



No Discharge Permit Application

(Renewal of NPDES Land Application)

August 3, 2016

FutureFuel Chemical Company

AFIN: 32-00036

Land Application Program

No Discharge Permit Application

August 3, 2016

FutureFuel Chemical Company

2800 Gap Road

Batesville, Arkansas 72501

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Arkansas Department of Environmental Quality
No-Discharge Section Permit Application
Waste Storage/Land Application

Permit No.:	AFIN: 32-00036	SIC Code: 2869	NAICS Code: 325199
(Office Use Only)	(Office Use Only)		

1. Permit Action and Type *(Please check one of the following):*

Operator Type: ☒ Corporation (State of Incorporation: Delaware) ☐ Limited Liability Company (State of LLC: _____)
☐ Partnership ☐ Sole Proprietorship/Private ☐ Other _____

☐ New Permit ☒ Renewal ☐ Modification of Permit, Describe: **Previously in NPDES AR0035386**

☐ Biosolids ☐ Industrial Waste ☐ Oil and Gas Waste ☐ Treated Effluent Residuals
☐ Water Treatment Residuals ☐ Water Based Drilling Fluids ☒ Other Industrial WW Sludge

2. Permittee Legal Name and Mailing Address: *(Must Match Arkansas's Secretary of State)*

Owner Name: FutureFuel Chemical Company (FFCC)			
Address: P.O. Box 2357		Phone Number: 870-698-3000	
City: Batesville	State: Arkansas		Zip Code: 72503
Contact Person: (Mr. / Mrs. / Ms.) Mr. Lynn Cornelius		Email: lynncornelius@ffcmail.com	
Title: Sr Environmental Biologist	Phone Number: 870-698-5634		Cell Number: 870-373-0321

3. Facility Location (*physical address is required; NO P.O. BOX*):

Facility Name: FutureFuel Chemical Company (FFCC)					
Address (911 Address): 2800 Gap Road				Phone Number: 870-698-3000	
City: Batesville			State: Arkansas		Zip Code: 72501
1/4 Sec.:	Section: 33		Township: 13N		Range: 5W
Latitude: _35_Deg_43__Min_43__Sec.		Longitude_91_Deg_31__Min_29__Sec.		Source Datum:	
County: Independence			Nearest Town: Magness		
Nearest Stream: White River			Distance: 2080 (ft)	Stream Segment: 4F	

4. Consultant Information:

Name:		Consulting Firm:	
Email:		Phone Number:	
Address:		Cell Number:	
City:	State:	Zip Code:	

Please read the following carefully and sign below.

I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, which may include fines and/or imprisonment.

SIGNATORY REQUIREMENTS:

The information contained in this form must be certified by a **responsible official** as defined below:

Corporation: principal officer at least the level of vice president (must be an officer or register agent with the secretary of state)

Partnership: a general partner

Sole Proprietorship: the proprietor/owner

Municipal, state, federal, or other public facility: principal executive officer, or ranking elected official

Responsible Official: Samuel W. Dortch Title: Executive VP and General Manager

Responsible Telephone: 870-698-5550 Email: samdortch@ffemail.com

Responsible Signature:  Date: 7/26/2016

Cognizant Official is an individual that is given signature authority from the Responsible Official

Cognizant Official: _____ Title: _____

Cognizant Telephone: _____ Email: _____

Cognizant Signature: _____ Date: _____

PERMIT REQUIREMENT VERIFICATION (Please check the following to verify the completion of permit requirements.)

- | Yes | No | |
|--------------------------|--------------------------|--|
| ☐ | ☐ | Submittal of Complete Application |
| | | Does the Owner name match the Secretary of State (Corporation or Limited Liability Company)? |
| | | Does the Responsible Official match the Secretary of State? |
| ☐ | ☐ | Submittal of Waste Management Plan |
| | | Stamped & Signed by an Arkansas Registered PE/ ADH Designated Representative |
| | | Are maps and site description included? |
| ☐ | ☐ | Submittal of Closure Plan (Oil and Gas/Water Based Drilling Fluids) |
| | | Is the cost estimate included? |
| ☐ | ☐ | Submittal of Disclosure Statement (completed and executed) |
| | | Not required for public entity |
| ☐ | ☐ | Submittal of Land use Contract/Deed/Lease |
| ☐ | ☐ | Arkansas Department of Health notification letter (letter transmitting documents to ADH) |
| | | (New permits or modified permits) |
| ☐ | ☐ | Provide Certificate of Good Standings with the Arkansas Secretary of State |
| | | (If foreign corporation, provide Certificate of Good Standings from the state of Origin) |

FUTUREFUEL TM



CHEMICAL COMPANY

Superior chemistry. Sustainable fuels.

Waste Management Plan



5/23/16

May 2016

FutureFuel Chemical Company

Land Application Program

Waste Management Plan

May 2016

FutureFuel Chemical Company

2800 Gap Road

Batesville, Arkansas 72501

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1.0 Introduction

FutureFuel is an organic chemical manufacturing facility near Batesville, Arkansas. The facility and land application site is located on 2,200 acres in a rural setting. It was built as a greenfield site by Eastman Kodak in 1975. Manufacturing of photographic chemicals for Kodak began in 1976. The site has grown to produce hundreds of products for numerous clients. Most products are manufactured in batch facilities, though there are several continuous processes running at the site. The plant site was purchased and became FutureFuel Chemical Company (FFCC) in 2006. Biodiesel manufacturing became a more prominent part of our product mix at that time.

FutureFuel owns its land application site and manages it in accordance with NPDES permit AR0035386. The original No-Discharge permit at this facility was issued to Eastman Kodak in 1975. The most recent NPDES permit was issued to Eastman Chemical Company by the Arkansas Department of Environmental Quality (ADEQ) on August 31, 2005. The permit is being split into separate NPDES and No-Discharge permits, AR0035386 and 5082-W respectively. The No-Discharge permit is being crafted to conform to applicable Federal and State requirements. An updated Waste Management Plan will be developed upon completion of a hydrogeological and monitoring network study of the land application area.

2.0 Source of Waste

The Wastewater Treatment Plant at FutureFuel Chemical Company treats process wastewater from various areas of the plant, sanitary wastewater, and stormwater. The wastewater treatment system consists of mixing/neutralization, extended aeration activated sludge, clarification and sludge digestion. Excess sludge is aerobically digested and then land applied on-site to FFCC's land application area.

3.0 Methods of Treatment

The land application system accepts sludge generated when organic material is broken down in FutureFuel's wastewater treatment system. Bacteria in the aeration basins are highly effective at breaking down the organic chemical compounds and converting them into carbon, hydrogen, nitrogen, phosphorous, and other micronutrients. Upon exiting the aeration basins, sludge is separated from treated water as it passes through clarifiers to an aerobic digester. Spent bacteria, or sludge, must be wasted from the system to maintain the overall treatment efficiency. From the aerobic digester, the sludge is transported via an underground piping system and sprayed through a sprinkler system onto a 95-acre tract of land. The entire spray irrigation system is enclosed within berms. Stormwater run-off is directed back into the wastewater treatment system. A block flow diagram of the wastewater treatment system is shown in Figure 3-1.

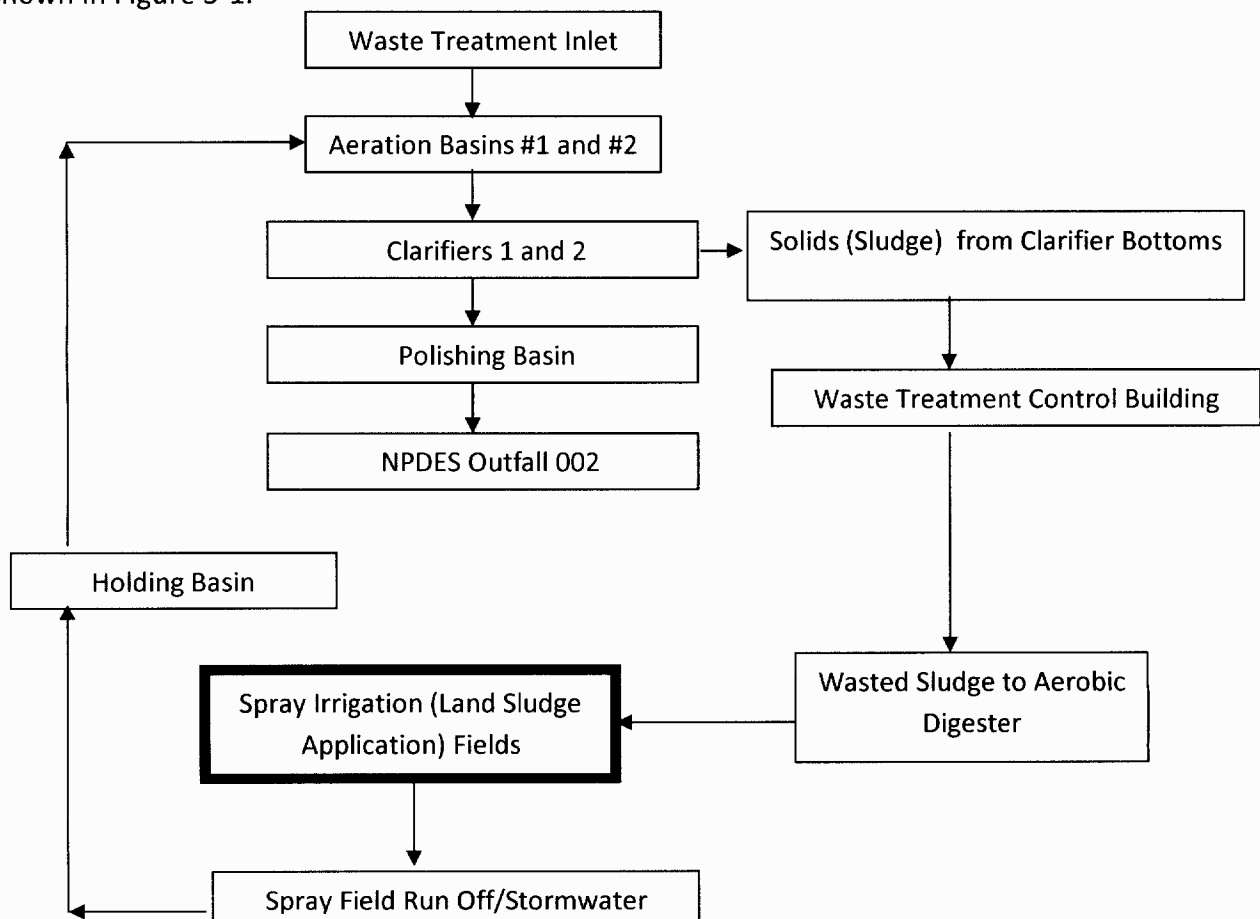


Figure 3-1. Wastewater Treatment System Block Flow Diagram

The primary mode of treatment in FutureFuel's land application system is denitrification. Unique to FutureFuel's land application system, plant available nitrogen (PAN) is not a limiting criterion. Denitrification is a natural process that works in the soil to break down ammonia, nitrates, nitrites, and organic nitrogen, resulting in inert nitrogen gas as the end product. While not applied for the purpose of conditioning the soil, some nitrogen is taken up by plants.

In the event that storage is exceeded and sludge cannot be land applied it can be burned onsite or transported to an ADEQ approved off-site landfill.

4.0 Waste Characteristics

Only sludge that is characterized as Non Hazardous shall be applied to the land application area. Analytical results for the past three years are in the following table. Analytical analysis was performed by American Interplex and reported on a wet basis.

	2/29/2016	4/9/2015	10/6/2015	3/11/2014	10/20/2014	3/21/2013	9/26/2013
TKN	559	561	1131	760	410	400	510
% Solids	1.3	1.1	1.3	1.4	1	1.2	1.2
Total Phosphorus	169	198	182	266	204	272	144
Total Potassium	111	165	143	210	180	176	156
Arsenic	<0.07	<0.06	<0.07	<0.07	<0.06	0.1	<0.06
Cadmium	<0.005	0.007	<0.005	<0.006	<0.005	<0.006	<0.005
Copper	0.17	0.18	0.26	0.25	0.17	0.21	0.13
Lead	<0.05	0.04	<0.05	<0.06	<0.05	<0.06	<0.05
pH	6.8	7.2	7.1	7.1	6.9	7.0	7.0
Nitrate Nitrogen	0.8	7	<0.5	<0.5	11	6.8	3.8
Ammonia Nitrogen	36	9	17	39	17	14	15
Nickel	1.1	2	0.8	2.1	3.8	2.2	9.5
Selenium	<0.09	0.08	<0.09	<0.1	<0.08	<0.11	<0.06
Mercury	<0.001	<0.001	<0.001	0.002	<0.001	0.002	0.002
Chromium	0.4	0.5	0.46	0.64	0.5	0.64	0.35
Zinc	1.0	1.2	1.1	1.7	1.3	1.2	0.8
% Volatile Solids	0.98	0.8	0.87	0.97	0.8	0.96	0.65
BOD5	871	220	325	650	370	464	216
Oil and Grease	1430	528	676	300	312	624	1044
Molybdenum	0.07	0.07	0.05	0.09	0.08	0.05	0.04

Table 4.1 Sludge Analysis

5.0 Land Application

5.1 Current Land Application Program

Future Fuel Chemical Company	Existing	33	13N	5W	95	35° 43' 6" N	91° 31' 56" W

FutureFuel's land application site is located on 2,200 acres in rural Independence County and owned by FutureFuel Chemical Company. The current land application program consists of 95 acres of bermuda and mixed grass pasture divided into 41 sections. Each section has 4 to 8 rainbird spray heads servicing approximately 2.6 acres. The land application area is enclosed by a berm with all stormwater run-off being directed back into the wastewater treatment system via a run-off collection system. Once in the wastewater treatment system, any run-off would then be discharged through a NPDES permitted outfall.

The following conditions are also followed when applying sludge:

Only sludge which is not classified as hazardous waste under state or federal regulations is land applied.

Due to the design of the fields, sludge is not applied to slopes with a gradient greater than 15%. Nor is it applied to soils that are saturated, frozen or covered with snow, and during rain or when precipitation is imminent.

Sludge is not spread within 50 feet of property lines and rock outcrops; 200 ft of drinking water well; 100 ft of lakes, ponds, springs, wetlands, streams, and sinkholes; 300 ft of occupied buildings (except for the WWT Control Room) and water supplies.

FutureFuel takes all necessary measures to reduce obnoxious or offensive odors. Equipment is properly maintained and operated to prevent spillage and leakage.

The current land application monitoring system consists of sludge analysis, soil analysis and groundwater monitoring. These will be discussed further in Section 6.0.

5.2 Proposed Land Application Program

FutureFuel proposes expanding acreage for the on-site application of sludge. Two areas adjacent to the existing spray fields have been studied and found to be suitable for this application. Approximately 20 acres to the west of the existing field and 8 acres to the south of the existing field may be added to the 95 acre plot currently used for land application of sludge. Detailed information associated with the expansion plans can be found in Section 5 of the 2016 No Discharge Permit Application.

Expanding the spray application area may necessitate installation of a new groundwater monitoring network. A hydro-geological study of the spray application field and surrounding area is in progress. Recommendations for improving the monitoring network will be submitted to ADEQ upon completion of the study.

5.3 Land Application Management

Operation of the land application area is seasonal. The program consists of frequent monitoring (see Section 6.0) of the spray area and rotation of spraying among the 41 sections to prevent excessive runoff. Pooling of free liquids is not a problem due to the gentle slope of the spray field and the runoff collection system installed in the lower areas. Land application takes place primarily between March and December with solids being stored during the colder months, burned, or landfilled.

The application site has been disked and re-sown as needed since it has been in operation. The land application area consists of bermuda and other mixed grasses. Frequent bush-hogging is needed to keep grass short enough to allow proper drying conditions. Maintenance of the site also includes the application of approximately 5-10 tons of lime per acre as needed to maintain the field.

6.0 Current Monitoring System

6.1 Sludge

The waste samples collected must be representative of the treated materials to be land applied. The samples are to be stored in appropriate glass or plastic containers and kept refrigerated or frozen to prevent any change in composition.

Semiannual grab samples of the waste from each facility under this permit shall be analyzed for the following parameters:

% Volatile Solids	Total Kjeldahl Nitrogen
% Total Solids	Nitrate + Nitrite Nitrogen
Total Phosphorus	Oil & Grease
Total Potassium	Ammonia Nitrogen
Arsenic	Selenium
Cadmium	Mercury
Copper	Chromium
Lead	Zinc
Nickel	pH
BOD5	Molybdenum

6.2 Soil

Each land application site shall be soil tested in the spring prior to the beginning of the land application season for the following parameters:

Nitrate-Nitrogen	Potassium
Phosphorus	Salt Content (micro-mohs/cm)
Magnesium	Arsenic
pH	Cadmium
Copper	Zinc
Lead	Nickel
Cation Exchange Capacity (me/100g)	

6.3 Groundwater

- The permittee shall maintain a comprehensive groundwater monitoring program consisting of the following:
 - A minimum of one up-gradient deep monitoring well, one up-gradient shallow monitoring well, two down-gradient deep monitoring wells, and two down-gradient shallow wells shall be maintained. Shallow wells shall sample groundwater above the underlying Moorefield Formation. Deep wells shall sample groundwater in or below the Moorefield Formation. Well locations must be approved by the Department.
 - Wells shall be sampled and analyzed on a quarterly basis as a minimum. Yearly summaries of all sample reports for the required wells shall be submitted to the Department.
 - Groundwater shall be sampled for nitrate-nitrogen, chlorides, lead, cadmium, nickel, copper, zinc, and pH as a minimum.
 - If any deep or any up-gradient shallow monitoring well nitrate concentration exceeds 10 mg/l, an intensive monitoring program shall be initiated within three (3) days to verify the finding. This program shall be completed within thirty (30) days. If any deep or up-gradient shallow monitoring well nitrate concentrations exceeding 10 mg/l are confirmed statistically (utilizing Student's t-test or other acceptable methods), FutureFuel shall notify the Department in writing within ten (10) days of confirmation. FutureFuel shall also submit a plan for sampling and/or additional wells to define the nitrate concentration of the groundwater within thirty (30) days of the notification. Based on the information collected after the execution of this plan, FutureFuel shall be placed on a compliance schedule which may include a program for reducing loading to the land application system and use of alternate methods of sludge disposal.
 - All runoff from the application site shall be contained and diverted back through the waste treatment system.
-

Sludge Analysis

"Wet Basis"

Values in RED are less than detection.

	TKN	% Solids	Total Phosphorus	Total Potassium	Arsenic	Cadmium	Copper	Lead	pH	Nitrate Nitrogen	Ammonia Nitrogen	Nickel	Selenium	Mercury	Chromium	Zinc	% Volatile Solids	BOD5	Oil and Grease	Molybdenum
2/29/2016	559	1.3	169	111	0.07	0.005	0.17	0.05	6.8	0.8	36	1.1	0.09	0.001	0.4	1.0	0.98	871	1430	0.07
4/9/2015	561	1.1	198	165	0.06	0.007	0.18	0.04	7.2	7	9	2.0	0.08	0.001	0.5	1.2	0.80	220	528	0.07
10/6/2015	1131	1.3	182	143	0.07	0.005	0.26	0.05	7.1	0.5	17	0.8	0.09	0.001	0.46	1.1	0.87	325	676	0.05
3/11/2014	760	1.4	266	210	0.07	0.006	0.25	0.06	7.1	0.5	39	2.1	0.1	0.002	0.64	1.7	0.97	650	300	0.09
10/20/2014	410	1.0	204	180	0.06	0.005	0.17	0.05	6.9	11	17	3.8	0.08	0.001	0.5	1.3	0.8	370	312	0.08

Soil Analysis

Values in RED are less than detection.

	Nitrate Nitrogen	Phosphorus	Magnesium	pH	Copper	Lead	Arsenic	Potassium	Electrical Conductivity (Salt Content)	Cation Exchange Capacity	Cadmium	Zinc	Nickel
	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg	mg/kg	mg/kg	umho/cm	meq/100g	mg/kg	mg/kg	mg/kg
2/29/2016	10	1600	360	7.2	5.2	12	5	380	400	12	0.4	18	7.9
10/6/2015	1.8	400	290	6.8	3.9	15	6.7	330	900	19	0.4	13	6
4/22/2015	5.8	570	710	7.4	6.9	9.6	11	760	190	11	0.4	25	9.6
10/20/2014	5.3	799	646	7.0	4.8	9	7.2	706	400	11	0.3	26	8.2
3/11/2014	7.6	745	699	8.7	5.8	12	5	653	840	9.3	0.4	24	9.2

Soil Analysis

Values in RED are less than detection.

	Nitrate Nitrogen	Phosphorus	Magnesium	pH	Copper	Lead	Arsenic	Potassium	Electrical Conductivity (Salt Content)	Cation Exchange Capacity	Cadmium	Zinc	Nickel
	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg	mg/kg	mg/kg	umho/cm	meq/100g	mg/kg	mg/kg	mg/kg
Proposed West	0.6	430	490	5.4	9.8	32	5	550	57	15	0.4	120	6.5
Proposed South	1.8	260	750	5.4	6.6	13	5.4	740	48	13	0.4	28	6.2

FutureFuel Chemical Company
2016 Annual Land Application Site Report
Permit #AR0035386
Ground Water Monitoring

1-R	7.0	0.090	34	<0.001	<0.004	<0.010	<0.006	0.011	3/8/2016
2	7.3	<0.05	87	<0.001	<0.004	<0.010	<0.006	<0.002	3/8/2016
9	4.9	71	170	<0.001	0.032	0.130	0.021	0.280	3/8/2016
11	7.3	0.059	240	<0.001	<0.004	0.012	<0.006	<0.002	3/8/2016
12	7.1	<0.05	16	<0.001	<0.004	<0.010	<0.006	0.011	3/8/2016
13	6.3	0.72	4.5	0.003	<0.004	0.012	0.031	0.023	3/8/2016
1-R	6.9	<0.05	36	0.004	<0.004	0.013	<0.006	0.012	6/8/2016
2	7.2	<0.05	97	<0.001	<0.004	<0.010	<0.006	0.005	6/8/2016
9	4.8	59	120	<0.001	0.022	0.097	0.016	0.200	6/8/2016
11	7.0	<0.05	270	<0.001	<0.004	0.012	<0.006	0.004	6/8/2016
12	7.5	<0.05	15	0.002	<0.004	<0.010	0.007	0.009	6/8/2016
13	5.8	0.73	4.8	0.007	0.014	0.019	0.081	0.045	6/8/2016
1-R									
2									
9									
11									
12									
13									
1-R									
2									
9									
11									
12									
13									

Analyses were performed by American Interplex Corporation in Little Rock.

FutureFuel Chemical Company
2015 Annual Land Application Site Report
Permit #AR0035386
Ground Water Monitoring

1-R	6.9	<0.05	33	<0.001	<0.004	<0.010	<0.006	0.016	3/17/2015 ¹
2	7.3	<0.05	80	<0.001	<0.004	<0.010	<0.006	0.013	3/17/2015
9	6.5	81	160	<0.001	0.032	0.100	0.014	0.240	3/17/2015
11	7.1	<0.5	180	0.001	<0.004	<0.010	<0.006	0.024	3/17/2015
12	6.3	<0.05	5.3	0.001	<0.004	0.01	<0.006	0.020	3/17/2015 ²
13	6.3	0.69	4.3	0.029	<0.004	0.019	0.230	0.110	3/17/2015 ²
1-R	6.3	<0.001	34	0.001	<0.004	0.011	0.008	0.014	6/9/2015
2	7.1	<0.5	79	<0.001	<0.004	<0.010	<0.006	0.007	6/9/2015
9	6.7	61	160	<0.001	0.023	0.090	0.016	0.180	6/9/2015
11	6.8	<0.001	240	<0.001	<0.004	<0.010	<0.006	0.007	6/9/2015
12	6.4	0.094	4.7	<0.001	<0.004	<0.010	<0.006	0.004	6/9/2015
13	6.3	0.77	3.8	0.028	0.005	0.028	0.220	0.110	6/9/2015
1-R	6.9	0.062	37	0.001	<0.004	<0.010	0.068	0.040	9/17/2015
2	7.3	<0.05	92	<0.001	<0.004	<0.010	<0.006	<0.002	9/17/2015
9	4.7	67	190	<0.001	0.038	0.120	0.017	0.290	9/17/2015
11	7.1	0.06	240	<0.001	<0.004	<0.010	<0.006	0.004	9/17/2015
12	7.5	<0.05	12	0.001	<0.004	<0.010	<0.006	0.015	9/17/2015
13	6.3	0.5	4.6	0.038	0.008	0.063	0.340	0.230	9/17/2015
1-R	6.9	<0.05	34	0.002	<0.004	0.016	0.009	0.014	10/21/2015
2	7.3	<0.05	89	<0.001	<0.004	<0.010	0.009	0.003	10/21/2015
9	4.7	34	200	<0.001	0.045	0.140	0.029	0.300	10/21/2015
11	7.1	<0.05	250	<0.001	<0.004	<0.010	<0.006	<0.002	10/21/2015
12	7.2	<0.05	8.9	0.001	<0.004	<0.010	<0.006	0.005	10/21/2015
13	6.6	1.4	4.5	0.016	0.006	0.051	0.310	0.190	10/21/2015

Analyses were performed by American Interplex Corporation in Little Rock.

¹Sample date was 3/31/2015 for NO3-N. pH on 3/31/2015 was 6.5 for well 1-R.

²Sample date was 3/25/2015 for NO3-N and chloride. pH on 3/31/2015 was 6.4 for well A-12 and 6.3 for well A-13.

FutureFuel Chemical Company
2014 Spray Irrigation Report
Permit #AR0035386
Ground Water Monitoring

1-R	7.1	<0.05	34	<0.001	<0.004	<0.010	0.008	0.025	03/11/14
2	7.1	<0.05	91	<0.001	<0.004	<0.010	<0.006	0.020	03/11/14
9	4.9	110*	780	<0.001	0.06	0.230	0.031	0.490	03/11/14
11	7.5	0.071	170	<0.001	<0.004	<0.010	<0.006	0.017	03/11/14
12	7.4	0.06	6.1	<0.001	<0.004	<0.010	<0.006	0.016	03/11/14
13	6.7	1.10	4.4	0.003	<0.004	0.014	0.140	0.100	03/11/14
1-R	7.0	<0.05	34	<0.001	<0.004	<0.010	0.01	0.007	05/21/14
2	6.8	<0.05	89	<0.001	<0.004	<0.010	<0.006	0.004	05/21/14
9	5.6	97	240	<0.001	0.039	0.130	0.03	0.280	05/21/14
11	7.2	<0.05	230	<0.001	<0.004	<0.010	<0.006	0.004	05/21/14
12	6.9	<0.05	6.3	<0.001	<0.004	<0.010	<0.006	0.009	05/21/14
13	6.1	0.078	3.8	0.030	0.010	0.063	0.420	0.280	05/21/14
1-R	6.7	<0.05	39	<0.001	<0.004	<0.010	0.010	0.011	07/15/14
2	7.4	<0.05	98	<0.001	<0.004	<0.010	<0.006	0.013	07/15/14
9	5.3	98	240	<0.001	0.034	0.130	0.032	0.270	07/15/14
11	7.1	<0.05	250	<0.001	<0.004	<0.010	<0.006	0.011	07/15/14
12	6.7	<0.05	6.8	<0.001	<0.004	<0.010	<0.006	0.009	07/15/14
13	5.8	0.9	4.4	0.005	<0.004	0.017	0.088	0.063	07/15/14
1-R	6.6	<0.05	35	0.001	<0.004	<0.010	0.012	0.043	10/14/14
2	6.9	<0.05	89	<0.001	<0.004	<0.010	<0.006	0.017	10/14/14
9	5.6	100	250	<0.001	0.053	0.170	0.026	0.390	10/14/14
11	7.1	<0.05	220	<0.001	<0.004	<0.010	<0.006	0.017	10/14/14
12	7.3	0.74	4.7	<0.001	<0.004	<0.010	<0.006	0.019	10/14/14
13	7.3	0.8	4.3	0.027	0.004	0.022	0.240	0.140	10/14/14

Analyses were performed by American Interplex Corporation in Little Rock.

*Sample taken 3/26/2014

USGS 7 km NE of Salado, Arkansas, United States 01 Jul 1981

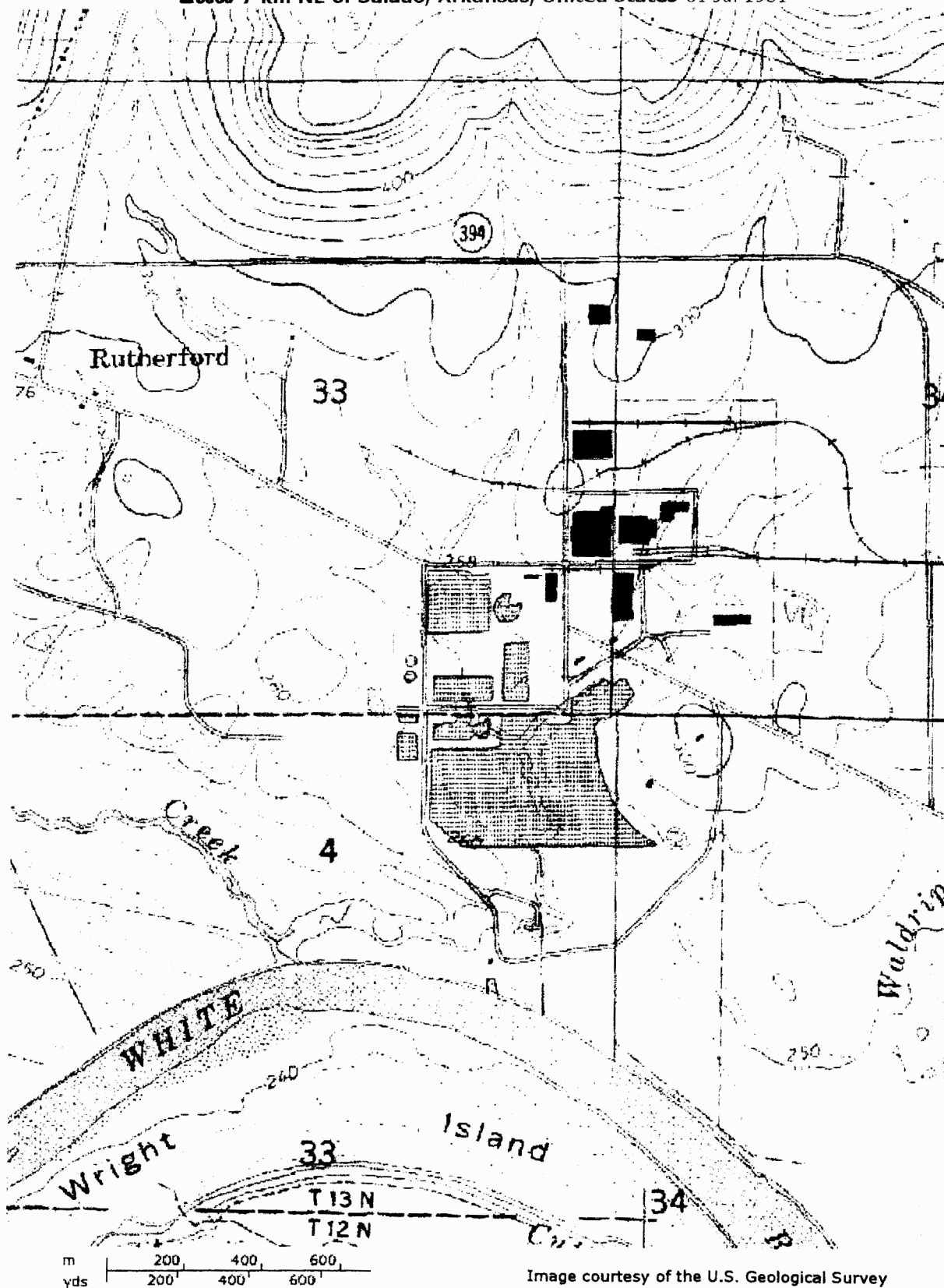
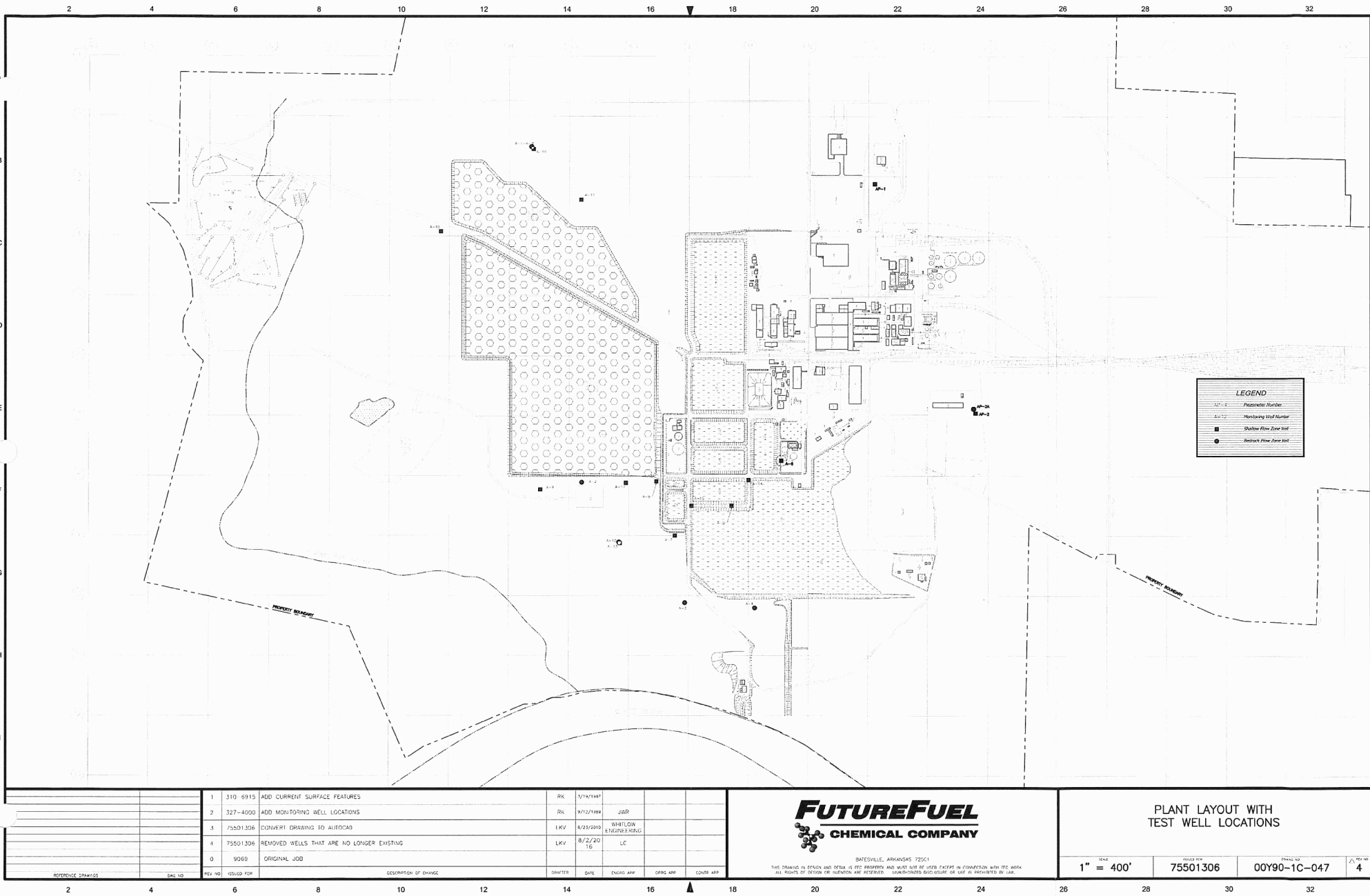


Image courtesy of the U.S. Geological Survey

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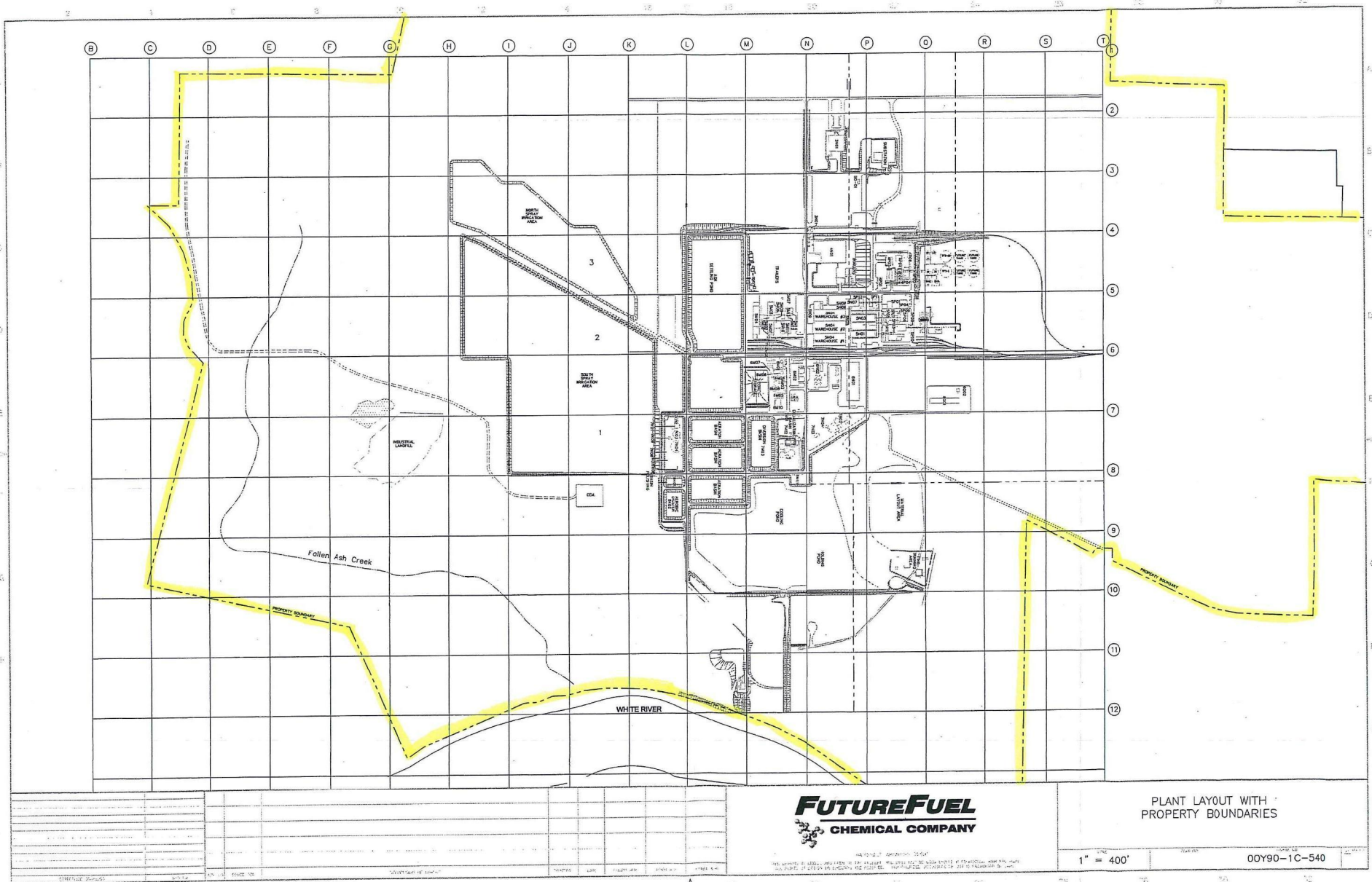
1	310-6915	ADD CURRENT SURFACE FEATURES	RK	5/16/1987					
2	327-4000	ADD MONITORING WELL LOCATIONS	RK	9/12/1988	JWR				
3	75501306	CONVERT DRAWING TO AUTOCAD	LKV	8/23/2010	WHITLOW ENGINEERING				
4	75501306	REMOVED WELLS THAT ARE NO LONGER EXISTING	LKV	8/2/2015	LC				
0	9069	ORIGINAL JOB							
REV NO	ISSUED FOR	DESCRIPTION OF CHANGE	DRAWN	DATE	ENGR APP	DRWG APP	CHECK APP	DATE	



BATESVILLE, ARKANSAS 72501
THIS DRAWING IN WHOLE AND IN PART IS THE PROPERTY OF FUTURE FUEL CHEMICAL COMPANY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH THE WORK FOR WHICH IT WAS PREPARED. NO PART OF THIS DRAWING OR THE INFORMATION CONTAINED HEREIN MAY BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF FUTURE FUEL CHEMICAL COMPANY.

PLANT LAYOUT WITH
TEST WELL LOCATIONS

SCALE 1" = 400'	PROJECT NO. 75501306	DRAWING NO. 00Y90-1C-047	REV NO 4
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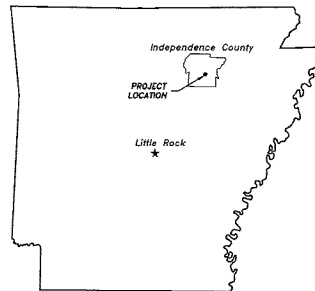
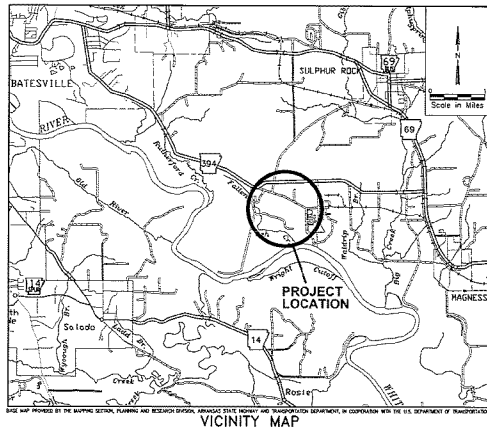


SPRAY IRRIGATION ENGINEERING DESIGN

FUTUREFUEL CHEMICAL COMPANY

BATESVILLE, ARKANSAS

OCTOBER 2013



INDEX OF DRAWINGS	
SHEET NO.	TITLE
1	GENERAL INFORMATION
2	EXISTING CONDITIONS
3	GRADING PLAN
4	PROPOSED PIPING LAYOUT
5	STORMWATER MANAGEMENT PLAN AND IMPACTED LAND APPLICATION AREA
6	DETAILS



FTN Project No. 10760-0278-001

R:\projects\10760-0278-001\CAD\DWG\CONSTRUCTION DRAWINGS\10760-0278-001-001.DWG

ABBREVIATIONS & SYMBOLS

GENERAL NOTES

ABBREVIATIONS

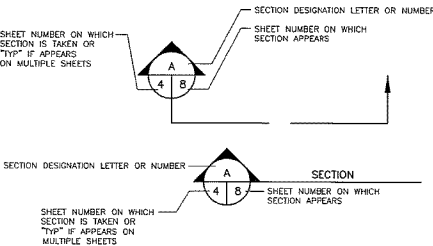
APPROX APPROXIMATE
DIA DIAMETER
DWO DRAWING
ELEV ELEVATION
FL FLOW LINE
FL IN FLOW LINE IN
FL OUT FLOW LINE OUT
FT FEET
HORIZ HORIZONTAL
ID INNER DIAMETER
INV INVERT
MAX MAXIMUM
MIN MINIMUM
N NORTHING
NVD NATIONAL GEODETIC VERTICAL DATUM
OD OUTER DIAMETER
P.P.S. POUNDS PER SQUARE INCH
PVC POLYVINYL CHLORIDE
R RADIUS
TYP TYPICAL
VERT VERTICAL
SCH SCHEDULE
M.J. MECHANICAL JOINT
C.I. CAST IRON
FPT FEMALE PIPE THREAD
MPT MALE PIPE THREAD

SYMBOLS

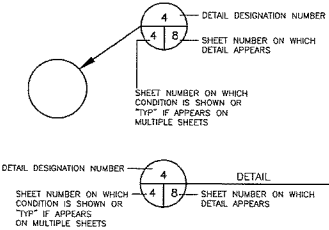
LEGEND
--- EXISTING LAND APPLICATION AREA
--- PROPOSED LAND APPLICATION AREA / STORMWATER CONTAINMENT BERM
--- PROPOSED LAND APPLICATION AREA / STORMWATER CONTAINMENT BERM
--- EXISTING WATER CHANNEL
--- APPROXIMATE EXISTING ROAD
--- EXISTING WASTEWATER TREATMENT FACILITIES
--- EXISTING 8-INCH PVC PIPING
--- EXISTING 6-INCH PVC PIPING
--- EXISTING 4-INCH PVC PIPING
--- EXISTING SPRINKLER HEAD AND 1-1/4 INCH GATE VALVE
--- 6-INCH GATE VALVE
--- EXISTING SAMPLED GROUNDWATER MONITORING WELL
--- FLOW DIRECTION
--- EXISTING CONTOUR LINES (10')
--- EXISTING CONTOUR LINES (2')
--- 290 PROPOSED CONTOUR LINES (10')
--- 292 PROPOSED CONTOUR LINES (2')
--- PROPOSED STORMWATER DRAINAGE DITCH
--- CONSTRUCTION POINTS
--- PROPOSED PERIMETER FENCE

- NOTES:
1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS SHOWN ON THESE DRAWINGS.
 2. HORIZONTAL DATUM AND PROJECTION: NAD83, ARKANSAS STATE PLAN, NORTH ZONE, U.S. SURVEY FOOT; VERTICAL DATUM IS NAVD83, FTFT.
 3. 1 FOOT RESOLUTION AERIAL PHOTOGRAPHS TAKEN IN 2010 WERE PROVIDED BY THE USACE LITTLE ROCK DISTRICT.
 4. THE INFORMATION SHOWN ON THESE MAPS WAS COMPILED FROM VARIOUS SOURCES AND HAS NOT BEEN FIELD VERIFIED.
 5. INFORMATION SHOWN ON THESE MAPS SHOULD NOT BE USED FOR PROPERTY BOUNDARY RESOLUTION, THIS DOES NOT REPRESENT A BOUNDARY SURVEY AND IS SHOWN FOR REFERENCE ONLY.
 6. SLOPES AND GRADES SHOWN ARE IN UNITS OF FT/FT UNLESS OTHERWISE NOTED.
 7. GRADE IS LINEAR BETWEEN ELEVATION POINTS.

SECTIONS



DETAILS

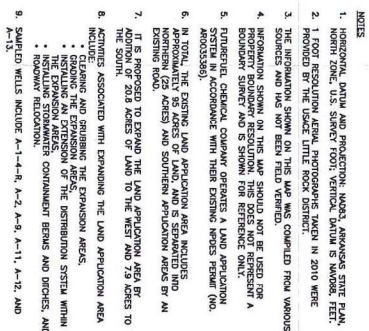


SPRAY IRRIGATION ENGINEERING DESIGN
FUTURE FUEL CHEMICAL COMPANY

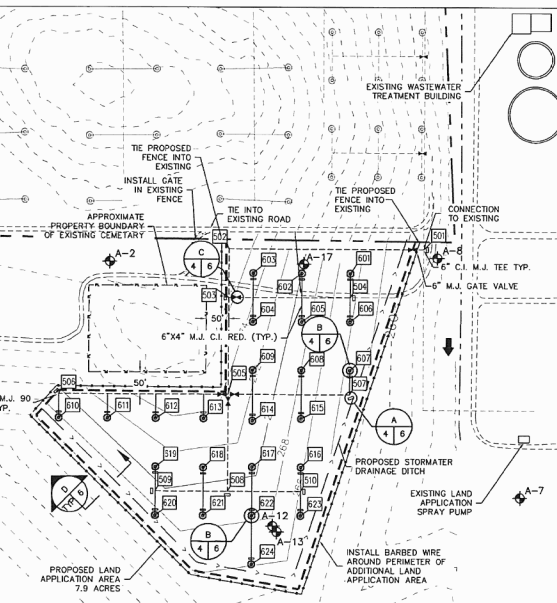
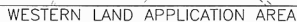
BATESVILLE, ARKANSAS

GENERAL INFORMATION

DRAWN BY:	FILE NAME:
MHR	IND1.DWG
APPROVED:	PROJECT NO.
PMR	10760-0278-001
SCALE:	DATE:
NONE	10/03/13
SHEET NO.	1 OF 6



ftn
Associates Ltd
water resources / environmental consultants



NOTES

1. 2 FOOT CONTOURS WERE GENERATED FROM LIDAR TOPOGRAPHICAL DATA COLLECTED IN 2010 AND WERE PROVIDED BY THE USACE LULU ROCK DISTRICT.
2. HORIZONTAL DATUM AND PROJECTION: NAD83, ARKANSAS STATE PLANE, NORTH ZONE, U.S. SURVEY FOOT; VERTICAL DATUM IS NAVD83, FEET.
3. THE INFORMATION SHOWN ON THIS MAP WAS COMPILED FROM VARIOUS SOURCES AND HAS NOT BEEN FIELD VERIFIED.
4. INFORMATION SHOWN ON THIS MAP SHOULD NOT BE USED FOR PROPERTY BOUNDARY RESOLUTION. THIS DOES NOT REPRESENT A BOUNDARY SURVEY AND IS SHOWN FOR REFERENCE ONLY.
5. TO PREVENT APPLICATION OUTSIDE OF BEHMED COUNTY, DESIGNATED SPRINKLER HEADS ARE LABELED WITH SPRINKLER HEADS AT THE FOLLOWING SPARKLER HEADS: 402, 409, 457, 486, 607, 623, 624, 625, 610.
6. INSTALL PIPING AND COMPONENTS AS SPECIFIED IN THE DETAILS (SHEET 6) TO MATCH TYPICAL EXISTING DISTRIBUTION SYSTEM MATERIALS.
7. ALL INSTALLED PIPING SHALL BE SCHEDULE 80 PVC PIPE ACCORDING TO THE DESIGN CALCULATIONS IN ATTACHMENT 1.
8. UP TO 30 SPRINKLER HEADS MAY BE OPERATED AT ONCE TO MAINTAIN SUFFICIENT PRESSURE IN THE DISTRIBUTION SYSTEM. THE DESIGN DOCUMENTATION IS LOCATED IN THE DESIGN CALCULATIONS (ATTACHMENT 1).
9. SAMPLED WELLS INCLUDE A-1-A-R, A-2, A-9, A-11, AND A-12.

WESTERN PIPE JUNCTIONS		
Point #	Northing	Easting
301	505737.7	144964.6
302	505737.3	144992.1
303	505591.1	144953.6
304	505571.5	144982.1
305	505297.9	144953.6
306	505297.3	144953.5
307	505075.8	144982.0
308	505075.8	145003.0
310	505075.4	145026.0
311	504691.5	145003.0
313	504526.1	145003.1
314	504526.1	145035.6
315	504526.1	145058.2
316	504527.0	144988.7
318	504306.1	145003.2
319	504306.1	144888.7
320	504086.1	145005.2
321	504086.0	145032.7
322	504055.8	145021.7
323	503865.7	145023.6
324	503865.5	145021.7
325	503645.7	145035.6
326	503645.5	145020.8

SOUTHERN PIPE JUNCTIONS		
Point #	Northing	Easting
501	503422.2	145178.8
502	503422.9	145135.7
503	503313.6	145135.7
504	503313.1	145135.2
505	503093.9	145135.7
506	503093.9	145059.5
507	503093.1	145135.3
508	502873.9	145135.6
509	502873.4	145119.3
510	502873.4	145129.3

SOUTHERN SPRINKLER HEADS		
Point #	Northing	Easting
601	503368.1	145163.2
602	503368.4	145162.2
603	503368.7	145152.4
604	503258.4	145142.6
605	503258.4	145152.2
606	503258.1	145163.2
607	503258.1	145163.2
608	503148.4	145122.2
609	503148.4	145122.2
610	503040.0	145097.7
611	503039.7	145098.0
612	503039.3	145108.1
613	503039.0	145130.7
614	503033.9	145129.3
615	503032.8	145152.1
616	502928.4	145152.1
617	502928.7	145141.6
618	502927.7	145140.9
619	502929.3	145119.4
620	502819.3	145119.1
621	502819.0	145119.1
622	502818.7	145141.1
623	502818.7	145152.1
624	502768.7	145101.8

SOUTHERN PIPE JUNCTIONS		
Point #	Northing	Easting
501	503422.7	1451798.6
502	503423.9	1451357.8
503	503313.9	1451357.5
504	503313.1	1451632.5
505	503093.9	1451356.9
506	503095.0	1450971.5
507	503093.1	1451631.9
508	502873.9	1451356.3
509	502874.3	1451191.3
510	502873.4	1451521.3

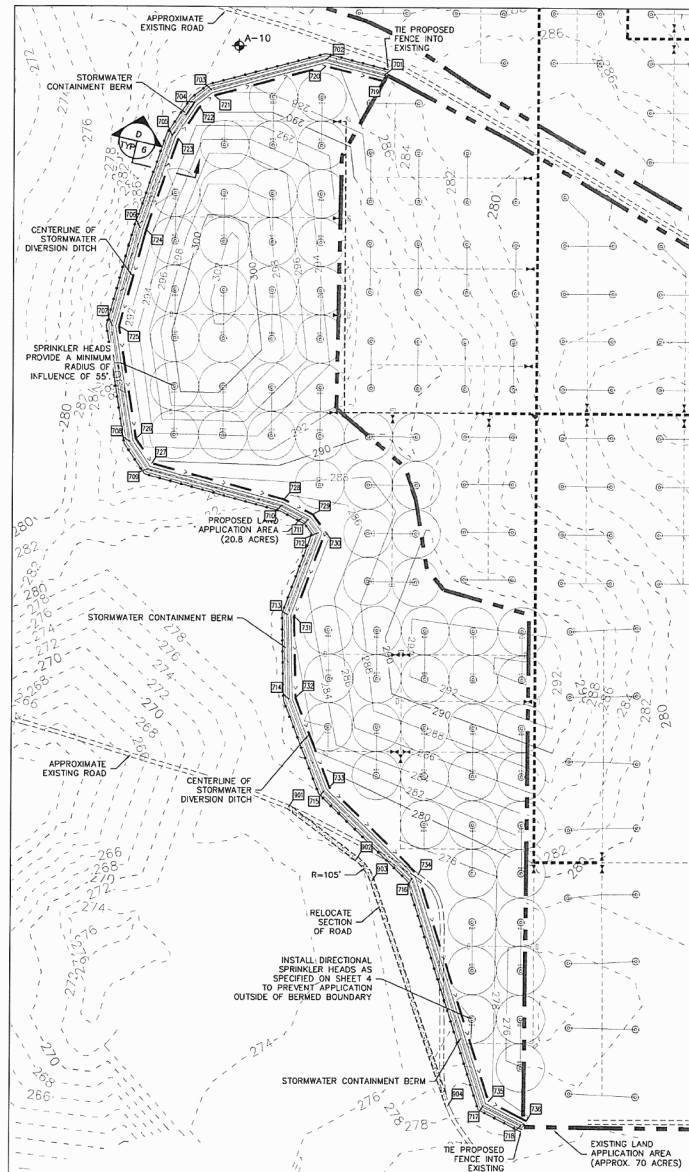
SOUTHERN SPRINKLER HEADS			
Point	Northing	Easting	
601	503368.1	1451632.6	
602	503368.4	1451522.2	
603	503368.7	1451512.6	
604	503258.4	1451412.1	
605	503258.4	1451522.2	
606	503258.1	1451632.1	
607	503148.1	1451632.3	
608	503148.4	1451522.2	
609	503148.7	1451412.0	
610	503040.0	1450971.7	
611	503039.7	1451081.8	
612	503039.3	1451191.9	
613	503039.0	1451301.7	
614	503033.9	1451141.1	
615	503038.4	1451521.2	
616	502928.4	1451521.4	
617	502928.7	1451411.4	
618	502927.7	1451301.4	
619	502929.3	1451191.4	
620	502819.3	1451191.9	
621	502819.0	1451301.9	
622	502818.7	1451411.1	
623	502818.7	1451521.2	
624	502708.7	1451081.8	



BATESVILLE, ARKANSAS

PROPOSED PIPING LAYOUT

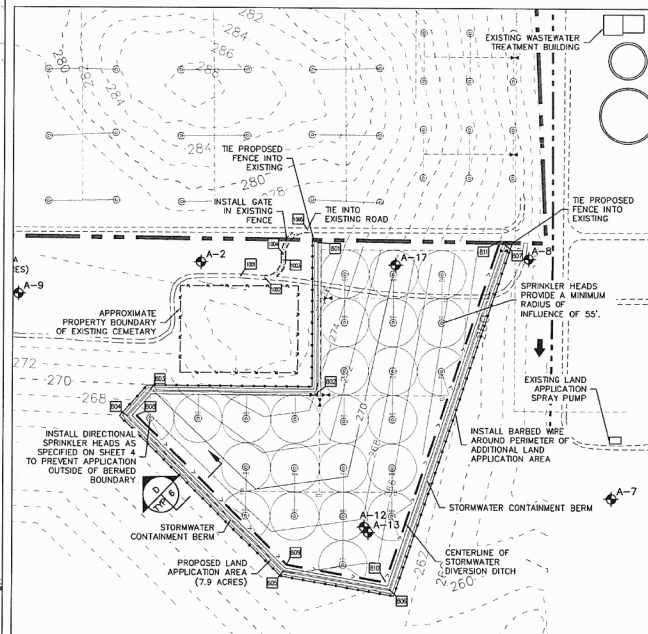
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APPROVED: <i>RMR</i>	PROJECT NO. 10760-0278-001
SCALE: 1" = 125'	DATE: 10/03/13
SHEET NO. 4 OF 6	



WESTERN LAND APPLICATION AREA

- LEGEND**
- EXISTING LAND APPLICATION AREA
 - PROPOSED LAND APPLICATION AREA/STORMWATER DIVERSION BERM
 - EXISTING WATER CHANNEL
 - APPROXIMATE EXISTING ROAD
 - EXISTING WASTEWATER TREATMENT FACILITIES
 - EXISTING 8-INCH PVC PIPING
 - EXISTING 4-INCH PVC PIPING
 - EXISTING SPRINKLER HEAD AND 1-1/4 INCH GATE VALVE
 - EXISTING 6-INCH GATE VALVE
 - EXISTING SAMPLED GROUNDWATER MONITORING WELL
 - FLOW DIRECTION
 - EXISTING CONTOUR LINES (10')
 - EXISTING CONTOUR LINES (2')
 - PROPOSED CONTOUR LINES (10')
 - PROPOSED CONTOUR LINES (2')
 - PROPOSED STORMWATER DRAINAGE DITCH
 - CONSTRUCTION POINTS
- 55' SPRINKLER RADIUS

- NOTES**
- 2 FOOT CONTOURS WERE GENERATED FROM LIDAR TOPOGRAPHICAL DATA COLLECTED IN 2010 AND WERE PROVIDED BY THE USACE LITTLE ROCK DISTRICT.
 - HORIZONTAL DATUM AND PROJECTION: NAD83, ARKANSAS STATE PLANE, NORTH ZONE, U.S. SURVEY FOOT, VERTICAL DATUM IS NAVD83, FEET.
 - THE INFORMATION SHOWN ON THIS MAP WAS COMPILED FROM VARIOUS SOURCES AND HAS NOT BEEN FIELD VERIFIED.
 - INFORMATION SHOWN ON THIS MAP SHOULD NOT BE USED FOR PROPERTY BOUNDARY RESOLUTION. THIS DOES NOT REPRESENT A BOUNDARY SURVEY AND IS SHOWN FOR REFERENCE ONLY.
 - THE PROPOSED GRADING PLAN RESULTS IN A TOTAL NET CUT OF APPROXIMATELY 7,300 CUBIC YARDS OF SOIL MATERIAL. THIS QUANTITY EXCEEDS THE REQUIREMENTS TO CONSTRUCT THE STORMWATER CONTAINMENT BERMS (APPROXIMATELY 6,800 C.Y.). ANY EXCESS SOIL MATERIAL SHALL BE PLACED WITHIN THE PROJECT BOUNDARIES (EXISTING OR NEW LAND APPLICATION AREAS) AS DIRECTED BY THE OWNER OR THE ENGINEER.
 - STORMWATER DRAINAGE DITCHES WITHIN EXISTING LAND APPLICATION AREAS SHALL BE IMPROVED AS NECESSARY TO CONVEY STORMWATER RUNOFF TO EXISTING DRAINS.
 - THE PROPOSED DISTRIBUTION SYSTEM CONFIGURATION PROVIDES THE MAXIMUM POSSIBLE INFLUENCED AREA WITHIN THE PROPOSED LAND APPLICATION AREAS. THE USE OF DIRECTIONAL SPRINKLER HEADS WILL BE NECESSARY AS SPECIFIED ON SHEET 4, TO PREVENT APPLICATION OUTSIDE OF CONTAINMENT BERMS.



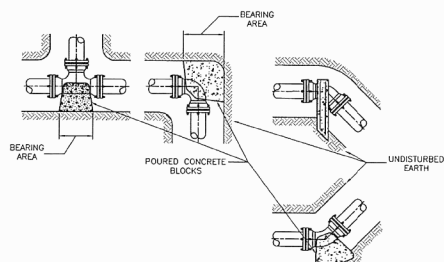
SOUTHERN LAND APPLICATION AREA

WESTERN STORMWATER CONSTRUCTION POINTS				
Point #	Northing	Easting	Elevation	Description
701	505844.84	1450008.92	287.0	TOP OF BERM
702	505878.50	1449875.50	289.0	TOP OF BERM
703	505808.51	1449616.01	291.0	TOP OF BERM
704	505779.00	1449579.00	292.0	TOP OF BERM
705	505703.03	1449528.20	293.0	TOP OF BERM
706	505493.74	1449455.65	293.0	TOP OF BERM
707	505270.78	1449395.72	293.0	TOP OF BERM
708	505008.53	1449435.25	292.0	TOP OF BERM
709	504945.45	1449476.30	291.0	TOP OF BERM
710	504884.03	1449779.74	287.0	TOP OF BERM
711	504832.41	1449840.46	286.0	TOP OF BERM
712	504802.41	1449862.49	285.0	TOP OF BERM
713	504815.89	1449794.16	285.0	TOP OF BERM
714	504425.32	1449798.26	284.0	TOP OF BERM
715	504216.28	1449878.23	282.0	TOP OF BERM
716	504018.78	1450081.41	280.0	TOP OF BERM
717	503503.56	1450243.80	279.0	TOP OF BERM
718	503459.26	1450328.91	278.0	CENTERLINE OF DITCH
719	502828.83	1450001.07	281.0	CENTERLINE OF DITCH
720	505863.01	1449875.58	283.0	CENTERLINE OF DITCH
721	505794.90	1449623.01	285.0	CENTERLINE OF DITCH
722	505768.72	1449590.17	286.0	CENTERLINE OF DITCH
723	505696.73	1449542.04	287.0	CENTERLINE OF DITCH
724	50488.94	1449469.89	287.0	CENTERLINE OF DITCH
725	505269.43	1449410.89	287.0	CENTERLINE OF DITCH
726	505014.21	1449449.46	286.0	CENTERLINE OF DITCH
727	504958.61	1449485.64	285.0	CENTERLINE OF DITCH
728	504878.08	1449785.24	281.0	CENTERLINE OF DITCH
729	504844.10	1449850.49	280.0	CENTERLINE OF DITCH
730	504805.08	1449879.15	279.0	CENTERLINE OF DITCH
731	504613.24	1449809.22	279.0	CENTERLINE OF DITCH
732	504428.24	1449813.21	278.0	CENTERLINE OF DITCH
733	504224.73	1449891.06	276.0	CENTERLINE OF DITCH
734	504026.91	1450094.57	274.0	CENTERLINE OF DITCH
735	503514.02	1450256.26	273.0	CENTERLINE OF DITCH
736	503469.85	1450342.11	273.0	CENTERLINE OF DITCH

SOUTHERN STORMWATER CONSTRUCTION POINTS				
Point #	Northing	Easting	Elevation	Description
801	503439.59	1451351.49	278.5	TOP OF BERM
802	503099.76	1451351.53	277.0	TOP OF BERM
803	503102.39	1450971.26	273.0	TOP OF BERM
804	503045.44	1450920.13	270.0	TOP OF BERM
805	502694.81	1451276.88	269.0	TOP OF BERM
806	502652.82	1451517.41	267.0	TOP OF BERM
807	503435.29	1451777.34	263.0	TOP OF BERM
808	503046.08	1450940.87	264.0	CENTERLINE OF DITCH
809	502708.79	1451284.06	263.0	CENTERLINE OF DITCH
810	502671.44	1451507.62	261.0	CENTERLINE OF DITCH
811	503445.72	1451785.00	257.0	CENTERLINE OF DITCH

WESTERN ROADWAY RELOCATION CONSTRUCTION POINTS				
Point #	Northing	Easting	Elevation	Description
901	504180.28	1449798.93	MATCH EXISTING	BEGIN RELOCATED SECTION
902	504063.05	1449953.17	MATCH EXISTING	BEGIN CURVE
903	504013.66	1449988.91	MATCH EXISTING	END CURVE
904	503503.78	1450184.59	MATCH EXISTING	END RELOCATED SECTION

SOUTHERN ROADWAY RELOCATION CONSTRUCTION POINTS				
Point #	Northing	Easting	Elevation	Description
1001	503363.18	1451177.37	MATCH EXISTING	BEGIN RELOCATED SECTION
1002	503359.91	1451231.11	MATCH EXISTING	BEGIN CURVE
1003	503399.84	1451273.44	MATCH EXISTING	END CURVE
1004	503412.56	1451273.44	MATCH EXISTING	BEGIN CURVE
1005	503467.56	1451328.44	MATCH EXISTING	END CURVE



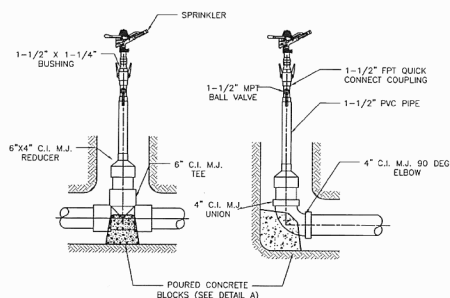
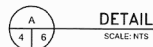
NOTES:

1. ALL-BLOCKING SHALL BE AGAINST UNDISTURBED, HAND DUG SOIL.
2. CLEARANCE SHALL BE A MINIMUM OF 6" BETWEEN PIPE AND OBSTRUCTIONS.
3. WRAP ALL FITTINGS WITH DOUBLE LAYER OF POLYETHYLENE ENCASEMENT PRIOR TO CASTING CONCRETE.

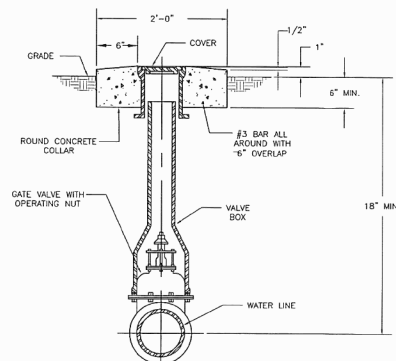
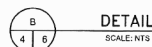
BEARING AREA OF BLOCK IN SQ. FT.									
SPRINKLER	1/2" x 1/2"	3/4" x 3/4"	1" x 1"	1 1/2" x 1 1/2"	2" x 2"	2 1/2" x 2 1/2"	3" x 3"	4" x 4"	6" x 6"
4"	3.6	5.4	7.5	1.5	6.8				
6"	4	6	9	2	9				
8"	6.8	8.9	12.8	2.5	1.3				

NOTE TO DESIGNER: AREAS BASED ON PIPE BURST PRESSURE OF 250 PSI.
SOIL BEARING PRESSURE MULTIPLIER
1500 1.33
2000 1.00
3000 0.67

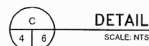
TYPICAL THRUST BLOCK DETAIL



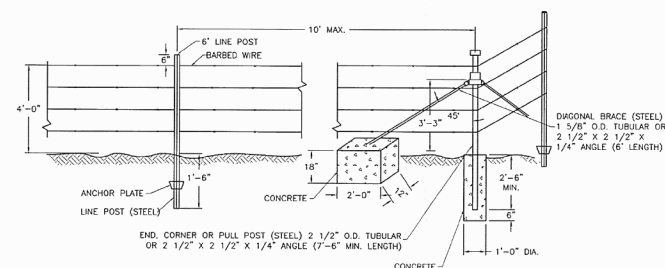
TYPICAL SPRINKLER RISER PIPE CONFIGURATIONS



TYPICAL VALVE BOX

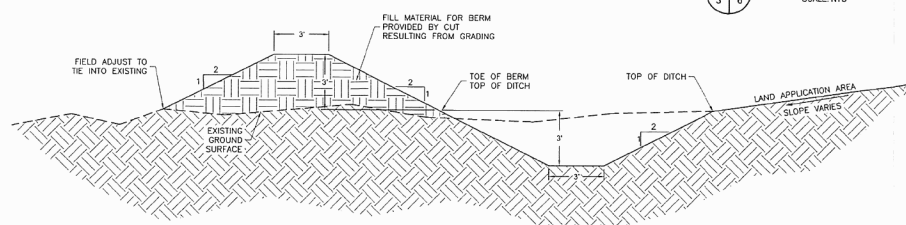
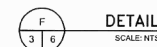


- NOTES:
1. BARBED WIRE SHALL BE 12-1/2 GAUGE, 4-POINT BARS, CONFORMING TO ASTM A121, CLASS 3 GALVANIZING.
 2. STEEL LINE POSTS SHALL BE GALVANIZED, 6-FT. IN LENGTH, AND CONFORM TO AASHTO M 281.
 3. HARDWARE AND FITTINGS SHALL CONFORM TO ASTM F 626.
 4. ANY MISCELLANEOUS HARDWARE OR FITTING NOT PREVIOUSLY MENTIONED SHALL BE GALVANIZED IN ACCORDANCE WITH THE APPLICABLE REQUIREMENTS OF AASHTO M 111 OR M 232.
 5. SPLICE FOR BARBED WIRE BETWEEN POST ASSEMBLY SHALL BE THE "EYE METHOD" AS DESCRIBED AS FOLLOWS: THE ENDS OF THE BARBED WIRE SHALL BE BENT TO FORM A LOOP. THE LOOP SHALL BE CONNECTED. AFTER THE LOOPS ARE CONNECTED, THE ENDS OF THE WIRE SHALL BE WRAPPED AROUND THE PROJECTING WIRE A MINIMUM OF 4 TIMES FOR EACH WIRE LOOP.
 6. IN AREAS OF EXISTING VEGETATION, CLEAR A MINIMUM OF 10 FEET FOR FENCE. INSTALL FENCE ON OUTSIDE OF CLEARED PATH.
 7. CORNER POSTS SHALL BE USED AT TRANSITIONS BETWEEN CHAIN LINK AND WOVEN WIRE FENCING.



NOTE: POSTS MAY BE STEEL T-POSTS OR ROUND POSTS.

BARBED WIRE FENCE



TYPICAL STORMWATER CONTAINMENT BERM AND DIVERSION DITCH



WORK PLAN FOR HYDROGEOLOGICAL INVESTIGATION

JULY 26, 2016

WORK PLAN
FOR
HYDROGEOLOGICAL INVESTIGATION

Prepared for

FutureFuel Chemical Company
PO Box 2357
Batesville, AR 72503

Prepared by

FTN Associates, Ltd.
3 Innwood Circle, Suite 220
Little Rock, AR 72211

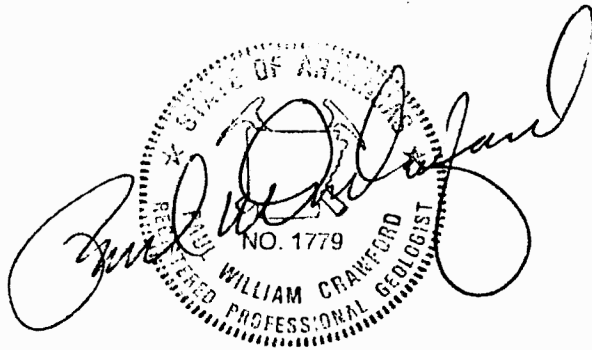
FTN No. R10760-1240-001

July 26, 2016

July 26, 2016

PROFESSIONAL GEOLOGIST'S CERTIFICATION

This work plan was prepared under the direction and supervision of a qualified, State of Arkansas - registered, Professional Geologist. Mr. Paul Crawford, PE, PG, of FTN Associates, Ltd., was responsible for the overall preparation of the work plan.



Paul Crawford, #1779

July 26, 2016
Date

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1.0 BACKGROUND

FutureFuel Chemical Company (FFCC) owns and operates a 2,200-acre chemical manufacturing facility at Batesville in Independence County, Arkansas. The facility discharges treated wastewater to the White River under National Pollutant Discharge Elimination System (NPDES) Permit No. AR0035386. This permit calls for rigorous monitoring for residual organics and other pollutants. The facility's wastewater treatment system has been effective at treating the wastewater and achieving the permit conditions stated in the NPDES permit.

Since 1981 FFCC has operated a 95-acre land application facility for the purpose of land applying industrial sludge from the wastewater treatment plant under the conditions established in the NPDES permit.

FFCC submitted a permit renewal application for the land application facility to the Arkansas Department of Environmental Quality (ADEQ) in May 2008. Numerous discussions were held with ADEQ regarding the proposed new permit until 2012, when a new permit was issued. FFCC submitted comments on that permit and after several more discussions with ADEQ; a new permit was issued in May 2015. FFCC submitted comments on the May 2015 permit and met with ADEQ to discuss the permit in February 2016. ADEQ and FFCC agreed that FFCC would resubmit the permit renewal application and, as part of the permit renewal, they would conduct a hydrogeological investigation of the land application area. The purpose of the investigation is to develop a better understanding of the hydrogeological setting of the FFCC land application area (including the proposed expansion areas) and to develop a groundwater monitoring well network that will comply with the FFCC no-discharge permit and 40 CFR Part 257.

Currently, FFCC monitors six wells around the perimeter of the land application area. Three wells are screened in the unconsolidated soils above underlying bedrock and three are screened in the underlying bedrock. Each monitoring zone has one upgradient and two downgradient wells. Most of these wells were not constructed to current monitoring well standards and were not initially meant to be used as part of a groundwater monitoring network for the land application area. Some were installed for monitoring the groundwater under the land

application site while others were installed specifically for the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) permitting activity in various locations across the plant site. Boring log data casts doubt over the existence of a perched, shallow groundwater flow regime as described in previous groundwater studies conducted at the FFCC facility. It is also unclear if the bedrock aquifer is monitored at the appropriate depth intervals.

2.0 PURPOSE OF WORK PLAN

FTN Associates, Ltd. (FTN) has prepared this Work Plan which describes the work to be conducted as part of a hydrogeological investigation of the FFCC land application area located at the FFCC facility in Batesville, Arkansas. This plan outlines the proposed work for the investigation that includes the installation of new groundwater monitoring wells, installation of temporary piezometers, monitoring well development, background groundwater sampling of the new wells and piezometers, preparation and submittal of a summary report of the installation activities, and preparation of a certification of the groundwater monitoring network as required by ADEQ.

The following section provides background information of the regional and site-specific geology and hydrogeology for the FFCC facility and was used for the basis of the proposed hydrogeological investigation.

3.0 GEOLOGICAL INFORMATION

3.1 Regional Geology

The FFCC facility is located on the eastern edge of the Springfield Plateau of the Ozark Plateau Physiographic Province, which is immediately west of the Mississippi River Alluvial Plain Province of the Coastal Plain Province. The Springfield Plateau is characterized by dissected plateau surfaces and steep-sided, sinuous streams. The geology of this region consists of horizontal Paleozoic bedrock with minor amounts of surficial unconsolidated Quaternary deposits. Land surfaces in this region typically range between 700 ft National Geodetic Vertical

Datum (NGVD) at the top of hills and to less than 300 ft NGVD in the White River valley. Farther to the east of the FFCC facility, the unconsolidated Quaternary deposits of the Mississippi River Alluvial Plain completely blanket the Paleozoic bedrock and thicken to the east. This region is characterized as flat and elevations that range between 250 and 220 ft NGVD, with local relief seldom exceeding 20 ft.

The stratigraphy in the region where the FFCC facility is located is characterized by consolidated bedrock of Mississippian age overlain locally by unconsolidated alluvial and colluvial deposits of Quaternary age. The bedrock in the area generally consists of interbedded shale, limestone, sandstone, and chert. The unconsolidated soils are comprised of alluvial deposits of the White River and its tributaries and typically consist of clays, silts, sands, and gravel. The colluvial deposits are typically found at the base of the upland hills of the area and consist of cobbles, gravel, sand, silt, and clayey soils with coarser materials at the base of the stratigraphic section. The unconsolidated soils are typically less than 50 ft in thickness along the White River, with localized areas of thicker deposits from old stream beds (Albin et al. 1967).

The bedrock formations found in the vicinity of the FFCC site are the Mississippian-age Batesville Sandstone, Ruddell Shale, Moorefield Formation, and Boone Formation (Croneis 1930). The Batesville Sandstone is the youngest of the Mississippian-age formations and is a gray to brown, medium-grained, calcareous sandstone containing dark-grey shale lenses. In the vicinity of the FFCC site, local erosion has mostly removed it from outcrops, although some remnants remain along ridge tops.

The Ruddell Shale formation underlies the Batesville Sandstone in the region and generally occurs near the surface in the same areas as the outcrop of the Batesville Sandstone, and crops out as a narrow band where the Batesville Sandstone has been removed by erosion. It also underlies the Quaternary deposits along stream and river bottoms in some portions of the region. It consists primarily of dark grey and green fissile clay shale with the upper and greater part of the shale containing clay-ironstone concretions. The lower portion of the formation contains platy, arenaceous, and calcareous shale beds with concretionary nodules of black limestone. The thickness of the Ruddell Shale formation in the region is reported to range between 120 and 270 ft.

The Moorefield Formation conformably underlies the Ruddell Shale in the region. It crops out locally in areas of higher elevation near the FFCC site. It also underlies Quaternary deposits along streams and rivers in similar areas as the Ruddell Shale. It consists of dark grey to black, platy calcareous shale, and impure limestone. The top of the formation in the region is marked by a bed of impure siliceous limestone about 8 ft thick that weathers to a tan, fine-grained grit. In the area of the FFCC facility, the formation is reported to range in thickness from 25 to 200 ft.

The upper member of the Boone Formation unconformably underlies the Moorefield Formation. It comprises most of the surface stratum of the Springfield Plateau, and is the oldest of the Mississippian rocks in the FFCC site area. The upper member is described as a grey, fine to coarse-grained limestone interbedded with white to grey, porous to dense chert. In the region, the Boone Formation ranges in thickness between 100 to 200 ft, but can be as thick as 450 ft.

According to Albin et al. (1967), groundwater in the region occurs in both the alluvial deposits along the White River and the consolidated bedrock. However, groundwater is not as plentiful in the bedrock and the White River alluvial deposits as in the alluvium in the Coastal Plain Province further east of the FFCC site.

Lammonds (1972) reported that the alluvium in the White River valley is not a productive water-bearing unit because of its limited thickness and areal extent. Wells in the White River alluvium are reported to yield between 0 to 50 gallons per minute (gpm), with the higher yields in thicker alluvium deposits further to the east of the FFCC facility.

Groundwater in the bedrock in the region generally is contained in secondary openings such as fractures, joints, solution cavities, and bedding separations (Albin et al. 1967, Lammonds 1972). The secondary openings are more numerous near the ground surface and generally decrease in size and number with depth. Therefore, so does the quantity of available groundwater. Wells in the region in the Moorefield Formation and the Ruddell Shale are reported to possibly yield as much as 25 gpm, but usually yield less than 10 gpm.

3.2 Site-specific Geology

Based on several subsurface investigations at the FFCC facility (JLGA 1988, Arkansas Eastman Division 1993), the geology is similar to the regional geology and can be characterized by thick deposits of consolidated Mississippian age bedrock overlain with relatively thin unconsolidated deposits of colluvium, residual soils from weathering of the underlying bedrock, and Quaternary-age alluvial soils deposited by the White River and its tributaries.

Figure 1 shows the FFCC site and the land application on the United States Geological Survey (USGS) 7.5-minute topographic quadrangle map for Saldo, AR. As shown on the figure, north of the FFCC site are Qualls and Caldwell Mountains, bisected by a valley draining southward across the site, and eventually to the White River. The White River Floodplain lies southwest, south, and southeast of the FFCC plant and land application area. According to the geologic map for the region (Figure 2), the Qualls and Caldwell Mountains are capped with Batesville Sandstone and the slopes of the hills and valley between them are mapped as the Ruddell Shale. The area south of the upland area is mapped as the Moorefield Formation (colluvial deposits from the upland hills and residual soils of the formation at the surface) up to the White River floodplain. The area south of the Moorefield Formation and under the plant and wastewater treatment area is mapped as Quaternary alluvium. There is an erosion boundary created by the White River between the colluvial/residual deposits of the Moorefield Formation and the alluvium that trends northwest to southeast from the middle of the western property boundary to immediately south of the Cooling Water Pond (Figure 2).

The alluvial deposits were reported to generally consist of clays, silts, fine and coarse grained sands, and gravel, with the gravel typically found at the top of the underlying bedrock. The alluvial deposits were reported to be found more on the southern portion of the FFCC site and the plant and wastewater treatment system area. They were found to be generally less than 30 ft thick, increasing in thickness towards the White River. Colluvium and local residual soil that is formed from natural physical and chemical weathering of the underlying bedrock were typically found on the northern portion of the FFCC site, and surrounding the land application area. These soils consist of silty clay with gravel, chert, and sand. The thickness of the residual soil/colluvium was reported to be between 9 and 26 ft. According to the RFI (Arkansas Eastman

Division 1993), the boundary between the alluvial and colluvium/residual deposits varies throughout the facility, but was approximately near elevation 250 ft NGVD; the point at which the topography changes from the alluvial floodplain to colluvial deposits and the residual soils from the upland areas (Figure 1).

According to the RFI report, the alluvial and colluvial/residual soils can be differentiated by physical properties. The alluvial soils are typically dark brown, clayey silts compared to the reddish brown to dark grey, clayey silt and sand mixtures found in the colluvial/residual soils. The alluvial soils were found to have a higher plasticity than the colluvial/residual soils. The colluvial/residual soils typically had gravel throughout the stratigraphic section, while gravel was only found at the bedrock interface in the alluvial soils.

Based on previous subsurface investigations at the site (JLGA 1988, Arkansas Eastman Division 1993), the primary bedrock formations encountered in the upper 100 ft beneath the unconsolidated soils at the plant site are the Moorefield Formation and the Ruddell Shale consisting primarily of shale and limestone. The Ruddell shale is reported to underlie the northern portion of the plant site above approximately elevation 280 ft NGVD. The Moorefield Formation is reported to underlie the majority of the plant and waste management areas (wastewater treatment and land application areas) of the FFCC facility (Arkansas Eastman Division 1993).

3.3 Site-specific Hydrogeology

The RFI concluded that there are two separate groundwater flow regimes at the site: a shallow flow zone located in the unconsolidated soils (alluvium and colluvium/residual materials) and groundwater located within the fractures, joints, bedding planes, and partings of the Mississippian-age bedrock (Moorefield Formation and Ruddell Shale). Each of these flow regimes is described in further detail below.

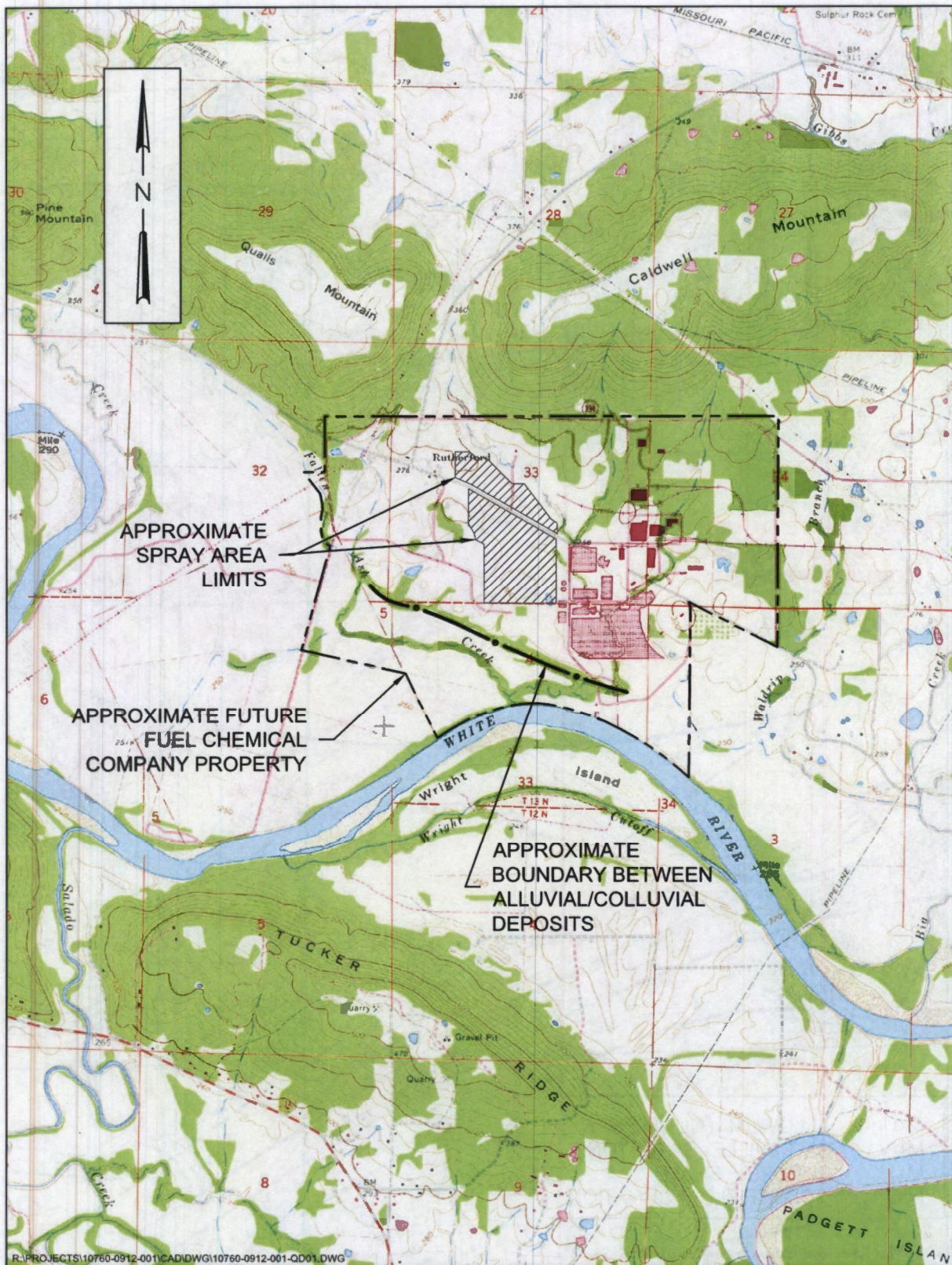


Figure 1. Site location map.USGS 7.5 minute series quadrangle maps: Saldo, Ark (1965); photorevised (1981).

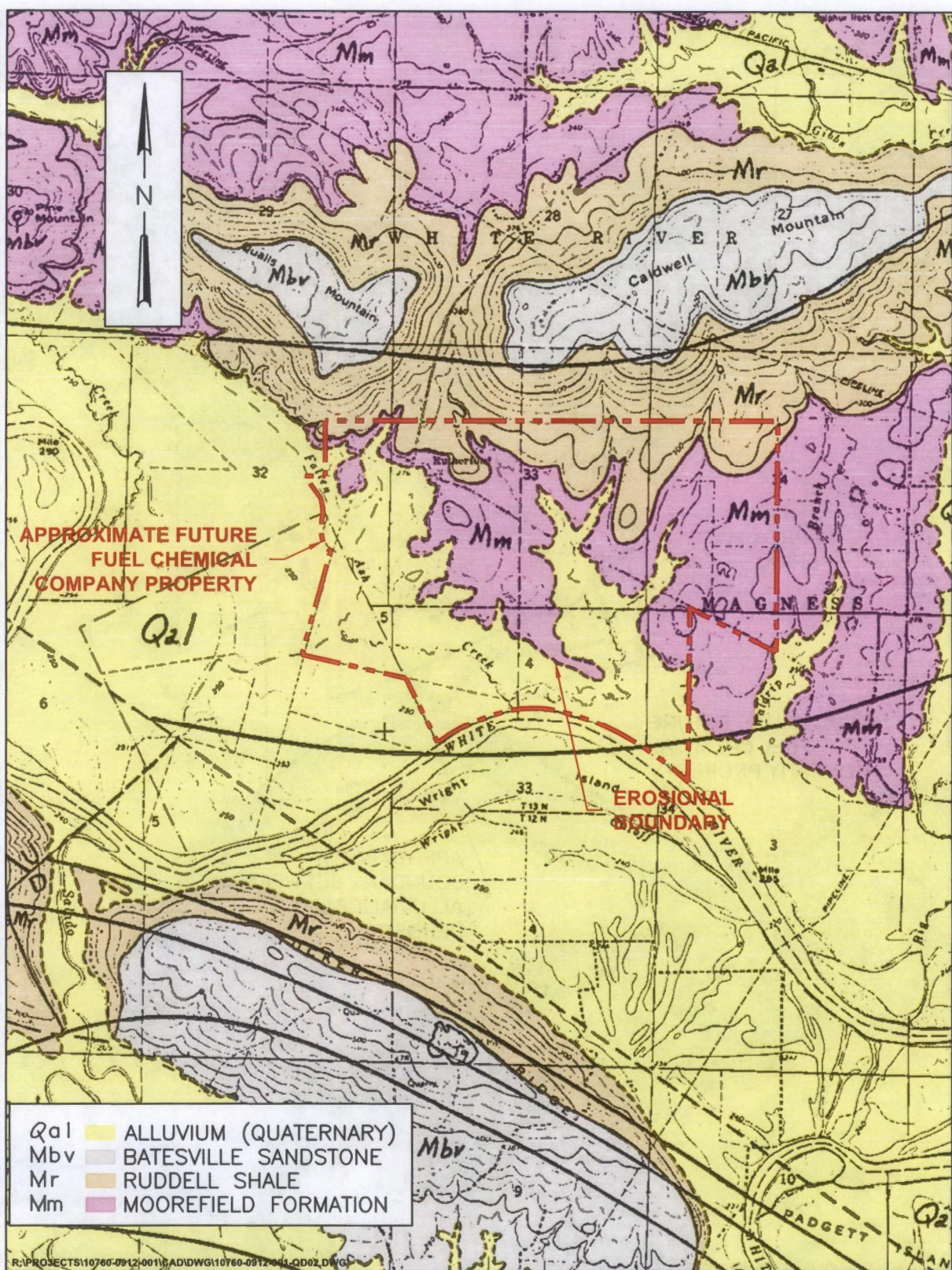


Figure 2. Geologic worksheet, Saldo, Arkansas quadrangle (Haley, 1967)

According to the RFI report, downward percolation of surface water into the upper unconsolidated sediments is largely restricted at its contact with the underlying bedrock, though minor amounts may migrate vertically through bedrock joints and fractures causing the formation of an unconfined perched saturated zone. The principal direction of groundwater flow in this unit is reported to be southward from the topographically higher areas toward the White River. Based on data reported in the RFI, the volume of groundwater contributed by the shallow zone to the White River is relatively small and has a minimal effect on the chemistry of the river. The RFI reported that the hydraulic conductivity of the colluvium/residual soil and alluvium was in the range of 10^{-4} cm/sec to 10^{-6} cm/sec, with an estimated flow velocity in the range of 2 to 410 ft/year.

Groundwater within the underlying bedrock is reported to occur at a wide range of depths, with no specific layer within the bedrock that is associated with groundwater occurrence (Arkansas Eastman Division 1993). It was determined that groundwater flow in the bedrock is controlled by secondary openings such as joints, fractures, bedding planes, and partings rather than lithology. Groundwater in this zone typically exhibits confined conditions and generally flows southward across the FFCC site and to the White River. The RFI reported that the hydraulic conductivity of the bedrock was in the range of 10^{-3} cm/sec and 10^{-5} cm/sec, with an estimated flow velocity in the range of 1 to 130 ft per year.

3.4 Proposed Hydrogeological Investigation

As stated above, the purpose of this investigation is to develop a hydrogeological model of the FFCC land application area and to install a groundwater monitoring network that complies with the FFCC no-discharge permit and 40 CFR Part 257.

Criteria for placement of downgradient wells includes locating them relative to “the waste management unit” and such that they intercept potential pathways for contaminant migration. In accordance with §257.3-4(a), a facility or practice shall not contaminate an underground drinking water source beyond the solid waste boundary or beyond an alternative boundary as specified in §257.3-4(b). Due to the close proximity of the land application area to other wastewater treatment facilities and the variance in vertical well placement, there is

uncertainty that the current well network for the FFCC land application area completely complies with these requirements.

To develop a hydrogeological model of the FFCC land application area (including the proposed expansion areas), the following will be performed:

1. Install monitoring wells up and down gradient of the existing and proposed expansion areas in both the unconsolidated soils and in the underlying bedrock units. Due to the uncertainty of whether or not the unconsolidated soils overlying the bedrock is an aquifer, these wells will be installed as temporary piezometers and can be completed as monitoring wells if the investigation determines that there is a shallow aquifer in this soil unit.
2. Conduct aquifer tests on both the upper soil unit and the lower bedrock unit to determine hydraulic characteristics of each unit.
3. Conduct eight quarterly groundwater sampling events to determine flow direction, and water quantity and quality characteristics of each unit.

In accordance with §257.3-4(b), a 500-ft compliance boundary has been established for the groundwater monitoring network for the land application area.

4.0 MONITORING WELL AND TEMPORARY PIEZOMETER INSTALLATION AND DEVELOPMENT

The proposed new monitoring wells and temporary piezometers will be installed in the approximate locations as shown on attached Figure 3, Proposed Well Network. The new monitoring wells and piezometers will surround the existing land application areas as well as the proposed expansion area. The new monitoring wells and piezometers will be within the proposed 500-foot compliance boundary.

The new monitoring wells will be installed into and screened in the underlying shale/limestone bedrock. Based on hydrogeological investigations at the FFCC facility, the estimated depth of the new wells is approximately 30 ft into the bedrock, but may be deeper depending on when the uppermost aquifer is encountered. The temporary piezometers will be installed and screened in the overburden soils above the contact with the underlying bedrock.

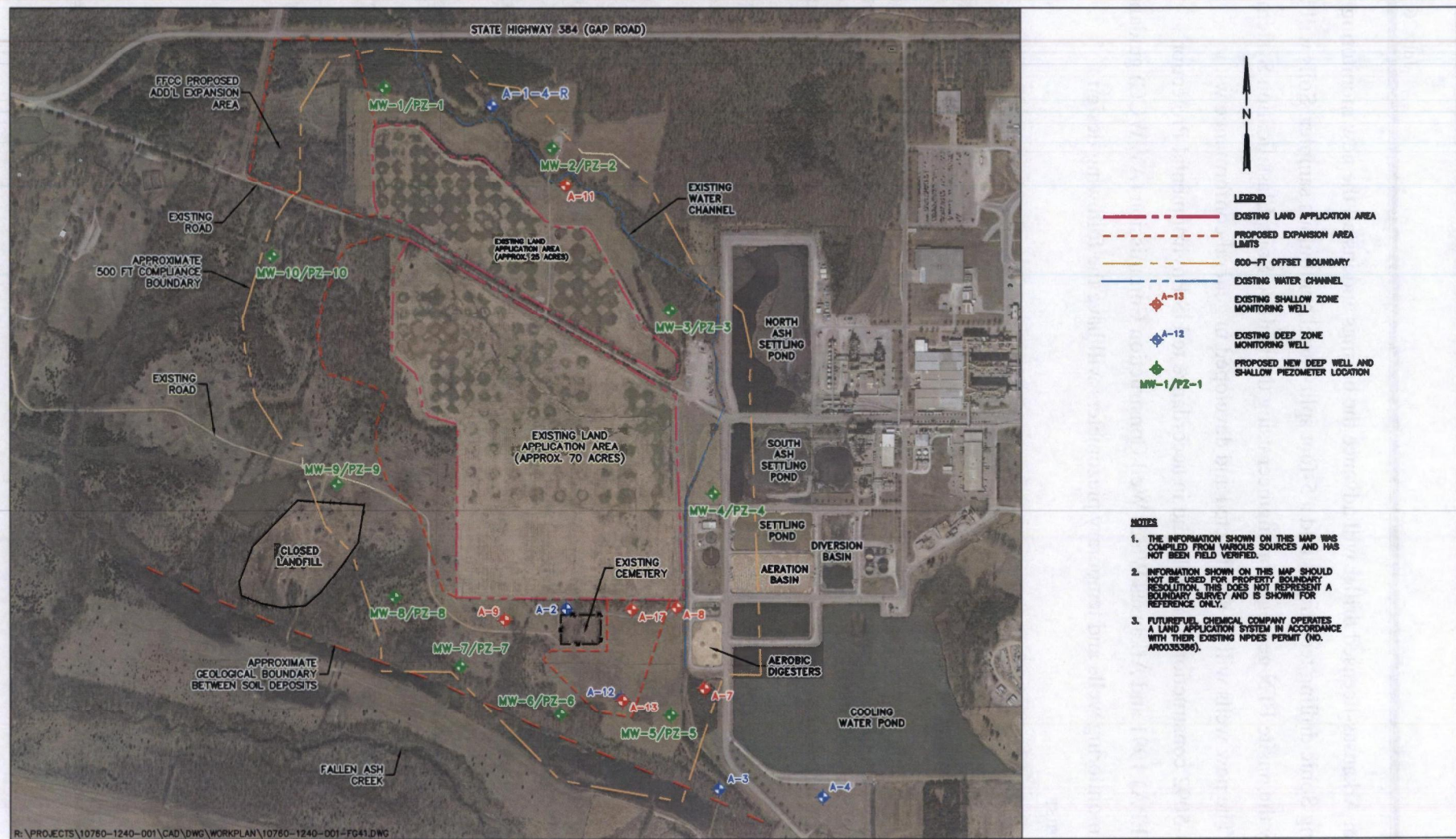


Figure 3. Proposed well network.

An Arkansas-licensed driller will advance the borings and install the new monitoring wells using Sonic drilling techniques and a 5-foot split-barrel continuous sampler. Soils will be logged by the onsite FTN geologist or engineer using the Unified Soils Classification System (USCS). The new wells will be constructed and developed in general conformance with ASTM D-5092 construction protocols and in accordance to US Environmental Protection Agency (EPA) 1991 and Arkansas Water Well Construction Commission (AWWCC) guidance. The new monitoring wells and temporary piezometers will have the following design components:

1. The borings will be advanced using augers of sufficient diameter such that each borehole is a minimum of 4 inches larger than the diameter of the PVC well casing.
2. Monitoring well casings and screens will be constructed of 2-inch diameter, Schedule 40 PVC with flush-threaded casing and 10-foot long, 10-slot (i.e., 0.010-inch) well screen. Piezometer casings and screens will be constructed of 2-inch diameter, Schedule 40 PVC with flush-threaded casing and 5-foot long, 10-slot (i.e., 0.010-inch) well screen.
3. The bottom of the wells and piezometers will be sealed with a 0.5-foot bottom plug. Each well and piezometer will have a pressure-sealed locking cap to prevent entrance of foreign materials.
4. Filter packs will consist of well-rounded, 10- to 20-silica sand and be placed to a minimum distance of 2 feet above the top of the screen.
5. The annular space above the filter pack will be completed with a sealant that includes a minimum of 2 feet of bentonite seal followed by a well-mixed bentonite cement grout.
6. Each monitoring well will be secured at the surface with a 4-inch locking, protective casing, concrete pad, and four protective pipe bollards.
7. The PVC well casing at each well will be vented to allow equilibration of water levels with atmospheric pressure.
8. The monitoring well identifications will be alphanumeric and clearly marked on the outside protective casing.
9. Orange safety fencing secured to metal T-posts will be placed around each temporary piezometer for protection.

Each new monitoring well and temporary piezometer will be developed to the degree necessary to restore formation hydraulic conductivity and yield representative samples of

formation groundwater quality. Wells and piezometers will be developed by using a submersible pump until the water removed is visibly free of silt and sand, where practical.

5.0 AQUIFER TESTS

The hydraulic conductivity of the shallow (overburden soils) and deep (bedrock) zone is required to calculate the groundwater velocity across the monitored units. Hydraulic conductivity will be determined based on slug testing at three shallow piezometers and three deep wells. The groundwater velocity of each zone will be estimated using the hydraulic conductivities determined from these slug tests and/or results from other studies, and the calculated hydraulic gradients based on water level measurements.

6.0 WELL SURVEY

A survey of the new monitoring wells and temporary piezometers will be conducted. Horizontal coordinates will be measured to the nearest 0.1-ft and elevation will be measured to the nearest 0.01 ft. The elevations of the top of PVC casing, ground surface, and top of concrete pad (for the monitoring wells) will also be determined.

7.0 INSTALLATION AND HYDROGEOLOGIC ASSESSMENT SUMMARY REPORT

Upon completion of monitoring well/piezometer installation, aquifer testing, and the well survey; a report will be submitted which documents field activities and presents a preliminary hydrogeologic model of the FFCC land application area. The report will be certified by the supervising professional and will include the following deliverables:

- A site map that includes the surveyed locations of the newly installed groundwater monitoring wells and temporary piezometers,
- A minimum of one potentiometric surface map,

- Boring logs and construction details for the new wells and temporary piezometers,
- Well development records,
- Aquifer test results, and
- The certified survey report which contains vertical and horizontal location coordinates for monitoring wells and temporary piezometers.

8.0 BACKGROUND SAMPLING AND REPORTING

Eight quarterly groundwater sampling events will be conducted upon completion of the installation activities. During each event, water level measurements and samples will be collected from the 10 new monitoring wells and 10 temporary piezometers. Groundwater samples and two quality assurance samples will be submitted to the analytical laboratory. The samples will be analyzed for the parameters in the new FFCC no-discharge permit.

Analytical parameters from each quarterly sampling event will be screened for irregularities. Data appearing to be suspect will be verified with the laboratory and corrected, if necessary. A historical database for groundwater data will be created and maintained using SanitasTM statistical software.

In addition, the average linear groundwater velocity will be calculated and a potentiometric surface map will be prepared for both monitored units following each groundwater sampling event. This information will help assess if the groundwater monitoring network is sufficiently monitoring the FFCC land application area.

9.0 CERTIFICATION OF GROUNDWATER MONITORING NETWORK

Upon completion of the eight quarterly background groundwater sampling activities, certification of the groundwater monitoring network will be submitted to ADEQ. The certification will identify which wells will be included in the network and the rationale for their inclusion. The certification will also include a revised hydrogeologic model based on new information gleaned from quarterly water level measurements and background sampling. The network will be certified by an Arkansas registered Professional Geologist.

10.0 REFERENCES

- Albin, D.R., M.S. Hines, and J.W. Stephens. 1967. *Water Resources of Jackson and Independence Counties, Arkansas* [USGS Water Supply Paper 1839-G]. Washington, DC: US Geological Survey. Prepared in cooperation with Arkansas Geological Commission.
- Arkansas Eastman Division. 1993. *RCRA Facility Investigation Report, Arkansas Eastman Division, Eastman Chemical Company, Batesville, AR, ARD089234884, Permit Number 11H-R1*. Prepared in cooperation with James L. Grant & Associates, Inc. Batesville, AR: Arkansas Eastman Division, Eastman Chemical Company.
- AquAeTer, Inc. 1999. *Grounwater Quality Assessment Report Arkansas Eastman Facility*.
- Croneis, C. 1930. *Geology of the Arkansas Paleozoic Area with Especial Reference to Oil and Gas Possibilities* [Arkansas Geological Survey Bulletin 3]. Little Rock, AR: Arkansas Geological Survey.
- EPA. 1986. *RCRA Ground-Water Monitoring Technical Enforcement Guidance Document*. National Water Well Association, Dublin, Ohio.
- Haley, B.R. 1967. *Geologic Map of Arkansas*. Arkansas Geologic Commission and the US Geological Survey.
- JLGA. 1988. *Dedicated Site Demonstration for the Arkansas Eastman Company Spray Irrigation Area*. Prepared for Arkansas Eastman Division of Eastman Chemical Company. Little Rock, AR: James L. Grant & Associates.
- Lammonds, A.G. 1972. *Water-resources reconnaissance of the Ozark plateaus province, northern Arkansas* [USGS Hydrologic Atlas HA-383]. Washington, DC: US Geological Survey.



2800 Gap Road
P.O. Box 2357
Batesville, AR 72503
Phone: 870-698-3000
www.futurefuelcorporation.com

July 19, 2016

CERTIFIED

Arkansas Department of Health
Engineering Division, Slot #37
4815 West Markham
Little Rock, AR 72205

Subject: FutureFuel Chemical Company No-Discharge Permit
Application Submittal

Gentlemen/Ladies:

This letter is to inform you that FutureFuel Chemical Company is submitting a No-Discharge Land Application Permit at the request of and to the Arkansas Department of Environmental Quality (ADEQ). This application is for an existing land application area that is currently permitted under NPDES Permit No. AR0035386, as well as additional acreage that borders the existing application area.

The land application site is used to manage sludge produced from the biological treatment of wastewater at FutureFuel Chemical Company's industrial wastewater treatment plant. The sludge is aerobically digested prior to application.

If you have any questions concerning this letter, please contact me at (870) 698-5634.

Very truly yours,

Lynn Cornelius
Sr. Environmental Biologist

swj

Enclosure

2006 649
Recorded in the Above
Deed Book & Page
02-01-2006 02:48:51 PM
Claudia Nobles Circuit Clerk
Independence County, AR

This Instrument prepared by and after
recording to be returned to:

W. Christopher Barrier, Esq.
Mitchell, Williams, Selig,
Gates & Woodyard, P.L.L.C.
425 West Capitol Avenue, Suite 1800
Little Rock, Arkansas 72201-3525
(501) 688-8800

SPECIAL WARRANTY DEED

KNOW ALL PERSONS BY THESE PRESENTS:

THAT EASTMAN CHEMICAL COMPANY, a Delaware corporation ("Grantor"), for and in consideration of the sum of **TEN DOLLARS (\$10.00)** and other good and valuable consideration, paid to Grantor by **EASTMAN SE, INC.**, a Delaware corporation ("Grantee"), the receipt and sufficiency of which are hereby acknowledged and confessed, has **BARGAINED, SOLD, GRANTED, and CONVEYED**, and by these presents does hereby **BARGAIN, SELL, GRANT and CONVEY** unto Grantee, whose mailing address is 200 South Wilcox Drive, Kingsport, TN 37660, all of the real property, together with all improvements situated thereon and appurtenances thereto, located in Independence County, Arkansas, in which the Grantor owns any interest whatsoever, including, without limitation, those certain tracts more particularly described in **Exhibits "A and "B"**, attached hereto and made a part hereof for all purposes.

And all other tracts of land, and all water rights, oil, gas, minerals and mineral rights, easements for water pipe lines and other easements, rights of reversion, rights of conveyance, and all other rights and interests in or relating to real estate, including but not limited to those conveyed to Grantor by or owned by Grantor (which term comprehends also any predecessor in

interest, including but not limited to **EASTMAN KODAK COMPANY**, a New Jersey corporation referred to herein as "Kodak") under deeds or other instruments of record in the Circuit Clerk's Official Records for said County, those reserved by Grantor in or owned by Grantor under deeds, leases or other instruments which have been made by Grantor to others, and those appurtenant to any or all of the lands hereby conveyed.

This conveyance is made and accepted subject to any and all liens, encumbrances, restrictions, covenants, mineral reservations or grants, conditions and easements, if any, relating to the hereinabove described property, but only to the extent the same are valid, still in effect and shown of record as of the date of this Deed in the Circuit Clerk's Official Records for said County; to all zoning laws, regulations and ordinances of municipal and/or other governmental authorities, if any, but only to the extent that they are valid, still in effect and relating to the hereinabove described property as of the date of this Deed; to any applicable real estate taxes, charges, levies or assessments; to any other matters appearing of record; and to rights of any parties presently or formerly in possession.

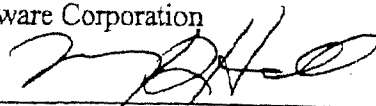
The purpose of this instrument is to convey to Grantee all that property conveyed to Grantor by Kodak by that Special Warranty Deed from Kodak to Grantor dated December 22, 1993, recorded February 3, 1994 in Deed Book L-15 at Pages 113-120 in the records of the Circuit Clerk of Independence County, Arkansas, which is correctly described in **Exhibits "A" and "B"** and which is the property which Grantor has occupied exclusively and upon which it has paid the real property taxes and any special assessments since that conveyance in 1993. It is the intention of the Grantor to include all accretions to any of the lands described herein.

TO HAVE AND TO HOLD the above-described premises, subject to the foregoing, together with all and each of the rights and appurtenances thereto in anywise belonging, unto Grantee, Grantee's successors and assigns forever; and Grantor hereby agrees to **WARRANT AND FOREVER DEFEND** all and each of the said premises unto Grantee, Grantee's successors and assigns, except with respect to the limitations stated in the immediately preceding paragraphs hereof, against every person whomsoever lawfully claiming the same or any part thereof, by, through and under Grantor, but not otherwise.

EXECUTED this 25th day of January, 2006.

GRANTOR:

EASTMAN CHEMICAL COMPANY,
A Delaware Corporation

By: 

Name: Mary D. Hall

Title: Vice President, Treasurer and Controller

STATE OF TENNESSEE)

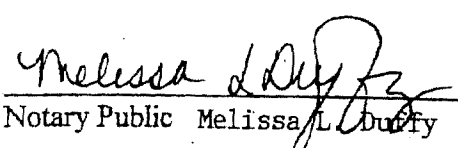
) ss:

COUNTY OF SULLIVAN)

ACKNOWLEDGMENT

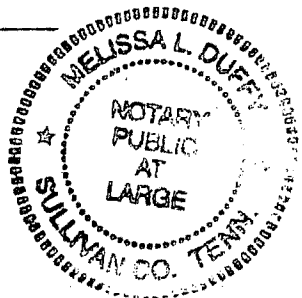
On this day, before me, the undersigned, a Notary Public, duly commissioned, qualified and acting, within and for said County and State, appeared in person the within named Mary D. Hall, to me personally well known, who stated that he was duly authorized to execute the foregoing instrument for and in the name and behalf of **EASTMAN CHEMICAL COMPANY**, and further stated and acknowledged that he had so signed, executed and delivered said foregoing instrument for the consideration, uses and purposes therein mentioned and set forth.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 25th day of January, 2006.


Notary Public Melissa L. Duffy

My commission expires:
6/26/07

(SEAL)



ACCEPTED:

EASTMAN S.E., INC.

Name: Richard A. Lorraine
Title: Richard A. Lorraine, Director & President

I certify under penalty of false swearing that at least the legally correct amount of documentary stamps have been placed on this instrument. Exempt or no consideration paid if none shown.

W. Chapman
Grantee or Grantee's Agent
Grantee's Address: EASTMAN S.E., INC.
200 SOUTH WILCOX DRIVE
KINGSPORT, TN 37660

STATE OF TENNESSEE)
) ss:
COUNTY OF SULLIVAN)

ACKNOWLEDGMENT

On this day, before me, the undersigned, a Notary Public, duly commissioned, qualified and acting, within and for said County and State, appeared in person the within named Richard A. Lorraine, to me personally well known, who stated that he was duly authorized to execute the foregoing instrument for and in the name and behalf of **EASTMAN S.E., INC.**, and further stated and acknowledged that he had so signed, executed and delivered said foregoing instrument for the consideration, uses and purposes therein mentioned and set forth.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal this 25th day of January, 2006.

Melissa L. Duffy
Notary Public Melissa L. Duffy

My commission expires:

6/26/07

(S E A L)

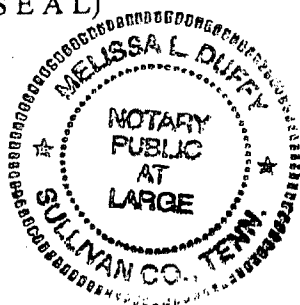


EXHIBIT "A"

TRACT #1

Beginning at a point in the Southeast Quarter Northeast Quarter Section 32, Township 13 North, Range 5 West, said point more specifically being located at Arkansas State Coordinates N507385.357, E2134846.635; thence, East 1,180 feet to a iron pin; thence, North 90 degrees East 835 feet to the West side of Sulphur Rock Road; thence North 90 degrees East 81.63 feet to a point on the East side of said road; thence with the East line of said road the following 6 courses and distances:

North 11 degrees 57 minutes East 388.17 feet to a point; by a curve to the right with a radius of 11,420 feet an arc distance of 1049.74 feet to a point; North 17 degrees 27 minutes East 566.93 feet to a point; by a curve to the right with a radius of 1,285 feet and arc distance of 603.97 feet to a point; North 44 degrees 22 minutes East 167.94 feet; North 44 degrees 22 minutes East 120 feet to a point; thence South 87 degrees 48 minutes East 276 feet to a point; thence South 87 degrees 48 minutes East 667.90 feet to a point in the half Section line of Section 28; thence, with the said half Section line South 0 degrees 53 minutes West 145.14 feet to a point; thence, South 83 degrees 17 minutes 25 seconds East 705.79 feet to a point; thence North 34 degrees 28 minutes 39 seconds East 253.93 feet to a point; thence, South 88 degrees 44 minutes 10 seconds East 1,815.89 feet to a point in the Section line between Sections 27 and 28, Township 13 North, Range 5 West; thence, South 88 degrees 42 minutes 15 seconds East 2,686.20 feet to a point in the half Section line of Section 27; thence South 89 degrees 21 minutes 20 seconds East 1,359.18 feet to a point, said point being the Northeast corner of the Southwest Quarter Southeast Quarter of Section 27; thence, South 0 degrees 57 minutes 36 seconds West 1,317.07 feet to the Southeast corner of the Southwest Quarter Southeast Quarter of Section 27; thence, along the Section line between Sections 27 and 34 North 89 degrees 23 minutes 10 seconds West 1,368.64 feet to the half Section line; thence, along the half Section line South 0 degrees 40 minutes West 1,321.68 feet to the Quarter Section line; thence, along the Quarter Section line South 89 degrees 04 minutes East 1,200.90 feet to a point; thence, South 0 degrees 39 minutes West 1,339.80 feet to point in the half Section line; thence, along the half Section line South 88 degrees 50 minutes East 1,506.90 feet to a point in the Section line between Sections 34 and 35; thence, along the Section line the following three (3) courses and distances: South 1 degree 03 minutes West 1,336.46 feet to a point in the North line of the Missouri Railroad right-of-way; South 1 degree 03 minutes West 160 feet to a point in the South line of the Missouri Railroad right-of-way; South 00 degrees 24 minutes West 1,150.32 feet to a point in the Township line between Township 13 North and Township 12 North; thence, along the Township line North 88 degrees 35 minutes West 578.60 feet to a point; thence, South 00 degrees 08 minutes East 792.90 feet to a point; thence, South 01 degree 44 minutes West 564.66 feet to a point; thence, North 88 degrees 15 minutes West 748.50 feet to a point; thence, North 78 degrees 26 minutes West 296.10 feet to a point; thence, North 66 degrees 30 minutes West 300.00 feet to a point; thence, North 62 degrees 25 minutes West 840.00 feet to a point; thence, North 00 degrees 05 minutes West 129.63 feet to a point; thence, North 90 degrees West 176 feet to a point; thence, South 27 degrees West 50 feet to a point in the South line of the old Batesville-Magness Road; thence, with the South line of said road North 63 degrees West 703.85 feet to a point; thence, South 00 degrees 20 minutes 45 seconds West 3,465.43 feet to a point; thence, North 89 degrees 49 minutes West 415.80 feet to a point; thence, South 00 degrees 22 minutes 40 seconds West 69.60 feet to a point on the left bank of the White River; thence, along the left bank of the White River the following twenty (20) courses and distances: North 50 degrees 18 minutes 48 seconds West 618.34 feet to a point; North 44 degrees 30 minutes West 300 feet to a point; North 48 degrees 50 minutes West 200 feet to a point; North 57 degrees West 619 feet to a point; North 55 degrees West 500 feet to a point; North 63 degrees 20 minutes West 300 feet to a point; North 68 degrees 15 minutes West 300 feet to a point; North 71 degrees 25 minutes West 300 feet to a point; North 75 degrees 32 minutes West 500 feet to a point; North 80 degrees 22 minutes West 300 feet to a point; North 88 degrees 54 minutes West 400 feet to a point; South 83 degrees 36 minutes West 233 feet to a point; South 73 degrees 30 minutes West 115 feet to a point; South 76 degrees West 76 feet to a point; South 88 degrees West 120 feet to a point; South 66 degrees 40 minutes West 153 feet to a point; South 86 degrees 22 minutes West 133 feet to a point; South 66 degrees 07 minutes West 600 feet to a point; South 66 degrees 55 minutes West 500 feet to a point; South 55 degrees 15 minutes West 205 feet to a point; thence, North 24 degrees 05 minutes West 1,421 feet to a point; thence, North 78 degrees West 2,100 feet to an iron pin in the East line of Russell Ferry Road; thence, along the East line of Russell Ferry Road North 14 degrees 10 minutes East 2,320 feet to a point;

thence, North 44 degrees 28 minutes West 215 feet to a point; thence, North 24 degrees 28 minutes West 136 feet to a point; thence, North 01 degree 20 minutes East 141 feet to a point; thence, North 24 degrees 20 minutes East 223 feet to a point; thence, North 04 degrees 25 minutes West 200 feet to a point; thence, North 17 degrees West 300 feet to a point; thence, North 29 degrees 20 minutes West 292 feet to a point; thence, North 48 degrees West 308 feet to a point; thence, North 90 degrees East 362 feet to a point; thence, North 0 degrees East 1300 feet to the Point of Beginning, containing 2, 036.471 acres, more or less, and being a part of Sections 27, 28, 32, 33 and 34, Township 13 North, Range 5 West, and a part of Sections 3, 4 and 5, Township 12 North, Range 5 West.



TRACT #2:

That certain tract of land situated in Independence County, Arkansas, to-wit: The West part of Lots 1, 2 and 3, West Half of Section 2, Township 12 North, Range 5 West and part of the Northwest Quarter of the Southwest Quarter of Section 2, Township 12 North, Range 5 West and part of the Island lying East of the Section line on the West side of Section 2 if extended South to White River and all accretions thereof and described by metes and bounds as follows: Beginning at the intersection of the South line of the Batesville-Magness Road with the Section line on the West side of Section 2, Township 12 North, Range 5 West and run thence along the South line of said road South 80 degrees East 800 feet; thence South 1 degree 42 minutes West 285 feet; thence South 7 degrees East 95 feet; thence South 37 degrees East 310 feet to a stump; thence South 39 degrees East 390 feet; thence South 19 degrees East 220 feet to the East line of West One Half of Lot 2 of the North West One Quarter; thence South 314 feet to the Southeast corner of Lot 2 in Big Creek; thence South 3 degrees West 450 feet down Big Creek; thence South 57 degrees West 550 feet; thence South 73 degrees West 200 feet; thence South 15 degrees West 300 feet; thence South 8 degrees East 220 feet to the North Line of the Southwest Quarter of Section 2, Township 12 North, Range 5 West; thence South 28 degrees West 350 feet; thence South 14 degrees East 420 feet; thence South 11 degrees East 370 feet; thence South 14 degrees West 580 feet; thence South 38 degrees West 85 feet; thence South 60 degrees West 140 feet; thence South 81 degrees West 270 feet; thence North 4707 feet to point of beginning, containing 84.019 acres, more or less.

TRACT #3: Part of the Southwest Quarter of the Northwest Quarter of Section 33, Township 13 North, Range 5 West, described as: Beginning at the intersection of the North line of the Batesville-Magness Road with the West line of the Sulphur Rock Road and run North 11 degrees 15 minutes East along the Sulphur Rock Road 279 feet; thence North 69 degrees 43 minutes West 198 feet; thence South 11 degrees 15 minutes West 279 feet to the North line of Batesville-Magness Road; thence South 69 degrees 43 minutes East 198 feet to point of beginning, containing 1.21 acres, more or less.

EXHIBIT "B"

I. It is the intention of Grantor and Grantee to include in this conveyance all real property and all interests in real property in Independence County, Arkansas, heretofore owned by or conveyed to Grantor, WHICH INCLUDES BUT IS NOT LIMITED TO the real property described in and conveyed to Grantor or Eastman Kodak Company in the conveyance documents appearing of record in the office of Circuit Clerk of Independence County, Arkansas, as follows:

<u>Book</u>	<u>Page</u>
T-9	465- 468
T-9	469-470
T-9	499-502
T-9	477-479
T-9	471-474
T-9	475-476
Q-10	150-155
F-12	411-414
J-12	389-392
R-12	581-589
F-14	703-706
F-14	773-774
I-14	79-82
K-14	487-488
F-14	711-712
H-14	115-118
G-13	443-444

II. It is further the intention of Grantor and Grantee to include in this conveyance all real property and interests in real property in Independence County, Arkansas, heretofore assessed in the name of Grantor, Grantee, Eastman Kodak Company, or any affiliate of any of them, WHICH INCLUDES BUT IS NOT LIMITED TO those properties having the following parcel identification numbers, to wit:

1. 01-04802-0001
2. 01-04803-0001
3. 01-04833-0001
4. 01-04891-000
5. 01-03630-000
6. 01-03649-000
7. 01-04805-000
8. 01-04830-000
9. 01-04832-000
10. 01-04876-000
11. 01-04889-000
12. 01-03580-000
13. 01-03586-000

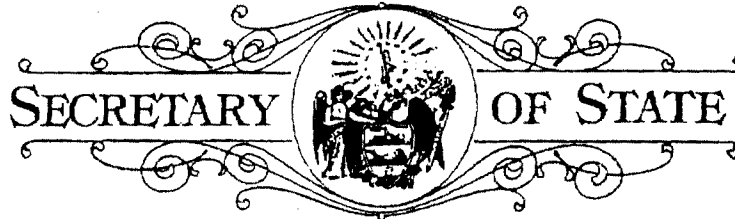
2006 657
Deed Book & Page

14. 01-03608-000
15. 01-03610-000
16. 01-03611-000
17. 01-03613-000
18. 01-03615-000
19. 01-03616-000
20. 01-03619-000
21. 01-04899-000
22. 01-04894-000
23. 01-04898-000
24. 01-04896-000

Independence County, AR
I certify this instrument was filed on
02-01-2006 02:48:51 PM
and recorded in Deed Book
2006 at pages 649 - 657
Claudia Nobles Circuit Clerk

By: Norma Shonah

STATE OF ARKANSAS



Charlie Daniels
SECRETARY OF STATE

To All to Whom These Presents Shall Come, Greetings:

I, Charlie Daniels, Secretary of State of Arkansas, do hereby certify that the following and hereto attached instrument of writing is a true and perfect copy of

Articles of Amendment

of

EASTMAN SE, INC.

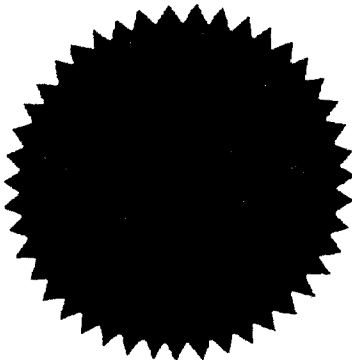
changing the name to

FUTUREFUEL CHEMICAL COMPANY

filed in this office

November 1, 2006.

In Testimony Whereof, I have hereunto set my hand and affixed my official Seal. Done at my office in the City of Little Rock, this 1st day of November 2006.




Secretary of State



Arkansas Secretary of State

Charlie Daniels

State Capitol • Little Rock, Arkansas 72201-1094
501-682-3409 • www.sos.arkansas.gov

Application for Amended Certificate of Authority

FILL IN COMPLETELY

(Please type or print)

The undersigned pursuant to the Arkansas Business Corporation Act of 1987, (Act 958 of 1987), sets forth the following:
Eastman SE, Inc

1. _____ is a foreign corporation authorized to transact business within the State of Arkansas.

2. The Certificate of Authority should be amended as follows:

☒ Corporate name to: FutureFuel Chemical Company

☐ Fictitious name to be used in Arkansas to: _____

(The corporation may use a fictitious name to transact business in Arkansas if its real name is unavailable and it delivers to the Secretary of State for filing a copy of the resolution of its Board of Directors certified by the Secretary adopting a fictitious name.

☐ Period of Duration to: _____

☐ State or Country of incorporation to: _____

3. The state, territory or foreign country under whose laws the corporation was incorporated is: Delaware

4. Date Incorporated: 9-1-2005 Period of Duration: Perpetual

5. The nature of the business of the corporation and the object or purposes proposed to be transacted, promoted or carried on by it are: engage in any lawful act or activity for which corporations may be organized

6. The name and street address of the registered agent of the corporation upon whom Service of Process is authorized to be made in Arkansas is:

Corporation Service Company 101 South Spring Street, Suite 220 Little Rock, Arkansas 72201
(Street Address) (City) (State) (ZIP)

7. The address of the general office or principal place of business of the corporation in the jurisdiction under whose laws the corporation was incorporated is:

The Corporation Trust Company, 1209 Orange Street, Wilmington DE 19801

8. The number and par value, if any, of shares of the corporation's capital stock owned or to be owned by residents of this state: 0

9. Value of assets in Arkansas: \$ 75,000,000 Total Value of all assets (including Arkansas): \$ 75,000,000

10. The foreign corporation shall deliver with the completed application an original certified copy of the amendment dated within 60 days of our receipt duly authorized by the Secretary of State or other official having custody of corporate records in the state or country under whose laws it is incorporated.

11. A filing fee of \$300.00 is submitted herewith in accordance with Act 958 of 1987.

I understand that knowingly signing a false document with the intent to file with the Arkansas Secretary of State is a Class C misdemeanor and is punishable by a fine up to \$100.00 and/or imprisonment up to 30 days.

Douglas D. Hommert, Executive Vice President

Authorizing Officer and Title (Type or Print)

Douglas D. Hommert

Authorized Signature

State of Delaware
Secretary of State
Division of Corporations
Delivered 12:55 PM 10/31/2006
FILED 12:48 PM 10/31/2006
SRV 060998305 - 4020958 FILE

**STATE OF DELAWARE
CERTIFICATE OF AMENDMENT
OF CERTIFICATE OF INCORPORATION**

The corporation organized and existing under and by virtue of the General Corporation Law of the State of Delaware does hereby certify:

FIRST: That at a meeting of the Board of Directors of _____
Eastman SE, Inc.

resolutions were duly adopted setting forth a proposed amendment of the Certificate of Incorporation of said corporation, declaring said amendment to be advisable and calling a meeting of the stockholders of said corporation for consideration thereof. The resolution setting forth the proposed amendment is as follows:

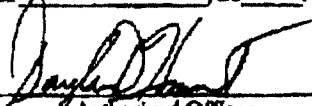
RESOLVED, that the Certificate of Incorporation of this corporation be amended by changing the Article thereof numbered " One " so that, as amended, said Article shall be and read as follows:

The name of the corporation is "FutureFuel Chemical Company".

SECOND: That thereafter, pursuant to resolution of its Board of Directors, a special meeting of the stockholders of said corporation was duly called and held upon notice in accordance with Section 222 of the General Corporation Law of the State of Delaware at which meeting the necessary number of shares as required by statute were voted in favor of the amendment.

THIRD: That said amendment was duly adopted in accordance with the provisions of Section 242 of the General Corporation Law of the State of Delaware.

IN WITNESS WHEREOF, said corporation has caused this certificate to be signed this 31st day of October, 2006.

By: 
Authorized Officer

Title: Executive Vice President

Name: Douglas D. Hornum

Print or Type

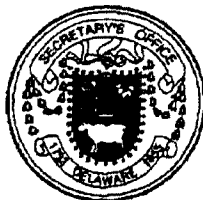
Delaware

PAGE 1

The First State

I, HARRIET SMITH WINDSOR, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY "FUTUREFUEL CHEMICAL COMPANY" IS DULY INCORPORATED UNDER THE LAWS OF THE STATE OF DELAWARE AND IS IN GOOD STANDING AND HAS A LEGAL CORPORATE EXISTENCE SO FAR AS THE RECORDS OF THIS OFFICE SHOW, AS OF THE THIRTY-FIRST DAY OF OCTOBER, A.D. 2006.

AND I DO HEREBY FURTHER CERTIFY THAT THE FRANCHISE TAXES HAVE BEEN PAID TO DATE.



4020958 8300

060998305

Harriet Smith Windsor

Harriet Smith Windsor, Secretary of State

AUTHENTICATION: 5160356

DATE: 10-31-06

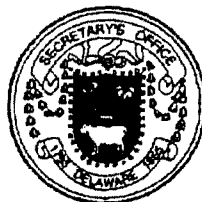
Delaware

PAGE 1

The First State

I, HARRIET SMITH WINDSOR, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY THE ATTACHED IS A TRUE AND CORRECT COPY OF THE CERTIFICATE OF AMENDMENT OF "EASTMAN SE, INC.", CHANGING ITS NAME FROM "EASTMAN SE, INC." TO "FUTUREFUEL CHEMICAL COMPANY", FILED IN THIS OFFICE ON THE THIRTY-FIRST DAY OF OCTOBER, A.D. 2006, AT 12:48 O'CLOCK P.M.

A FILED COPY OF THIS CERTIFICATE HAS BEEN FORWARDED TO THE NEW CASTLE COUNTY RECORDER OF DEEDS.



4020958 8100

060998305

Harriet Smith Windsor

Harriet Smith Windsor, Secretary of State

AUTHENTICATION: 5160350

DATE: 10-31-06

Delaware

PAGE 1

The First State

I, HARRIET SMITH WINDSOR, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY THE ATTACHED IS A TRUE AND CORRECT COPY OF THE CERTIFICATE OF AMENDMENT OF "EASTMAN SE, INC.", CHANGING ITS NAME FROM "EASTMAN SE, INC." TO "FUTUREFUEL CHEMICAL COMPANY", FILED IN THIS OFFICE ON THE THIRTY-FIRST DAY OF OCTOBER, A.D. 2006, AT 12:48 O'CLOCK P.M.

A FILED COPY OF THIS CERTIFICATE HAS BEEN FORWARDED TO THE NEW CASTLE COUNTY RECORDER OF DEEDS.



4020958 8100

060998305

Harriet Smith Windsor
Harriet Smith Windsor, Secretary of State

AUTHENTICATION: 5160349

DATE: 10-31-06

State of Delaware
Secretary of State
Division of Corporations
RECEIVED 12:35 PM 10/31/2006
FILED 12:48 PM 10/31/2006
SRV 060998305 - 4020958 FILE

**STATE OF DELAWARE
CERTIFICATE OF AMENDMENT
OF CERTIFICATE OF INCORPORATION**

The corporation organized and existing under and by virtue of the General Corporation Law of the State of Delaware does hereby certify:

FIRST: That at a meeting of the Board of Directors of _____
Eastman SE, Inc.

resolutions were duly adopted setting forth a proposed amendment of the Certificate of Incorporation of said corporation, declaring said amendment to be advisable and calling a meeting of the stockholders of said corporation for consideration thereof. The resolution setting forth the proposed amendment is as follows:

RESOLVED, that the Certificate of Incorporation of this corporation be amended by changing the Article thereof numbered " One " so that, as amended, said Article shall be and read as follows:

The name of the corporation is "FuturoFuel Chemical Company".

SECOND: That thereafter, pursuant to resolution of its Board of Directors, a special meeting of the stockholders of said corporation was duly called and held upon notice in accordance with Section 222 of the General Corporation Law of the State of Delaware at which meeting the necessary number of shares as required by statute were voted in favor of the amendment.

THIRD: That said amendment was duly adopted in accordance with the provisions of Section 242 of the General Corporation Law of the State of Delaware.

IN WITNESS WHEREOF, said corporation has caused this certificate to be signed this 31st day of October, 2006

By: 
Authorized Officer
Title: Executive Vice President

Name: Douglas D. Housner
Print or Type

Independence County, AR
I certify this instrument was filed
04-13-2007 11:01:03 AM
and recorded in Misc Book
2007 at pages 243 - 249
Claudia Nobles Circuit Clerk



Delaware

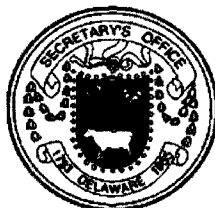
The First State

Page 1

I, JEFFREY W. BULLOCK, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY "FUTUREFUEL CHEMICAL COMPANY" IS DULY INCORPORATED UNDER THE LAWS OF THE STATE OF DELAWARE AND IS IN GOOD STANDING AND HAS A LEGAL CORPORATE EXISTENCE SO FAR AS THE RECORDS OF THIS OFFICE SHOW, AS OF THE ELEVENTH DAY OF FEBRUARY, A.D. 2016.

AND I DO HEREBY FURTHER CERTIFY THAT THE ANNUAL REPORTS HAVE BEEN FILED TO DATE.

AND I DO HEREBY FURTHER CERTIFY THAT THE FRANCHISE TAXES HAVE BEEN PAID TO DATE.



4020958 8300

SR# 20160753213

You may verify this certificate online at corp.delaware.gov/authver.shtml

A handwritten signature in black ink, appearing to read "JB", is written over a horizontal line. Below the line, the text "Jeffrey W. Bullock, Secretary of State" is printed.

Authentication: 201816944

Date: 02-11-16



**Arkansas Secretary of State
Mark Martin**

State Capitol Building ♦ Little Rock, Arkansas 72201-1094 ♦ 501-682-3409

Certificate of Good Standing

I, Mark Martin, Secretary of State of the State of Arkansas, and as such, keeper of the records of domestic and foreign corporations, do hereby certify that the records of this office show

FUTUREFUEL CHEMICAL COMPANY

formed under the laws of the state of Delaware, and authorized to transact business in the State of Arkansas as a Foreign For Profit Corporation, was granted a Application for Certificate of Authority by this office November 4, 2005.

Our records reflect that said entity, having complied with all statutory requirements in the State of Arkansas, is qualified to transact business in this State.



In Testimony Whereof, I have hereunto set my hand and affixed my official Seal. Done at my office in the City of Little Rock, this 11th day of February 2016.

Mark Martin

Mark Martin
Secretary of State

Online Certificate Authorization Code: 3c9896fc30fc737

To verify the Authorization Code, visit sos.arkansas.gov

Financial Reports

10-K March 10, 2016

<http://ir.futurefuelcorporation.com/secfiling.cfm?filingID=1437749-16-27311&CIK=1337298>

10-Q May 10, 2016

<http://ir.futurefuelcorporation.com/secfiling.cfm?filingID=1437749-16-31425&CIK=1337298>