

April 29, 2013

Certified Mail 7011 0110 0000 0858 4398  
Return Receipt Requested

U.S. Nuclear Regulatory Commission  
ATTN: Mr. Gary Janosko, Chief  
Fuel Cycle Facilities Branch  
Division of Fuel Cycle Safety and Safeguards  
11545 Rockville Pike  
Two White Flint  
Washington, D.C. 20852-2738

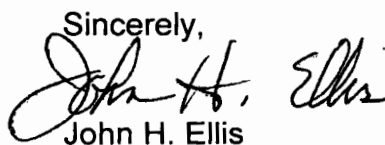
RE: License No. SUB-1010; Docket No. 40-8027  
Ammonium Nitrate Fertilizer Program  
2012 Completion Report

Dear Mr. Janosko:

Please find enclosed one (1) copy of the 2012 Completion Report for the Ammonium Nitrate Fertilizer Program conducted by Sequoyah Fuels Corporation (SFC).

In accordance with License No. SUB-1010 requirements, the report describes the application of facility produced ammonium nitrate fertilizer on SFC lands near Gore, Oklahoma, and the results obtained from comprehensive soil and vegetation monitoring programs.

Should you require further information, please contact me at 918-489-5511. (Ext. 226)

Sincerely,  
  
John H. Ellis  
President

Enclosure

cc: Ken Kalman (NRC) ✓  
Angie Radcliffe (ODEQ)

*AMMONIUM NITRATE  
FERTILIZER APPLICATION PROGRAM*

*2012 Completion Report*

*License SUB-1010; Docket 40-8027*

*April 26, 2013*

# TABLE OF CONTENTS

- 1.0 INTRODUCTION ..... 3
- 2.0 APPLICATION AREAS ..... 3
- 3.0 AMMONIUM NITRATE APPLICATION ..... 4
- 4.0 PROGRAM MONITORING RESULTS ..... 4
  - 4.1 Soil ..... 4
  - 4.2 Vegetation ..... 5
- 5.0 FORAGE MANAGEMENT PROGRAM ..... 5

## ADDENDA

<u>TABLES</u>	<u>DESCRIPTION</u>
1	Projected 2013 Ammonium Nitrate Fertilizer Application
2	2012 Fertilizer Application Data
3	2012 Fertilizer Composite Analyses
4	2012 Fertilizer Source Analyses
5	Soil Nitrate Analyses
6	Background Soil Analyses
7	Annual Post-Season Analyses
8	Forage Analysis

<u>FIGURES</u>	<u>DESCRIPTION</u>
1	Fertilizer Application Sites

# 2012 FERTILIZER PROGRAM COMPLETION REPORT

Sequoyah Fuels Corporation  
Gore, Oklahoma

## 1.0 INTRODUCTION

Source Material License SUB-1010, issued to Sequoyah Fuels Corporation (SFC), authorizes the application of fertilizer onto SFC owned or controlled lands for the production of forage, utilized by cattle for grazing, or for growing crops that are not used directly as human food, such as hay or seed production. On July 1, 2005 a new Oklahoma Pollution Discharge Elimination System (OPDES) permit became effective. This new OPDES permit includes additional sampling and application requirements for the fertilizer program. In accordance with license and permit requirements, this completion report describes the 2012 Fertilizer Application Program.

SFC monitors a control plot as specified in the license in order to implement good programmatic control and ensure that the program is being operated in accordance with best agricultural practices. In September 1996, an NRC License Amendment which changed the fertilizer program control plot was approved. This report contains the fertilizer program monitoring results as described in the amended license.

The 2012 Fertilizer Application Program included oversight by Mr. Brian C. Pugh, Area Agronomist, Northeast District, Cooperative Extension Service, Oklahoma State University. Mr. Pugh provided recommendations to ensure maximum plant nutrient utilization and forage production while limiting impact to the environment. Additionally, Mr. Pugh assisted in investigations of anomalous monitoring data.

Fertilizer application began in May 2012 and concluded in August 2012. A total of 10.7 million gallons of ammonium nitrate fertilizer was applied. Application amounts ranged from 120 to 138 lbs-N/acre. The 2013 schedule for the Ammonium Nitrate Fertilizer Program is provided in Table 1.

## 2.0 APPLICATION AREA

In 2012, SFC's ammonium nitrate fertilizer was applied to the control plot which is located within the facility boundary. This application area is referred to as Agland #1 (Previously identified as Agland XVII) and is comprised of approximately 91 acres of which approximately 60 acres were utilized for application. Fertilizer was also applied to an 8 acre field located immediately south of the Agland #1 site, referred to as Agland #2 (Previously identified as

Agland XVII South). In addition, ammonium nitrate fertilizer was applied to a 20 acre portion of the field located immediately east of the Agland #1 site. This area has been identified as Agland #3 (Previously identified as Province 5 of Area160A). Other areas where ammonium nitrate fertilizer was applied included the Pond Area, North Meadow, Timber South #2 and South Meadow. Figure 1 shows the location of the fertilizer application sites.

### 3.0 AMMONIUM NITRATE APPLICATION

Pre-growing season soil samples were collected early in the year prior to implementation of fertilizer application. Nitrate analysis of these samples provided a basis for application rates and scheduling. Mr. Pugh reviewed this information and provided SFC with application rate recommendations.

Application rates were monitored based upon monthly nitrate analysis of the fertilizer solution. Application began in May and continued until August. A total of 10.7 million gallons was applied utilizing Kifco Ag-Rain A-Series irrigation system. The 2012 fertilizer application summary is presented in Table 2.

Analytical results of a representative composite of the fertilizer solution are provided in Table 3. In addition, samples were also collected from fertilizer sources as they were being transferred to the fertilizer storage ponds. These analytical results for these sources, which include Clarifier Basin 3A, Monitor Well MW095A Collection Trench, Monitor Well MW095A Collection Pit and Catchment No. 3, are included in Table 4. Storm water runoff from Outfall 008 no longer contributes to the fertilizer storage ponds.

### 4.0 PROGRAM MONITORING RESULTS

#### 4.1 Soil

The 2012 pre-, mid- and post-growing season soil samples for the fertilizer application areas were collected in March, July and October, respectively. The analysis results for these sampling events are provided in Table 5. The top six inches of soil was characterized for nitrate content by collecting and compositing at least twenty samples from different locations in the Agland tract (one-inch diameter cores). In addition, profile samples were collected from one location in the Agland tract at six inch increments from surface to 48". Review of the 2012 pre-season soil profiles, and the top six inch soil composite, provided the basis for recommended application rates for the 2012 Fertilizer Program.

Soil samples were also collected as required by the new OPDES permit that became effective on July 1, 2005. This permit requires that background soil samples be collected from each land application site and be analyzed for soil pH; the nutrients Total Kjeldahl Nitrogen, nitrogen, ammonia, nitrate, potassium and

phosphorus; and the metals included in 40 CFR 503, "Standards for the Use or Disposal of Sewage Sludge." The analyses for background sampling are included in Table 6. Figure 1 shows the location of each fertilizer application site. The analyses of post season samples collected on October 16, 2012, from each land application site that received fertilizer solution are included in Table 7.

#### 4.2 Vegetation

Forage samples were collected and analyzed from the Agland area only. Analytical data for the forage cuttings from the Agland is provided in Table 8.

Forage collected during 2012 had elevated molybdenum concentrations. SFC determined that use of the hay should be restricted.

#### 5.0 FORAGE MANAGEMENT PROGRAM

Hay was harvested three times during 2012. Hay yields and harvest were dependent upon the weather and forage growing conditions. A total of approximately 876 round bales were produced from the SFC property. Round hay bales average approximately 1040 pounds.

Soil testing during 2012 identified inadequate levels of phosphorus and potassium to sustain high forage yields. Mr. Pugh recommended that commercial phosphate fertilizer (preferably triple super phosphate, 0-46-0) as well as a commercial potassium source such as potash (0-0-60) should be applied to the land application sites. Between July 7 and July 13, 2012 phosphate and potassium fertilizer was applied to the land application sites in accordance with Mr. Pugh's recommendations. Application rates varied from 50 to 125 pounds per acre for phosphate (0-46-0) and 50 to 165 pounds per acre for potash (0-0-60).

The primary crop system utilized by SFC in the past has been bermudagrass, a warm season perennial grass that is highly responsive to nitrogen inputs in the time frame of May through October. Mr. Pugh recommended that the growing season could be lengthened in which nitrogen uptake from the soil could occur by the addition of a cool season annual grass, such as annual ryegrass, to increase forage production and potential uptake from the soil. To accomplish this SFC broadcast seeded 25 pounds of ryegrass seed per acre during September 2012.

## TABLES

**Table 1**  
**Sequoyah Fuels Corporation**  
**Projected 2012 Ammonium Nitrate Fertilizer Application**

ID	Task Name	Qtr 1, 2013			Qtr 2, 2013			Qtr 3, 2013			Qtr 4, 2013		
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	SPREAD FERTILIZER												
2	Conduct Environmental Monitoring												
3	Collect Preseason Soil Samples		3/7	3/8									
4	Collect Preseason Fertilizer Samples		3/25		3/26								
5	Collect Forage Samples				5/3							10/12	
6	Collect Midseason Soil Samples							7/18	7/19				
7	Collect Postseason Soil Samples										11/3	11/4	
8	Perform Follow-up / Re-sample				4/7						9/15		
9													
10	Evaluate Environmental Data				4/7								12/6
11													
12	Develop Manpower to Operate Program				4/4				6/24				
13													
14	Implement Field Applications				4/15							10/3	
15	Complete Application of 20,000,000 Gallons											10/3	
16													
17	Maintain Distribution System				4/1							9/21	
18													
19	Pond Management		3/5										11/2

Date: Mon 4/9/2011

Task

Milestone

Page 1



TABLE 2

## 2012 Fertilizer Application Data

LOCATION	APPL	CONC g/l N	GALS APPLIED	Acres Applied To	LBS/ ACRE
XVII (AGLAND )	1	0.208	4,549,538	57	138
TOTAL			4,549,538		138
160A Province 5	1	0.198	1,314,570	16.2	134
TOTAL			1,314,570		134
XVII (South)	1	0.197	638,210	8.2	128
TOTAL			638,210		128
Pond / Timber / Meadow Areas	1	0.214	4,146,708	61.5	120
TOTAL			4,146,708		120

Notes: Total Volume Applied to All Areas: 10,676,026 gallons

N = Total Nitrogen

TABLE 3		
2012 Fertilizer Composite Analyses		
Element		Composite
As	mg/l	0.042
Ba	mg/l	0.083
B	mg/l	0.023
Cd	mg/l	< 0.001
Co	mg/l	0.016
Cr	mg/l	< 0.005
Cu	mg/l	0.002
Fe	mg/l	< 0.100
Mg	mg/l	33.6
Mn	mg/l	1.90
Mo	mg/l	2.50
Ni	mg/l	0.156
Pb	mg/l	0.005
Se	mg/l	< 0.010
V	mg/l	0.052
Zn	mg/l	< 0.010
Hg	mg/l	< 0.0002
NO <sub>3</sub> (N)	mg/l	181
NH <sub>3</sub> (N)	mg/l	55.6
U	ug/l	1.08
Ra226	pCi/l	0.186 ± 0.097
Th230	pCi/l	0.664 ± 0.220

**Table 4**  
**2012 Fertilizer Source Analyses**

Parameter	Clarifier Basin 3A	MW095A Coll. Trench	MW095A Coll. Pit	Catchment No. 3	
<b>Inorganic Analyses</b>					
Ammonia (as N), mg/l	3.77	0.3	0.6	52.6	
Nitrate (as N), mg/l	257	803	880	165	
TKN, mg/l	4.20	0.4	0.9	55.8	
pH, SU	5.99	6.26	7.07	5.83	
<b>Radiochemical Analyses</b>					
Radium-226 pCi/l	0.652 ± 0.175	0.209 ± 0.157	0.292 ± 0.110	0.255 ± 0.112	
Uranium, µg/l	24.6	3.37	6.18	12.7	
<b>Metals Analyses</b>					
Arsenic, mg/l	0.259	0.016	0.017	0.067	
Cadmium, mg/l	< 0.001	< 0.001	< 0.001	< 0.001	
Chromium, mg/l	< 0.005	< 0.005	< 0.005	< 0.005	
Copper, mg/l	< 0.010	< 0.010	0.054	0.010	
Lead, mg/l	< 0.005	< 0.005	< 0.005	< 0.005	
Mercury, mg/l	< 0.0002	< 0.0002	< 0.0002	< 0.0002	
Molybdenum, mg/l	1.08	< 0.002	0.008	< 0.002	
Nickel, mg/l	0.079	0.005	0.011	0.131	
Phosphorus, mg/l	0.791	0.131	< 0.100	0.118	
Potassium, mg/l	22.0	5.16	5.33	7.42	
Selenium, mg/l	< 0.010	< 0.010	< 0.010	< 0.010	
Zinc, mg/l	< 0.010	0.020	0.011	< 0.010	

**TABLE 5**  
**Soil Nitrate Analyses (mg/kg)**

<b>Sequoyah Acreage</b>								
	<b>Pre-Season Results (Collected on 3/5/2012)</b>							
Location	0-6C"	6-12"	12-18"	18-24"	24-30"	30-36"	36-42"	42-48"
Agland	4.1	2.7	< 2.5	2.6	2.9	3.9	5.8	8.3
	<b>Mid-Season Results (Collected on 7/25/2012)</b>							
Location	0-6C"	6-12"	12-18"	18-24"	24-30"	30-36"	36-42"	42-48"
Agland	6.0	4.4	3.5	3.0	4.0	3.5	3.4	3.6
	<b>Post-Season Results (Collected on 10/16/2012)</b>							
Location	0-6C"	6-12"	12-18"	18-24"	24-30"	30-36"	36-42"	42-48"
Agland	6.6	6.7	4.3	4.4	4.5	4.9	4.8	4.5

**Table 6**  
**Background Soil Analyses - Fertilizer Application Sites**

Parameter	Agland # 1	Agland # 2	Agland # 3	Agland # 4	North Meadow	South Meadow
<b>Inorganic Analyses</b>						
Ammonia (as N), mg/kg	6.6	3.9	3.6	4.5	3.1	2.2
Nitrate (as N), mg/kg	28.2	33.1	31.6	17.4	15.4	26
TKN, mg/kg	1790	1880	1640	1740	1500	2340
pH	4.34	5.83	6.32	5.18	6.02	6.33
<b>Radiochemical Analyses</b>						
Radium-226 pCi/g	0.779 ± 0.142	1.42 ± 0.221	0.730 ± 0.144	1.07 ± 0.202	1.28 ± 0.197	1.73 ± 0.219
Uranium, µg/g	1.92	1.99	1.93	3.26	9.55	2.47
<b>Metals Analyses</b>						
Arsenic, mg/kg	2.39	1.62	1.53	2.25	2.62	2.2
Cadmium, mg/kg	0.728	0.505	0.612	0.819	0.805	0.838
Chromium, mg/kg	1.14	2.02	3.57	4.09	7.55	5.45
Copper, mg/kg	6.24	3.13	1.02	2.05	2.21	1.36
Lead, mg/kg	8.65	7.09	5.54	7.38	10.7	10.1
Mercury, mg/kg	< 0.24	< 0.24	< 0.24	< 0.24	< 0.24	< 0.24
Molybdenum, mg/kg	21.9	12.7	5.3	< 0.716	2.42	1.57
Nickel, mg/kg	5.72	3.43	5.61	1.33	0.906	1.57
Phosphorus, mg/kg	274	55.9	139	221	207	221
Potassium, mg/kg	731	268	324	453	293	298
Selenium, mg/kg	< 0.520	< 0.505	< 0.510	< 0.512	< 0.503	< 0.524
Zinc, mg/kg	19.8	9.19	7.95	13.9	13.3	11

Parameter	Pond Area	Timber North # 1	Timber North # 2	Timber South # 1	Timber South # 2	Timber South # 3
<b>Inorganic Analyses</b>						
Ammonia (as N), mg/kg	2.1	2.7	3.7	3.0	1.8	1.8
Nitrate (as N), mg/kg	14.2	9.6	22.3	27.4	25.5	13.2
TKN, mg/kg	2020	2470	1850	2290	2090	1740
pH	6.35	5.4	4.9	5.28	5.2	5.5
<b>Radiochemical Analyses</b>						
Radium-226 pCi/g	1.04 ± 0.163	1.57 ± 0.249	1.07 ± 0.188	1.58 ± 0.243	1.29 ± 0.189	1.27 ± 0.201
Uranium, µg/g	2.41	5.24	16.8	12.2	9.78	2.12
<b>Metals Analyses</b>						
Arsenic, mg/kg	2.94	1.2	3.85	1.98	4.33	2.81
Cadmium, mg/kg	1.01	< 0.502	1.77	0.991	1.54	1.35
Chromium, mg/kg	6.9	< 0.703	11.4	4.46	6.8	11.2
Copper, mg/kg	0.913	< 0.602	3.02	2.78	1.54	1.04
Lead, mg/kg	9.66	< 0.390	15.1	14.8	13.6	10.7
Mercury, mg/kg	< 0.24	< 0.24	< 0.23	< 0.24	< 0.24	< 0.24
Molybdenum, mg/kg	< 0.710	< 0.703	1.14	< 0.694	< 0.721	< 0.729
Nickel, mg/kg	< 0.710	< 0.703	8.94	0.892	< 0.721	16.9
Phosphorus, mg/kg	< 10.1	192	282	280	224	168
Potassium, mg/kg	326	17.3	564	574	381	542
Selenium, mg/kg	< 0.507	< 0.502	< 0.520	< 0.496	< 0.515	< 0.521
Zinc, mg/kg	12.4	< 0.703	37.8	23.3	17.1	14.2

**Table 7**  
**Annual Post-Season Soil Analyses - Fertilizer Application Sites**

Page 1 of 1

Parameter	Agland #1 Composite	Agland #2 Composite	Agland #3 Composite	Pond Area Composite	N. Meadow Composite	Timber S#2 Composite
<b>Inorganic Analyses</b>						
Ammonia (as N), mg/kg	9.0	5.5	6.1	3.2	7.5	3.8
Nitrate (as N), mg/kg	6.6	5.1	6.6	4.9	8.0	6.7
TKN, mg/kg	969	826	273	1210	1350	1190
pH	5.23	6.07	6.23	6.36	5.09	5.89
<b>Radiochemical Analyses</b>						
Radium-226 pCi/g	0.236 ± 0.075	0.716 ± 0.131	0.680 ± 0.101	0.757 ± 0.150	0.489 ± 0.165	0.747 ± 0.111
Uranium, µg/g	1.83	2.69	2.23	2.62	8.38	4.52
<b>Metals Analyses</b>						
Arsenic, mg/kg	3.22	3.44	4.74	10.1	6.43	6.36
Cadmium, mg/kg	< 0.50	< 0.50	0.69	1.23	0.80	0.82
Chromium, mg/kg	5.16	6.49	8.44	13.4	16.7	10.8
Copper, mg/kg	8.92	7.27	7.98	18.5	9.53	9.44
Lead, mg/kg	9.56	11.0	14.3	77.7	19.8	19.0
Mercury, mg/kg	< 0.082	< 0.083	< 0.082	< 0.083	< 0.083	< 0.083
Molybdenum, mg/kg	14.7	7.57	6.94	5.34	4.59	5.54
Nickel, mg/kg	3.98	3.05	2.31	8.73	2.30	2.67
Phosphorus, mg/kg	199	125	119	142	163	142
Potassium, mg/kg	385	197	223	507	187	211
Selenium, mg/kg	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Zinc, mg/kg	11.7	5.50	4.63	22.7	7.35	8.11

Parameter	S. Meadow Composite					
<b>Inorganic Analyses</b>						
Ammonia (as N), mg/kg	5.4					
Nitrate (as N), mg/kg	9.3					
TKN, mg/kg	1490					
pH	5.39					
<b>Radiochemical Analyses</b>						
Radium-226 pCi/g	0.823 ± 0.113					
Uranium, µg/g	3.32					
<b>Metals Analyses</b>						
Arsenic, mg/kg	4.89					
Cadmium, mg/kg	0.67					
Chromium, mg/kg	8.77					
Copper, mg/kg	9.33					
Lead, mg/kg	18.4					
Mercury, mg/kg	< 0.083					
Molybdenum, mg/kg	4.78					
Nickel, mg/kg	3.44					
Phosphorus, mg/kg	169					
Potassium, mg/kg	221					
Selenium, mg/kg	< 1.00					
Zinc, mg/kg	7.2					

Figure 1

Fertilizer Application Sites  
Background Soil Sample Locations  
Collected on 04 Aug 2005

