



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
611 RYAN PLAZA DRIVE, SUITE 400  
ARLINGTON, TEXAS 76011-4005**

July 25, 2006

Mr. Jeff Lux, Project Manager  
Tronox Worldwide, LLC  
P.O. Box 268859  
Oklahoma City, Oklahoma 73126-8859

SUBJECT: NRC INSPECTION REPORT 070-00925/06-001

Dear Mr. Lux:

On May 22-23, 2006, the NRC conducted an inspection at your Cimarron facility near Crescent, Oklahoma. At the conclusion of the onsite inspection, a preliminary exit briefing was held with you and your staff. A final exit briefing was held telephonically with Karen Morgan and Rick Callahan on July 24, 2006, following receipt of the surface and groundwater sample results and the preliminary May 2006 environmental analysis results on July 20, 2006. The enclosed report presents the scope and results of that inspection.

The purpose of the inspection was to examine activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations, conditions of your license, and the approved decommissioning plan. Within these areas, the inspection consisted of selected examination of procedures and representative records, facility site tours, and interviews with personnel, including a review of your organization and management, radiation protection, environmental protection, emergency preparedness, fire protection, radioactive waste management, transportation of radioactive materials, and closeout inspection and survey. No violations of NRC regulations were identified during the inspection.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

Should you have any questions concerning this inspection, please contact Ms. Beth Alferink at (817) 860-8169 or the undersigned at (817) 860-8191.

Sincerely,

/RA/

D. Blair Spitzberg, Ph.D., Chief  
Fuel Cycle and Decommissioning Branch

Docket No.: 070-00925  
License No.: SNM-928

Enclosure: NRC Inspection Report 070-00925/06-001

Tronox Worldwide, LLC

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cc w/enclosure:

Cimarron Corporation

P.O. Box 268859

Oklahoma City, Oklahoma 73126-8859

Karen Morgan, RSO

Cimarron Corporation

P. O. Box 315

Crescent, Oklahoma 73028

Mr. Earl Hatley

Oklahoma Toxics Campaign

3000 United Founders Blvd. #125

Oklahoma City, Oklahoma 73112

Mike Broderick

Oklahoma DEQ

Radiation Management Section

P.O. Box 1677

Oklahoma City, Oklahoma 73101-1677

bcc w/enclosure (via ADAMS distrib):

LDWert

DBSpitzberg

RJEvans

KEGardin

KMKalman, NMSS/DWMEP

JPeckenpaugh, NMSS/DWMEP

FCDB File

Materials Docket File (5th Floor)

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**ENCLOSURE**

U. S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket No.: 070-00925

License No.: SNM-928

Report No.: 070-00925/06-001

Licensee: Cimarron Corporation  
Oklahoma City, Oklahoma 73126

Facility: Cimarron Site

Location: Crescent, Oklahoma

Dates: May 22 - 23, 2006  
July 20 - 24, 2006

Inspector: Beth (Schlapper) Alferink, Health Physicist  
Fuel Cycle & Decommissioning Branch

Accompanied By: Ashley M. Tull, NSPDP Participant  
Division of Nuclear Materials Safety

Approved By: D. Blair Spitzberg, Ph.D., Chief  
Fuel Cycle & Decommissioning Branch

Attachment: Supplemental Information

## **EXECUTIVE SUMMARY**

### **Cimarron Corporation NRC Inspection Report 070-00925/06-001**

The Cimarron Corporation has been conducting site remediation activities in preparation for the termination of Special Nuclear Materials License SNM-928. Decommissioning inspections, in-process and final radiological surveys had been conducted by the NRC at the Cimarron Site as part of the overall decommissioning and confirmatory survey process. This inspection was an announced core inspection as a continuation of that process. This inspection included a review of management organization and controls, radiation protection and maintenance and surveillance testing, environmental protection, emergency preparedness and fire protection, radioactive waste management, radioactive waste generator activities, transportation of radioactive materials, and closeout inspection and survey.

#### **Management Organization and Controls**

- The licensee's organization was consistent with the license requirements. There was a change in ownership of Cimarron Corporation from Kerr-McGee Chemical Worldwide LLC to Tronox Worldwide LLC in early 2006. The Cimarron ALARA Committee membership met the requirements of License Condition 27(e) (Section 1).
- Radiation protection procedures were updated on a regular frequency to reflect the program changes, and were reviewed and approved by the radiation safety officer (Section 1).
- The licensee had conducted periodic audits and surveillances of its licensed programs. Audits and surveillances were being effectively and objectively implemented. Findings were appropriately identified, tracked, and corrected (Section 1).

#### **Radiation Protection and Maintenance and Surveillance Testing**

- The licensee had appropriately implemented the health physics program. No measurable occupational exposure was received through April 2006. Appropriate training had been presented to all affected individuals. The licensee appropriately issued special work permits for work where the potential for significant exposure to radioactive materials existed and for which no standard operating procedure existed. Radiation survey instruments used were operable and within their calibration interval. All removable contamination surveys reviewed were less than the minimum detectable activity. Radioactive sources were stored in a locked and properly labeled cabinet. Radiation protection procedures were reviewed and approved by the radiation safety officer (Section 2).

### Environmental Protection

- The licensee had procedures and practices in place to effectively implement the environmental protection program at the site. All environmental samples were taken as required by the license. The public dose assessment last conducted in 2002 indicated that the exposure to the public resulting from site activities was well below the limit specified in 10 CFR 20.1301(a). Due to the significant reduction of radioactive material inventory resulting from decommissioning activities, the licensee presumed that radiation levels have decreased and relied on the 2002 public dose assessment results (Section 3).

### Emergency Preparedness and Fire Protection

- The licensee maintained an emergency plan even though one was not required by NRC because a radiological emergency with significant offsite consequences is not considered credible. Training had been provided to onsite personnel on the emergency plan. Operational fire extinguishers were distributed throughout the facility. A wildfire occurred onsite in early 2006 with prompt response provided by a local volunteer fire department. The wildfire had no radiological impact on the site (Section 4).

### Transportation Activities, Radioactive Waste Management and Waste Generator Requirements

- The licensee had effectively implemented the license requirements related to the management, waste generator requirements, and shipment of radioactive waste. There were no offsite shipments of licensed radioactive material since the last inspection. The onsite waste disposal cell was properly posted and secured (Section 5).

### Closeout Inspection and Survey

- Five groundwater and one surface water sample were collected and split for analysis by both Tronox's and NRC's laboratories for confirmatory analysis and comparison of results. The groundwater analytical result from 2 well locations exceeded the applicable release criteria of 180 pCi/l for total uranium. These samples were collected from wells located on a known groundwater plume. The remaining samples, which were all below the release criteria, were from site characterization wells (Section 6).

## **Report Details**

### **Summary of Site Status**

The Cimarron site is comprised of approximately 830 acres, with four buildings from licensed operations. All four buildings have been decommissioned and released for unrestricted use. Ongoing operations are managed from two rental trailers onsite. The site was divided into Subareas A through O; final status surveys reports have been submitted for all Subareas. Twelve of the fifteen Subareas have been released for unrestricted use. NRC has performed confirmatory surveys for two remaining Subareas (G and N), and has concurred that soils in those Subareas comply with the decommissioning criteria. Subareas G and N have not been released for unrestricted use due to groundwater impact identified in or near those areas.

Groundwater formerly exceeded license criteria in three areas: Well 1319 area, U-Pond #1 area, and U-Pond #2 area. For these areas, Cimarron plans to submit a license amendment that presents the data obtained from the monitoring wells associated with these areas and will propose to discontinue groundwater monitoring in these areas. Groundwater still exceeds decommissioning criteria in three areas: Burial Area #1 (Subarea F and C), Western Alluvial Area (Subarea H and E), and the Western Upland Area (Subarea M and H). Cimarron has completed groundwater investigations in all three areas and plans to submit a license amendment request amending the existing decommissioning plan to remediate groundwater in these three areas. Of 163 groundwater monitoring wells on the site, approximately 80 wells are located in Burial Area #1, approximately 20 wells are located in the Western Alluvial Area, and approximately 10 wells are located in the Western Upland Area.

## **1 Decommissioning Inspection for Materials Facilities/Management Organization and Controls (87104, 88005)**

### **1.1 Inspection Scope**

The inspectors reviewed the licensee's organization, procedure controls, internal reviews and audits, and quality assurance programs to ensure that the licensee was effectively implementing and conducting these activities in accordance with the decommissioning plan.

### **1.2 Observations and Findings**

#### **Organization**

By letter dated, January 26, 2006, the NRC was notified of a Change of Ownership of Cimarron Corporation. When NRC License SNM-928 was issued to Cimarron Corporation, the Cimarron Corporation owned the site as a wholly owned subsidiary of Kerr-McGee Corporation (KM). Ownership of the property was transferred to Kerr-McGee Chemical Worldwide LLC several years ago, but KM maintained control of the license, funding, and other aspects of the project. In early 2005, KM announced the intent to divest its chemical subsidiary, and in preparation for the divestiture, on September 12, 2005, changed the name of Kerr-McGee Chemical Worldwide LLC to

Tronox Worldwide LLC. Tronox Worldwide LLC is a wholly owned subsidiary of Tronox Incorporated. The individuals responsible for decommissioning the site have all transferred to Tronox and retain the same responsibilities related to the Cimarron site.

At this site, the radiation safety committee is called the As Low as Reasonably Achievable (ALARA) Committee. The ALARA Committee had license authorization to evaluate and approve changes to the decommissioning plan (DP) or radiation protection plan (RPP) in accordance with License Condition 27(e).

Section 3.0 of Revision 9 to the Cimarron Radiation Protection Plan described the revised organizational structure and reporting chain. The licensee was operating under the contractual agreement with NEXTEP Environmental for site management. In January 2006, the ALARA Committee approved the License Condition 27(e) evaluation of the change in the parent company from KM to Tronox. Site management by NEXTEP remained the same, and the new parent company was implemented in February 2006.

The senior person directly responsible for the site was titled vice president, Cimarron Corporation. The project manager reported directly to the vice president, Cimarron Corporation, Tronox, who was also titled director of Chemical, Nuclear, and Hydrocarbon Environmental Remediation, Tronox. The only Tronox employees at the site on a part time basis are the project manager, the radiation safety officer, and the administrative supervisor. The site manager, who is a contractor from NEXTEP Environmental, reported to the project manager. Three individuals, also from NEXTEP Environmental, reported directly to the site manager. These are the quality assurance coordinator; the health physics technician and the administrative assistant staff positions. The quality assurance coordinator is an offsite contractor to NEXTEP. The individual working as the radiation safety officer was as noted in the license.

#### Procedure Controls

##### a. Inspection Scope

The inspector reviewed radiation protection procedures revised since the last inspection to verify that the licensee's system for approving procedures complies with license requirements.

##### b. Observations and Findings

Section 2.1.1 of Procedure KM-CI-RP-6, "Procedure Generation, Review, and Approval," stated that the radiation safety officer/health physics supervisor (RSO/HPS) had the responsibility for approving all Cimarron radiation protection procedures.

Since the last inspection, the licensee had revised all radiation protection procedures. This included 21 active procedures in Volume I and 13 active procedures in Volume II. All procedures revisions were approved by the RSO.



## Audits and Surveillances

### a. Inspection Scope

The inspector reviewed annual corporate audit reports and quality assurance surveillance checklists and inspection form reports.

### b. Observations and Findings

#### 1. Audits

The 2005 annual audit was performed in December 2005 as required by procedure KM-CI-RP-4, "Radiological Control and Safety Audits." The audit was conducted by an auditor from NEXTEP Environmental. The audit identified no findings addressing internal program requirements. Audit observations and recommendations were clearly documented in the audit report.

#### 2. Surveillances

Surveillances were performed by the onsite quality assurance (QA) coordinator through 2004. The QA coordinator position responsibility is provided by an offsite contractor from NEXTEP. The last QA surveillance checklist and inspection form was completed on December 20, 2005. The next surveillance is in process with expected completion in May 2006.

## Safety Committee

### a. Inspection Scope

The inspector reviewed the ALARA Committee membership and meeting minutes for compliance with applicable requirements. The annual submittal of License Condition 27(e) changes were reviewed for 2004 and 2005.

### b. Observations and Findings

License Condition 27(e).3 specified that membership of the ALARA Committee shall consist of a minimum of three individuals employed by the licensee and one of these shall be designated as the ALARA Committee chairman. Membership shall include an individual with expertise in management; one individual with expertise in decommissioning and one member shall be the site corporate RSO.

The Cimarron ALARA Committee membership consisted of three individuals employed by the licensee and one contractor staff member, all with the required expertise. The ALARA Committee had met at least quarterly. Since the last inspection, twelve changes to the RPP were made in 2004 and six changes in 2005. Full documentation of the changes were maintained as part of the quality assurance records. The changes did not cause a degradation in safety or environmental commitments addressed in the NRC approved Cimarron RPP or the DP.

### 1.3 Conclusions

The licensee's organization was consistent with the license requirements. There was a change in ownership of Cimarron Corporation from Kerr-McGee Chemical Worldwide LLC to Tronox Worldwide LLC in early 2006. The Cimarron ALARA Committee membership met the requirements of License Condition 27(e).

Radiation protection procedures were updated on a regular frequency to reflect the program changes, and were reviewed and approved by the radiation safety officer.

The licensee had conducted periodic audits and surveillances of its licensed programs. Audits and surveillances were being effectively and objectively implemented. Findings were appropriately identified, tracked, and corrected.

## **2 Radiation Protection and Maintenance and Surveillance Testing (83822, 88025)**

### 2.1 Inspection Scope

The inspectors examined the radiation protection program for consistency with the requirements of 10 CFR Parts 19 and 20 and the Decommissioning Plan (DP). The inspectors reviewed instrument calibration practices for consistency with approved procedures and DP requirements, including daily instrument operational checks.

### 2.2 Observations and Findings

#### Personnel Monitoring

The inspector reviewed the exposure reports through April 2004 submitted by the external dosimetry supplier; selected licensee reports; and internal memorandums related to external dosimetry.

The inspector reviewed Technical Memorandum 05-03 dated February 23, 2005, which reviewed and assessed the historical records of occupationally exposed personnel external dosimetry monitoring at the Cimarron site. The licensee reviewed 10 CFR 20.1201 and 10 CFR 20.1502(a) in the Technical Memorandum, as well as, Regulatory Guide 8.34. The Technical Memorandum recommended termination of the external radiation monitoring program. This Memorandum was approved by the Radiation Safety Officer. At the time of the inspection, the licensee was still receiving external dosimetry badges onsite for issuance, but no work had required monitoring. The licensee planned to discontinue receiving dosimetry badges and personnel monitoring in 2006.

The external dosimetry supplier was accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). The licensee used whole body beta gamma film badges as the primary means of determining the external dose of record. During the last two quarters of 2004, 7 dosimetry badges were issued for well drilling work. No dosimetry badges were issued during 2005 through May 2006. No personnel exposure was recorded since the last inspection in July 2004. The issuance of personnel dosimetry is determined on an as-needed basis (if < 10% of administrative limits, no

dosimetry is issued). No personnel dosimetry badges had been issued since September 30, 2004. Administrative limits were set at 100-millirem for individuals and 200-millirem for collective dose. Doses for the years 2004, 2005 and 2006 were 0-millirem for individual and collective dose. The licensee's ALARA goals were met.

### Training

All individuals who were permitted to enter the Cimarron facility restricted areas received information and training in radiation safety with annual refresher training. The depth of the training was commensurate with the potential radiation safety hazards present and was in compliance with the requirements of 10 CFR 19 and 20. The licensee had several levels of training, such as visitor, escorted radiation worker, radiation worker, and health physics technician training. The RSO was responsible for training workers. Visitor training requirements were approved by the RSO, but could have been administered by radiation workers if delegated by the RSO.

One new employee, an administrative assistant, had been hired since the last inspection. Contractor site specific radiation protection training was presented during January 2006. The licensee had conducted monthly safety meetings and refresher training. When KM-CI-RP procedures were changed, training was conducted. Annual emergency manual and health and safety training was provided during April 2006.

### Survey Instruments

The inspector selected one stationary and five portable radiation survey instruments used by the licensee to determine operability, response and calibration. All instruments were operable, had charged batteries, responded to radiation and were within the calibration interval. A sixth portable radiation survey instrument had just been returned to the site following calibration, so the inspector did not review the calibration records or observe operability checks. The licensee had their portable instruments on a 6-month calibration interval and annual for the Tennelec LB 5100 used in the laboratory. Most instruments were calibrated onsite but the 3 dose rate meters were shipped offsite for calibration.

### Radiation Work Permits

Section 9.1 of Annex A of the Radiation Protection Plan required that a special work permit (SWP) be developed whenever work with potentially hazardous or radioactive material is performed. The licensee issued SWPs for work where the potential for significant exposure to radioactive materials existed and for which no standard operating procedure (SOP) existed. Special work permits used by the licensee contained the details of the job to be performed, any precautions necessary to reduce exposure and radiological monitoring and sampling required before, during, and following completion of the job. The RSO indicated, by signature, the review of each SWP prior to the initiation of the work. Activities since the last inspection were related to installation of wells, drilling and direct push services, bore hole drilling for sampling in BA-1 areas, and well abandonment. A total of six RWPs had been issued since the last inspection. The work was carried out in adherence to the conditions of the SWPs. Training was verified on all SWPs. Each work permit included a signed and dated sheet by all parties

involved and initialed by the health physics (HP) technician or site manager. No problems with the SWP program and SWPs issued were identified.

#### Removable Contamination Surveys

Procedure KM-CI-RP-39 required removable alpha contamination surveys using wipes be conducted periodically. The licensee performed quarterly smears of the source locker in accordance with procedure KM-CI-RP-38 and periodic smears in the HP count room and instrument laboratory dependent on site activities. Results for all removable contamination surveys reviewed for 2004, 2005, and 2006 to date were less than the minimum detectable activity (MDA).

#### Security

The licensee maintained all radioactive sources in a secured cabinet. The cabinet was observed to be locked and the appropriate posting was in place. The licensee maintained 33 radioactive check sources in the secured cabinet safe. The sources were leak-tested and inventoried quarterly by procedure KM-CI-RP-35, "Source Receipt, Control, Inventory, Leak Testing & Disposal," Revision 5. Quarterly inventories and leak testing were reviewed for the period of May 17, 2004 to May 3, 2006. The inspector also verified that all sources listed in the inventory records were accounted for and secured.

### 2.3 Conclusions

The licensee had appropriately implemented the health physics program. No measurable occupational exposure was received through April 2006. Appropriate training had been presented to all affected individuals. The licensee appropriately issued special work permits for work where the potential for significant exposure to radioactive materials existed and for which no standard operating procedure existed. Radiation survey instruments used were operable and within their calibration interval. All removable contamination surveys reviewed were less than the minimum detectable activity. Radioactive sources were stored in a locked and properly labeled cabinet. Radiation protection procedures were reviewed and approved by the radiation safety officer.

## **3 Environmental Protection (88045)**

### 3.1 Inspection Scope

The inspectors reviewed the environmental protection program records to assess the effectiveness of the licensee's programs and to evaluate the impact, if any, of site activities on the public and the local environment.

### 3.2 Observations and Findings

#### a. Environmental Monitoring

Section 15 Revision 5 of the Cimarron Radiation Protection Plan (RPP) requires the licensee to implement an environmental monitoring program. The licensee's environmental monitoring program includes monitoring surface water and groundwater well sites. The licensee's program no longer required the licensee to submit an annual environmental report to the NRC; however, the analytical data is retained onsite. The August 2005 Site-wide Groundwater Assessment identified three areas of concern: Burial Area 1, Western Alluvial, and the Western Upland Area. The records of the analytical results of surface and groundwater wells specified in Annex A of the RPP were reviewed.

#### b. Surface Water Monitoring

Surface water samples were collected annually at seven locations and were analyzed for gross alpha, gross beta, and total uranium concentrations. Additional analysis for isotopic uranium was performed if the gross alpha action level of 15 pCi/l or gross beta action level of 20 pCi/l was exceeded. Annex A of the RPP required analysis for technetium-99 (Tc-99) be performed if the gross beta to gross alpha ratio exceeded 3:1 and gross beta exceeded 30 pCi/l.

The inspector reviewed the May 2005 environmental sampling event analytical data. Additional analysis for isotopic uranium were performed when necessary. The highest surface water sample result during 2005 was sample location 1208 which recorded a gross alpha of 205 pCi/l, gross beta of 1550 pCi/l and Tc-99 at 5300 pCi/l. Sample Location 1208 is in a stream north of Uranium Pond #2 located in Subarea G. Surface water samples 1202, 1206, and 1208 results for gross beta were and all in excess of 30 pCi/l gross beta, the licensee analyzed for Tc-99 when the beta to alpha ratio exceeded 3:1.

#### c. Groundwater Monitoring

Groundwater well samples were collected annually at 26 monitoring well (MW) locations and were analyzed for the same constituents as surface water. Additional analysis for isotopic uranium was performed if the gross alpha action level of 15 pCi/l or gross beta action level of 20 pCi/l was exceeded. Annex A of the RPP required analysis for Tc-99 be performed if the gross beta to gross alpha ratio exceeded 3:1 and gross beta exceeded 30 pCi/l.

The inspector reviewed the May 2005 environmental sampling event analytical data. Additional analysis for isotopic uranium were performed when necessary. The highest GW sample result for gross alpha and gross beta was TMW-13 with 3070 pCi/l and 756 pCi/l, respectively. The highest GW sample result for Tc-99 was 1336A with 839 pCi/l. Groundwater MWs 1313, 1315R, 1316R, 1327B, 1332, 1336A, and TMW-13 results for gross beta were and all in excess of 30 pCi/l gross beta. The licensee analyzed for Tc-99 when the beta to alpha ratio exceeded 3:1.

The licensee was continuing to monitor the contaminated groundwater within and adjacent to Burial Area 1. Groundwater monitoring wells in this area have reported total uranium concentrations greater than the 180 pCi/l total uranium release criteria specified in the license for groundwater. On April 17, 2002, the licensee submitted a work plan to delineate and evaluate the groundwater plume within and adjacent to Burial Area 1. Ground water MW 1319 B-1, 1319 C-1, and TMW-13 all exceeded 180 pCi/l total uranium concentrations. The licensee was continuing to monitor these wells on a quarterly basis as required. The licensee's investigation consisted of monitoring the groundwater quality, hydrology and soil activity in the area. Upon completion of all field investigation work, the licensee was reviewing several groundwater remediation plan options, including pump and treat and bioremediation, to be submitted for NRC approval during 2006.

d. Ambient Radiation Monitoring

The licensee had implemented an ALARA Committee approved change to the decommissioning plan to eliminate the use of TLDs to monitor ambient radiation during the second quarter of 2000, but continued to use TLDs throughout the facility and at boundaries to monitor potential exposures to individuals in unrestricted areas through the first quarter of 2001. The inspector reviewed the licensee's public dose assessment dated April 17, 2002 to ensure that site activities did not result in a total effective dose equivalent in excess of 100-millirem per year to individual members of the public as specified in 10 CFR 20.1301(a). Background at the site averaged 7 µR/hr, or approximately 60-millirem per year. During 2002, the exposure to the public resulting from site activities were less than 10 percent of the limit specified in 10 CFR 20.1301(a).

3.3 Conclusions

The licensee had procedures and practices in place to effectively implement the environmental protection program at the site. All environmental samples were taken as required by the license. The public dose assessment last conducted in 2002 indicated that the exposure to the public resulting from site activities was well below the limit specified in 10 CFR 20.1301(a). Due to the significant reduction of radioactive material inventory resulting from decommissioning activities, the licensee presumed that radiation levels have decreased and relied on the 2002 public dose assessment results.

**4 Emergency Preparedness and Fire Protection (88050, 88055)**

4.1 Inspection Scope

The inspector reviewed the licensee's emergency plan and fire protection program, interviewed responsible personnel, toured the facility, and reviewed records of training.

4.2 Observations and Findings

The NRC does not require the licensee to have an emergency plan because a radiological emergency with significant offsite consequences is not considered credible. However, the licensee did have a site emergency preparedness plan as a section of the Health and Safety Plan. This plan was last revised on February 3, 2004. Training to the licensee's staff and contractors was provided in May 2006 and ongoing to site contract



workers on an as needed basis. During the training, procedure changes were discussed. No emergency response drills have been conducted since the last inspection.

Records reviewed indicated that the last fire protection and response training was provided on June 28, 2005. During a tour of the facility, the inspector observed that operational fire extinguishers were located throughout the facility buildings and were checked on a monthly basis.

A wildfire occurred January 1, 2006, burning an estimated 400-acres of the 834-acres comprising the site. There was no impact to onsite activities or buildings. The Crescent, Oklahoma volunteer fire department, with Cimarron staff assistance to provide access to the site, responded to the fire.

#### 4.3 Conclusions

The licensee maintained an emergency plan even though one was not required by NRC because a radiological emergency with significant offsite consequences is not considered credible. Training had been provided to onsite personnel on the emergency plan. Operational fire extinguishers were distributed throughout the facility. A wildfire occurred onsite in early 2006 with prompt response provided by a local volunteer fire department. The wildfire had no radiological impact on the site.

### **5 Transportation Activities, Radioactive Waste Management and Waste Generator Requirements (86740, 84850, 84900)**

#### 5.1 Inspection Scope

The inspectors reviewed the radioactive waste management program for consistency with the requirements of the DP and 10 CFR Part 20. The inspection also consisted of a review to determine whether transportation of licensed materials was in compliance with applicable NRC and U.S. Department of Transportation regulations.

#### 5.2 Observations and Findings

There have been no offsite shipments of licensed radioactive material since the last inspection. At the time of the inspection, there were no temporary storage/staging areas for radioactive wastes from building demolition, equipment dismantlement, soil excavation or GW well construction. No decommissioning waste material had been free released offsite for disposal. The onsite waste disposal cell was properly posted. The licensee had placed cairns on each corner of the disposal cell that delineated the cell's location. The onsite disposal cell was adequately protected by fencing around the entire site, onsite security, and a 4-foot cap of clean soil and completely vegetated.

#### 5.3 Conclusions

The licensee had effectively implemented the license requirements related to the management, waste generator requirements, and shipment of radioactive waste. There

were no offsite shipments of licensed radioactive material since the last inspection. The onsite waste disposal cell was properly posted and secured.

## **6 Closeout Inspection and Survey (83890)**

### **6.1 Inspection Scope**

The inspection was performed to ensure that final surveys performed at the site were conducted as stated in the licensee's decommissioning plan, and to verify that the site has been decontaminated to acceptable radiological levels for unrestricted use.

### **6.2 Observations and Findings**

On May 22 - 23, 2006, NRC staff observed the collection of 5 groundwater samples from wells and surface water from one seep. The samples were split between the licensee and NRC. The NRC splits were sent to the NRC's contractor laboratory operated by Oak Ridge Institute for Science Education (ORISE), where the samples were preserved and acidified. All NRC water sample splits were analyzed for gross alpha and gross beta, and by alpha spectroscopy for total uranium. The licensee splits were sent to GEL, General Engineering Lab, an independent contract laboratory for analysis.

NRC License SNM-928, issued to Cimarron Corporation, lists the release criteria in License Condition 27 for groundwater at 180 pCi/l total uranium. The attachment to a letter from the NRC project manager to the licensee's project manager dated March 13, 1997, states that the Tc-99 concentration in groundwater should not exceed the US Environmental Protection Agency's Interim Primary Drinking Water Regulations (40 CFR 141.16). This regulation requires that the average annual concentration in drinking water shall not produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem/yr. The NRC derived concentration limit for Tc-99 is 3,790 pCi/l. There are no NRC groundwater release criteria for gross alpha or gross beta. The NRC split samples were not analyzed for Tc-99.

Table 1 summarizes the gross alpha and gross beta sample results. Section 15.2 of the Decommissioning Plan (DP) states, in part, that analysis for Tc-99 shall be performed if the gross beta to gross alpha ratio exceeded 3:1 and gross beta exceeded 30 pCi/l. In addition, there are no NRC groundwater release criteria for gross alpha or gross beta addressed in the approved DP.



**TABLE 1**  
**Kerr-McGee Cimarron Site**  
**Groundwater Samples Gross Alpha and Gross Beta Analysis Results**  
**Samples Collected on May 23, 2006**

Sample ID	GROSS ALPHA ACTIVITY pCi/L		GROSS BETA ACTIVITY pCi/L		Beta/Alpha Ratio	
	NRC Results <sup>1,2</sup>	Tronox Results	NRC Results <sup>1,3</sup>	Tronox Results	NRC	Tronox
Seep 1206	51.0 ± 6.7	76.1	34.6 ± 4.7	39.6	0.68	0.52
Well 1312	58 ± 12	47.1	529 ± 61	406	9.12	8.62
Well 1315R	1520 ± 110	1780	730 ± 70	789	0.48	0.44
Well 1319-B1	45.9 ± 5.6	2.88	20.7 ± 3.2	13.5	0.45	4.69
Well 1319-C1	3.8 ± 1.7	5.77	3.2 ± 2.0	17.8	0.84	3.08
Well TMW-13	3850 ± 270	4170	1520 ± 140	1290	0.39	0.31

<sup>1</sup> Uncertainties represent 95% confidence level, based on total propagated uncertainties.

Gross beta to gross alpha ratios are routinely used as a screening tool to determine the need for further analysis. Although Well 1319-B1 was not in statistical agreement for gross alpha activity, and Well 1319-C1 was not in statistical agreement for gross beta activity, the uranium concentration results listed in Table 2 are in statistical agreement. The licensee is aware of the discrepancies noted in Table 1, and has initiated a review of the sample results and requested re-analysis of certain samples from the May 2006 sampling event. The May 2006 sample analysis report is expected to be finalized in September 2006. Since this report was not available at the conclusion of this inspection, the results are not included in this report. Table 2 summarizes the uranium alpha spectrum analysis results.

**TABLE 2**  
**Kerr-McGee Cimarron Site**  
**Groundwater Samples Uranium Alpha Spectroscopy Analysis Results**  
**Samples Collected on May 23, 2006**

Sample ID	Radionuclide Concentration pCi/l							
	U-234		U-235		U-238		Total U	
	NRC <sup>1</sup>	Tronox	NRC <sup>1</sup>	Tronox	NRC <sup>1</sup>	Tronox	NRC <sup>1,2</sup>	Tronox
Seep 1206	62.5 ± 5.0	61.3	3.38 ± 0.61	4.59	17.2 ± 1.7	17	83.1 ± 5.3	82.89
Well 1312	30.9 ± 2.7	29.9	1.58 ± 0.39	1.6	11.2 ± 1.2	10.1	43.6 ± 3.0	41.6
Well 1315R	1108 ± 91	1090	61 ± 11	82.1	766 ± 66	827	1900 ± 110	1999.1
Well 1319-B1	69.2 ± 5.2	70.4	2.91 ± 0.53	4.91	11.1 ± 1.1	11.4	83.2 ± 5.4	86.71
Well 1319-C1	12.2 ± 1.3	12	0.62 ± 0.26	0.61	2.39 ± 0.46	2.36	15.2 ± 1.4	14.97
Well TMW-13	2750 ± 200	2670	154 ± 19	175	1650 ± 120	1560	4600 ± 230	4405
<b>NRC Release criteria (Total U)</b>					<b>180 pCi/l</b>			

<sup>1</sup> Uncertainties represent 95% confidence level, based on total propagated uncertainties.

<sup>2</sup> Total U is the sum of U-234 + U-235 + U-238.

At 2 locations, the analytical results for total uranium exceeded the applicable release criteria of 180 pCi/l. These were locations within a known contamination plume adjacent to Burial Area 1. This plume is believed to be the result of radiological material that had been previously buried hydrologically up gradient from these wells. The licensee believed the plume was due to rain water accumulating in the trenches made during the remediation of the buried material.

### 6.3 Conclusions

Five groundwater and one surface water sample were collected and split for analysis by both Tronox's and NRC's laboratories for confirmatory analysis and comparison of results. The groundwater analytical result from 2 well locations exceeded the applicable release criteria of 180 pCi/l for total uranium. These samples were collected from wells located on a known groundwater plume. The remaining samples, which were all below the release criteria, were from site characterization wells.

## 7 **Exit Meeting Summary**

The inspector reviewed the scope and findings of the inspection during a preliminary exit briefing that was conducted at the conclusion of the onsite inspection on May 23, 2006. A final exit briefing was held telephonically with Karen Morgan and Rick Callahan on July 24, 2006 following receipt of the surface and groundwater sample results and the preliminary May 2006 environmental analysis results on July 20, 2006. The licensee did not identify as proprietary any information provided to, or reviewed, by the inspectors.

ATTACHMENT

**PARTIAL LIST OF PERSONS CONTACTED**

Licensee Cimarron Corporation

M. Logan, Vice President  
J. Lux, Project Manager  
K. Morgan, Radiation Safety Officer  
T. Ostmeyer, Administrative Supervisor

NEXTEP Environmental (contractor)

R. Callahan, Site Manager  
L. Morgan, Health Physics Technician  
T. Williams, Hydrologic Field Assistant  
A. Davis, Administrative Assistant

**INSPECTION PROCEDURES USED**

IP	87104	Decommissioning Inspection Procedure for Materials Facilities
IP	88005	Management Organization and Controls
IP	83822	Radiation Protection
IP	88025	Maintenance and Surveillance Testing
IP	88045	Environmental Protection
IP	88050	Emergency Preparedness
IP	88055	Fire Protection
IP	86740	Inspection of Transportation Activities
IP	84850	Radioactive Waste Management
IP	84900	Radioactive Waste Generator Requirements
IP	83890	Closeout Inspection and Survey

**ITEMS OPENED, CLOSED AND DISCUSSED**

Opened

None

Closed

None

Discussed

None

**LIST OF ACRONYMS**

ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
HP	health physics
DP	Decommissioning Plan
KM	Kerr-McGee
μR/hr	microRoentgen/hour
NVLAP	National Voluntary Laboratory Accreditation Program
ORISE	Oak Ridge Institute for Science and Education
GEL	General Engineering Lab
pCi/l	picocuries per liter
QA	quality assurance
RPP	radiation protection plan
RSO	radiation safety officer
SNM	special nuclear material
SOP	standard operating procedure
SWP	special work permits
Tc-99	technetium-99
TLD	thermoluminescence dosimeters
TMW	temporary monitoring well