE SCHWEIKERT REVOCABLE TRUST	00000 E DAVID ALLEN RD	COLUMBIA	MO	
	DAVID E & LISA B ALLEN	00000 E DAVID ALLEN RD	COLUMBIA	MO	
	DAVID E & LISA B ALLEN	0000 COUNTY ROAD 351	FULTON	MO	
	JOHN R HARRISON TRUST	5199 COUNTY ROAD 351	FULTON	MO	
	THOMAS D. & CATHERINE L. SHRYOCK	0000 COUNTY ROAD 351	FULTON	MO	
	DONALD BRADLEY WEISS TRUST	5190 COUNTY ROAD 351	FULTON	MO	
	SPROUSE DIVERSIFIED INVESTMENT CORP.	5114 COUNTY ROAD 351	FULTON	MO	
	JOHN D. & SHERRI GRIFFIN	4925 COUNTY ROAD 351	FULTON	MO	
	2011-2012	County Road 351	Fulton	MO	573-808-1402
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Allen, John - Site #7	SCHOFIELD, DONALD J. & MARILYN R. TRUST	0000 COUNTY ROAD 351	FULTON	MO	
	JANICE KAYE SCHWEIKERT REVOCABLE TRUST	00000 E VEMERS FORD RD	COLUMBIA	MO	
	JOHN PAUL & MARILYN ALLEN	0000 E DAVID ALLEN RD	COLUMBIA	MO	
	SPROUSE DIVERSIFIED INVESTMENT CORP.	5114 COUNTY ROAD 351	FULTON	MO	
	TERRY & DEBRA SHOWERS	5106 COUNTY ROAD 351	FULTON	MO	
	HENRY L BUTTS TRUST, ETAL	5090 COUNTY ROAD 351	FULTON	MO	
	DONALD F. & CAROLYN BURNETT	5020 COUNTY ROAD 351	FULTON	MO	
	JOYANNE BLOCK TRUST	5194 COUNTY ROAD 351	FULTON	MO	
	2014	9525 E. Logan Rd	Columbia	MO	573-424-6502
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Barnes, Jerry - Site #1	WADE D CUNNINGHAM & ELIZABETH BOOTS-CUNNINGHAM	12903 S RANGELINE RD	COLUMBIA	MO	
	TODD RILEY WENDELL, ETAL	0000 E NEW SALEM LN	COLUMBIA	MO	
	CHARLES M & LAURIE SHAWVER	13231 S RANGELINE RD	COLUMBIA	MO	
	JAMES & TIMA GOODNIGHT	13300 S RANGELINE RD	COLUMBIA	MO	
	FASCIOTTI JOHN A REVOCABLE TRUST	8500 E ELLIS SCHOOL RD	COLUMBIA	MO	
	JOHN & CAROLINE DETWEILER	8700 E ELLIS SCHOOL RD	COLUMBIA	MO	
	LENORA CLATTERBUCK	8900 E ELLIS SCHOOL RD	COLUMBIA	MO	
	WILLIAM F II & ROBIN K MONTGOMERY	9200 E ELLIS SCHOOL RD	COLUMBIA	MO	
	JOHN S MEYER & ANN L HUBER	9300 E ELLIS SCHOOL RD	COLUMBIA	MO	
	SHANNON K & JEREMY S REED	13331 S BOB VEACH RD	COLUMBIA	MO	
	FASCIOTTE FAMILY TRUST	0000 E ELLIS SCHOOL RD	COLUMBIA	MO	
	PAUL & CATHERINE SCHILTZ	13011 S BOB VEACH RD	COLUMBIA	MO	
	ZACHARY C & JANE M RIPPETO REVOCABLE LIVING TRUST	13301 S BOB VEACH RD	COLUMBIA	MO	
	JOHN C & NANCY MEADOWS	12735 S BOB VEACH RD	COLUMBIA	MO	
	2014	9525 E. Logan Rd	Columbia	MO	573-424-6502
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Barnes, Jerry - Site #3	SHANNON K & JEREMY S REED	13331 S BOB VEACH RD	COLUMBIA	MO	
	FASCIOTTE FAMILY TRUST	0000 E ELLIS SCHOOL RD	COLUMBIA	MO	
	PAUL & CATHERINE SCHILTZ	13011 S BOB VEACH RD	COLUMBIA	MO	
	JEFFREY K WREN	13401 S BOB VEACH RD	COLUMBIA	MO	
	THOMAS L & DEBRA J COCHRAN	13521 S BOB VEACH RD	COLUMBIA	MO	
	JOSEPH-HELEN SMITH TRUST	9600 E ROSS LN	COLUMBIA	MO	
	ANN KELLY REVOCABLE TRUST	00000 E ROSS LN	COLUMBIA	MO	
	DUANE G & KATHERINE SICHT	12403 S CLINKERBEARD RD	COLUMBIA	MO	
	STEVEN M & JENNIFER G TADE	12410 S BOB VEACH RD	COLUMBIA	MO	
	2014	9525 E. Logan Rd	Columbia	MO	573-424-6502
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Barnes, Jerry - Site #4	M E L OETTING FAMILY'S LEGACY LLC	6552 E HWY AB	COLUMBIA	MO	
	TOM ETAL BASS	0000 S HWY 63	COLUMBIA	MO	
	AL-HU FARMS LLC	0000 E HUBBARD RD	COLUMBIA	MO	
	2013	9201 E. Logan Rd.	Columbia	MO	573-443-4406
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Barnes, Terry - Site #1	KAREN SAPP	0000 E HWY AB	COLUMBIA	MO	
	BUD & GERALDEAN C HOLIMAN REVOCABLE LIVNG TRUSTS	8400 S RANGELINE RD	COLUMBIA	MO	
	BARNES FAMILY TRUST	0000 E LOGAN RD	COLUMBIA	MO	
	2013	9201 E. Logan Rd.	Columbia	MO	573-443-4406
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Barnes, Terry - Site #2	TERRY L & PATRICIA L SELBY	6451 S RANGELINE RD	COLUMBIA	MO	
	THOMAS S BASS	7425 E HWY AB	COLUMBIA	MO	
	MICHAEL R & LISA M GORDON	6851 S RANGELINE RD	COLUMBIA	MO	
	CARL G & JOYCE A FRITCHEY REVOCABLE LIVING TRUSTS				
	SCOTT PARKER	6700 S RANGELINE RS	COLUMBIA	MO	
	JUDD PRICE	0000 S RANGELINE RD	COLUMBIA	MO	

	2013	9201 E. Logan Rd.	Columbia	MO	573-443-4406
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Barnes, Terry - Site #3	THOMAS S BASS	0000 S BEN WILLIAMS RD	COLUMBIA	MO	
	THOMAS S BASS	7425 E HWY AB	COLUMBIA	MO	
	CARL G & JOYCE A FRITCHEY REVOCABLE LIVING TRUSTS	0000 S RANGELINE RD	COLUMBIA	MO	
	JAMES A & DIANE L DENNIS	6600 S RANGELINE RD	COLUMBIA	MO	
	WILLIAM-MARY MCQUEGGE TRUST	6402 S RANGELINE RD	COLUMBIA	MO	
	2013	9201 E. Logan Rd.	Columbia	MO	573-443-4406
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Barnes, Terry - Site #4	THOMAS S BASS	0000 S BEN WILLIAMS RD	COLUMBIA	MO	
	THOMAS S BASS	7425 E HWY AB	COLUMBIA	MO	
	CARL G & JOYCE A FRITCHEY REVOCABLE LIVING TRUSTS	0000 S RANGELINE RD	COLUMBIA	MO	
	JAMES A & DIANE L DENNIS	6600 S RANGELINE RD	COLUMBIA	MO	
	WILLIAM-MARY MCQUEGGE TRUST	6402 S RANGELINE RD	COLUMBIA	MO	
	2013	12471 Rangelune Rd., Ashland, MO	Ashland	MO	573-823-4468
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Joe Baumgartner - Site #1	JOE F & MARY SUE BAUMGARTNER LIVING TRUST	0000 S RANGELINE RD	COLUMBIA	MO	
	CITY OF COLUMBIA	11450 S AIRPORT DR	COLUMBIA	MO	
	TODD RILEY WENDELL, ETAL	0000 E NEW SALEM LN	COLUMBIA	MO	
	THEODORE D & CHERI L LAU	12601 S RANGLELINE RD	COLUMBIA	MO	
	JOE F & MARY SUE BAUMGARTNER LIVING TRUST	12471 S RANGELINE RD	COLUMBIA	MO	
	WADE D CUNNINGHAM AND ELIZABETH BOOTS	11900 S RANGELINE RD	COLUMBIA	MO	
	2013	12471 Rangelune Rd., Ashland, MO	Ashland	MO	573-823-4468
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	JOE F & MARY SUE BAUMGARTNER LIVING TRUST	12471 S RANGELINE RD	COLUMBIA	MO	
	THEODORE D & CHERI L LAU	12601 S RANGLELINE RD	COLUMBIA	MO	
	WADE D CUNNINGHAM & ELIZABETH BOOTS-CUNNINGHAM	12903 S RANGELINE RD	COLUMBIA	MO	
Joe Baumgartner - Site #2	PAUL & CATHERINE SCHILTZ	13011 S BOB VEACH RD	COLUMBIA	MO	
	ZACHARY C & JANE M RIPPETO REVOCABLE LIVING TRUST	13301 S BOB VEACH RD	COLUMBIA	MO	
	JOHN C & NANCY MEADOWS	12735 S BOB VEACH RD	COLUMBIA	MO	
	MICHAEL & PATRICIA M COLLINS	0000 S BOB VEACH RD	COLUMBIA	MO	
	DAVID C & JODIE LEWIS	12370 N BOB VEACH RD	COLUMBIA	MO	
	WADE D CUNNINGHAM & ELIZABETH BOOTS-CUNNINGHAM	11900 S RANGELINE RD	COLUMBIA	MO	
	2011-2012	5595 County Road 335, Fulton, MO	Fulton	MO	573-642-5638
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Andrew Bonderer - Site #17	BILL L. & BRENDA K. CHILES	5404 COUNTY ROAD 335	FULTON	MO	
	U S A.	COUNTY ROAD 335	FULTON	MO	
	U.S.A.	COUNTY ROAD 336	FULTON	MO	
	2013	12200 E. Barnes Chapel Rd	Columbia	MO	573-819-0181
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	MARGARET R TOLLERTON	11600 E BARNES CHAPEL RD	COLUMBIA	MO	
	DAVID M & DONNA M SMITH	7801 N MILLSITE RD	COLUMBIA	MO	
	HARRY C WINFREY	7951 N MILLSITE RD	COLUMBIA	MO	
	JEFFREY J & TAMMY M GIBSON	0000 N MILLSITE RD	COLUMBIA	MO	
Brooks, Phil - Site #1	SUSAN K BALLARD TRUST	8280 N MILLSITE RD	COLUMBIA	MO	
	PAUL K & LAURA R ELLIFRIT REVOCABLE TRUST	8804 N MILLSITE RD	COLUMBIA	MO	
	DAVID A HORNER TRUST	12200 E BARNES CHAPEL RD	COLUMBIA	MO	
	WIN H GRACE	11990 E BARNES CHAPEL RD	COLUMBIA	MO	
	MONEY MANAGEMENT INC	0000 E BARNES CHAPEL RD	COLUMBIA	MO	
	MICHAEL P CURRIER REVOCABLE LIVING TRUST	11801 E BARNES CHAPEL RD	COLUMBIA	MO	
	IRVING M ASHER	11605 E BARNES CHAPEL RD	COLUMBIA	MO	
	2013	12200 E. Barnes Chapel Rd	Columbia	MO	573-819-0181
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	THOMAS D. & CATHERINE L. SHRYOCK	COUNTY ROAD 351	FULTON	MO	
	MONEY MANAGEMENT INC	0000 E BARNES CHAPEL RD	COLUMBIA	MO	
Brooks, Phil - Site #2	DAVID A HORNER TRUST	12200 E BARNES CHAPEL RD	COLUMBIA	MO	
	DAVID A HORNER TRUST	12200 E BARNES CHAPEL RD	COLUMBIA	MO	
	WIN H GRACE	11990 E BARNES CHAPEL RD	COLUMBIA	MO	
	ABRAMOVITZ-ELWING TRUST	1500 COUNTY ROAD 346	FULTON	MO	
	THOMAS D. & CATHERINE L. SHRYOCK	COUNTY ROAD 351	FULTON	MO	
	2013	13595 US Hwy 63 S	Ashland	MO	573-489-4627
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	MARK W & TAMMY JO PAULEY	5250 MINOR HILL RD	COLUMBIA	MO	
Bullard, Joel - Site #2	GARY L & DIAN E PAULEY	0000 MINOR HILL RD	COLUMBIA	MO	
	CLIFTON & LINDA NAHLER	0000 MINOR HILL RD	COLUMBIA	MO	
	RAYMOND J & BETTY A WINKELMAN	5101 MARTIN LN	COLUMBIA	MO	
	THE BAPTIST HOME	12425 HIGHWAY 63 SOUTH	COLUMBIA	MO	
	MO CONSERVATION COM	5611 MINOR HILL RD	COLUMBIA	MO	
	2013	6703 E. New Salem Ln	Ashland	MO	573-228-2647
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	BLAKE INVESTMENT LLC	ASHLAND INDUSTRIAL CT	COLUMBIA	MO	
Craig, Steve - Site #1	SANRON DEVELOPMENT LLC	ASHLAND INDUSTRIAL CT	COLUMBIA	MO	
	CENTRAL CONCRETE COMPANY	ASHLAND INDUSTRIAL CT	COLUMBIA	MO	
	KNIPP FARMS LLC	12050 S HARDWICK LN	COLUMBIA	MO	
	MARGARET A CAMPBELL	0000 E ANGEL LN	COLUMBIA	MO	
	LINDA H & CAROL J O'KEEFE	0000 S HARDWICK LN	COLUMBIA	MO	

	2013	6703 E. New Salem Ln	Ashland	MO	573-228-2647
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Craig, Steve - Site #2	ANNA MARIE KNIPP	0000 E ANGEL LN	COLUMBIA	MO	
	OLLIE MAE KNIPP	0000 S HARDWICK LN	COLUMBIA	MO	
	GOETTING FAMILY IRREVOCABLE TRUST	6701 E NEW SALEM LN	COLUMBIA	MO	
	JOHN R & ROBIN S BULLARD	0000 E ANGEL LN	COLUMBIA	MO	
	J & S PROPERTIES OF JEFFERSON CITY LLC	7200 E ANGEL LN	COLUMBIA	MO	
	GEORGE R CAMPBELL	6671 E ANGLE LN	COLUMBIA	MO	
	2013	6703 E. New Salem Ln	Ashland	MO	573-228-2647
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Craig, Steve - Site #3	JAMES ROBERT HAGANS, ETAL	6300 E NEW SALEM LN	ASHLAND	MO	
	GOETTING FAMILY IRREVOCABLE TRUST	00000 E NEW SALEM LN	COLUMBIA	MO	
	LINDA P GOETTING	7020 E ANGEL LN	ASHLAND	MO	
	OLLIE MAE KNIPP	0000 S HARDWICK LN	ASHLAND	MO	
	KNIPP FARMS LLC	12050 S HARDWICK LN	ASHLAND	MO	
	2014	8238 S. Tomlin Hill Rd	Columbia	MO	573-449-1843
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Gardner, Virginia - Site #1	CHRISTOPHER D & TRACY FUEMMELER	8350 FOREST CREEK DR	COLUMBIA	MO	
	JOAN C BUTCHER TRUSTEE	8501 S TOMLIN HILL RD	COLUMBIA	MO	
	JEFFREY EUGENE SQUIRES	2501 E CHEAVENS RD	COLUMBIA	MO	
	RICHARD B CAPLE	2555 E CHEAVENS RD	COLUMBIA	MO	
	NATHANIEL MURPHEY	2950 E HOWARD REDDEN RD	COLUMBIA	MO	
	DENNIS PAUL O'BRIEN & JUDITH SARAH MYERS	0000 E HOWARD REDDEN RD	COLUMBIA	MO	
	NICHOLS RONALD AND FRANCES	2571 E HOWARD REDDEN RD	COLUMBIA	MO	
	EVERETT V & MARIAN LEAH COX	0000 S FOX LN	COLUMBIA	MO	
	JAMES D & ELIZABETH B KYD	8150 FOX LN	COLUMBIA	MO	
	2014	8238 S. Tomlin Hill Rd	Columbia	MO	573-449-1843
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Gardner, Virginia - Site #2	THOMAS G DRESNER	8220 S TOMLIN HILL RD	COLUMBIA	MO	
	RICHARD L HUSE TRUST	0000 S TOMLIN HILL RD	COLUMBIA	MO	
	BRENDA J COOK	8231 S TOMLIN HILL RD	COLUMBIA	MO	
	JAMES U TURNER, ETAL	0000 S FOX LN	COLUMBIA	MO	
	JOHN W TURNER REVOCABLE LIVING TRUST	0000 S FOX LN	COLUMBIA	MO	
	DEPARTMENT OF NATURAL RESOURCES	0000 S TOMLIN HILL RD	COLUMBIA	MO	
	2011-2012	5350 State Road J	Fulton	MO	573-642-7971
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Gentzsch, Bill - Site #8	TIMOTHY E & ERICKA A ALLEN	1698 COUNTY ROAD 342	FULTON	MO	
	KIMBERLY D GRIFFIN & WALKER CLARIDGE	0000 DEER RUN RD	FULTON	MO	
	CAROLYN S LINTON TRUST	0000 QUAIL RUN	FULTON	MO	
	MELODY ACRES INC	COUNTY ROAD 344	FULTON	MO	
	RACHAEL J ROWDEN TRUST	5151 STATE ROAD J	FULTON	MO	
	DANNY D FORSEE	4999 STATE ROAD J	FULTON	MO	
	RICK L & MOLLY L MEANS	1899 COUNTY ROAD 342	FULTON	MO	
	2011-2012	5350 State Road J	Fulton	MO	573-642-7971
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Gentzsch, Bill - Site #9	MELODY ACRES INC	COUNTY ROAD 344	FULTON	MO	
	WILLIAM B & NADINE GENTZSCH,	5450 STATE ROAD J	FULTON	MO	
	SHADY BROOK FARM	5690 STATE ROAD J	FULTON	MO	
	STEPHEN W WELSH M.D., ETAL	0000 STATE ROAD J	FULTON	MO	
	MICHAEL H & CAROL J GORDON	5375 COUNTY ROAD 343	FULTON	MO	
	JOHN R & BEVERLY A MARTIN	5399 COUNTY ROAD 343	FULTON	MO	
	EDDIE L FORSEE	5180 STATE ROAD J	FULTON	MO	
	CORALIE B FORSEE TRUST	5555 COUNTY ROAD 343	FULTON	MO	
	2011-2012	5350 State Road J	Fulton	MO	573-642-7971
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Gentzsch, Bill - Site #10	RACHAEL J ROWDEN TRUST	5151 STATE ROAD J	FULTON	MO	
	NADINE GENTZSCH, ETAL	COUNTY ROAD 343	FULTON	MO	
	EDDIE L FORSEE	5180 STATE ROAD J	FULTON	MO	
	2011-2012	2599 State Road F	Fulton	MO	573-220-3204
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Giboney, Jeff - Site #11	JULIE DEVAULT, ETAL	2491 STATE ROAD F	FULTON	MO	
	WILLIAM D & ERNA P BLACKBURN	2598 STATE ROAD F	FULTON	MO	
	NATHAN C WILLIAMS	2698 STATE ROAD F	FULTON	MO	
	LARRY L & SHIRLEY R GIBONEY	2684 STATE ROAD F	FULTON	MO	
	WILLIAM THOMAS GREEN	2699 STATE ROAD F	FULTON	MO	
	STEPHEN & SHARON BIELINSKI	2731 STATE ROAD F	FULTON	MO	
	LAVORE RICHMOND, ETAL	COUNTY ROAD 232	FULTON	MO	
	U.S.A.	COUNTY ROAD 229	FULTON	MO	
	LONNIE K & FRANCES A GIBONEY	STATE ROAD F	FULTON	MO	
	DANIEL GIBONEY, ETAL	COUNTY ROAD 257	FULTON	MO	
	LONNIE K & JEFFERY K GIBONEY	COUNTY ROAD 257	FULTON	MO	
	LONNIE K & FRANCES A GIBONEY	STATE ROAD F	FULTON	MO	

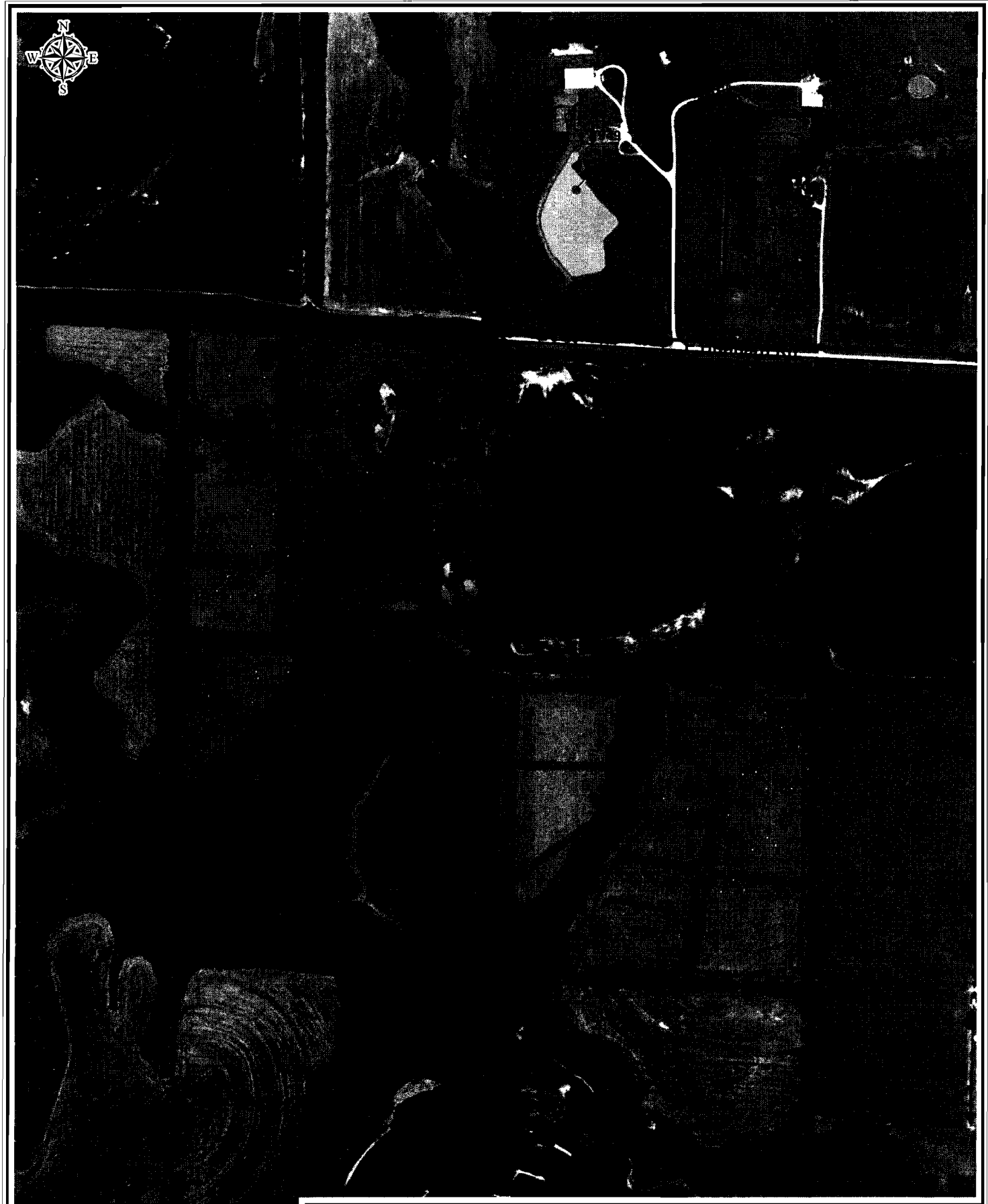
	2011-2012	2589 State Road F	Fulton	MO	573-642-5697
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	JATHO LIVING TRUST	STATE ROAD F	FULTON	MO	
Giboney, Lonnie - Site #13	WILLIAM & WANDA L CANNELL	2590 STATE ROAD F	FULTON	MO	
	JEFFREY K GIBONEY	2599 STATE ROAD F	FULTON	MO	
	LARRY L & SHIRLEY R GIBONEY	STATE ROAD F	FULTON	MO	
	DANNY LEE ROSE, ETAL	4772 COUNTY ROAD 257	FULTON	MO	
	2011-2012	4925 County Road 351	Fulton	MO	573-642-2590
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	JOHN P & MARILYN J ALLEN	5151 COUNTY ROAD 351	FULTON	MO	
Griffin, John D. - Site #15	THOMAS W & KATHERINE PADGETT	5280 COUNTY ROAD 351	FULTON	MO	
	JAMES M & NANCY W GENTZSCH, TRUST	COUNTY ROAD 344	FULTON	MO	
	TERRY & DEBRA SHOWERS	5106 COUNTY ROAD 351	FULTON	MO	
	JOHN D & SHERRI GRIFFIN	4925 COUNTY ROAD 351	FULTON	MO	
	2014	10681 S. Meyers Lane	Ashland	MO	573-999-0479
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	BRUCE HENRY & KIMBERLIN ANN HACKMANN TRUST	11055 S MYERS LN	ASHLAND	MO	
Hackman, Bruce - Site #1	JAMES HENRY & BARBARA LOUISE SAPP TRUST	0000 S MYERS LN	ASHLAND	MO	
	RICK & WENDY WIESNER	4050 S MINOR HILL RD	ASHLAND	MO	
	JOHN C & PATSY R CORLEY	0000 S MINOR HILL RD	ASHLAND	MO	
	OPAL N MORRIS	4211 S MINOR HILL RD	COLUMBIA	MO	
	2014	10681 S. Meyers Lane	Ashland	MO	573-999-0479
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	DANIEL RYAN HELMKA	10601 MYERS LN	ASHLAND	MO	
	JUSTIN ROBERT & ROXANNE MARIE HELMKA	00000 NASHVILLE CHURCH	ASHLAND	MO	
	JAMES K & BRENDA L FORBIS	3269 E NASHVILLE CHURCH	ASHLAND	MO	
Hackman, Bruce - Site #2	JAMES HENRY & BARBARA LOUISE SAPP TRUST	0000 S MYERS LN	ASHLAND	MO	
	SAPP LIVING TRUST	11052 S MYERS LN	ASHLAND	MO	
	OPAL N MORRIS	4211 MINOR HILL RD	ASHLAND	MO	
	TRAVIS & CARI NICHOLS	0000 S MYERS LN	ASHLAND	MO	
	CONSERVATION COMMISSION OF THE STATE OF MISSOURI	0000 S MYERS LN	ASHLAND	MO	
	2014	10681 S. Meyers Lane	Ashland	MO	573-999-0479
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	JOHN & PATRICIA L DOUGAN	14701 S HWY DD	ASHLAND	MO	
	ASHLAND CHRISTIAN CHURCH	14775 S HWY DD	ASHLAND	MO	
	NELLIE J BRANSON TRUST	14860 S HENRY LN	ASHLAND	MO	
	LURA BETH STIERS (WHITE)	0000 S PALIS NICHOLS RD	ASHLAND	MO	
	ROBERT D & ROBIN P BLAKE	112 BRIAN LN	ASHLAND	MO	
	ANDREW & JESSICA GORDON	114 BRIAN LN	ASHLAND	MO	
Hackman, Bruce - Site #3	MIKE DAREN & LISA INLOW	109 BRIAN LN	ASHLAND	MO	
	KELLY L LISTER	205 BRIAN LN	ASHLAND	MO	
	ERIN & MATTHEW CHRIST	209 BRIAN LN	ASHLAND	MO	
	TRAVIS & AMY BANNING	301 BRIAN LN	ASHLAND	MO	
	CYNTHIA M PHILLIPS TRUST	303 BRIAN LN	ASHLAND	MO	
	GOSHEN PRIMITIVE BAPTIST CHURCH	307 BRIAN LN	ASHLAND	MO	
	JASON COLEMAN	401 BRIAN LN	ASHLAND	MO	
	MICHAEL & MELINDA COLLINS	0000 JAMESON DR	ASHLAND	MO	
	ROBERT D & SANDRA L SHORT	14400 S HIGHWAY DD	ASHLAND	MO	
	2014	10681 S. Meyers Lane	Ashland	MO	573-999-0479
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	CODY ANDERSON HACKMANN	3030 E BIGGS RD	ASHLAND	MO	
	JOHN LEE AND BETTY BUCKNER	2941 E BIGGS RD	ASHLAND	MO	
	CPW PARTNERSHIP LP	0000 E EDWARDS	ASHLAND	MO	
	CPW PARTNERSHIP LP	0000 E EDWARDS	ASHLAND	MO	
Hackman, Bruce - Site #4	KEITH W & JENNIFER K GRABNER	3301 E EDWARDS RD	ASHLAND	MO	
	DAVID REED GILMORE	0000 E EDWARDS	ASHLAND	MO	
	BRANDON D & ANDREA K WESTLAKE	3589 E EDWARDS RD	ASHLAND	MO	
	JOEL BENTON & JANET KAY BULLARD TRUST AGREEMENT	0000 E EDWARDS	ASHLAND	MO	
	BIGGS FAMILY IRREVOCABLE TRUST	0000 HWY DD	ASHLAND	MO	
	SBC TOWER HOLDINGS LLC	3600 E BIGGS	ASHLAND	MO	
	KEVIN S & RACHEL LYNN BROWN	3500 E BIGGS	ASHLAND	MO	
	2014	10681 S. Meyers Lane	Ashland	MO	573-999-0479
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	JAMES K & BRENDA L FORBIS	3269 E NASHVILLE CHURCH	ASHLAND	MO	
	CHARLES M & ALISON L DONIGIAN	3400 E NASHVILLE CHURCH	ASHLAND	MO	
	CPW PARTNERSHIP LP	0000 E NASHVILLE CHURCH	ASHLAND	MO	
Hackman, Bruce - Site #5	JAY MICHAEL & JANICE M LUNDQUIST	11671 S HWY DD	ASHLAND	MO	
	MATTHEW & LYNETTE MORASCH	11601 S HWY DD	ASHLAND	MO	
	RICK & WENDY WIESNER	4050 E MINOR HILL RD	ASHLAND	MO	
	JAMES HENRY & BARBARA LOUISE SAPP TRUST	0000 S MYERS LN	ASHLAND	MO	
	BRUCE HENRY & KIMBERLIN ANN HACKMANN TRUST	11055 S MYERS LN	ASHLAND	MO	
	EASLEY LIVING TRUST	3255 E NASHVILLE CHURCH RD	ASHLAND	MO	

	2014	10681 S. Meyers Lane	Ashland	MO	573-999-0479
Hackman, Bruce - Site #6	**Contiguous Parcels Owners**	**Address**	**City**	**State**	
	JOHN LEE AND BETTY BUCKNER	2941 E BIGGS RD	ASHLAND	MO	
	CPW PARTNERSHIP LP	0000 E EDWARDS	ASHLAND	MO	
	CPW PARTNERSHIP LP	0000 E EDWARDS	ASHLAND	MO	
	KEVIN S & RACHEL LYNN BROWN	3500 E BIGGS	ASHLAND	MO	
	THOMAS & SHANNON BURGESS	3300 E BIGGS RD	ASHLAND	MO	
	MARK D COFFMAN	0000 E BIGGS RD	ASHLAND	MO	
	FRANCES P ALBANO (PANKEN)	3151 E BIGGS RD	ASHLAND	MO	
	TIM R & CHRISTINE PHILLIPS	3051 E BIGGS RD	ASHLAND	MO	
	2013	6300 E. New Salem Ln	Ashland	MO	573-999-2908
Hagans, Robert - Site #1	**Contiguous Parcels Owners**	**Address**	**City**	**State**	
	JAMES ROBERT HAGANS, ETAL	6300 E NEW SALEM LN	ASHLAND	MO	
	LARRY D & RUTH ANN DOUGLAS TRUSTS	0000 E LOY MARTIN RD	ASHLAND	MO	
	GOETTING FAMILY IRREVOCABLE TRUST	6701 E NEW SALEM LN	ASHLAND	MO	
	ELMO L HAMBURG	6601 E NEW SALEM LN	ASHLAND	MO	
	2013	6300 E. New Salem Ln	Ashland	MO	573-999-2908
Hagans, Robert - Site #2	**Contiguous Parcels Owners**	**Address**	**City**	**State**	
	DONNIE L & JENNIE L WREN	6100 E LOY MARTIN RD	ASHLAND	MO	
	RYAN L & MELISSA D SCHEER	6600 LOY MARTIN RD	ASHLAND	MO	
	LARRY D & RUTH ANN DOUGLAS TRUSTS	0000 E LOY MARTIN RD	ASHLAND	MO	
	JAMES ROBERT HAGANS, ETAL	6300 E NEW SALEM LN	ASHLAND	MO	
	2013	6300 E. New Salem Ln	Ashland	MO	573-999-2908
Hagans, Robert - Site #3	**Contiguous Parcels Owners**	**Address**	**City**	**State**	
	DIANA L & LARRY N HALLETT	6161 S NEW SALEM LN	ASHLAND	MO	
	CENTRAL ELEC POWER COOP	6205 S NEW SALEM LN	ASHLAND	MO	
	ELMO L HAMBURG	6601 E NEW SALEM LN	ASHLAND	MO	
	GOETTING FAMILY IRREVOCABLE TRUST	6701 E NEW SALEM LN	ASHLAND	MO	
	KNIPP FARMS LLC	12050 S HARDWICK LN	ASHLAND	MO	
	2011-2012	5199 Count Road 351	Fulton	MO	573-642-1154
Harrison, John - Site #3	**Contiguous Parcels Owners**	**Address**	**City**	**State**	
	SCOTT M & CHERI L MALINSKI	4675 COUNTY ROAD 351	FULTON	MO	
	JOHN L & SHELLEY R VESTAL,	4715 COUNTY ROAD 351	FULTON	MO	
	HUNT CEMETERY	COUNTY ROAD 342	FULTON	MO	
	DONALD J & MARILYN R SCHOFIELD TRUST	COUNTY ROAD 351	FULTON	MO	
	JOHN D & SHERRI GRIFFIN	4925 COUNTY ROAD 351	FULTON	MO	
	DONALD F & CAROLYN BURNETT	5020 COUNTY ROAD 351	FULTON	MO	
	CAROLINE S MINER	1501 COUNTY ROAD 342	FULTON	MO	
	ANATOLE MORI	1575 COUNTY ROAD 342	FULTON	MO	
	EDWARD K BRIGHT TRUST	COUNTY ROAD 342	FULTON	MO	
	EDWARD K BRIGHT TRUST	COUNTY ROAD 342	FULTON	MO	
	EDWARD K BRIGHT TRUST	STATE ROAD J	FULTON	MO	
	JOHN R & KIMBERLY J HARRISON	4640 COUNTY ROAD 351	FULTON	MO	
	WALLACE V & BRANDY A AHRENS	4740 COUNTY ROAD 351	FULTON	MO	
	2011-2012	5199 Count Road 351	Fulton	MO	573-642-1154
Harrison, John - Site #5	**Contiguous Parcels Owners**	**Address**	**City**	**State**	
	JOHN R HARRISON TRUST	5199 COUNTY ROAD 351	FULTON	MO	
	THOMAS D & CATHERINE L SHRYOCK	COUNTY ROAD 351	FULTON	MO	
	MONEY MANAGEMENT INC	0000 E BARNES CHAPEL RD	COLUMBIA	MO	
	WINIFRED B HORNER TRUST	00000 E BARNES CHAPEL RD	COLUMBIA	MO	
	JAMES M & NANCY W GENTZSCH TRUST	COUNTY ROAD 344	FULTON	MO	
	DONALD BRADLEY WEISS TRUST	5190 COUNTY ROAD 351	FULTON	MO	
	JOHN P & MARILYN J ALLEN	5151 COUNTY ROAD 351	FULTON	MO	
	DAVID & LISA ALLEN	COUNTY ROAD 351	FULTON	MO	
	2011-2012	5199 Count Road 351	Fulton	MO	573-642-1154
Harrison, John - Site #6	**Contiguous Parcels Owners**	**Address**	**City**	**State**	
	THOMAS W & LISA A MEYER	10800 E DAVID ALLEN RD	COLUMBIA	MO	
	MICHAEL DAVID FISHER	00000 E BARNES CHAPEL RD	COLUMBIA	MO	
	THOMAS D & CATHERINE L SHRYOCK	COUNTY ROAD 351	FULTON	MO	
	DAVID & LISA ALLEN	COUNTY ROAD 351	FULTON	MO	
	2011-2012			MO	573-592-0208
Jones, Russ - Site #12	**Contiguous Parcels Owners**	**Address**	**City**	**State**	
	DOLORES TENNENBAUM TRUST	COUNTY ROAD 246	FULTON	MO	
	JOHN M EARLY	2183 COUNTY ROAD 228	FULTON	MO	
	JOSEPH B RICHNER	2198 COUNTY ROAD 228	FULTON	MO	
	BRIAN K MORRIS & MARY MORRIS-WALKER	2250 COUNTY ROAD 228	FULTON	MO	
	RUSSELL C & JULIE F JONES	2286 COUNTY ROAD 228	FULTON	MO	
	JOHN M & ROSEMARY ASHLOCK	4300 SPENCE	FULTON	MO	
	WENDELL D & JEANNE M CUNNINGHAM	COUNTY ROAD 228	FULTON	MO	
	JEANETTE PORTER	2420 COUNTY ROAD 228	FULTON	MO	
	CENTRAL ELECTRIC POWER COOPERATIVE	4280 COUNTY ROAD 228	FULTON	MO	
	WAYNE C LATTY	4152 COUNTY ROAD 257	FULTON	MO	
	MELINDA FRANCINE THIELBAR, ETAL	4041 COUNTY ROAD 257	FULTON	MO	
	TRENTON BOYD	1976 COUNTY ROAD 246	FULTON	MO	

	2011-2012	County Road 346	Fulton	MO	
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	THOMAS D & CATHERINE L SHRYOCK	COUNTY ROAD 351	FULTON	MO	
	ABRAMOVITZ-ELWING TRUST	1500 COUNTY ROAD 346	FULTON	MO	
Jeffries, - Site #14	GEORGE A NEAL	1550 COUNTY ROAD 346	FULTON	MO	
	DEBRA A NEAL	1599 COUNTY ROAD 346	FULTON	MO	
	PATRICIA ANN POTTS	COUNTY ROAD 344	FULTON	MO	
	SANDRA J DAVIES	COUNTY ROAD 344	FULTON	MO	
	2014	S Tomlin Hill Rd.	Columbia	MO	573-875-5634
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	LARRY G & DONNA K SCOTT	8255 FOREST CREEK DR	COLUMBIA	MO	
Kyd, Jim - Site #1	VIRGINIA E GARDNER	0000 S TOMLIN HILL RD	COLUMBIA	MO	
	ERIC R & FRANCES E POPE	0000 S TOMLIN HILL RD	COLUMBIA	MO	
	EVERETT V & MARIAN LEAH COX	0000 S FOX LN	COLUMBIA	MO	
	JAMES U TURNER, ETAL	8051 S FOX LN	COLUMBIA	MO	
	2011-2012	1818 County Road 269	Columbia	MO	573-881-5476
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	OTTO F & ELIZABETH A FAJEN JOINT REVOC TRUST	12150 E MAUPIN LN	COLUMBIA	MO	
	JEFFREY L & GLENDA A DESHON FAMILY TRUST	0000 E JUDY SCHOOL RD	COLUMBIA	MO	
	ROGER L ADAIR	0000 E MAUPIN LN	COLUMBIA	MO	
	DALE D & VICKI S HUMBURG JOINT REVOCABLE LIVING TRUST	12501 E JUDY SCHOOL RD	COLUMBIA	MO	
	BARBARA & JERRY LEE	1495 COUNTY ROAD 274	FULTON	MO	
	JOHNNY ANDREW & KRISTA LEIGH EAKER,	COUNTY ROAD 274	FULTON	MO	
	GARY DALE WATHEN	1520 COUNTY ROAD 274	FULTON	MO	
Lee, Tom - Site #18	JAMES H LOWES,	1667 COUNTY ROAD 269	FULTON	MO	
	DAVID & JOYCE REAMS TRUST	1713 COUNTY ROAD 274	FULTON	MO	
	CHARLES E AUSFAHL TRUST	COUNTY ROAD 269	FULTON	MO	
	RAY A & WILMA G GRACE TRUST	1332 COUNTY ROAD 269	FULTON	MO	
	OTTO F & ELIZABETH A FAJEN TRUST	COUNTY ROAD 286-269	FULTON	MO	
	JEREMIAH & JENNIFER MARTIN	1683 COUNTY ROAD 286	FULTON	MO	
	MARK & LEIGH ANN LAMONT	1675 COUNTY ROAD 286	FULTON	MO	
	JOEL & LORETTA HALEY FAMILY LIVING TRUST	0000 MAUPIN LN	COLUMBIA	MO	
	DOROTHY ANNE LEWIS	0000 MAUPIN LN	COLUMBIA	MO	
	LOUISE ADKINS, ETAL	0000 MAUPIN LN	COLUMBIA	MO	
	2014	601 E. Fox Hollow Rd	Ashland	MO	573-657-4543
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	STOGSDILL LIVING TRUST	275 E FOX HOLLOW RD	ASHLAND	MO	
	ERIC R & FRANCES E POPE	0000 E FOX HOLLOW RD	ASHLAND	MO	
Leonard, Rick - Site #1	ROBERT W KORMEIER	0000 E FOX HOLLOW RD	ASHLAND	MO	
	MICHAEL R & RHONDA J NICHOLS	875 E FOX HOLLOW RD	ASHLAND	MO	
	MITCHELL L & ILA B BENNETT REVOCABLE TRUST	1001 E FOX HOLLOW RD	ASHLAND	MO	
	RONALD C NEELY & IRENE L WOLF REVOCABLE TRUST	611 E FOX HOLLOW RD	ASHLAND	MO	
	ROBERT W & JESSICA W & JOHNNIE L SATTERFIELD	605 E FOX HOLLOW RD	ASHLAND	MO	
	2011-2012	4693 State Road J	Fulton	MO	573-289-0044
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	EDWARD K BRIGHT TRUST	STATE ROAD J	FULTON	MO	
	RICK L & MOLLY L MEANS	STATE ROAD J	FULTON	MO	
	RICK L & MOLLY L MEANS	1899 COUNTY ROAD 342	FULTON	MO	
	JAMES EDSON FORKER & RACHEL CARTER	STATE ROAD J	FULTON	MO	
	SARAH KLINGBEIL TRUST	4746 STATE ROAD J	FULTON	MO	
	JAMES & JAIME N KERPASH	4750 STATE ROAD J	FULTON	MO	
Martin, Mike - Site #1	RICHARD P KLINGBEIL, ETAL	4684 STATE ROAD J	FULTON	MO	
	DAVID J PEZOLD	1910 OWL CREEK LN	FULTON	MO	
	MICHAEL J & DEBRA MARTIN	4693 STATE ROAD J	FULTON	MO	
	MICHAEL C & NANCY C DUENOW	0000 SHILOH CT	FULTON	MO	
	MATTHEW J MEHMERT	0000 SHILOH CT	FULTON	MO	
	JACKIE TRATCHEL	1842 SHILOH CT	FULTON	MO	
	CARLOS A CASARES & MEGAN E CAMACHO	1831 SHILOH CT	FULTON	MO	
	DIANE M BERNARD	4489 STATE ROAD J	FULTON	MO	
	DONALD & MERILYN GHOLSON	1749 JEFFERY DR	FULTON	MO	
	2011-2012	4693 State Road J	Fulton	MO	573-289-0044
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	JOHN R & KIMBERLY J HARRISON	4640 COUNTY ROAD 351	FULTON	MO	
	JOYANNE BLOCK TRUST	4750 COUNTY ROAD 351	FULTON	MO	
	JOYANNE BLOCK TRUST	5194 COUNTY ROAD 351	FULTON	MO	
	ANATOLE MORI	1575 COUNTY ROAD 342	FULTON	MO	
	LYNNE M VANBENTHUYSEN	COUNTY ROAD 342	FULTON	MO	
	LYNNE M VANBENTHUYSEN	1655 COUNTY ROAD 342	FULTON	MO	
Martin, Mike - Site #2	RICK L & MOLLY L MEANS	1899 COUNTY ROAD 342	FULTON	MO	
	RICK L & MOLLY L MEANS	STATE ROAD J	FULTON	MO	
	MICHAEL J & DEBORAH F MARTIN	4693 STATE ROAD J	FULTON	MO	
	DIANE M BERNARD	4489 STATE ROAD J	FULTON	MO	
	DONALD & MERILYN GHOLSON	1749 JEFFERY DR	FULTON	MO	
	KELLENA GILPIN	1750 EWING CR	FULTON	MO	
	FLORENCE MARIE & STEVEN ALEXANDER CASON	1736 EWING CR	FULTON	MO	
	BURTON L & CYNTHIA J STOERKER	1530 COUNTY ROAD 340	FULTON	MO	
	BURTON L & CYNTHIA J STOERKER	1520 COUNTY ROAD 340	FULTON	MO	

	2014	4301 Pearman Road	Ashland	MO	573-999-0479
	Contiguous Parcels Owners	**Address**	**City**	**State**	
Nahler, Cliffton - Site #1	ROBERT R EDWARDS	4500 E MINOR HILL RD	ASHLAND	MO	
	KENNETH LEE SAPP	12200 S HIGHWAY DD	ASHLAND	MO	
	JESSE & CAROLYN NORTHWEATHER	4001 E BIGGS RD	ASHLAND	MO	
	BRADLY T & REBECCA L NEWKIRK	12501 S HWY DD	ASHLAND	MO	
	MICHAEL G & SUE ANN NIKOLENKO	12561 S HWY DD	ASHLAND	MO	
	JUDITH M GONNERMAN	4101 E BIGGS RD	ASHLAND	MO	
	JEFFREY S & SHERIE L GARRIOTT	12765 S HWY DD	ASHLAND	MO	
	LARRY D & JOCELYN G MEYER	12885 S HWY DD	ASHLAND	MO	
	SUZANNE MYERS TRUST	13000 S HIGHWAY DD	ASHLAND	MO	
	JAMES E & SYLVIA L CRANE	0000 E MARTIN LN	ASHLAND	MO	
	RAYMOND J & BETTY A WINKELMAN	5101 MARTIN LN	ASHLAND	MO	
	KENNETH E & MARY LOUISE PAULEY REVOCABLE INTER	12001 HIGHWAY 63 S	ASHLAND	MO	
	GARY L & DIAN E PAULEY	0000 MINOR HILL RD	ASHLAND	MO	
	HAROLD & WANDA CUNNINGHAM	4909 MINOR HILL RD	ASHLAND	MO	
	MICHAEL A & LISA J GOLDMAN	4751 E MINOR HILL RD	ASHLAND	MO	
	CHERYL A PERRY	4701 MINOR HILL RD	ASHLAND	MO	
	BRANDI N DAVIS & CHASE T & JULIE A BIANCO	4509 E MINOR HILL RD	ASHLAND	MO	
	JUSTIN NELSON	4401 E MINOR HILL RD	ASHLAND	MO	
	2014	4301 Pearman Road	Ashland	MO	573-999-0479
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	NELLIE J BRANSON TRUST	14860 S HENRY LN	ASHLAND	MO	
	MARY C MARTIN	15101 S PALIS NICHOLS RD	ASHLAND	MO	
	NEW LIBERTY CHURCH TRUSTEES	0000 S PALIS NICHOLS RD	ASHLAND	MO	
	CEMETERY GROUNDS	0000 S PALIS NICHOLS RD	ASHLAND	MO	
	CHURCH GROUNDS	4200 E LIBERTY LN	ASHLAND	MO	
Nahler, Cliffton - Site #2	PALIS I JR & BETTY NICHOLS	0000 S PALIS NICHOLS RD	ASHLAND	MO	
	MARY ANN & LEO SANDER	0000 E LIBERTY LN	ASHLAND	MO	
	MERLE JR & CHARLOTTE SMARR	804 W BROADWAY	ASHLAND	MO	
	ERIC A & DEBORAH R SHIMP	201 COLLINS CT	ASHLAND	MO	
	CHADLEY & MARIA KNIGGE	106 BRIAN LN	ASHLAND	MO	
	TRACEY DEAN FRITCHEY	0000 BRIAN LN	ASHLAND	MO	
	ROBERT D & ROBIN P BLAKE	112 BRIAN LN	ASHLAND	MO	
	EDWARD M & HARGITA TOALSON	0000 S HWY DD	ASHLAND	MO	
	2014	Hagens Road	Ashland	MO	573-673-6278
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	ELIZABETH F BURNETT	15100 S HAGANS RD	ASHLAND	MO	
	BOYD J & SHIRLEY I MCCLATCHEY TRUSTS	0000 E RTE Y	ASHLAND	MO	
	ERVIN A BENTLAGE, ETAL	0000 S HAGANS RD	ASHLAND	MO	
	RAYMOND-ANNA BADE TRUST	16100 S HAGANS RD	ASHLAND	MO	
	RENATA MAIORINO	16201 S HAGANS RD	ASHLAND	MO	
Purcell, Mike - Site #1	TROY E & JOAN E BENTLAGE	8502 RTE Y	ASHLAND	MO	
	MATTHEW KEMNA	8484 RTE Y	ASHLAND	MO	
	DWIGHT D & CLAUDIA KRUCKENBERG	8394 E ROUTE Y	ASHLAND	MO	
	JERRY M & LORETTA L WASHBURN	7900 E STATE ROUTE Y	ASHLAND	MO	
	CLIFF E & KAREN L BARKER	7810 E STATE ROUTE Y	ASHLAND	MO	
	ROBERT W & KANYA HINES	7800 E STATE ROUTE Y	ASHLAND	MO	
	DAVID A & ANNETTE M STEVENSON	7600 E RTE Y	ASHLAND	MO	
	CHARLES W HUHMAN	15050 S HAGANS RD	ASHLAND	MO	
	2011-2012	5596 State Road J	Fulton	MO	573-592-0202
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	W. ART BEDSWORTH,	5465 STATE ROAD J	FULTON	MO	
	ROBERT & PATRICIA MCGRATH	STATE ROAD J	FULTON	MO	
	CHRIS V & SHANNON M THOMPSON	2000 COUNTY ROAD 334	FULTON	MO	
	DAVID A III & CAROLINE TODD	2080 COUNTY ROAD 334	FULTON	MO	
	DAVID A III & CAROLINE TODD	COUNTY ROAD 334	FULTON	MO	
	KEN & SUSAN MCCARTY	COUNTY ROAD 334	FULTON	MO	
	CLIFTON SCOTT GUSE'	2240 COUNTY ROAD 334	FULTON	MO	
Ryan, Larry (Gary) - Site #10	DENNIS H & SUSAN AUGUR,	2290 COUNTY ROAD 334	FULTON	MO	
	DENNIS H AUGUR	COUNTY ROAD 334	FULTON	MO	
	LESLIE E & MARY JO STEPHENS	5841 COUNTY ROAD 334	FULTON	MO	
	SHADY BROOK FARM INC.	COUNTY ROAD 334	FULTON	MO	
	U.S.A.	COUNTY ROAD 335	FULTON	MO	
	U.S.A.	COUNTY ROAD 343	FULTON	MO	
	U.S.A.	COUNTY ROAD 335	FULTON	MO	
	STEPHEN W WELSH M.D., ETAL	COUNTY ROAD 343	FULTON	MO	
	NADINE GENTZSCH, ETAL	COUNTY ROAD 343	FULTON	MO	
	WILLIAM B & NADINE GENTZSCH	5350 State Road J	FULTON	MO	
	2014	7949 E. Hubbard Rd	Columbia	MO	573-489-3965
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	AL-HU FARMS LLC	0000 E HUBBARD RD	COLUMBIA	MO	
	JOE E ALLEN, ETAL	0000 E HUBBARD RD	COLUMBIA	MO	
Sapp, Jaramie - Site #1	LINDA A MISSOURI TRUST	0000 S RANGELINE RD	COLUMBIA	MO	
	A L BRADY & ANNE H WELCH-BRADY	8101 E HUBBARD LN	COLUMBIA	MO	
	STEPHANIE A SMITH REVOCABLE LIVING TRUST	8351 S RANGELINE RD	COLUMBIA	MO	
	STUART & BARBARA KING	8100 E HIGHWAY AB	COLUMBIA	MO	
	DONALD L & MARYLOU MAYSE TRUST	8090 E HIGHWAY AB	COLUMBIA	MO	
	FAIRWAY COMMERICAL BUILDINGS INC	7750 E HIGHWAY AB	COLUMBIA	MO	

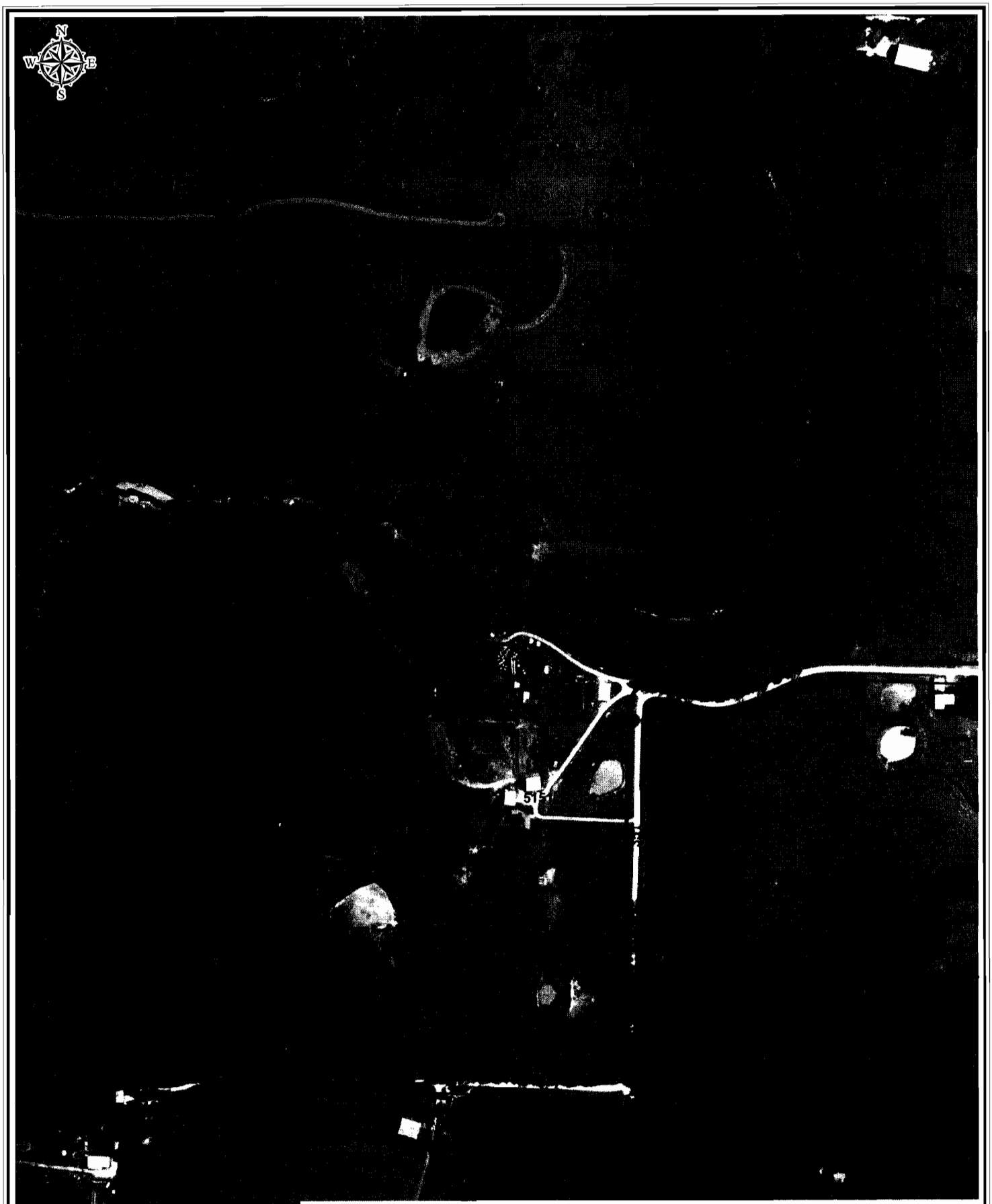
	2014	5550 S. Hwy 63	Columbia	MO	573-808-0374
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	GEORGE W & LYNN MONTGOMERY	5205 S HIGHWAY 163	COLUMBIA	MO	
	LEONARD HENRY MANSON III	5201 S HIGHWAY 163	COLUMBIA	MO	
	JOHN WILLIAM & NANCY GAY	815 E HAPPY HOLLOW RD	COLUMBIA	MO	
	E LYNN & JACQUELINE MILLER	820 HAPPY HOLLOW	COLUMBIA	MO	
	MARK FLINN & CAROL WARD-FLINN	5701 S HIGHWAY 163	COLUMBIA	MO	
Wilson, Dale - Site #1	MO STATE PARK BOARD	5901 S HIGHWAY 163	COLUMBIA	MO	
	STATE OF MISSOURI	0000 S HWY 163	COLUMBIA	MO	
	RUSSELL-RUTH THOMPSON TRUST	6300 S ST HWY 163	COLUMBIA	MO	
	DEPARTMENT OF NATURAL RESOURCES STATE OF MISSOUR	0000 S HWY 163	COLUMBIA	MO	
	MCTURNAN FAMILY PARTNERSHIP LLLP	0000 S ROCK QUARRY RD	COLUMBIA	MO	
	JOHN D & LISA CRAVENS	5320 S HWY 163	COLUMBIA	MO	
	CROWN CENTER FARMS INC	0000 S HWY 163	COLUMBIA	MO	
	JEROME JR & JEANNIE W TAYLOR	5302 S HWY 163	COLUMBIA	MO	
	2014	5550 S. Hwy 63	Columbia	MO	573-808-0374
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	MCTURNAN FAMILY PARTNERSHIP LLLP	5550 S HWY 163	COLUMBIA	MO	
	DEPARTMENT OF NATURAL RESOURCES STATE OF MISSOUR	0000 S HWY 163	COLUMBIA	MO	
	THOMAS F & ROBERTA J SATALOWICH REVOC LIV TRUSTS	6030 S ROCK QUARRY RD	COLUMBIA	MO	
Wilson, Dale - Site #2	BARNES LISA D REVOCABLE TRUST	5540 S ROCK QUARRY RD	COLUMBIA	MO	
	JUDD BEATRICE REVOCABLE LIVING TRUST	5450 S ROCK QUARRY RD	COLUMBIA	MO	
	CHRISTOPHER J DENNIS	5380 S ROCK QUARRY RD	COLUMBIA	MO	
	SUZANNE OPPERMAN	5310 S ROCK QUARRY RD	COLUMBIA	MO	
	ANTHONY LOWELL DAVIS	0000 S ROCK QUARRY RD	COLUMBIA	MO	
	MARY JO & ROBERT A HAGAN	5250 S ROCK QUARRY ROAD	COLUMBIA	MO	
	ANTHONY LOWELL DAVIS REVOCABLE TRUST	0000 S ROCK QUARRY RD	COLUMBIA	MO	
	2014	2001 E. Hwy MM	Ashland	MO	573-657-2403
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	BILLY G & ALVA J GARRETT	1795 E LEO SMITH RD	ASHLAND	MO	
	SARA BURSAC & BRANDON MCELROY	1800 E LEO SMITH RD	ASHLAND	MO	
Winfrey, Brandon - Site #1	DEVIN M & NICOLE R BLOCK	1820 E LEO SMITH RD	ASHLAND	MO	
	BETTY SITZE	0000 E LEO SMITH RD	ASHLAND	MO	
	POWERS CONSTRUCTION LLC	1840 E LEO SMITH RD	ASHLAND	MO	
	LINDA N WINFREY	2001 E STATE ROUTE MM	ASHLAND	MO	
	LYNETTE & ROGER JONES	1950 E HWY MM	ASHLAND	MO	
	2014	2001 E. Hwy MM	Ashland	MO	573-657-2403
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	JERRY P & JANICE SCHUERENBERG	1795 E HWY MM	ASHLAND	MO	
	LYNETTE & ROGER JONES	1950 E HWY MM	ASHLAND	MO	
Winfrey, Brandon - Site #2	LINDA N WINFREY	2001 E STATE ROUTE MM	ASHLAND	MO	
	POWERS CONSTRUCTION LLC	1840 E LEO SMITH RD	ASHLAND	MO	
	THOMAS H & SARAH GIESSMANN	0000 E HWY MM	ASHLAND	MO	
	LINDA N WINFREY	2303 E HIGHWAY MM	ASHLAND	MO	
	DALE H & NYOKA D WILSON	1803 E HWY MM	ASHLAND	MO	
	WILLIAM CARL & CHARLOTTE A RATHERT	1801 E HWY MM	ASHLAND	MO	
	2014	2001 E. Hwy MM	Ashland	MO	573-657-2403
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	CARL W & DEBRA K HEAD	1613 E FOX HOLLOW RD	ASHLAND	MO	
	CHARLES KEITH CLAYTON TRUST	0000 E FOX HOLLOW RD	ASHLAND	MO	
Winfrey, Brandon - Site #3	GRIFFIN FAMILY IRREVOCABLE TRUST	0000 E FOX HOLLOW RD	ASHLAND	MO	
	DENNIS & TRACY GRIFFIN	2400 E FOX HOLLOW RD	ASHLAND	MO	
	MICHAEL ALLAN STICHNOTE & KIM RENEE	2387 E FOX HOLLOW RD	ASHLAND	MO	
	KIRK L & BARBARA L MOREFIELD	14500 S KIDWELL CT	ASHLAND	MO	
	JAMES ONEAL	2363 E FOX HOLLOW RD	ASHLAND	MO	
	2014	8700 S. Tomlin Hill Rd	Ashland	MO	573-874-1261
	Contiguous Parcels Owners	**Address**	**City**	**State**	
	HAROLD L & CECILIA S HENTGES	2080 E BLUEBIRD LN	COLUMBIA	MO	
	KRISTOPHER & JULIE FARMER	2110 E BLUEBIRD LN	COLUMBIA	MO	
	JKB 2007 & BNB 2007 REVOCABLE TRUSTS	0000 E BLUEBIRD LN	COLUMBIA	MO	
	JBBB TRUST	2140 E BLUEBIRD LN	COLUMBIA	MO	
Winfrey, Dave - Site #1	CONSERVATION COMM OF THE STATE OF MISSOURI	0000 E BLUEBIRD LN	COLUMBIA	MO	
	CHARLES HUGH DENNEY	9031 S TOMLIN HILL RD	COLUMBIA	MO	
	PHYLLIS M WINFREY REVOCABLE LIVING TRUST	8801 S TOMLIN HILL RD	COLUMBIA	MO	
	GREGORY A & LORI A JOHNSON	8665 S TOMLIN HILL RD	COLUMBIA	MO	
	JOHN GONNERMAN TRUST	8645 S TOMLIN HILL RD	COLUMBIA	MO	
	JASON & TONYA GOODIN	8621 S TOMLIN HILL RD	COLUMBIA	MO	
	NIKKI D BARNES	2261 E BLUEBIRD LN	COLUMBIA	MO	



Land Application Sites for LSR
JOE ALLEN #16

Sheet 1 of 1 **1 inch = 520 feet**

COLUMBIA WATER & LIGHT

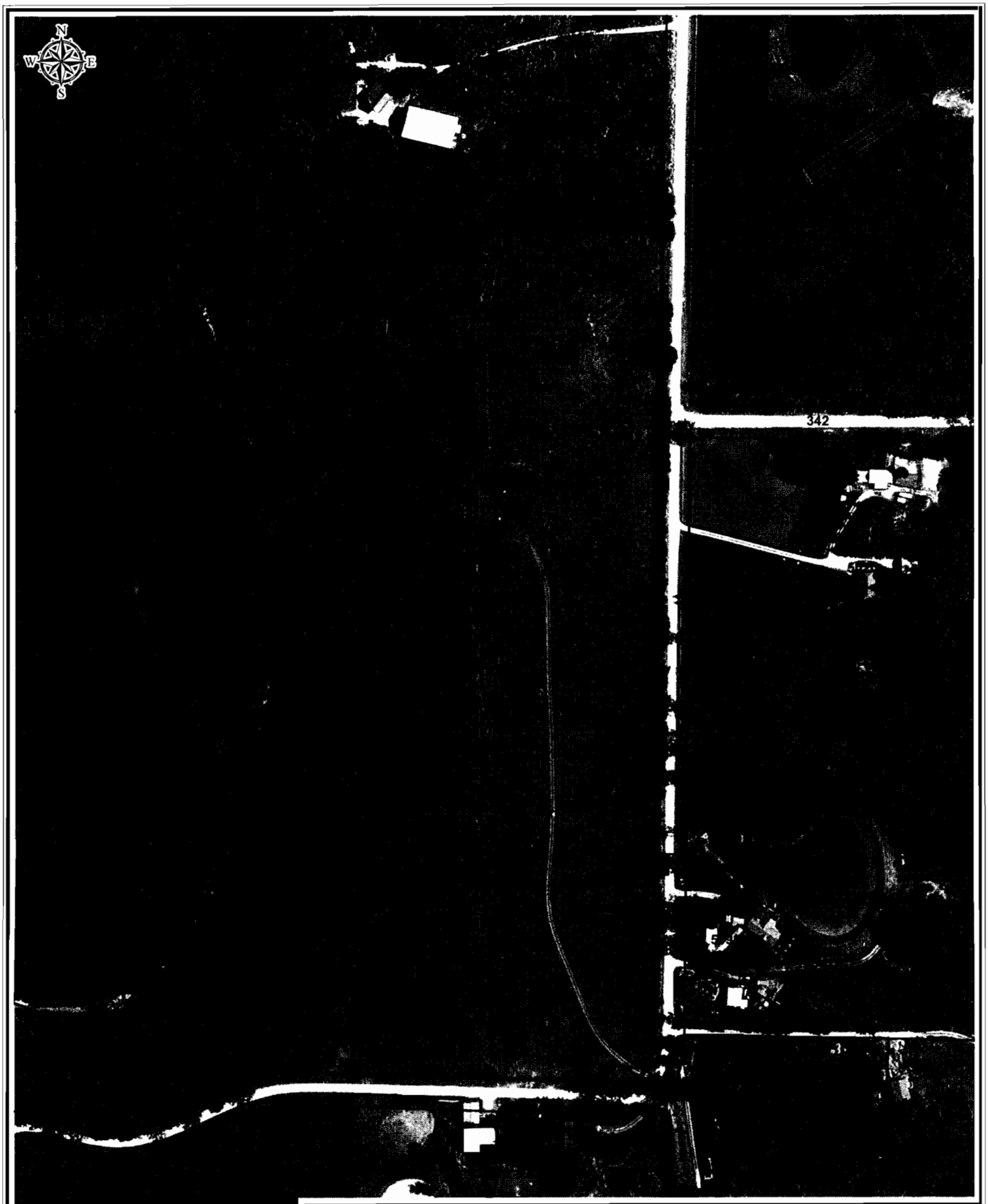


Land Application Sites for LSR
JOHN ALLEN #4

Sheet 1 of 2

1 inch = 388 feet

COLUMBIA WATER & LIGHT

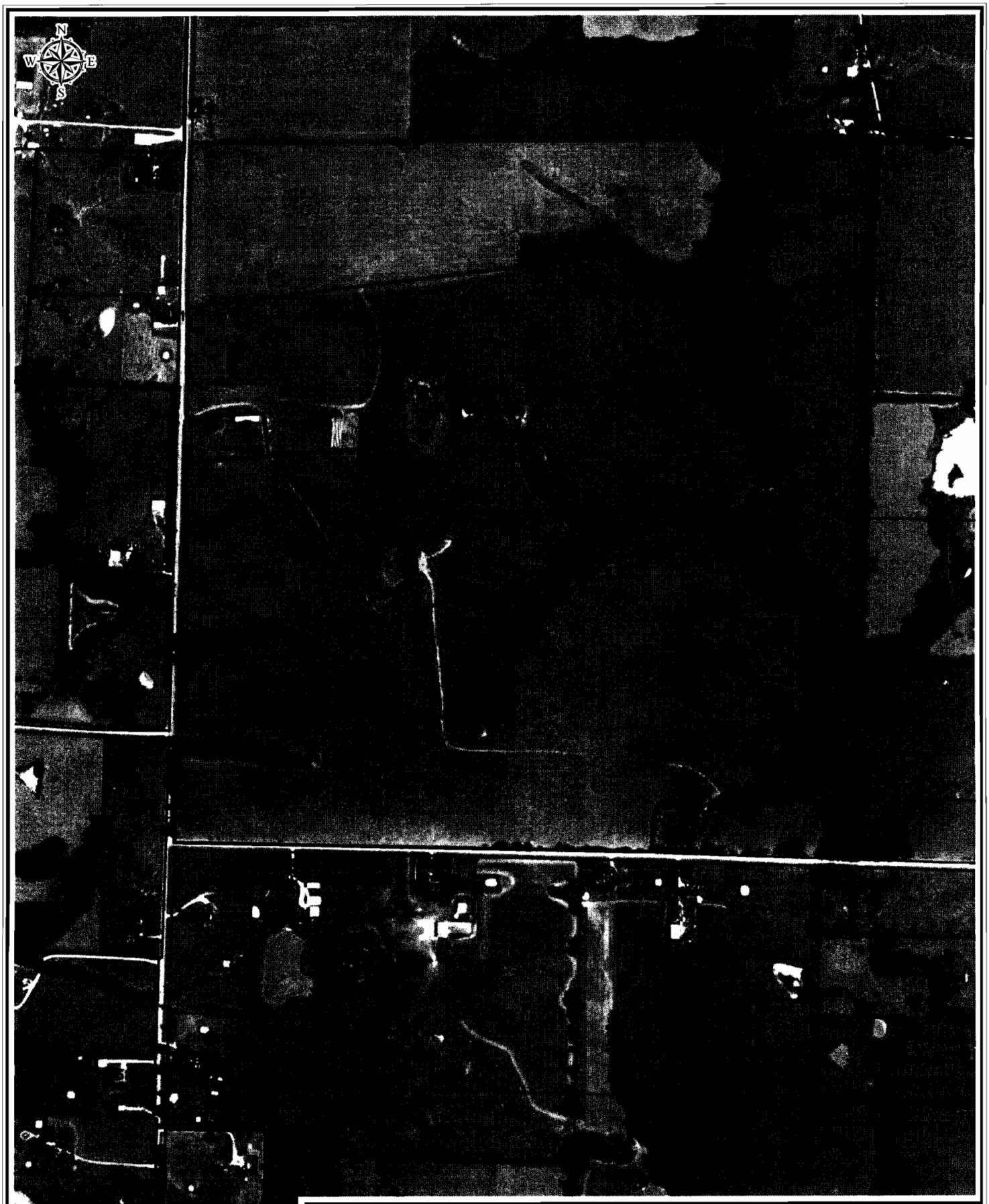


Land Application Sites for LSR
JOHN ALLEN #7

Sheet 1 of 3

1 inch = 246 feet

COLUMBIA WATER LIGHT

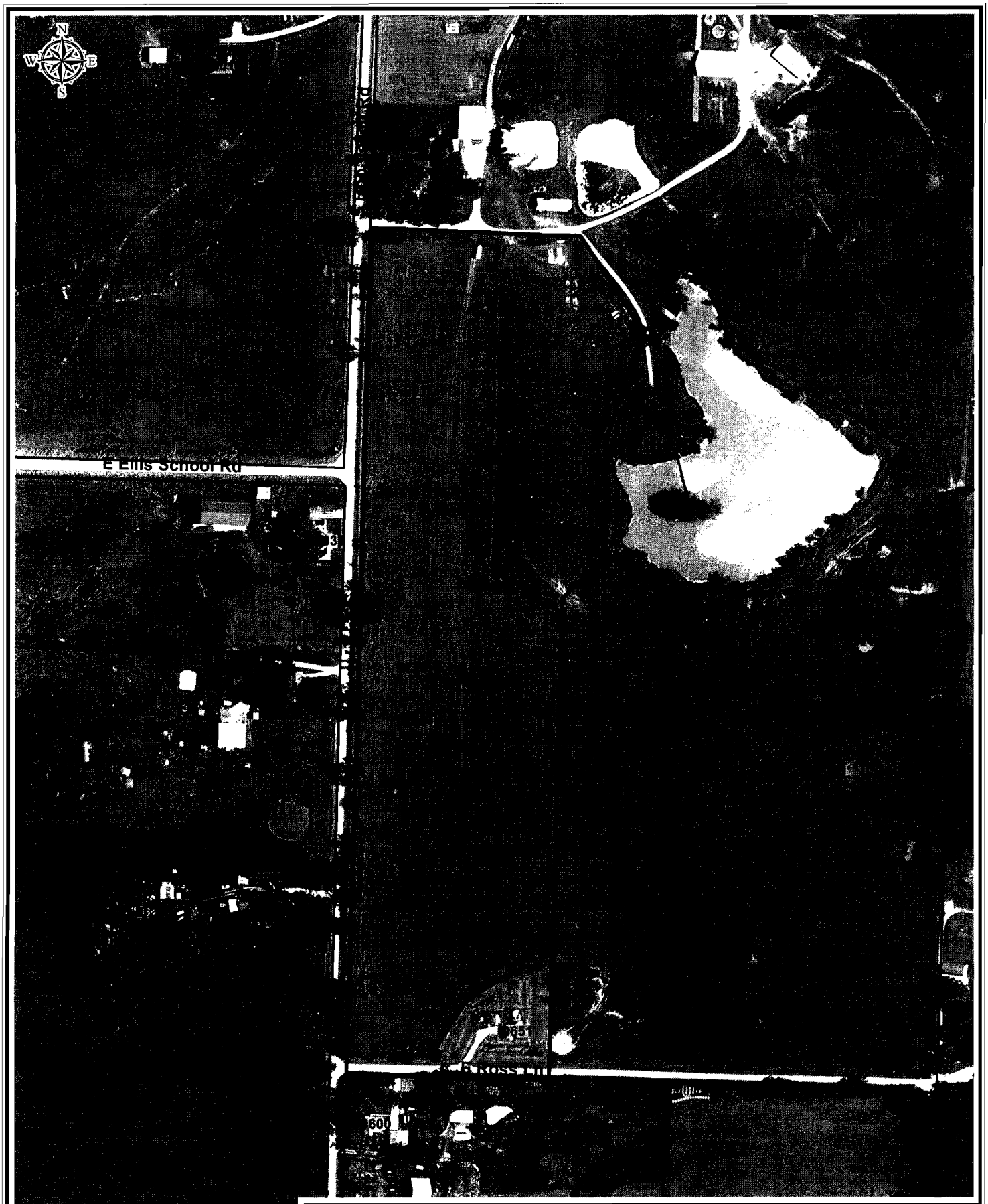


Land Application Sites for LSR
JERRY BARNES #1

Sheet 1 of 4

1 inch = 679 feet

COLUMBIA WATER & LIGHT

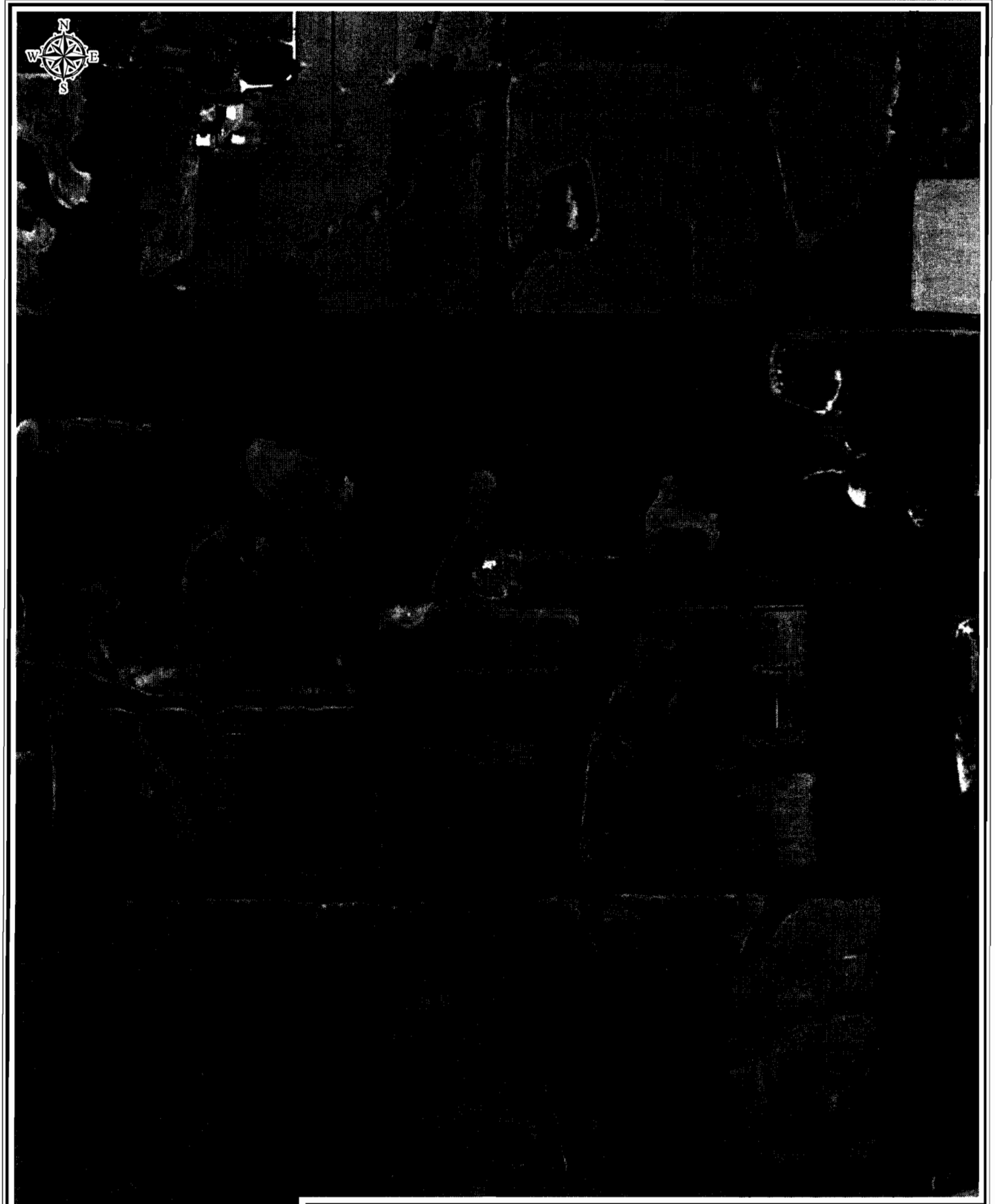


Land Application Sites for LSR
JERRY BARNES #3

Sheet 1 of 5

1 inch = 273 feet

COLUMBIA WATER LIGHT

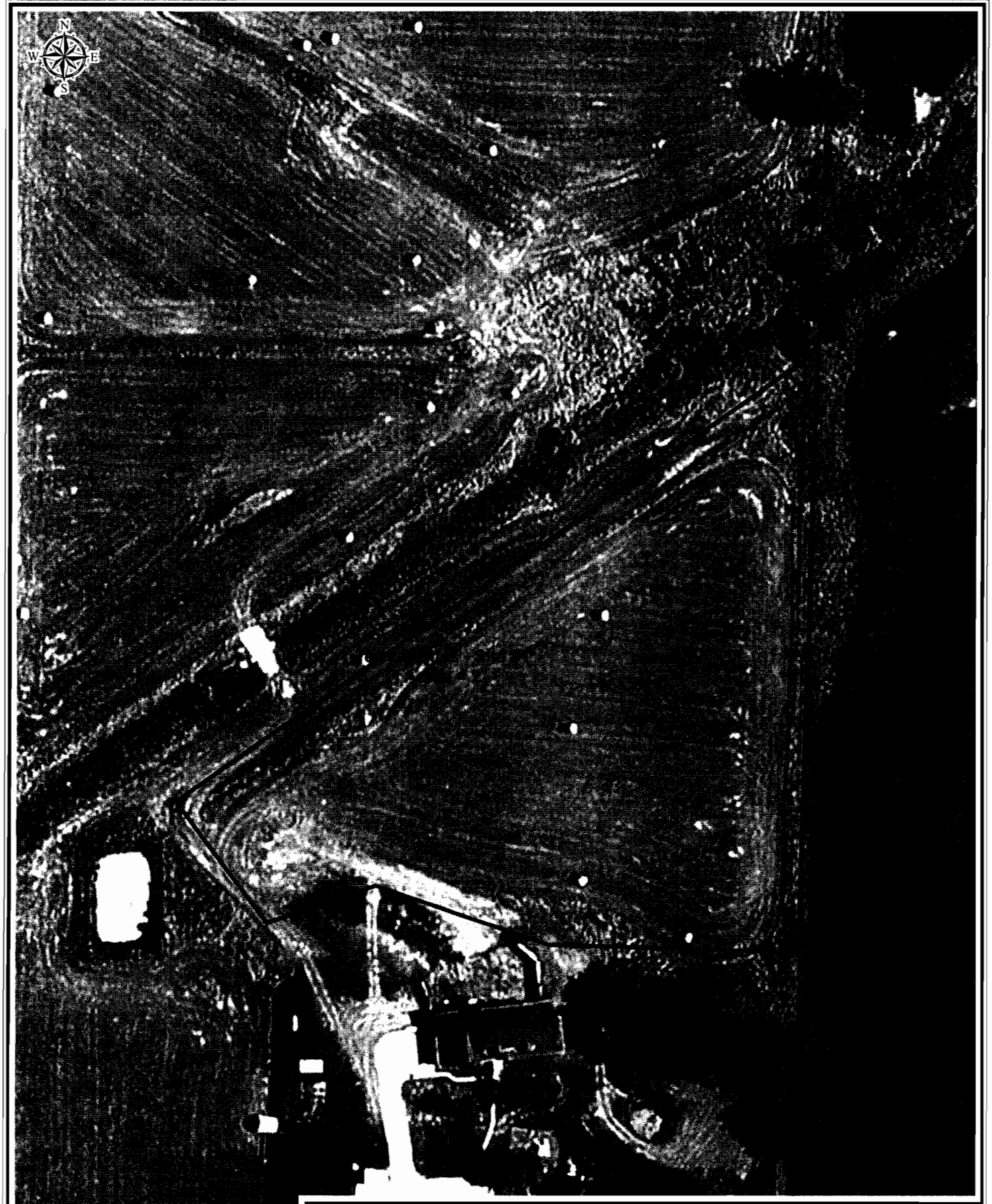


Land Application Sites for LSR
JERRY BARNES #4

Sheet 1 of 6

1 inch = 580 feet

COLUMBIA WATER & LIGHT

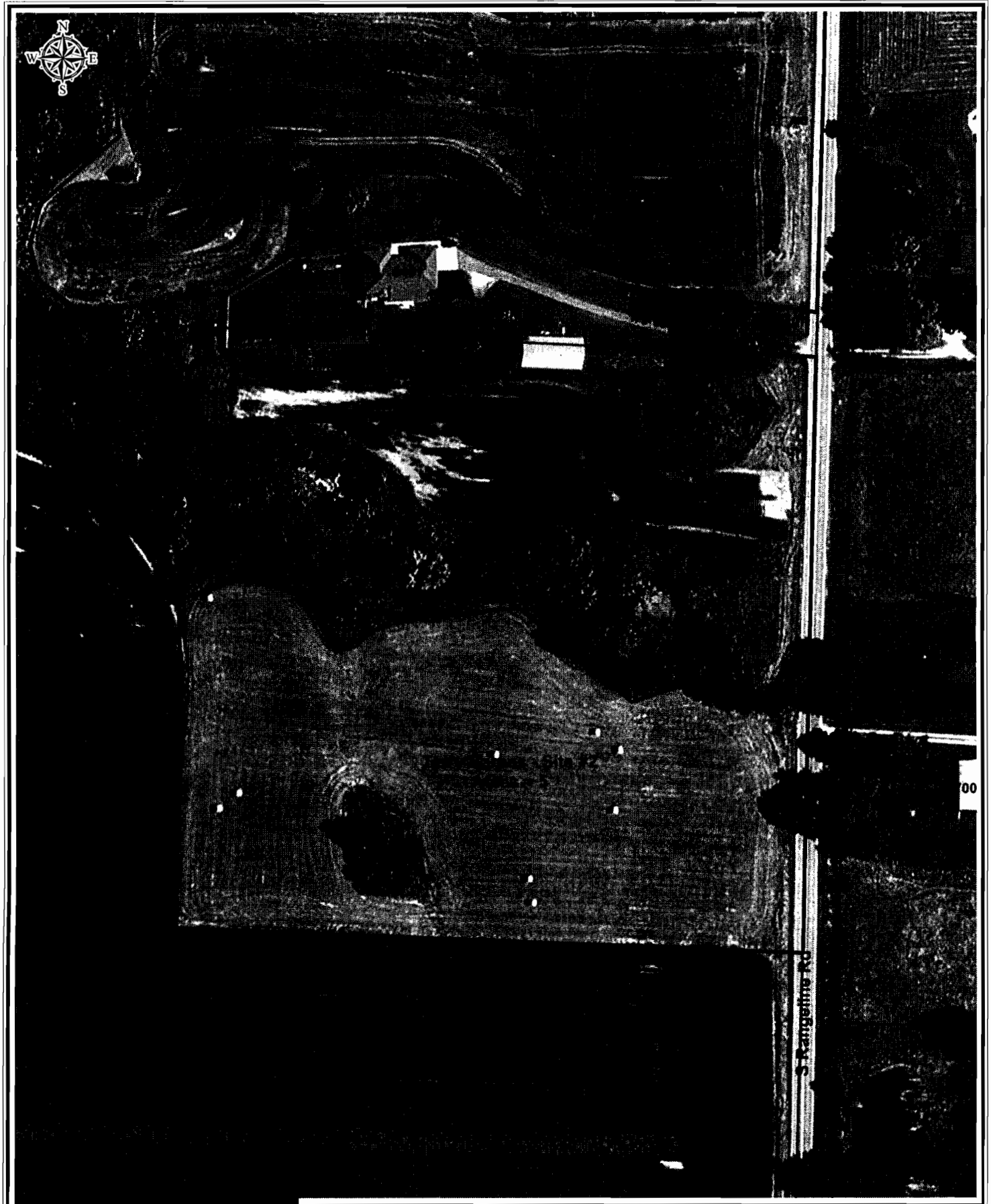


Land Application Sites for LSR
TERRY BARNES #1

Sheet 1 of 7

1 inch = 87 feet

COLUMBIA WATER LIGHT

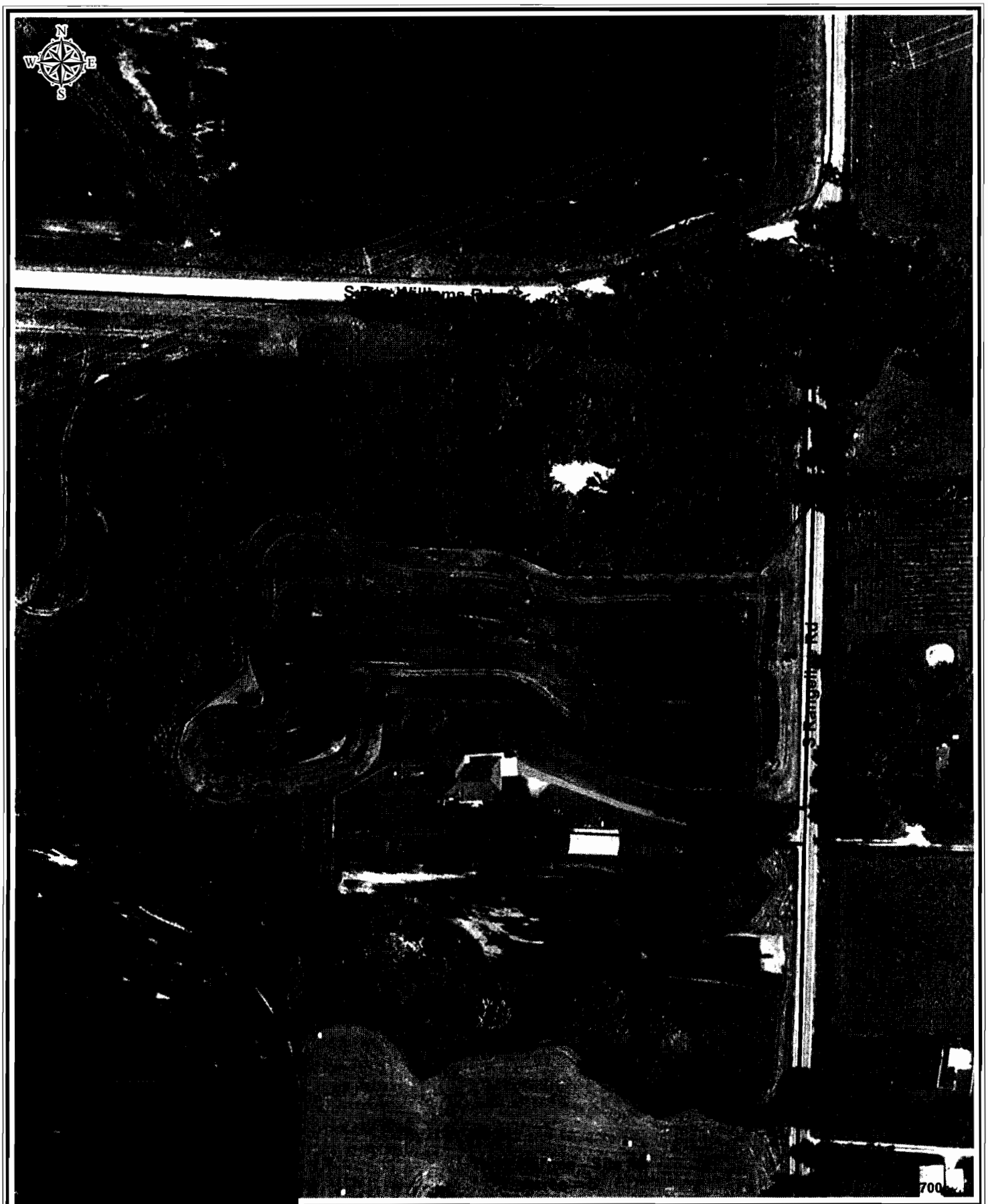


Land Application Sites for LSR
TERRY BARNES #2

Sheet 1 of 8

1 inch = 122 feet

COLUMBIA WATER & LIGHT

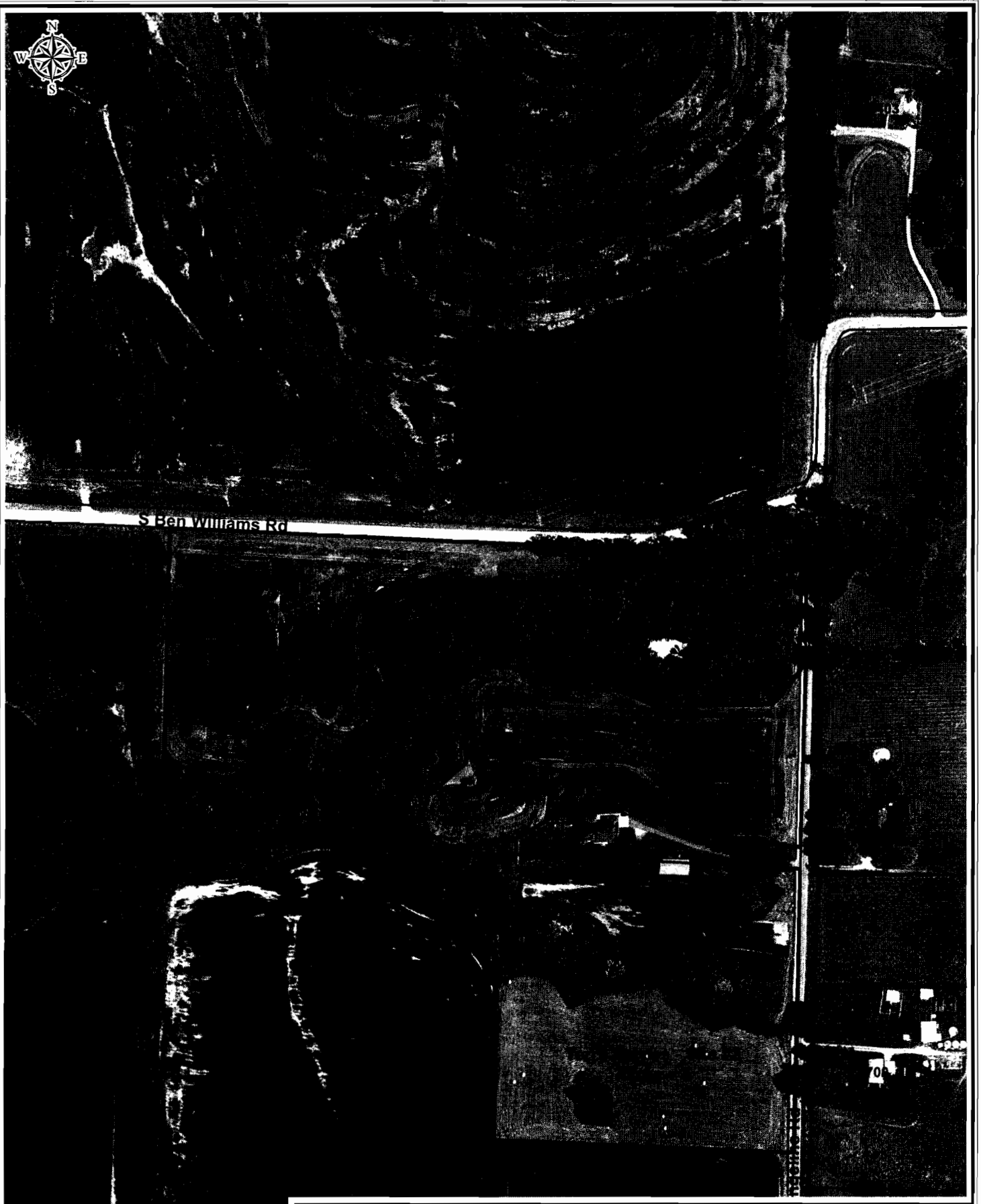


Land Application Sites for LSR
TERRY BARNES #3

Sheet 1 of 9

1 inch = 152 feet

COLUMBIA WATER LIGHT

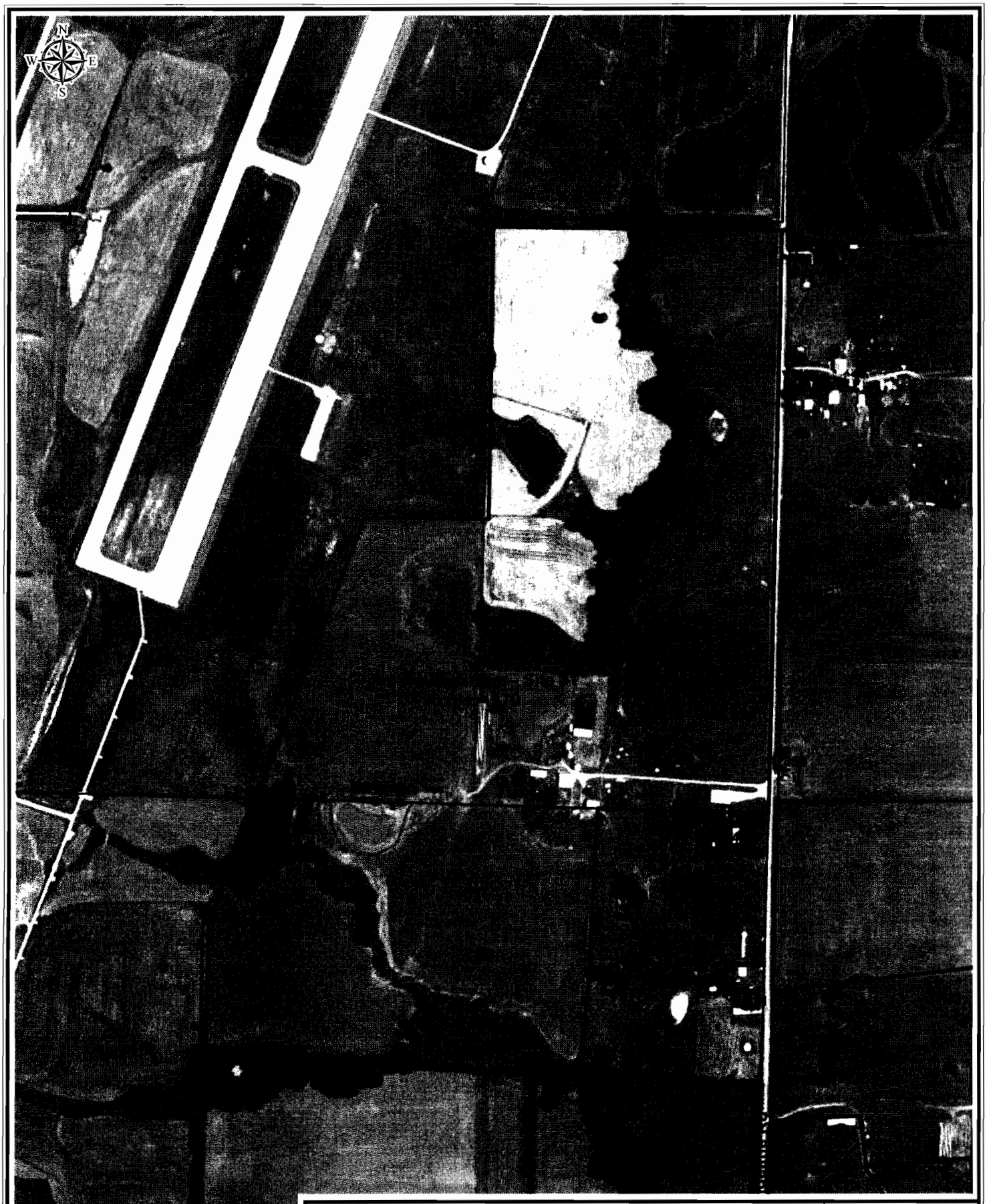


Land Application Sites for LSR
TERRY BARNES #4

Sheet 1 of 10

1 inch = 254 feet

COLUMBIA WATER LIGHT

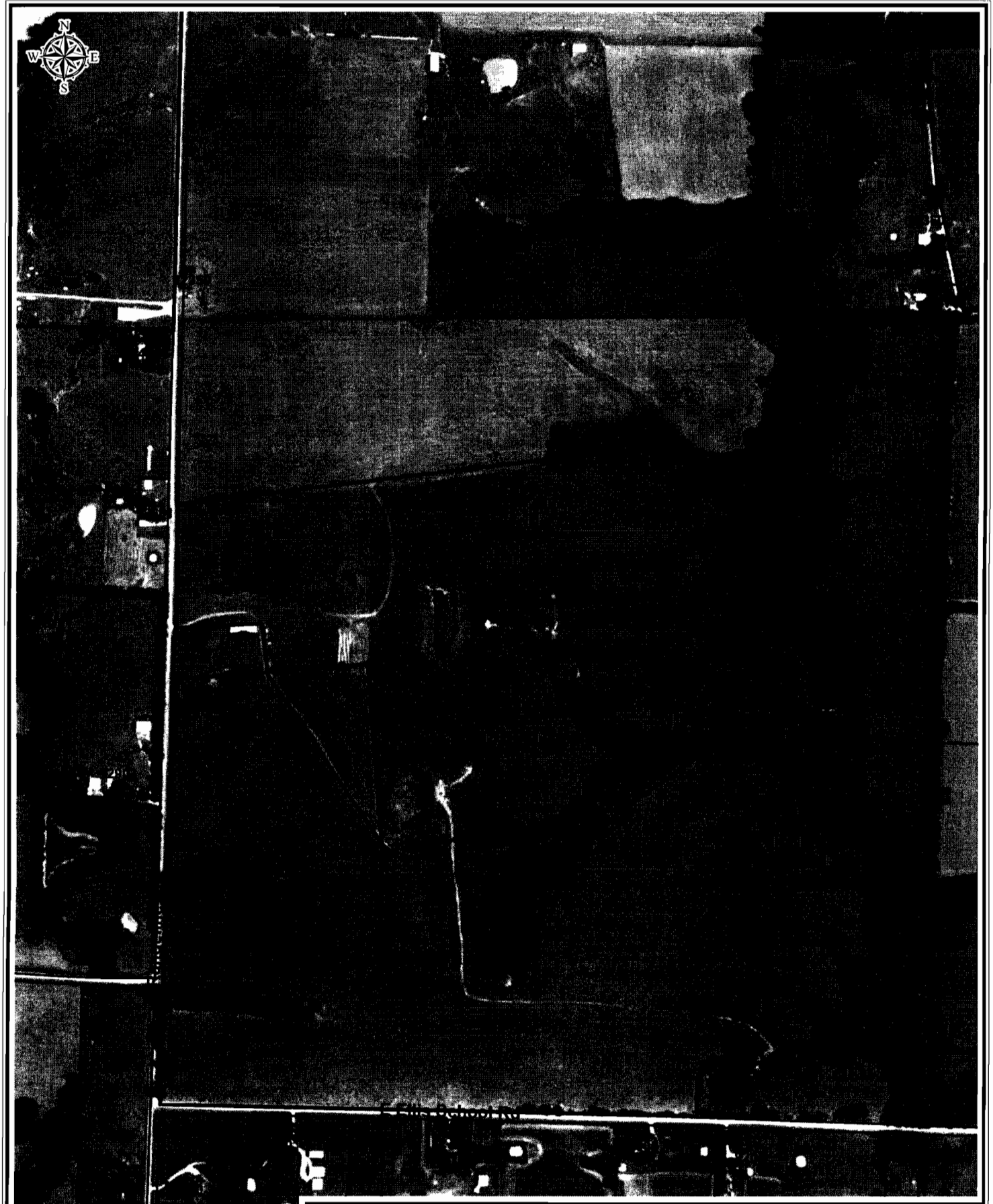


Land Application Sites for LSR
JOE BAUMGARTNER #1

Sheet 1 of 11

1 inch = 582 feet

COLUMBIA WATER & LIGHT

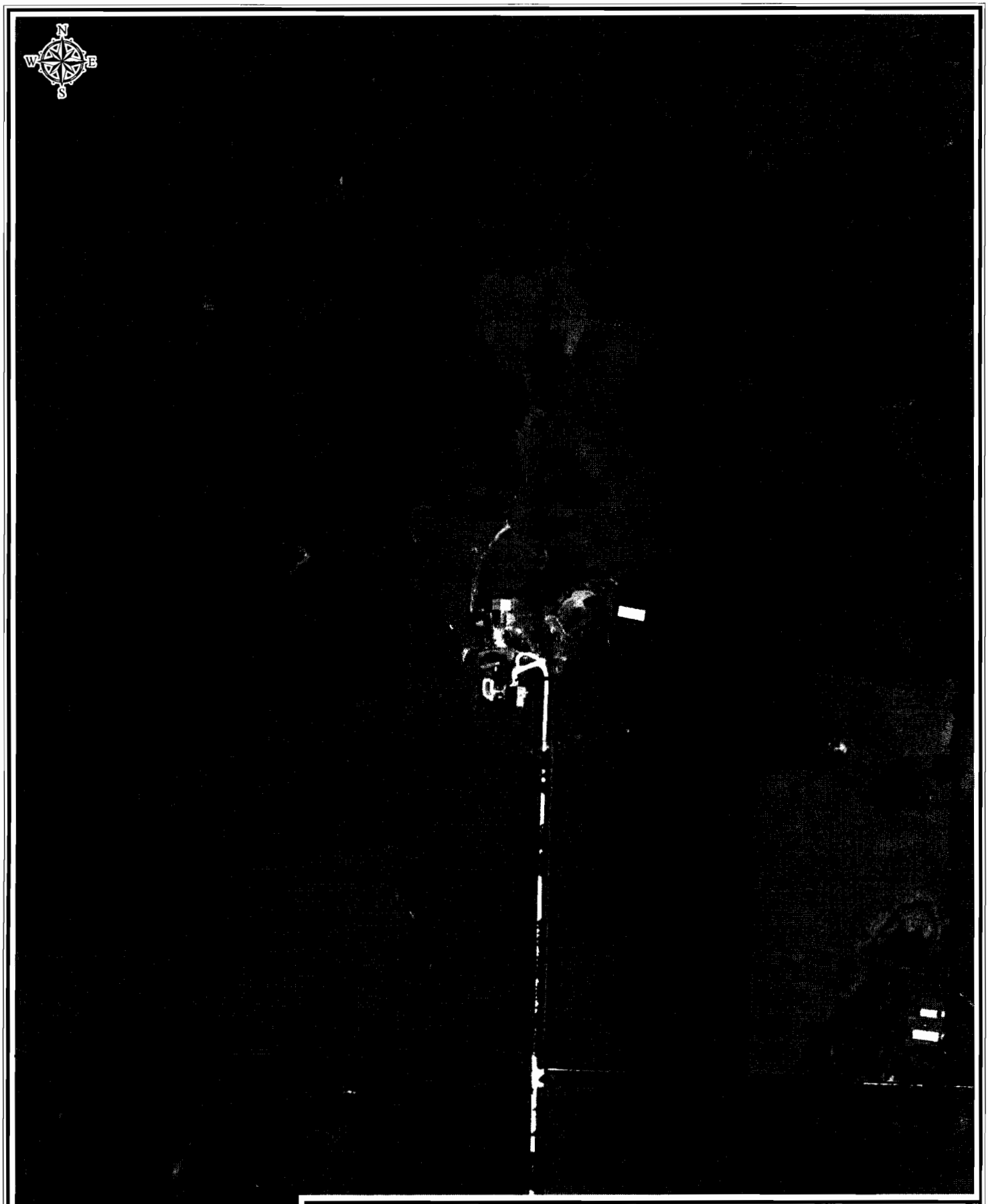


Land Application Sites for LSR
JOE BAUMGARTNER #2

Sheet 1 of 12

1 inch = 606 feet

COLUMBIA WATER & LIGHT

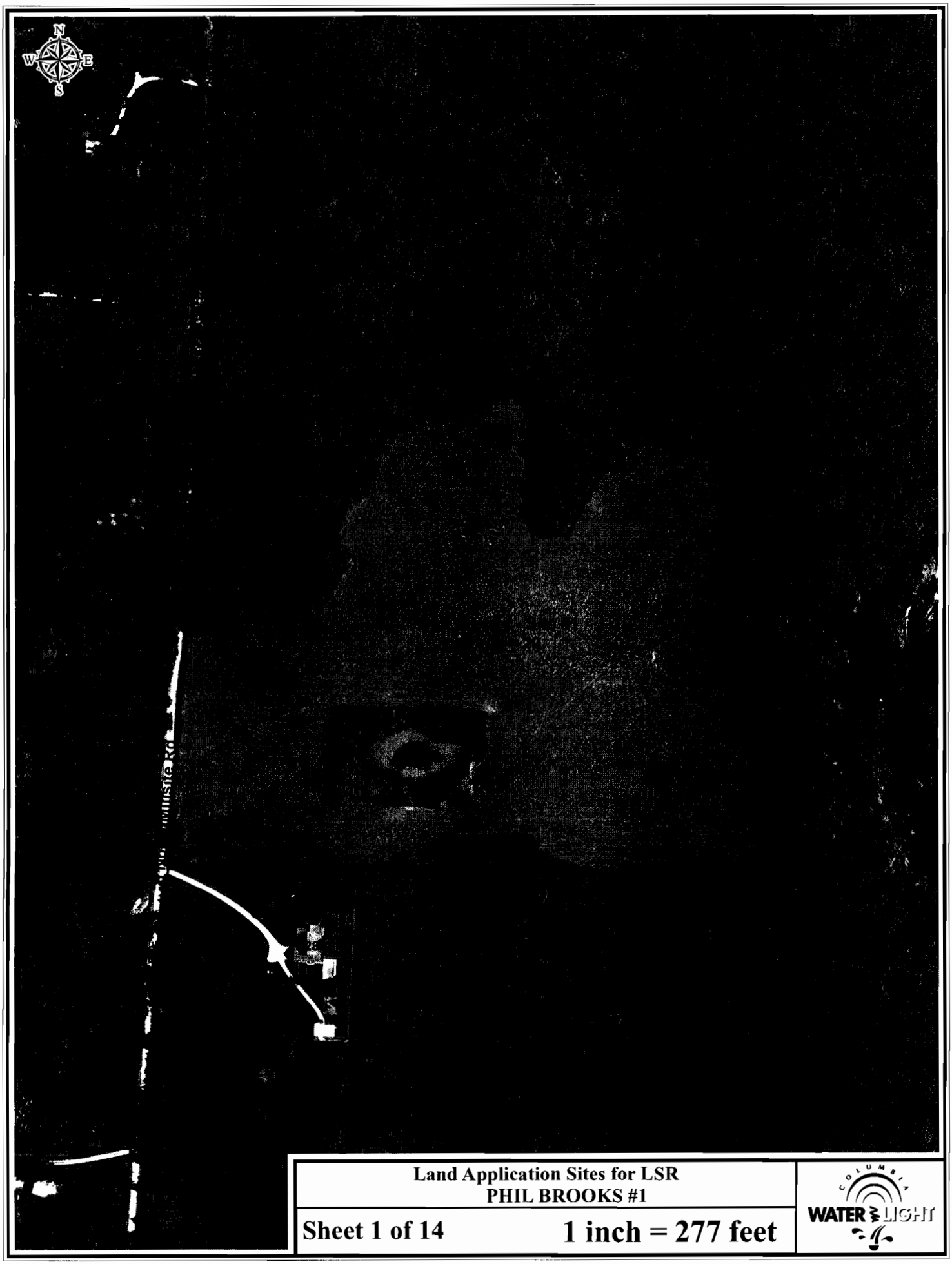


Land Application Sites for LSR
ANDREW BONDERER #17

Sheet 1 of 13

1 inch = 395 feet

COLUMBIA WATER & LIGHT

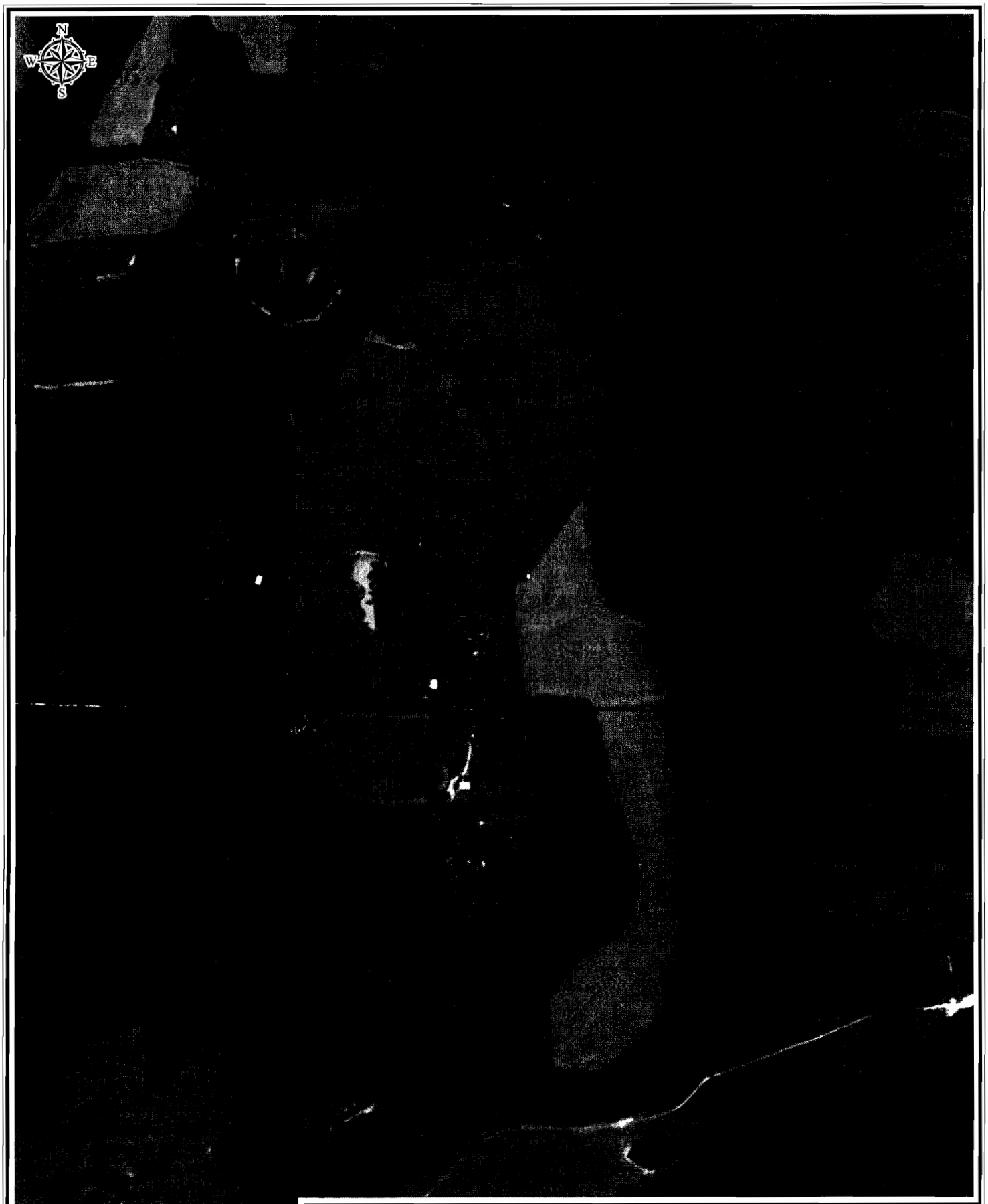


Land Application Sites for LSR
PHIL BROOKS #1

Sheet 1 of 14

1 inch = 277 feet

COLUMBIA WATER & LIGHT

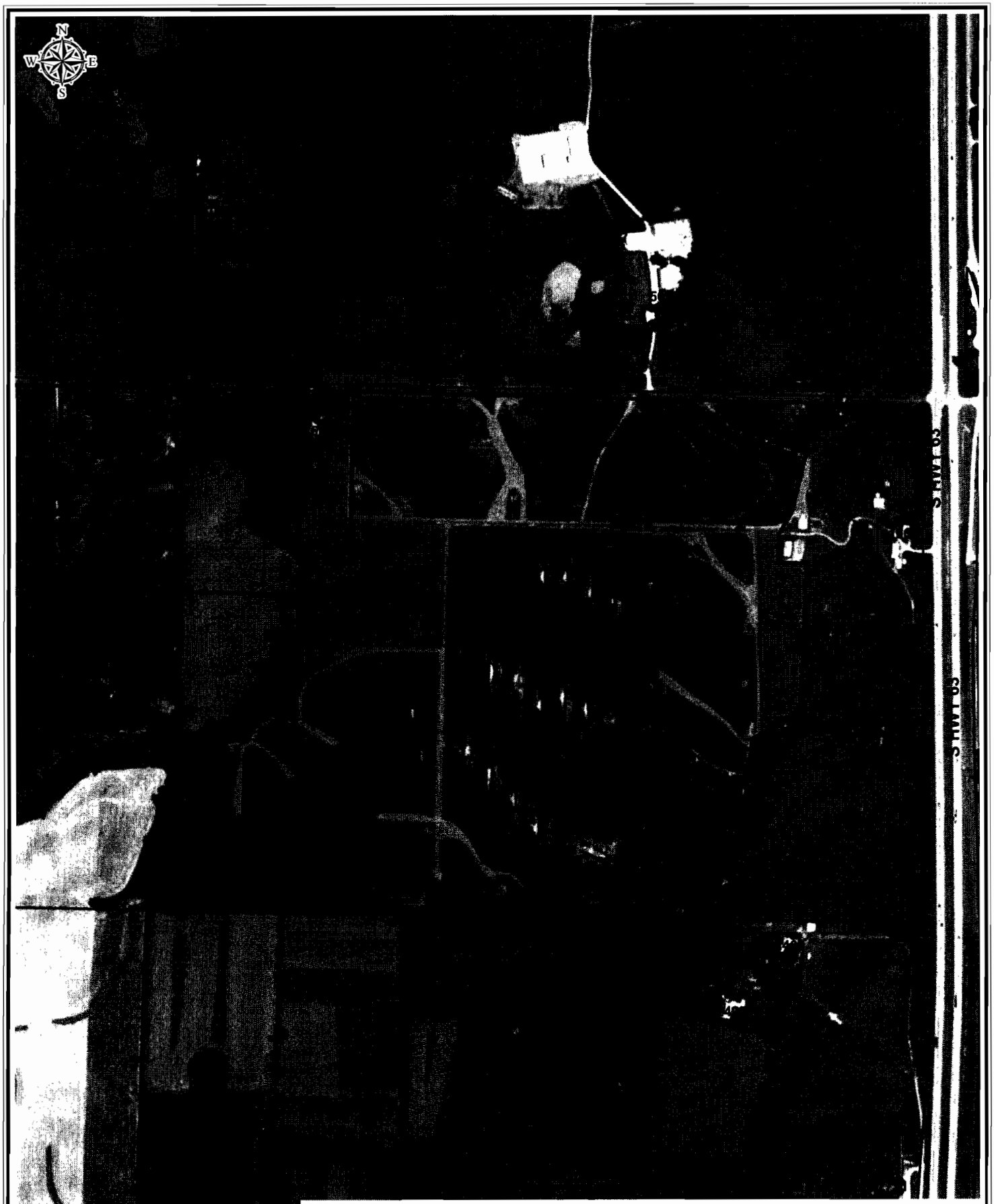


Land Application Sites for LSR
PHIL BROOKS #2

Sheet 1 of 15

1 inch = 601 feet

COLUMBIA WATER LIGHT

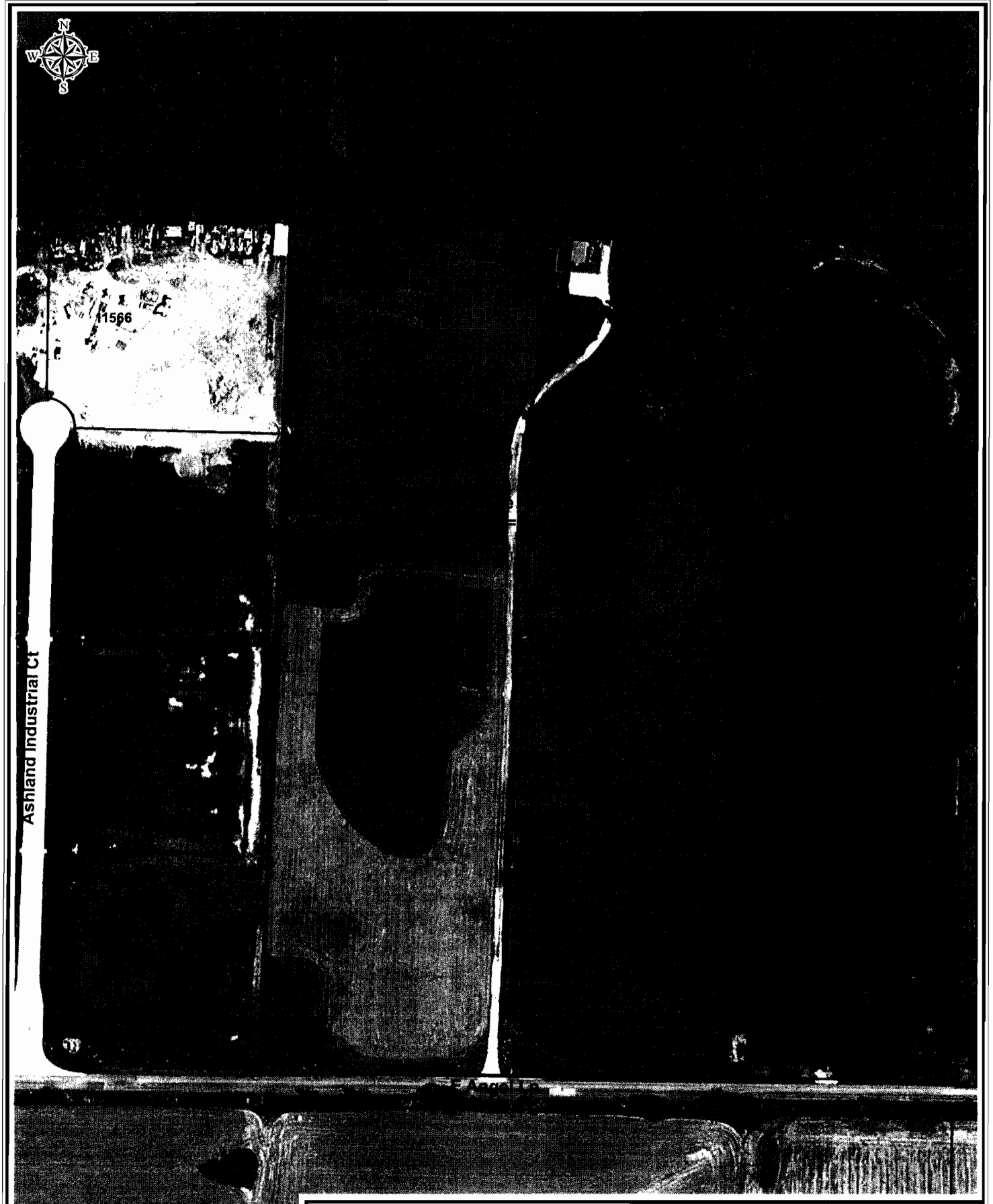


Land Application Sites for LSR
JOEL BULLARD #2

Sheet 1 of 16

1 inch = 630 feet

COLUMBIA WATER & LIGHT

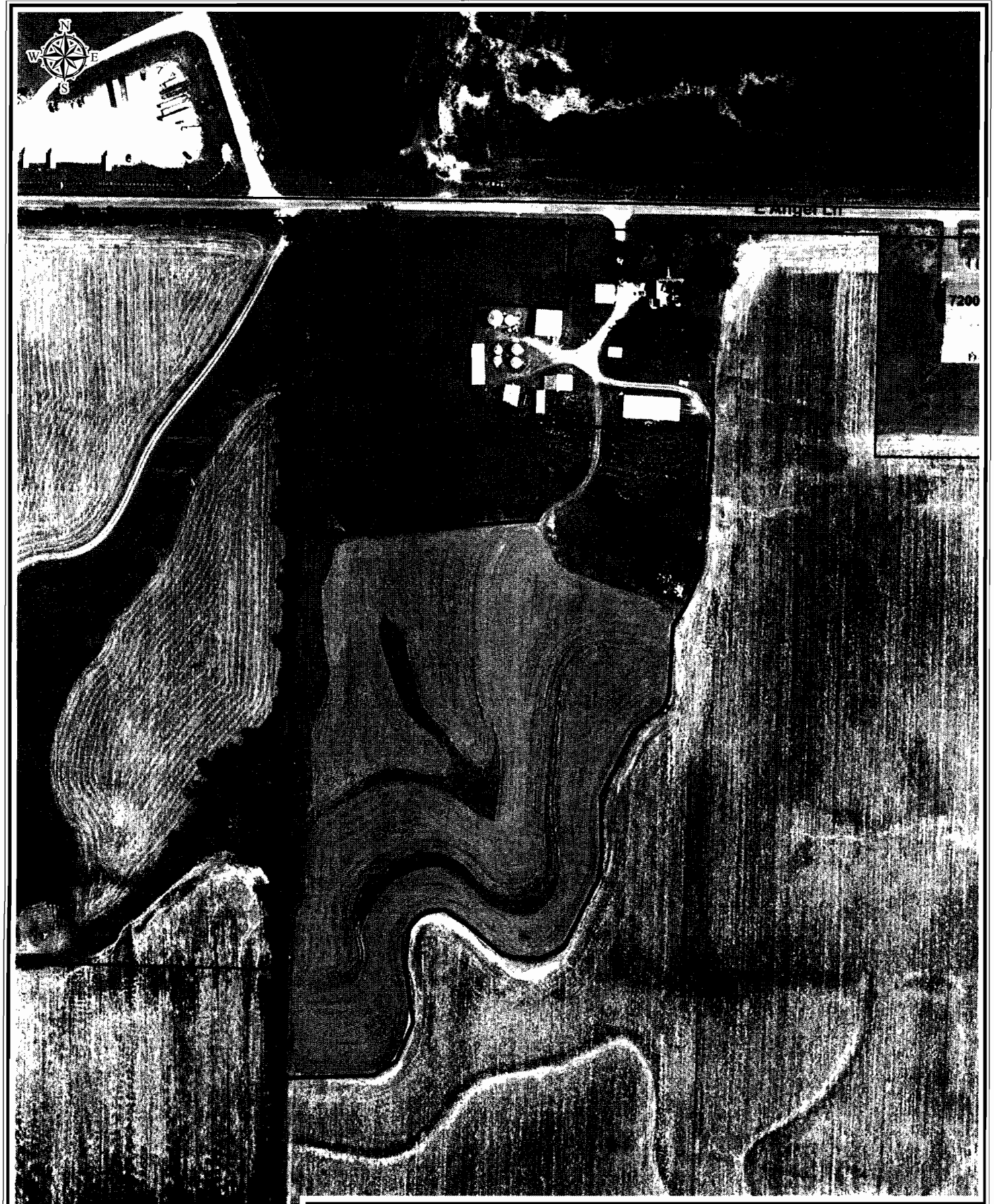


Land Application Sites for LSR
STEVE CRAIGE #1

Sheet 1 of 17

1 inch = 191 feet

COLUMBIA WATER & LIGHT

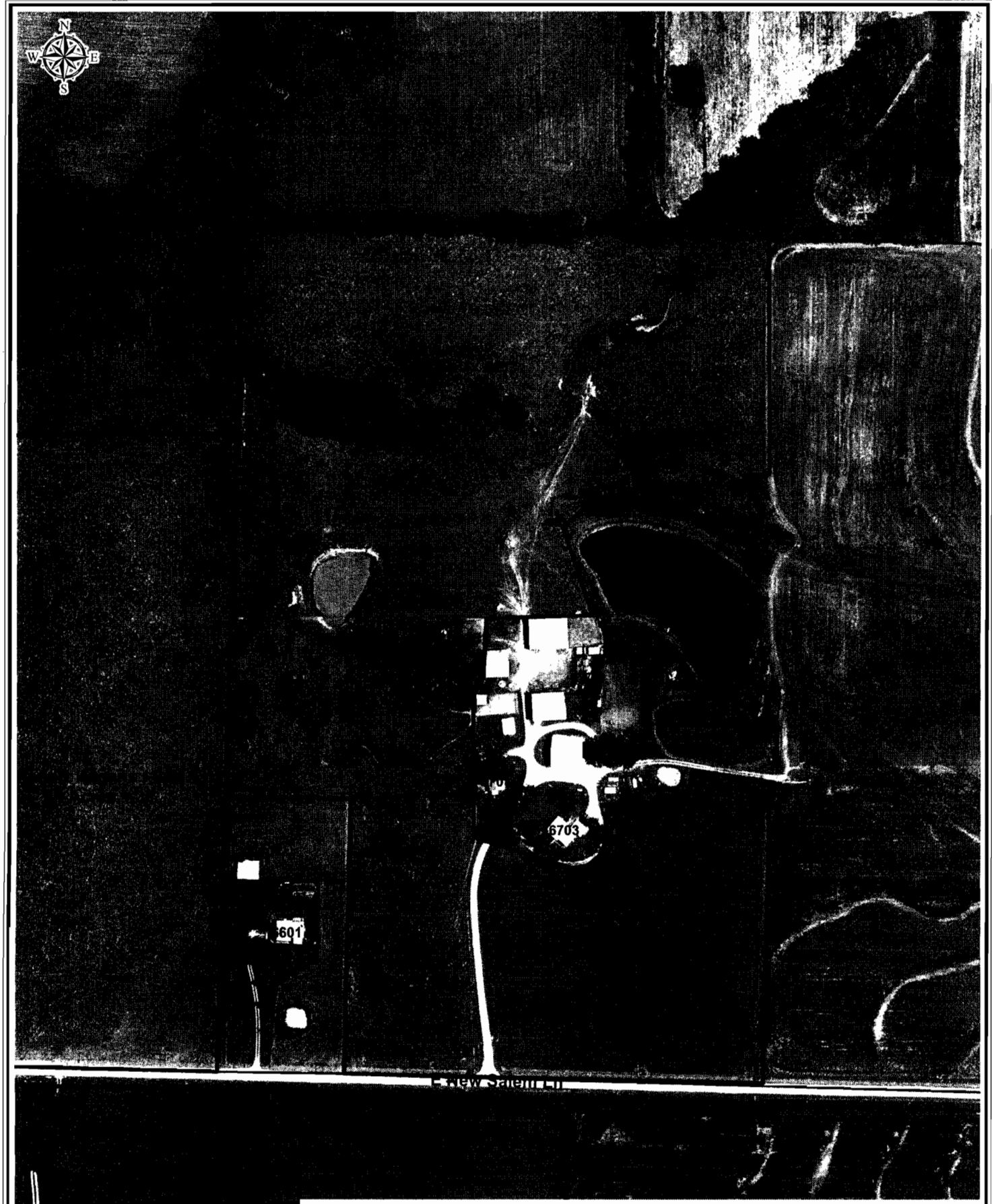


Land Application Sites for LSR
STEVE CRAIGE #2

Sheet 1 of 18

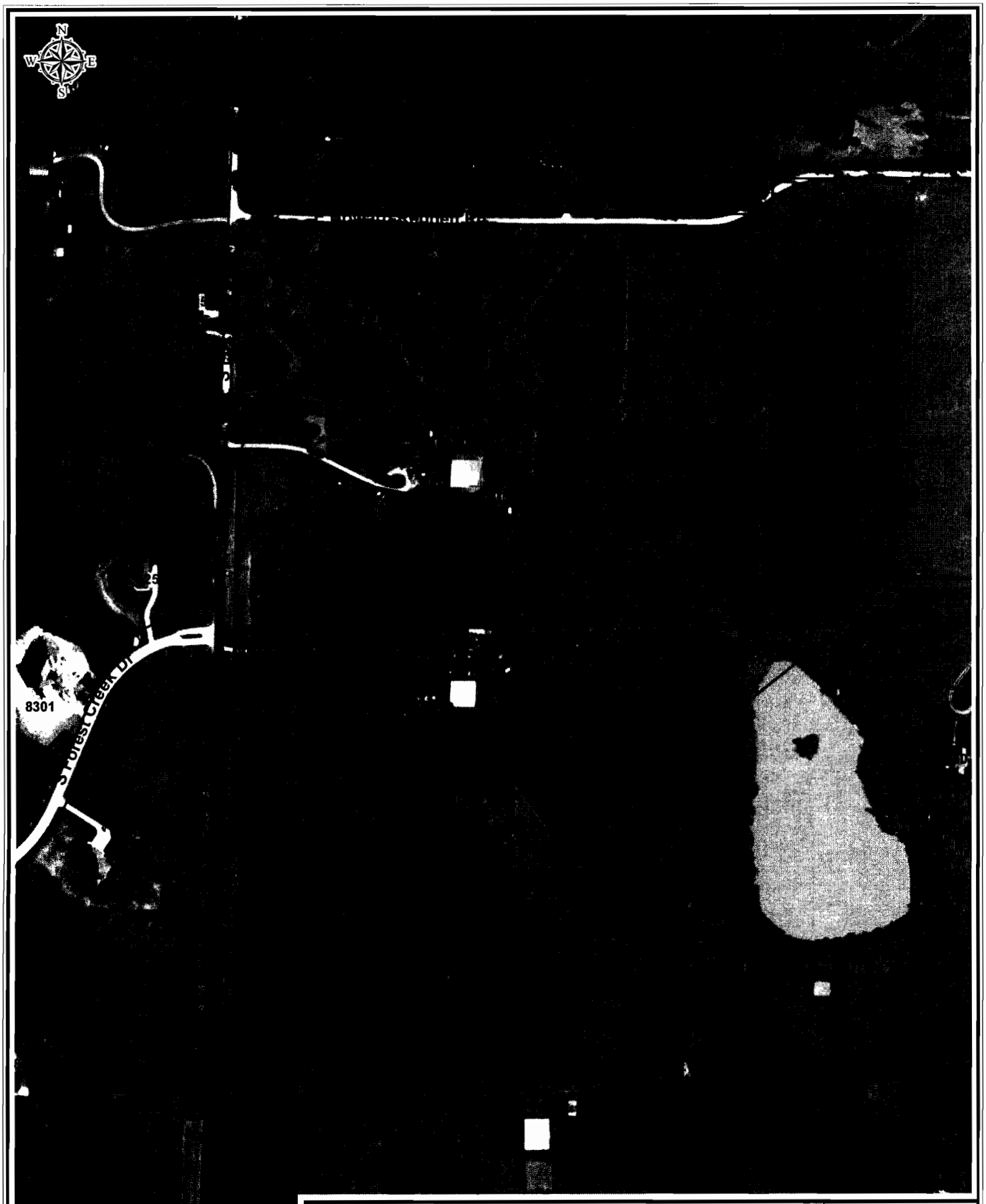
1 inch = 223 feet

COLUMBIA WATER & LIGHT



Land Application Sites for LSR STEVE CRAIGE #3	
Sheet 1 of 19	**1 inch = 248 feet**

COLUMBIA WATER & LIGHT

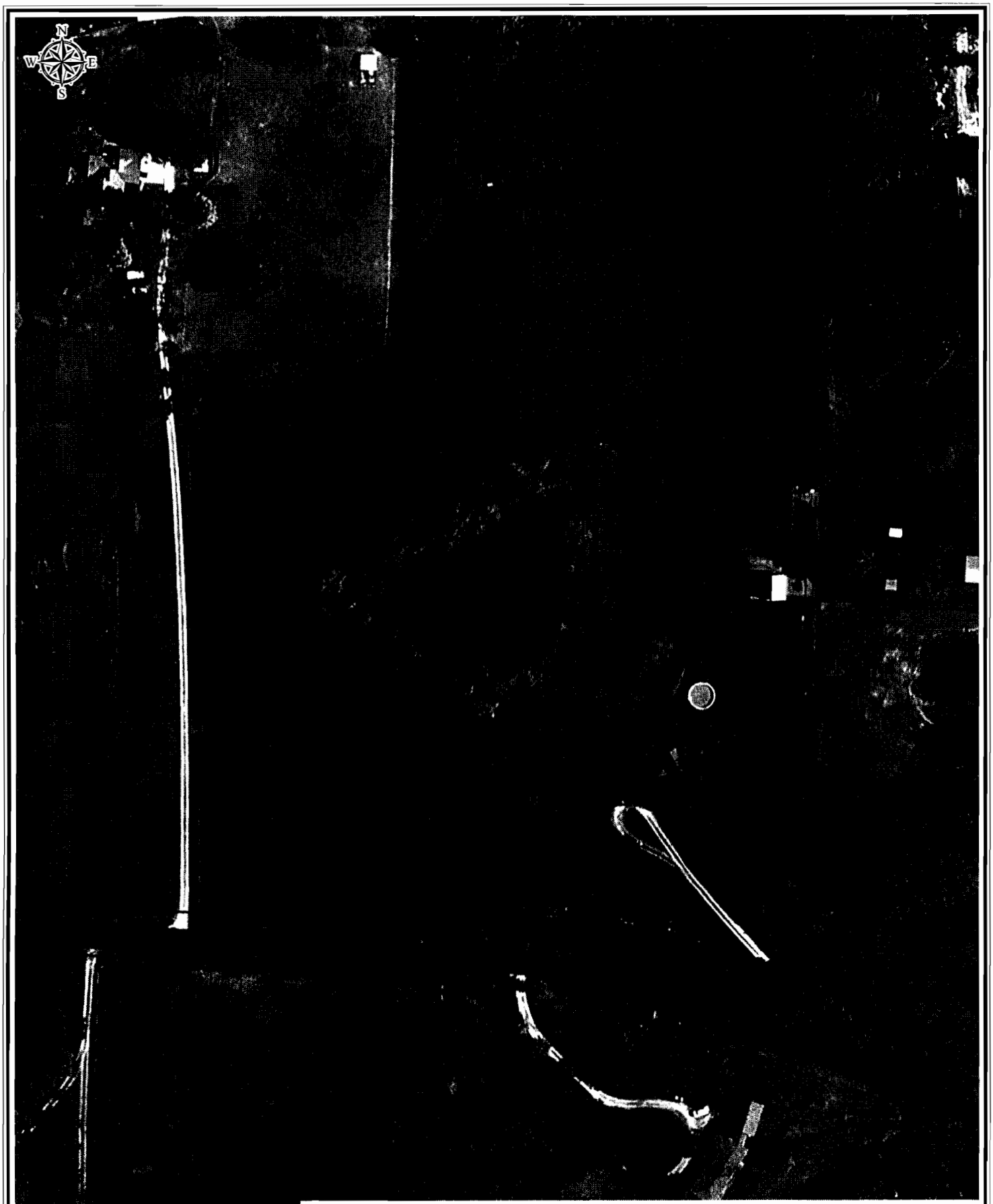


Land Application Sites for LSR
VIRGINIA GARDNER #1

Sheet 1 of 20

1 inch = 309 feet

COLUMBIA WATER & LIGHT

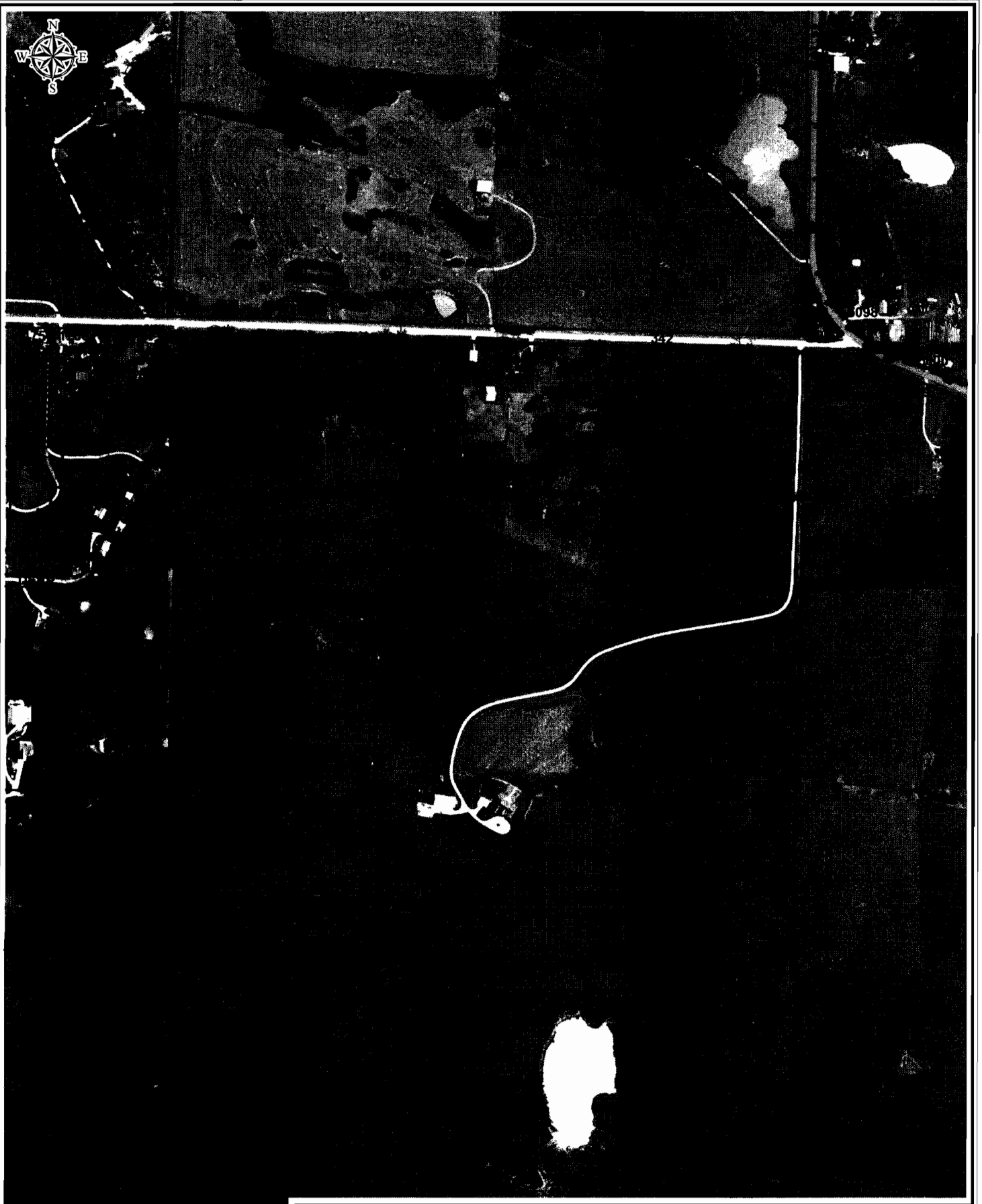


Land Application Sites for LSR
VIRGINIA GARDNER #2

Sheet 1 of 21

1 inch = 130 feet

COLUMBIA WATER & LIGHT

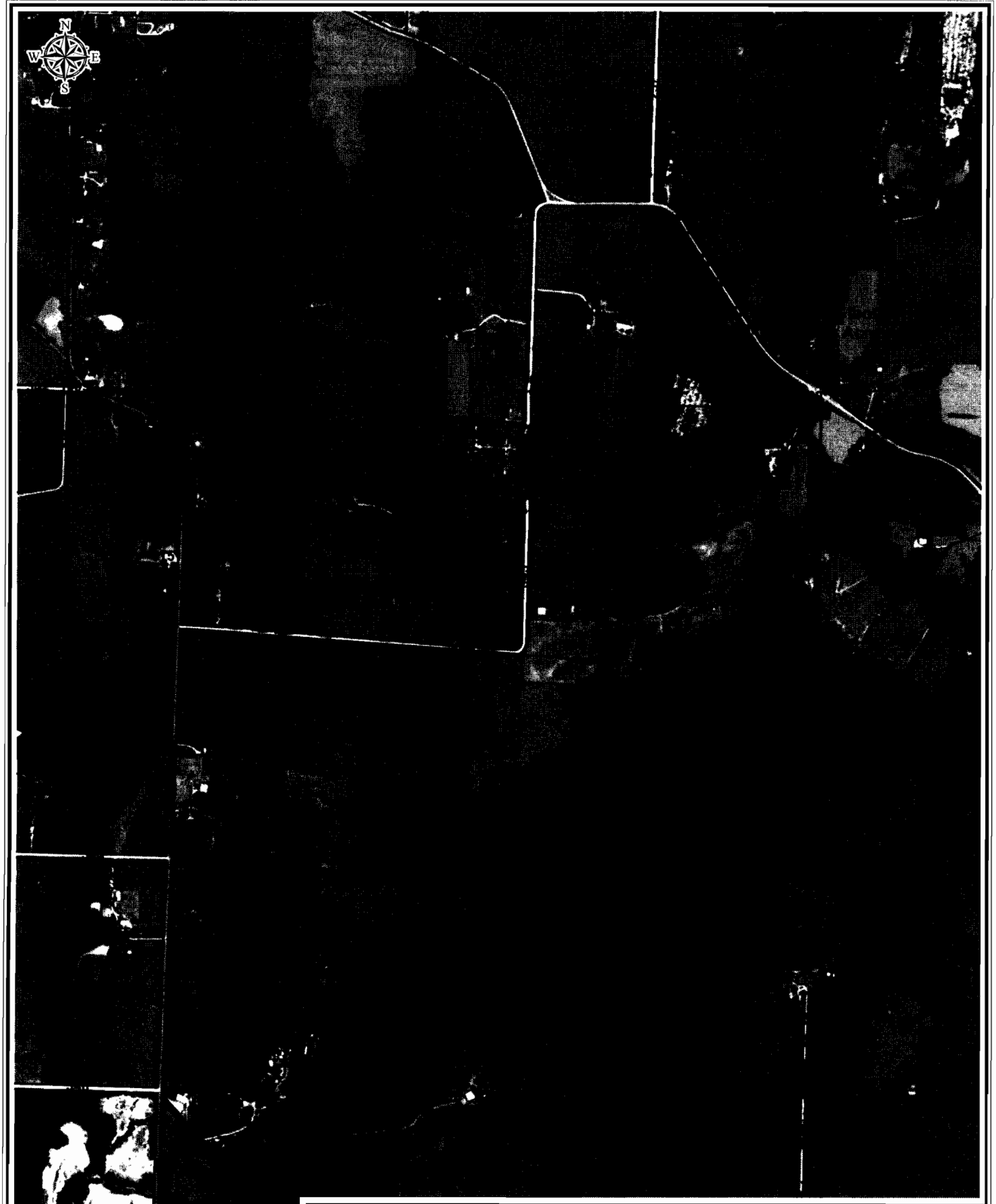


Land Application Sites for LSR
BILL GENTZSH #8

Sheet 1 of 22

1 inch = 529 feet

COLUMBIA WATER & LIGHT

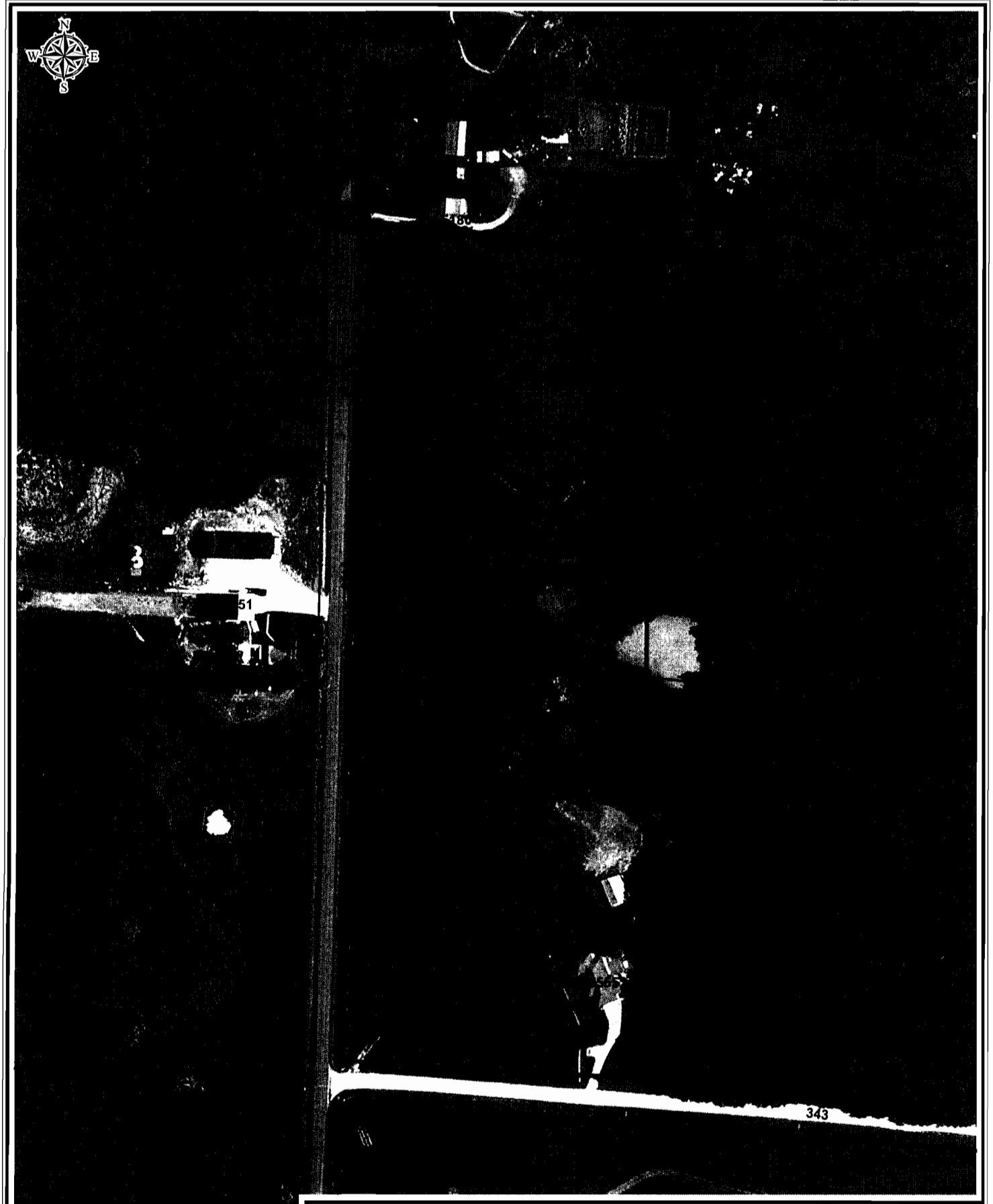


Land Application Sites for LSR
BILL GENTZSH #9

Sheet 1 of 23

1 inch = 1,428 feet

COLUMBIA WATER & LIGHT

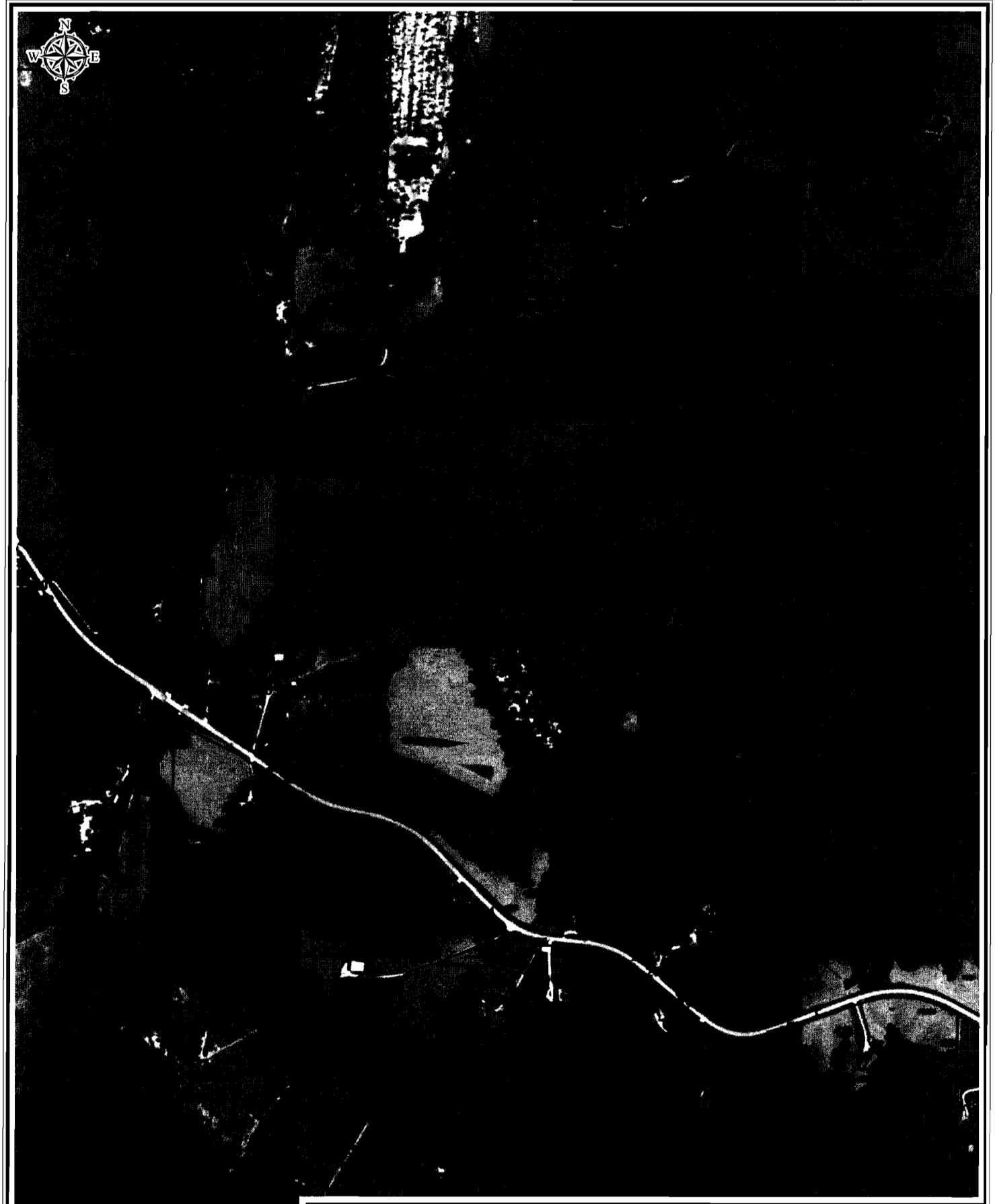


Land Application Sites for LSR
BILL GENTZSH #10

Sheet 1 of 24

1 inch = 197 feet

COLUMBIA WATER LIGHT

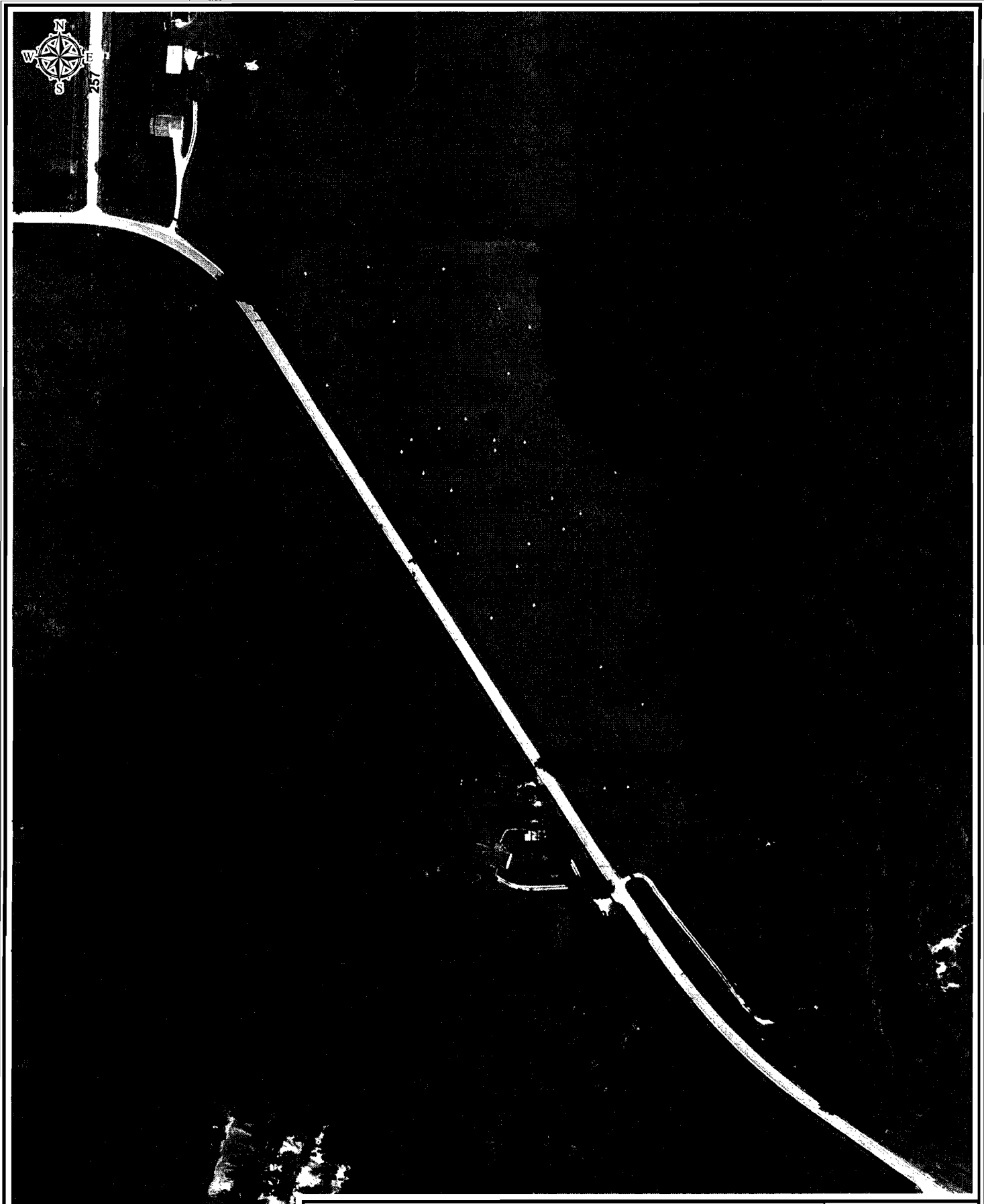


Land Application Sites for LSR
JEFF GIBONEY #11

Sheet 1 of 25

1 inch = 789 feet

COLUMBIA WATER & LIGHT

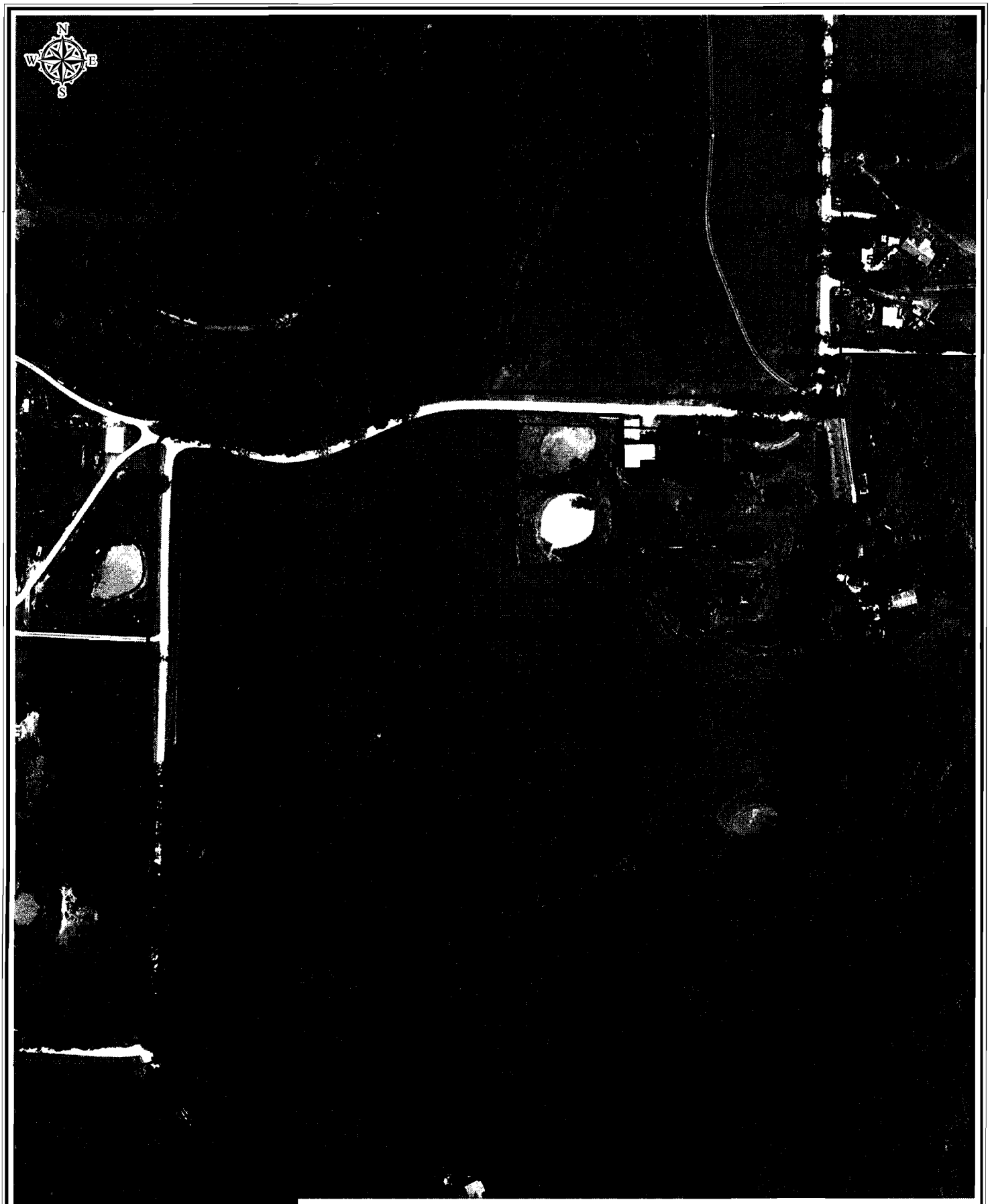


Land Application Sites for LSR
LONNEY GIBONEY #13

Sheet 1 of 26

1 inch = 269 feet

COLUMBIA WATER & LIGHT

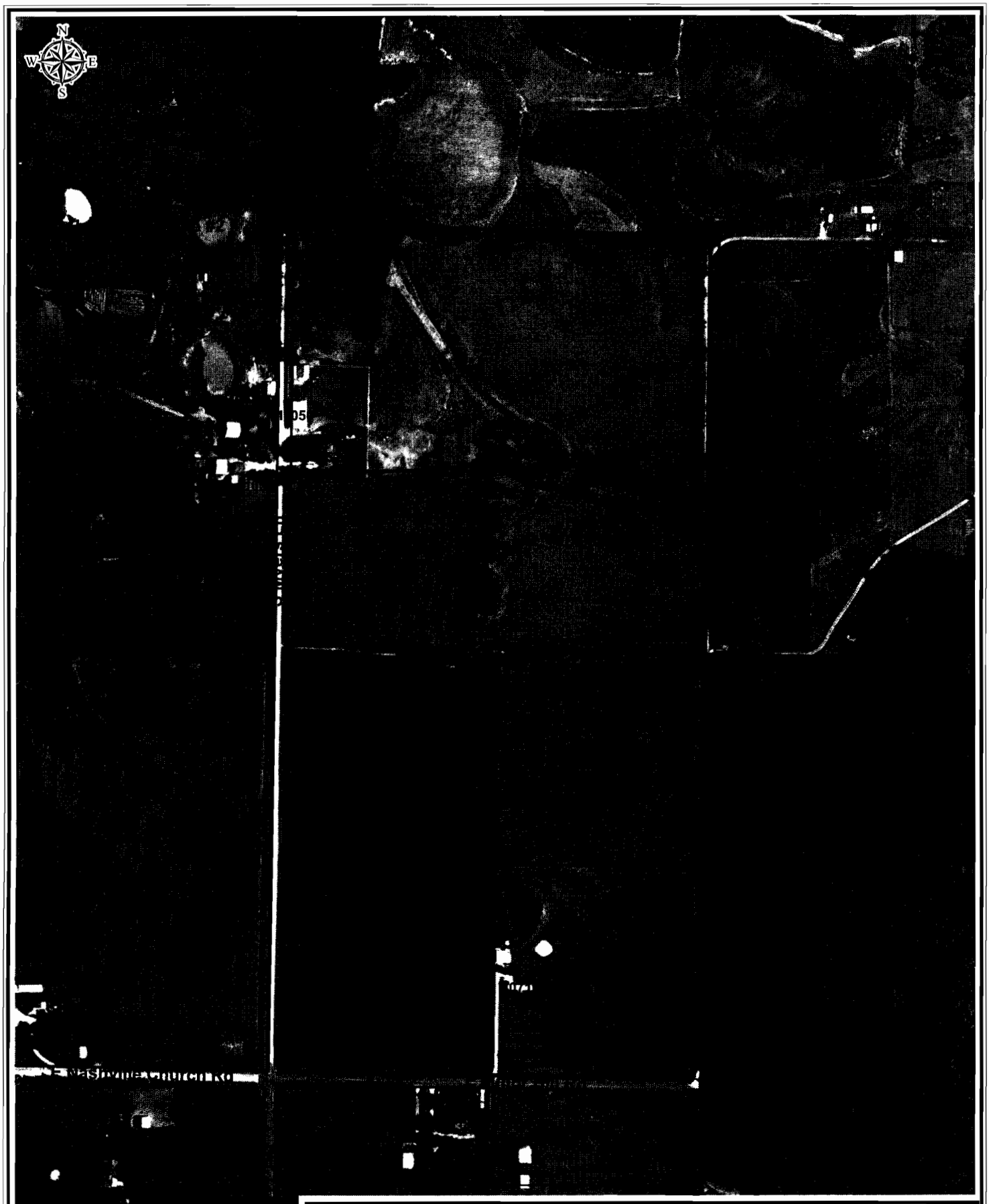


Land Application Sites for LSR
JOHN D. GRIFFIN #15

Sheet 1 of 27

1 inch = 251 feet

COLUMBIA WATER & LIGHT

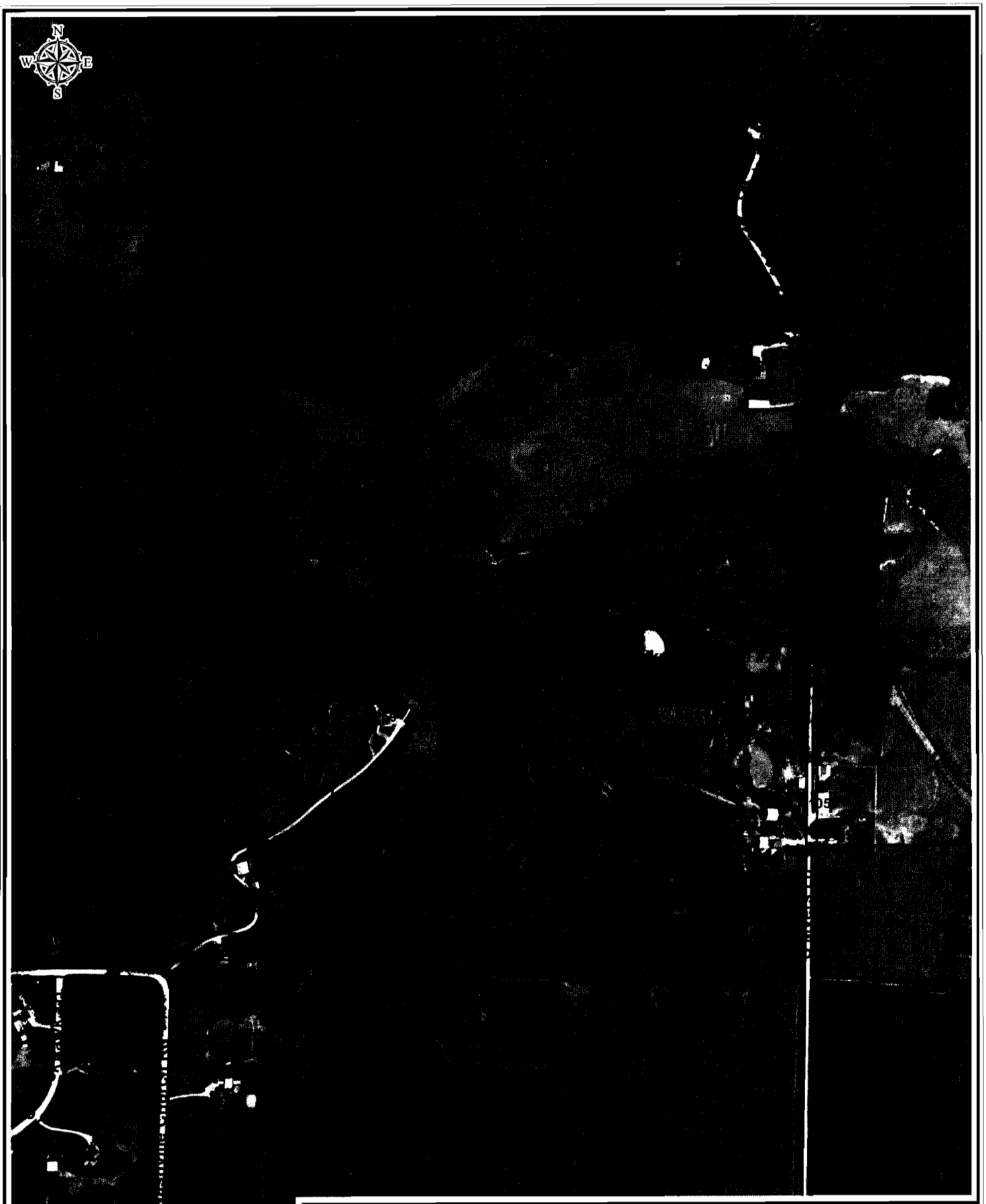


Land Application Sites for LSR
BRUCE HACKMANN #1

Sheet 1 of 28

1 inch = 387 feet

COLUMBIA WATER & LIGHT



Land Application Sites for LSR
BRUCE HACKMANN #2

Sheet 1 of 29

1 inch = 507 feet

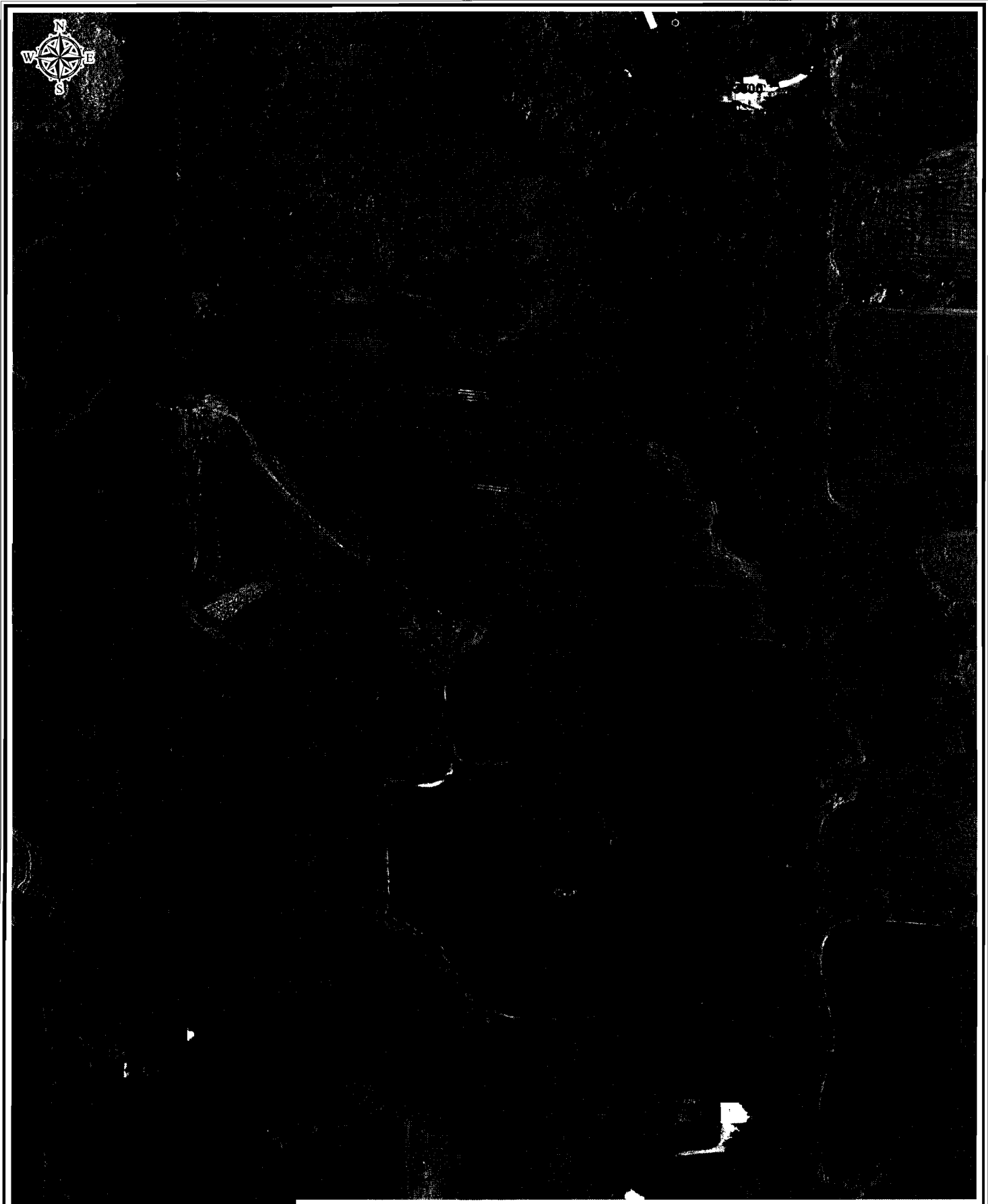
COLUMBIA WATER & LIGHT

Land Application Sites for LSR
BRUCE HACKMANN #3

Sheet 1 of 30

1 inch = 249 feet

COLUMBIA WATER & LIGHT

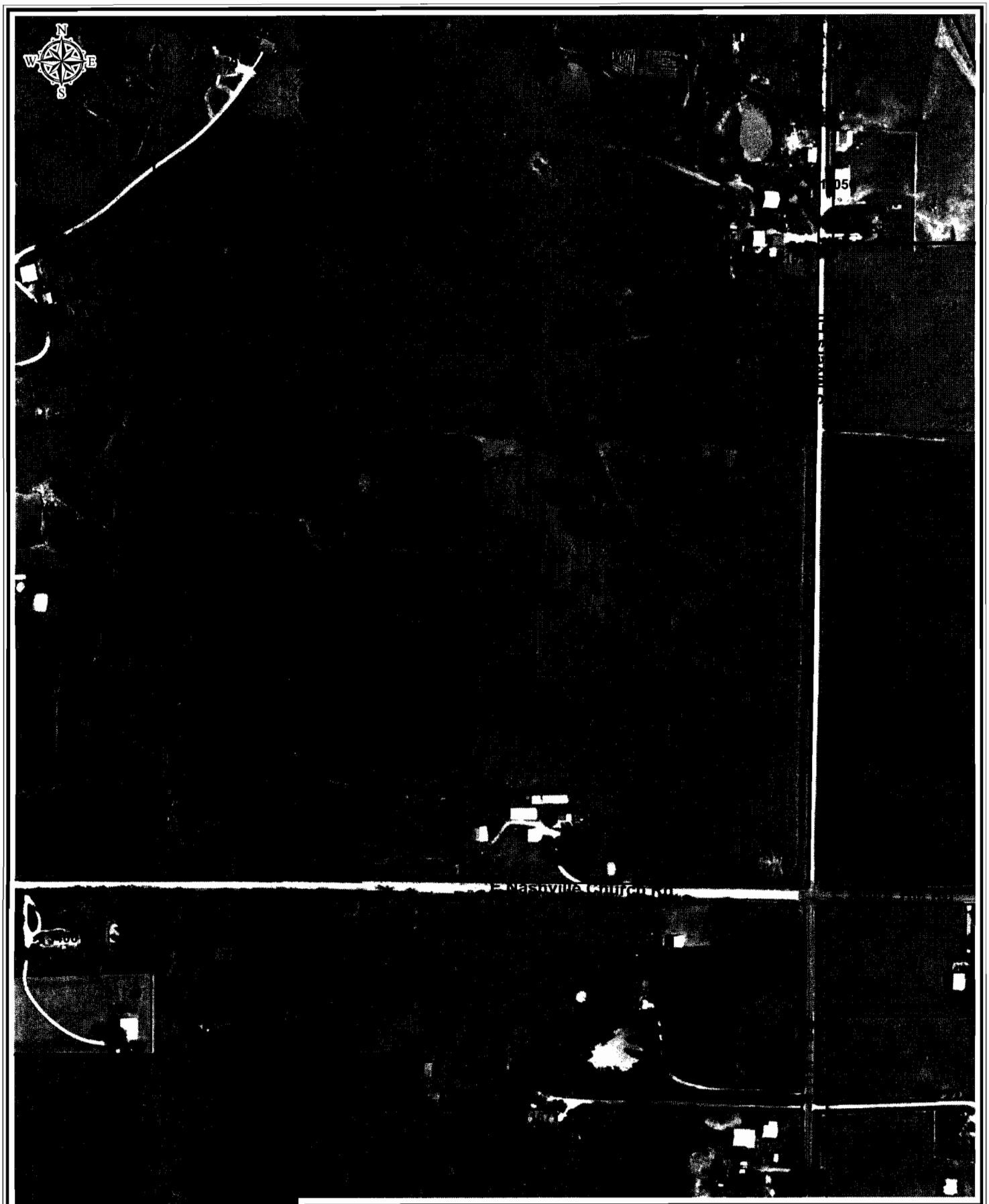


Land Application Sites for LSR
BRUCE HACKMANN #4

Sheet 1 of 31

1 inch = 263 feet

COLUMBIA WATER & LIGHT

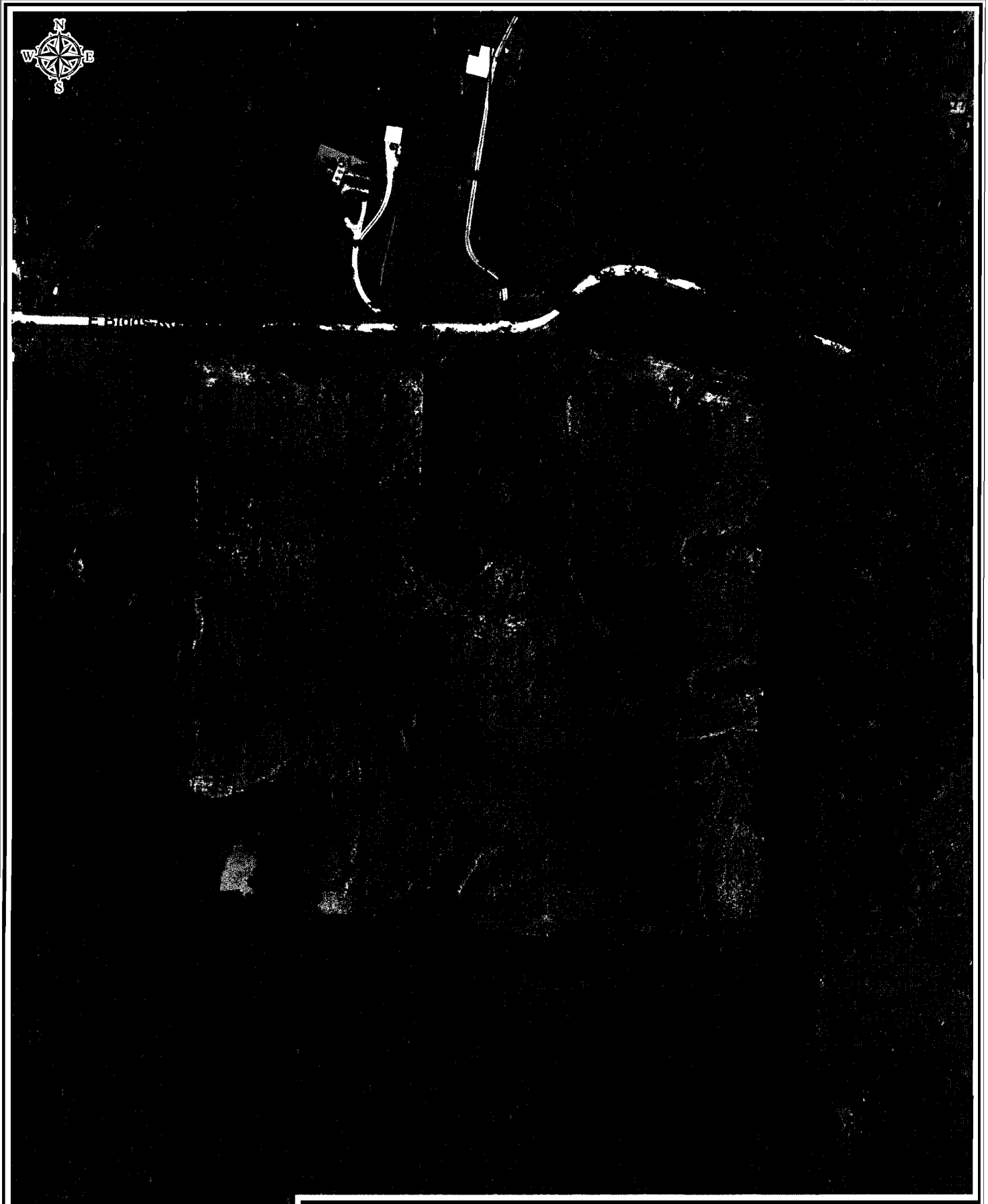


Land Application Sites for LSR
BRUCE HACKMANN #5

Sheet 1 of 32

1 inch = 362 feet

COLUMBIA WATER & LIGHT

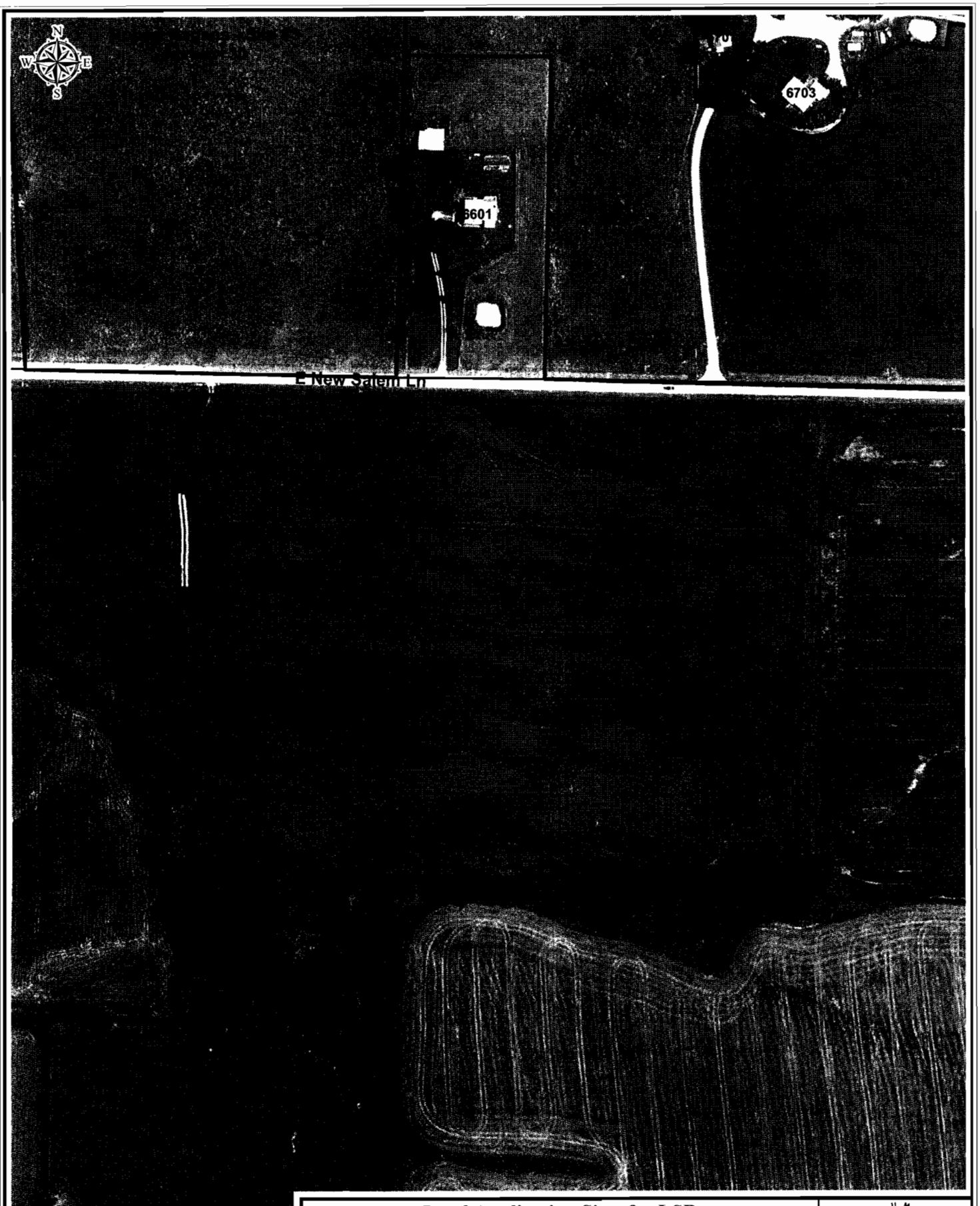


Land Application Sites for LSR
BRUCE HACKMANN #6

Sheet 1 of 33

1 inch = 244 feet

COLUMBIA WATER & LIGHT

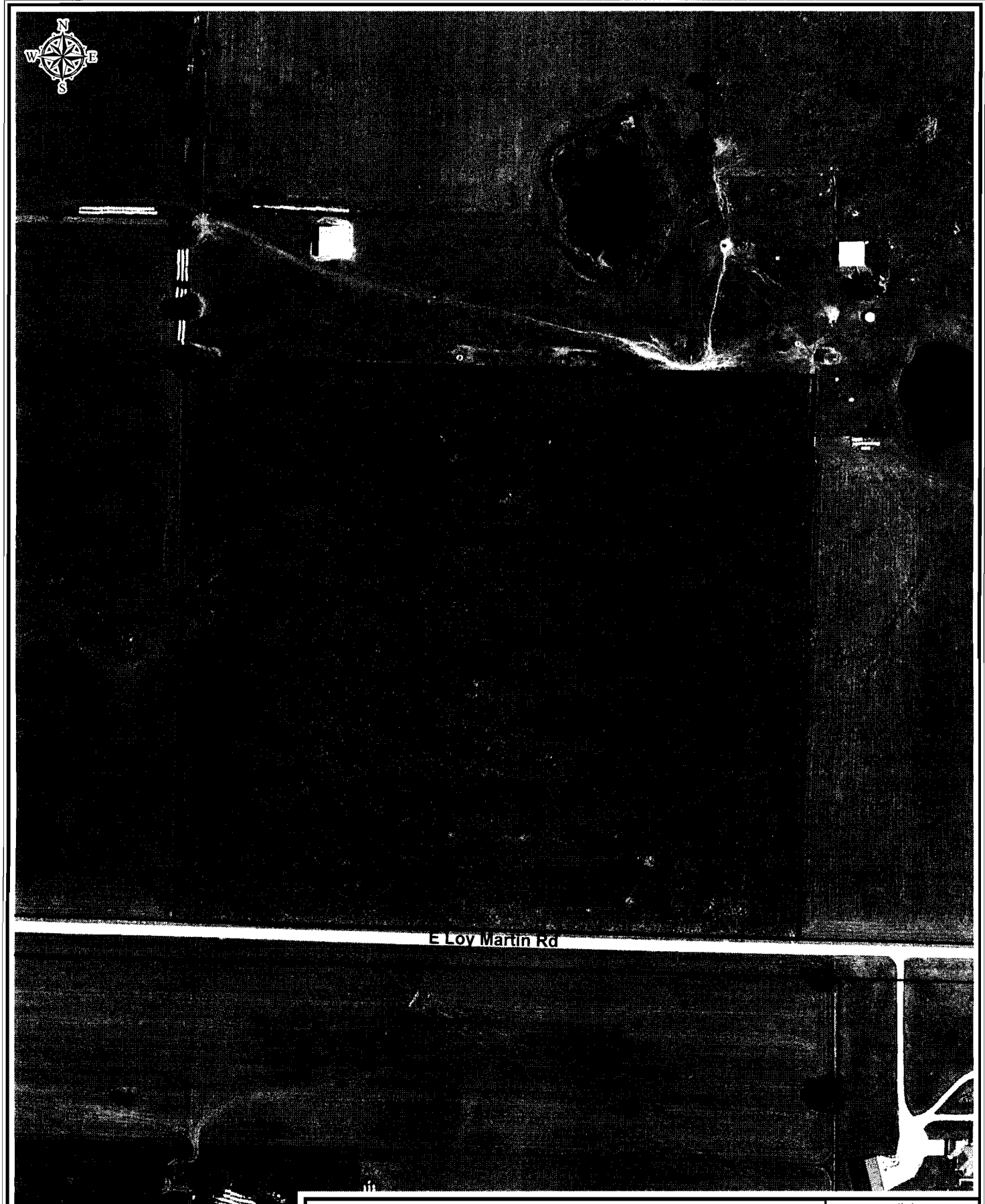


Land Application Sites for LSR
ROBERT HAGANS #1

Sheet 1 of 34

1 inch = 210 feet

COLUMBIA WATER & LIGHT

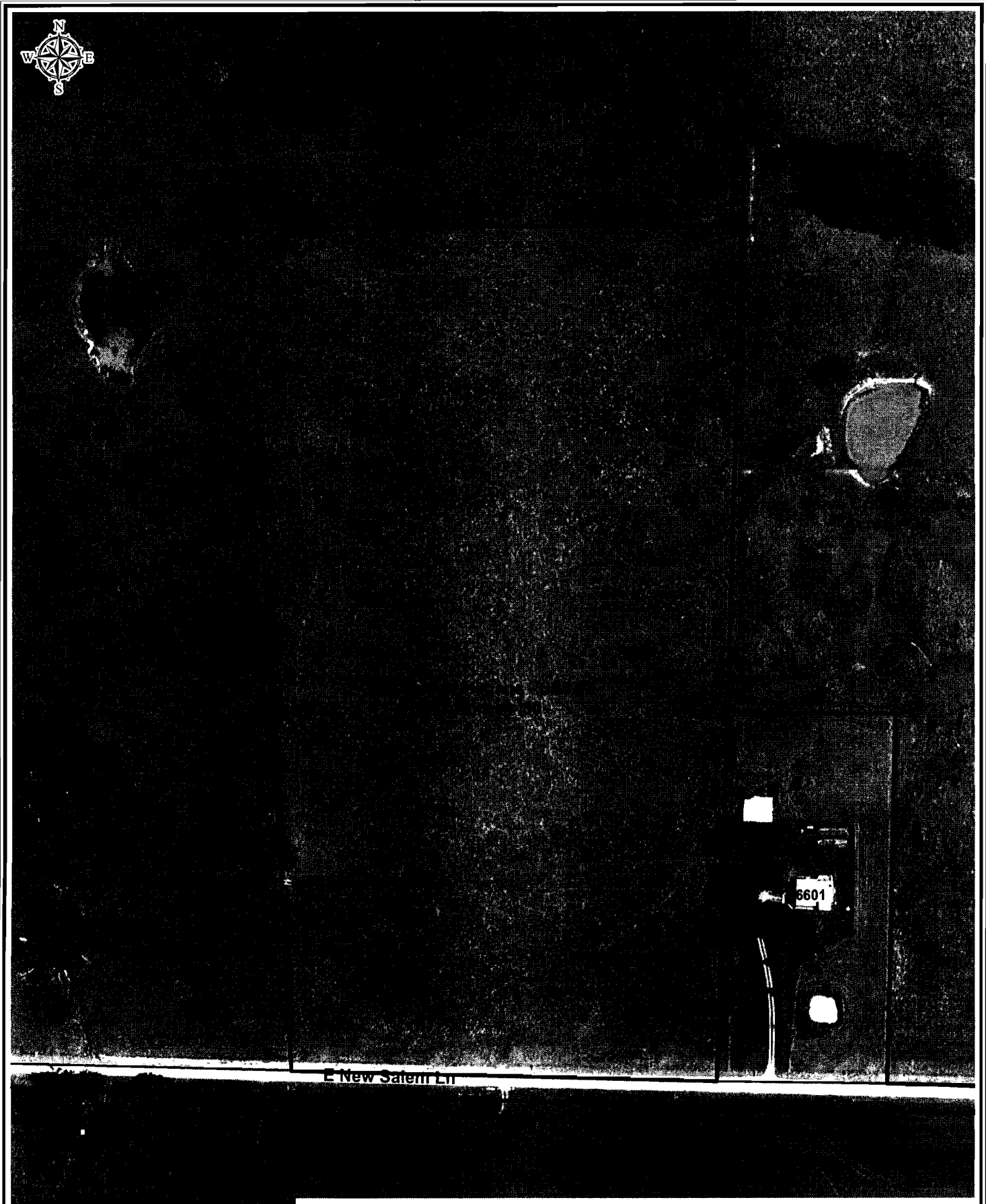


Land Application Sites for LSR
ROBERT HAGANS #2

Sheet 1 of 35

1 inch = 212 feet

COLUMBIA WATER & LIGHT

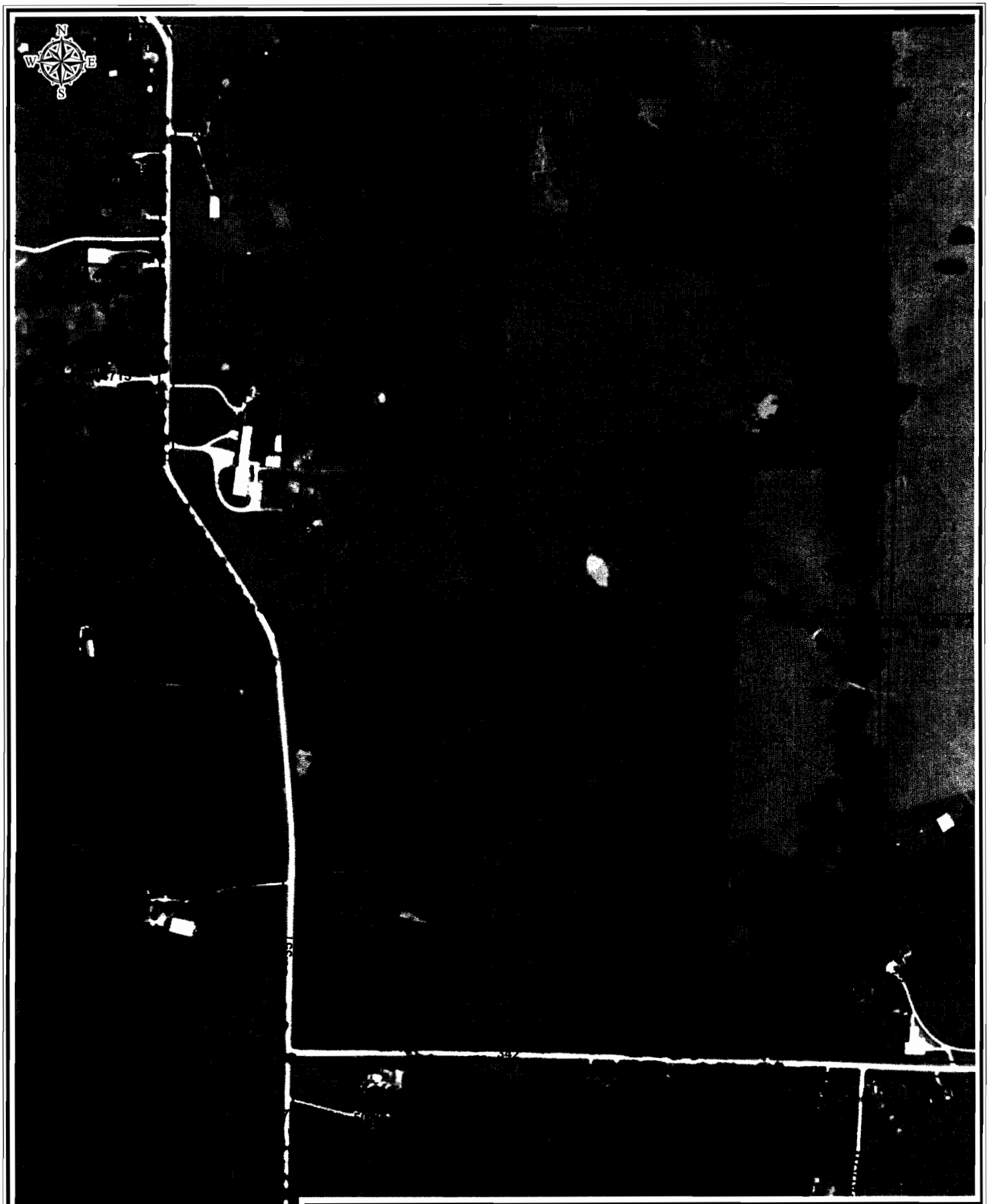


Land Application Sites for LSR
ROBERT HAGANS #3

Sheet 1 of 36

1 inch = 185 feet

COLUMBIA WATER LIGHT

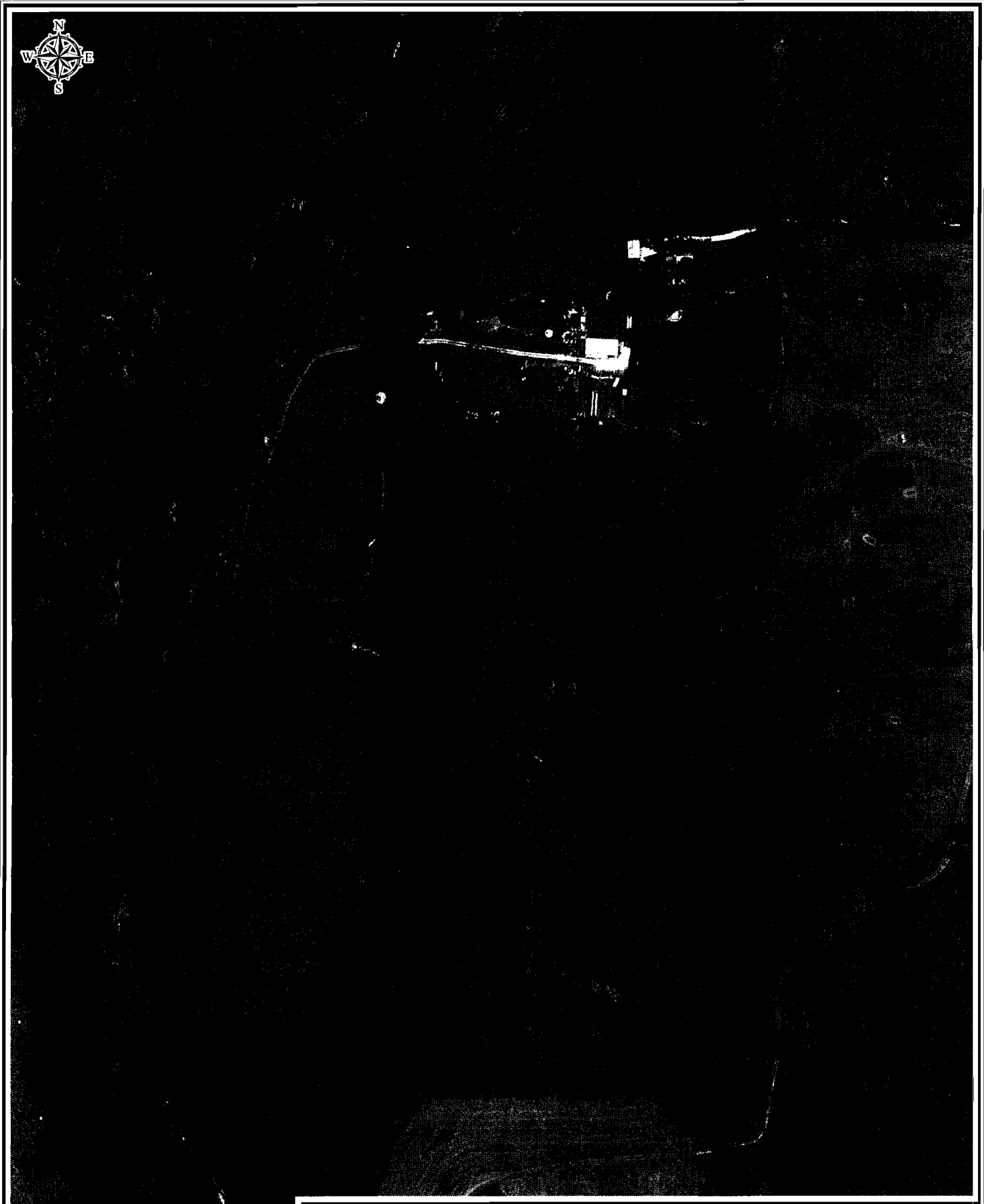


Land Application Sites for LSR
JOHN HARRISON #3

Sheet 1 of 37

1 inch = 568 feet

COLUMBIA WATER LIGHT



Land Application Sites for LSR
JOHN HARRISON #6

Sheet 1 of 38

1 inch = 255 feet

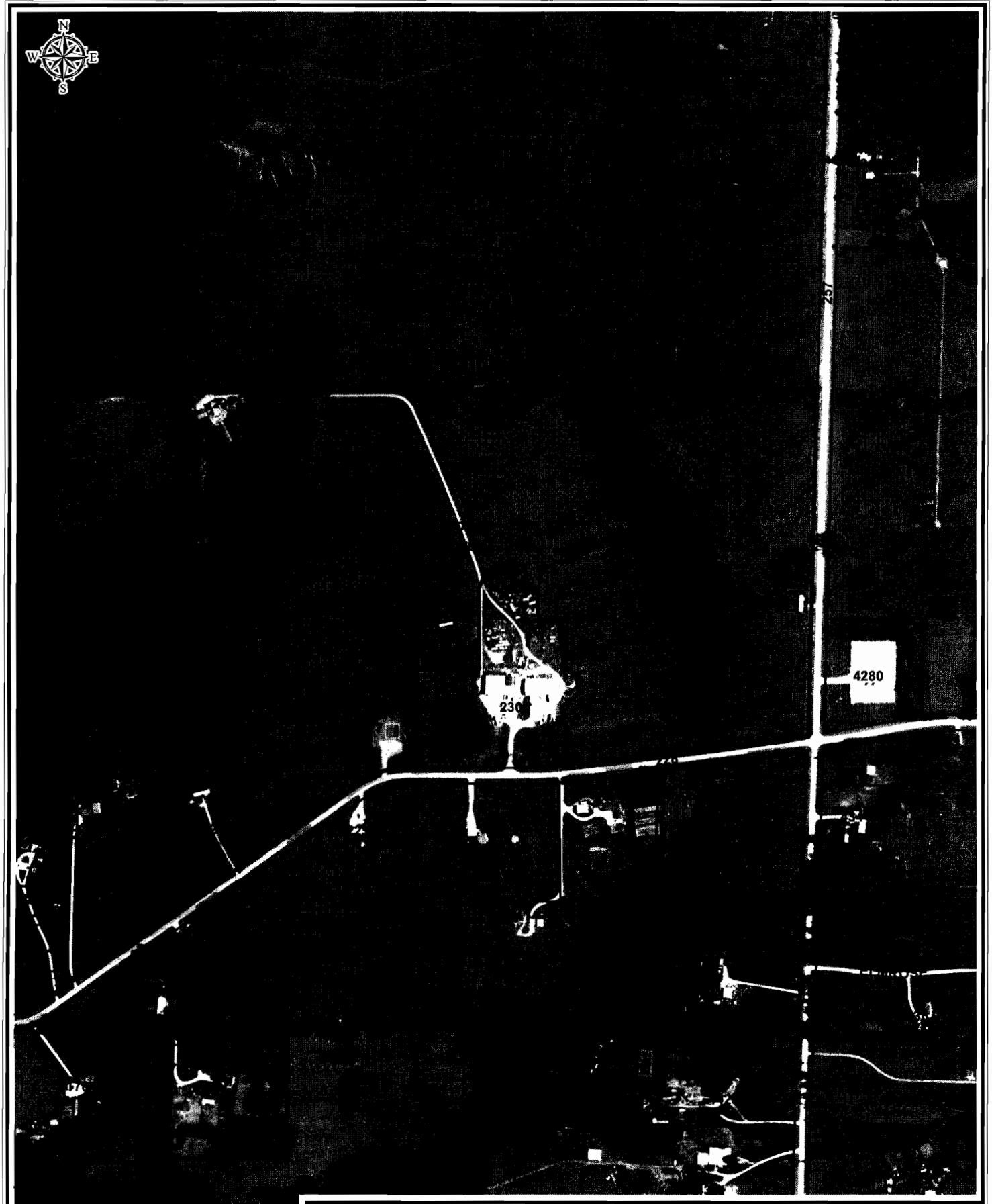
COLUMBIA WATER LIGHT

Land Application Sites for LSR
JOHN HARRISON #5

Sheet 1 of 39

1 inch = 541 feet

COLUMBIA WATER LIGHT

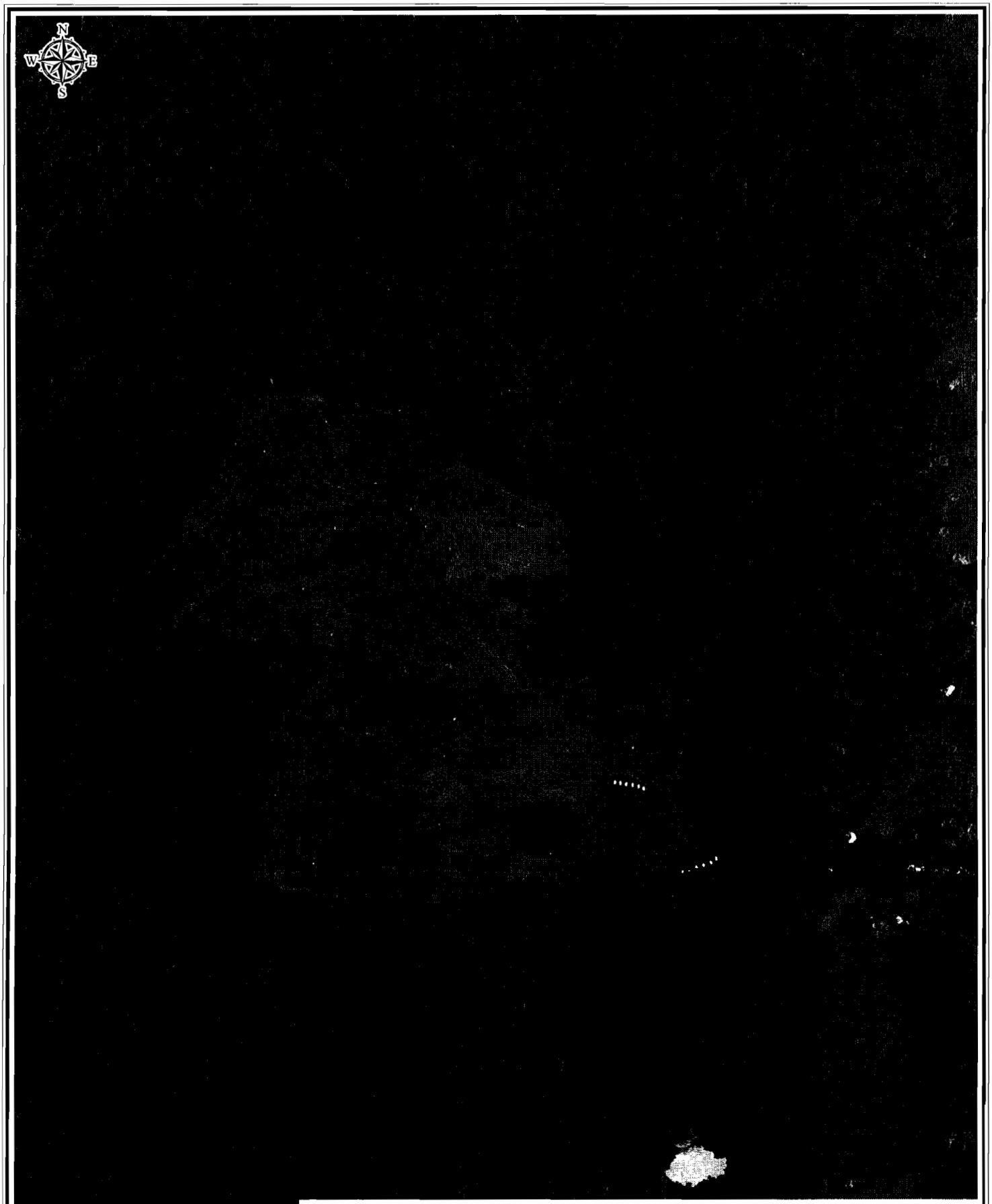


Land Application Sites for LSR
RUSS JONES

Sheet 1 of 40

1 inch = 524 feet

COLUMBIA WATER LIGHT

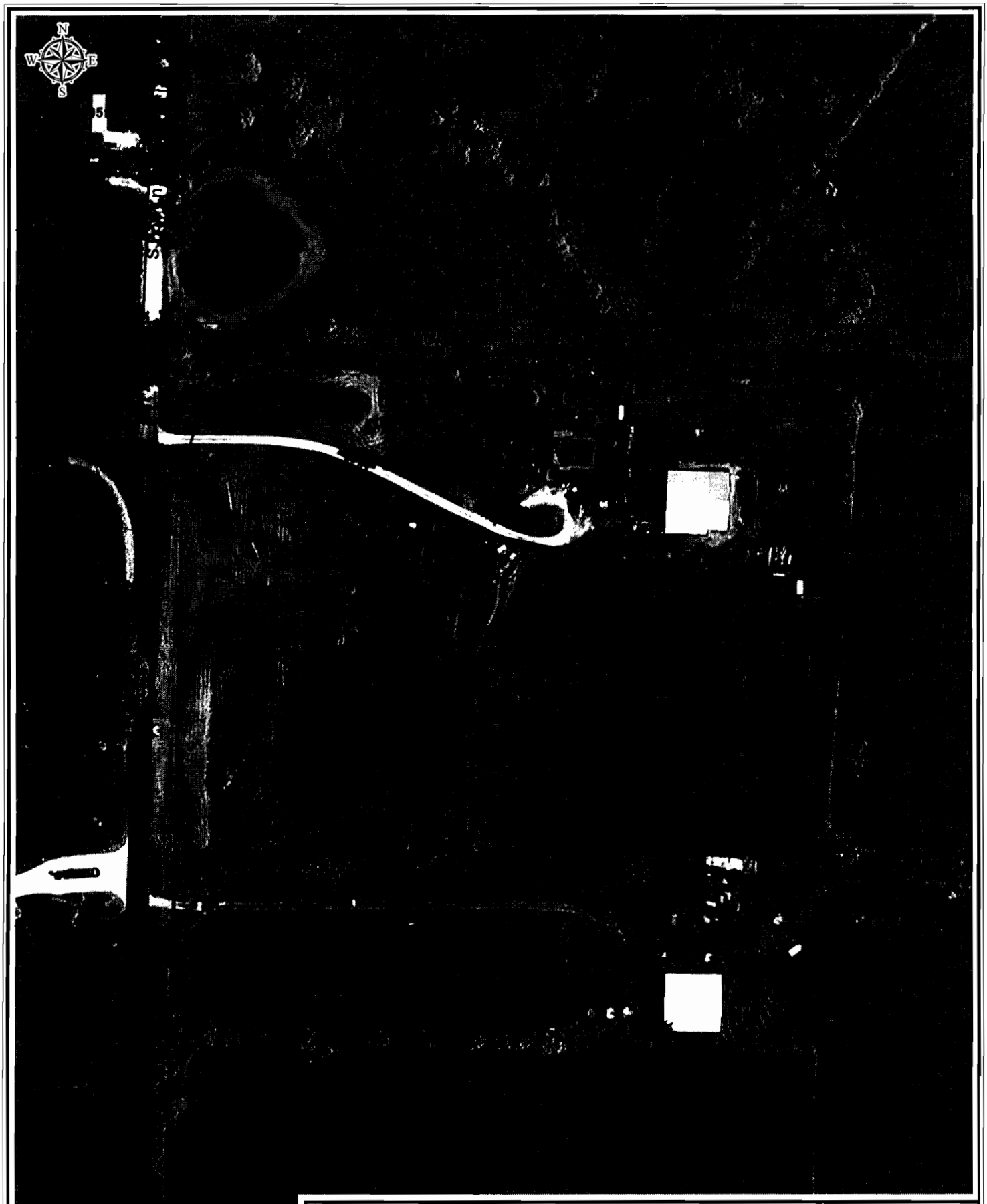


Land Application Sites for LSR
JEFFRIES #14

Sheet 1 of 41

1 inch = 215 feet

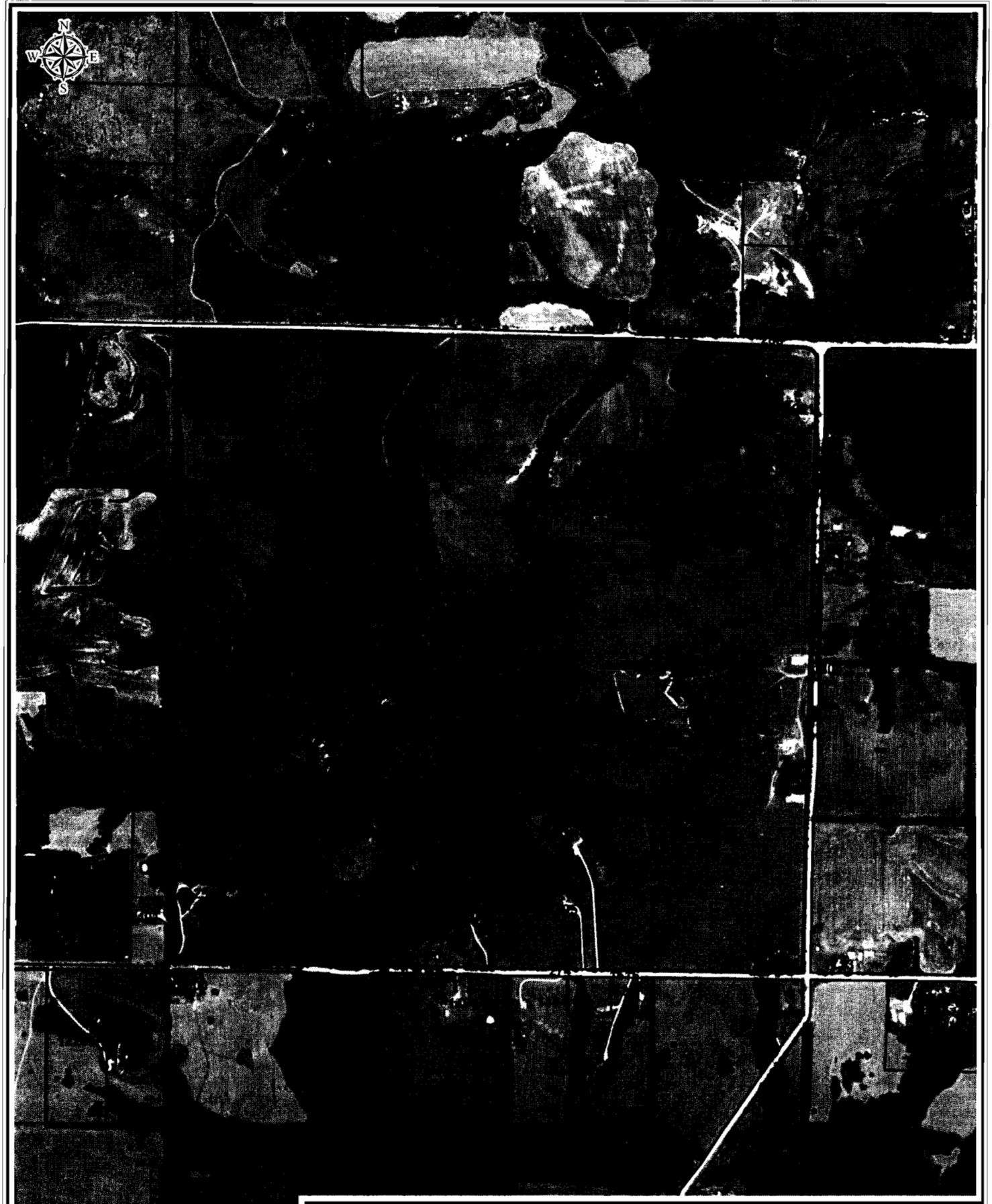
COLUMBIA WATER LIGHT



Land Application Sites for LSR
JIM KYD

Sheet 1 of 42 **1 inch = 136 feet**

COLUMBIA WATER & LIGHT

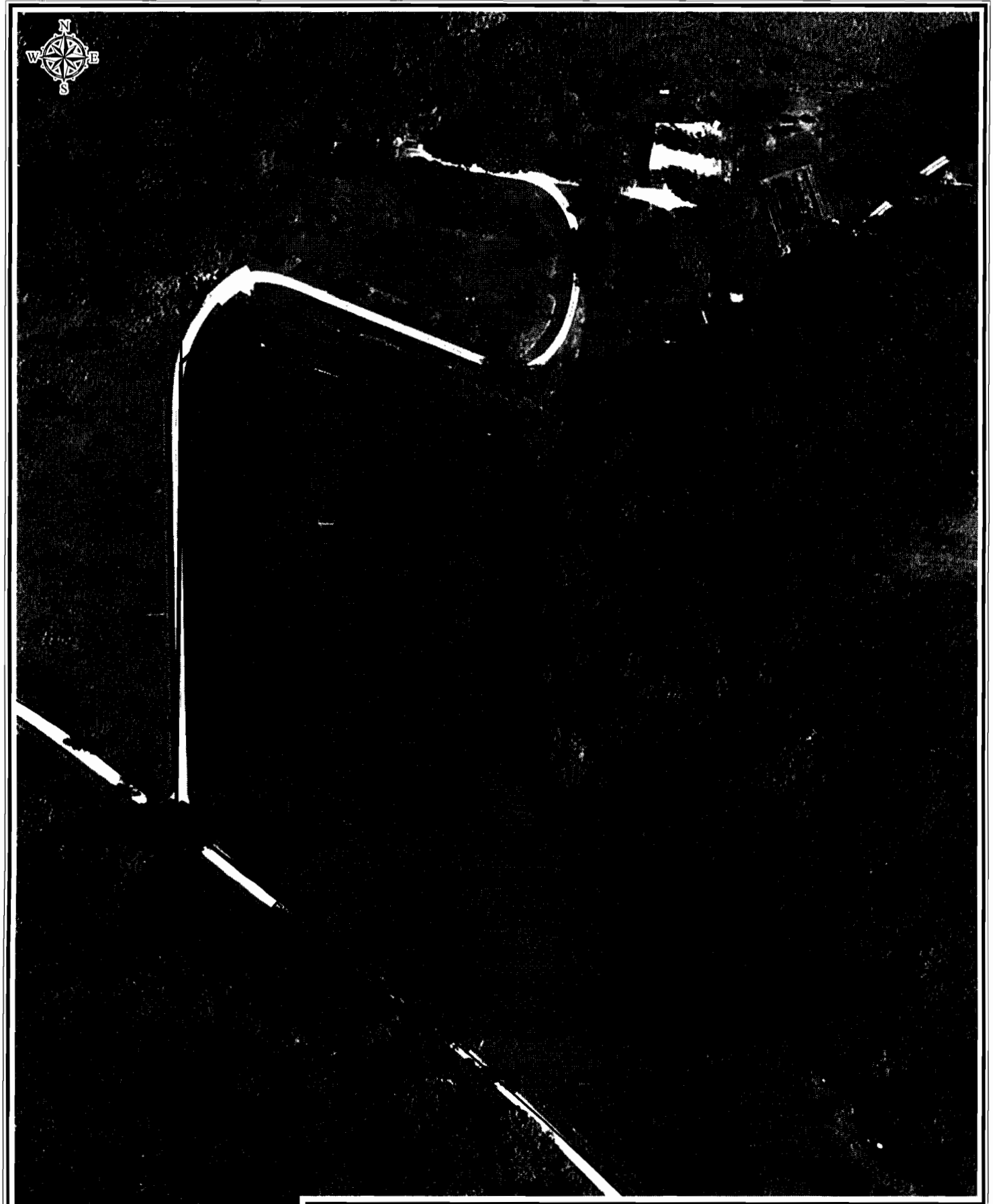


Land Application Sites for LSR
THOMAS LEE #18

Sheet 1 of 43

1 inch = 1,035 feet

COLUMBIA WATER & LIGHT

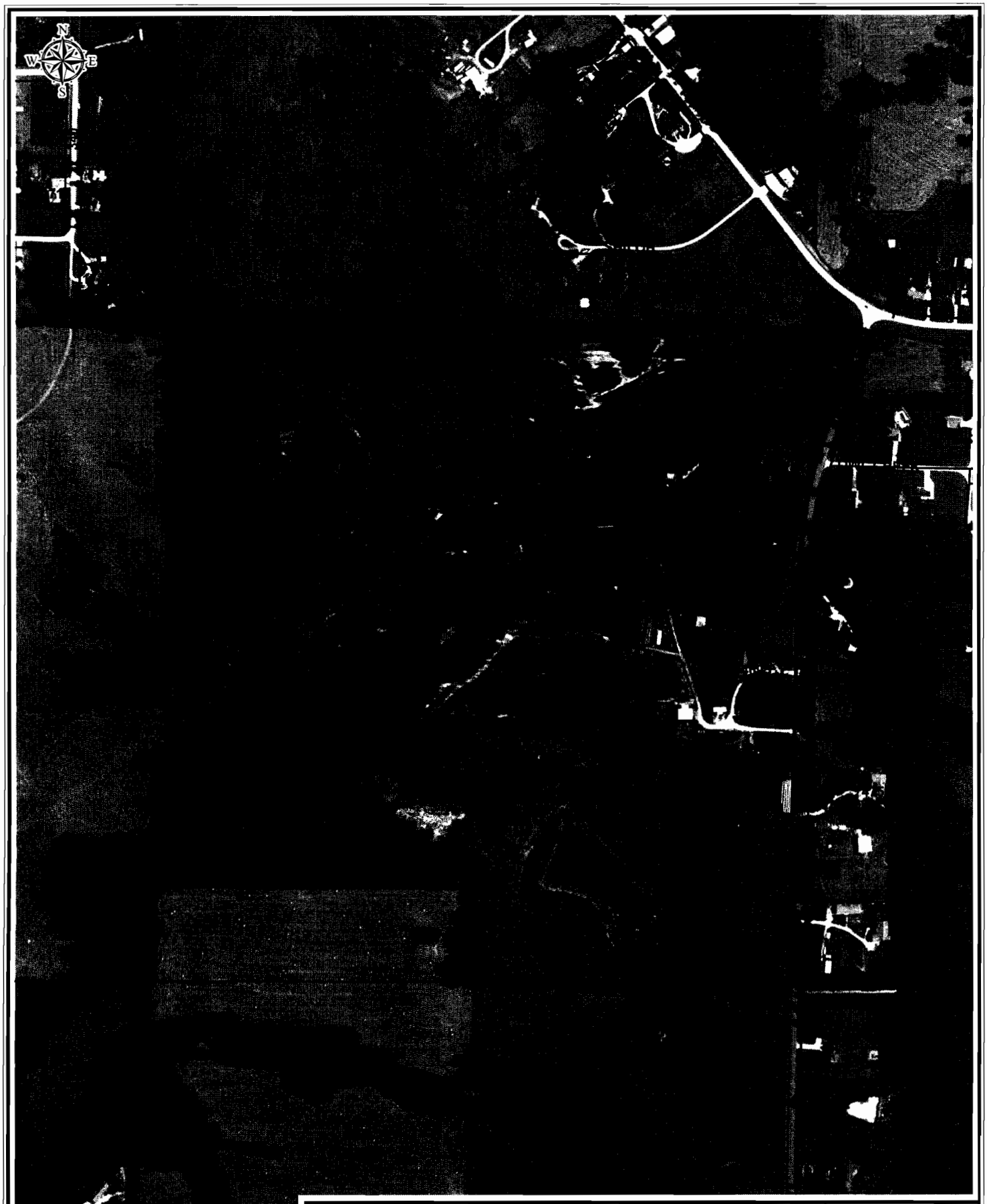


Land Application Sites for LSR
RICK LEONARD #1

Sheet 1 of 44

1 inch = 138 feet

COLUMBIA WATER LIGHT

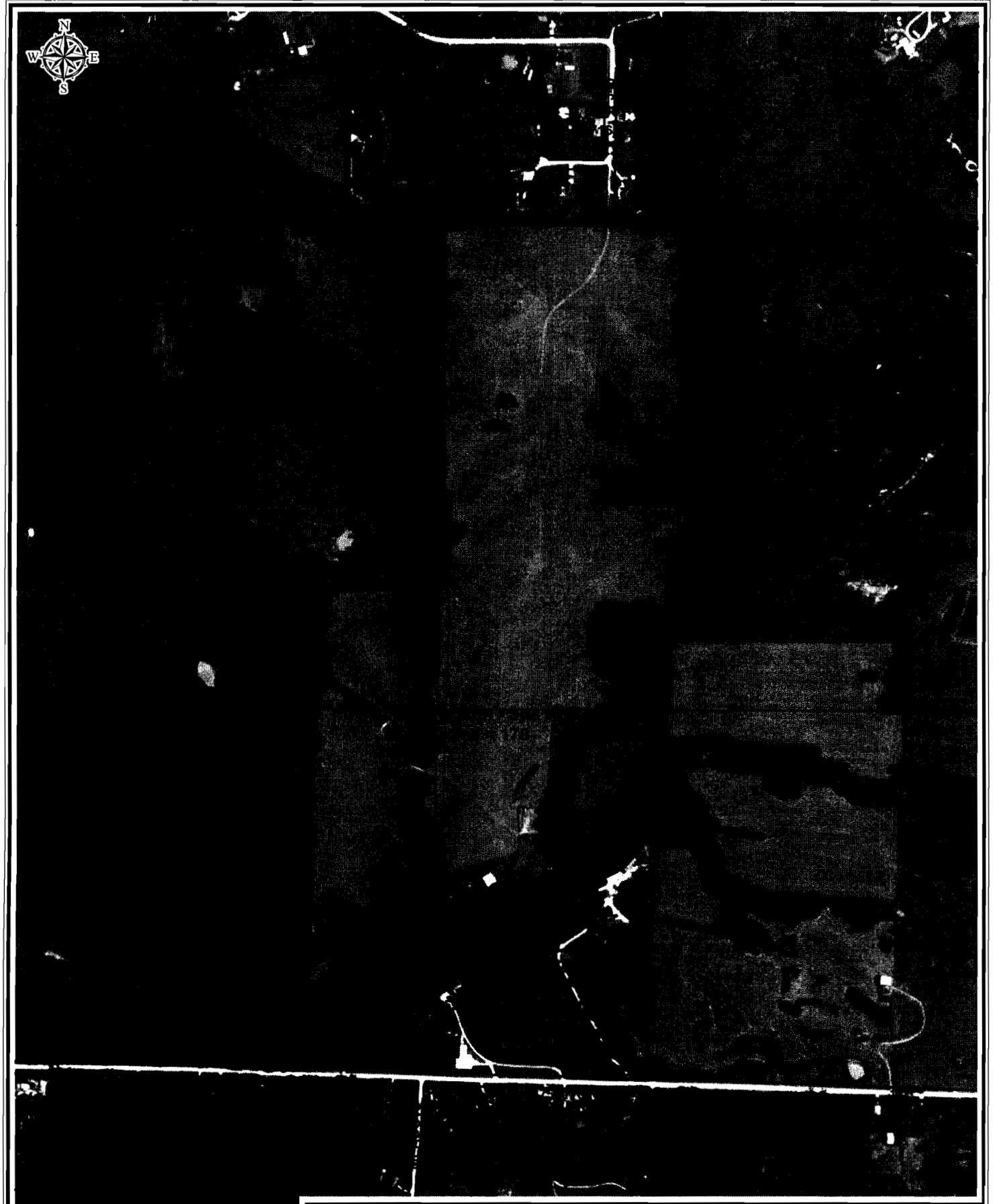


Land Application Sites for LSR
MIKE MARTIN #1

Sheet 1 of 45

1 inch = 511 feet

COLUMBIA WATER LIGHT

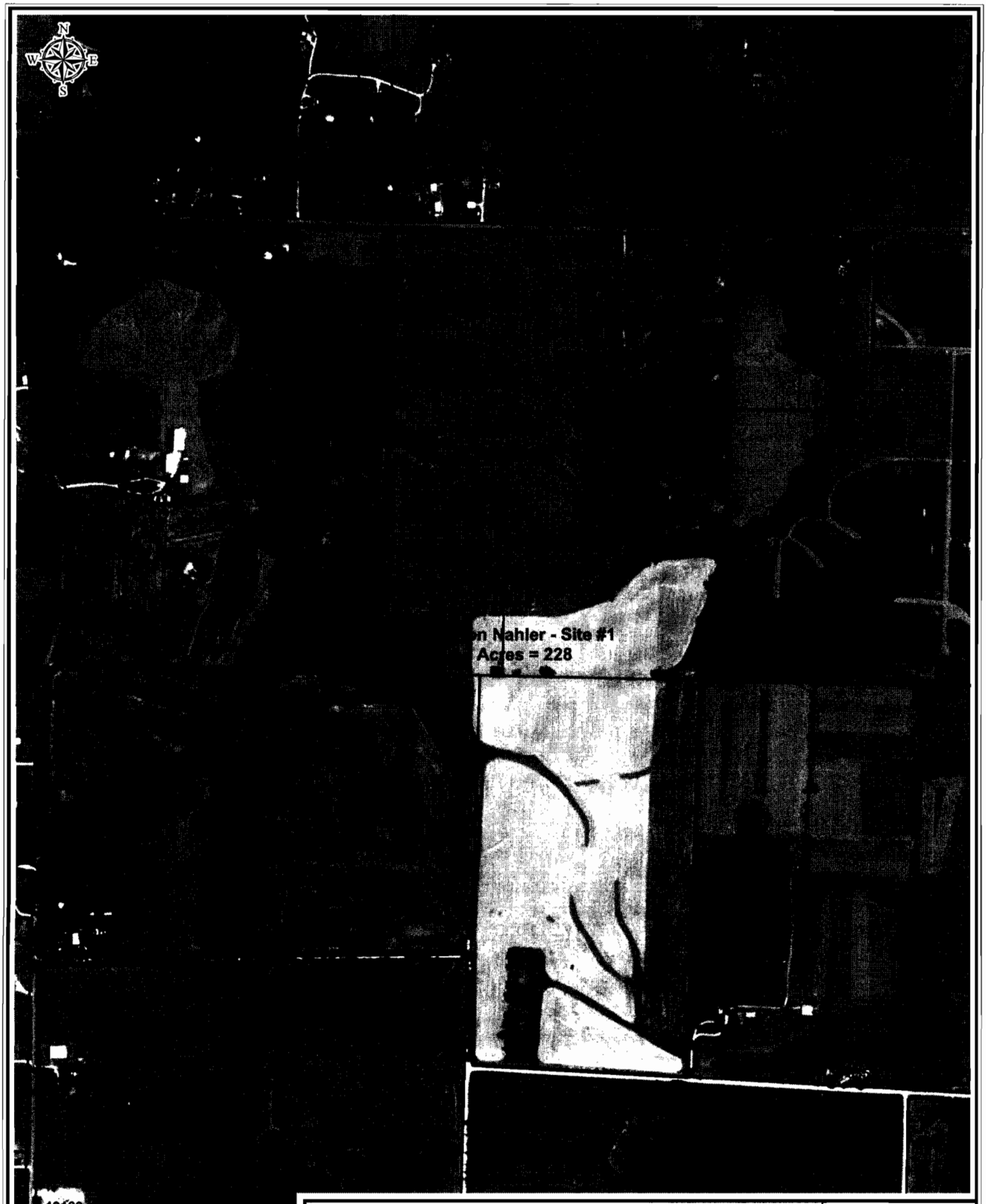


Land Application Sites for LSR
MIKE MARTIN #2

Sheet 1 of 46

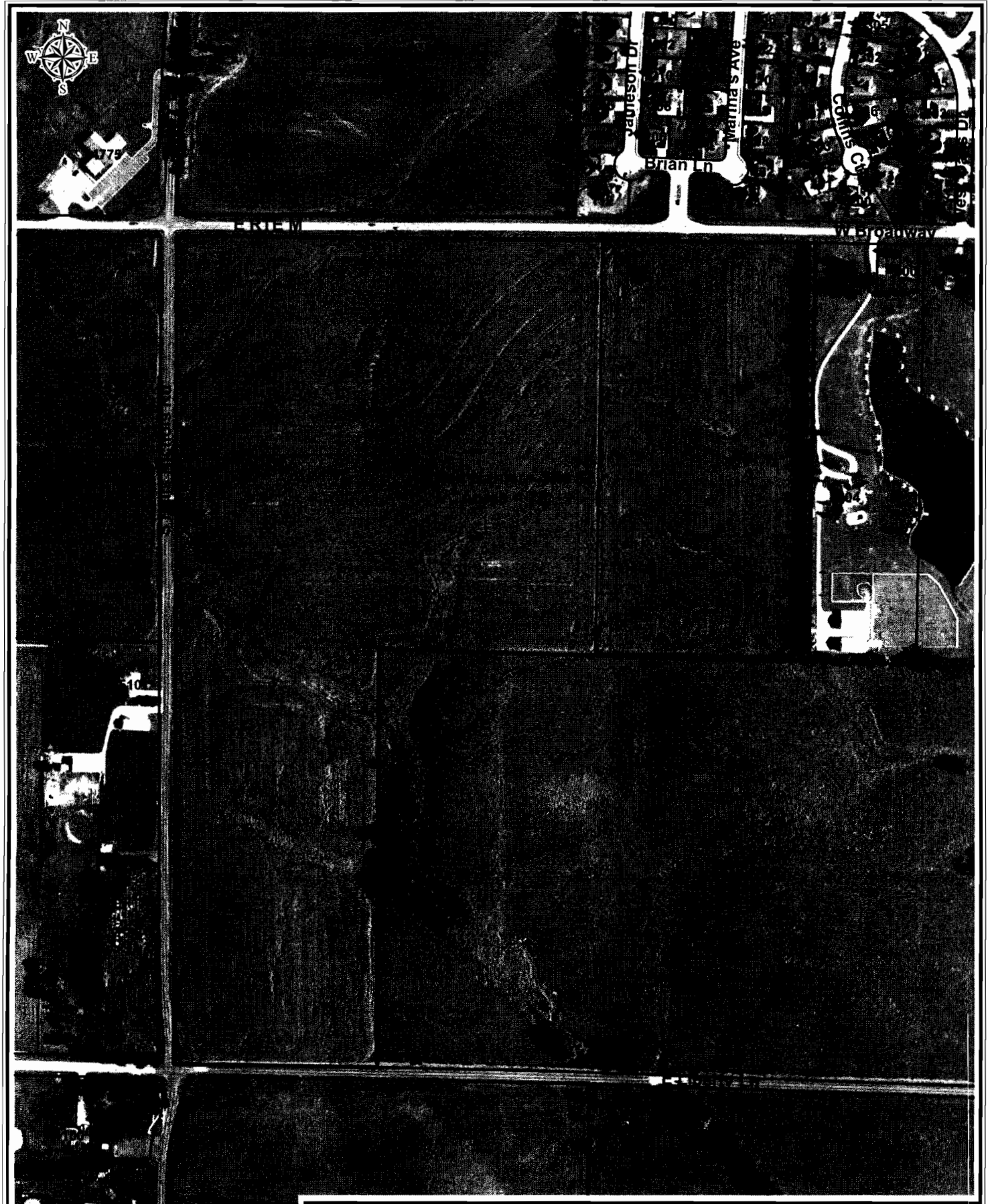
1 inch = 698 feet

COLUMBIA WATER & LIGHT



Land Application Sites for LSR CLIFTON NAHLER #1	
Sheet 1 of 47	1 inch = 737 feet

COLUMBIA WATER & LIGHT



Land Application Sites for LSR
CLIFTON NAHLER #2

Sheet 1 of 48

1 inch = 386 feet

COLUMBIA WATER & LIGHT

Land Application Sites for LSR
MIKE PURCELL #1

Sheet 1 of 49

1 inch = 600 feet

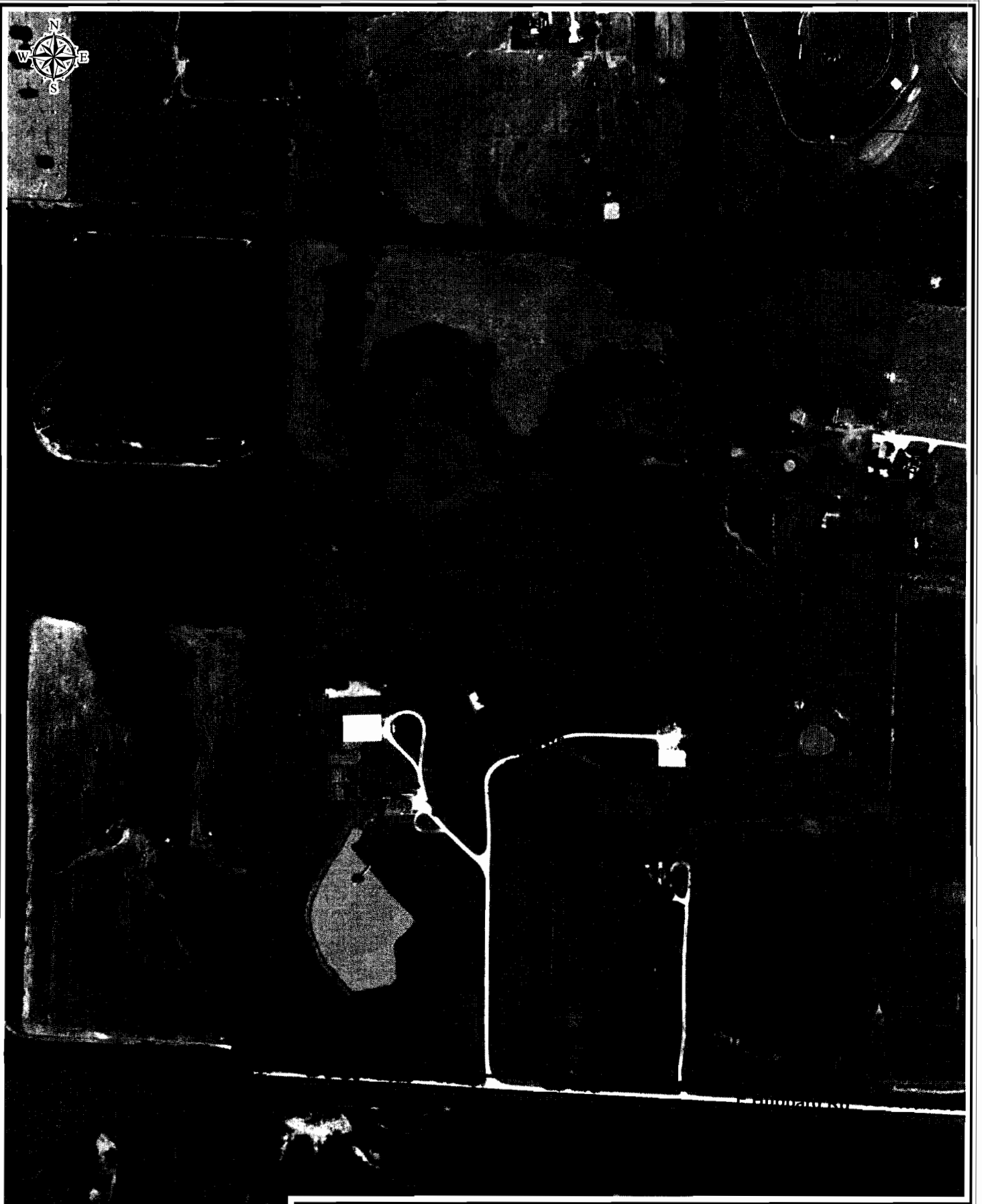
COLUMBIA WATER LIGHT

Land Application Sites for LSR
GARY RYAN #10

Sheet 1 of 50

1 inch = 1,044 feet

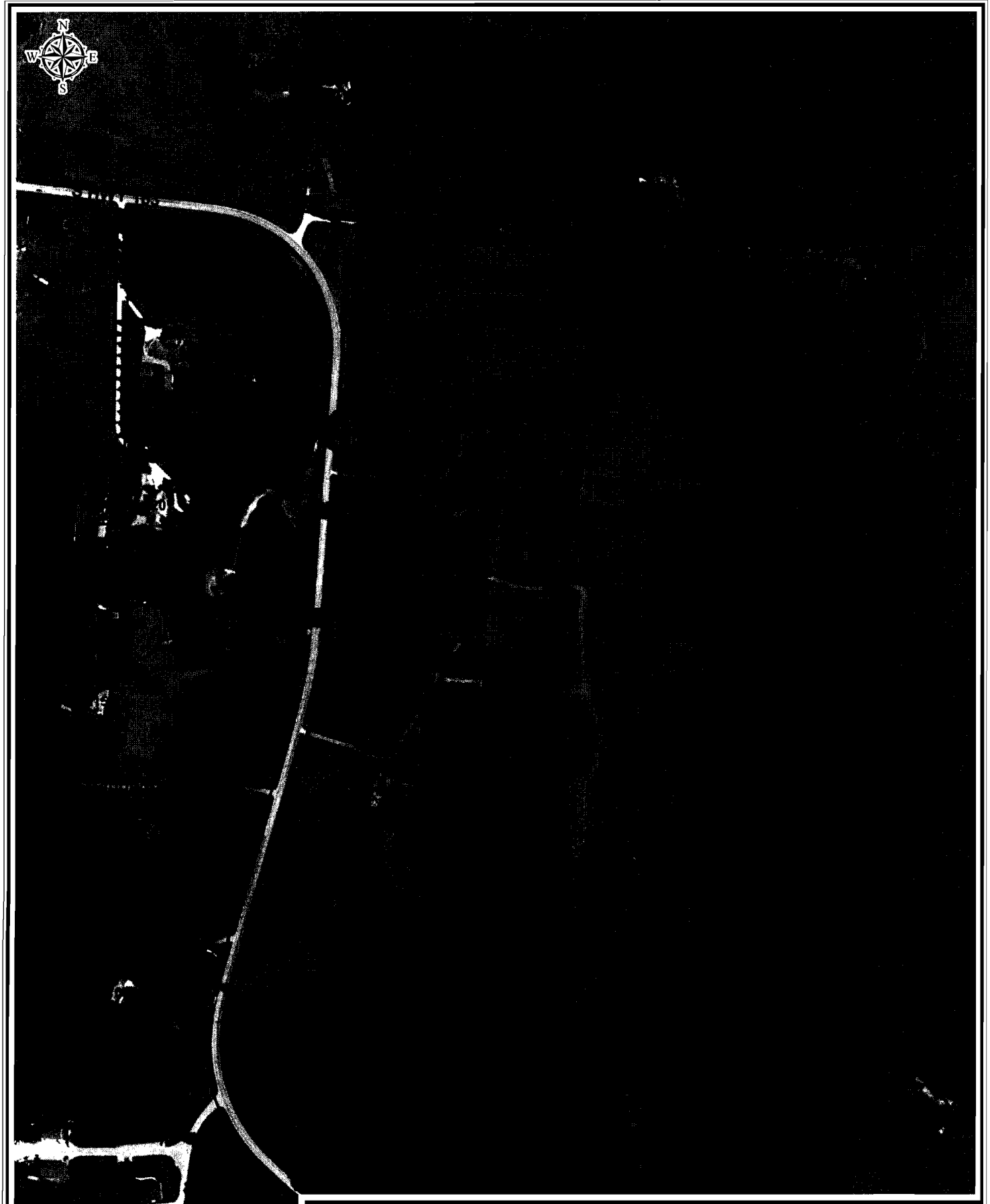
COLUMBIA WATER & LIGHT



Land Application Sites for LSR
JARAMIE SAPP #1

Sheet 1 of 51 **1 inch = 391 feet**

COLUMBIA WATER LIGHT

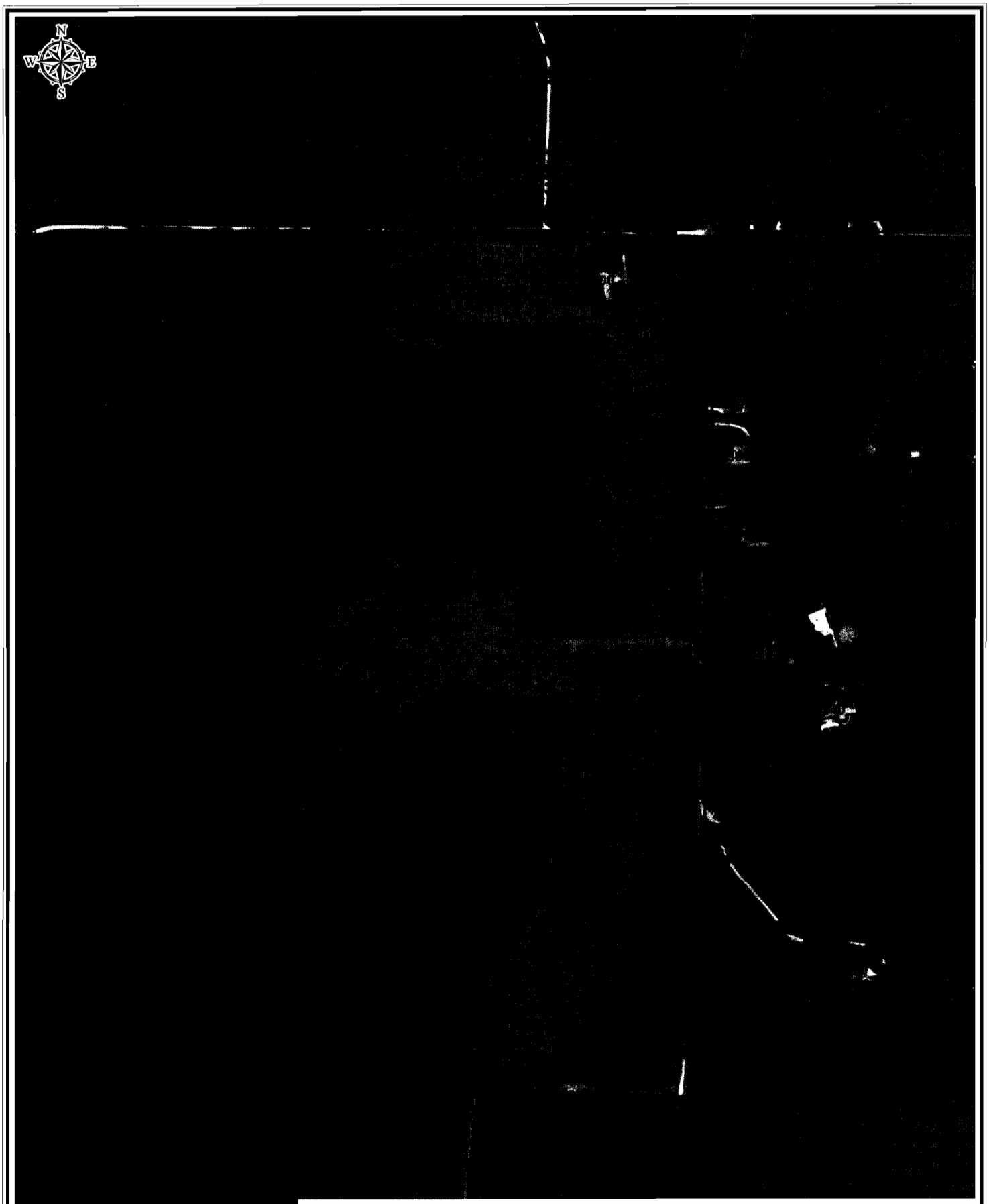


Land Application Sites for LSR
DALE WILSON #1

Sheet 1 of 52

1 inch = 390 feet

COLUMBIA WATER & LIGHT

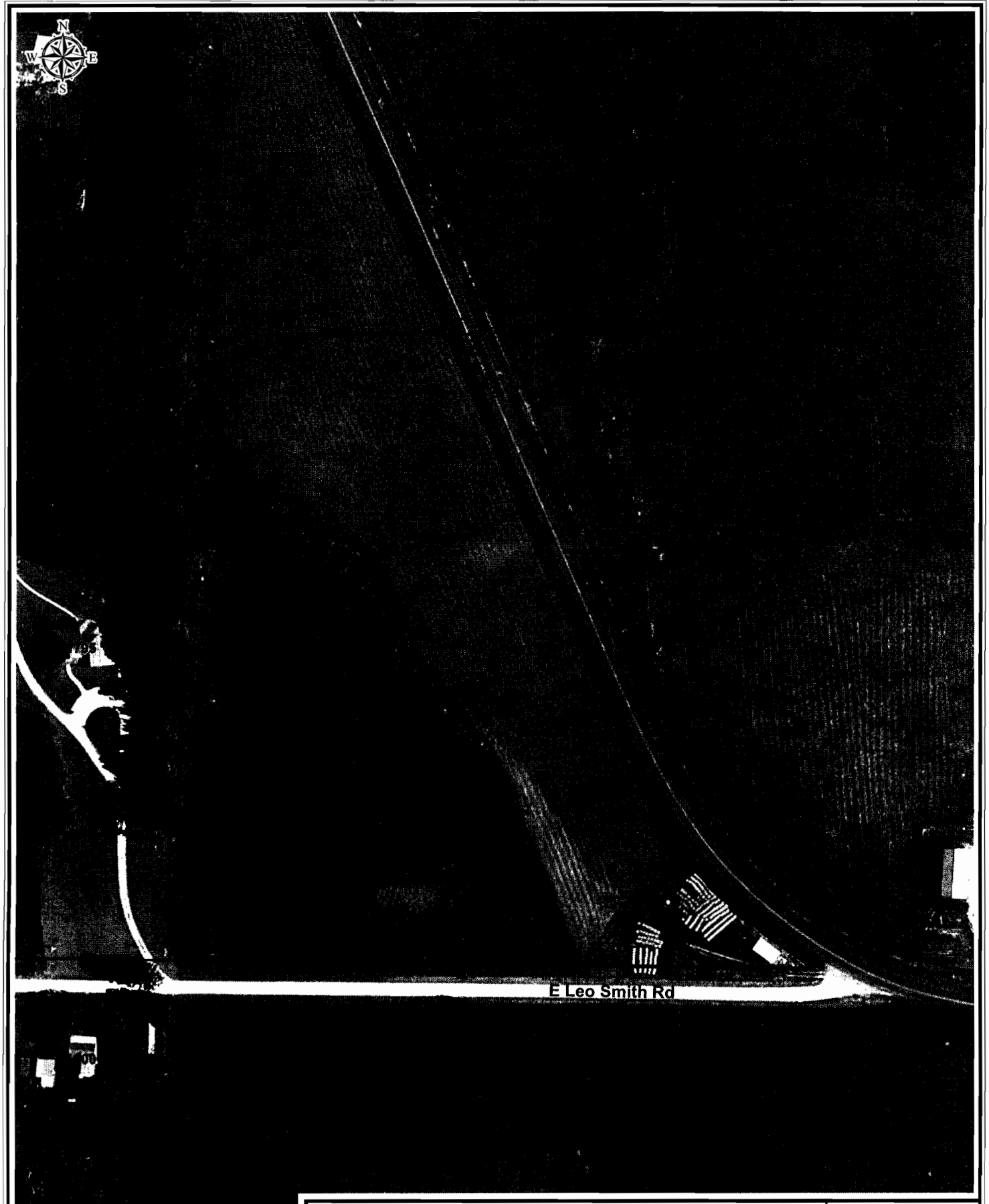


Land Application Sites for LSR
DALE WILSON #2

Sheet 1 of 53

1 inch = 380 feet

COLUMBIA WATER & LIGHT

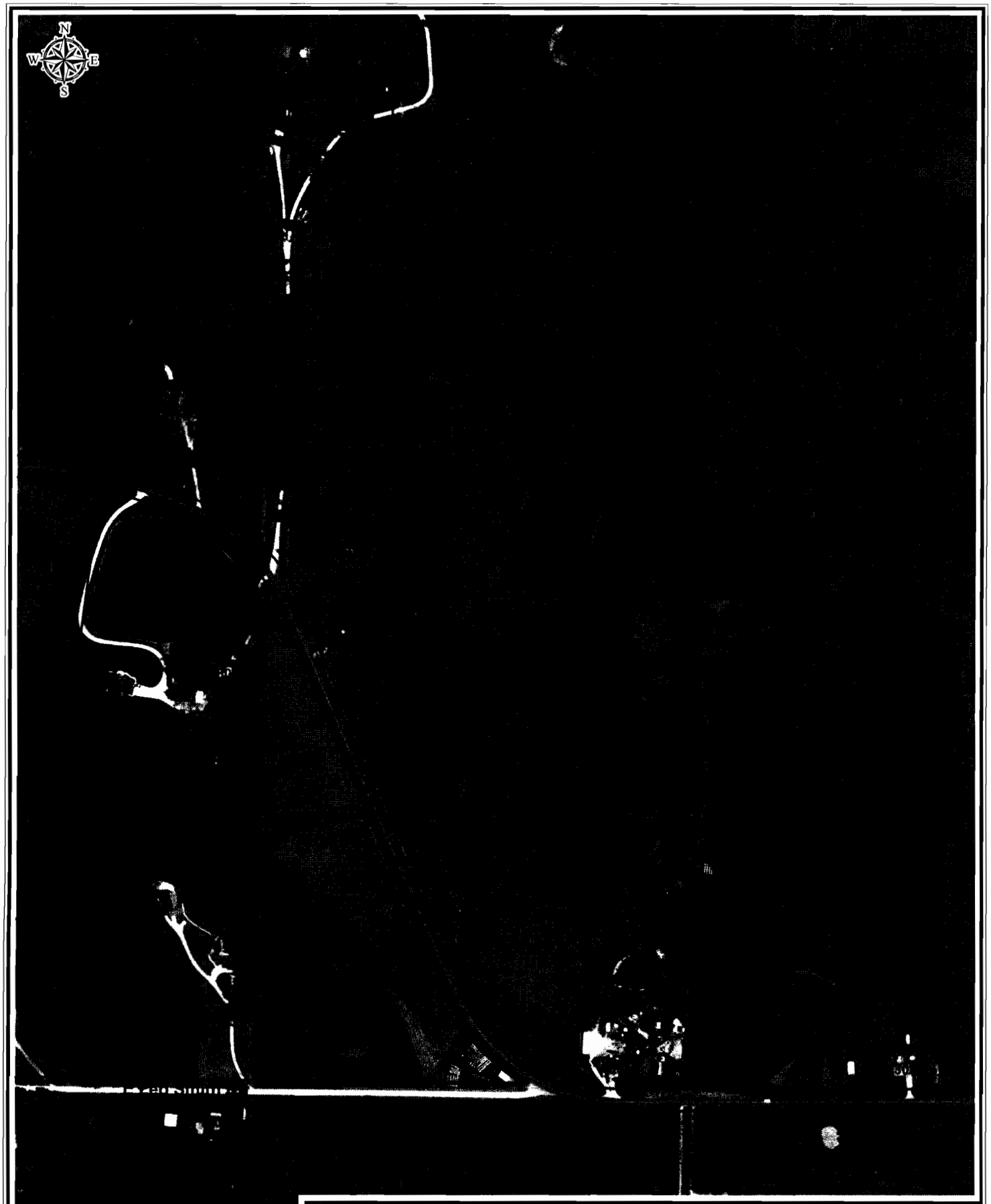


Land Application Sites for LSR
BRANDON WINFREY #1

Sheet 1 of 54

1 inch = 162 feet

COLUMBIA WATER & LIGHT

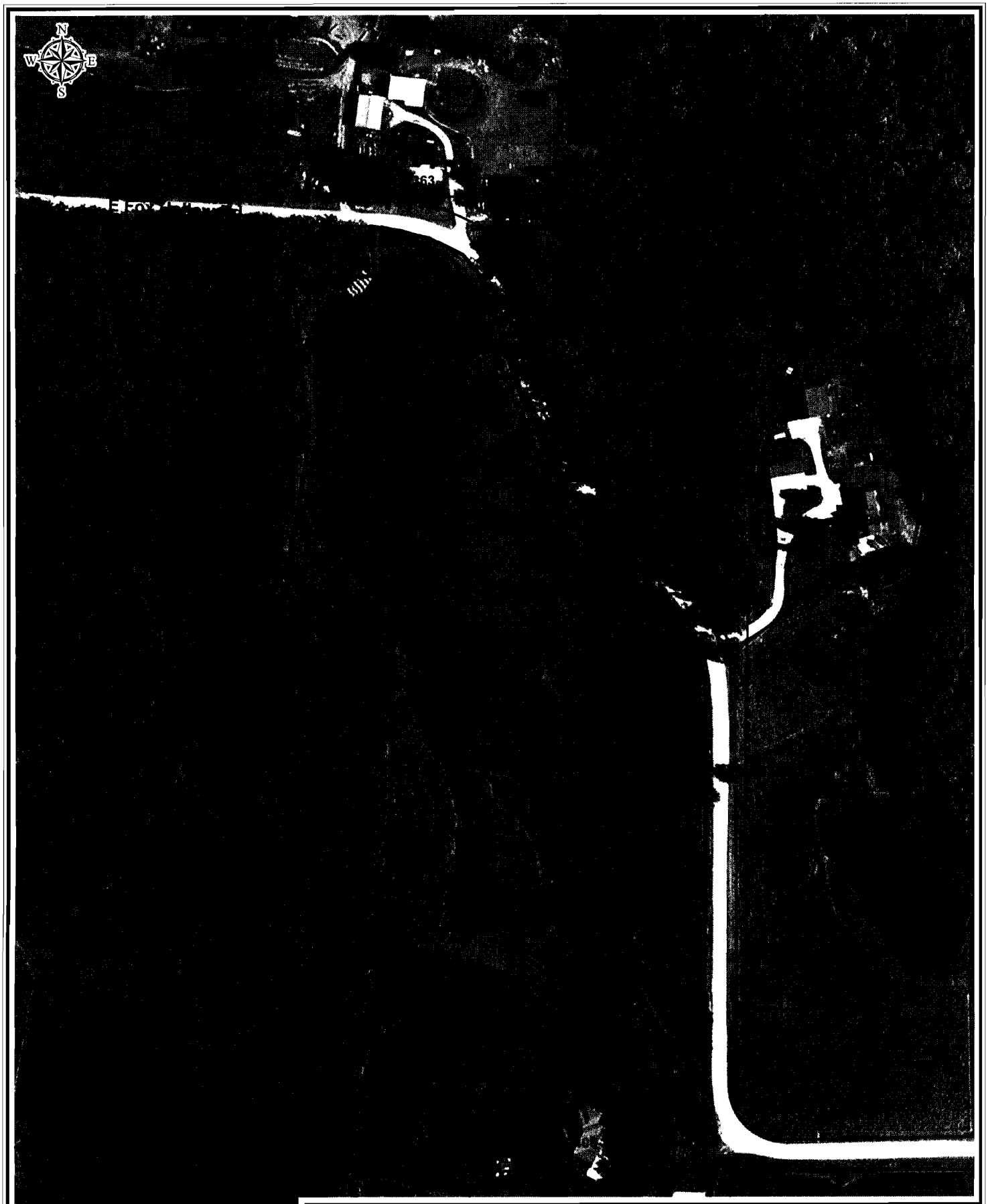


Land Application Sites for LSR
BRANDON WINFREY #2

Sheet 1 of 55

1 inch = 383 feet

COLUMBIA WATER & LIGHT

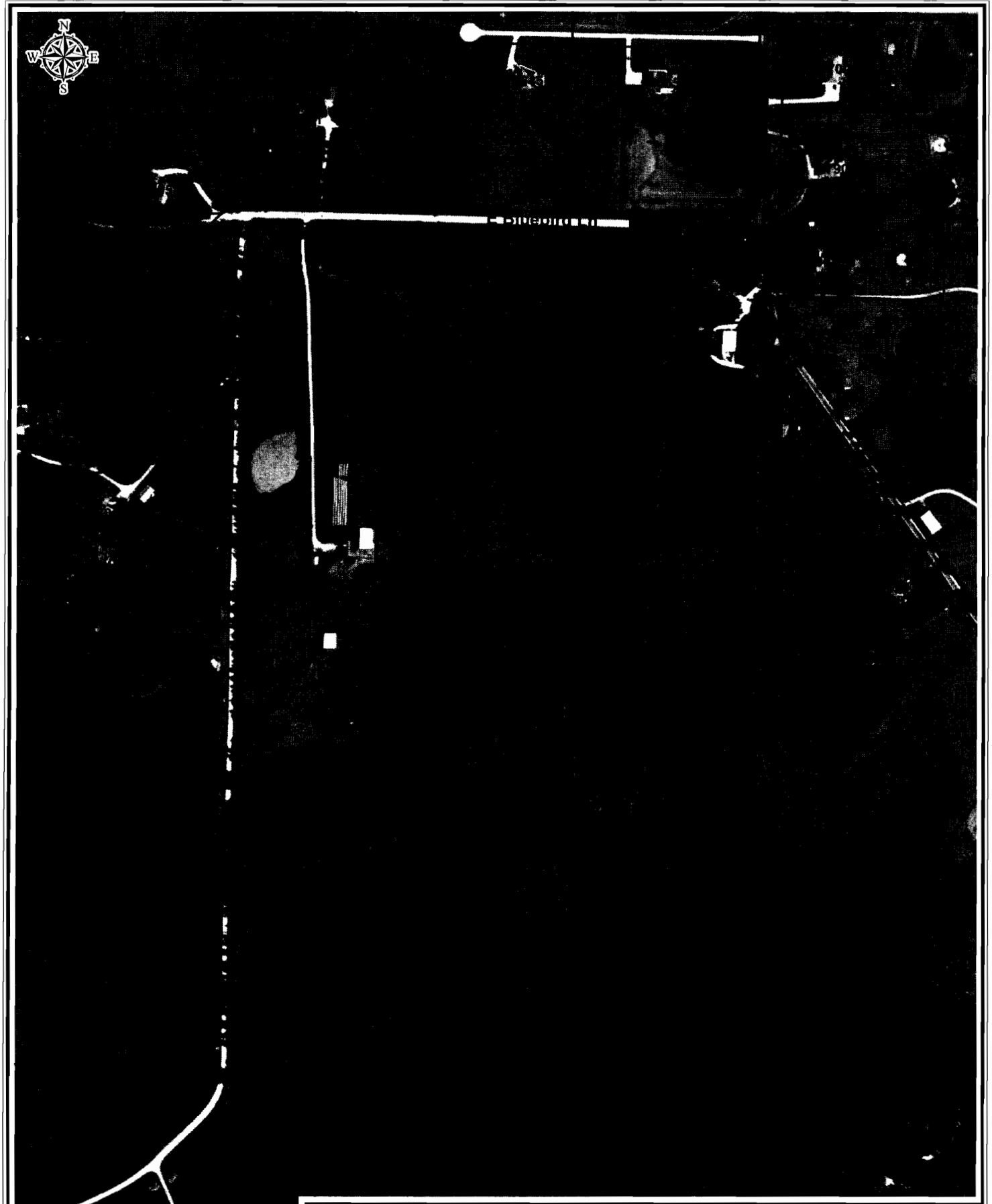


Land Application Sites for LSR
BRANDON WINFREY #3

Sheet 1 of 56

1 inch = 173 feet

COLUMBIA WATER & LIGHT



Land Application Sites for LSR
DAVE WINFREY

Sheet 1 of 57 **1 inch = 385 feet**

COLUMBIA WATER LIGHT

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION BRANCH

FORM C – APPLICATION FOR DISCHARGE PERMIT – MANUFACTURING, COMMERCIAL, MINING, SILVICULTURE OPERATIONS, PROCESS AND STORMWATER

FOR AGENCY USE ONLY	
CHECK NO.	
DATE RECEIVED	FEE SUBMITTED

NOTE: DO NOT ATTEMPT TO COMPLETE THIS FORM BEFORE READING THE ACCOMPANYING INSTRUCTIONS

1.00 NAME OF FACILITY

City of Columbia Water Treatment Plant

1.10 THIS FACILITY IS NOW IN OPERATION UNDER MISSOURI OPERATING PERMIT NUMBER

MO-0136034

1.20 THIS IS A NEW FACILITY AND WAS CONSTRUCTED UNDER MISSOURI CONSTRUCTION PERMIT NUMBER (COMPLETE ONLY IF THIS FACILITY DOES NOT HAVE AN OPERATING PERMIT).

N/A

2.00 LIST THE STANDARD INDUSTRIAL CLASSIFICATION (SIC) CODES APPLICABLE TO YOUR FACILITY (FOUR DIGIT CODE)

A. FIRST 4941 - Drinking Water B. SECOND

C. THIRD D. FOURTH

2.10 FOR EACH OUTFALL GIVE THE LEGAL DESCRIPTION.

OUTFALL NUMBER (LIST)			SEC	T	R	COUNTY
001	SW 1/4	SE 1/4	1	47N	14W	Boone
002	NE	SE	1	47N	14W	BOONE
003	NE	SE	1	47N	14W	BOONE
004	SW	SE	1	47N	14W	BOONE

2.20 FOR EACH OUTFALL LIST THE NAME OF THE RECEIVING WATER

OUTFALL NUMBER (LIST)	RECEIVING WATER
001	unnamed tributary to Perche Creek
002	unnamed tributary to Perche Creek
003	unnamed tributary to Perche Creek
004	unnamed tributary to Perche Creek

2.30 BRIEFLY DESCRIBE THE NATURE OF YOUR BUSINESS

Production and distribution of potable water to the City of Columbia, Missouri.

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent and treatment units labeled to correspond to the more detailed descriptions in item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, public sewers and outfalls. If a water balance cannot by determined (e.g., for certain mining activities), provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures.

B. For each outfall, provide a description of 1. All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water and storm water runoff. 2. The average flow contributed by each operation. 3. The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NO.	2. OPERATION(S) CONTRIBUTING FLOW		3. TREATMENT	
(LIST)	A. OPERATION (LIST)	B. AVERAGE FLOW (INCLUDE UNITS) (MAXIMUM FLOW)	A. DESCRIPTION	B. LIST CODES FROM TABLE A
001	Storm Water Runoff	Rainfall - Sludge Pile		
002	Storm Water Runoff	Rainfall - Sludge Pile		
003	Storm Water Runoff	Rainfall - Sludge Pile		
004	Storm Water Runoff	Rainfall- Sludge Pile		
A	Storm water pollution prevention	Rainfall - Water Plant		
B	Storm water pollution prevention	Rainfall - Water Plant		
C	Storm water pollution prevention	Rainfall - Water Plant		

2.40 CONTINUED

C. EXCEPT FOR STORM RUNOFF, LEAKS OR SPILLS, ARE ANY OF THE DISCHARGES DESCRIBED IN ITEMS A OR B INTERMITTENT OR SEASONAL?

☐ **YES** *(COMPLETE THE FOLLOWING TABLE)* ☑ **NO** *(GO TO SECTION 2.50)*

1. OUTFALL NUMBER *(list)*	2. OPERATION(S) CONTRIBUTING FLOW *(list)*	3. FREQUENCY		4. FLOW				C. DURATION *(in days)*
				A. FLOW RATE *(in mgd)*		B. TOTAL VOLUME (specify with units)		
		A. DAYS PER WEEK *(specify average)*	B. MONTHS PER YEAR *(specify average)*	1. LONG TERM AVERAGE	2. MAXIMUM DAILY	4. LONG TERM DAILY	3. MAXIMUM AVERAGE	

2.50 MAXIMUM PRODUCTION

A. DOES AN EFFLUENT GUIDELINE LIMITATION PROMULGATED BY EPA UNDER SECTION 304 OF THE CLEAN WATER ACT APPLY TO YOUR FACILITY?

☐ **YES** *(COMPLETE B.)* ☑ **NO** *(GO TO SECTION 2.60)*

B. ARE THE LIMITATIONS IN THE APPLICABLE EFFLUENT GUIDELINES EXPRESSED IN TERMS OF PRODUCTION (OF OTHER MEASURE OF OPERATION)?

☐ **YES** *(COMPLETE c.)* ☑ **NO** *(GO TO SECTION 2.60)*

C. IF YOU ANSWERED "YES" TO B. LIST THE QUANTITY THAT REPRESENTS AN ACTUAL MEASUREMENT OF YOUR MAXIMUM LEVEL OF PRODUCTION, EXPRESSED IN THE TERMS AND UNITS USED IN THE APPLICABLE EFFLUENT GUIDELINE AND INDICATE THE AFFECTED OUTFALLS.

1. MAXIMUM QUANTITY			2. AFFECTED OUTFALLS *(list outfall numbers)*
A. QUANTITY PER DAY	B. UNITS OF MEASURE	C. OPERATION, PRODUCT, MATERIAL, ETC. *(specify)*	

2.60 IMPROVEMENTS

A. ARE YOU NOW REQUIRED BY ANY FEDERAL, STATE OR LOCAL AUTHORITY TO MEET, ANY IMPLEMENTATION SCHEDULE FOR THE CONSTRUCTION, UPGRADING OR OPERATION OF WASTEWATER TREATMENT EQUIPMENT OR PRACTICES OR ANY OTHER ENVIRONMENTAL PROGRAMS THAT MAY AFFECT THE DISCHARGES DESCRIBED IN THIS APPLICATION? THIS INCLUDES, BUT IS NOT LIMITED TO, PERMIT CONDITIONS, ADMINISTRATIVE OR ENFORCEMENT ORDERS, ENFORCEMENT COMPLIANCE SCHEDULE LETTERS, STIPULATIONS, COURT ORDERS AND GRANT OR LOAN CONDITIONS.

☐ **YES** *(COMPLETE THE FOLLOWING TABLE)* ☑ **NO** *(GO TO 3.00)*

1. IDENTIFICATION OF CONDITION AGREEMENT, ETC.	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE	
				A. REQUIRED	B. PROJECTED

B. OPTIONAL: YOU MAY ATTACH ADDITIONAL SHEETS DESCRIBING ANY ADDITIONAL WATER POLLUTION CONTROL PROGRAMS *(OR OTHER ENVIRONMENTAL PROJECTS WHICH MAY AFFECT YOUR DISCHARGES)* YOU NOW HAVE UNDER WAY OR WHICH YOU PLAN. INDICATE WHETHER EACH PROGRAM IS NOW UNDER WAY OR PLANNED, AND INDICATE YOUR ACTUAL OR PLANNED SCHEDULES FOR CONSTRUCTION.

☐ **MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED.**

3.00 INTAKE AND EFFLUENT CHARACTERISTICS

A. & B. SEE INSTRUCTIONS BEFORE PROCEEDING – COMPLETE ONE TABLE FOR EACH OUTFALL – ANNOTATE THE OUTFALL NUMBER IN THE SPACE PROVIDED.
NOTE: TABLE 1 IS INCLUDED ON SEPARATE SHEETS NUMBERED FROM PAGE 6 TO PAGE 7.

C. USE THE SPACE BELOW TO LIST ANY OF THE POLLUTANTS LISTED IN PART B OF THE INSTRUCTIONS, WHICH YOU KNOW OR HAVE REASON TO BELIEVE IS DISCHARGED OR MAY BE DISCHARGED FROM ANY OUTFALL. FOR EVERY POLLUTANT YOU LIST, BRIEFLY DESCRIBE THE REASONS YOU BELIEVE IT TO BE PRESENT AND REPORT ANY ANALYTICAL DATA IN YOUR POSSESSION.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE

3.10 BIOLOGICAL TOXICITY TESTING DATA

DO YOU HAVE ANY KNOWLEDGE OR REASON TO BELIEVE THAT ANY BIOLOGICAL TEST FOR ACUTE OR CHRONIC TOXICITY HAS BEEN MADE ON ANY OF YOUR DISCHARGES OR ON RECEIVING WATER IN RELATION TO YOUR DISCHARGE WITHIN THE LAST THREE YEARS?

☐ YES (IDENTIFY THE TEST(S) AND DESCRIBE THEIR PURPOSES BELOW.) ☑ NO (GO TO 3.20)

3.20 CONTRACT ANALYSIS INFORMATION

WERE ANY OF THE ANALYSES REPORTED PERFORMED BY A CONTRACT LABORATORY OR CONSULTING FIRM?

☑ YES (*LIST THE NAME, ADDRESS AND TELEPHONE NUMBER OF AND POLLUTANTS ANALYZED BY EACH SUCH LABORATORY OR FIRM BELOW.*) ☐ NO (*GO TO 3.30*)

A. NAME	B. ADDRESS	C. TELEPHONE *(area code and number)*	D. POLLUTANTS ANALYZED *(list)*
Inovatia Laboratories, LLC	120 East Davis Street Fayette, MO 65248-1405	660-248-1911	
Perry Agricultural Laboratory Inc	P.O.Box 418 Highway 54 East Bowling Green, MO 63334	573-324-2831	

3.30 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 THE 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 AND IMPRISONMENT.

NAME AND OFFICIAL TITLE (TYPE OR PRINT)	TELEPHONE NUMBER WITH AREA CODE
Tad Johnsen Water and Light Director	(573) 874-7300
SIGNATURE (SEE INSTRUCTIONS)	DATE SIGNED
Tad Johnsen	9/17/14

PLEASE PRINT OR TYPE. You may report some or all of this information on separate sheet *(Use the same format)* instead of completing these pages.
SEE INSTRUCTIONS

FORM C
TABLE 1 FOR 3.00 ITEM A AND B

INTAKE AND EFFLUENT CHARACTERISTICS

OUTFALL NO.

PART A – You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	A. MAXIMUM DAILY VALUE		B. MAXIMUM 30 DAY VALUE *(if available)*		C. LONG TERM AVRG. VALUE *(if available)*		D. NO. OF ANALYSES	A. CONCEN-TRATION	B. MASS	A. LONG TERM AVRG. VALUE		B. NO. OF ANALYSES
	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
A. Biochemical Oxygen Demand (BOD)												
B. Chemical Oxygen Demand (COD)												
C. Total organic Carbon (TOC)												
D. Total Suspended Solids (TSS)												
E. Ammonia *(as N)*												
F. Flow	VALUE		VALUE		VALUE					VALUE		
G. Temperature *(winter)*	VALUE		VALUE		VALUE			°C		VALUE		
H. Temperature *(summer)*	VALUE		VALUE		VALUE			°C		VALUE		
I. pH	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM				STANDARD UNITS				

PART B – Mark "X" in column 2A for each pollutant you know or have reason to believe is present. Mark "X" in column 2B for each pollutant you believe to be absent. If you mark column 2A for any pollutant, you must provide the results for at least one analysis for that pollutant. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NUMBER *(if available)*	2. MARK "X"		3. EFFLUENT							4. UNITS		5. INTAKE *(optional)*		
	A. BELIEVED PRESENT	B. BELIEVED ABSENT	A. MAXIMUM DAILY VALUE		B. MAXIMUM 30 DAY VALUE *(if available)*		C. LONG TERM AVRG. VALUE *(if available)*		D. NO. OF ANALYSES	A. CONCEN-TRATION	B. MASS	A. LONG TERM AVRG. VALUE		B. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
CONVENTIONAL AND NONCONVENTIONAL POLLUTANTS														
A. Bromide (24959-67-9)														
B. Chlorine, Total Residual														
C. Color														
D. Fecal Coliform														
E. Fluoride (16984-48-8)														
F. Nitrate - Nitrate *(as N)*														

1. POLLUTANT AND CAS NUMBER *(if available)*	2. MARK "X"		3. EFFLUENT							4. UNITS		5. INTAKE *(optional)*		
	A. BELIEVED PRESENT	B. BELIEVED ABSENT	A. MAXIMUM DAILY VALUE		B. MAXIMUM 30 DAY VALUE *(if available)*		C. LONG TERM AVRG. VALUE *(if available)*		D. NO. OF ANALYSES	A. CONCEN-TRATION	B. MASS	A. LONG TERM AVRG. VALUE		B. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
G. Nitrogen, Total Organic *(as N)*														
H. Oil and Grease														
I. Phosphorus *(as P)*, Total (7723-14-0)														
J. Sulfate *(as SO^4)* (14808-79-8)														
K. Sulfide *(as S)*														
L. Sulfite (as SO^3) (14265-45-3)														
M. Surfactants														
N. Aluminum, Total (7429-90-5)														
O. Barium, Total (7440-39-3)														
P. Boron, Total (7440-42-8)														
Q. Cobalt, Total (7440-48-4)														
R. Iron, Total (7439-89-6)														
S. Magnesium, Total (7439-95-4)														
T. Molybdenum, Total (7439-98-7)														
U. Manganese, Total (7439-96-5)														
V. Tin, Total (7440-31-5)														
W. Titanium, Total (7440-32-6)														

1. POLLUTANT AND CAS NUMBER *(if available)*	2. MARK "X"		3. EFFLUENT							4. UNITS		5. INTAKE *(optional)*		
	A. BELIEVED PRESENT	B. BELIEVED ABSENT	A. MAXIMUM DAILY VALUE		B. MAXIMUM 30 DAY VALUE *(if available)*		C. LONG TERM AVRG. VALUE *(if available)*		D. NO. OF ANALYSES	A. CONCEN-TRATION	B. MASS	A. LONG TERM AVRG. VALUE		B. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
METALS, AND TOTAL PHENOLS														
1M. Antimony, Total (7440-36-9)														
2M. Arsenic, Total (7440-38-2)														
3M. Beryllium, Total (7440-41-7)														
4M. Cadmium, Total (7440-43-9)														
5M. Chromium III (16065-83-1)														
6M. Chromium VI (18540-29-9)														
7M. Copper, Total (7440-50-8)														
8M. Lead, Total (7439-92-1)														
9M. Mercury, Total (7439-97-6)														
10M. Nickel, Total (7440-02-0)														
11M. Selenium, Total (7782-49-2)														
12M. Silver, Total (7440-22-4)														
13M. Thallium, Total (7440-28-0)														
14M. Zinc, Total (7440-66-6)														
15M. Cyanide, Amenable to Chlorination														
16M. Phenols, Total														
RADIOACTIVITY														
(1) Alpha Total														
(2) Beta Total														
(3) Radium Total														
(4) Radium 226 Total														

INOVATIA® LABORATORIES, LLC

120 East Davis Street
Fayette, MO 65248-1405
(660) 248-1911
www.inovatia.com

3/28/2014

6851 W. Route K McBaine
Columbia, MO 65201
Blaise Brazos

RE: Project Name/Number: N/A / N/A
Chain of Custody Number: 14-0237

Date Received: March 14, 2014
Time Received: 11:15
Relinquished by: Blaise Brazos
Sampler: Blaise Brazos

Enclosed please find analytical results for sample(s) received as described above. The values reported are in conformance with internal and method quality control guidelines, unless otherwise noted. If you have questions or need more information, please contact us.

Thank you for your interest in working with Inovatia Laboratories.

Sincerely,

Jennifer Vandelicht

Digitally signed by Jennifer Vandelicht
DN: cn=Jennifer Vandelicht, o=Inovatia Laboratories, LLC, ou=Quality Assurance, email=jvandelicht@inovaita.com, c=US
Date: 2014.03.31 10:39:43 -05'00'

Jennifer Vandelicht
Quality Assurance

Enclosures: Chain of Custody Record(s)

INOVATIA LABORATORIES, LLC

120 East Davis Street
P.O. Box 30
Fayette, MO 65248-0030

hone: (660) 248-1911
Fax: (660) 248-1921
www.inovatia.com

ANALYSIS REPORT

Chain of Custody Number: 14-0237
Project Name / Number: N/A / N/A
Date Collected: 03/13/14
Time Collected: 10:00

Sample Number: La 2
Lab Number: 14
Sample Matrix: Li lge
Sample Type: Gr

Analysis	Result	Units	Reporting Limit	Analysis Method	Date - Analyst
Arsenic, Total	< 1.50	mg/Kg	1.50	EPA 200.8	3/24/2014 - DS
Antimony, Total	< 2.50	mg/Kg	2.50	EPA 6010	/24/2014 - MWL
Lead, Total	< 1.50	mg/Kg	1.50	EPA 200.8	3/24/2014 - DS
Sieve (% Passing 8 Mesh)	100	%	N/A	Wet Sieve	/24/2014 - MWL
Sieve (% Passing 40 Mesh)	100	%	N/A	Wet Sieve	/24/2014 - MWL
Sieve (% Passing 60 Mesh)	100	%	N/A	Wet Sieve	/24/2014 - MWL
ENM	369	lbs/ton	1	Calulation	/25/2014 - MWL
Total Neutralizing Value (CaCO3 eq)	46.2	%	0.1	AOAC 955.01	/24/2014 - MWL

Notes:

Report Date: 03
Page Number: 2 c

INOVATIA® LABORATORIES, LLC

120 East Davis Street
P.O. Box 30
Fayette, MO 65248-0030

Phone: (660) 248-1911
Fax: (660) 248-1921
www.inovatia.com

ANALYSIS REPORT

Chain of Custody Number: 14-0237
Project Name / Number: N/A / N/A
Date Collected: 03/13/14
Time Collected: 10:00

Sample Number: La[illegible]3
Lab Number: 14[illegible]
Sample Matrix: Li[illegible]lge
Sample Type: Gr[illegible]

Analysis	Result	Units	Reporting Limit	Analysis Method	Date - Analyst
Arsenic, Total	< 1.50	mg/Kg	1.50	EPA 200.8	3/24/2014 - DS
Antimony, Total	< 2.50	mg/Kg	2.50	EPA 6010	/24/2014 - MWL
Lead, Total	< 1.50	mg/Kg	1.50	EPA 200.8	3/24/2014 - DS
Sieve (% Passing 8 Mesh)	100.000	%	N/A	Wet Sieve	/24/2014 - MWL
Sieve (% Passing 40 Mesh)	100	%	N/A	Wet Sieve	/24/2014 - MWL
Sieve (% Passing 60 Mesh)	100	%	N/A	Wet Sieve	/24/2014 - MWL
ENM	401	lbs/ton	1	Calulation	/25/2014 - MWL
Total Neutralizing Value (CaCO3 eq)	50.2	%	0.1	AOAC 955.01	/24/2014 - MWL

Notes:

Report Date: 03[illegible]
Page Number: 3 o[illegible]

INOVATIA® LABORATORIES, LLC

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P.O. Box 30
Fayette, MO 65248-0030

hone: (660) 248-1911
Fax: (660) 248-1921
www.inovatia.com

ANALYSIS REPORT

Chain of Custody Number: 14-0237
Project Name / Number: N/A / N/A
Date Collected: 03/13/14
Time Collected: 10:00

Sample Number: Lag[illegible]4
Lab Number: 140[illegible]
Sample Matrix: Lir[illegible]lge
Sample Type: Gra[illegible]

Analysis	Result	Units	Reporting Limit	Analysis Method	Date - Analyst
Arsenic, Total	< 1.50	mg/Kg	1.50	EPA 200.8	3/24/2014 - DS
Antimony, Total	< 2.50	mg/Kg	2.50	EPA 6010	'24/2014 - MWL
Lead, Total	< 1.50	mg/Kg	1.50	EPA 200.8	3/24/2014 - DS
Sieve (% Passing 8 Mesh)	100	%	N/A	Wet Sieve	'24/2014 - MWL
Sieve (% Passing 40 Mesh)	100	%	N/A	Wet Sieve	'24/2014 - MWL
Sieve (% Passing 60 Mesh)	100.0	%	N/A	Wet Sieve	'24/2014 - MWL
ENM	397	lbs/ton	1	Calulation	'25/2014 - MWL
Total Neutralizing Value (CaCO3 eq)	49.7	%	0.1	AOAC 955.01	'24/2014 - MWL

Notes:

Report Date: 03[illegible]
Page Number: 4 o[illegible]

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CHAIN OF CUSTODY RECORD

INOVATIA LABORATORIES, LLC
120 EAST DAVIS STREET • P.O. BOX 30
FAYETTE, MO 65248-0030

PHONE: (660) 248-1911
FAX: (660) 248-1921
IL_CustServ@inovatia.com

FOR OFFICE USE ONLY:
CHAIN NUMBER: 14-0237
DATE REPORTED: 3-31-14
INVOICE NUMBER:

Contact Name:
Company Name: CITY OF COLUMBIA
Address:
City, State, Zip: COLUMBIA, MO 65201
E-Mail: BJBRAZOS@GOCOLUMBIAMO.COM

Cell Phone Number: 573-289-6017
Fax Number:
Project Name / Number:
Quote Number:
Purchase Order Number:

Project Due Date:
Comments:
Sampler's Name (please print): BLAKE BRAZOS
Sampler's Signature: [signature]

FOR OFFICE USE ONLY:
DELIVERY METHOD: Hand
CUSTODY SEALS: ☐ YES ☑ NO ☐ INTACT ☐ BROKEN
COOLANT: ☐ ICE ☐ ICE PACK ☑ NONE
PACKAGE TYPE: N/A
ARRIVAL TEMPERATURE: 16.8 °C
MEASURED BY: ☐ TEMPERATURE BLANK ☑ SAMPLE ☐ COOLER / CONTAINER

DISPOSITION INFORMATION

- ☐ STORE WITHIN HOLD TIME
- ☐ STORE LONG TERM
- ☐ RETURN AT CUSTOMER EXPENSE
- ☐ DISPOSE OF SAMPLE AT INOVATIA
- ☐ OTHER

NOTES:

Please include any information that may be useful in the analysis of the sample, such as: expected concentrations, required detection limits, and method of collection

Comments:

REQUESTED ANALYSES — Method Number →: As, Pb, [struck out], Sb; ENM

	LAB NUMBER	Customer Sample Number	Date Collected	Time Collected	Matrix (Soil / Water / Sludge / Other)	G=grab / C=composite	No. of Containers	HCl	HNO_3	NaOH	H_2SO_4	TSP	Other:	Other: % SOLIDS	As	Pb	Sb	ENM
1	140995	LAGOON #2	13 MAR	1000	LIME SOLIDS	G	1											
2					RESIDUAL	G												
3	140996	LAGOON #3	13 MAR 2014	1000	"		1											
4																		
5	140997	LAGOON #4	13 MAR	1000	"		1											
6																		
7																		
8																		
9																		
10																		

Relinquished By: [signature]	Date: 14 MAR 14	Time: 1115	Received By:	Date:	Time:
Relinquished By: B.J. BRAZOS	Date: 14 MAR 14	Time: 1115	Received By: Jennifer Vandiviert	Date: 3/14/14	Time: 1115

INOVATIA® LABORATORIES, LLC

120 East Davis Street
Fayette, MO 65248-1405
(660) 248-1911
www.inovatia.com

6/19/2014

City of Columbia
6851 W. Route K McBaine
Columbia, MO 65201
Blaise Brazos

RE: Project Name/Number: N/A / N/A
Chain of Custody Number: 14-0598

Date Received: June 5, 2014
Time Received: 13:00
Relinquished by: Blaise Brazos
Sampler: Blaise Brazos

Enclosed please find analytical results for sample(s) received as described above. The values reported are in conformance with internal and method quality control guidelines, unless otherwise noted. If you have questions or need more information, please contact us.

Thank you for your interest in working with Inovatia Laboratories.

Sincerely,

Jennifer Vandelicht

Digitally signed by Jennifer Vandelicht
DN: cn=Jennifer Vandelicht, o=Inovatia Laboratories, LLC, ou=Quality Assurance, email=jvandelicht@inovaita.com, c=US
Date: 2014.06.19 13:27:17 -05'00'

Jennifer Vandelicht
Quality Assurance

Enclosures: Chain of Custody Record(s)

INOVATIA® LABORATORIES, LLC

120 East Davis Street
P.O. Box 30
Fayette, MO 65248-0030

Phone: (660) 248-1911
Fax: (660) 248-1921
www.inovatia.com

ANALYSIS REPORT

Chain of Custody Number: 14-0598
Project Name / Number: N/A / N/A
Date Collected: 05/31/14
Time Collected: N/A

Sample Number: Li[illegible]dge
Lab Number: 14[illegible]
Sample Matrix: Sl[illegible]
Sample Type: N/[illegible]

Analysis	Result	Units	Reporting Limit	Analysis Method	Date - Analyst
Nitrogen, Total Kjeldahl	103	mg/Kg	5	PAI-DK 01	/13/2014 - MWL
Percent Solids	46.4	%	0.01	SM 2540 G	6/9/2014 - MWL
Aluminum, Total	583	mg/Kg	5	EPA 6010	/10/2014 - MWL
Chromium, Total	4	mg/Kg	1	EPA 6010	/10/2014 - MWL
Nickel, Total	< 1	mg/Kg	1	EPA 6010	/10/2014 - MWL
Copper, Total	< 1	mg/Kg	1	EPA 6010	/10/2014 - MWL
Zinc, Total	< 1	mg/Kg	1	EPA 6010	/10/2014 - MWL
Antimony, Total	< 5	mg/Kg	5	EPA 6010	/10/2014 - MWL
Selenium, Total	< 10	mg/Kg	10	EPA 6010	/10/2014 - MWL
Molybdenum, Total	< 1	mg/Kg	1	EPA 6010	/10/2014 - MWL
Cadmium, Total	< 0.5	mg/Kg	0.5	EPA 6010	/10/2014 - MWL
Mercury, Total	< 0.05	mg/Kg	0.05	EPA 7471	/10/2014 - MWL
Lead, Total	< 5	mg/Kg	5	EPA 6010	/10/2014 - MWL
Sieve (% Passing 8 Mesh)	100	%	N/A	Wet Sieve	/12/2014 - MWL
Sieve (% Passing 40 Mesh)	100	%	N/A	Wet Sieve	/12/2014 - MWL
Sieve (% Passing 60 Mesh)	99	%	N/A	Wet Sieve	/12/2014 - MWL
ENM	735	lbs/ton	N/A	Calulation	/13/2014 - MWL
Total Neutralizing Value (CaCO3 eq)	92.8	%	0.1	AOAC 955.01	6/9/2014 - MWL

Notes:
Results on a Dry Weight Basis
Amended Report: Added Antimony per client request

Report Date: 06[illegible]
Page Number: 2[illegible]

CHAIN OF CUSTODY RECORD

INOVATIA LABORATORIES, LLC
120 EAST DAVIS STREET • P.O. BOX 30
FAYETTE, MO 65248-0030
PHONE: (660) 248-1911
FAX: (660) 248-1921
IL_CustServ@inovatia.com
www.inovatia.com

FOR OFFICE USE ONLY:
CHAIN NUMBER: 14-0598
DATE REPORTED: 6/16/2014
INVOICE NUMBER: 6/19/14 V2

Contact Name: BLAISE BRAZOS
Company Name: CITY OF COLUMBIA
Address: W+L ENGR
City, State, Zip: COLUMBIA MO
E-Mail: BJBRAZOS@GOCOLUMBIAMO.COM
Phone Number: 573-289-6077
Fax Number:
Project Name / Number:
Quote Number:
Purchase Order Number:
Project Due Date:
Comments:
Sampler's Name (please print): BRAZOS
Sampler's Signature:

FOR OFFICE USE ONLY:
DELIVERY METHOD: Hand
CUSTODY SEALS: ☐ YES ☑ NO ☐ INTACT ☐ BROKEN
COOLANT: ☐ ICE ☐ ICE PACK ☑ NONE
PACKAGE TYPE: N/A
ARRIVAL TEMPERATURE: 23.6 °C
MEASURED BY: ☐ TEMPERATURE BLANK ☑ SAMPLE ☐ COOLER / CONTAINER

DISPOSITION INFORMATION
☐ STORE WITHIN HOLD TIME
☐ STORE LONG TERM
☐ RETURN AT CUSTOMER EXPENSE
☐ DISPOSE OF SAMPLE AT INOVATIA
☐ OTHER
NOTES:

	LAB NUMBER	Customer Sample Number	Date Collected	Time Collected	Matrix (Soil / Water / Sludge / Other)	G=grab / C=composite	No. of Containers	NUMBER PER REPRESENTATIVE: HCl	HNO_3	NaOH	H_2SO_4	TSP	Other:	Other:	Method Number → REQUESTED ANALYSES: ENVM	TKN	As Al Ca	Cr Cu Fe Pb	Hg Mo Ni	Se Zn	90 Solids
1	142088	Lime Sludge	5/31/14		Sludge		1								X	X	X	X	X	X	X
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					

Please include any information that may be useful in the analysis of the sample, such as: expected concentrations, required detection limits, and method of collection.

Comments:

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
[signature]	6-5-14	1300	[signature]	6-5-14	1300
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

Unless otherwise governed under separate contract, by signing this form, the client accepts Inovatia's standard terms and conditions for service, pricing, and payment as p on the reverse side of this form.
Prior, written notification of regulatory compliance requirements (GLP/cGMP) is mandatory and may result in additional fees.

When You Want Innovation, Think Inovatia™

INOVATIA® LABORATORIES, LLC

120 East Davis Street
Fayette, MO 65248-1405
(660) 248-1911
www.inovatia.com

5/4/2012

City of Columbia
6851 W. Route K McBaine
Columbia, MO 65201
Attn: Blaise Brazos

RE: Project Name/Number: Lagoon #4 / N/A
Chain of Custody Number: 12-0328

Date Received: April 13, 2012
Time Received: 10:40
Relinquished by: Blaise Brazos
Sampler: Blaise Brazos

Enclosed please find analytical results for sample(s) received as described above. The values reported are in conformance with internal and method quality control guidelines, unless otherwise noted. If you have questions or need more information, please contact us.

Thank you for your interest in working with Inovatia Laboratories.

Sincerely,

Jennifer Vandelicht

Digitally signed by Jennifer Vandelicht
DN: cn=Jennifer Vandelicht, o=Inovatia Laboratories, LLC, ou=Quality Assurance, email=jvandelicht@inovaita.com, c=US
Date: 2012.05.04 10:02:42 -05'00'

Jennifer Vandelicht
Quality Assurance

Enclosures: Chain of Custody Record(s)

INOVATIA® LABORATORIES, L.L.C

120 East Davis Street
P.O. Box 30
Fayette, MO 65248-0030

Phone: (660) 248-1911
Fax: (660) 248-1921
http://www.inovatia.com

ANALYSIS REPORT

Client Information:
City of Columbia
6851 W. Route K McBaine
Columbia, MO 65201
Attn: Blaise Brazos

Date Received: April 13, 2012
Time Received: 10:40
Relinquished by: Blaise Brazos
Sampler: Blaise Brazos
Sample Matrix: Sludge
Sample Type: Composite

Chain of Custody Number: 1
Project Name: L #4
Project Number: N
Sample Number: L #4
Lab Number: 1
Page: 2

Analysis	Result	Units	Reporting Limit	Analysis Method	Date - Analyst
Aluminum, Total - Dry Weight Basis	3250	mg/Kg	5	EPA 6010	4/19/2012 - MWL
Antimony, Total - Dry Weight Basis	< 5	mg/Kg	5	EPA 6010	4/19/2012 - MWL
Arsenic, Total - Dry Weight Basis	< 10	mg/Kg	10	EPA 6010	4/19/2012 - MWL
Barium, Total - Dry Weight Basis	855	mg/Kg	0.5	EPA 6010	4/19/2012 - MWL
Beryllium, Total - Dry Weight Basis	< 0.5	mg/Kg	0.5	EPA 6010	4/19/2012 - MWL
Boron, Total - Dry Weight Basis	< 5	mg/Kg	5	EPA 6010	4/19/2012 - MWL
Cadmium, Total - Dry Weight Basis	< 0.5	mg/Kg	0.5	EPA 6010	4/19/2012 - MWL
Cobalt, Total - Dry Weight Basis	< 1	mg/Kg	1	EPA 6010	4/19/2012 - MWL
Copper, Total - Dry Weight Basis	< 1	mg/Kg	1	EPA 6010	4/19/2012 - MWL
Chromium III- Dry Weight Basis	3.5	mg/Kg	1	EPA/Calculation	4/23/2012 - MWL
Iron, Total - Dry Weight Basis	11100	mg/Kg	5	EPA 6010	4/19/2012 - MWL
Lead, Total - Dry Weight Basis	< 5	mg/Kg	5	EPA 6010	4/19/2012 - MWL
Magnesium, Total - Dry Weight Basis	6060	mg/Kg	1	EPA 6010	4/19/2012 - MWL
Manganese, Total - Dry Weight Basis	1120	mg/Kg	1	EPA 6010	4/19/2012 - MWL
Mercury, Total - Dry Weight Basis	< 0.05	mg/Kg	0.05	EPA 7471	4/19/2012 - MWL
Nickel, Total - Dry Weight Basis	< 1	mg/Kg	1.00	EPA 6010	4/19/2012 - MWL
Percent Solids	62	%	0.01	SM 2540 G	4/20/2012 - MWL
Selenium, Total - Dry Weight Basis	< 10	mg/Kg	10	EPA 6010	4/19/2012 - MWL
Silver, Total - Dry Weight Basis	< 1	mg/Kg	1	EPA 6010	4/19/2012 - MWL
Sodium, Total - Dry Weight Basis	474	mg/Kg	1	EPA 6010	4/19/2012 - MWL
Thallium, Total - Dry Weight Basis	< 5	mg/Kg	5	EPA 6010	4/19/2012 - MWL
Zinc, Total - Dry Weight Basis	8.0	mg/Kg	1	EPA 6010	4/19/2012 - MWL

Notes:

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INOVATIA® LABORATORIES, LLC

120 East Davis Street
P.O. Box 30
Fayette, MO 65248-0030

Phone: (660) 248-1911
Fax: (660) 248-1921
http://www.inovatia.com

ANALYSIS REPORT

Client Information:
City of Columbia
6851 W. Route K McBaine
Columbia, MO 65201
Attn: Blaise Brazos

Date Received: April 13, 2012
Time Received: 10:40
Relinquished by: Blaise Brazos
Sampler: Blaise Brazos
Sample Matrix: Sludge
Sample Type: Composite

Chain of Custody Number: 12
Project Name: La 4
Project Number: N
Sample Number: La 4
Lab Number: 12
Page: 3

Analysis	Result	Units	Reporting Limit	Analysis Method	Date - Analyst
pH (Solid)	10.1	S.U.	N/A	EPA 9045	4/20/2012 - MWL
Sulfate - Dry Weight Basis	258	mg/Kg	10	EPA 9056	4/26/2012 - MWL
Nitrogen, Nitrate - Dry Weight Basis	< 10	mg/Kg	10	EPA 353.2	4/26/2012 - MWL
Chloride - Dry Weight Basis	24	mg/Kg	10	EPA 9056	4/26/2012 - MWL
Fluoride - Dry Weight Basis	< 1	mg/Kg	1	EPA 340.2	4/24/2012 - MWL
Aluminum, Total	< 0.05	mg/L	0.05	EPA 1312/200.7	4/24/2012 - MWL
Antimony, Total	< 0.05	mg/L	0.05	EPA 1312/200.7	4/24/2012 - MWL
Arsenic, Total	< 0.10	mg/L	0.10	EPA 1312/200.7	4/24/2012 - MWL
Barium, Total	0.01	mg/L	0.005	EPA 1312/200.7	4/24/2012 - MWL
Beryllium, Total	< 0.0005	mg/L	0.0005	EPA 1312/200.7	4/24/2012 - MWL
Boron, Total	< 0.10	mg/L	0.10	EPA 1312/200.7	4/24/2012 - MWL
Cadmium, Total	< 0.002	mg/L	0.002	EPA 1312/200.7	4/24/2012 - MWL
Cobalt, Total	< 0.01	mg/L	0.01	EPA 1312/200.7	4/24/2012 - MWL
Copper, Total	< 0.01	mg/L	0.01	EPA 1312/200.7	4/24/2012 - MWL
Chromium III	< 0.01	mg/L	0.01	EPA/Calculation	4/27/2012 - MWL
Iron, Total	0.01	mg/L	0.01	EPA 1312/200.7	4/24/2012 - MWL
Lead, Total	< 0.05	mg/L	0.05	EPA 1312/200.7	4/24/2012 - MWL
Magnesium, Total	0.79	mg/L	0.01	EPA 1312/200.7	4/24/2012 - MWL
Manganese, Total	< 0.01	mg/L	0.01	EPA 1312/200.7	4/24/2012 - MWL
Mercury, Total	< 0.0004	mg/L	0.0004	EPA 1312/7470	4/24/2012 - MWL
Nickel, Total	< 0.01	mg/L	0.01	EPA 1312/200.7	4/24/2012 - MWL
Selenium, Total	< 0.10	mg/L	0.10	EPA 1312/200.7	4/24/2012 - MWL

Notes:

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120 East Davis Street
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http://www.inovatia.com

ANALYSIS REPORT

Client Information:
City of Columbia
6851 W. Route K McBaine
Columbia, MO 65201
Attn: Blaise Brazos

Date Received: April 13, 2012
Time Received: 10:40
Relinquished by: Blaise Brazos
Sampler: Blaise Brazos
Sample Matrix: Sludge
Sample Type: Composite

Chain of Custody Number: 12
Project Name: La 4
Project Number: N
Sample Number: La 4
Lab Number: 12
Page: 4

Analysis	Result	Units	Reporting Limit	Analysis Method	Date - Analyst
Silver, Total	< 0.01	mg/L	0.01	EPA 1312/6010	4/24/2012 - MWL
Sodium, Total	1.60	mg/L	0.01	EPA 1312/6010	4/24/2012 - MWL
Thallium, Total	< 0.05	mg/L	0.05	EPA 1312/6010	4/24/2012 - MWL
Zinc, Total	< 0.01	mg/L	0.01	EPA 1312/6010	4/24/2012 - MWL
pH (Liquid)	9.99	mg/L	N/A	EPA 1312/150.1	4/26/2012 - MWL
Sulfate	< 1	mg/L	1	EPA 1312/300.0	4/26/2012 - MWL
Nitrogen, Nitrate	< 1	mg/L	1	EPA 1312/353.2	4/26/2012 - MWL
Chloride	< 1	mg/L	1	EPA 1312/300.0	4/26/2012 - MWL
Fluoride	< 0.1	mg/L	0.1	EPA 1312/300.0	4/26/2012 - MWL

Notes:

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CHAIN OF CUSTODY RECORD

INOVATIA LABORATORIES, LLC
www.inovatia.com

INOVATIA LABORATORIES, LLC
120 EAST DAVIS STREET • P.O. BOX 30
FAYETTE, MO 65248-0030

PHONE: (660) 248-1911
FAX: (660) 248-1921
IL_CustServ@inovatia.com

FOR OFFICE USE ONLY:
CHAIN NUMBER: 12-0328
DATE REPORTED: 5-4-2012
INVOICE NUMBER:

Contact Name: BLAISE BRAZOS
Company Name: CITY OF COLUMBIA
Address: 6851 W RT K
City, State, Zip: COLUMBIA, MO 65201
E-Mail: BJBRAZOS@GOCOLUMBIAMO.COM

Phone Number: 573-445-7994
Fax Number:
Project Name / Number: LAGOON #4
Quote Number:
Purchase Order Number:

Project Due Date: 13 APR 2012
Comments:
Sampler's Name: BLAISE BRAZOS (please print)
Sampler's Signature: B. Brazos

DISPOSITION INFORMATION

- ☐ STORE WITHIN HOLD TIME
- ☐ STORE LONG TERM
- ☐ RETURN AT CUSTOMER EXPENSE
- ☐ DISPOSE OF SAMPLE AT INOVATIA
- ☐ OTHER

NOTES:

FOR OFFICE USE ONLY:
DELIVERY METHOD: HAND
CUSTODY SEALS: ☐ YES ☒ NO ☐ INTACT ☐ BROKEN
COOLANT: ☐ ICE ☐ ICE PACK ☒ NONE
PACKAGE TYPE: ZIP LOCK
ARRIVAL TEMPERATURE: N/A °C
MEASURED BY: ☐ TEMPERATURE BLANK ☐ SAMPLE ☐ COOLER / CONTAINER

REQUESTED ANALYSES

Method Number →

	LAB NUMBER	Customer Sample Number	Date Collected	Time Collected	Matrix (Soil / Water / Sludge / Other)	G=grab / C=composite	No. of Containers	NUMBER PER REPRESENTATIVE: HCl	HNO_3	NaOH	H_2SO_4	TSP	Other:	Other:	S AMS 4-043	SBS
1	121806	LAGOON #4	11 APR	1400	SLUDGE	C	1									
2																
3																
4																
5																
6																
7																
8																
9																
10																

Please include any information that may be useful in the analysis of the sample, such as: expected concentrations, required detection limits, and method of collection.

Comments:

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
B. Brazos	13 APR 2012	1040	[illegible]	13 APR 2012	1040

Unless otherwise governed under separate contract, by signing this form, the client accepts Inovatia's standard terms and conditions for service, pricing, and payment as publ[illegible] the reverse side of this form.
Prior, written notification of regulatory compliance requirements (GLP/cGMP) is mandatory and may result in additional fees.

When You Want Innovation, Think Inovatia™

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Field 17 Andrew Bonderer**

Date: 6/24/2012

Site information

Acres applied to:	100.00
Total gallons applied:	115,685.00
% solids as applied	45.25
Specific Gravity	1.42
Dry tons applied	309.97

Agronomic Rates Per Acre (as applied data)

Dry tons	3.10		Phosphorous	3.21
Total Kjeldahl Nitrogen	0.45		Potassium	0.21
Ammonia Nitrogen	0.09			
Organic Nitrogen	0.35			
P.A.N.	0.16			
Carryover from prior yrs	0	=	0.16	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**6162.3447**
Aluminum	1,460.00	2.9201	**9.0513**
Copper	0.94	0.0019	**0.0058**
Potassium	34.00	0.0680	**0.2108**
Arsenic	2.40	0.0048	**0.0149**
Cadmium	0.09	0.0002	**0.0006**
Lead	3.77	0.0075	**0.0234**
Nickel	1.15	0.0023	**0.0071**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0058**
Selenium	3.77	0.0075	**0.0234**
Zinc	9.15	0.0183	**0.0567**
Mercury	0.02	0.0000	**0.0001**
Chromium	3.58	0.0072	**0.0222**
Total Kjeldahl Nitrogen	71.90	0.1438	**0.4457**
Ammonia Nitrogen	15.00	0.0300	**0.0930**
Organic Nitrogen	56.90	0.1138	**0.3528**
Phosphorous	517.00	1.0340	**3.2052**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Field 8 Bill Gentzsch**

Date: 1/12/2012

Site information

Acres applied to:	160.00
Total gallons applied:	94,793.00
% solids as applied	53.75
Specific Gravity	1.52
Dry tons applied	322.95

Agronomic Rates Per Acre (as applied data)

Dry tons	2.02		Phosphorous	2.09
Total Kjeldahl Nitrogen	0.29		Potassium	0.14
Ammonia Nitrogen	0.06			
Organic Nitrogen	0.23			
P.A.N.	0.11			
Carryover from prior yrs	0	=	0.11	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**4012.7338**
Aluminum	1,460.00	2.9201	**5.8940**
Copper	0.94	0.0019	**0.0038**
Potassium	34.00	0.0680	**0.1373**
Arsenic	2.40	0.0048	**0.0097**
Cadmium	0.09	0.0002	**0.0004**
Lead	3.77	0.0075	**0.0152**
Nickel	1.15	0.0023	**0.0046**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0038**
Selenium	3.77	0.0075	**0.0152**
Zinc	9.15	0.0183	**0.0369**
Mercury	0.02	0.0000	**0.0001**
Chromium	3.58	0.0072	**0.0145**
Total Kjeldahl Nitrogen	71.90	0.1438	**0.2903**
Ammonia Nitrogen	15.00	0.0300	**0.0606**
Organic Nitrogen	56.90	0.1138	**0.2297**
Phosphorous	517.00	1.0340	**2.0871**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Field 9 Bill Gentzsch**

Date: 1/12/2012

Site information

Acres applied to:	424.00
Total gallons applied:	636,681.00
% solids as applied	51.40
Specific Gravity	1.51
Dry tons applied	2,060.62

Agronomic Rates Per Acre (as applied data)

Dry tons	4.86		Phosphorous	5.03
Total Kjeldahl Nitrogen	0.70		Potassium	0.33
Ammonia Nitrogen	0.15			
Organic Nitrogen	0.55			
P.A.N.	0.26			
Carryover from prior yrs	0	=	0.26	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**9661.8015**
Aluminum	1,460.00	2.9201	**14.1914**
Copper	0.94	0.0019	**0.0091**
Potassium	34.00	0.0680	**0.3305**
Arsenic	2.40	0.0048	**0.0233**
Cadmium	0.09	0.0002	**0.0009**
Lead	3.77	0.0075	**0.0366**
Nickel	1.15	0.0023	**0.0112**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0091**
Selenium	3.77	0.0075	**0.0366**
Zinc	9.15	0.0183	**0.0889**
Mercury	0.02	0.0000	**0.0002**
Chromium	3.58	0.0072	**0.0348**
Total Kjeldahl Nitrogen	71.90	0.1438	**0.6989**
Ammonia Nitrogen	15.00	0.0300	**0.1458**
Organic Nitrogen	56.90	0.1138	**0.5531**
Phosphorous	517.00	1.0340	**5.0253**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name:** **Field 10-2** **Bill Gentzsch**

Date: **1/12/2012**

Site information

Acres applied to:	20.00
Total gallons applied:	22,297.00
% solids as applied	52.60
Specific Gravity	1.50
Dry tons applied	73.36

Agronomic Rates Per Acre (as applied data)

Dry tons	3.67		Phosphorous	3.79
Total Kjeldahl Nitrogen	0.53		Potassium	0.25
Ammonia Nitrogen	0.11			
Organic Nitrogen	0.42			
P.A.N.	0.19			
Carryover from prior yrs	0	=	0.19	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**7292.1476**
Aluminum	1,460.00	2.9201	**10.7108**
Copper	0.94	0.0019	**0.0069**
Potassium	34.00	0.0680	**0.2494**
Arsenic	2.40	0.0048	**0.0176**
Cadmium	0.09	0.0002	**0.0007**
Lead	3.77	0.0075	**0.0277**
Nickel	1.15	0.0023	**0.0084**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0069**
Selenium	3.77	0.0075	**0.0277**
Zinc	9.15	0.0183	**0.0671**
Mercury	0.02	0.0000	**0.0002**
Chromium	3.58	0.0072	**0.0263**
Total Kjeldahl Nitrogen	71.90	0.1438	**0.5275**
Ammonia Nitrogen	15.00	0.0300	**0.1100**
Organic Nitrogen	56.90	0.1138	**0.4174**
Phosphorous	517.00	1.0340	**3.7928**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Field 10 Gary Ryan**

Date: 6/23/2012

Site information

Acres applied to:	547.00
Total gallons applied:	996,174.00
% solids as applied	50.91
Specific Gravity	1.49
Dry tons applied	3,151.09

Agronomic Rates Per Acre (as applied data)

Dry tons	5.76		Phosphorous	5.96
Total Kjeldahl Nitrogen	0.83		Potassium	0.39
Ammonia Nitrogen	0.17			
Organic Nitrogen	0.66			
P.A.N.	0.30			
Carryover from prior yrs	0	=	0.30	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**11452.4723**
Aluminum	1,460.00	2.9201	**16.8215**
Copper	0.94	0.0019	**0.0108**
Potassium	34.00	0.0680	**0.3917**
Arsenic	2.40	0.0048	**0.0277**
Cadmium	0.09	0.0002	**0.0010**
Lead	3.77	0.0075	**0.0434**
Nickel	1.15	0.0023	**0.0132**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0108**
Selenium	3.77	0.0075	**0.0434**
Zinc	9.15	0.0183	**0.1054**
Mercury	0.02	0.0000	**0.0003**
Chromium	3.58	0.0072	**0.0412**
Total Kjeldahl Nitrogen	71.90	0.1438	**0.8284**
Ammonia Nitrogen	15.00	0.0300	**0.1728**
Organic Nitrogen	56.90	0.1138	**0.6556**
Phosphorous	517.00	1.0340	**5.9567**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Field 15 J and S Griffin**

Date: 6/24/2012

Site information

Acres applied to:	37.00
Total gallons applied:	71,114.00
% solids as applied	41.80
Specific Gravity	1.37
Dry tons applied	169.82

Agronomic Rates Per Acre (as applied data)

Dry tons	4.59		Phosphorous	4.75
Total Kjeldahl Nitrogen	0.66		Potassium	0.31
Ammonia Nitrogen	0.14			
Organic Nitrogen	0.52			
P.A.N.	0.24			
Carryover from prior yrs	0	=	0.24	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**9124.5665**
Aluminum	1,460.00	2.9201	**13.4023**
Copper	0.94	0.0019	**0.0086**
Potassium	34.00	0.0680	**0.3121**
Arsenic	2.40	0.0048	**0.0220**
Cadmium	0.09	0.0002	**0.0008**
Lead	3.77	0.0075	**0.0346**
Nickel	1.15	0.0023	**0.0106**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0086**
Selenium	3.77	0.0075	**0.0346**
Zinc	9.15	0.0183	**0.0840**
Mercury	0.02	0.0000	**0.0002**
Chromium	3.58	0.0072	**0.0329**
Total Kjeldahl Nitrogen	71.90	0.1438	**0.6600**
Ammonia Nitrogen	15.00	0.0300	**0.1377**
Organic Nitrogen	56.90	0.1138	**0.5223**
Phosphorous	517.00	1.0340	**4.7459**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Field 11 Jeff Giboney**

Date: 6/6/2012

Site information

Acres applied to:	230.00
Total gallons applied:	388,718.00
% solids as applied	51.30
Specific Gravity	1.49
Dry tons applied	1,239.01

Agronomic Rates Per Acre (as applied data)

Dry tons	5.39		Phosphorous	5.57
Total Kjeldahl Nitrogen	0.77		Potassium	0.37
Ammonia Nitrogen	0.16			
Organic Nitrogen	0.61			
P.A.N.	0.28			
Carryover from prior yrs	0	=	0.28	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**10709.5805**
Aluminum	1,460.00	2.9201	**15.7304**
Copper	0.94	0.0019	**0.0101**
Potassium	34.00	0.0680	**0.3663**
Arsenic	2.40	0.0048	**0.0259**
Cadmium	0.09	0.0002	**0.0010**
Lead	3.77	0.0075	**0.0406**
Nickel	1.15	0.0023	**0.0124**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0101**
Selenium	3.77	0.0075	**0.0406**
Zinc	9.15	0.0183	**0.0986**
Mercury	0.02	0.0000	**0.0002**
Chromium	3.58	0.0072	**0.0386**
Total Kjeldahl Nitrogen	71.90	0.1438	**0.7747**
Ammonia Nitrogen	15.00	0.0300	**0.1616**
Organic Nitrogen	56.90	0.1138	**0.6131**
Phosphorous	517.00	1.0340	**5.5703**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Field 14 Jeffries**

Date: 6/24/2012

Site information

Acres applied to:	40.00
Total gallons applied:	43,673.00
% solids as applied	41.80
Specific Gravity	1.37
Dry tons applied	104.29

Agronomic Rates Per Acre (as applied data)

Dry tons	2.61		Phosphorous	2.70
Total Kjeldahl Nitrogen	0.37		Potassium	0.18
Ammonia Nitrogen	0.08			
Organic Nitrogen	0.30			
P.A.N.	0.14			
Carryover from prior yrs	0	=	0.14	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**5183.3662**
Aluminum	1,460.00	2.9201	**7.6134**
Copper	0.94	0.0019	**0.0049**
Potassium	34.00	0.0680	**0.1773**
Arsenic	2.40	0.0048	**0.0125**
Cadmium	0.09	0.0002	**0.0005**
Lead	3.77	0.0075	**0.0197**
Nickel	1.15	0.0023	**0.0060**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0049**
Selenium	3.77	0.0075	**0.0197**
Zinc	9.15	0.0183	**0.0477**
Mercury	0.02	0.0000	**0.0001**
Chromium	3.58	0.0072	**0.0187**
Total Kjeldahl Nitrogen	71.90	0.1438	**0.3749**
Ammonia Nitrogen	15.00	0.0300	**0.0782**
Organic Nitrogen	56.90	0.1138	**0.2967**
Phosphorous	517.00	1.0340	**2.6960**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Field 16 Joe Allen**

Date: 6/27/2012

Site information

Acres applied to:	120.00
Total gallons applied:	285,572.00
% solids as applied	46.64
Specific Gravity	1.43
Dry tons applied	794.23

Agronomic Rates Per Acre (as applied data)

Dry tons	6.62		Phosphorous	6.84
Total Kjeldahl Nitrogen	0.95		Potassium	0.45
Ammonia Nitrogen	0.20			
Organic Nitrogen	0.75			
P.A.N.	0.35			
Carryover from prior yrs	0	=	0.35	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**13158.0328**
Aluminum	1,460.00	2.9201	**19.3267**
Copper	0.94	0.0019	**0.0124**
Potassium	34.00	0.0680	**0.4501**
Arsenic	2.40	0.0048	**0.0318**
Cadmium	0.09	0.0002	**0.0012**
Lead	3.77	0.0075	**0.0499**
Nickel	1.15	0.0023	**0.0152**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0124**
Selenium	3.77	0.0075	**0.0499**
Zinc	9.15	0.0183	**0.1211**
Mercury	0.02	0.0000	**0.0003**
Chromium	3.58	0.0072	**0.0474**
Total Kjeldahl Nitrogen	71.90	0.1438	**0.9518**
Ammonia Nitrogen	15.00	0.0300	**0.1986**
Organic Nitrogen	56.90	0.1138	**0.7532**
Phosphorous	517.00	1.0340	**6.8438**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Field 4 John Allen**

Date: 12/13/2011

Site information

Acres applied to:	87.00
Total gallons applied:	46,837.00
% solids as applied	51.90
Specific Gravity	1.50
Dry tons applied	152.05

Agronomic Rates Per Acre (as applied data)

Dry tons	1.75		Phosphorous	1.81
Total Kjeldahl Nitrogen	0.25		Potassium	0.12
Ammonia Nitrogen	0.05			
Organic Nitrogen	0.20			
P.A.N.	0.09			
Carryover from prior yrs	0	=	0.09	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**3474.4850**
Aluminum	1,460.00	2.9201	**5.1034**
Copper	0.94	0.0019	**0.0033**
Potassium	34.00	0.0680	**0.1188**
Arsenic	2.40	0.0048	**0.0084**
Cadmium	0.09	0.0002	**0.0003**
Lead	3.77	0.0075	**0.0132**
Nickel	1.15	0.0023	**0.0040**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0033**
Selenium	3.77	0.0075	**0.0132**
Zinc	9.15	0.0183	**0.0320**
Mercury	0.02	0.0000	**0.0001**
Chromium	3.58	0.0072	**0.0125**
Total Kjeldahl Nitrogen	71.90	0.1438	**0.2513**
Ammonia Nitrogen	15.00	0.0300	**0.0524**
Organic Nitrogen	56.90	0.1138	**0.1989**
Phosphorous	517.00	1.0340	**1.8072**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Field 7 John Allen**

Date: 1/6/2012

Site information

Acres applied to:	55.00
Total gallons applied:	45,312.00
% solids as applied	52.25
Specific Gravity	1.50
Dry tons applied	148.09

Agronomic Rates Per Acre (as applied data)

Dry tons	2.69		Phosphorous	2.78
Total Kjeldahl Nitrogen	0.39		Potassium	0.18
Ammonia Nitrogen	0.08			
Organic Nitrogen	0.31			
P.A.N.	0.14			
Carryover from prior yrs	0	=	0.14	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**5352.9120**
Aluminum	1,460.00	2.9201	**7.8624**
Copper	0.94	0.0019	**0.0051**
Potassium	34.00	0.0680	**0.1831**
Arsenic	2.40	0.0048	**0.0129**
Cadmium	0.09	0.0002	**0.0005**
Lead	3.77	0.0075	**0.0203**
Nickel	1.15	0.0023	**0.0062**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0051**
Selenium	3.77	0.0075	**0.0203**
Zinc	9.15	0.0183	**0.0493**
Mercury	0.02	0.0000	**0.0001**
Chromium	3.58	0.0072	**0.0193**
Total Kjeldahl Nitrogen	71.90	0.1438	**0.3872**
Ammonia Nitrogen	15.00	0.0300	**0.0808**
Organic Nitrogen	56.90	0.1138	**0.3064**
Phosphorous	517.00	1.0340	**2.7842**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Field 3 John Harrison**

Date: 12/3/2011

Site information

Acres applied to:	262.00
Total gallons applied:	465,449.00
% solids as applied	47.22
Specific Gravity	1.43
Dry tons applied	1,310.60

Agronomic Rates Per Acre (as applied data)

Dry tons	5.00		Phosphorous	5.17
Total Kjeldahl Nitrogen	0.72		Potassium	0.34
Ammonia Nitrogen	0.15			
Organic Nitrogen	0.57			
P.A.N.	0.26			
Carryover from prior yrs	0	=	0.26	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**9944.7722**
Aluminum	1,460.00	2.9201	**14.6070**
Copper	0.94	0.0019	**0.0094**
Potassium	34.00	0.0680	**0.3402**
Arsenic	2.40	0.0048	**0.0240**
Cadmium	0.09	0.0002	**0.0009**
Lead	3.77	0.0075	**0.0377**
Nickel	1.15	0.0023	**0.0115**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0094**
Selenium	3.77	0.0075	**0.0377**
Zinc	9.15	0.0183	**0.0915**
Mercury	0.02	0.0000	**0.0002**
Chromium	3.58	0.0072	**0.0358**
Total Kjeldahl Nitrogen	71.90	0.1438	**0.7193**
Ammonia Nitrogen	15.00	0.0300	**0.1501**
Organic Nitrogen	56.90	0.1138	**0.5693**
Phosphorous	517.00	1.0340	**5.1725**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Field 5 John Harrison**

Date: 12/13/2011

Site information

Acres applied to:	135.00
Total gallons applied:	130,051.00
% solids as applied	52.30
Specific Gravity	1.51
Dry tons applied	428.28

Agronomic Rates Per Acre (as applied data)

Dry tons	3.17		Phosphorous	3.28
Total Kjeldahl Nitrogen	0.46		Potassium	0.22
Ammonia Nitrogen	0.10			
Organic Nitrogen	0.36			
P.A.N.	0.17			
Carryover from prior yrs	0	=	0.17	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**6306.9672**
Aluminum	1,460.00	2.9201	**9.2638**
Copper	0.94	0.0019	**0.0060**
Potassium	34.00	0.0680	**0.2157**
Arsenic	2.40	0.0048	**0.0152**
Cadmium	0.09	0.0002	**0.0006**
Lead	3.77	0.0075	**0.0239**
Nickel	1.15	0.0023	**0.0073**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0060**
Selenium	3.77	0.0075	**0.0239**
Zinc	9.15	0.0183	**0.0581**
Mercury	0.02	0.0000	**0.0001**
Chromium	3.58	0.0072	**0.0227**
Total Kjeldahl Nitrogen	71.90	0.1438	**0.4562**
Ammonia Nitrogen	15.00	0.0300	**0.0952**
Organic Nitrogen	56.90	0.1138	**0.3610**
Phosphorous	517.00	1.0340	**3.2804**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Field 6 John Harrison**

Date: 12/13/2011

Site information

Acres applied to:	50.00
Total gallons applied:	31,817.00
% solids as applied	51.50
Specific Gravity	1.49
Dry tons applied	101.81

Agronomic Rates Per Acre (as applied data)

Dry tons	2.04		Phosphorous	2.11
Total Kjeldahl Nitrogen	0.29		Potassium	0.14
Ammonia Nitrogen	0.06			
Organic Nitrogen	0.23			
P.A.N.	0.11			
Carryover from prior yrs	0	=	0.11	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**4048.0394**
Aluminum	1,460.00	2.9201	**5.9458**
Copper	0.94	0.0019	**0.0038**
Potassium	34.00	0.0680	**0.1385**
Arsenic	2.40	0.0048	**0.0098**
Cadmium	0.09	0.0002	**0.0004**
Lead	3.77	0.0075	**0.0154**
Nickel	1.15	0.0023	**0.0047**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0038**
Selenium	3.77	0.0075	**0.0154**
Zinc	9.15	0.0183	**0.0373**
Mercury	0.02	0.0000	**0.0001**
Chromium	3.58	0.0072	**0.0146**
Total Kjeldahl Nitrogen	71.90	0.1438	**0.2928**
Ammonia Nitrogen	15.00	0.0300	**0.0611**
Organic Nitrogen	56.90	0.1138	**0.2317**
Phosphorous	517.00	1.0340	**2.1055**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Field 13 Lonney Giboney**

Date: 6/8/2012

Site information

Acres applied to:	25.00
Total gallons applied:	48,835.00
% solids as applied	53.84
Specific Gravity	1.53
Dry tons applied	167.75

Agronomic Rates Per Acre (as applied data)

Dry tons	6.71		Phosphorous	6.94
Total Kjeldahl Nitrogen	0.96		Potassium	0.46
Ammonia Nitrogen	0.20			
Organic Nitrogen	0.76			
P.A.N.	0.35			
Carryover from prior yrs	0	=	0.35	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**13339.8110**
Aluminum	1,460.00	2.9201	**19.5937**
Copper	0.94	0.0019	**0.0126**
Potassium	34.00	0.0680	**0.4563**
Arsenic	2.40	0.0048	**0.0322**
Cadmium	0.09	0.0002	**0.0012**
Lead	3.77	0.0075	**0.0506**
Nickel	1.15	0.0023	**0.0154**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0126**
Selenium	3.77	0.0075	**0.0506**
Zinc	9.15	0.0183	**0.1228**
Mercury	0.02	0.0000	**0.0003**
Chromium	3.58	0.0072	**0.0480**
Total Kjeldahl Nitrogen	71.90	0.1438	**0.9649**
Ammonia Nitrogen	15.00	0.0300	**0.2013**
Organic Nitrogen	56.90	0.1138	**0.7636**
Phosphorous	517.00	1.0340	**6.9383**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Field 1 Mike Martin**

Date: 11/20/2011

Site information

Acres applied to:	150.00
Total gallons applied:	334,110.00
% solids as applied	43.58
Specific Gravity	1.38
Dry tons applied	837.90

Agronomic Rates Per Acre (as applied data)

Dry tons	5.59		Phosphorous	5.78
Total Kjeldahl Nitrogen	0.80		Potassium	0.38
Ammonia Nitrogen	0.17			
Organic Nitrogen	0.64			
P.A.N.	0.29			
Carryover from prior yrs	0	=	0.29	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**11105.2039**
Aluminum	1,460.00	2.9201	**16.3115**
Copper	0.94	0.0019	**0.0105**
Potassium	34.00	0.0680	**0.3799**
Arsenic	2.40	0.0048	**0.0268**
Cadmium	0.09	0.0002	**0.0010**
Lead	3.77	0.0075	**0.0421**
Nickel	1.15	0.0023	**0.0128**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0105**
Selenium	3.77	0.0075	**0.0421**
Zinc	9.15	0.0183	**0.1022**
Mercury	0.02	0.0000	**0.0002**
Chromium	3.58	0.0072	**0.0400**
Total Kjeldahl Nitrogen	71.90	0.1438	**0.8033**
Ammonia Nitrogen	15.00	0.0300	**0.1676**
Organic Nitrogen	56.90	0.1138	**0.6357**
Phosphorous	517.00	1.0340	**5.7760**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Field 2 Mike Martin**

Date: 11/22/2011

Site information

Acres applied to:	170.00
Total gallons applied:	206,482.00
% solids as applied	44.20
Specific Gravity	1.39
Dry tons applied	529.00

Agronomic Rates Per Acre (as applied data)

Dry tons	3.11		Phosphorous	3.22
Total Kjeldahl Nitrogen	0.45		Potassium	0.21
Ammonia Nitrogen	0.09			
Organic Nitrogen	0.35			
P.A.N.	0.16			
Carryover from prior yrs	0	=	0.16	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**6186.3196**
Aluminum	1,460.00	2.9201	**9.0865**
Copper	0.94	0.0019	**0.0059**
Potassium	34.00	0.0680	**0.2116**
Arsenic	2.40	0.0048	**0.0149**
Cadmium	0.09	0.0002	**0.0006**
Lead	3.77	0.0075	**0.0235**
Nickel	1.15	0.0023	**0.0072**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0059**
Selenium	3.77	0.0075	**0.0235**
Zinc	9.15	0.0183	**0.0569**
Mercury	0.02	0.0000	**0.0001**
Chromium	3.58	0.0072	**0.0223**
Total Kjeldahl Nitrogen	71.90	0.1438	**0.4475**
Ammonia Nitrogen	15.00	0.0300	**0.0934**
Organic Nitrogen	56.90	0.1138	**0.3541**
Phosphorous	517.00	1.0340	**3.2176**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Field 12 Russ Jones**

Date: 6/7/2012

Site information

Acres applied to:	100.00
Total gallons applied:	283,341.00
% solids as applied	53.31
Specific Gravity	1.52
Dry tons applied	957.41

Agronomic Rates Per Acre (as applied data)

Dry tons	9.57		Phosphorous	9.90
Total Kjeldahl Nitrogen	1.38		Potassium	0.65
Ammonia Nitrogen	0.29			
Organic Nitrogen	1.09			
P.A.N.	0.51			
Carryover from prior yrs	0	=	0.51	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**19033.7211**
Aluminum	1,460.00	2.9201	**27.9570**
Copper	0.94	0.0019	**0.0180**
Potassium	34.00	0.0680	**0.6511**
Arsenic	2.40	0.0048	**0.0460**
Cadmium	0.09	0.0002	**0.0017**
Lead	3.77	0.0075	**0.0722**
Nickel	1.15	0.0023	**0.0220**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0180**
Selenium	3.77	0.0075	**0.0722**
Zinc	9.15	0.0183	**0.1752**
Mercury	0.02	0.0000	**0.0004**
Chromium	3.58	0.0072	**0.0686**
Total Kjeldahl Nitrogen	71.90	0.1438	**1.3768**
Ammonia Nitrogen	15.00	0.0300	**0.2872**
Organic Nitrogen	56.90	0.1138	**1.0896**
Phosphorous	517.00	1.0340	**9.8998**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Field 18 Thomas Lee**

Date: 7/2/2012

Site information

Acres applied to:	432.00
Total gallons applied:	625,110.00
% solids as applied	54.98
Specific Gravity	1.54
Dry tons applied	2,207.08

Agronomic Rates Per Acre (as applied data)

Dry tons	5.11		Phosphorous	5.28
Total Kjeldahl Nitrogen	0.73		Potassium	0.35
Ammonia Nitrogen	0.15			
Organic Nitrogen	0.58			
P.A.N.	0.27			
Carryover from prior yrs	0	=	0.27	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**10156.8764**
Aluminum	1,460.00	2.9201	**14.9186**
Copper	0.94	0.0019	**0.0096**
Potassium	34.00	0.0680	**0.3474**
Arsenic	2.40	0.0048	**0.0245**
Cadmium	0.09	0.0002	**0.0009**
Lead	3.77	0.0075	**0.0385**
Nickel	1.15	0.0023	**0.0118**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0096**
Selenium	3.77	0.0075	**0.0385**
Zinc	9.15	0.0183	**0.0935**
Mercury	0.02	0.0000	**0.0002**
Chromium	3.58	0.0072	**0.0366**
Total Kjeldahl Nitrogen	71.90	0.1438	**0.7347**
Ammonia Nitrogen	15.00	0.0300	**0.1533**
Organic Nitrogen	56.90	0.1138	**0.5814**
Phosphorous	517.00	1.0340	**5.2828**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Joe Baumgartner #1

Date: 7/15/2013

Site information

Acres applied to:	165.00
Total gallons applied:	798,512.00
% solids as applied	48.30
Specific Gravity	1.51
Dry tons applied	2,428.52

Agronomic Rates Per Acre (as applied data)

Dry tons	14.72		Phosphorous	15.22
Total Kjeldahl Nitrogen	2.12		Potassium	1.00
Ammonia Nitrogen	0.44			
Organic Nitrogen	1.67			
P.A.N.	0.78			
Carryover from prior yrs	0	=	0.78	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**29260.6245**
Aluminum	1,460.00	2.9201	**42.9784**
Copper	0.94	0.0019	**0.0277**
Potassium	34.00	0.0680	**1.0009**
Arsenic	2.40	0.0048	**0.0706**
Cadmium	0.09	0.0002	**0.0026**
Lead	3.77	0.0075	**0.1110**
Nickel	1.15	0.0023	**0.0339**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0277**
Selenium	3.77	0.0075	**0.1110**
Zinc	9.15	0.0183	**0.2694**
Mercury	0.02	0.0000	**0.0006**
Chromium	3.58	0.0072	**0.1054**
Total Kjeldahl Nitrogen	71.90	0.1438	**2.1165**
Ammonia Nitrogen	15.00	0.0300	**0.4416**
Organic Nitrogen	56.90	0.1138	**1.6750**
Phosphorous	517.00	1.0340	**15.2191**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Joe Baumgartner #2

Date: 7/18/2013

Site information

Acres applied to:	75.00
Total gallons applied:	371,164.00
% solids as applied	48.85
Specific Gravity	1.46
Dry tons applied	1,103.87

Agronomic Rates Per Acre (as applied data)

Dry tons	14.72		Phosphorous	15.22
Total Kjeldahl Nitrogen	2.12		Potassium	1.00
Ammonia Nitrogen	0.44			
Organic Nitrogen	1.67			
P.A.N.	0.78			
Carryover from prior yrs	0	=	0.78	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**29260.6532**
Aluminum	1,460.00	2.9201	**42.9784**
Copper	0.94	0.0019	**0.0277**
Potassium	34.00	0.0680	**1.0009**
Arsenic	2.40	0.0048	**0.0706**
Cadmium	0.09	0.0002	**0.0026**
Lead	3.77	0.0075	**0.1110**
Nickel	1.15	0.0023	**0.0339**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0277**
Selenium	3.77	0.0075	**0.1110**
Zinc	9.15	0.0183	**0.2694**
Mercury	0.02	0.0000	**0.0006**
Chromium	3.58	0.0072	**0.1054**
Total Kjeldahl Nitrogen	71.90	0.1438	**2.1165**
Ammonia Nitrogen	15.00	0.0300	**0.4416**
Organic Nitrogen	56.90	0.1138	**1.6750**
Phosphorous	517.00	1.0340	**15.2191**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Joel Bullard #2

Date: 8/8/2013

Site information

Acres applied to:	175.00
Total gallons applied:	852,076.00
% solids as applied	48.98
Specific Gravity	1.48
Dry tons applied	2,575.70

Agronomic Rates Per Acre (as applied data)

Dry tons	14.72	Phosphorous	15.22
Total Kjeldahl Nitrogen	2.12	Potassium	1.00
Ammonia Nitrogen	0.44		
Organic Nitrogen	1.67		
P.A.N.	0.78		
Carryover from prior yrs	0	= 0.78	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**29260.5705**
Aluminum	1,460.00	2.9201	**42.9783**
Copper	0.94	0.0019	**0.0277**
Potassium	34.00	0.0680	**1.0009**
Arsenic	2.40	0.0048	**0.0706**
Cadmium	0.09	0.0002	**0.0026**
Lead	3.77	0.0075	**0.1110**
Nickel	1.15	0.0023	**0.0339**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0277**
Selenium	3.77	0.0075	**0.1110**
Zinc	9.15	0.0183	**0.2694**
Mercury	0.02	0.0000	**0.0006**
Chromium	3.58	0.0072	**0.1054**
Total Kjeldahl Nitrogen	71.90	0.1438	**2.1165**
Ammonia Nitrogen	15.00	0.0300	**0.4416**
Organic Nitrogen	56.90	0.1138	**1.6750**
Phosphorous	517.00	1.0340	**15.2190**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Phil Brooks #1

Date: 8/8/2013

Site information

Acres applied to:	20.00
Total gallons applied:	94,638.00
% solids as applied	50.40
Specific Gravity	1.48
Dry tons applied	294.37

Agronomic Rates Per Acre (as applied data)

Dry tons	14.72		Phosphorous	15.22
Total Kjeldahl Nitrogen	2.12		Potassium	1.00
Ammonia Nitrogen	0.44			
Organic Nitrogen	1.68			
P.A.N.	0.78			
Carryover from prior yrs	0	=	0.78	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**29261.0441**
Aluminum	1,460.00	2.9201	**42.9790**
Copper	0.94	0.0019	**0.0277**
Potassium	34.00	0.0680	**1.0009**
Arsenic	2.40	0.0048	**0.0707**
Cadmium	0.09	0.0002	**0.0026**
Lead	3.77	0.0075	**0.1110**
Nickel	1.15	0.0023	**0.0339**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0277**
Selenium	3.77	0.0075	**0.1110**
Zinc	9.15	0.0183	**0.2694**
Mercury	0.02	0.0000	**0.0006**
Chromium	3.58	0.0072	**0.1054**
Total Kjeldahl Nitrogen	71.90	0.1438	**2.1166**
Ammonia Nitrogen	15.00	0.0300	**0.4416**
Organic Nitrogen	56.90	0.1138	**1.6750**
Phosphorous	517.00	1.0340	**15.2193**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Phil Brooks #2

Date: 8/10/2013

Site information

Acres applied to:	80.00
Total gallons applied:	390,960.00
% solids as applied	48.80
Specific Gravity	1.48
Dry tons applied	1,177.47

Agronomic Rates Per Acre (as applied data)

Dry tons	14.72		Phosphorous	15.22
Total Kjeldahl Nitrogen	2.12		Potassium	1.00
Ammonia Nitrogen	0.44			
Organic Nitrogen	1.67			
P.A.N.	0.78			
Carryover from prior yrs	0	=	0.78	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**29260.7791**
Aluminum	1,460.00	2.9201	**42.9786**
Copper	0.94	0.0019	**0.0277**
Potassium	34.00	0.0680	**1.0009**
Arsenic	2.40	0.0048	**0.0706**
Cadmium	0.09	0.0002	**0.0026**
Lead	3.77	0.0075	**0.1110**
Nickel	1.15	0.0023	**0.0339**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0277**
Selenium	3.77	0.0075	**0.1110**
Zinc	9.15	0.0183	**0.2694**
Mercury	0.02	0.0000	**0.0006**
Chromium	3.58	0.0072	**0.1054**
Total Kjeldahl Nitrogen	71.90	0.1438	**2.1165**
Ammonia Nitrogen	15.00	0.0300	**0.4416**
Organic Nitrogen	56.90	0.1138	**1.6750**
Phosphorous	517.00	1.0340	**15.2191**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Robert Hagans #1

Date: 8/12/2013

Site information

Acres applied to:	22.00
Total gallons applied:	100,130.00
% solids as applied	51.70
Specific Gravity	1.50
Dry tons applied	323.80

Agronomic Rates Per Acre (as applied data)

Dry tons	14.72		Phosphorous	15.22
Total Kjeldahl Nitrogen	2.12		Potassium	1.00
Ammonia Nitrogen	0.44			
Organic Nitrogen	1.67			
P.A.N.	0.78			
Carryover from prior yrs	0	=	0.78	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**29260.7428**
Aluminum	1,460.00	2.9201	**42.9786**
Copper	0.94	0.0019	**0.0277**
Potassium	34.00	0.0680	**1.0009**
Arsenic	2.40	0.0048	**0.0706**
Cadmium	0.09	0.0002	**0.0026**
Lead	3.77	0.0075	**0.1110**
Nickel	1.15	0.0023	**0.0339**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0277**
Selenium	3.77	0.0075	**0.1110**
Zinc	9.15	0.0183	**0.2694**
Mercury	0.02	0.0000	**0.0006**
Chromium	3.58	0.0072	**0.1054**
Total Kjeldahl Nitrogen	71.90	0.1438	**2.1165**
Ammonia Nitrogen	15.00	0.0300	**0.4416**
Organic Nitrogen	56.90	0.1138	**1.6750**
Phosphorous	517.00	1.0340	**15.2191**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Robert Hagans #2

Date: 8/12/2013

Site information

Acres applied to:	25.00
Total gallons applied:	116,578.00
% solids as applied	50.80
Specific Gravity	1.49
Dry tons applied	367.96

Agronomic Rates Per Acre (as applied data)

Dry tons	14.72		Phosphorous	15.22
Total Kjeldahl Nitrogen	2.12		Potassium	1.00
Ammonia Nitrogen	0.44			
Organic Nitrogen	1.67			
P.A.N.	0.78			
Carryover from prior yrs	0	=	0.78	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**29260.9608**
Aluminum	1,460.00	2.9201	**42.9789**
Copper	0.94	0.0019	**0.0277**
Potassium	34.00	0.0680	**1.0009**
Arsenic	2.40	0.0048	**0.0707**
Cadmium	0.09	0.0002	**0.0026**
Lead	3.77	0.0075	**0.1110**
Nickel	1.15	0.0023	**0.0339**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0277**
Selenium	3.77	0.0075	**0.1110**
Zinc	9.15	0.0183	**0.2694**
Mercury	0.02	0.0000	**0.0006**
Chromium	3.58	0.0072	**0.1054**
Total Kjeldahl Nitrogen	71.90	0.1438	**2.1166**
Ammonia Nitrogen	15.00	0.0300	**0.4416**
Organic Nitrogen	56.90	0.1138	**1.6750**
Phosphorous	517.00	1.0340	**15.2192**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Robert Hagans #3

Date: 8/15/2013

Site information

Acres applied to:	20.00
Total gallons applied:	90,853.00
% solids as applied	51.80
Specific Gravity	1.50
Dry tons applied	294.37

Agronomic Rates Per Acre (as applied data)

Dry tons	14.72		Phosphorous	15.22
Total Kjeldahl Nitrogen	2.12		Potassium	1.00
Ammonia Nitrogen	0.44			
Organic Nitrogen	1.68			
P.A.N.	0.78			
Carryover from prior yrs	0	=	0.78	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**29261.2116**
Aluminum	1,460.00	2.9201	**42.9792**
Copper	0.94	0.0019	**0.0277**
Potassium	34.00	0.0680	**1.0009**
Arsenic	2.40	0.0048	**0.0707**
Cadmium	0.09	0.0002	**0.0026**
Lead	3.77	0.0075	**0.1110**
Nickel	1.15	0.0023	**0.0339**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0277**
Selenium	3.77	0.0075	**0.1110**
Zinc	9.15	0.0183	**0.2694**
Mercury	0.02	0.0000	**0.0006**
Chromium	3.58	0.0072	**0.1054**
Total Kjeldahl Nitrogen	71.90	0.1438	**2.1166**
Ammonia Nitrogen	15.00	0.0300	**0.4416**
Organic Nitrogen	56.90	0.1138	**1.6750**
Phosphorous	517.00	1.0340	**15.2194**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Steve Craige #1

Date: 8/15/2013

Site information

Acres applied to:	15.00
Total gallons applied:	68,140.00
% solids as applied	51.80
Specific Gravity	1.50
Dry tons applied	220.78

Agronomic Rates Per Acre (as applied data)

Dry tons	14.72		Phosphorous	15.22
Total Kjeldahl Nitrogen	2.12		Potassium	1.00
Ammonia Nitrogen	0.44			
Organic Nitrogen	1.68			
P.A.N.	0.78			
Carryover from prior yrs	0	=	0.78	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**29261.3190**
Aluminum	1,460.00	2.9201	**42.9794**
Copper	0.94	0.0019	**0.0277**
Potassium	34.00	0.0680	**1.0009**
Arsenic	2.40	0.0048	**0.0707**
Cadmium	0.09	0.0002	**0.0026**
Lead	3.77	0.0075	**0.1110**
Nickel	1.15	0.0023	**0.0339**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0277**
Selenium	3.77	0.0075	**0.1110**
Zinc	9.15	0.0183	**0.2694**
Mercury	0.02	0.0000	**0.0006**
Chromium	3.58	0.0072	**0.1054**
Total Kjeldahl Nitrogen	71.90	0.1438	**2.1166**
Ammonia Nitrogen	15.00	0.0300	**0.4416**
Organic Nitrogen	56.90	0.1138	**1.6750**
Phosphorous	517.00	1.0340	**15.2194**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Steve Craige #2

Date: 8/15/2013

Site information

Acres applied to:	17.00
Total gallons applied:	77,225.00
% solids as applied	51.80
Specific Gravity	1.50
Dry tons applied	250.22

Agronomic Rates Per Acre (as applied data)

Dry tons	14.72	Phosphorous	15.22
Total Kjeldahl Nitrogen	2.12	Potassium	1.00
Ammonia Nitrogen	0.44		
Organic Nitrogen	1.68		
P.A.N.	0.78		
Carryover from prior yrs	0	= 0.78	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**29261.1927**
Aluminum	1,460.00	2.9201	**42.9792**
Copper	0.94	0.0019	**0.0277**
Potassium	34.00	0.0680	**1.0009**
Arsenic	2.40	0.0048	**0.0707**
Cadmium	0.09	0.0002	**0.0026**
Lead	3.77	0.0075	**0.1110**
Nickel	1.15	0.0023	**0.0339**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0277**
Selenium	3.77	0.0075	**0.1110**
Zinc	9.15	0.0183	**0.2694**
Mercury	0.02	0.0000	**0.0006**
Chromium	3.58	0.0072	**0.1054**
Total Kjeldahl Nitrogen	71.90	0.1438	**2.1166**
Ammonia Nitrogen	15.00	0.0300	**0.4416**
Organic Nitrogen	56.90	0.1138	**1.6750**
Phosphorous	517.00	1.0340	**15.2194**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Steve Craige #3**

Date: 8/15/2013

Site information

Acres applied to:	30.00
Total gallons applied:	141,955.00
% solids as applied	50.40
Specific Gravity	1.48
Dry tons applied	441.55

Agronomic Rates Per Acre (as applied data)

Dry tons	14.72		Phosphorous	15.22
Total Kjeldahl Nitrogen	2.12		Potassium	1.00
Ammonia Nitrogen	0.44			
Organic Nitrogen	1.67			
P.A.N.	0.78			
Carryover from prior yrs	0	=	0.78	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	lbs/acre applied
CCE	994,000.00	1988.0438	**29260.6319**
Aluminum	1,460.00	2.9201	**42.9784**
Copper	0.94	0.0019	**0.0277**
Potassium	34.00	0.0680	**1.0009**
Arsenic	2.40	0.0048	**0.0706**
Cadmium	0.09	0.0002	**0.0026**
Lead	3.77	0.0075	**0.1110**
Nickel	1.15	0.0023	**0.0339**

	dry results	lbs/dry ton	lbs/acre applied
Molybdenum	0.94	0.0019	**0.0277**
Selenium	3.77	0.0075	**0.1110**
Zinc	9.15	0.0183	**0.2694**
Mercury	0.02	0.0000	**0.0006**
Chromium	3.58	0.0072	**0.1054**
Total Kjeldahl Nitrogen	71.90	0.1438	**2.1165**
Ammonia Nitrogen	15.00	0.0300	**0.4416**
Organic Nitrogen	56.90	0.1138	**1.6750**
Phosphorous	517.00	1.0340	**15.2191**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Terry Barnes #1

Date: 8/15/2013

Site information

Acres applied to:	2.00
Total gallons applied:	9,465.00
% solids as applied	50.40
Specific Gravity	1.48
Dry tons applied	29.44

Agronomic Rates Per Acre (as applied data)

Dry tons	14.72		Phosphorous	15.22
Total Kjeldahl Nitrogen	2.12		Potassium	1.00
Ammonia Nitrogen	0.44			
Organic Nitrogen	1.68			
P.A.N.	0.78			
Carryover from prior yrs	0	=	0.78	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**29264.7544**
Aluminum	1,460.00	2.9201	**42.9844**
Copper	0.94	0.0019	**0.0277**
Potassium	34.00	0.0680	**1.0010**
Arsenic	2.40	0.0048	**0.0707**
Cadmium	0.09	0.0002	**0.0026**
Lead	3.77	0.0075	**0.1110**
Nickel	1.15	0.0023	**0.0339**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0277**
Selenium	3.77	0.0075	**0.1110**
Zinc	9.15	0.0183	**0.2694**
Mercury	0.02	0.0000	**0.0006**
Chromium	3.58	0.0072	**0.1054**
Total Kjeldahl Nitrogen	71.90	0.1438	**2.1168**
Ammonia Nitrogen	15.00	0.0300	**0.4416**
Organic Nitrogen	56.90	0.1138	**1.6752**
Phosphorous	517.00	1.0340	**15.2212**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Terry Barnes #2

Date: 8/15/2013

Site information

Acres applied to:	5.00
Total gallons applied:	23,660.00
% solids as applied	50.40
Specific Gravity	1.48
Dry tons applied	73.59

Agronomic Rates Per Acre (as applied data)

Dry tons	14.72		Phosphorous	15.22
Total Kjeldahl Nitrogen	2.12		Potassium	1.00
Ammonia Nitrogen	0.44			
Organic Nitrogen	1.68			
P.A.N.	0.78			
Carryover from prior yrs	0	=	0.78	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**29261.6625**
Aluminum	1,460.00	2.9201	**42.9799**
Copper	0.94	0.0019	**0.0277**
Potassium	34.00	0.0680	**1.0009**
Arsenic	2.40	0.0048	**0.0707**
Cadmium	0.09	0.0002	**0.0026**
Lead	3.77	0.0075	**0.1110**
Nickel	1.15	0.0023	**0.0339**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0277**
Selenium	3.77	0.0075	**0.1110**
Zinc	9.15	0.0183	**0.2694**
Mercury	0.02	0.0000	**0.0006**
Chromium	3.58	0.0072	**0.1054**
Total Kjeldahl Nitrogen	71.90	0.1438	**2.1166**
Ammonia Nitrogen	15.00	0.0300	**0.4416**
Organic Nitrogen	56.90	0.1138	**1.6750**
Phosphorous	517.00	1.0340	**15.2196**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Terry Barnes #3

Date: 8/15/2013

Site information

Acres applied to:	4.00
Total gallons applied:	18,925.00
% solids as applied	50.40
Specific Gravity	1.48
Dry tons applied	58.87

Agronomic Rates Per Acre (as applied data)

Dry tons	14.72		Phosphorous	15.22
Total Kjeldahl Nitrogen	2.12		Potassium	1.00
Ammonia Nitrogen	0.44			
Organic Nitrogen	1.67			
P.A.N.	0.78			
Carryover from prior yrs	0	=	0.78	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**29257.0247**
Aluminum	1,460.00	2.9201	**42.9731**
Copper	0.94	0.0019	**0.0277**
Potassium	34.00	0.0680	**1.0007**
Arsenic	2.40	0.0048	**0.0706**
Cadmium	0.09	0.0002	**0.0026**
Lead	3.77	0.0075	**0.1110**
Nickel	1.15	0.0023	**0.0338**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0277**
Selenium	3.77	0.0075	**0.1110**
Zinc	9.15	0.0183	**0.2693**
Mercury	0.02	0.0000	**0.0006**
Chromium	3.58	0.0072	**0.1054**
Total Kjeldahl Nitrogen	71.90	0.1438	**2.1163**
Ammonia Nitrogen	15.00	0.0300	**0.4415**
Organic Nitrogen	56.90	0.1138	**1.6748**
Phosphorous	517.00	1.0340	**15.2172**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Terry Barnes #4**

Date: 8/15/2013

Site information

Acres applied to:	6.00
Total gallons applied:	28,390.00
% solids as applied	50.40
Specific Gravity	1.48
Dry tons applied	88.31

Agronomic Rates Per Acre (as applied data)

Dry tons	14.72		Phosphorous	15.22
Total Kjeldahl Nitrogen	2.12		Potassium	1.00
Ammonia Nitrogen	0.44			
Organic Nitrogen	1.67			
P.A.N.	0.78			
Carryover from prior yrs	0	=	0.78	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	994,000.00	1988.0438	**29259.6013**
Aluminum	1,460.00	2.9201	**42.9769**
Copper	0.94	0.0019	**0.0277**
Potassium	34.00	0.0680	**1.0008**
Arsenic	2.40	0.0048	**0.0706**
Cadmium	0.09	0.0002	**0.0026**
Lead	3.77	0.0075	**0.1110**
Nickel	1.15	0.0023	**0.0339**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.94	0.0019	**0.0277**
Selenium	3.77	0.0075	**0.1110**
Zinc	9.15	0.0183	**0.2693**
Mercury	0.02	0.0000	**0.0006**
Chromium	3.58	0.0072	**0.1054**
Total Kjeldahl Nitrogen	71.90	0.1438	**2.1165**
Ammonia Nitrogen	15.00	0.0300	**0.4415**
Organic Nitrogen	56.90	0.1138	**1.6749**
Phosphorous	517.00	1.0340	**15.2185**
Total Solids	45.20		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Brandon Winfrey #1

Date: 7/15/2014

Site information

Acres applied to:	9.00
Total gallons applied:	27,375.00
% solids as applied	45.10
Specific Gravity	1.39
Dry tons applied	71.56

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95		Phosphorous	8.32
Total Kjeldahl Nitrogen	1.12		Potassium	0.51
Ammonia Nitrogen	0.21			
Organic Nitrogen	0.91			
P.A.N.	0.40			
Carryover from prior yrs	0	=	0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15775.7588**
Aluminum	1,380.00	2.7601	**21.9461**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5089**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0142**
Selenium	4.21	0.0084	**0.0670**
Zinc	8.75	0.0175	**0.1392**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1212**
Ammonia Nitrogen	13.50	0.0270	**0.2147**
Organic Nitrogen	57.00	0.1140	**0.9065**
Phosphorous	523.00	1.0460	**8.3173**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Brandon Winfrey #2

Date: 7/15/2014

Site information

Acres applied to:	37.00
Total gallons applied:	109,800.00
% solids as applied	46.20
Specific Gravity	1.39
Dry tons applied	294.03

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95	Phosphorous	8.31
Total Kjeldahl Nitrogen	1.12	Potassium	0.51
Ammonia Nitrogen	0.21		
Organic Nitrogen	0.91		
P.A.N.	0.40		
Carryover from prior yrs	0	= 0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15766.8410**
Aluminum	1,380.00	2.7601	**21.9337**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5086**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0141**
Selenium	4.21	0.0084	**0.0669**
Zinc	8.75	0.0175	**0.1391**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1205**
Ammonia Nitrogen	13.50	0.0270	**0.2146**
Organic Nitrogen	57.00	0.1140	**0.9060**
Phosphorous	523.00	1.0460	**8.3126**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Brandon Winfrey #3

Date: 7/15/2014

Site information

Acres applied to:	9.00
Total gallons applied:	25,925.00
% solids as applied	47.60
Specific Gravity	1.39
Dry tons applied	71.53

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95		Phosphorous	8.31
Total Kjeldahl Nitrogen	1.12		Potassium	0.51
Ammonia Nitrogen	0.21			
Organic Nitrogen	0.91			
P.A.N.	0.40			
Carryover from prior yrs	0	=	0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15768.3157**
Aluminum	1,380.00	2.7601	**21.9358**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5087**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0141**
Selenium	4.21	0.0084	**0.0669**
Zinc	8.75	0.0175	**0.1391**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1206**
Ammonia Nitrogen	13.50	0.0270	**0.2146**
Organic Nitrogen	57.00	0.1140	**0.9060**
Phosphorous	523.00	1.0460	**8.3133**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Bruce Hackmann #1

Date: 7/15/2014

Site information

Acres applied to:	70.00
Total gallons applied:	194,200.00
% solids as applied	48.40
Specific Gravity	1.42
Dry tons applied	556.57

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95		Phosphorous	8.32
Total Kjeldahl Nitrogen	1.12		Potassium	0.51
Ammonia Nitrogen	0.21			
Organic Nitrogen	0.91			
P.A.N.	0.40			
Carryover from prior yrs	0	=	0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15775.1025**
Aluminum	1,380.00	2.7601	**21.9452**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5089**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0142**
Selenium	4.21	0.0084	**0.0669**
Zinc	8.75	0.0175	**0.1391**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1211**
Ammonia Nitrogen	13.50	0.0270	**0.2147**
Organic Nitrogen	57.00	0.1140	**0.9064**
Phosphorous	523.00	1.0460	**8.3169**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Bruce Hackmann #2

Date: 7/15/2014

Site information

Acres applied to:	101.00
Total gallons applied:	282,000.00
% solids as applied	48.10
Specific Gravity	1.42
Dry tons applied	803.19

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95	Phosphorous	8.32
Total Kjeldahl Nitrogen	1.12	Potassium	0.51
Ammonia Nitrogen	0.21		
Organic Nitrogen	0.91		
P.A.N.	0.40		
Carryover from prior yrs	0	= 0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15777.8729**
Aluminum	1,380.00	2.7601	**21.9491**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5090**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0142**
Selenium	4.21	0.0084	**0.0670**
Zinc	8.75	0.0175	**0.1392**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1213**
Ammonia Nitrogen	13.50	0.0270	**0.2147**
Organic Nitrogen	57.00	0.1140	**0.9066**
Phosphorous	523.00	1.0460	**8.3184**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Bruce Hackmann #3**

Date: 7/15/2014

Site information

Acres applied to:	23.00
Total gallons applied:	62,100.00
% solids as applied	49.70
Specific Gravity	1.42
Dry tons applied	182.76

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95	Phosphorous	8.31
Total Kjeldahl Nitrogen	1.12	Potassium	0.51
Ammonia Nitrogen	0.21		
Organic Nitrogen	0.91		
P.A.N.	0.40		
Carryover from prior yrs	0	= 0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15765.0660**
Aluminum	1,380.00	2.7601	**21.9312**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5086**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0141**
Selenium	4.21	0.0084	**0.0669**
Zinc	8.75	0.0175	**0.1391**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1204**
Ammonia Nitrogen	13.50	0.0270	**0.2145**
Organic Nitrogen	57.00	0.1140	**0.9059**
Phosphorous	523.00	1.0460	**8.3116**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Bruce Hackmann #4

Date: 7/15/2014

Site information

Acres applied to:	25.00
Total gallons applied:	67,500.00
% solids as applied	49.70
Specific Gravity	1.42
Dry tons applied	198.65

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95	Phosphorous	8.31
Total Kjeldahl Nitrogen	1.12	Potassium	0.51
Ammonia Nitrogen	0.21		
Organic Nitrogen	0.91		
P.A.N.	0.40		
Carryover from prior yrs	0	= 0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15765.0660**
Aluminum	1,380.00	2.7601	**21.9312**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5086**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0141**
Selenium	4.21	0.0084	**0.0669**
Zinc	8.75	0.0175	**0.1391**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1204**
Ammonia Nitrogen	13.50	0.0270	**0.2145**
Organic Nitrogen	57.00	0.1140	**0.9059**
Phosphorous	523.00	1.0460	**8.3116**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Bruce Hackmann #5

Date: 7/15/2014

Site information

Acres applied to:	42.50
Total gallons applied:	116,900.00
% solids as applied	47.80
Specific Gravity	1.45
Dry tons applied	337.87

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95	Phosphorous	8.32
Total Kjeldahl Nitrogen	1.12	Potassium	0.51
Ammonia Nitrogen	0.21		
Organic Nitrogen	0.91		
P.A.N.	0.40		
Carryover from prior yrs	0	= 0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15772.7993**
Aluminum	1,380.00	2.7601	**21.9420**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5088**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0142**
Selenium	4.21	0.0084	**0.0669**
Zinc	8.75	0.0175	**0.1391**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1209**
Ammonia Nitrogen	13.50	0.0270	**0.2146**
Organic Nitrogen	57.00	0.1140	**0.9063**
Phosphorous	523.00	1.0460	**8.3157**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Bruce Hackmann #6**

Date: 7/15/2014

Site information

Acres applied to:	26.50
Total gallons applied:	72,900.00
% solids as applied	47.80
Specific Gravity	1.45
Dry tons applied	210.70

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95		Phosphorous	8.32
Total Kjeldahl Nitrogen	1.12		Potassium	0.51
Ammonia Nitrogen	0.21			
Organic Nitrogen	0.91			
P.A.N.	0.40			
Carryover from prior yrs	0	=	0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15774.8359**
Aluminum	1,380.00	2.7601	**21.9448**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5089**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0142**
Selenium	4.21	0.0084	**0.0669**
Zinc	8.75	0.0175	**0.1391**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1211**
Ammonia Nitrogen	13.50	0.0270	**0.2147**
Organic Nitrogen	57.00	0.1140	**0.9064**
Phosphorous	523.00	1.0460	**8.3168**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Clifton Nahler #1**

Date: 7/15/2014

Site information

Acres applied to:	228.00
Total gallons applied:	608,500.00
% solids as applied	48.60
Specific Gravity	1.47
Dry tons applied	1,812.80

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95	Phosphorous	8.32
Total Kjeldahl Nitrogen	1.12	Potassium	0.51
Ammonia Nitrogen	0.21		
Organic Nitrogen	0.91		
P.A.N.	0.40		
Carryover from prior yrs	0	= 0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15774.9008**
Aluminum	1,380.00	2.7601	**21.9449**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5089**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0142**
Selenium	4.21	0.0084	**0.0669**
Zinc	8.75	0.0175	**0.1391**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1211**
Ammonia Nitrogen	13.50	0.0270	**0.2147**
Organic Nitrogen	57.00	0.1140	**0.9064**
Phosphorous	523.00	1.0460	**8.3168**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Clifton Nahler #2

Date: 7/15/2014

Site information

Acres applied to:	72.00
Total gallons applied:	192,100.00
% solids as applied	48.60
Specific Gravity	1.47
Dry tons applied	572.29

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95		Phosphorous	8.31
Total Kjeldahl Nitrogen	1.12		Potassium	0.51
Ammonia Nitrogen	0.21			
Organic Nitrogen	0.91			
P.A.N.	0.40			
Carryover from prior yrs	0	=	0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15770.1480**
Aluminum	1,380.00	2.7601	**21.9383**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5087**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0141**
Selenium	4.21	0.0084	**0.0669**
Zinc	8.75	0.0175	**0.1391**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1208**
Ammonia Nitrogen	13.50	0.0270	**0.2146**
Organic Nitrogen	57.00	0.1140	**0.9061**
Phosphorous	523.00	1.0460	**8.3143**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Dale Wilson #1

Date: 7/15/2014

Site information

Acres applied to:	52.00
Total gallons applied:	144,000.00
% solids as applied	47.80
Specific Gravity	1.44
Dry tons applied	413.32

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95	Phosphorous	8.31
Total Kjeldahl Nitrogen	1.12	Potassium	0.51
Ammonia Nitrogen	0.21		
Organic Nitrogen	0.91		
P.A.N.	0.40		
Carryover from prior yrs	0	= 0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15770.1867**
Aluminum	1,380.00	2.7601	**21.9384**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5087**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0141**
Selenium	4.21	0.0084	**0.0669**
Zinc	8.75	0.0175	**0.1391**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1208**
Ammonia Nitrogen	13.50	0.0270	**0.2146**
Organic Nitrogen	57.00	0.1140	**0.9061**
Phosphorous	523.00	1.0460	**8.3143**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Dale Wilson #2**

Date: 7/15/2014

Site information

Acres applied to:	30.00
Total gallons applied:	83,100.00
% solids as applied	47.80
Specific Gravity	1.44
Dry tons applied	238.52

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95		Phosphorous	8.32
Total Kjeldahl Nitrogen	1.12		Potassium	0.51
Ammonia Nitrogen	0.21			
Organic Nitrogen	0.91			
P.A.N.	0.40			
Carryover from prior yrs	0	=	0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15774.5673**
Aluminum	1,380.00	2.7601	**21.9445**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5089**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0142**
Selenium	4.21	0.0084	**0.0669**
Zinc	8.75	0.0175	**0.1391**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1211**
Ammonia Nitrogen	13.50	0.0270	**0.2147**
Organic Nitrogen	57.00	0.1140	**0.9064**
Phosphorous	523.00	1.0460	**8.3166**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Dave Winfrey #1

Date: 7/15/2014

Site information

Acres applied to:	78.00
Total gallons applied:	223,700.00
% solids as applied	46.50
Specific Gravity	1.43
Dry tons applied	620.28

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95		Phosphorous	8.32
Total Kjeldahl Nitrogen	1.12		Potassium	0.51
Ammonia Nitrogen	0.21			
Organic Nitrogen	0.91			
P.A.N.	0.40			
Carryover from prior yrs	0	=	0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15777.8444**
Aluminum	1,380.00	2.7601	**21.9490**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5090**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0142**
Selenium	4.21	0.0084	**0.0670**
Zinc	8.75	0.0175	**0.1392**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1213**
Ammonia Nitrogen	13.50	0.0270	**0.2147**
Organic Nitrogen	57.00	0.1140	**0.9066**
Phosphorous	523.00	1.0460	**8.3184**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: J Sapp #1**

Date: 7/15/2014

Site information

Acres applied to:	80.00
Total gallons applied:	229,300.00
% solids as applied	46.50
Specific Gravity	1.43
Dry tons applied	635.81

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95		Phosphorous	8.31
Total Kjeldahl Nitrogen	1.12		Potassium	0.51
Ammonia Nitrogen	0.21			
Organic Nitrogen	0.91			
P.A.N.	0.40			
Carryover from prior yrs	0	=	0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15768.4990**
Aluminum	1,380.00	2.7601	**21.9360**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5087**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0141**
Selenium	4.21	0.0084	**0.0669**
Zinc	8.75	0.0175	**0.1391**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1206**
Ammonia Nitrogen	13.50	0.0270	**0.2146**
Organic Nitrogen	57.00	0.1140	**0.9061**
Phosphorous	523.00	1.0460	**8.3134**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Jennie Gardner #1**

Date: 7/15/2014

Site information

Acres applied to:	36.00
Total gallons applied:	93,000.00
% solids as applied	50.20
Specific Gravity	1.47
Dry tons applied	286.18

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95	Phosphorous	8.32
Total Kjeldahl Nitrogen	1.12	Potassium	0.51
Ammonia Nitrogen	0.21		
Organic Nitrogen	0.91		
P.A.N.	0.40		
Carryover from prior yrs	0	= 0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15772.0737**
Aluminum	1,380.00	2.7601	**21.9410**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5088**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0142**
Selenium	4.21	0.0084	**0.0669**
Zinc	8.75	0.0175	**0.1391**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1209**
Ammonia Nitrogen	13.50	0.0270	**0.2146**
Organic Nitrogen	57.00	0.1140	**0.9063**
Phosphorous	523.00	1.0460	**8.3153**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Jennie Gardner #2

Date: 7/15/2014

Site information

Acres applied to:	6.25
Total gallons applied:	16,150.00
% solids as applied	50.20
Specific Gravity	1.47
Dry tons applied	49.70

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95		Phosphorous	8.32
Total Kjeldahl Nitrogen	1.12		Potassium	0.51
Ammonia Nitrogen	0.21			
Organic Nitrogen	0.91			
P.A.N.	0.40			
Carryover from prior yrs	0	=	0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15776.1439**
Aluminum	1,380.00	2.7601	**21.9467**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5089**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0142**
Selenium	4.21	0.0084	**0.0670**
Zinc	8.75	0.0175	**0.1392**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1212**
Ammonia Nitrogen	13.50	0.0270	**0.2147**
Organic Nitrogen	57.00	0.1140	**0.9065**
Phosphorous	523.00	1.0460	**8.3175**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Jerry Barnes #1**

Date: 7/15/2014

Site information

Acres applied to:	110.00
Total gallons applied:	280,500.00
% solids as applied	51.20
Specific Gravity	1.46
Dry tons applied	874.36

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95		Phosphorous	8.31
Total Kjeldahl Nitrogen	1.12		Potassium	0.51
Ammonia Nitrogen	0.21			
Organic Nitrogen	0.91			
P.A.N.	0.40			
Carryover from prior yrs	0	=	0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15770.6755**
Aluminum	1,380.00	2.7601	**21.9390**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5087**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0141**
Selenium	4.21	0.0084	**0.0669**
Zinc	8.75	0.0175	**0.1391**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1208**
Ammonia Nitrogen	13.50	0.0270	**0.2146**
Organic Nitrogen	57.00	0.1140	**0.9062**
Phosphorous	523.00	1.0460	**8.3146**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Jerry Barnes #3**

Date: 7/15/2014

Site information

Acres applied to:	20.00
Total gallons applied:	51,000.00
% solids as applied	51.20
Specific Gravity	1.46
Dry tons applied	158.98

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95		Phosphorous	8.31
Total Kjeldahl Nitrogen	1.12		Potassium	0.51
Ammonia Nitrogen	0.21			
Organic Nitrogen	0.91			
P.A.N.	0.40			
Carryover from prior yrs	0	=	0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15770.6755**
Aluminum	1,380.00	2.7601	**21.9390**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5087**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0141**
Selenium	4.21	0.0084	**0.0669**
Zinc	8.75	0.0175	**0.1391**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1208**
Ammonia Nitrogen	13.50	0.0270	**0.2146**
Organic Nitrogen	57.00	0.1140	**0.9062**
Phosphorous	523.00	1.0460	**8.3146**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Jerry Barnes #4

Date: 7/15/2014

Site information

Acres applied to:	48.50
Total gallons applied:	134,200.00
% solids as applied	47.20
Specific Gravity	1.46
Dry tons applied	385.64

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95		Phosphorous	8.32
Total Kjeldahl Nitrogen	1.12		Potassium	0.51
Ammonia Nitrogen	0.21			
Organic Nitrogen	0.91			
P.A.N.	0.40			
Carryover from prior yrs	0	=	0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15775.8558**
Aluminum	1,380.00	2.7601	**21.9463**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5089**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0142**
Selenium	4.21	0.0084	**0.0670**
Zinc	8.75	0.0175	**0.1392**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1212**
Ammonia Nitrogen	13.50	0.0270	**0.2147**
Organic Nitrogen	57.00	0.1140	**0.9065**
Phosphorous	523.00	1.0460	**8.3173**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Jim Kyd #1**

Date: 7/15/2014

Site information

Acres applied to:	7.50
Total gallons applied:	20,750.00
% solids as applied	47.20
Specific Gravity	1.46
Dry tons applied	59.63

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95		Phosphorous	8.32
Total Kjeldahl Nitrogen	1.12		Potassium	0.51
Ammonia Nitrogen	0.21			
Organic Nitrogen	0.91			
P.A.N.	0.40			
Carryover from prior yrs	0	=	0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15773.8966**
Aluminum	1,380.00	2.7601	**21.9435**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5088**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0142**
Selenium	4.21	0.0084	**0.0669**
Zinc	8.75	0.0175	**0.1391**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1210**
Ammonia Nitrogen	13.50	0.0270	**0.2147**
Organic Nitrogen	57.00	0.1140	**0.9064**
Phosphorous	523.00	1.0460	**8.3163**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO

Landowner name: Mike Purcell #1

Date: 7/15/2014

Site information

Acres applied to:	123.00
Total gallons applied:	289,300.00
% solids as applied	53.70
Specific Gravity	1.51
Dry tons applied	978.22

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95		Phosphorous	8.32
Total Kjeldahl Nitrogen	1.12		Potassium	0.51
Ammonia Nitrogen	0.21			
Organic Nitrogen	0.91			
P.A.N.	0.40			
Carryover from prior yrs	0	=	0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15779.0863**
Aluminum	1,380.00	2.7601	**21.9507**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5090**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0142**
Selenium	4.21	0.0084	**0.0670**
Zinc	8.75	0.0175	**0.1392**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1214**
Ammonia Nitrogen	13.50	0.0270	**0.2147**
Organic Nitrogen	57.00	0.1140	**0.9067**
Phosphorous	523.00	1.0460	**8.3190**
Total Solids	46.10		

Oros & Busch Application Technologies, Inc.

Project name: City of Columbia, MO **Landowner name: Rick Leonard #1**

Date: 7/15/2014

Site information

Acres applied to:	7.00
Total gallons applied:	16,450.00
% solids as applied	53.70
Specific Gravity	1.51
Dry tons applied	55.62

Agronomic Rates Per Acre (as applied data)

Dry tons	7.95		Phosphorous	8.31
Total Kjeldahl Nitrogen	1.12		Potassium	0.51
Ammonia Nitrogen	0.21			
Organic Nitrogen	0.91			
P.A.N.	0.40			
Carryover from prior yrs	0	=	0.40	**Total available lbs. of nitrogen for this crop year**

Actual Laboratory Results

	dry results	lbs/dry ton	**lbs/acre applied**
CCE	992,000.00	1984.0437	**15765.4508**
Aluminum	1,380.00	2.7601	**21.9318**
Copper	1.17	0.0023	**0.0186**
Potassium	32.00	0.0640	**0.5086**
Arsenic	3.10	0.0062	**0.0493**
Cadmium	0.12	0.0002	**0.0019**
Lead	3.68	0.0074	**0.0585**
Nickel	1.05	0.0021	**0.0167**

	dry results	lbs/dry ton	**lbs/acre applied**
Molybdenum	0.89	0.0018	**0.0141**
Selenium	4.21	0.0084	**0.0669**
Zinc	8.75	0.0175	**0.1391**
Mercury	0.02	0.0000	**0.0003**
Chromium	2.98	0.0060	**0.0474**
Total Kjeldahl Nitrogen	70.50	0.1410	**1.1204**
Ammonia Nitrogen	13.50	0.0270	**0.2145**
Organic Nitrogen	57.00	0.1140	**0.9059**
Phosphorous	523.00	1.0460	**8.3118**
Total Solids	46.10		

ANDREW BOWSER #17

REPORT NUMBER A0031 | DATE 7/9/2012

P.A.L., Inc. AGRICULTURAL LABORATORY

SUBMITTED FOR
OROS & BUSCH

SEND TO
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING
					VERY LOW | LOW | MODERATE | DESIRED | VERY HIGH | EXCESS
Sample:	10A	pH	5.40		
ACRES		PHOSPHORUS (P)	8	lbs/a	
C.E.C.	16.94 me	SULFUR (SO4-S)	18	lbs/a	
SOIL TEXTURE	Silt Loam	CALCIUM (Ca)	3445	lbs/a	
ORGANIC MATTER	1.20 %	MAGNESIUM (Mg)	777	lbs/a	
		POTASSIUM (K)	82	lbs/a	
Nelr. A	4.00	SODIUM (Na)		lbs/a	
BASE SATURATION PERCENT		BORON (B)		ppm	
CALCIUM	53.84	IRON (Fe)		ppm	
MAGNESIUM	20.31	MANGANESE (Mn)		ppm	
POTASSIUM	0.66	COPPER (Cu)		ppm	
		ZINC (Zn)		ppm	
				ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
PASTURE GRASS	CO	150	72	53	88	5					
PASTURE-LEGUME	CO	150	30	95	88	5					
PASTURE GRASS	CO	100	88	64	84	5					
PASTURE-LEGUME	CO	100	30	95	84	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS

lbs CNMA 720

APPLIED

COMMENTS Apply 2 tons of lime per acre

113622

BILL GENTSCH #8

PERRY AGRICULTURAL LABORATORY, INC

REPORT NUMBER: A0058 | DATE: 7/9/2012

SUBMITTED FOR
OROS & BUSCH

SEND TO
P A L, Inc
P O BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING					
					VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample:	2C	pH	4.70							
ACRES		PHOSPHORUS (P)	12	lbs/a						
CEC	16.05 me	SULFUR (SO4-S)	27	lbs/a						
SOIL TEXTURE:	Silt Loam	CALCIUM (Ca)	2955	lbs/a						
ORGANIC MATTER:	3.10 %	MAGNESIUM (Mg)	585	lbs/a						
		POTASSIUM (K)	173	lbs/a						
Neut. A	6.00	SODIUM (Na)		lbs/a						
BASE SATURATION PERCENT		BORON (B)		ppm						
CALCIUM	46.04	IRON (Fe)		ppm						
MAGNESIUM	15.19	MANGANESE (Mn)		ppm						
POTASSIUM	1.38	COPPER (Cu)		ppm						
		ZINC (Zn)		ppm						
				ppm						

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			N (NITROGEN)	P2O5 (PHOSPHATE)	K2O (POTASH)	S (SULFUR)	B (BORON)	Fe (IRON)	Mn (MANGANESE)	Cu (COPPER)	Zn (ZINC)
PASTURE GRASS	CO	150	60	46	50	5					
PASTURE-LEGUME	CO	150	20	92	50	5					
PASTURE GRASS	CO	180	78	46	50	5					
PASTURE-LEGUME	CO	180	20	84	50	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATION:

lbs ENMA 1625

APPLIED

COMMENTS: Apply 4 tons of lime per acre

113822

BILL GENTZCH #9

PERRY AGRICULTURAL LABORATORY, INC.

REPORT NUMBER A8041 | DATE 7/3/2012

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L. Inc
P.O. BOX 419

BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample	28		pH	5.30	
ACRES			PHOSPHORUS (P)	12	lbs/a
CEC	16.24	me	SULFUR (SO4-S)	21	lbs/a
SOIL TEXTURE	Silt Loam		CALCIUM (Ca)	3787	lbs/a
ORGANIC MATTER	2.20	%	MAGNESIUM (Mg)	394	lbs/a
			POTASSIUM (K)	132	lbs/a
Soil A	5.00		SODIUM (Na)		lbs/a
BASE SATURATION PERCENT			BORON (B)		ppm
CALCIUM	58.30		IRON (Fe)		ppm
MAGNESIUM	10.11		MANGANESE (Mn		ppm
POTASSIUM	0.81		COPPER (Cu)		ppm
			ZINC (Zn)		ppm
					ppm

RATING

VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT / POUNDS / ACRE								
			N	P2O5	K2O	S					
PASTURE GRASS	CD	150	60	46	75	5					
PASTURE LEGUME	CD	150	20	60	75	5					
PASTURE GRASS	CD	180	70	46	85	5					
PASTURE LEGUME	CD	180	20	84	85	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS

lbs ENMA 1267

APPLIED

COMMENTS

Apply 3 tons of lime per acre

113022

BILL GERITZEN #18

PERRY AGRICULTURAL LABORATORY, INC.

REPORT NUMBER A6045 | DATE | 7/9/2012

SUBMITTED FOR
CROS & BUSCH

SEND TO
P.A.L., INC.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample:	68		pH	5.50		RATING: VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
ACRES			PHOSPHORUS (P)	9	lbs/a	
CEC	16.11	me	SULFUR (SO4-S)	27	lbs/a	
SOIL TEXTURE:	Silt Loam		CALCIUM (Ca)	4225	lbs/a	
ORGANIC MATTER	1.50	%	MAGNESIUM (Mg)	346	lbs/a	
			POTASSIUM (K)	85	lbs/a	
Note: A	4.00		SODIUM (Na)		lbs/a	
BASE SATURATION PERCENT			BORON (B)		ppm	
CALCIUM	56.55		IRON (Fe)		ppm	
MAGNESIUM	8.05		MANGANESE (Mn		ppm	
POTASSIUM	0.66		COPPER (CU)		ppm	
			ZINC (Zn)		ppm	
					ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE: N								
PASTURE GRASS	CO	160	78	53	87	5					
PASTURE-LEGUME	CO	150	38	95	87	5					
PASTURE GRASS	CO	180	88	54	93	5					
PASTURE-LEGUME	CO	180	38	96	93	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS

lbs ENM/A 648

APPLIED

COMMENTS: Apply 2 tons of lime per acre

113022

GARY RYAN #10

PERRY AGRICULTURAL LABORATORY, INC.

REPORT NUMBER A0049 | DATE 7/9/2012

SUBMITTED FOR:
OROS & BUSCH

SEND TO
P.A.L., Inc
P.O. BOX 415

BOWLING GREEN, Missouri 63334

SOIL REPORT

				RATING						
				VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample	116	pH	6.00						
ACRES		PHOSPHORUS (P)	31	lbs/a					
CCE	11.75 lime	SULFUR (SO4-S)	27	lbs/a					
SOIL TEXTURE	Silt Loam	CALCIUM (Ca)	3810	lbs/a					
ORGANIC MATTER	2.50 %	MAGNESIUM (Mg)	425	lbs/a					
		POTASSIUM (K)	352	lbs/a					
Neut. A.	2.00	SODIUM (Na)		lbs/a					
BASE SATURATION PERCENT		BORON (B)		ppm					
CALCIUM	64.06	IRON (Fe)		ppm					
MAGNESIUM	16.07	MANGANESE (Mn)		ppm					
POTASSIUM	3.84	COPPER (Cu)		ppm					
		ZINC (Zn)		ppm					
				ppm					

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			N	P2O5	K2O	S	B	Fe	Mn	Cu	Zn
PASTURE GRASS	CD	150	80	28	0	5					
PASTURE LEGUME	CD	150	20	25	0	5					
PASTURE GRASS	CD	180	78	23	0	5					
PASTURE LEGUME	CD	180	20	28	0	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS

A-HLLJ.

COMMENTS

113022

J + S GRIFFIN #15

PERRY AGRICULTURAL LABORATORY, INC

REPORT NUMBER | A0026 | DATE

SUBMITTED FOR
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING					
					VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample:	6A	pH	6.20							
ACRES:		PHOSPHORUS (P)	47	lbs/a						
CEC	17.63	meq SULFUR (SO_4-S)	12	lbs/a						
SOIL TEXTURE:	Silt Loam	CALCIUM (Ca)	5518	lbs/a						
ORGANIC MATTER:	1.90 %	MAGNESIUM (Mg)	377	lbs/a						
		POTASSIUM (K)	201	lbs/a						
Neut. A	2.00	SODIUM (Na)		lbs/a						
BASE SATURATION PERCENT		BORON (B)		ppm						
CALCIUM:	78.26	IRON (Fe)		ppm						
MAGNESIUM:	8.91	MANGANESE (Mn)		ppm						
POTASSIUM:	1.46	COPPER (Cu)		ppm						
		ZINC (Zn)		ppm						
				ppm						

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE							
			N	P_2O_5	K_2O	S	B	Mn	Cu	Zn
PASTURE GRASS	CD	150	70	20	43	10				
PASTURE-LEGUME	CD	150	30	20	43	10				
PASTURE-GRASS	CD	180	98	20	49	10				
PASTURE-LEGUME	CD	180	30	20	49	10				
DATE/AMOUNT APPLIED										

LIME RECOMMENDATIONS

APPLIED:

COMMENTS:

113022

JEFF GIBONEY #11

PERRY AGRICULTURAL LABORATORY, INC

REPORT NUMBER	A0054	DATE	7/9/2012

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

RATING: VERY LOW | LOW | MODERATE | DESIRED | VERY HIGH | EXCESS

Sample	180		pH	4.90	
ACRES			PHOSPHORUS (P)	15	lbs/a
CEC	17.61	me	SULFUR (SO4-S)	15	lbs/a
SOIL TEXTURE	Silt Loam		CALCIUM (Ca)	3498	lbs/a
ORGANIC MATTER	2.40	%	MAGNESIUM (Mg)	651	lbs/a
			POTASSIUM (K)	130	lbs/a
Neut. A	6.00		SODIUM (Na)		lbs/a
BASE SATURATION PERCENT			BORON (B)		ppm
CALCIUM	49.50		IRON (Fe)		ppm
MAGNESIUM	15.41		MANGANESE (Mn)		ppm
POTASSIUM	1.01		COPPER (Cu)		ppm
			ZINC (Zn)		ppm
					ppm

SOIL FERTILITY RECOMMENDATIONS

SUGGESTED TREATMENT POUNDS / ACRE

CROPPING OPTIONS		YIELD GOAL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PASTURE GRASS	CD	150	60	41	66	10					
PASTURE-LEGUME	CD	150	20	71	65	10					
PASTURE GRASS	CD	180	78	42	71	10					
PASTURE-LEGUME	CD	150	20	72	71	10					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS

lbs ENM/A: 1514

APPLIED:

COMMENTS: Apply 4 tons of lime per acre

113622

JEFFERIES #14

PERRY AGRICULTURAL LABORATORY, INC

REPORT NUMBER 45025 | DATE 7/9/2012

SUBMITTED FOR:
GROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 415
BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING
					VERY LOW | LOW | MODERATE | DESIRED | VERY HIGH | EXCESS
Sample:	3A	pH	5.30		
ACRES		PHOSPHORUS (P)	88	lbs/a	
CEC:	18.67 me	SULFUR (SO4-S)	33	lbs/a	
SOIL TEXTURE:	Clay Loam	CALCIUM (Ca)	4493	lbs/a	
ORGANIC MATTER:	2.30 %	MAGNESIUM (Mg)	551	lbs/a	
		POTASSIUM (K)	887	lbs/a	
Neut. A:	4.00	SODIUM (Na)		lbs/a	
BASE SATURATION PERCENT		BORON (B)		ppm	
CALCIUM	63.19	IRON (Fe)		ppm	
MAGNESIUM	12.30	MANGANESE (Mn)		ppm	
POTASSIUM	6.09	COPPER (Cu)		ppm	
		ZINC (Zn)		ppm	
				ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	NITROGEN (N)	PHOSPHATE (P2O5)	POTASH (K2O)	SUGGESTED TREATMENT / POUNDS / ACRE: SULFUR (S)	BORON (B)	MANGANESE (Mn)	COPPER (Cu)	ZINC (Zn)
PASTURE GRASS	CO	150	75	0	0	0				
PASTURE LEGUME	CO	150	20	0	0	0				
PASTURE GRASS	CO	180	90	0	0	0				
PASTURE-LEGUME	CO	180	20	0	0	0				
DATE/AMOUNT APPLIED										

LIME RECOMMENDATIONS: COMMENTS: Appy 2 tons of lime per acre

lbs ENM/A: 500

APPLIED

113622

JOE ALLEN #16

PERRY AGRICULTURAL LABORATORY, INC.

REPORT NUMBER A8060 | DATE 7/9/2012

SUBMITTED FOR:
CROSS BUSCH

SEND TO
P.A.L., Inc.
P.O. BOX 41A

BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample:	9A	pH	4.90		
ACRES:		PHOSPHORUS (P)	80	lbs/a	
CEC:	18.38	me	SULFUR (SO4-S)	30	lbs/a
SOIL TEXTURE	Clay Loam		CALCIUM (Ca)	3900	lbs/a
ORGANIC MATTER	2.50	%	MAGNESIUM (Mg)	583	lbs/a
			POTASSIUM (K)	153	lbs/a
Nitrate-N	6.00		SODIUM (Na)		lbs/a
			BORON (B)		ppm
BASE SATURATION PERCENT			IRON (Fe)		ppm
CALCIUM	53.06		MANGANESE (Mn)		ppm
MAGNESIUM	13.22		COPPER (Cu)		ppm
POTASSIUM	1.07		ZINC (Zn)		ppm

RATING

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			N	P2O5	K2O	S	B	Fe	Mn	Cu	Zn
PASTURE GRASS	CO	150	75	0	63	5					
PASTURE/LEGUME	CO	150	20	0	63	5					
PASTURE GRASS	CO	180	90	0	67	5					
PASTURE/LEGUME	CO	180	20	0	67	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENMA 1514

APPLIED

COMMENTS: Apply 4 tons of lime per acre.

113022

JOHN ALLEN Atty

PERRY AGRICULTURAL LABORATORY, INC.

REPORT NUMBER A3070 | DATE 7/9/2012

SUBMITTED FOR
URDS & BUSCH

SEND TO
P.A.L., Inc
P.O. BOX 418
BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample:	5D	pH	4.50		
ACRES:		PHOSPHORUS (P)	12	lbs/a	
CEC:	21.10 meq	SULFUR (SO4-S)	27	lbs/a	
SOIL TEXTURE	Clay Loam	CALCIUM (Ca)	4163	lbs/a	
ORGANIC MATTER:	1.60 %	MAGNESIUM (Mg)	662	lbs/a	
		POTASSIUM (K)	143	lbs/a	
Buff. A	7.80	SODIUM (Na)		lbs/a	
BASE SATURATION PERCENT		BORON (B)		ppm	
CALCIUM	52.88	IRON (Fe)		ppm	
MAGNESIUM	13.07	MANGANESE (Mn		ppm	
POTASSIUM	0.87	COPPER (Cu)		ppm	
		ZINC (Zn)		ppm	
				ppm	

RATING

VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE						
PASTURE GRASS	CD	15D	75	45	69	5			
PASTURE-LEGUME	CD	15D	30	93	69	5			
PASTURE GRASS	CD	18D	90	48	75	5			
PASTURE LEGUME	CD	18D	30	84	75	5			
DATE/AMOUNT APPLIED									

LIME RECOMMENDATIONS:

lbs E.N.M.A. 2003

APPLIED:

COMMENTS: Apply 4 tons of lime per acre.

113632

JOHN ALLEN #7

REPORT NUMBER	A304D	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.

SUBMITTED FOR
ORDS & BUSCH

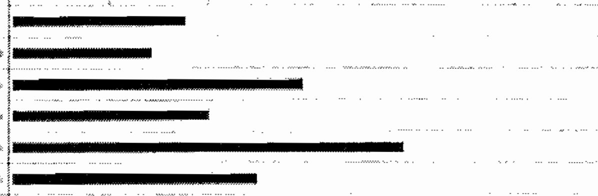
SEND TO
P A I Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample	18		pH	4.10	
ACRES			PHOSPHORUS (P)	6	lbs/a
CEC	23.17	me	SULFUR (SO4-S)	53	lbs/a
SOIL TEXTURE:	Clay Loam		CALCIUM (Ca)	4564	lbs/a
ORGANIC MATTER	1.00	%	MAGNESIUM (Mg)	1080	lbs/a
			POTASSIUM (K)	202	lbs/a
NeuA	7.00		SODIUM (Na)		lbs/a
BASE SATURATION PERCENT			BORON (B)		ppm
CALCIUM	49.25		IRON (Fe)		ppm
MAGNESIUM	19.42		MANGANESE (Mn)		ppm
POTASSIUM	1.12		COPPER (Cu)		ppm
			ZINC (Zn)		ppm
					ppm

RATING



SOIL FERTILITY RECOMMENDATIONS

SUGGESTED TREATMENT POUNDS / ACRE

CROPPING OPTIONS		YIELD GOAL	NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE-GRASS	CD	150	73	80	51	5					
PASTURE-LEGUME	CD	150	30	111	51	5					
PASTURE GRASS	CD	180	93	92	56	5					
PASTURE LEGUME	CD	180	30	111	56	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS

lbs ENM/A: 2185

APPLIED

COMMENTS Apply 4 tons of lime per acre

113822

JOHN HARRISON #3

PERRY AGRICULTURAL LABORATORY, INC

REPORT NUMBER: A0033 | DATE: 7/5/2012

SUBMITTED FOR:
ORCS & BUSCH

SEND TO:
P.A.L. Inc
P.O. BOX 418
BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample	12A	
ACRES		
CEC	24.09	me
SOIL TEXTURE	Clay	
ORGANIC MATTER	3.10	%
Nest A	3.00	

BASE SATURATION PERCENT	
CALCIUM	67.34
MAGNESIUM	18.66
POTASSIUM	1.66

pH	5.60	
PHOSPHORUS (P)	19	lbs/a
SULFUR (SO4 S)	45	lbs/a
CALCIUM (Ca)	6480	lbs/a
MAGNESIUM (Mg)	1079	lbs/a
POTASSIUM (K)	291	lbs/a
SODIUM (Na)		lbs/a
BORON (B)		ppm
IRON (Fe)		ppm
MANGANESE (Mn)		ppm
COPPER (Cu)		ppm
ZINC (Zn)		ppm
		ppm

RATING: VERY LOW | LOW | MODERATE | DESIRED | VERY HIGH | EXCESS

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT N	P2O5	K2O	S	B	Mn	Cu	Zn	POUNDS / ACRE
PASTURE GRASS	CO	150	79	34	28	0					
PASTURE LEGUME	CO	150	20	64	26	0					
PASTURE GRASS	CO	180	88	36	31	0					
PASTURE LEGUME	CO	180	29	69	31	0					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS

APPLIED

COMMENTS

113527

JOHN HARRISON #5

PENNY AGRICULTURAL LABORATORY, INC

REPORT NUMBER A0053 DATE 7/9/2012

SUBMITTED FOR:
GROS & BLSCH

SEND TO
P.A.L. Inc
P.O. BOX 418

BOWLING GREEN Missouri 63334

SOIL REPORT

					RATING					
					VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample	12C	pH	5.80							
ACRES		PHOSPHORUS (P)	12	lbs/a						
CEC	23.91 me	SULFUR (SO4-S)	24	lbs/a						
SOIL TEXTURE	Clay Loam	CALCIUM (Ca)	6225	lbs/a						
ORGANIC MATTER	4.60 %	MAGNESIUM (Mg)	1071	lbs/a						
		POTASSIUM (K)	687	lbs/a						
Neut. A	3.00	SODIUM (Na)		lbs/a						
BASE SATURATION PERCENT		BORON (B)		ppm						
CALCIUM	65.10	IRON (Fe)		ppm						
MAGNESIUM	18.67	MANGANESE (Mn)		ppm						
POTASSIUM	3.68	COPPER (Cu)		ppm						
		ZINC (Zn)		ppm						
				ppm						

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			N	P2O5	K2O	S	CaO	B	Fe	Mn	Cu	Zn
PASTURE GRASS	CD	150	75	46	0	6						
PASTURE-LEGUME	CD	150	30	83	0	6						
PASTURE GRASS	CD	100	90	46	0	5						
PASTURE-LEGUME	CD	100	30	64	0	5						
DATE/AMOUNT APPLIED												

LIME RECOMMENDATIONS

APPLIED

COMMENTS

113622

JOHN HARRISON #6

PERRY AGRICULTURAL LABORATORY, INC

REPORT NUMBER: A0843 | DATE: 7/9/2012

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc
P.O. BOX 416

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING
					VERY LOW / LOW / MODERATE / OPTIMUM / VERY HIGH / EXCESS
Sample:	48	pH	4.40		
ACRES:		PHOSPHORUS (P)	25	lbs/a	
CEC:	21.39	me SULFUR (SO4-S)	18	lbs/a	
SOIL TEXTURE:	Clay Loam	CALCIUM (Ca)	4738	lbs/a	
ORGANIC MATTER	2.93 %	MAGNESIUM (Mg)	789	lbs/a	
		POTASSIUM (K)	393	lbs/a	
Neut #:	7.00	SODIUM (Na)		lbs/a	
BASE SATURATION PERCENT		BORON (B)		ppm	
CALCIUM	49.50	IRON (Fe)		ppm	
MAGNESIUM	15.37	MANGANESE (Mn)		ppm	
POTASSIUM	2.39	COPPER (Cu)		ppm	
		ZINC (Zn)		ppm	
				ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN (N)	PHOSPHATE (P_2O_5)	POTASH (K_2O)	SULFUR (S)	BORON (B)	IRON (Fe)	MANGANESE (Mn)	COPPER (Cu)	ZINC (Zn)
PASTURE GRASS	CD	150	75	25	23	5					
PASTURE-LEGUME	CD	150	20	48	23	5					
PASTURE GRASS	CD	180	93	27	23	5					
PASTURE-LEGUME	CD	180	20	41	26	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 2049

APPLIED

COMMENTS: Apply 4 tons of lime per acre

11/3/22

LONNEY GIBONEY #13

PERRY ASHELL TURAL LABORATORY, INC

REPORT NUMBER A0823 | DATE 7/9/2012

SUBMITTED FOR
ONOS & GLASCH

SEND TO
P.A.L., Inc
P.O. BOX 415

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING
Sample	1A				VERY LOW | LOW | MODERATE | DESIRED | VERY HIGH | EXCESS
ACRES		pH	5.80		
CEC	17.97	PHOSPHORUS (P)	9	lbs/a	
SOIL TEXTURE	Silt Loam	SULFUR (SO4-S)	24	lbs/a	
ORGANIC MATTER	1.50 %	CALCIUM (Ca)	5137	lbs/a	
		MAGNESIUM (Mg)	473	lbs/a	
Neut. A.	3.00	POTASSIUM (K)	121	lbs/a	
		SODIUM (Na)		lbs/a	
BASE SATURATION PERCENT		BORON (B)		ppm	
CALCIUM	71.47	IRON (Fe)		ppm	
MAGNESIUM	12.97	MANGANESE (Mn		ppm	
POTASSIUM	0.88	COPPER (Cu)		ppm	
		ZINC (Zn)		ppm	
				(OM)	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN (N)	PHOSPHATE (P2O5)	POTASH (K2O)	SULFUR (S)	BORON (B)	MANGANESE (Mn)	COPPER (Cu)	ZINC (Zn)
PASTURE GRASS	CO	150	70	53	73	5				
PASTURE LEGUME	CO	150	30	96	73	5				
PASTURE GRASS	CO	150	88	54	79	5				
PASTURE LEGUME	CO	150	30	96	79	5				
DATE/AMOUNT APPLIED										

LIME RECOMMENDATIONS:

APPLIED

COMMENTS

113822

MIKE MARTIN #1

PERRY AGRICULTURAL LABORATORY, INC

REPORT NUMBER	A3036	DATE	7/9/2012

SUBMITTED FOR:
ORCS & BUSCH

SEND TO
P.A.L., Inc.
P.O. BOX 416

BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample:	1/A		
ACRES			
CEC:	17.02	me	
SOIL TEXTURE:	Silt Loam		
ORGANIC MATTER	2.18	%	
Buff. A	6.93		

BASE SATURATION PERCENT	
CALCIUM	80.84
MAGNESIUM	14.24
POTASSIUM	0.87

pH	4.80	
PHOSPHORUS (P)	29	lbs/a
SULFUR (SO4-S)	33	lbs/a
CALCIUM (Ca)	3583	lbs/a
MAGNESIUM (Mg)	602	lbs/a
POTASSIUM (K)	120	lbs/a
SODIUM (Na)		lbs/a
BORON (B)		ppm
IRON (Fe)		ppm
MANGANESE (Mn)		ppm
COPPER (Cu)		ppm
ZINC (Zn)		ppm
		ppm

RATING

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P_2O_5	POTASH K_2O	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PASTURE GRASS	CO	150	60	21	73	0					
PASTURE-LEGUME	CO	150	20	32	73	0					
PASTURE GRASS	CO	180	78	25	78	0					
PASTURE LEGUME	CO	180	20	33	79	0					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:	COMMENTS: Apply 4 tons of lime per acre
TONS/A 15/3	
APPLIED	

113022

MIKE MARTIN #2

PERRY AGRICULTURAL LABORATORY, INC

REPORT NUMBER A0075 | DATE 7/9/2012

SUBMITTED FOR
OROS & BUSCH

SEND TO
P.A.L., Inc.
P.O. BOX 418
ROWLING GREEN, Missouri 63334

SOIL REPORT

					RATING
					VERY LOW | LOW | MODERATE | DESIRED | VERY HIGH | EXCESS
Sample:	160	pH	5.50		
ACRES:		PHOSPHORUS (P)	51	lbs/a	
CEC	17.07 me	SULFUR (SO4-S)	27	lbs/a	
SOIL TEXTURE	Silt Loam	CALCIUM (Ca)	4215	lbs/a	
ORGANIC MATTER:	2.50 %	MAGNESIUM (Mg)	519	lbs/a	
		POTASSIUM (K)	285	lbs/a	
Neal A	4.00	SODIUM (Na)		lbs/a	
BASE SATURATION PERCENT		BORON (B)		ppm	
CALCIUM:	61.75	IRON (Fe)		ppm	
MAGNESIUM:	12.67	MANGANESE (Mn		ppm	
POTASSIUM:	2.14	COPPER (Cu)		ppm	
		ZINC (Zn)		ppm	
				ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			N	P2O5	K2O	S	Mg	B	Mn	Cu	Zn
PASTURE GRASS	CO	150	60	20	20	5					
PASTURE-LEGUME	CO	150	20	20	20	5					
PASTURE GRASS	CO	180	78	20	23	5					
PASTURE LEGUME	CO	180	20	20	23	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENMA: 648

APPLIED:

COMMENTS: Apply 2 tons of lime per acre

7/9/12

ROSS JONES #2

PERRY AGRICULTURAL LABORATORY, INC

REPORT NUMBER: A0335 | DATE: 7/6/2012

SUBMITTED FOR
CROSS & BUSCH

SEND TO
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING					
					VERY LOW	LOW	MODERATE	OLSP/MLD	VERY HIGH	EXCESS
Sample	16A	pH	4.30							
ACRES		PHOSPHORUS (P)	19	lbs/a						
CEC	17.56 me	SULFUR (SO4-S)	18	lbs/a						
SOIL TEXTURE	SiCLoam	CALCIUM (Ca)	3482	lbs/a						
ORGANIC MATTER	2.40 %	MAGNESIUM (Mg)	640	lbs/a						
		POTASSIUM (K)	184	lbs/a						
Neut. Ac	8.00	SODIUM (Na)		lbs/a						
BASE SATURATION PERCENT		BORON (B)		ppm						
CALCIUM	49.51	IRON (Fe)		ppm						
MAGNESIUM	15.17	MANGANESE (Mn)		ppm						
POTASSIUM	1.20	COPPER (Cu)		ppm						
		ZINC (Zn)		ppm						
				ppm						

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT / POUNDS / ACRE								
PASTURE GRASS	CO	150	60	34	66	5					
PASTURE-LEGUME	CO	150	20	58	56	5					
PASTURE GRASS	CO	180	78	76	81	5					
PASTURE-LEGUME	CO	180	20	76	81	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1514

APPLIED:

COMMENTS: Apply 4 tons of lime per acre

113822

THOMAS LEE #18

PENNY AGRICULTURAL LABORATORY, INC

REPORT NUMBER: A3037 | DATE: 7/9/2012

SUBMITTED FOR:
ORDS & BUSCH

SEND TO:
P.A.L., Inc
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING
					VERY LOW / LOW / MODERATE / OPTIMUM / VERY HIGH / EXCESS
Sample	11A	pH	6.00		
ACRES		PHOSPHORUS (P)	25	lbs/a	
CEC	11.72 me	SULFUR (SO4-S)	27	lbs/a	
SOIL TEXTURE	Silt Loam	CALCIUM (Ca)	3013	lbs/a	
ORGANIC MATTER	2.20 %	MAGNESIUM (Mg)	422	lbs/a	
		POTASSIUM (K)	331	lbs/a	
Nov. A	2.00	SODIUM (Na)		lbs/a	
BASE SATURATION PERCENT		BORON (B)		ppm	
CALCIUM	64.30	IRON (Fe)		ppm	
MAGNESIUM	15.01	MANGANESE (Mn)		ppm	
POTASSIUM	3.62	COPPER (Cu)		ppm	
		ZINC (Zn)		ppm	
				ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN (N)	PHOSPHATE (P2O5)	POTASH (K2O)	SULFUR (S)	BORON (B)	IRON (Fe)	MANGANESE (Mn)	COPPER (Cu)	ZINC (Zn)
PASTURE GRASS	CO	150	60	25	0	5					
PASTURE-LEGUME	CO	150	20	40	0	5					
PASTURE GRASS	CO	180	75	27	0	5					
PASTURE-LEGUME	CO	180	20	41	0	5					
DATES/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

COMMENTS

APPLIED

113022

JOE BAUMGARTNER #1

PERRY AGRICULTURAL LABORATORY, INC.

P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2831

REPORT NUMBER A0077 DATE 7/9/2012

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING
					VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
Sample:	18D	pH	4.80		
ACRES:		PHOSPHORUS (P)	76	lbs/a	
CEC:	17.94 me	SULFUR (SO4-S)	84	lbs/a	
SOIL TEXTURE:	Silt Loam	CALCIUM (Ca)	3720	lbs/a	
ORGANIC MATTER:	2.10 %	MAGNESIUM (Mg)	596	lbs/a	
		POTASSIUM (K)	122	lbs/a	
Neut. A:	6.00	SODIUM (Na)		lbs/a	
BASE SATURATION PERCENT		BORON (B)		ppm	
CALCIUM:	51.84	IRON (Fe)		ppm	
MAGNESIUM:	13.84	MANGANESE (Mn		ppm	
POTASSIUM:	0.87	COPPER (Cu)		ppm	
		ZINC (Zn)		ppm	
				ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	60	0	73	0					
PASTURE-LEGUME	CD	150	20	0	73	0					
PASTURE GRASS	CD	180	78	0	79	0					
PASTURE-LEGUME	CD	180	20	0	79	0					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1573

APPLIED:

COMMENTS: Apply 4 tons of lime per acre.

113622

JOE BAUMGARTNER #2

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

REPORT NUMBER A0071 DATE 7/9/2012

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING
					VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
Sample:	9D	pH	4.90		
ACRES:		PHOSPHORUS (P)	73	lbs/a	
CEC:	17.94 me	SULFUR (SO4-S)	27	lbs/a	
SOIL TEXTURE:	Silt Loam	CALCIUM (Ca)	3731	lbs/a	
ORGANIC MATTER:	2.50 %	MAGNESIUM (Mg)	581	lbs/a	
		POTASSIUM (K)	147	lbs/a	
Neut. A:	6.00	SODIUM (Na)		lbs/a	
		BORON (B)		ppm	
BASE SATURATION PERCENT		IRON (Fe)		ppm	
CALCIUM:	52.00	MANGANESE (Mn		ppm	
MAGNESIUM:	13.50	COPPER (Cu)		ppm	
POTASSIUM:	1.05	ZINC (Zn)		ppm	
				ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	60	0	63	5					
PASTURE-LEGUME	CD	150	20	0	63	5					
PASTURE GRASS	CD	180	78	0	68	5					
PASTURE-LEGUME	CD	180	20	0	68	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1514

APPLIED:

COMMENTS: Apply 4 tons of lime per acre.

113622

JOEL BULLARD #2

PERRY AGRICULTURAL LABORATORY, INC.

P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

REPORT NUMBER A0066 | DATE 7/9/2012

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample:	18C
ACRES:	
CEC:	18.09 me
SOIL TEXTURE:	Clay Loam
ORGANIC MATTER:	2.40 %
Neut. A:	5.00

BASE SATURATION PERCENT	
CALCIUM:	55.02
MAGNESIUM:	16.12
POTASSIUM:	1.21

			RATING: VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
pH	5.00		
PHOSPHORUS (P)	19	lbs/a	
SULFUR (SO4-S)	21	lbs/a	
CALCIUM (Ca)	3981	lbs/a	
MAGNESIUM (Mg)	700	lbs/a	
POTASSIUM (K)	171	lbs/a	
SODIUM (Na)		lbs/a	
BORON (B)		ppm	
IRON (Fe)		ppm	
MANGANESE (Mn		ppm	
COPPER (Cu)		ppm	
ZINC (Zn)		ppm	
		ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE: NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn	
PASTURE GRASS	CD	150	75	34	54	5						
PASTURE-LEGUME	CD	150	20	58	54	5						
PASTURE GRASS	CD	180	93	36	60	5						
PASTURE-LEGUME	CD	180	20	59	60	5						
DATE/AMOUNT APPLIED												

LIME RECOMMENDATIONS:

lbs ENM/A: 1207

APPLIED:

COMMENTS: Apply 3 tons of lime per acre.

113622

PHIL BROOKS #1

REPORT NUMBER	A0067	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.

P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING					
					VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample:	1D		pH	4.70						
ACRES:			PHOSPHORUS (P)	9	lbs/a					
CEC:	22.60	me	SULFUR (SO4-S)	24	lbs/a					
SOIL TEXTURE:	Clay Loam		CALCIUM (Ca)	5214	lbs/a					
ORGANIC MATTER:	1.40	%	MAGNESIUM (Mg)	800	lbs/a					
			POTASSIUM (K)	182	lbs/a					
Neut. A:	6.00		SODIUM (Na)		lbs/a					
BASE SATURATION PERCENT			BORON (B)		ppm					
CALCIUM:	57.67		IRON (Fe)		ppm					
MAGNESIUM:	14.75		MANGANESE (Mn		ppm					
POTASSIUM:	1.03		COPPER (Cu)		ppm					
			ZINC (Zn)		ppm					
					ppm					

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	75	53	57	5					
PASTURE-LEGUME	CD	150	30	95	57	5					
PASTURE GRASS	CD	180	93	54	62	5					
PASTURE-LEGUME	CD	180	30	96	62	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1625

APPLIED:

COMMENTS: Apply 4 tons of lime per acre.

113622

Phil Brooks #2

PERRY AGRICULTURAL LABORATORY, INC.

P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

REPORT NUMBER	A0067	DATE	7/9/2012

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING					
					VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample:	1D		pH	4.70						
ACRES:			PHOSPHORUS (P)	9 lbs/a						
CEC:	22.60	me	SULFUR (SO4-S)	24 lbs/a						
SOIL TEXTURE:	Clay Loam		CALCIUM (Ca)	5214 lbs/a						
ORGANIC MATTER:	1.40	%	MAGNESIUM (Mg)	800 lbs/a						
			POTASSIUM (K)	182 lbs/a						
Neut. A:	6.00		SODIUM (Na)	lbs/a						
BASE SATURATION PERCENT			BORON (B)	ppm						
CALCIUM:	57.67		IRON (Fe)	ppm						
MAGNESIUM:	14.75		MANGANESE (Mn	ppm						
POTASSIUM:	1.03		COPPER (Cu)	ppm						
			ZINC (Zn)	ppm						
				ppm						

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	75	53	57	5					
PASTURE-LEGUME	CD	150	30	95	57	5					
PASTURE GRASS	CD	180	93	54	62	5					
PASTURE-LEGUME	CD	180	30	96	62	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1625

APPLIED:

COMMENTS: Apply 4 tons of lime per acre.

113622

ROBERT HIGHLS #1

REPORT NUMBER	A0047	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING
					VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
Sample:	9B	pH	5.00		
ACRES:		PHOSPHORUS (P)	63	lbs/a	
CEC:	16.61 me	SULFUR (SO4-S)	45	lbs/a	
SOIL TEXTURE:	Silt Loam	CALCIUM (Ca)	3638	lbs/a	
ORGANIC MATTER:	2.20 %	MAGNESIUM (Mg)	560	lbs/a	
		POTASSIUM (K)	142	lbs/a	
Neut. A:	5.00	SODIUM (Na)		lbs/a	
		BORON (B)		ppm	
		IRON (Fe)		ppm	
		MANGANESE (Mn		ppm	
		COPPER (Cu)		ppm	
		ZINC (Zn)		ppm	
				ppm	

BASE SATURATION PERCENT	
CALCIUM:	54.75
MAGNESIUM:	14.05
POTASSIUM:	1.10

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	60	0	63	0					
PASTURE-LEGUME	CD	150	20	0	63	0					
PASTURE GRASS	CD	180	78	0	68	0					
PASTURE-LEGUME	CD	180	20	0	68	0					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:	
lbs ENM/A:	1207
APPLIED:	

COMMENTS: Apply 3 tons of lime per acre.

113622

ROBERT HAGANS #2

PERRY AGRICULTURAL LABORATORY, INC.

P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

REPORT NUMBER A0044 DATE 7/9/2012

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample:	5B
ACRES:	
CEC:	23.57 me
SOIL TEXTURE:	Clay Loam
ORGANIC MATTER:	1.30 %
Neut. A:	7.00

BASE SATURATION PERCENT	
CALCIUM:	51.75
MAGNESIUM:	17.47
POTASSIUM:	1.09

			RATING: VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
pH	4.20		
PHOSPHORUS (P)	6	lbs/a	
SULFUR (SO4-S)	33	lbs/a	
CALCIUM (Ca)	4879	lbs/a	
MAGNESIUM (Mg)	988	lbs/a	
POTASSIUM (K)	200	lbs/a	
SODIUM (Na)		lbs/a	
BORON (B)		ppm	
IRON (Fe)		ppm	
MANGANESE (Mn		ppm	
COPPER (Cu)		ppm	
ZINC (Zn)		ppm	
		ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE: NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	75	60	52	0					
PASTURE-LEGUME	CD	150	30	111	52	0					
PASTURE GRASS	CD	180	93	62	58	0					
PASTURE-LEGUME	CD	180	30	111	58	0					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 2130

APPLIED:

COMMENTS: Apply 4 tons of lime per acre.

113622

ROBERT MAGAJS #3

REPORT NUMBER A0047 DATE 7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING: VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
Sample:	9B	pH	5.00		
ACRES:		PHOSPHORUS (P)	63	lbs/a	
CEC:	16.61 me	SULFUR (SO4-S)	45	lbs/a	
SOIL TEXTURE:	Silt Loam	CALCIUM (Ca)	3638	lbs/a	
ORGANIC MATTER:	2.20 %	MAGNESIUM (Mg)	560	lbs/a	
		POTASSIUM (K)	142	lbs/a	
Neut. A:	5.00	SODIUM (Na)		lbs/a	
		BORON (B)		ppm	
BASE SATURATION PERCENT		IRON (Fe)		ppm	
CALCIUM:	54.75	MANGANESE (Mn		ppm	
MAGNESIUM:	14.05	COPPER (Cu)		ppm	
POTASSIUM:	1.10	ZINC (Zn)		ppm	
				ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE: NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	60	0	63	0					
PASTURE-LEGUME	CD	150	20	0	63	0					
PASTURE GRASS	CD	180	78	0	68	0					
PASTURE-LEGUME	CD	180	20	0	68	0					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1207

APPLIED:

COMMENTS: Apply 3 tons of lime per acre.

113622

STEVE CRAIG #1

REPORT NUMBER	A0069	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.

P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING					
					VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample:	3D		pH	5.20						
ACRES:			PHOSPHORUS (P)	31	lbs/a					
CEC:	19.14	me	SULFUR (SO4-S)	12	lbs/a					
SOIL TEXTURE:	Clay Loam		CALCIUM (Ca)	4169	lbs/a					
ORGANIC MATTER:	3.90	%	MAGNESIUM (Mg)	797	lbs/a					
			POTASSIUM (K)	310	lbs/a					
Neut. A:	5.00		SODIUM (Na)		lbs/a					
BASE SATURATION PERCENT			BORON (B)		ppm					
CALCIUM:	54.45		IRON (Fe)		ppm					
MAGNESIUM:	17.35		MANGANESE (Mn		ppm					
POTASSIUM:	2.08		COPPER (Cu)		ppm					
			ZINC (Zn)		ppm					
					ppm					

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	70	20	20	10					
PASTURE-LEGUME	CD	150	20	25	20	10					
PASTURE GRASS	CD	180	88	20	20	10					
PASTURE-LEGUME	CD	180	20	26	20	10					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1078

APPLIED:

COMMENTS: Apply 3 tons of lime per acre.

113622

STEVE CRAIG #2

REPORT NUMBER	A0069	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING: VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
Sample:	3D	pH	5.20		
ACRES:		PHOSPHORUS (P)	31	lbs/a	
CEC:	19.14 me	SULFUR (SO4-S)	12	lbs/a	
SOIL TEXTURE:	Clay Loam	CALCIUM (Ca)	4169	lbs/a	
ORGANIC MATTER:	3.90 %	MAGNESIUM (Mg)	797	lbs/a	
		POTASSIUM (K)	310	lbs/a	
Neut. A:	5.00	SODIUM (Na)		lbs/a	
		BORON (B)		ppm	
		IRON (Fe)		ppm	
		MANGANESE (Mn		ppm	
		COPPER (Cu)		ppm	
		ZINC (Zn)		ppm	
				ppm	

BASE SATURATION PERCENT	
CALCIUM:	54.45
MAGNESIUM:	17.35
POTASSIUM:	2.08

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	70	20	20	10					
PASTURE-LEGUME	CD	150	20	25	20	10					
PASTURE GRASS	CD	180	88	20	20	10					
PASTURE-LEGUME	CD	180	20	26	20	10					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1078

APPLIED:

COMMENTS: Apply 3 tons of lime per acre.

113622

STEVE CRAIG #3

REPORT NUMBER	A0036	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING					
					VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample:	15A		pH	4.60						
ACRES:			PHOSPHORUS (P)	15 lbs/a						
CEC:	14.51	me	SULFUR (SO4-S)	15 lbs/a						
SOIL TEXTURE:	Silt Loam		CALCIUM (Ca)	2534 lbs/a						
ORGANIC MATTER:	2.70	%	MAGNESIUM (Mg)	485 lbs/a						
			POTASSIUM (K)	118 lbs/a						
Neut. A:	6.00		SODIUM (Na)	lbs/a						
			BORON (B)	ppm						
			IRON (Fe)	ppm						
			MANGANESE (Mn	ppm						
			COPPER (Cu)	ppm						
			ZINC (Zn)	ppm						
				ppm						

BASE SATURATION PERCENT	
CALCIUM:	43.67
MAGNESIUM:	13.93
POTASSIUM:	1.04

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	60	41	69	10					
PASTURE-LEGUME	CD	150	20	71	69	10					
PASTURE GRASS	CD	180	78	42	75	10					
PASTURE-LEGUME	CD	180	20	72	75	10					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:
lbs ENM/A: 1673
APPLIED:

COMMENTS: Apply 4 tons of lime per acre.

113622

TERRY BARNES #1

REPORT NUMBER	A0029	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.

P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING					
					VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample:	7A		pH	4.60						
ACRES:			PHOSPHORUS (P)	51	lbs/a					
CEC:	20.75	me	SULFUR (SO4-S)	42	lbs/a					
SOIL TEXTURE:	Clay Loam		CALCIUM (Ca)	4469	lbs/a					
ORGANIC MATTER:	1.70	%	MAGNESIUM (Mg)	658	lbs/a					
			POTASSIUM (K)	651	lbs/a					
Neut. A:	6.00		SODIUM (Na)		lbs/a					
			BORON (B)		ppm					
			IRON (Fe)		ppm					
			MANGANESE (Mn		ppm					
			COPPER (Cu)		ppm					
			ZINC (Zn)		ppm					
					ppm					

BASE SATURATION PERCENT	
CALCIUM:	53.85
MAGNESIUM:	13.21
POTASSIUM:	4.02

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	75	20	0	0					
PASTURE-LEGUME	CD	150	30	20	0	0					
PASTURE GRASS	CD	180	93	20	0	0					
PASTURE-LEGUME	CD	180	30	20	0	0					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:
lbs ENM/A: 1673
APPLIED:

COMMENTS: Apply 4 tons of lime per acre.

113622

TERRY BARNES #3

REPORT NUMBER	A0029	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING					
					VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample:	7A		pH	4.60						
ACRES:			PHOSPHORUS (P)	51	lbs/a					
CEC:	20.75	me	SULFUR (SO4-S)	42	lbs/a					
SOIL TEXTURE:	Clay Loam		CALCIUM (Ca)	4469	lbs/a					
ORGANIC MATTER:	1.70	%	MAGNESIUM (Mg)	658	lbs/a					
			POTASSIUM (K)	651	lbs/a					
Neut. A:	6.00		SODIUM (Na)		lbs/a					
			BORON (B)		ppm					
			IRON (Fe)		ppm					
			MANGANESE (Mn		ppm					
			COPPER (Cu)		ppm					
			ZINC (Zn)		ppm					
					ppm					

BASE SATURATION PERCENT	
CALCIUM:	53.85
MAGNESIUM:	13.21
POTASSIUM:	4.02

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	75	20	0	0					
PASTURE-LEGUME	CD	150	30	20	0	0					
PASTURE GRASS	CD	180	93	20	0	0					
PASTURE-LEGUME	CD	180	30	20	0	0					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1673

APPLIED:

COMMENTS: Apply 4 tons of lime per acre.

113622

TERRY BARNES #2

REPORT NUMBER	A0029	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING					
					VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample:	7A		pH	4.60						
ACRES:			PHOSPHORUS (P)	51	lbs/a					
CEC:	20.75	me	SULFUR (SO4-S)	42	lbs/a					
SOIL TEXTURE:	Clay Loam		CALCIUM (Ca)	4469	lbs/a					
ORGANIC MATTER:	1.70	%	MAGNESIUM (Mg)	658	lbs/a					
			POTASSIUM (K)	651	lbs/a					
Neut. A:	6.00		SODIUM (Na)		lbs/a					
			BORON (B)		ppm					
			IRON (Fe)		ppm					
			MANGANESE (Mn		ppm					
			COPPER (Cu)		ppm					
			ZINC (Zn)		ppm					
					ppm					

BASE SATURATION PERCENT	
CALCIUM:	53.85
MAGNESIUM:	13.21
POTASSIUM:	4.02

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	75	20	0	0					
PASTURE-LEGUME	CD	150	30	20	0	0					
PASTURE GRASS	CD	180	93	20	0	0					
PASTURE-LEGUME	CD	180	30	20	0	0					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1673

APPLIED:

COMMENTS: Apply 4 tons of lime per acre.

113622

TERRY BARNES #4

REPORT NUMBER	A0029	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2831

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING: VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
Sample:	7A	pH	4.60		
ACRES:		PHOSPHORUS (P)	51	lbs/a	
CEC:	20.75 me	SULFUR (SO4-S)	42	lbs/a	
SOIL TEXTURE:	Clay Loam	CALCIUM (Ca)	4469	lbs/a	
ORGANIC MATTER:	1.70 %	MAGNESIUM (Mg)	658	lbs/a	
		POTASSIUM (K)	651	lbs/a	
Neut. A:	6.00	SODIUM (Na)		lbs/a	
		BORON (B)		ppm	
		IRON (Fe)		ppm	
		MANGANESE (Mn)		ppm	
		COPPER (Cu)		ppm	
		ZINC (Zn)		ppm	
				ppm	

BASE SATURATION PERCENT	
CALCIUM:	53.85
MAGNESIUM:	13.21
POTASSIUM:	4.02

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	75	20	0	0					
PASTURE-LEGUME	CD	150	30	20	0	0					
PASTURE GRASS	CD	180	93	20	0	0					
PASTURE-LEGUME	CD	180	30	20	0	0					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1673

APPLIED:

COMMENTS: Apply 4 tons of lime per acre.

113622

BRANDON WINFREY #1

PERRY AGRICULTURAL LABORATORY, INC.

P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2831

REPORT NUMBER	A0076	DATE	7/9/2012

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING						
					VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample:	17D		pH	4.90						
ACRES:			PHOSPHORUS (P)	31	lbs/a						
CEC:	17.84	me	SULFUR (SO4-S)	24	lbs/a						
SOIL TEXTURE:	Silt Loam		CALCIUM (Ca)	3587	lbs/a						
ORGANIC MATTER:	2.30	%	MAGNESIUM (Mg)	642	lbs/a						
			POTASSIUM (K)	156	lbs/a						
Neut. A:	6.00		SODIUM (Na)		lbs/a						
			BORON (B)		ppm						
			IRON (Fe)		ppm						
			MANGANESE (Mn		ppm						
			COPPER (Cu)		ppm						
			ZINC (Zn)		ppm						
					ppm						

BASE SATURATION PERCENT	
CALCIUM:	50.26
MAGNESIUM:	14.99
POTASSIUM:	1.12

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	60	20	59	5					
PASTURE-LEGUME	CD	150	20	25	59	5					
PASTURE GRASS	CD	180	78	20	65	5					
PASTURE-LEGUME	CD	180	20	26	65	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1514

APPLIED:

COMMENTS: Apply 4 tons of lime per acre.

113622

BRANDON WINTREY #2

REPORT NUMBER	A0090	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING					
					VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample:	10H		pH	5.20						
ACRES:			PHOSPHORUS (P)	25 lbs/a						
CEC:	17.78	me	SULFUR (SO4-S)	27 lbs/a						
SOIL TEXTURE:	Silt Loam		CALCIUM (Ca)	3927 lbs/a						
ORGANIC MATTER:	2.30	%	MAGNESIUM (Mg)	649 lbs/a						
			POTASSIUM (K)	199 lbs/a						
Neut. A:	5.00		SODIUM (Na)	lbs/a						
			BORON (B)	ppm						
			IRON (Fe)	ppm						
			MANGANESE (Mn	ppm						
			COPPER (Cu)	ppm						
			ZINC (Zn)	ppm						
				ppm						

BASE SATURATION PERCENT	
CALCIUM:	55.23
MAGNESIUM:	15.21
POTASSIUM:	1.44

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	60	25	44	5					
PASTURE-LEGUME	CD	150	20	40	44	5					
PASTURE GRASS	CD	180	78	27	49	5					
PASTURE-LEGUME	CD	180	20	41	49	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1078

APPLIED:

COMMENTS: Apply 3 tons of lime per acre.

113622

BRANDON WINFREY #3

REPORT NUMBER	A0026	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample:	4A
ACRES:	
CEC:	19.53 me
SOIL TEXTURE:	Clay Loam
ORGANIC MATTER:	2.00 %
Neut. A:	4.00

BASE SATURATION PERCENT	
CALCIUM:	60.84
MAGNESIUM:	13.82
POTASSIUM:	4.86

			RATING: VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
pH	5.20		
PHOSPHORUS (P)	60	lbs/a	
SULFUR (SO4-S)	36	lbs/a	
CALCIUM (Ca)	4753	lbs/a	
MAGNESIUM (Mg)	648	lbs/a	
POTASSIUM (K)	740	lbs/a	
SODIUM (Na)		lbs/a	
BORON (B)		ppm	
IRON (Fe)		ppm	
MANGANESE (Mn		ppm	
COPPER (Cu)		ppm	
ZINC (Zn)		ppm	
		ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE: NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	75	0	0	0					
PASTURE-LEGUME	CD	150	20	0	0	0					
PASTURE GRASS	CD	180	93	0	0	0					
PASTURE-LEGUME	CD	180	20	0	0	0					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS

lbs ENM/A: 862

APPLIED:

COMMENTS: Apply 2 tons of lime per acre.

113622

BRUCE HACKMAN #1

REPORT NUMBER	A0037	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

				RATING						
				VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample:	16A		pH	4.60					
ACRES:			PHOSPHORUS (P)	19	lbs/a					
CEC:	14.35	me	SULFUR (SO4-S)	30	lbs/a					
SOIL TEXTURE:	Silt Loam		CALCIUM (Ca)	2470	lbs/a					
ORGANIC MATTER:	3.00	%	MAGNESIUM (Mg)	483	lbs/a					
			POTASSIUM (K)	125	lbs/a					
Neut. A:	6.00		SODIUM (Na)		lbs/a					
BASE SATURATION PERCENT			BORON (B)		ppm					
CALCIUM:	43.04		IRON (Fe)		ppm					
MAGNESIUM:	14.03		MANGANESE (Mn		ppm					
POTASSIUM:	1.12		COPPER (Cu)		ppm					
			ZINC (Zn)		ppm					
					ppm					

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	60	34	66	5					
PASTURE-LEGUME	CD	150	20	58	66	5					
PASTURE GRASS	CD	180	78	36	72	5					
PASTURE-LEGUME	CD	180	20	59	72	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1673

APPLIED:

COMMENTS: Apply 4 tons of lime per acre.

113622

BRUCE HACKMAN #2

REPORT NUMBER	A0058	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.

P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING					
					VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample:	4C		pH	4.30						
ACRES:			PHOSPHORUS (P)	12	lbs/a					
CEC:	20.47	me	SULFUR (SO4-S)	30	lbs/a					
SOIL TEXTURE:	Clay Loam		CALCIUM (Ca)	3849	lbs/a					
ORGANIC MATTER:	2.60	%	MAGNESIUM (Mg)	860	lbs/a					
			POTASSIUM (K)	203	lbs/a					
Neut. A:	7.00		SODIUM (Na)		lbs/a					
			BORON (B)		ppm					
			IRON (Fe)		ppm					
			MANGANESE (Mn		ppm					
			COPPER (Cu)		ppm					
			ZINC (Zn)		ppm					
					ppm					

BASE SATURATION PERCENT	
CALCIUM:	47.02
MAGNESIUM:	17.51
POTASSIUM:	1.27

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	75	46	46	5					
PASTURE-LEGUME	CD	150	20	83	46	5					
PASTURE GRASS	CD	180	93	48	52	5					
PASTURE-LEGUME	CD	180	20	84	52	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:
lbs ENM/A: 2091
APPLIED:

COMMENTS: Apply 4 tons of lime per acre.

113622

BRUCE HACKMAN #3

PERRY AGRICULTURAL LABORATORY, INC.

P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2831

REPORT NUMBER	A0059	DATE	7/9/2012

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample:	5C	
ACRES:		
CEC:	24.08	me
SOIL TEXTURE:	Clay	
ORGANIC MATTER:	0.90	%
Neut. A:	7.00	

BASE SATURATION PERCENT	
CALCIUM:	50.20
MAGNESIUM:	19.50
POTASSIUM:	1.22

			RATING: VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
pH	4.20		
PHOSPHORUS (P)	6	lbs/a	
SULFUR (SO4-S)	27	lbs/a	
CALCIUM (Ca)	4835	lbs/a	
MAGNESIUM (Mg)	1127	lbs/a	
POTASSIUM (K)	229	lbs/a	
SODIUM (Na)		lbs/a	
BORON (B)		ppm	
IRON (Fe)		ppm	
MANGANESE (Mn		ppm	
COPPER (Cu)		ppm	
ZINC (Zn)		ppm	
		ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE: NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	75	60	43	5					
PASTURE-LEGUME	CD	150	30	111	43	5					
PASTURE GRASS	CD	180	93	62	49	5					
PASTURE-LEGUME	CD	180	30	111	49	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 2130

APPLIED:

COMMENTS: Apply 4 tons of lime per acre.

113622

BRUCE HACKMAN #4

REPORT NUMBER	A0055	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2831

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample:	1C				RATING: VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
ACRES:		pH	4.40		
CEC:	20.08 me	PHOSPHORUS (P)	9	lbs/a	
SOIL TEXTURE:	Clay Loam	SULFUR (SO4-S)	18	lbs/a	
ORGANIC MATTER:	1.00 %	CALCIUM (Ca)	3893	lbs/a	
		MAGNESIUM (Mg)	773	lbs/a	
		POTASSIUM (K)	101	lbs/a	
Neut. A:	7.00	SODIUM (Na)		lbs/a	
BASE SATURATION PERCENT		BORON (B)		ppm	
CALCIUM:	48.46	IRON (Fe)		ppm	
MAGNESIUM:	16.04	MANGANESE (Mn		ppm	
POTASSIUM:	0.64	COPPER (Cu)		ppm	
		ZINC (Zn)		ppm	
				ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE									
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn	
PASTURE GRASS	CD	150	75	53	85	5						
PASTURE-LEGUME	CD	150	30	95	85	5						
PASTURE GRASS	CD	180	93	54	91	5						
PASTURE-LEGUME	CD	180	30	96	91	5						
DATE/AMOUNT APPLIED												

LIME RECOMMENDATIONS:
lbs ENM/A: 2049
APPLIED:

COMMENTS: Apply 4 tons of lime per acre.

113622

BRUCE HACKMAN #5

PERRY AGRICULTURAL LABORATORY, INC.

P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

REPORT NUMBER	A0060	DATE	7/9/2012

SUBMITTED FOR
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample:	9C	
ACRES:		
CEC:	17.33	me
SOIL TEXTURE:	Silt Loam	
ORGANIC MATTER:	2.10	%
Neut. A:	5.00	

BASE SATURATION PERCENT	
CALCIUM:	55.55
MAGNESIUM:	14.40
POTASSIUM:	1.21

			RATING: VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
pH	5.10		
PHOSPHORUS (P)	57	lbs/a	
SULFUR (SO4-S)	33	lbs/a	
CALCIUM (Ca)	3851	lbs/a	
MAGNESIUM (Mg)	599	lbs/a	
POTASSIUM (K)	163	lbs/a	
SODIUM (Na)		lbs/a	
BORON (B)		ppm	
IRON (Fe)		ppm	
MANGANESE (Mn		ppm	
COPPER (Cu)		ppm	
ZINC (Zn)		ppm	
		ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE: NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	60	20	56	0					
PASTURE-LEGUME	CD	150	20	20	56	0					
PASTURE GRASS	CD	180	78	20	61	0					
PASTURE-LEGUME	CD	180	20	20	61	0					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1146

APPLIED:

COMMENTS: Apply 3 tons of lime per acre.

113622

BRUCE HACKMAN #6

REPORT NUMBER	A0072	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.

P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample:	10D
ACRES:	
CEC:	17.19 me
SOIL TEXTURE:	Silt Loam
ORGANIC MATTER:	1.30 %
Neut. A:	4.00

BASE SATURATION PERCENT	
CALCIUM:	56.07
MAGNESIUM:	19.91
POTASSIUM:	0.75

			RATING: VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
pH	5.30		
PHOSPHORUS (P)	15	lbs/a	
SULFUR (SO4-S)	30	lbs/a	
CALCIUM (Ca)	3854	lbs/a	
MAGNESIUM (Mg)	821	lbs/a	
POTASSIUM (K)	101	lbs/a	
SODIUM (Na)		lbs/a	
BORON (B)		ppm	
IRON (Fe)		ppm	
MANGANESE (Mn		ppm	
COPPER (Cu)		ppm	
ZINC (Zn)		ppm	
		ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE: NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	70	41	81	5					
PASTURE-LEGUME	CD	150	30	71	81	5					
PASTURE GRASS	CD	180	88	42	87	5					
PASTURE-LEGUME	CD	180	30	72	87	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 800

APPLIED:

COMMENTS: Apply 2 tons of lime per acre.

113622

CLIFTON NAHLER #1

REPORT NUMBER	A0034	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2831

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample:	13A
ACRES:	
CEC:	23.95 me
SOIL TEXTURE:	Clay Loam
ORGANIC MATTER:	2.40 %
Neut. A:	4.00

BASE SATURATION PERCENT	
CALCIUM:	63.24
MAGNESIUM:	18.02
POTASSIUM:	2.03

			RATING: VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
pH	5.30		
PHOSPHORUS (P)	19	lbs/a	
SULFUR (SO4-S)	36	lbs/a	
CALCIUM (Ca)	6059	lbs/a	
MAGNESIUM (Mg)	1036	lbs/a	
POTASSIUM (K)	380	lbs/a	
SODIUM (Na)		lbs/a	
BORON (B)		ppm	
IRON (Fe)		ppm	
MANGANESE (Mn		ppm	
COPPER (Cu)		ppm	
ZINC (Zn)		ppm	
		ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE: NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	75	34	20	0					
PASTURE-LEGUME	CD	150	20	58	20	0					
PASTURE GRASS	CD	180	93	36	20	0					
PASTURE-LEGUME	CD	180	20	59	20	0					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 800

APPLIED:

COMMENTS: Apply 2 tons of lime per acre.

113622

CLIFTON NAHLER #2

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

REPORT NUMBER	A0027	DATE	7/9/2012

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

				RATING						
				VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample:	5A		pH	5.20					
ACRES:			PHOSPHORUS (P)	86	lbs/a				
CEC:	17.84	me	SULFUR (SO4-S)	30	lbs/a				
SOIL TEXTURE:	Silt Loam		CALCIUM (Ca)	4237	lbs/a				
ORGANIC MATTER:	1.70	%	MAGNESIUM (Mg)	523	lbs/a				
			POTASSIUM (K)	834	lbs/a				
Neut. A:	4.00		SODIUM (Na)		lbs/a				
			BORON (B)		ppm				
			IRON (Fe)		ppm				
			MANGANESE (Mn		ppm				
			COPPER (Cu)		ppm				
			ZINC (Zn)		ppm				
					ppm				

BASE SATURATION PERCENT	
CALCIUM:	59.37
MAGNESIUM:	12.21
POTASSIUM:	5.99

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	70	0	0	5					
PASTURE-LEGUME	CD	150	30	0	0	5					
PASTURE GRASS	CD	180	88	0	0	5					
PASTURE-LEGUME	CD	180	30	0	0	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:
lbs ENM/A: 862
APPLIED:

COMMENTS: Apply 2 tons of lime per acre.

113622

DALE WILSON #1

PERRY AGRICULTURAL LABORATORY, INC.

P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

REPORT NUMBER	A0053	DATE	7/9/2012

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L , Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

				RATING					
				VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample:	17B		pH	5.10					
ACRES:			PHOSPHORUS (P)	22	lbs/a				
CEC:	16.33	me	SULFUR (SO4-S)	24	lbs/a				
SOIL TEXTURE:	Silt Loam		CALCIUM (Ca)	3402	lbs/a				
ORGANIC MATTER:	2.50	%	MAGNESIUM (Mg)	622	lbs/a				
			POTASSIUM (K)	179	lbs/a				
Neut. A:	5.00		SODIUM (Na)		lbs/a				
BASE SATURATION PERCENT			BORON (B)		ppm				
CALCIUM:	52.09		IRON (Fe)		ppm				
MAGNESIUM:	15.87		MANGANESE (Mn		ppm				
POTASSIUM:	1.41		COPPER (Cu)		ppm				
			ZINC (Zn)		ppm				
					ppm				

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	60	29	48	5					
PASTURE-LEGUME	CD	150	20	49	48	5					
PASTURE GRASS	CD	180	78	31	54	5					
PASTURE-LEGUME	CD	180	20	50	54	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1146

APPLIED:

COMMENTS: Apply 3 tons of lime per acre.

113622

DALE WILSON #2

REPORT NUMBER	A0065	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING					
					VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample:	17C		pH	5.10						
ACRES:			PHOSPHORUS (P)	22	lbs/a					
CEC:	16.83	me	SULFUR (SO4-S)	24	lbs/a					
SOIL TEXTURE:	Silt Loam		CALCIUM (Ca)	3571	lbs/a					
ORGANIC MATTER:	2.50	%	MAGNESIUM (Mg)	642	lbs/a					
			POTASSIUM (K)	175	lbs/a					
Neut. A:	5.00		SODIUM (Na)		lbs/a					
			BORON (B)		ppm					
			IRON (Fe)		ppm					
			MANGANESE (Mn		ppm					
			COPPER (Cu)		ppm					
			ZINC (Zn)		ppm					
					ppm					

BASE SATURATION PERCENT	
CALCIUM:	53.06
MAGNESIUM:	15.90
POTASSIUM:	1.33

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	60	29	51	5					
PASTURE-LEGUME	CD	150	20	49	51	5					
PASTURE GRASS	CD	180	78	31	56	5					
PASTURE-LEGUME	CD	180	20	50	56	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:
lbs ENM/A: 1146
APPLIED:

COMMENTS: Apply 3 tons of lime per acre.

113622

DAVE VINFREY #4

PERRY AGRICULTURAL LABORATORY, INC.

P.O. BOX 418, HIGHWAY 34 EAST
BOWLING GREEN, MO 63334
573/324-2031

REPORT NUMBER	A0068	DATE	7/9/2012

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

				RATING					
				VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample:	2D	pH	4.60						
ACRES:		PHOSPHORUS (P)	15 lbs/a						
CEC:	16.24 me	SULFUR (SO4-S)	12 lbs/a						
SOIL TEXTURE:	Silt Loam	CALCIUM (Ca)	2980 lbs/a						
ORGANIC MATTER:	3.30 %	MAGNESIUM (Mg)	614 lbs/a						
		POTASSIUM (K)	182 lbs/a						
Neut. A:	6.00	SODIUM (Na)	lbs/a						
BASE SATURATION PERCENT		BORON (B)	ppm						
CALCIUM:	45.87	IRON (Fe)	ppm						
MAGNESIUM:	15.75	MANGANESE (Mn	ppm						
POTASSIUM:	1.44	COPPER (Cu)	ppm						
		ZINC (Zn)	ppm						
			ppm						

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	60	41	47	10					
PASTURE-LEGUME	CD	150	20	71	47	10					
PASTURE GRASS	CD	180	78	42	53	10					
PASTURE-LEGUME	CD	180	20	72	53	10					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1673

APPLIED:

COMMENTS: Apply 4 tons of lime per acre.

113622

JOHN SAPP #1

REPORT NUMBER	A0042	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample:	3B
ACRES:	
CEC:	18.63 me
SOIL TEXTURE:	Clay Loam
ORGANIC MATTER:	2.50 %
Neut. A:	5.00

BASE SATURATION PERCENT	
CALCIUM:	55.20
MAGNESIUM:	13.10
POTASSIUM:	4.86

			RATING: VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
pH	5.10		
PHOSPHORUS (P)	60	lbs/a	
SULFUR (SO4-S)	33	lbs/a	
CALCIUM (Ca)	4114	lbs/a	
MAGNESIUM (Mg)	586	lbs/a	
POTASSIUM (K)	706	lbs/a	
SODIUM (Na)		lbs/a	
BORON (B)		ppm	
IRON (Fe)		ppm	
MANGANESE (Mn		ppm	
COPPER (Cu)		ppm	
ZINC (Zn)		ppm	
		ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE: NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	75	0	0	0					
PASTURE-LEGUME	CD	150	20	0	0	0					
PASTURE GRASS	CD	180	93	0	0	0					
PASTURE-LEGUME	CD	180	20	0	0	0					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1146

APPLIED:

COMMENTS: Apply 3 tons of lime per acre.

113622

JENNIE GARDNER #1

REPORT NUMBER	A0046	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample:	7B
ACRES:	
CEC:	15.00 me
SOIL TEXTURE:	Silt Loam
ORGANIC MATTER:	2.70 %
Neut. A:	4.00

BASE SATURATION PERCENT	
CALCIUM:	59.23
MAGNESIUM:	12.47
POTASSIUM:	1.62

			RATING: VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
pH	5.40		
PHOSPHORUS (P)	38	lbs/a	
SULFUR (SO4-S)	30	lbs/a	
CALCIUM (Ca)	3553	lbs/a	
MAGNESIUM (Mg)	449	lbs/a	
POTASSIUM (K)	190	lbs/a	
SODIUM (Na)		lbs/a	
BORON (B)		ppm	
IRON (Fe)		ppm	
MANGANESE (Mn		ppm	
COPPER (Cu)		ppm	
ZINC (Zn)		ppm	
		ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE: NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn	
PASTURE GRASS	CD	150	60	20	43	5						
PASTURE-LEGUME	CD	150	20	20	43	5						
PASTURE GRASS	CD	180	78	20	48	5						
PASTURE-LEGUME	CD	180	20	20	48	5						
DATE/AMOUNT APPLIED												

LIME RECOMMENDATIONS:

lbs ENM/A: 729

APPLIED:

COMMENTS: Apply 2 tons of lime per acre.

113622

JENNIE GARDNER #2

PERRY AGRICULTURAL LABORATORY, INC.

P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

REPORT NUMBER	A0048	DATE	7/9/2012

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample:	10B
ACRES:	
CEC:	17.98 me
SOIL TEXTURE:	Silt Loam
ORGANIC MATTER:	1.40 %
Neut. A:	4.00

BASE SATURATION PERCENT	
CALCIUM:	56.19
MAGNESIUM:	20.88
POTASSIUM:	0.68

			RATING: VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
pH	5.30		
PHOSPHORUS (P)	15	lbs/a	
SULFUR (SO4-S)	21	lbs/a	
CALCIUM (Ca)	4041	lbs/a	
MAGNESIUM (Mg)	901	lbs/a	
POTASSIUM (K)	96	lbs/a	
SODIUM (Na)		lbs/a	
BORON (B)		ppm	
IRON (Fe)		ppm	
MANGANESE (Mn		ppm	
COPPER (Cu)		ppm	
ZINC (Zn)		ppm	
		ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE: NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	70	41	85	5					
PASTURE-LEGUME	CD	150	30	71	85	5					
PASTURE GRASS	CD	180	88	42	90	5					
PASTURE-LEGUME	CD	180	30	72	90	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 800

APPLIED:

COMMENTS: Apply 2 tons of lime per acre.

113622

JERRY BARNES #1

REPORT NUMBER	A0052	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2831

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

				RATING					
				VERY LOW	LOW	MODERATE	DESIRED	VERY HIGH	EXCESS
Sample:	16B	pH	4.60						
ACRES:		PHOSPHORUS (P)	15 lbs/a						
CEC:	14.27 me	SULFUR (SO4-S)	33 lbs/a						
SOIL TEXTURE:	Silt Loam	CALCIUM (Ca)	2467 lbs/a						
ORGANIC MATTER:	2.70 %	MAGNESIUM (Mg)	474 lbs/a						
		POTASSIUM (K)	98 lbs/a						
Neut. A:	6.00	SODIUM (Na)	lbs/a						
BASE SATURATION PERCENT		BORON (B)	ppm						
CALCIUM:	43.23	IRON (Fe)	ppm						
MAGNESIUM:	13.84	MANGANESE (Mn	ppm						
POTASSIUM:	0.88	COPPER (Cu)	ppm						
		ZINC (Zn)	ppm						
			ppm						

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	60	41	78	0					
PASTURE-LEGUME	CD	150	20	71	78	0					
PASTURE GRASS	CD	180	78	42	84	0					
PASTURE-LEGUME	CD	180	20	72	84	0					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1673

APPLIED:

COMMENTS: Apply 4 tons of lime per acre.

113622

JERRY BARNES #3

PERRY AGRICULTURAL LABORATORY, INC.

P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2831

REPORT NUMBER	A0087	DATE	7/9/2012

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample:	9G		
ACRES:			
CEC:	17.66	me	
SOIL TEXTURE:	Silt Loam		
ORGANIC MATTER:	2.10	%	
Neut. A:	5.00		

BASE SATURATION PERCENT	
CALCIUM:	56.61
MAGNESIUM:	13.99
POTASSIUM:	1.10

			RATING: VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
pH	5.20		
PHOSPHORUS (P)	82	lbs/a	
SULFUR (SO4-S)	18	lbs/a	
CALCIUM (Ca)	4000	lbs/a	
MAGNESIUM (Mg)	593	lbs/a	
POTASSIUM (K)	151	lbs/a	
SODIUM (Na)		lbs/a	
BORON (B)		ppm	
IRON (Fe)		ppm	
MANGANESE (Mn		ppm	
COPPER (Cu)		ppm	
ZINC (Zn)		ppm	
		ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE: NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	60	0	61	5					
PASTURE-LEGUME	CD	150	20	0	61	5					
PASTURE GRASS	CD	180	78	0	66	5					
PASTURE-LEGUME	CD	180	20	0	66	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1078

APPLIED:

COMMENTS: Apply 3 tons of lime per acre.

113622

JERRY BARNES #4

REPORT NUMBER	A0084	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.

P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2831

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING: VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
Sample:	9J	pH	5.10		
ACRES:		PHOSPHORUS (P)	73	lbs/a	
CEC:	17.74 me	SULFUR (SO4-S)	21	lbs/a	
SOIL TEXTURE:	Silt Loam	CALCIUM (Ca)	3960	lbs/a	
ORGANIC MATTER:	2.70 %	MAGNESIUM (Mg)	635	lbs/a	
		POTASSIUM (K)	153	lbs/a	
Neut. A:	5.00	SODIUM (Na)		lbs/a	
		BORON (B)		ppm	
		IRON (Fe)		ppm	
		MANGANESE (Mn		ppm	
		COPPER (Cu)		ppm	
		ZINC (Zn)		ppm	
				ppm	

BASE SATURATION PERCENT	
CALCIUM:	55.80
MAGNESIUM:	14.91
POTASSIUM:	1.11

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	60	0	60	5					
PASTURE-LEGUME	CD	150	20	0	60	5					
PASTURE GRASS	CD	180	78	0	66	5					
PASTURE-LEGUME	CD	180	20	0	66	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:	
lbs ENM/A:	1146
APPLIED:	

COMMENTS: Apply 3 tons of lime per acre.

113622

Jim Kyd #1

REPORT NUMBER	A0078	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2931

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample:	10J
ACRES:	
CEC:	18.76 me
SOIL TEXTURE:	Clay Loam
ORGANIC MATTER:	1.90 %
Neut. A:	4.00

BASE SATURATION PERCENT	
CALCIUM:	56.75
MAGNESIUM:	20.50
POTASSIUM:	1.41

			RATING: VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
pH	5.30		
PHOSPHORUS (P)	22	lbs/a	
SULFUR (SO4-S)	21	lbs/a	
CALCIUM (Ca)	4258	lbs/a	
MAGNESIUM (Mg)	923	lbs/a	
POTASSIUM (K)	207	lbs/a	
SODIUM (Na)		lbs/a	
BORON (B)		ppm	
IRON (Fe)		ppm	
MANGANESE (Mn		ppm	
COPPER (Cu)		ppm	
ZINC (Zn)		ppm	
		ppm	

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE: NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	75	29	43	5					
PASTURE-LEGUME	CD	150	30	49	43	5					
PASTURE GRASS	CD	180	93	31	48	5					
PASTURE-LEGUME	CD	180	30	50	48	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:
lbs ENM/A: 800
APPLIED:

COMMENTS: Apply 2 tons of lime per acre.

113622

MIKE PURCELL #1

REPORT NUMBER	A0091	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2831

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

Sample:	10N		pH	5.10		RATING
ACRES:			PHOSPHORUS (P)	60	lbs/a	
CEC:	17.89	me	SULFUR (SO4-S)	24	lbs/a	
SOIL TEXTURE:	Silt Loam		CALCIUM (Ca)	4075	lbs/a	
ORGANIC MATTER:	2.10	%	MAGNESIUM (Mg)	599	lbs/a	
			POTASSIUM (K)	160	lbs/a	
Neut. A:	5.00		SODIUM (Na)		lbs/a	
BASE SATURATION PERCENT			BORON (B)		ppm	
CALCIUM:	56.95		IRON (Fe)		ppm	
MAGNESIUM:	13.95		MANGANESE (Mn		ppm	
POTASSIUM:	1.15		COPPER (Cu)		ppm	
			ZINC (Zn)		ppm	
					ppm	

RATING: VERY LOW | LOW | MODERATE | DESIRED | VERY HIGH | EXCESS

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	60	0	58	5					
PASTURE-LEGUME	CD	150	20	0	58	5					
PASTURE GRASS	CD	180	78	0	63	5					
PASTURE-LEGUME	CD	180	20	0	63	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1146

APPLIED:

COMMENTS: Apply 3 tons of lime per acre.

113622

RICK LEONARD #1

REPORT NUMBER	A0089	DATE	7/9/2012

PERRY AGRICULTURAL LABORATORY, INC.
P.O. BOX 418, HIGHWAY 54 EAST
BOWLING GREEN, MO 63334
573/324-2831

SUBMITTED FOR:
OROS & BUSCH

SEND TO:
P.A.L., Inc.
P.O. BOX 418

BOWLING GREEN, Missouri 63334

SOIL REPORT

					RATING: VERY LOW / LOW / MODERATE / DESIRED / VERY HIGH / EXCESS
Sample:	9H	pH	5.20		
ACRES:		PHOSPHORUS (P)	66	lbs/a	
CEC:	17.79 me	SULFUR (SO4-S)	24	lbs/a	
SOIL TEXTURE:	Silt Loam	CALCIUM (Ca)	4042	lbs/a	
ORGANIC MATTER:	2.20 %	MAGNESIUM (Mg)	596	lbs/a	
		POTASSIUM (K)	159	lbs/a	
Neut. A:	5.00	SODIUM (Na)		lbs/a	
		BORON (B)		ppm	
		IRON (Fe)		ppm	
		MANGANESE (Mn		ppm	
		COPPER (Cu)		ppm	
		ZINC (Zn)		ppm	
				ppm	

BASE SATURATION PERCENT	
CALCIUM:	56.79
MAGNESIUM:	13.96
POTASSIUM:	1.15

SOIL FERTILITY RECOMMENDATIONS

CROPPING OPTIONS		YIELD GOAL	SUGGESTED TREATMENT POUNDS / ACRE								
			NITROGEN N	PHOSPHATE P2O5	POTASH K2O	SULFUR S	BORON B	IRON Fe	MANGANESE Mn	COPPER Cu	ZINC Zn
PASTURE GRASS	CD	150	60	0	58	5					
PASTURE-LEGUME	CD	150	20	0	58	5					
PASTURE GRASS	CD	180	78	0	64	5					
PASTURE-LEGUME	CD	180	20	0	64	5					
DATE/AMOUNT APPLIED											

LIME RECOMMENDATIONS:

lbs ENM/A: 1078

APPLIED:

COMMENTS: Apply 3 tons of lime per acre.

113622

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION BRANCH
(SEE MAP FOR APPROPRIATE REGIONAL OFFICE)

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

FOR AGENCY USE ONLY

PERMIT NUMBER
MO -

DATE RECEIVED

INSTRUCTIONS: FORMS A & C or F (CAFOs) (and D where applicable) must also be submitted for land application of industrial wastewater sludge biosolids or residuals. **Submit FORMS E and G** for land disturbance permit if construction areas total five acres or more.

Attach **FORM I**, if wastewater will be land applied or irrigated.

1.00 FACILITY INFORMATION

1.10 Facility Name

City of Columbia Water Treatment Plant

1.20 Application for:
- ☐ Construction Permit (attach Engineering report, Plans and Specifications per 10 CSR 20-8.020)
- ☐ Operating Permit (if no construction permit, attach engineering documents)
  Date Land Application System Began Operation: _____
- ☑ Operating Permit Renewal

1.30 Months when the business or enterprise will operate or generate sludge or residuals:
- ■ 12 months per year
- ☐ Part of year (list Months): _____

1.40 List the Facility outfalls which will be applicable to the land application system from outfalls listed on Form A, C, D and F.
Outfall Nos. ___ ___ ___ ___ ___ ___ ___

2.00 STORAGE BASINS

2.10 Number of storage basins: 4 Type of basin: ☐ Steel ☐ Concrete ☐ Fiberglass ☑ Earthen ☐ Earthen with membrane liner

2.20 Storage basin dimensions at inside top of berm (feet): Report freeboard as feet from top of berm to emergency spillway or overflow pipe.
(Complete Attachment A: Profile Sketch)
Basin #1: Length _____ Width _____ Depth _____ Freeboard _____ Berm Width _____ % Slope _____
Basin #2: Length _____ Width _____ Depth _____ Freeboard _____ Berm Width _____ % Slope _____

2.21 Storage basin volumes (gallons): Permanent volume means two foot water depth for seal protection, and any required treatment volume capacity.
Basin #1: Gallons: _____ Permanent Volume + _____ Storage = _____ Total volume (gallons)
Basin #2: Gallons: _____ Permanent Volume + _____ Storage = _____ Total volume (gallons)

2.30 Storage Basin operating levels (report as feet below emergency overflow level)
Basin #1: Maximum water level _____ ft. Minimum operating water level _____ ft.
Basin #2: Maximum water level _____ ft. Minimum operating water level _____ ft.

2.40 Storage Basin design storage capacity: (storage between minimum and maximum operating levels for 1-in10 year storm water flows.)
Basin #1: ___ days Basin #2: ___ days Basin #3: ___ days

2.50 Attach Water Balance Test results to verify earthen basin seal in accordance with 10 CSR 20-8.020(13) and (16), when required by the department.

2.60 Attach a sludge management plan for materials that are not land applied.

2.70 Attach a closure plan for lagoons, storage basins and treatment units.

3.00 LAND APPLICATION SYSTEM

3.10 Number of application sites 57 Total Available Acres 5046 Minimum & Maximum % field slopes _____
Location: ___ ¼ ___ ¼ ___ ¼ ___ Sec. ___ T ___ R _____ County ___ Acres
Location: ___ ¼ ___ ¼ ___ ¼ ___ Sec. ___ T ___ R _____ County ___ Acres
Attach extra sheets as necessary.

3.12 Type of vegetation: ☑ Grass hay ☑ Pasture ☐ Timber ☑ Row crops ☐ Other (describe) _____
Specific Crops and Yields/acre: Goal: _____ Actual for last five years: _____

3.20 Annual sludge production (gallons per year): _____ Actual _____ Design
(dry tons per year): 6890 Actual _____ Design
Human Population Equivalent: _____ Actual _____ Design

3.21 Land Application rate per acre:
Design: _____ dry ton/year _____ dry ton/application _____ No. applications/year
Actual: _____ dry ton/year 6.87 dry ton/application 1 No. applications/year
Total amount land applied each year (total all sites) Design _____ dry ton/year Actual _____ dry ton/year
Actual months used for land application: ☐ Jan ☐ Feb ☐ Mar ☐ Apr ☑ May ☑ Jun ☑ Jul ☑ Aug ☐ Sep
☐ Oct ☑ Nov ☑ Dec

3.22 Land Application Rate is based on:
☐ Nutrient Management Plan (N&P) ☐ PAN ☐ Conservative
☐ Hydraulic Loading ☐ Limiting Pollutant (Specify) _____
■ Other (describe) Determined by Oros and Busch and Farmers

3.30 Equipment type: ☐ Tank wagon ☐ Tank truck ☐ Subsurface injection ☑ Slinger spreader ☐ Dry spreader
☐ Other (describe) _____
Equipment Capacity: _____ Gallons (cubic feet) per hour _____ Total hours of operation per year

3.40 Public Use/Access Sites: If public use or access to land application site, describe pathogen treatment and site access restrictions. If human, animal, or organic wastes, refer to 40 CFR 503.32 for pathogen treatment methods. Attach extra sheets as necessary.
None

3.50 Separation distance (in feet) from the outside edge of the biosolids application area to down gradient features:
_____ Permanent flowing stream _____ Losing Stream _____ Intermittent (wet weather) stream _____Lake or pond
_____ Property boundary _____ Dwellings _____ Water supply well _____ Other (describe) _____

3.60 SOILS INFORMATION: Use information from the County Soil Survey, NRCS, or professional soil scientist.
NOTE: On-site soils classification by a professional soil scientist may be required by the department where appropriate.
Soil Series Name _____ Depth of bedrock ____ Feet Depth to water table ____ Feet
Soil Infiltration rate in inches/hour (in/hr) for most restrictive layer within the following soil depth ranges:
_____ In/hr for 0-12 inch soil depth _____ In/hr for 12-24 inch soil depth _____ In/hr for 24-60 inch soil depth

3.70 Attach Nutrient Management Plan (NMP) including calculations for plant available nitrogen (PAN) and other nutrients, crop requirements, crop yields and other management factors. Include USDA/NRCS phosphorus recommendations.

3.80 Geologic Investigation: _____ Date of most recent Geologic Report by Department's Division of Geology and Land Survey.

3.81 Ground Water Monitoring Wells: (Attach Groundwater Monitoring Plan when required by department)
☐ NONE ☐ EXISTING ☐ PLANNED NUMBER: 1 Monitoring Wells 2 Lysimeters

3.90 Attach a current copy of the Operation and Maintenance (O&M) Plan for the land application system. Date of O&M Plan:

3.91 Attach a site map showing topography, storage basins, land application sites, property boundary, streams, wells, roads, dwellings and other pertinent features.

3.92 Attach a facility sketch showing treatment units, storage basins, pipelines, application sites and other features.

4.00 INDUSTRIAL PROCESS INFORMATION

4.10 Brief description of treatment processes prior to land application and note any changes made in last five years. (Attach extra sheets as necessary.)
_____

4.11 Detailed description of industrial production processes. Also indicate any changes made in last five years. (attach extra sheets as necessary)
Drinking Water ptoduced from treatment of alluvial wells using lime softening after aeration to remove carbon dioxide and add oxygen for the oxidation of iron. No coagulants or polymers used in sedimentation.

4.20 List of raw materials, chemicals, additives, products, and by-products (Attach extra sheets as necessary)

Anoxic Alluvial Well Water with aeration to remove carbon dioxide and add oxygen to oxidize ferrous iron. Slaked lime added to precipitate calcium carbonate.

4.31 Attach following FORMS for wastewater to be land applied.

FORM C or F is required for all applicants. Use Form F for CAFOs.

FORM D is required for those industries listed in the Form D instructions or when required by the department.

Use actual testing results within last 12 months. For new operations use testing results from other similar operations or from published literature.

4.32 Are there any listed hazardous wastes in the material to be land applied: ☐ YES ☑ NO (If YES, attach testing results)

4.40 A. Are any Pollutants listed in 40 CFR 268.40 believed to be present in detectable concentrations: ☐ YES ☑ NO

B Are any Pollutants listed in 10 CSR 20-7.031 believed to be present in detectable concentrations: ☐ YES ☑ NO

C. Are any 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: ☐ YES ☐ NO

(Attach a copy of testing results for any pollutants that may be present in detectable concentrations.)

4.50 Environmental Assessment. Do any of the pollutants detected exceed the criteria for pollutant concentrations of limitations contained in the publications referenced in Section 4.40 of this form: ☐ YES ☑ NO

If YES, attach a copy of the Environmental Assessment as required in 10 CSR 20-8.020(3)(D).

5.00 SOIL TESTING RESULTS: Complete information for each pollutant listed and each land application site. Attach results of any other soil testing performed in the last 12 months. Soil sampling and testing should conform to University publication G9110, Sampling Your Soil for Testing; Soil Test Procedures for North Central Region (North Dakota Agricultural Experiment Bulleting 499-Revised); Methods of Soil Analysis, American Society of Agronomy, Inc.; Soil Testing and Plant Analysis, Soil Science Society of America, Inc.; EPA Methods; or other methods approved by the department. Attach extra sheets as necessary.

Total area sampled is 5046 acres. Each composite sample covers varies acres. Each composite consists of 7-10 subsamples.

Sample depth: ☑ 0-6 inches ☐ 0-12 inches ☐ Other (describe) _____

Pollutant	Concentration (mg/kg or ppm)			Pounds/ Acre	No. Composite Samples	Sample Period
	Minimum	Maximum	Average			
Organic Nitrogen as N						
Ammonia Nitrogen as N			See Attached	57	Soil Reports	
Nitrate Nitrogen as N						
Phosphorus as P (Bray 1P)						
Exchangeable Sodium %						
Organic Matter (percent)						
Cation Exchange Capacity						
pH (standard units)						
Other pollutants present in the material to be land applied: (Attach extra sheets as necessary)						

6.00 LAND LIMITING CONSTITUENTS FOR LAND APPLICATION

6.10 Metals of Concern for Land Application. Complete information for each pollutant listed. Analysis results must be for "TOTAL METALS". (Do NOT use TCLP, dissolved, total recoverable or other extraction methods. Include all test results for the last 5 years and a minimum of 4 separate samples.

Pollutant (total metals)	Concentration (mg/kg dry weight)			Design LBS/ Acre/Year	Type of Samples	Number Samples	Sample Location	Sample Period
	Minimum	Maximum	Average					
Aluminum			3250		composite	1	lagoon 4	2012
Arsenic			<10		composite		lagoon 4	2012
Beryllium			<0.5		composite		lagoon 4	2012
Cadium			<0.5		composite		lagoon 4	2012
Chromium			3.5		composite		lagoon 4	2012
Copper			<1		composite		lagoon 4	2012
Fluoride			<1		composite		lagoon 4	2012
Lead			<5		composite		lagoon 4	2012
Manganese			1120		composite		lagoon 4	2012
Mercury			<0.05		composite		lagoon 4	2012
Molybdenum								
Nickel			<1		composite		lagoon 4	2012
Selenium			<10		composite		lagoon 4	2012
Silver			<1		composite		lagoon 4	2012
Tin								
Zinc			8.0		composite		lagoon 4	2012

6.20 Major Pollutants of Concern for Land Application. Complete information for each pollutant listed. Include any other pollutants that are most limiting for determining land application rates. Attach extra sheets as necessary.

Organic Nitrogen as N								
Ammonia Nitrogen as N								
Nitrate Nitrogen as N			<10		composite		lagoon 4	2012
Total Nitrogen as N								
Plant Available Nitrogen (PAN)								
Total Phosphorus as P								
Boron								
Chlorides			24		composite		lagoon 4	2012
Sodium								
COD								
TPH								
Total Suspended Solids								
Oil & Grease								
Sodium Absorption Ration (SAR)								
pH (standard units)			10.1		composite		lagoon 4	2012

6.30 Other Limiting Pollutants for Land Application Rates. Specify any other pollutants that are most limiting for determining land application rates. Include any additional significant pollutants from Section 4 that is not already listed in Section 6.00. Attach extra sheets as necessary.

Pollutant	Concentration (mg/kg dry weight)			Design LBS/ Acre/Year	Type of Samples	Number Samples	Sample Location	Sample Period
	Minimum	Maximum	Average					

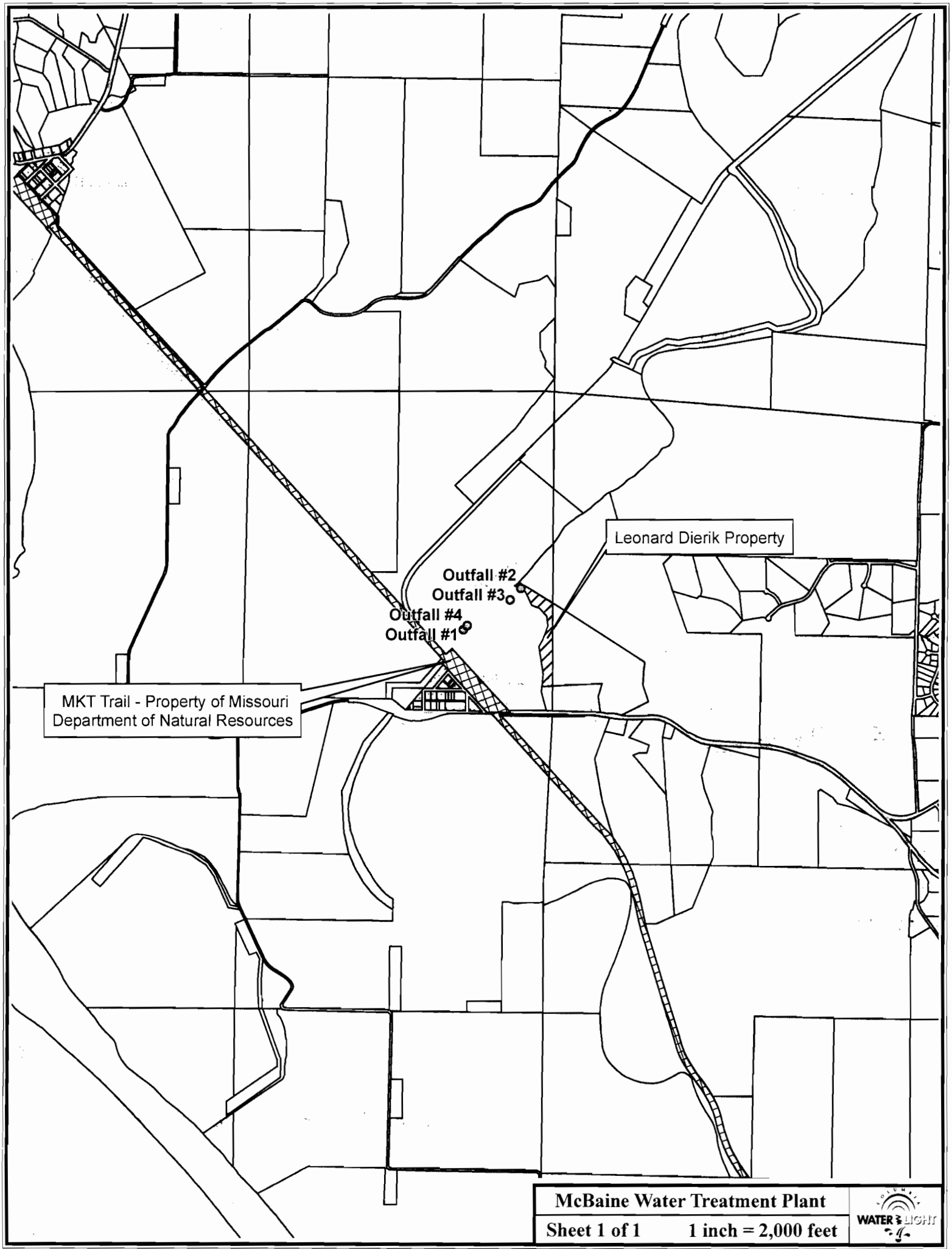
6.40 Requirements for Public Use Sites. Complete this if land application onto public use or public access sites or if material will be distributed for general public use. Fecal Coliform, Salmonella and Entric Virus must be tested if the biosolids include waste material from humans, animals, vegetables or organic matter.

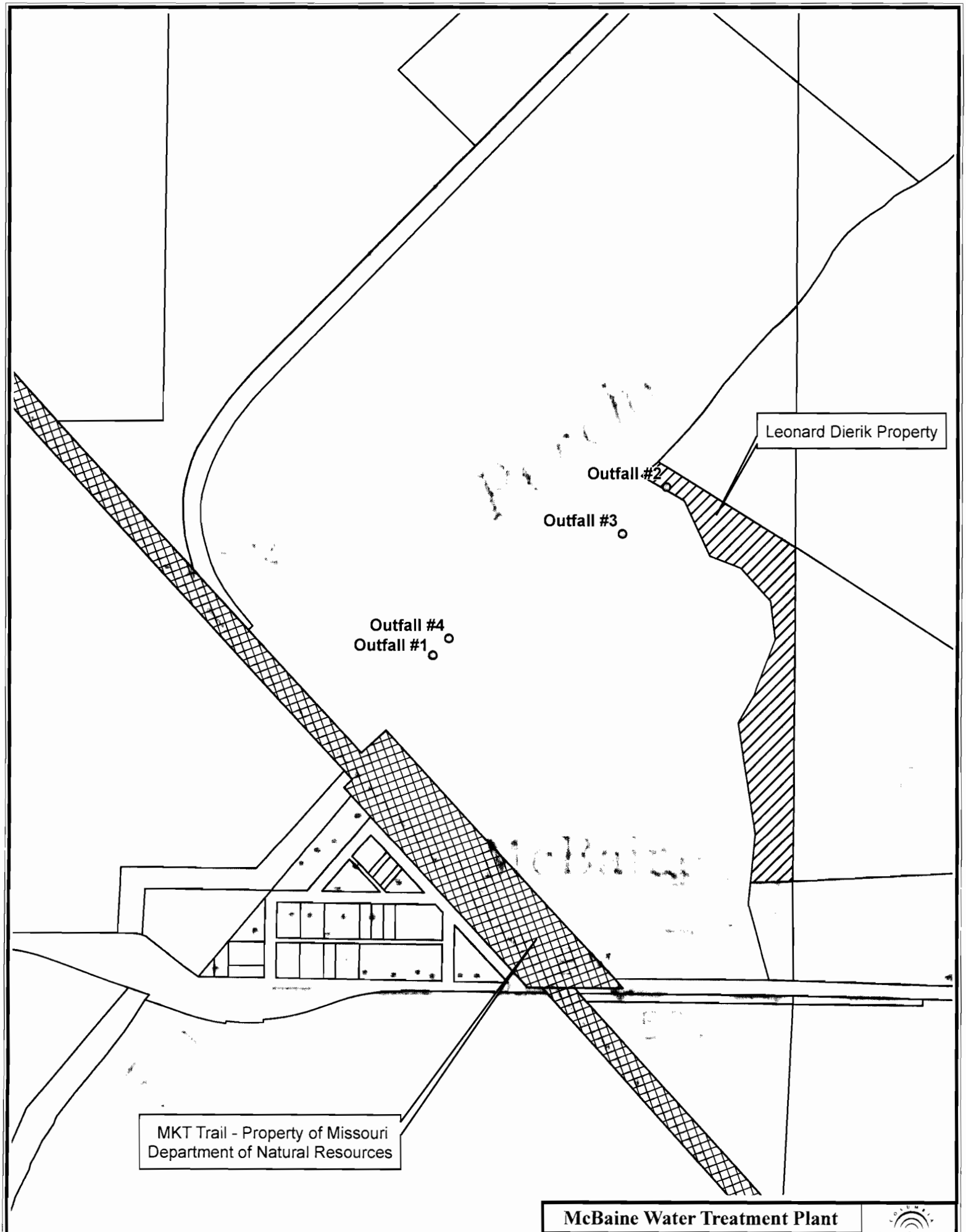
Pollutant		Concentration (mg/kg dry weight)			Type of Samples	Number Samples	Sample Location	Sample Period
		Minimum	Maximum	Average				
Total Dioxin TEQ*								
* Required Only for public access sites. TEQ = Toxicity Equivalents for CDD and CDF isomers per EPA Publication EPA/625/3-89/016 and EPA method 1613. Detection limits must be less than 1.0 ppt.								
Fecal Coliform								
Salmonella								
Enteric Virus								
Other (specify)								

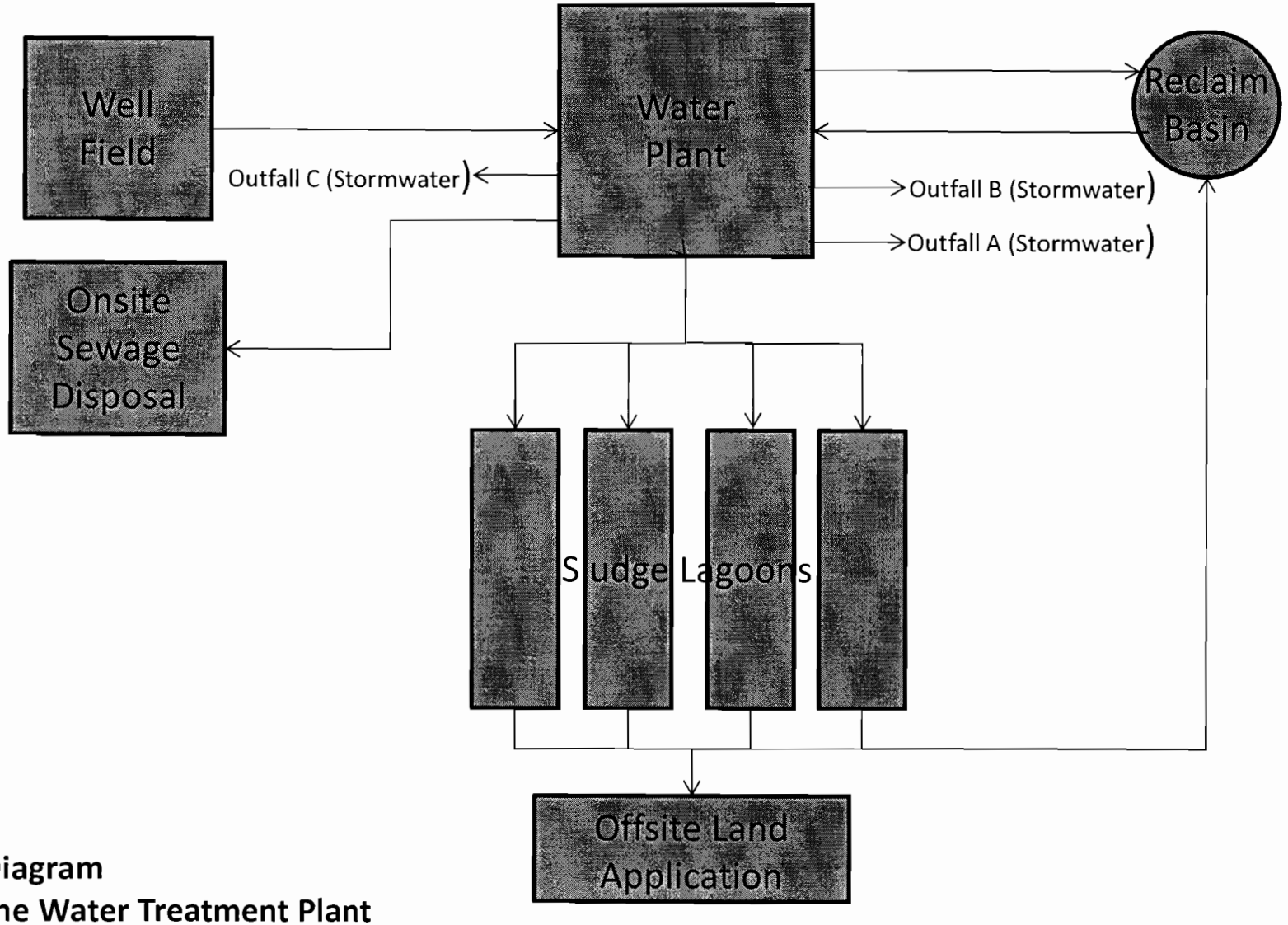
7.00 CERTIFICATION

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 IMPRISSONMENT.

CONSULTING ENGINEER – Name, Official Title and Engineering Firm (TYPE OR PRINT)	TELEPHONE NUMBER (area code and number)
SIGNATURE	DATE SIGNED
OWNER OR AUTHORIZED REPRESENTATIVE – Name and Official Title (TYPE OR PRINT)	TELEPHONE NUMBER (area code and number)
Tad Johnsen Water and Light Director	573-874-7300
SIGNATURE	DATE SIGNED
Tad Johnsen	9/17/14


Leonard Dierik Property
Outfall #2
Outfall #3
Outfall #4
Outfall #1
MKT Trail - Property of Missouri Department of Natural Resources
McBaine Water Treatment Plant
Sheet 1 of 1
1 inch = 2,000 feet
WATER & LIGHT


Leonard Dierik Property
Outfall #2
Outfall #3
Outfall #4
Outfall #1
MKT Trail - Property of Missouri Department of Natural Resources
McBaine Water Treatment Plant
Sheet 1 of 1
1 inch = 500 feet
WATER LIGHT



Flow Diagram
McBaine Water Treatment Plant
Columbia Water & Light
Columbia, Boone, Missouri