

September 20, 2010

Attention: Ms. Kelly Phillips

via email: klp@ksu.edu

Reference: K-State Groundwater Treatment System
Contaminant Removal Efficiencies
AEC File No.

Dear Ms. Phillips:

This letter responds to your inquiry on the behalf of the City of Manhattan, Kansas regarding the potential removal efficiencies offered by the proposed groundwater treatment system for the Old Chemical Waste Landfill (OCWLF). We are enclosing literature provided by TrojanUV for systems similar to the one proposed to treat groundwater at the OCWLF. Please note that these systems are reported to have exceptional removal rates, but this success relies heavily on the source groundwater chemistry, and may not represent the potential for the K-State system.

In August 2010, Allied provided a sample of the groundwater from the vicinity of the planned interceptor trench to TrojanUV. TrojanUV completed tests to evaluate if the basic groundwater quality would adversely affect the system's performance. TrojanUV's test and calculations suggest that the treatment system should be capable of removing 1,4-dioxane to levels below the proposed Kansas Risk-Based (RSK) level of 77 parts-per-billion (ppb). However, we will only be sure about the overall system capabilities once it is in place and processing the raw groundwater.

Initially, the treated water will be captured during startup using a large mobile tank (i.e., frac tank). We will test the raw and treated water during the first week to determine the removal efficiency for the system. With satisfactory chemical and radiological results, and communication with the City, the water would be released to the sanitary sewer. Periodic testing will occur to ensure the system continues to perform as required.

We look forward to discussing this at length during the September 22, 2010 meeting with the City of Manhattan. Please call with any questions.

Sincerely,

ALLIED ENVIRONMENTAL CONSULTANTS, INC.

A handwritten signature in black ink, appearing to read 'Paul R. Clark', is written over the typed name.

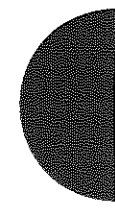
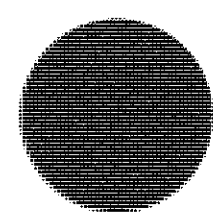
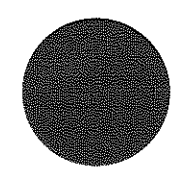
Paul R. Clark, P.G.
President

Enclosures as noted

C: Abdu Durar: City of Manhattan
Lisa Gotto: USEPA
Steve Galfitzer: K-State University
Ron Bridges: K-State University

Mark Taussig: K-State Facilities Planning
Tom Conley: BEH
Kelly Phillips: K-State University

INTRODUCTION TO UV-OXIDATION FOR
ENVIRONMENTAL CONTAMINANT TREATMENT



What are Environmental Contaminants?

There is a growing awareness of chemicals in the world's water supply (see the water supply diagram on the opposing flap, right). Recent research has shown that a wide variety of such chemicals exist at trace concentrations in streams, lakes, rivers, and groundwater throughout the world.

The term "environmental contaminants" refers to harmful chemicals present in soil, in air, and in water. These compounds may come directly from human sources such as industrial manufacturing, agricultural run-off, and wastewater discharge, or they may originate from natural sources, such as the taste and odor-causing chemicals in water generated by algae and bacteria blooms.

A Growing List of Environmental Contaminants:

- Pesticides and herbicides
- Taste and odor-causing compounds (e.g. geosmin and MIB)
- N-nitrosodimethylamine (NDMA)
- 1,4-Dioxane
- Pesticides and herbicides
- Fuels and fuel additives (e.g. MTBE and BTEX)
- VOCs (e.g. PCE and TCE)
- Pharmaceuticals and personal care products (PPCPs)
- Endocrine disruptor chemicals (EDCs)

These compounds can be treated either by ultraviolet (UV) light alone or by UV light in conjunction with an oxidant such as hydrogen peroxide.

Why UV for Environmental Contaminants?

UV disinfection has been used successfully over the last century to disinfect drinking water and wastewater. That same technology is now being applied to perform environmental contaminant treatment (ECT) on a large scale.

Simultaneous Disinfection

UV, as part of a multi-barrier system, can act to disinfect and destroy contaminants, simultaneously. This is accomplished without the formation of potentially hazardous disinfection by-products, such as the formation of THMs when using chlorine or the formation of bromate when using ozone.

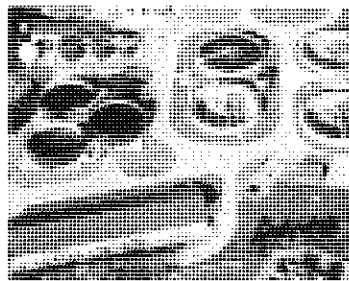
Cost-Effective

For certain contaminants, UV is the only economical method of treatment. For example, NDMA and 1,4-dioxane cannot be fully treated with membrane technologies (including reverse osmosis), carbon adsorption, or air stripping.

Eliminates Residuals

UV also has the added advantage of being a destructive technology that breaks down a variety of contaminants into their safe, elemental components. Other treatment technologies merely transfer the contaminant from one phase to another (e.g. air stripping; from water to air)—resulting in a potentially hazardous, contaminant-laden residual that requires further treatment or disposal.

Key Contaminants



NDMA: Potential Sources

- Disinfection of drinking water with chlorine or chloramine
- Printed circuit board manufacturing
- Rocket testing/manufacturing
- Pesticide manufacturing
- Rubber and tire manufacturing
- Meat curing

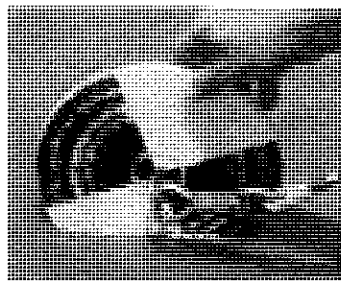


Photo courtesy of Bruce Macleod

Taste and Odor-Causing Compounds

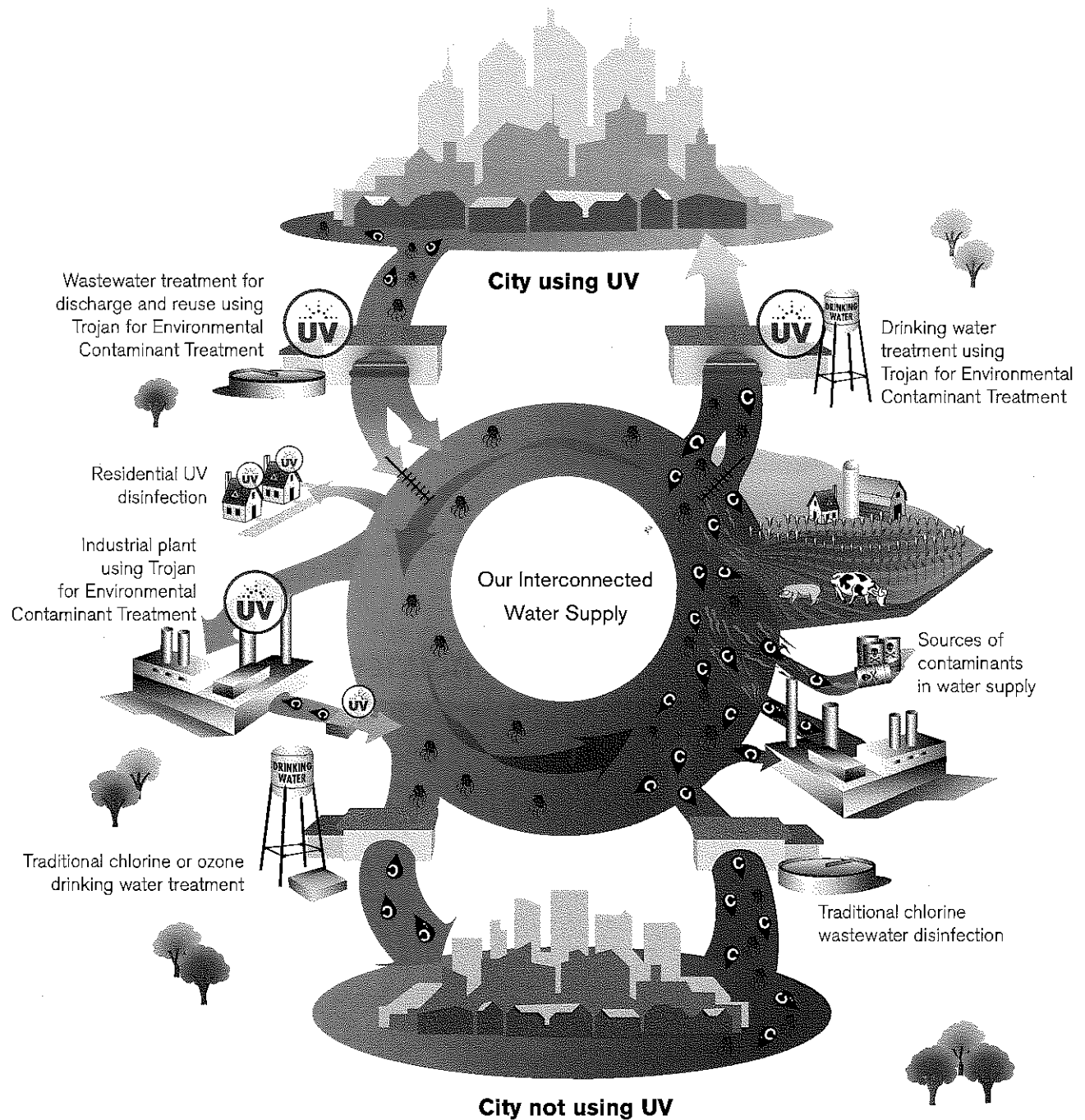
- MIB and geosmin
- Generated by algae and bacteria blooms in rivers, lakes and reservoirs
- A growing problem due to increasing phosphorus and nitrogen loads on surface waters
- Causes water to taste and smell earthy and musty

Trojan: Providing Water Confidence

Trojan has a solution to treat water at virtually every point in its cycle of use to give you confidence in the quality of your water supply. From the moment it is pumped from the ground or drawn from

a reservoir, through its various stages of use, to its discharge into our rivers, lakes and oceans, Trojan provides a treatment solution. Our technology is a natural part of a multi-barrier

treatment strategy, and offers communities a proven and cost-effective way to protect water supplies from microbial and chemical contamination.

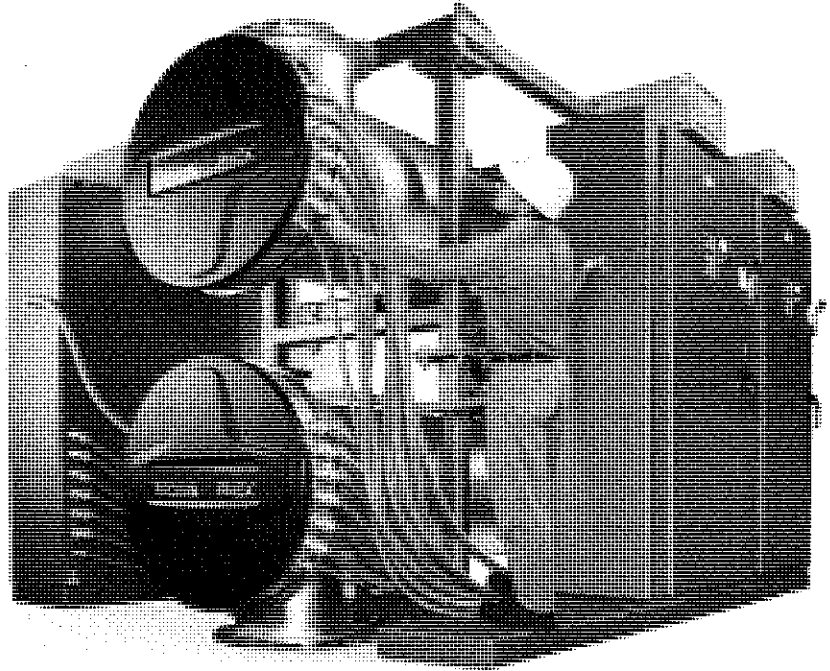


Trojan – A Commitment to R&D

A strong commitment to R&D has fueled Trojan's leadership in the application of UV light to treat environmental contaminants. In addition to research in North America, Trojan has formed an international alliance with the PWN Water Supply Company North-Holland (the Netherlands). This research collaboration and the resulting full-scale installations have further developed the use of UV-oxidation as a drinking water treatment technology for simultaneous disinfection and destruction of contaminants.

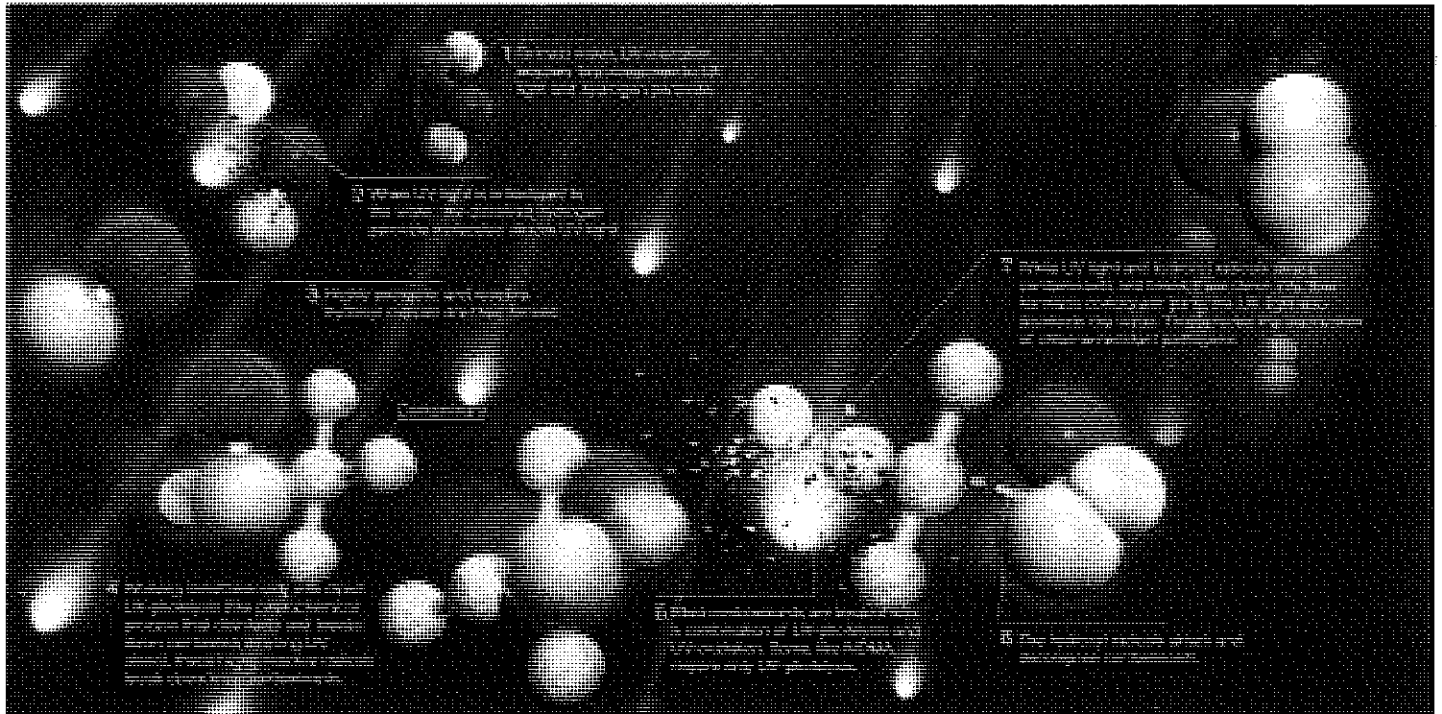
Our Solutions are Applicable in:

- Municipal drinking water treatment
- Water recycling/reclamation/reuse
- Wastewater treatment
- Groundwater remediation (e.g. at U. S. Superfund and other contamination sites)
- Industrial discharge treatment
- Industrial process water treatment



Trojan's leadership is demonstrated by the patent-pending TrojanUVPhox™ that is being used to cost-effectively treat NDMA and other contaminants in drinking water and water reuse applications.

The UV-Oxidation Reaction



The Proven Leader in UV Solutions for ECT

Drinking Water Solution: Cornwall

The City of Cornwall draws its drinking water from the St. Lawrence River in northeastern Ontario, Canada. Frequently, in the late summer and early fall, the water has a musty/earthy taste and smell due to organic compounds produced by summer algae blooms. When the city looked to upgrade its disinfection system to comply with new disinfection rules, it took the opportunity to save taste and odor (T&O) treatment costs by using UV-oxidation versus its existing granular activated carbon (GAC) system. The TrojanUVSwift™ECT, installed in 2006, uses UV to disinfect year round, while treating MIB and geosmin during T&O events using UV in combination with hydrogen peroxide. This integrated system economically provides the dual benefits of disinfection and taste and odor control in treating 100 million liters of drinking water per day. Equally importantly, it will do so without forming bromate or other disinfection by-products.

Year-Round Objective	UV Disinfection
Seasonally-Treated Contaminants	MIB and geosmin
Contaminant Treatment Target	1-log Removal

Water Reuse Solution: Orange County

The Orange County Water District is constructing the largest water reuse treatment facility in the world, the Groundwater Replenishment System (GWRS). The GWRS employs a highly advanced water treatment facility that treats wastewater to standards beyond those required for drinking water. The project treats a peak of 265 million liters per day, and will ultimately be capable of treating more than 380 MLD. The TrojanUVPhox™ destroys trace chemical contaminants (e.g. NDMA and pharmaceuticals) and acts as the main disinfection system.

Primary Contaminant	NDMA
Secondary Contaminant	other organics
Influent Concentration (NDMA)	150 ppt
Effluent Concentration (NDMA)	<10 ppt

Solutions for Emerging Needs

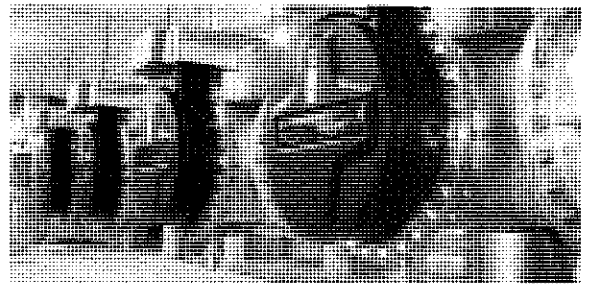
The patent-pending **TrojanUVPhox™** (UV-Photolysis and UV-Oxidation) is a groundbreaking, pressurized UV light reactor that utilizes Trojan's high-output, amalgam UV lamps. Through the extensive use of computational fluid dynamics modeling and other computer simulation tools, it has been optically and hydraulically optimized to provide extremely efficient and cost-effective UV treatment. Its unique design allows for the use of multiple reactors in series, giving the TrojanUVPhox™ an extremely compact footprint.

The **TrojanUVSwift™ECT** employs medium-pressure lamps and sophisticated controls to optimize the treatment of environmental contaminants. Its ultra-compact footprint and large flow capacity makes it an excellent reactor for use as part of a multi-barrier system in large, municipal applications (hundreds of millions of liters per day). In such an application, the TrojanUVSwift™ECT destroys contaminants such as taste and odor-causing compounds while providing disinfection of microorganisms such as *Cryptosporidium* and *Giardia*.

How UV Works

UV-Photolysis is a photochemical reaction that takes place when a contaminant molecule absorbs UV light. The photons break down chemical bonds of the molecule and reduce the potentially harmful chemical to its safe, elemental components (similar to steps 1 through 3 in illustration, left).

UV-Oxidation (illustrated at left) is also a photochemical reaction, but involves the irradiation of hydrogen peroxide with UV light. This creates strongly oxidizing hydroxyl radicals (steps 1 through 3) that oxidize the contaminant, breaking the bonds between the molecules, and reducing the potentially harmful chemical to its safe, elemental components (steps 4 through 7).



A TrojanUVSwift™ECT system installed at the PWN Water Supply Company in Andijk, the Netherlands.

Leading the Way from Science to Solutions

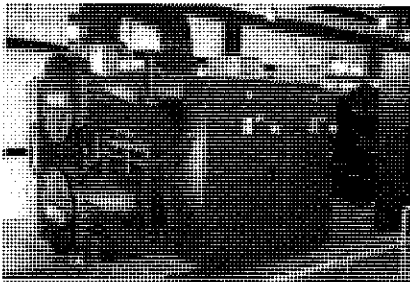
Trojan is the world leader in ultraviolet knowledge and technology, with over 100 patents granted and an additional 90 patents pending. We are a global company with over 600 employees worldwide.

Trojan has the largest installed base of municipal UV water disinfection systems and over a quarter century of experience dedicated to improving the quality of water with ultraviolet light. Our production is ISO9001 Certified – an internationally recognized standard of quality assurance in design, development, production, installation and service.

Trojan Industry Firsts

We are responsible for many of today's global innovations in UV technology, including:

- The first large scale, monochromatic lamp-based UV system for the treatment of NDMA
- The first installation of UV-oxidation for simultaneous disinfection and control of taste and odor-causing compounds in municipal drinking water
- The first application of UV technology to disinfect reclaimed wastewater to stringent limits
- The first incorporation of electronic ballasts into low-pressure UV lamp disinfection systems
- The first integrated chemical/mechanical cleaning system (ActiClean™)
- The industry's first facility for underwater UV lamp testing



The TrojanUVPhox™ installed at the California Domestic Water Company.

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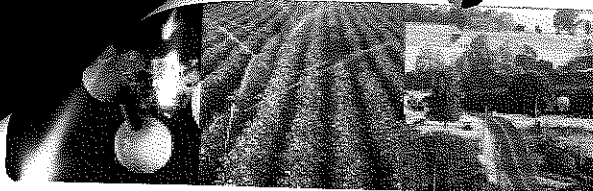
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Hach/Trojan Technologies (China): 86-10-65150290

Products in this brochure may be covered by one or more of the following patents: Can. 2,117,004; Can. 2,239,925; US 5,418,370; US RE 36,896; US 6,342,188; CA 2,340,199; US 6,659,431; CA 2,381,307; US 6,500,346; CA 2,386,223; US 6,635,613; US 7,018,975; CA 2,422,045; US 6,830,697; CA 2,383,686; US 6,818,900 CA 2,411,975; US 7,077,965; US 7,018,544; US 7,531,095.

Other patents pending.

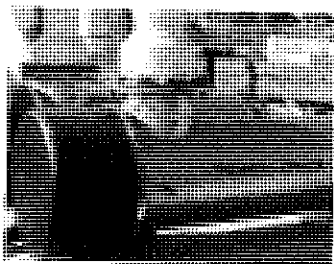
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TROJANUV
WATER CONFIDENCE™



Site Example: The Trojan UVPhox™ Applied at a Groundwater Remediation Site for 1,4-Dioxane and VOC Treatment

Stockton, California Project



The Trojan UVPhox™ treats 1,4-Dioxane in Stockton, California.

Derek Reed, P.E.
Project Engineer, Dudek and Associates, Inc.:

"We are extremely pleased with the performance of the Trojan system. The energy costs are significantly lower than expected and Trojan has continued to work with us to optimize operations as influent concentrations of 1,4-dioxane have changed."

In the early 1990's, the volatile organic compounds (VOCs) tetrachloroethylene (PCE), and trichloroethylene (TCE) were discovered in the vicinity of several city water supply wells near the city of Stockton, California. An aggressive hydraulic containment/water reinjection system was installed to contain the plume and protect the quality of the drinking water. For several years, a treatment system consisting of granular activated carbon and air stripping was used to remove VOCs from the reinjected water.

Recently, however, the contaminant 1,4-dioxane was also discovered in the plume. 1,4-Dioxane is commonly used as a stabilizer in chlorinated solvents, and therefore is often present in VOC plumes. In particular, 1,4-dioxane contamination is commonly found at sites contaminated with 1,1,1-trichloroethane (TCA), a solvent that contains up to 15% 1,4-dioxane.

A semi-volatile contaminant with low volatility and low affinity for carbon materials, 1,4-dioxane resists removal from water by carbon or air stripping. The consulting engineer for the project, Dudek and Associates Inc., contacted Trojan Technologies for a treatment solution to remove this emerging contaminant. Trojan worked closely with the engineers to provide an optimized low-energy ultraviolet light (UV) oxidation system to treat the 1,4-dioxane.

The Trojan Solution

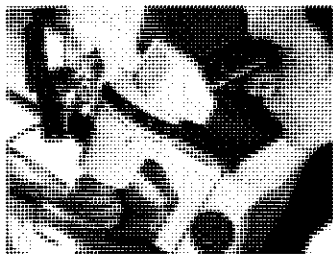
Trojan provided a pressurized, multi-lamp Trojan UVPhox™ reactor system to treat the 1,4-dioxane by UV-oxidation, a process that combines UV light and hydrogen peroxide. To optimize the UV treatment system during the design phase, Trojan performed testing on groundwater collected at the site to determine its water quality parameters. The resulting Trojan UVPhox™ system was installed in the summer of 2001 and operation continues currently.

Design Parameters

- Flow Rate: 200 gallons per minute
- Influent 1,4-dioxane concentration: 110 parts per billion (ppb)
- Effluent 1,4-dioxane concentration: < 1.0 ppb
- Oxidizer (for 1,4-dioxane treatment): hydrogen peroxide



Trojan



General Contaminant Overview

Contaminant:

1,4-Dioxane

Potential Sources:

- Chlorinated solvents manufacturing
- Printed circuit board manufacturing
- Plastic, lacquer, varnish & paint manufacturing
- Dye, resin, wax & grease manufacturing
- Textile processing
- Pesticide production
- Tissue processing & biological labs

Toxicity:

Probable human carcinogen

California Department of Health Services (DHS):

- Action Level - 3.0 parts per billion (ppb)

Summary

1,4-Dioxane is most commonly used in industry as a stabilizer in chlorinated solvents such as TCE. Reported fractions of 1,4-dioxane in the host solvent range from 1% to 15%, depending on the manufacturer. For this reason, 1,4-dioxane is often found intermingled in groundwater solvent plumes. Due to its chemical properties, 1,4-dioxane migrates farther and persists longer than other contaminants in a groundwater plume.

Before Treatment:

- (1,4-Dioxane) 110 ppb

After Trojan Low-Energy UV Treatment:

- (1,4-Dioxane) <1.0 ppb



Trojan Technologies Inc.

3020 Gore Road, London, Ontario, Canada N5V 4T7 Telephone: (519) 457-3400 Fax: (519) 457-3030

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Trojan Technologies Inc. is a publicly traded company on the Toronto Stock Exchange under the symbol TUV.



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Products shown may be covered by one or more of the following patents:
 Can. 2,117,040 Can. 2,239,825 Can. 1,927,877
 U.S. 5,418,370 U.S. RE 36,896 U.S. 5,006,244
 Other patents pending.

Trojan ECT Projects

ECT Reference List with System Description

No.	Project Name	City/State/Country	Application	All Chemicals Treated	Target contaminant(s)	Flowrate (MGD)	H2O2?	Design Log Removal
1	Middleton Wellhead Site, Region of Waterloo	Waterloo, ON	Drinking Water	TCE, 1,4-dioxane and providing disinfection	TCE, 1,4-dioxane	40.4	Y	TCE, 1,4-dioxane
2	G&E Burlington	Burlington, MA	Remediation	1,4-dioxane	1,4-dioxane	0.02		1,4-dioxane
3	Secor International/Federal Denver Facility	Colorado, USA	Remediation	1,4-dioxane	1,4-dioxane	0.0	Y	1.82-log 1,4-dioxane
4	Univar 1,4-dioxane	San Jose, CA	Remediation	1,4-dioxane	1,4-dioxane	0.0	Y	1,4-dioxane
5	El Monte Operable Unit	El Monte, CA	Groundwater remediation	1,4-Dioxane	1,4-Dioxane	0.1	Y	1,4-dioxane
6	Mystic Lake Casino	MN	Indirect Potable Reuse	NDMA 1,4-dioxane, endocrine disruptors and providing disinfection	NDMA, 1,4-Dioxane	0.1		1.2 log NDMA, 0.5 log 1,4 dioxane
7	Stockton Groundwater Remediation	California, USA	Groundwater remediation	1,4-dioxane, VOCs	1,4-dioxane	0.3	Y	2-log removal 1,4-dioxane
8	Regional Municipality of Waterloo, Greenbrook Drinking Water Plant	Ontario, Canada	Drinking Water	TCE, 1,4-dioxane and providing disinfection	TCE 1,4-dioxane	3.4	Y	1.3-log removal of 1,4-dioxane
9	La Puente Valley County Water District	California, USA	Drinking Water	Nitrosamines, 1,4-dioxane, barrier to various VOCs (TCE, PCE, DCE, etc.)	NDMA, 1,4-Dioxane	3.6	Y	2.9-log NDMA removal; 0.23-log 1,4-dioxane removal
10	Sundamba Advanced Water Treatment Plant, Phase 1A	Brisbane, Australia	Indirect Potable Reuse	NDMA 1,4-dioxane, endocrine disruptors and providing disinfection	NDMA	5.3	Y	1.0-log removal NDMA; 0.5-log removal of 1,4-dioxane
11	Sundamba Advanced Water Treatment Plant, Phase 1B	Brisbane, Australia	Indirect Potable Reuse	NDMA 1,4-dioxane, endocrine disruptors and providing disinfection	NDMA, 1,4-Dioxane	5.3	Y	1.0-log removal NDMA; 0.5-log removal of 1,4-dioxane
12	Oxnard Advanced Water Purification Facility	Oxnard, CA	Indirect Potable Reuse	NDMA 1,4-dioxane, endocrine disruptors and providing disinfection	NDMA, 1,4-Dioxane	6.3	Y	1.2-log removal NDMA; 0.5-log removal of 1,4-dioxane
13	Joint Water Purification Project (JWPP); Cottonwood, Colorado	Cottonwood, CO	Indirect Potable Reuse	NDMA 1,4-dioxane, endocrine disruptors and providing disinfection	NDMA, 1,4-Dioxane	9.0	N	1.0-log removal NDMA; 0.5-log removal of 1,4-dioxane
14	Middleton Water Treatment Plant, Region of Waterloo	Waterloo, ON	Drinking Water	TCE, 1,4-dioxane and providing disinfection	TCE, 1,4-dioxane	10.7	Y	TCE, 1,4-dioxane
15	San Gabriel Valley Water Company B5	California, USA	Drinking Water	Nitrosamines, 1,4-dioxane, barrier to various VOCs (TCE, PCE, DCE, etc.)	NDMA, 1,4-Dioxane	11.2	Y	2.54-log NDMA removal;
16	San Gabriel Valley Water Company B6	California, USA	Drinking Water	Nitrosamines, 1,4-dioxane, barrier to various VOCs (TCE, PCE, DCE, etc.)	NDMA, 1,4-Dioxane	11.2	Y	2.65-log NDMA removal; 0.48-log 1,4-dioxane removal
17	Valley County Water Company - Sub Area 1	California, USA	Drinking Water	Nitrosamines, 1,4-dioxane, barrier to various VOCs (TCE, PCE, DCE, etc.)	NDMA, 1,4-Dioxane	11.2	Y	3.2-log NDMA removal; 1.1-log 1,4-dioxane removal
18	West Basin Municipal Water District	California, USA	Groundwater Recharge	NDMA 1,4-dioxane, endocrine disruptors and providing disinfection	NDMA, 1,4-Dioxane	12.5	Y	1.3-log NDMA reduction
19	Luggage Point Advanced Water Treatment Plant	Brisbane, Australia	Indirect Potable Reuse	NDMA 1,4-dioxane, endocrine disruptors and providing disinfection	NDMA, 1,4-Dioxane	18.5	Y	1.2-log removal NDMA; 0.5-log removal of 1,4-dioxane
20	Gibson Island Advanced Water Treatment Plant	Brisbane, Australia	Indirect Potable Reuse	NDMA 1,4-dioxane, endocrine disruptors and providing disinfection	NDMA, 1,4-Dioxane	26.4	Y	1.0-log removal NDMA; 0.5-log removal of 1,4-dioxane
21	Aurora Reservoir Water Purification Facility	Colorado, USA	Drinking Water	Nitrosamines, pharmaceuticals, MIB, geosmin, microcystin and providing disinfection	NDMA, 1,4-Dioxane	50.0	Y	1.2-log NDMA, treatment of EDCs, Pharms, algal toxins, T&O, etc.
22	Orange County Water District, Groundwater Replenishment System	California, USA	Groundwater recharge	NDMA 1,4-dioxane, endocrine disruptors and providing disinfection	NDMA, 1,4-Dioxane	100.0	Y	1.2-log removal NDMA; 0.5-log removal of 1,4-dioxane
23	Thames Water Demonstration System	London, UK	Indirect Potable Reuse	NDMA 1,4-dioxane, endocrine disruptors and providing disinfection	NDMA, 1,4-Dioxane			



Mark Parkinson, Governor
Roderick L. Bremby, Secretary

DEPARTMENT OF HEALTH
AND ENVIRONMENT

www.kdheks.gov

August 23, 2010

Vice President Bruce Shubert
Administration and Finance
Kansas State University
105 Anderson Hall
Manhattan, Kansas 66506-0116

**RE: Corrective Measures Study Report
Old Chemical Waste Landfill
Kansas State University - Manhattan
EPA ID NO. KSD980632772**

Dear Mr. Shubert:

The Kansas Department of Health and Environment (KDHE), Bureau of Waste Management (BWM), received the Corrective Measures Implementation & Decommissioning Plan (CMI&DP) on July 30, 2010 via electronic mail for the Kansas State University (KSU) Old Chemical Waste Landfill (OCWLF). KDHE has the following comments:

Volume I – Regulatory Review Submittal

1. Section 1.1, 4th paragraph, the Bureau of Environmental Health did not exist in 1965. Revise this statement.
2. Section 1.1, 5th paragraph, the CMI&DP indicated that burial of chemical waste continued until 1984. KDHE's records indicate that burial of chemical waste ceased in 1979. KDHE would like to know where KSU come up with this new, later date. If it is a typo, revise this statement.
3. Section 1.2, 2nd paragraph, the text indicates that the landfill is under the northern most building. The landfill is not entirely contained beneath the building, revise this statement.
4. Section 2.1.1, 1st paragraph states "the stability of the waste mass is questionable." Considering the groundwater contamination that is now off site, it can be concluded that the waste mass is not stable. Revise this statement.

5. Section 2.2 1st paragraph states that the vegetation studies conclude that this media is not affected. Further investigation is needed to make this statement. Revise this statement to read that further investigation is still needed.
6. Section 2.2.1.1, 1st paragraph indicates that chemical waste was buried into the 1980s. See comment number 2.
7. Section 2.2.2.1, 1st bullet states that the groundwater flow system is comprised of an upper and a lower aquifer. This has not been confirmed site wide, revise this statement.
8. Section 2.2.2.1, 8th bullet states that there is an aquitard separating the upper and lower aquifer. See comment number 7.
9. Section 5.8.5, 2nd bullet states that soil placed above the OCWLF trenches but below the concrete of the Hazardous Waste Storage building is not considered hazardous waste. This is an incorrect statement as the waste characterization has yet to be completed. Revise this statement to state that some of the soil may be hazardous.
10. Section 5.9.1, 3rd paragraph states that intact containers retrieved whole from the landfill will be processed using the KSU and State of Kansas disposal process and contract. KDHE recognizes that any material pulled from the landfill could be potentially radioactive. Therefore, all material pulled from the landfill should be disposed of with the rest of the hazardous waste pulled from the landfill.
11. Section 5.9.3, 1st paragraph states that material will be shipped as Class 7 or DOT non-regulated. Elaborate on what both of these classifications mean.
12. Figure 4, there is a date of June 21, 2010 on the figure. Clarify if this is the date the static water levels were taken or when the figure was created.

Volume II – Groundwater Corrective Measures Implementation Plan

13. Section 2.1 states there will be a pre-construction conference prior to the mobilization of the equipment. Clarify where this meeting will take place and how far before the construction this will be held.
14. Section 2.2 states that groundwater sampling will occur to specify the requirements of the treatment train. Since this has already occurred, update this section.
15. Section 2.4 discusses the building that will hold the treatment system. As this building will be located outside the fenced area of the landfill, clarify how this building will be secured and who will have access to the building after construction is complete.
16. Section 3.1 discusses the site preparation prior to establishing the exclusion zone. Discuss how the exclusion zone will be determined, its approximate location, what type of barrier

will be in place to prevent the public from accessing the site and how long this barrier will be in place.

17. Section 3.2 states that water produced from dewatering may be discharged into the nearby creek. All water pulled from the trench during dewatering must be characterized and disposed of properly.
18. Section 3.3 briefly discusses how the treatment system will operate. Schematics for this system need to be included in the CMI & DP along with a more detailed discussion in the text for how this system will accomplish the corrective action goals. In addition, the one schematic that does accompany this volume has too many elements to it. Reduce the number of drawings on each page and add more as necessary.
19. Section 3.4 discusses the various permits that will be needed to complete the groundwater remediation system. Describe what the timeline is for when the permits will be applied for and issued.
20. Section 4.3 describes the initial performance monitoring for the groundwater remediation system. Describe who will be completing this work, what type of samples will be taken, how many samples will be obtained and what the constituent list is for the samples. KSU also needs to reiterate what the ongoing performance requirements of the groundwater remediation system are and how they will be monitored over time.
21. Section 4.4 state that Aptos will provide an operation and maintenance (O&M) manual for the long term operation of the treatment system. Clarify when this plan will be submitted to KDHE for review. In addition, refer to the O&M outline attached to this letter to ensure that all aspects of the O&M plan are included in the submittal.
22. Section 5.0 states that a decommissioning plan will be provided once the cleanup goals have been met for a minimum of three years. Since the document provided is a decommissioning plan, please refer to this document as a corrective measures complete report. KDHE would like to remind KSU that when it submits the corrective measures complete report, this is not a guarantee that KSU will be done with corrective action. That determination will be made by KDHE after the corrective measures complete report has been reviewed.
23. Corrective action objectives for groundwater are not stated in Volume II. Add this to Volume II.
24. Design criteria for the groundwater corrective action is not stated. Specify performance requirements for the groundwater corrective action.
25. The design process and methods for the groundwater corrective action are not stated. Include schematic diagrams for the major components of the groundwater corrective action.

26. Start-up procedures for the groundwater corrective action are not stated. Add this into Volume II.
27. There is only limited design and implementation consideration discussed in Volume II. There needs to be further discussion on this subject which should also include anticipated technical problems and engineering data.

Volume III – Landfill Corrective Measures Implementation Plan

28. There are no page numbers within volume three. Add page numbers to ease discussing the document with others.
29. Section 2.1, 2nd sentence, the work “activity” should replace the work “energy.”
30. Section 3.1 states that the HWSB must be cleaned and decontaminated prior to the waste characterization. This section must be expanded to include who will be performing the decontamination and what the clean-up criteria are before the waste characterization work can begin.
31. Section 3.3 states that an asbestos clearance will be performed by KSU. The CMI&DP assumes that no asbestos will be found inside the facility. KSU needs to state why it believes there is no asbestos in the building and how it will handle the asbestos removal if it is found.
32. Section 4.2 details the training that will be required by each employee working at the OCWLF. Also add that additional information regarding this subject can be found in the Health and Safety Plan.
33. Section 4.3 states that concrete from the base of the Hazardous Waste Storage Building (HWSB) will be disposed of at an off-site construction and demolition (C&D) landfill or a concrete recycler if it is found to be clean. The CMI&DP needs to state how this determination will be made and state the concrete will be disposed of with the rest of the hazardous material if it is found to be contaminated.
34. Section 4.3 states that TCLP analysis will be performed on the trees adjacent to the HWSB. KSU needs to state when this analysis will occur and submit analytical results to KDHE. In addition, KSU needs to give an account of how the trees will be disposed of in the event they are found to contain hazardous materials. If the trees do not have hazardous materials, they may be disposed of in the city landfill.
35. Section 4.3 states that issuance of TLD badges and collection of baseline bioassay samples will be “as required.” KSU needs to describe what the circumstances are to perform these two tasks. In addition, the acronym TLD needs to be spelled out in the text or included in the acronym list in the front of Volume III.

36. Section 4.4 states that the extent of the clean material will be determined during the waste characterization process. Please refer to the Waste Characterization Work Plan in the text to provide further detail on this process.
37. The description in Section 4.4 of the excavation using the cake method is very difficult to understand. KDHE suggests re-writing this section using a numbered or bullet format to clearly understand how the excavation will progress.
38. Section 4.4 states that samples will be taken from each "cake" to identify the contaminants. Revise this paragraph to include what type of samples will be taken, how many samples will be taken per "cake", and what constituents will be analyzed per sample.
39. Section 4.4 describes a ramp that will be adjacent to where the excavation will start. There is no description of this ramp anywhere in the text and there is not ramp included in the figures. Revise the text.
40. Section 4.4, 3rd paragraph states "if groundwater is encountered at a depth that will interfere with excavation or site safety, KSU, KDHE, AEC, Solutient and the excavation contractor will meet to develop a plan to remove and treat the water..." As groundwater was measured between 10 ft. and 13 ft. during the November 2009 groundwater sampling event, groundwater needs to be anticipated. A plan to dewater and dispose of the wastewater in the excavation area needs to be included with the revised CMI&DP.
41. Section 4.4, 3rd paragraph states the contractor will "bench" the site to maintain an OSHA safe excavation. Clarify what "benching" means.
42. Section 5.2.1, 1st paragraph states that samples will be sampled using the sampling and analysis plan (SAP) for the project. As the current SAP for the OCWLF does not cover taking soil and waste samples, a new SAP for the excavation needs to be submitted as an attachment to the revised CMI&DP.
43. Section 5.2.1, 2nd paragraph, 1st sentence, the content of this sentence is unclear. Revise this sentence.
44. Section 5.2.2 states that drums will be lab packed and characterized for waste streams. Describe what will happen to the drums after this is complete.
45. Include any sample manifest documents for the shipping of wastes as an appendix to Volume III.
46. Section 7.0 describes a restoration plan that will be submitted once the excavator has backfilled the OCWLF. Include the restoration plan as an appendix to Volume III. In addition, KSU needs to also describe what the future use for this site is in the restoration plan.

47. Corrective action objectives need to be stated for the landfill removal. A new Risk-Based Standards for Kansas RSK Manual – 5th version will be available soon. Please note that when these new numbers are published, KSU will need to meet the RSK numbers found in the 5th version.
48. The grey-out area of Figure C-2 is difficult to read. Please revise this figure.

Waste Characterization Work Plan

49. Revise Table 1-1 to have Christy McCormick as the KDHE project manager.
50. Section 1.4, the Central Interstate Low-Level Radioactive Waste Commission requires that an application for the exportation of low-level radioactive waste for disposal out of state be approved prior to the waste leaving the compact region. Additional information can be obtained on the CILLRWCC website at <http://cillrwcc.org/>. Please make the appropriate revisions to include obtaining approval of this permit.
51. Section 2.1.1, 2nd paragraph states that all material disturbed during the waste characterization, including concrete, soil cap, and inter-trench soil are considered waste unless determined otherwise from chemical analysis. KDHE would like to remind KSU that all waste produced during the excavation of the landfill will also be considered waste until KSU has provided sufficient documentation showing excavated material is not a hazardous waste.
52. Section 2.4.3, include the Kansas laboratory certification number to the text of this section.
53. Section 3.1.1, states the sampling crew will be allowed to use professional judgment to use alternative sampling methods if necessary to collect samples during the waste characterization. KDHE would like to remind KSU that the sampling crew may use professional discretion in employing described methods when obtaining samples during the waste characterization, however they may not decrease the number of samples (as described in Table 2-1) without prior authorization from KDHE.
54. Section 3.2 describes what field documentation will be needed during the waste characterization. KDHE needs a comprehensive list of what will be included in the field logs and sample logs. Any standardized forms used by the sampling crew must be provided to KDHE as an attachment to the waste characterization work plan (WCWP).
55. Section 3.3, on the shipping cooler preparation, all samples should be wrapped with bubble wrap only, not paper towels. In addition, extra bubble wrap should be placed in any empty space within the cooler to prevent jostling during shipment.
56. Section 3.3, on sample shipping, if a contract carrier is utilized to ship the sample containers, the coolers should have a “fragile” or “glass” label attached to the cooler to alert the shipper that contents are fragile.

57. Section 5.0, the summary report needs to include a table with all detections found during the waste characterization event.
58. The WCWP needs to also have a section to deal with any groundwater that is encountered during the waste characterization event.

General Comments

59. As the landfill removal work is scheduled to begin in the middle of winter, KDHE recommends having a contingency plan in place for any adverse weather conditions that may occur. Specifically, KDHE would like to make sure there is a contingency plan in place for the chance that the weather is too cold for equipment and instrumentation to operate normally.
60. KDHE requests progress reports be submitted during both the groundwater remediation and the landfill excavation. In the revised CMI&DP, include a schedule of when reports will be submitted and what will be included in the reports.
61. There is no long-term groundwater monitoring discussed in any volume of the plan. Submit KSU's plan to continue groundwater monitoring with the revised CMI&DP.
62. KSU is required to submit for review and approval a 5-Year Remedy Performance Evaluation Report evaluating the remedy's effectiveness and performance. This evaluation shall be consistent with the CERCLA Comprehensive Five-Year Review Guidance, OSWER9355.7-03B-P, and any subsequent revisions or additions, and shall include the following:
 - A. Horizontal capture zone analysis prepared in accordance with Capture Zone How-To Guide for Groundwater Pump and Treat Systems if a pump and treat system is a component of the selected remedy;
 - B. Effectiveness of the remedy in protecting human health and the environment as planned in the Statement of Basis;
 - C. Effectiveness of Engineering Controls and Institutional Controls in protecting human health and the environment as planned in the Statement of Basis;
 - D. Results of sampling and analysis to determine the effectiveness and performance of the remedy;
 - E. Progress toward attaining site-specific media cleanup goals, an estimate of the time remaining to attain those goals, and identification of limiting factors in attaining those goals;

- F. Any changed circumstances that render the remedy, including engineered and institutional controls, ineffective;
- G. Possible modifications to the remedy to provide necessary protection;
- H. Any other reporting requirements included in the KDHE approved CMI WP.

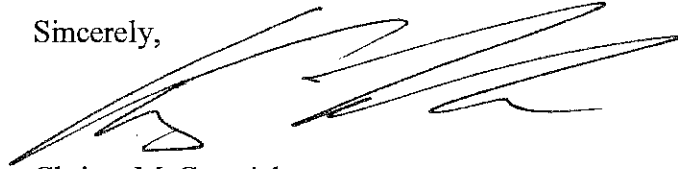
Based upon KDHE's review of the 5-Year Remedy Performance Evaluation Report, KDHE may require KSU to conduct additional investigations, studies, and/or work in order to modify the existing remedy or to select a new remedy or remedies. If action is needed to protect human health or the environment from releases or to prevent or minimize the further spread of contamination while long-term remedies are pursued, KDHE may require KSU to implement interim measures. Modify the CMI&DP to include this report.

63. KSU must submit a Corrective Measures Construction Completion Report (CMCCR). The CMCCR must include at a minimum, the following elements:
- A. A statement of the purpose of the Report;
 - B. A synopsis of the corrective measures, design criteria, and a certification that the corrective measure was constructed and implemented in accordance with the approved CMI Work Plan;
 - C. An explanation and description of any modifications to the approved CMI Work Plan and design specifications, and why such modifications were necessary and appropriate;
 - D. Copies of any sampling/test results for operational testing and/or monitoring that documents how initial operation of the corrective measure compares to design criteria;
 - E. A summary of significant activities that occurred during the implementation/construction, including a discussion of any problems encountered and how such problems were addressed;
 - F. A summary of all inspection findings (including copies of inspection reports, documents and appendices);
 - G. Copies of as-built drawings and photographs.

Attached to this letter is an outline provided by EPA to detail what is typically included in a CMI Work Plan. Please refer to this document for your revision of the CMI&DP. In addition, there is also an outline for the O&M plan that will also need to be submitted as an

attachment to the CMI&DP. The revised CMI&DP is due to KDHE on October 15, 2010. If there are any questions regarding this letter, please contact me at (785) 296-6597.

Sincerely,



Christy McCormick
Environmental Scientist
Hazardous Waste Permits Section
Bureau of Waste Management

Enclosures: CMI Work Plan outline and O&M outline

cc:

Bill Bider – BWM
Lisa Gotto – EPA Region 7/RCAP
Jennifer Nichols – KDHE/NCDO

Paul Clark – Allied Environmental
Steve Galitzer – KSU
Tom Conley - BEH

O&M Plan Outline

Project Management - The O&M Plan must describe the management approach including levels of personnel authority and responsibility (including an organizational chart), lines of communication and the qualifications of key personnel who will operate and maintain the corrective action (including contractor personnel);

System description - The O&M Plan must describe the corrective action components and identify significant equipment, as applicable to each selected corrective action alternative. Provide schematics or process diagrams to illustrate system design and operation;

Personnel Training - The O&M Plan must describe the training process for O&M personnel, as applicable. KSU must prepare, and include the technical specifications governing the operation and on-going maintenance of contaminant mitigation systems, and the support requirements for the following:

- a. Appropriate service visits by experienced personnel to supervise the installation, adjustment, start-up and operation of contaminant mitigation systems;
- b. Training covering appropriate operational procedures once the start-up has been successfully accomplished;

Start-Up Procedures - The O&M Plan must describe all applicable system start-up procedures including any operational testing;

O&M Procedures - The O&M Plan must describe all normal operation and maintenance procedures including:

- a. A description of tasks for operation;
- b. A description of tasks for maintenance;
- c. A description of prescribed treatment or operation conditions; and
- d. A schedule showing frequency of each O&M task.

Data Management and Documentation Requirements - The O&M Plan must specify that KSU must collect and maintain the following information:

- a. Progress report information;
- b. Monitoring and laboratory data;
- c. Records of operating costs; and
- d. Personnel, maintenance and inspections.

Replacement Schedule - the O&M Plan must specify a replacement schedule for equipment and installed components;

Waste Management Practices - The O&M Plan must describe any solid wastes/hazardous wastes which may be generated by the operation of the corrective measures components and describe how they will be managed;

Contingency Procedures - The O&M Plan must describe, as applicable, the following types of contingency procedures necessary to ensure system operation in a manner protective of human health and the environment:

- a. Procedures to address system breakdowns and operational problems including a list of redundant and emergency back-up equipment and procedures;
- b. Alternative procedures to be implemented if the corrective measure systems suffer complete failure. The alternative procedures must be able to achieve the performance standards for the corrective measures until system operations are restored;
- c. The O&M Plan must specify that, in the event of a major breakdown and/or the failure of the corrective measures, KSU must notify KDHE within 24 hours of the event; and
- d. The O&M Plan must specify the procedures to be implemented in the event that the corrective measure(s) are experiencing major operational problems, are not performing to design specifications, and/or will not achieve the corrective action objectives.

CMI Work Plan Outline

Introduction/Purpose: The CMI Work Plan must contain a description of the purpose of the document and a summary description of the project;

Corrective action objectives including media cleanup standards;

Description of the final corrective measure(s) selected by KDHE including institutional controls, if any;

Conceptual model of contaminant migration;

Design Criteria – Specify performance requirements for the overall corrective measure(s) and for each major component. Long-lead performance considerations should be included;

Design Basis – Discuss the process and methods for designing all major components of the corrective measure. At a minimum the following must be addressed:

- a. Conceptual process/Schematic diagrams;
- b. Site plan showing preliminary plan layout and/or treatment area.

Startup Procedures, including all applicable system startup procedures and operational testing;

Design and implementation considerations to implement the selected remedy, to include, but not be limited to:

- a. Anticipated technical problems;
- b. Additional engineering data that may be required;
- c. A description of any permits and regulatory requirements; and
- d. Access, easements and right-of-way.

Waste Management Practices – Describe the wastes generated by the construction of the corrective measure(s) and how they will be managed. Also discuss drainage and indicate how rainwater runoff will be managed;

Long-term monitoring requirements;

Cost estimates, including the capital and O&M costs for implementing the entire corrective action;

Corrective Measures Completion Criteria - The CMI Work Plan must propose the process and criteria for determining when the implemented corrective measures have achieved the corrective action objectives. The CMI Work Plan must also describe the process and criteria for determining when maintenance and monitoring may cease; and

Project Schedule - The CMI Work Plan must also specify a schedule for key elements of the CMI process including bidding and construction process, and for the initiation of all major corrective action construction tasks and milestones.



August 6, 2010

Kansas Department of Health and Environment
Bureau of Waste Management
1000 SW Jackson, Suite 320
Topeka, Kansas 66612-1366

Attn: Ms. Christy McCormick:

RE: Old Chemical Waste Landfill –
Groundwater Corrective Measure Implementation Support
Water Quality Treatability Sampling Work Plan
Kansas State University, Manhattan, Kansas
AEC Project No.: 09124:0544

Dear Ms. McCormick:

This letter serves as a work plan to collect one composite sample of groundwater from the Old Chemical Waste Landfill (OCWLF) site to allow sizing of the anticipated groundwater treatment system. We are requesting a review of and concurrence with this plan from the Kansas Department of Health and Environment (KDHE). The scope of work reflected herein supports the Groundwater Corrective Measures Implementation (GCM) plan submitted for review on July 30, 2010.

Purpose

This plan will guide the collection of aliquot groundwater samples from the upper aquifer at the locations specified herein. The aliquot samples will be combined to form a single composite sample that reflects the quality of groundwater immediately upgradient of an interceptor trench location proposed in the GCM Plan. The composite sample will be shipped to the vendor proposed in the GCM Plan to provide the ultraviolet light-based oxidation system. The vendor will analyze water quality parameters using internal method in order to size the system for accommodate naturally-occurring geochemical species. This analysis is not considered a treatability study for the groundwater contaminants-of-concern (COCs), but will evaluate the following scenarios:

- Optimizing the peroxide dosing rates and locations along the treatment train
- Need for, or hindrance of using granular activated carbon (GAC) within the treatment train
- Oxidation demand/competition for species such sulfate and iron
- Vendor standard pre-specification analysis

Schedule

This sample must be collected the week of August 9, 2010 in order to maintain the project schedule for the GCM. Preferably, AEC will be allowed to collect the sample no later than August 10, 2010. KDHE's acceptance of this work plan is the only pre-requisite to meeting this schedule. The personnel that will perform this work have completed the most recent sampling event for the OCWLF site.

Sampling Locations

The locations proposed for sampling during this work include MW-15(I), MW-18(I), and MW-19(I). These locations approximate the trend of the interceptor trench (south-north) and include the north and south non-detect areas on either side of the groundwater plume as well as the higher concentrations of groundwater COCs near the central plume axis.

Sampling Methods

Each monitoring is presently equipped with a low-flow sampling pump. These pumps and the accompanying tubing will be removed from the wells and placed in cleaned new plastic bags, with one pump assembly per bag and with the corresponding well number. The bags will be tied and set aside for reinstallation after the samples are collected. With the pumps removed, the water levels and total depth

The Anawalt House, 1109 N. Topeka ■ Wichita, KS 67214 ■ Mail: P.O. Box 234 ■ Wichita, KS 67201-0234
Phone: (316) 262-5698 ■ Fax: (316) 262-0736 ■ www.alliedenvironmental.com

of each well will be measured, as prescribed in Volume III of the existing QAPP for the site. These depths will be recorded in the field notes and the water level indicator decontaminated prior to making the recording the measurements for the successive wells in the group of three.

Using a new disposal bailer, the groundwater present in each of the three wells will be purged by the bailer method described in Volume III of the existing QAPP. If any well is bailed "dry" allow the well to recover and collect the sample aliquot within 24 hours. Contain all purge water for management with the purge water collected during the spring 2010 sampling event, using the spring sampling results to guide disposal.

Once purging is complete per the bailer method requirements of Volume III of the QAPP, AEC will collect the following quantities for the respective wells in new 1-liter glass containers (clear or amber) with caps.:

- 2 liters each from MW-18(I) and MW-19(I)
- 4 liters from MW-15(I)

While not necessary, the field crew may mark each container with the respective well number. Replace the pump assemblies into the designated wells and secure the well sites by closing the protective covers and locking each well.

Place the water from all liters into a new plastic 5-gallon bucket, preferably fitted with a spigot placed on the side of the bucket near the bottom. The eight 1-liter containers should provide approximately 2 gallons of groundwater when combined into the bucket. Stir the water thoroughly and begin to transfer the water into quart or gallon LDPE collapsible sampling containers. Continue the transfer, while stirring the water in the bucket to retain the sediment in suspension, until all water is in the containers. Firmly cap the filled containers. Mark all containers directly or on a label with the date the sample was collected and with the words "K-State OCWLF Sample."

Sampling Handling And Shipping

With the required 2-gallons of water placed in the collapsible sample containers, wipe the outside of each container and place into coolers as described below.

1. Place a clean plastic bag in a cooler and place two or more filled LDPE containers inside the bag.
2. If needed, place clean cardboard sheets between and around the LDPE containers for support and close the plastic bag by tying a knot near the opening.
3. Use two coolers to minimize weight, if needed.
4. Please wet ice in enough plastic sealable gallon-size bags to fill the space between the knotted bag and the cooler sides. Also place ice bags on top of the knotted bag.
5. Complete a sample chain-of-custody and place in a separate plastic sealable gallon-size bag. Tape the custody form bag to the top of each cooler.
6. Close and tape the lid of each cooler with clear packing tape by placing tape around the seam between the lid and cooler body. Then place two strips of tape completely around the cooler to cover each lid hinge, placing a cooler seal or evidence stripe under one of the two strips and across the lid/body seam.
7. Label each cooler with a "Wet Ice" sticker.
8. Process each cooler for overnight deliver according to the shipper's instructions and labeling requirements.

Coordinate the shipping address with Mr. Rob Haas of TrojanUV, phone number 519-457-3400.

Reporting

TrojanUV is responsible for performing the analysis of the water according to their internal methods. The manufacturer will provided a report to Aptos and AEC for discussion regarding the proposed configuration of the groundwater treatment system. The heart of this system will be a TrojanUV Model 18AL40 ultraviolet treatment cell. This cell is fitted with 18 UV lamps, each rated for 12,000 hours of operation,

KDHE – KSU OCWLF 2010 Corrective Measures Study
August 6, 2010
Page 3 of 3

fitted into a 40-cm diameter chamber. TrojanUV will use the groundwater analysis to evaluate the ancillary components, peroxide feed requirements, and usefulness of the GAC unit to the overall system.

AEC will provide any written reports prepared from this process, as provided by TrojanUV to K-State and the KDHE.

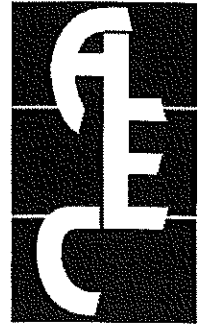
We hope this plan meets with your acceptance. Please contact the undersigned with any questions or additional comments.

Sincerely,
ALLIED ENVIRONMENTAL CONSULTANTS, INC.



Paul R. Clark, P.G.
Director in Charge

c: Lisa Gotto: USEPA
Tom Conley: BEH
Steve Galitzer: K-State University
Kelly Phillips: K-State University
Ron Bridges: K-State University



July 30, 2010

RECEIVED
AUG 03 2010
BUREAU OF WASTE MANAGEMENT

Kansas Department of Health and Environmental
Bureau of Waste Management
1000 SW Jackson Street, Suite 320
Topeka, Kansas 66612-1366

Attention: Ms. Christy McCormick
Environmental Scientist

Subject: Old Chemical Waste Landfill
Corrective Measures Implementation & Decommissioning Program Plan
(Volumes 1 through 4)
Kansas State University; Manhattan, Kansas
AEC File No. 09124 : 0544

Dear Ms. McCormick:

We are pleased to submit the Corrective Measures Implementation & Decommissioning Program Plan for the Old Chemical Waste Landfill. The Program Plan is provided in four functional volumes, as:

- Volume 1 – Corrective Measures Implementation & Decommissioning Program Plan
- Volume 2 – Groundwater Corrective Measures Implementation Plan
- Volume 3 – Landfill Corrective Measures Implementation Plan (including templates for the Waste Characterization Work Plan and the Final Status Survey Plan)
- Volume 4 – Health and Safety Plan (HASP) Old Chemical Waste Landfill

We have not included the pdf of the schedule, which has been submitted previously. This will be included in the bound copies that will be delivered next week.

If you have any questions or comments please contact the undersigned.

Sincerely,
ALLIED ENVIRONMENTAL CONSULTANTS, INC.

A handwritten signature in black ink, appearing to read 'Paul R. Clark', is written over a white background.

Paul R. Clark, P.G.
President

Enclosure as noted

C: Lisa Gotto: USEPA
Steve Galitzer: K-State University
Ron Bridges: K-State University

Tom Conley: BEH
Kelly Phillips: K-State University



Mark Parkinson, Governor
Roderick L. Bremby, Secretary

DEPARTMENT OF HEALTH
AND ENVIRONMENT

www.kdheks.gov

June 25, 2010

Vice President Bruce Shubert
Administration and Finance
Kansas State University
105 Anderson Hall
Manhattan, Kansas 66506-0116

**RE: Remedial Action and Remedial Design Timeline
Old Chemical Waste Landfill
Kansas State University - Manhattan
EPA ID NO. #KSD980632772**

Dear Mr. Shubert:

The Kansas Department of Health and Environment (KDHE), Bureau of Waste Management (BWM), received the remedial design and remedial action timeline on June 21, 2010 for the Kansas State University (KSU) Old Chemical Waste Landfill (OCWLF). KDHE has the following comments. KDHE conditionally approves the timeline with the following comments:

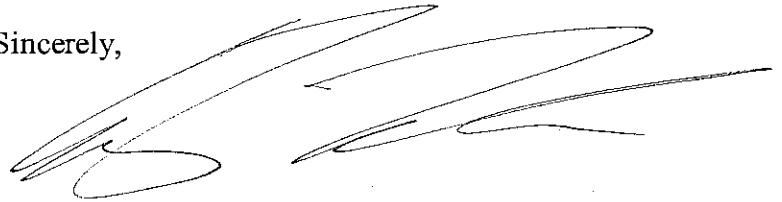
1. KDHE will take primary responsibility for public participation components requiring limited assistance from KSU. Therefore, the due dates on the timeline may be moved forward or back as deemed necessary by KDHE.
2. The timeline has many dates for activities that do not necessarily have a submittal attached with it. KDHE recognizes the following dates as due dates for submittals:
 - A) Corrective Measures Study - June 21, 2010
 - B) Decommissioning Plan - July 30, 2010
 - C) Final Assessment Report/Corrective Measures Complete Report - March 1, 2013

Any submittals not received by the close of business on the due date will be considered late and KDHE will pursue enforcement action as necessary. KDHE would like to note that the Corrective Measures Study was not received until June 22, 2010. All future submittals must be turned in by the due dates outlined above.

3. The timeline will be added by reference to the KSU radioactive materials license. The timeline will then become a binding condition of the license in accordance with K.S.A. 28-35-183a "Conditions imposed upon any specific license" paragraph (b).

If there are any questions regarding this letter, please contact me at 785-296-6597

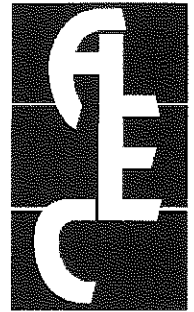
Sincerely,



Christy McCormick
Environmental Scientist
Hazardous Waste Permits Section
Bureau of Waste Management

cc: Bill Bider – BWM
Lisa Gotto – EPA Region 7/RCAP
Jennifer Nichols – KDHE/NCDO

Paul Clark – Allied Environmental
Steve Galitzer – KSU
Tom Conley - BEH



June 21, 2010

Kansas Department of Health and Environment
Curtis State Office Building
1000 SW Jackson Street, Suite 320
Topeka, Kansas 66612-1366

Attention: Ms. Christy McCormick
Hazardous Waste Permits Section

Subject: Radioactive Materials License#: 38-C011-01
EPA ID #KSD980632772
Old Chemical Waste Landfill (OCWLF), Kansas State University
Remedial Design & Remedial Action Timeline
AEC File No. 09124:0544

Dear Ms. McCormick:

Please find enclosed one copy of the subject timeline. This timeline represents the third iteration based on communication with the KDHE and USEPA, and is submitted on behalf of Kansas State University in response to comments received in a KDHE letter dated June 10, 2010. Following are the comments and our responses in italics.

1. In the cover letter that accompanied the timeline, the point of compliance is described as "contaminated groundwater on-site (area inside the fence) and off-site (area outside the fence) where monitoring wells demonstrate that one or more of the contaminants of concern occur." The regulatory definition of the point of compliance as stated in EPA's Handbook of Groundwater Protection and Cleanup Policies for RCRA Corrective Action is "throughout the area of contaminated groundwater." Please use this definition in all further documents submitted for the OCWLF.

Concur.

2. The timeline is missing all elements of public participation. The elements that must be included are the public notice for the statement of basis, response to comments for the public notice period, and the final remedy decision.

Concur, these elements have been added for your review. In similar manner, we have added a new element at line 62, "Final Status Work Plan Verification." The intent of this element will be to investigate and determine the nature of the radioactive materials (strength and type) in the buried waste and adjust the work plan and health and safety plan accordingly.

3. The timeline needs to include line items for additional investigation, including, but not limited to, a geoprobe investigation to determine the boundaries of the contaminant plume and additional well installation for delineation of the plume.

We have added this to the timeline following the installation and operation of the anticipated groundwater remedial action.

4. Line items 38 through 41 need to be deleted as they relate to the ART well technology that is no longer being used.

Concur.

5. Line items 57 through 60 need to be deleted as unnecessary to the technical elements of this project.

These items have been removed.

6. Line items 1 through 9 need to be deleted as they have already been completed.

Concur; we have hidden these, accordingly.

7. A corrective measures implementation (CMI) work plan and a corrective measures construction complete report need to be added to the timeline.

These have now been added to the timeline.

8. Line items 107 through 111 need to be deleted from the timeline as KDHE does not want to speculate when the site will be available for unrestricted use. However, KSU is welcome to put down these dates as goal dates for unrestricted use in the CMS report

Concur. While it is the project team's desire to shown an anticipated end point, the scheduling software being used imposes some limitations and we have difficulty in showing indeterminate elements. As such we have deleted the requested items.

9. The timeline has many line items that are currently out of date, i.e. the date has already passed. Revise all line items that still need to be completed with current dates.

These items have been revised accordingly. Please note that we now show the due date of July 30, 2010 (per letter dated February 19, 2010) for the Decommissioning Plan / CMI, as originally allowed by the KDHE.

Please contact the undersigned at (316) 262-5698 if you have any questions or comments.

Sincerely,

ALLIED ENVIRONMENTAL CONSULTANTS INC.



Paul R. Clark, P.G.
Project Manager

Printed copies to follow.

C: KDHE BEH: Mr. Tom Conley
USEPA Region 7/RCAP: Mr. Lisa Gotto
K-State: Dr. Steve Galitzer, Ms. Kelly Phillips, and Mr. Ron Bridges
Solutient Technologies: Mr. Brad Squibb



Mark Parkinson, Governor
Roderick L. Bremby, Secretary

DEPARTMENT OF HEALTH
AND ENVIRONMENT

www.kdheks.gov

July 15, 2010

Vice President Bruce Shubert
Administration and Finance
Kansas State University
105 Anderson Hall
Manhattan, Kansas 66506-0116

**RE: Corrective Measures Study Report
Old Chemical Waste Landfill
Kansas State University - Manhattan
EPA ID NO. KSD980632772**

Dear Mr. Shubert:

The Kansas Department of Health and Environment (KDHE), Bureau of Waste Management (BWM), received the Corrective Measures Study (CMS) Report on June 22, 2010 for the Old Chemical Waste Landfill (OCWLF) at Kansas State University (KSU). The report was due on June 21, 2010. After reviewing CMS Report, KDHE has the following comments:

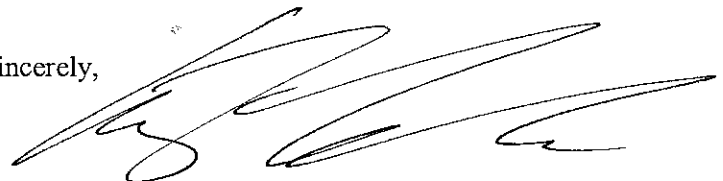
1. In section 2.1, first paragraph, the second sentence states that the surface water, soil gas, and the air pathway are not affected by the OCWLF. This statement is incorrect as there is contamination found in the outfall downgradient from the OCWLF. Furthermore, the soil gas and air pathways have not been investigated, therefore it would be misleading to say there is no contamination. Please remove this sentence from the section.
2. In section 2.2.2, third paragraph, the CMS Report states that there are disposal records from April 1971 to April 1979 for non-radioactive chemicals disposed of at OCWLF. Please revise this statement to correlate with the more current Groundwater Monitoring System Comprehensive Monitoring Evaluation (2008), which states that burial occurred from the early 1960s to 1979.
3. In section 2.3.1, the eighth bullet point states that "the upper and lower aquifers are separated by an aquitard...." This aquitard has not been proven to be site wide. Please revise this statement.
4. In section 2.3.2, the term "bathtubbing" is used. Please clarify this term in the text.
5. In section 3.1, the overall objectives for the remediation of the OCWLF are listed. However, this list was modified from the March 25, 2010 letter submitted to KSU regarding this issue. Please revise the CMS to state the overall objectives as listed in the March 25, 2010 letter.

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT
CURTIS STATE OFFICE BUILDING, 1000 SW JACKSON ST., TOPEKA, KS 66612-1366
Voice 785-291-3132 Fax 785-296-8909 <http://www.kdhe.state.ks.us/waste>

6. In section 4.2.1, first paragraph, the acronym OCWLF is misspelled. Please revise.
7. On the cost estimates for the Demolition of 50' X 50' Butler Building, Demolition of the Concrete Foundation, Demolition of Asphalt, Trees, and Site Prep, Groundwater Treatment System, and Operation and Maintenance, there are notes that do not correlate to any line item on the cost estimate. Please revise each cost estimate accordingly.
8. The word "preliminary" is misspelled on note 6 of the cost estimate for the Demolition of the 50' X 50' Butler Building and note 4 of the cost estimate for the Demolition of the Concrete Foundation. Please revise both cost estimates.
9. On the Operation and Maintenance cost estimate, there is no indication on how many years this cost estimate includes. If it is only for one year, indicate that on the cost estimate and multiply it by the number of years this maintenance will occur. Please revise this cost estimate accordingly.
10. KDHE would like to remind KSU that the CAOs listed are proposals and that the CAOs will be finalized in the Statement of Basis.
11. In section 2.0, first paragraph, and in several other locations in the CMS, KSU makes the assertion that documents prepared in the past for the OCWLF fulfill the requirement of a RCRA Facility Investigation (RFI). As the full nature and extent of the contamination has never fully been characterized, this statement is incorrect and should be removed from the CMS.

Please submit a revised CMS Report by August 6, 2010. If there are any questions regarding this letter, please call me at (785) 296-6597.

Sincerely,



Christy McCormick
Environmental Scientist
Hazardous Waste Permits Section
Bureau of Waste Management

cc: Bill Bider – BWM
Lisa Gotto – EPA Region 7/RCAP
Jennifer Nichols – KDHE/NCDO

Paul Clark – Allied Environmental
Steve Galitzer – KSU
Tom Conley - BEH



June 22, 2010

Kansas Department of Health and Environment
Curtis State Office Building
1000 SW Jackson Street, Suite 320
Topeka, Kansas 66612-1366

Attention: Ms. Christy McCormick
Hazardous Waste Permits Section

Subject: Radioactive Materials License#: 38-C011-01
EPA ID #KSD980632772
Old Chemical Waste Landfill (OCWLF), Kansas State University
Corrective Measures Study (CMS) Report
AEC File No. 09124:0544

Dear Ms. McCormick:

Please find enclosed one copy of the subject report. This report is submitted in response KDHE's request for a focused Corrective Measures Study provided in a letter dated May 5, 2010 and in accordance with the revised CMS Work Plan dated May 12, 2010. We do have a few issues to discuss with the Bureau of Environmental Health regarding the document contents.

Please accept our apologies for the tardiness of this report. We stand ready to address any comments or questions you may have regarding this document. You may reach me at 316-262-5698 (office) or 316-253-6070 (cell).

Sincerely,

ALLIED ENVIRONMENTAL CONSULTANTS INC.

Paul R. Clark, P.G.
Project Manager

Printed copies to follow.

C: KDHE BEH: Mr. Tom Conley
USEPA Region 7/RCAP: Mr. Lisa Gotto
K-State: Dr. Steve Galitzer, Ms. Kelly Phillips, and Mr. Ron Bridges
Solutient Technologies: Mr. Brad Squibb



May 12, 2010

Kansas Department of Health and Environment
Bureau of Waste Management
1000 SW Jackson, Suite 320
Topeka, Kansas 66612-1366

Attn: Ms. Christy McCormick:

RE: Old Chemical Waste Landfill – Corrective Measures Study (CMS)
Response to Comments for KDHE Letter Dated May 5, 2010
Kansas State University, Manhattan, Kansas
AEC Project No.: 09124:0544

Dear Ms. McCormick:

This letter responds to the May 5, 2010 letter issued by the Kansas Department of Health and Environment (KDHE) regarding the Corrective Measures Study work plan. A revised copy of the work plan is provided with this letter. Our responses to the KDHE comments are provided below in italics.

1. The work plan does not state that other remedial alternatives for groundwater remediation will be discussed in addition to the interceptor trench. KDHE expects Kansas State University (KSU) to evaluate several remedial alternatives as this is the purpose of the CMS. Each alternative must be evaluated using the General Standards found in the RCRA Corrective Action Plan (CAP) [OSWER Directive 9902.3-2A May 1994.] Only the alternatives that meet the General Standards will then be evaluated using the Remedy Selection Decision Factors.

The following item has been added to Task 1 of the workplan:

Other groundwater remediation alternatives will be evaluated for comparison with the interceptor trench / ex-situ treatment alternate. All alternatives will be evaluated using the General Standards provided in the RCRA CAP, and only those alternatives that satisfy the General Standards will be further evaluated using the Remedy Selection Decision Factors.

2. Please rephrase the second bullet of item one to remove the word "mid-plume." Also, remove the phrase "other potential remedy evaluation" and replace it with, "contingencies in the event the distal plume is not stable or decreasing following the soil source removal and final ground water remedy implementation."

Task 2 has been revised, accordingly.

3. KSU needs to state in the CMS work plan that the determination of "corrective action complete" will occur when all constituents of concern are at or below RSK for a minimum of three years in all groundwater samples. KSU also needs to state that with respect to radioactive contamination, the site will be released for unrestricted use when it has been demonstrated that the requirements of K.A.R. 28-35-205 have been met.

The following text has been added to Task 2 of the workplan:

The determination of corrective action completion will occur when all constituents of concern are at or below the RSK values for a minimum of three years in all groundwater samples. With respect to radioactive contamination, the site will be released for unrestricted use when the requirements of K.A.R. 28-25-205 are satisfied.

4. Within the CMS work plan, there needs to be a list of all constituents of concern. Please include a table of constituents identified in the groundwater within the text of the document or include it as a separate attachment. The table should also include which constituents are currently or have previously exceeded RSK.

The requested table is now included.

5. On item four, please include the General Standards and the Remedy Selection Decision Factors as a regulatory requirement that will be considered when evaluating potential corrective measures.

The requested language has been added to the revised work plan.

6. The work plan states the ground water CAOs are "Kansas Risk-based Standards presented in the 2007 version of the RSK manual for mid-plume area, and monitoring focused extents investigation/future remedy evaluation as needed for the distal plume end ... " Please replace the words "mid-plume area" with "entire plume" since the CAO will be at or below the RSK throughout the entire plume.

The mid-plume references have been changed to entire plume when discussing the CAOs. There are two mid-plume references remaining that relate solely to the planned treatment system.

7. The CMS work plan should include the soil cleanup goals in addition to groundwater cleanup goals.

The second bullet of Task 2 provided for these standards. Please advise if additional references are required.

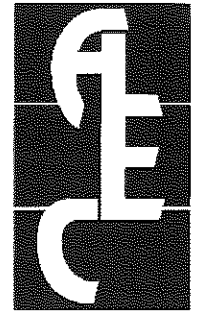
We hope that these responses adequately address the KDHE's concerns. Please contact the undersigned with any questions or additional comments.

Sincerely,
ALLIED ENVIRONMENTAL CONSULTANTS, INC.



Paul R. Clark, P.G.
Director in Charge

c: Lisa Gotto: USEPA
Tom Conley: BEH
Steve Galitzer: K-State University
Kelly Phillips: K-State University
Ron Bridges: K-State University



May 12, 2010

Kansas Department of Health and Environment
Bureau of Waste Management
1000 SW Jackson, Suite 320
Topeka, Kansas 66612-1366

Attn: Ms. Christy McCormick:

RE: Old Chemical Waste Landfill – Corrective Measures Study (CMS) Work Plan
Revised per KDHE Letter Dated May 5, 2010
AEC Project No.: 09124:0544

Dear Ms. McCormick:

This document serves as the Revised Corrective Measures Study (CMS) Workplan for the Old Chemical Waste Landfill (OCWLF) located at Kansas State University, Manhattan, Kansas. This workplan responds to the KDHE's letter dated March 25, 2010 and focuses on the streamlined remedial alternatives evaluation approached discussed with the KDHE and EPA during a telephone conference held April 15, 2010. The KDHE has indicated that, from this point in the project forward, the provisions of the RCRA Corrective Action Plan (CAP) [OSWER Directive 9902.3-2A May 1994] will be used to guide the regulatory approach to the site. A CMS is required to communicate the remedial objectives and alternatives for the OCWLF site to both the regulatory agencies and the public. Such studies are conducted according to a workplan having the numbered elements (taken directly from the RCRA CAP) shown below, followed immediately by the tasks or approach that Allied Environmental Consultants will take, on behalf of K-State to prepare the OCWLF CMS:

1. A site-specific description of the overall purpose of the Corrective Measure Study;

The purpose of the OCWLF CMS will be to document the evaluation of the following focused remedial alternatives:

- Landfill Removal (waste segregation, waste stabilization/treatment, containerization, shipping & disposal)
- Phased Groundwater Response to include (1) remedial system technology (interceptor trench, granulated activated carbon unit, equalization tank, oxidation modules, permitted discharge options) to address VOCs and 1,4-Dioxane; and, (2) Distal Plume End monitoring, focused extents investigation and contingencies in the event the distal plume is not stable or decreasing following the soil source removal and final groundwater remedy implementation.
- Other groundwater remediation alternatives will be evaluated for comparison with the interceptor trench / ex-situ treatment alternate. All alternatives will be evaluated using the General Standards provided in the RCRA CAP, and only those alternatives that satisfy the General Standards will be further evaluated using the Remedy Selection Decision Factors.

Additionally, related sections of the CMS will expand on the following topics for each of the OCWLF remedies:

- a) Be protective of human health and the environment;
- b) Attain media cleanup standards (discussed below);

- c) Control the source(s) of releases so as to reduce or eliminate to the extent practicable, future release that may pose a threat to human health and the environment;
- d) Comply with any applicable standards for management of wastes; and,
- e) Other factors (remedy selection decision factors).

Additionally, the proposed remedies will be evaluated according to the following Remedy Selection Decision Factors:

- 1) Long-term reliability and effectiveness;
- 2) Reduction in toxicity, mobility, radioactivity, and/or volume of wastes;
- 3) Short-term effectiveness;
- 4) Implementability; and,
- 5) Cost.

2. A description of the corrective measure objectives, including proposed target media cleanup standards (e.g., promulgated federal and state standards, risk derived standards) and points of compliance or a description of how a risk assessment will be performed (e.g., guidance documents);

The remedial objectives for the OCWLF Site include:

- Waste Materials: Source removal, stabilization/treatment, off-site disposal (mixed low level radiation waste landfill) or destruction (incineration) at permitted and licensed facility. The removal must account for asbestos considerations.
- Soils: Residential Soil Cleanup Standards for soil beneath and around the waste cells in the OCWLF.
- Radioactivity: Site background levels of radiation for the sidewalls and bottom of the landfill (for unrestricted use and removing landfill from K-State Rad. Materials License; demonstrated in final status survey – landfill location).
- Groundwater: Kansas Risk-based Standards presented in the 2007 version of the RSK manual for the entire plume area, and monitoring/focused extents investigation/future remedy evaluation as needed for the distal plume end (principally for 1,4-Dioxane, again to RSK values, 80 ppb). The groundwater response must also address radiation levels above background that may exist downgradient of the landfill (e.g., Tritium at MW-4).

The point of compliance for the OCWLF is the entire plume area and levels of constituents of concern occurring above RSK values. The distal end of the plume currently represents a data gap which will eventually be addressed by a focused investigation, but the regulatory agencies are allowing mid-plume corrective actions to occur first as a means to provide an expedited response.

The determination of corrective action completion will occur when all constituents of concern are at or below the RSK values for a minimum of three years in all groundwater samples. With respect to radioactive contamination, the site will be released for unrestricted use when the requirements of K.A.R. 28-25-205 are satisfied.

The constituents of concern for this site are shown below, ranked based on number of total analyses and exceeding RSK values:

Chemical Parameter	CAS Number	RSK Value	Number of Analyses ¹	Number of Detection	Samples Exceeding RSK
Trichloroethene	79-01-6	5	791	216	118
1,2-Dichloroethane	107-06-2	5	784	120	77
1,4-Dioxane	123-91-1	80	485	155	129
Benzene	71-43-2	5	779	111	49
Tetrachloroethene	127-18-4	5	780	105	46
1,2-Dichloropropane	78-87-5	5	777	101	33
cis-1,2-Dichloroethene	156-59-2	70	636	213	32
Diethylhexyl phthalate	117-81-7	6	152	17	16
Chlorobenzene	108-90-7	100	784	193	21
1,1-Dichloroethene	75-35-4	7	779	78	10
Methylene chloride ³	75-09-2	5	776	71	7
Vinyl chloride	75-01-4	2	783	29	8
1,4-Dichlorobenzene	106-46-7	75	534	44	1
1,1,2,2-Tetrachloroethane	630-20-6	0.7	638	1	1
Carbon Disulfide	75-15-0	9	522	24	3
Tritium (MW-4) ²	--	--	--	--	~5

Note 1: Since routine monitoring began in 1990; some more recently added

Note 2: Tritium has been detected in Monitoring Well MW-4 above background levels and Safe Drinking Water Act levels approximately 5 times.

Note 3: A noted laboratory contamination and may be removed from the list upon further evaluation.

The list of constituents of concern does not include naturally occurring metals, which have had sporadic detections above RSK values during the monitoring history for this site. A number of other parameter groups have been analyzed at this site, and will be removed from the monitoring regimen pending negotiation with the KDHE.

3. A description of the specific corrective measure technologies and/or corrective measure alternatives which will be studied;

The CMS will focus on:

- Physical source removal and off-site disposal for wastes and affected soils in and around the landfill;
- Groundwater mid-plume treatment system consisting of GAC, oxidation, discharge under permit;
- Distal plume end monitoring, extents investigation, and remedy evaluation.

4. A description of the general approach to investigating and evaluating potential corrective measures;

The RCRA CAP General Standards and Remedy Selection Decision Factors will be applied during the evaluation of alternative corrective measures. Additionally, the evaluation will focus on the regulatory requirements promulgated by the Nuclear Regulatory Commission (NRC), EPA - RCRA, KDHE, and DOT, etc., as requested in Item 1.d., above. These considerations will likely drive a majority of costs (or cost estimates) for this project.

5. A detailed description of any proposed pilot, laboratory and/or bench scale studies;

Pilot and Bench-scale studies are not contemplated for this focused approach.

6. A proposed outline for the CMS Report including a description of how information will be presented;

The outline provided in the RCRA CAP will be followed to the extent possible, given the streamlined approach being taken for this site.

- A. Introduction /Purpose
- B. Description of Current Conditions
- C. Corrective Action Objectives
- D. Identification, Screening and Development of Corrective Measure Alternatives
- E. Evaluation of a Final Corrective Measure Alternative
- F. Recommendation by a Permittee/Respondent for a Final Corrective Measure Alternative
- G. Public Involvement Plan

The CMS will indicate that prior investigations and remedial alternatives have been performed and explain what was found and provided the rationale for the selected approach (i.e., principally removal is required due to the provisions of 10 CFR 61, and to cease the continued release of groundwater contamination).

Engineering cost estimates will be prepared for the selected alternatives using information solicitations and discussions with vendors, including costs for viable disposal options, or engineering estimates (based on RS Means and/or research) when vendor quotations are not available. As mixed low-level radioactive waste will be present in the removed materials, issues such as receiving facility radiation licensing, Western Interstate Nuclear Compact states, etc., must be addressed.

The Public Involvement Plan will be either provided for inclusion in the CMS by the KDHE or will be deferred to the KDHE (in the CMS) for implementation.

7. A description of overall project management including overall approach, levels of authority (include organization chart), lines of communication, project schedules, budget and personnel. Include a description of qualifications for personnel directing or performing the work.

These issues were discussed at the April 9, 2010 meeting held between K-State, KDHE BEH, KDHE BWM, and the USEPA. Additional documents will cover some of these items, and the CMS or they will be addressed in the Decommissioning & Remedial Plan.

Sincerely,
ALLIED ENVIRONMENTAL CONSULTANTS, INC.



Jeff M. Wilson.
Project Manager



Paul R. Clark, P.G.
Director in Charge

c: Lisa Gotto: USEPA
Steve Galitzer: K-State University
Kelly Phillips: K-State University
Ron Bridges: K-State University



Mark Parkinson, Governor
Roderick L. Bremby, Secretary

DEPARTMENT OF HEALTH
AND ENVIRONMENT

www.kdheks.gov

May 12, 2010

Vice President Bruce Shubert
Administration and Finance
Kansas State University
105 Anderson Hall
Manhattan, Kansas 66506-0116

**RE: Point of Compliance
Old Chemical Waste Landfill
Kansas State University - Manhattan
EPA ID NO. #KSD980632772**

Dear Mr. Shubert:

The Kansas Department of Health and Environment (KDHE), Bureau of Waste Management (BWM), would like to clarify KDHE's position regarding the clean-up of the groundwater at the Old Chemical Waste Landfill (OCWLF). KDHE will require Kansas State University (KSU) to clean-up the contaminated groundwater associated with the OCWLF to standards set forth in the *Risk-Based Standards for Kansas, RSK Manual - 4th Version*. KSU must use monitoring wells associated with contamination source both on and offsite to demonstrate all groundwater contaminate concentrations are at or below the RSK Tier 2 numbers for all contaminants of concern for three consecutive years before corrective action can be deemed complete. To return the groundwater to its most beneficial use, the *Handbook of Groundwater Protection and Cleanup Policies for RCRA Corrective Action, April 2004* defines the point of compliance as throughout the area of contaminated groundwater.

If there are any questions regarding this letter, please contact me at 785-296-6597

Sincerely,

Christy McCormick
Environmental Scientist
Hazardous Waste Permits Section
Bureau of Waste Management

cc: Bill Bider – BWM
Lisa Gotto – EPA Region 7/RCAP
Jennifer Nichols – KDHE/NCDO
Paul Clark – Allied Environmental
Steve Galitzer – KSU
Tom Conley - BEH

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT
CURTIS STATE OFFICE BUILDING; 1000 SW JACKSON ST., TOPEKA, KS 66612-1366
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Mark Parkinson, Governor
Raderick L. Bremby, Secretary

DEPARTMENT OF HEALTH
AND ENVIRONMENT

www.kdheks.gov

May 5, 2010

Vice President Bruce Shubert
Administration and Finance
Kansas State University
105 Anderson Hall
Manhattan, Kansas 66506-0116

**RE: Corrective Measures Study Work Plan
Old Chemical Waste Landfill
Kansas State University - Manhattan
EPA ID NO. #KSD980632772**

Dear Mr. Shubert:

The Kansas Department of Health and Environment (KDHE), Bureau of Waste Management (BWM), received the Corrective Measures Study (CMS) work plan via email on April 29, 2010. After reviewing the work plan, KDHE has the following comments:

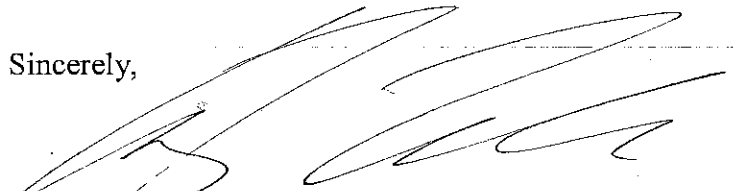
1. The work plan does not state that other remedial alternatives for groundwater remediation will be discussed in addition to the interceptor trench. KDHE expects Kansas State University (KSU) to evaluate several remedial alternatives as this is the purpose of the CMS. Each alternative must be evaluated using the General Standards found in the RCRA Corrective Action Plan (CAP) [OSWER Directive 9902.3-2A May 1994.] Only the alternatives that meet the General Standards will then be evaluated using the Remedy Selection Decision Factors.
2. Please rephrase the second bullet of item one to remove the word "mid-plume." Also, remove the phrase "other potential remedy evaluation" and replace it with, "contingencies in the event the distal plume is not stable or decreasing following the soil source removal and final ground water remedy implementation."
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KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT
CURTIS STATE OFFICE BUILDING, 1000 SW JACKSON ST., TOPEKA, KS 66612-1366
Voice 785-291-3132 Fax 785-296-8909 <http://www.kdhe.state.ks.us/waste>

4. Within the CMS work plan, there needs to be a list of all constituents of concern. Please include a table of constituents identified in the groundwater within the text of the document or include it as a separate attachment. The table should also include which constituents are currently or have previously exceeded RSK.
5. On item four, please include the General Standards and the Remedy Selection Decision Factors as a regulatory requirement that will be considered when evaluating potential corrective measures.
6. The work plan states the ground water CAOs are "Kansas Risk-based Standards presented in the 2007 version of the RSK manual for mid-plume area, and monitoring focused extents investigation/future remedy evaluation as needed for the distal plume end..." Please replace the words "mid-plume area" with "entire plume" since the CAO will be at or below the RSK throughout the entire plume.
7. The CMS work plan should include the soil cleanup goals in addition to groundwater cleanup goals.

Please submit a revised CMS work plan by May 12, 2010. If there are any questions regarding this letter, please call me at (785) 296-6597.

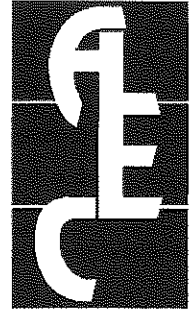
Sincerely,



Christy McCormick
Environmental Scientist
Hazardous Waste Permits Section
Bureau of Waste Management

cc: Bill Bider – BWM
Lisa Gotto – EPA Region 7/RCAP
Jennifer Nichols – KDHE/NCDO

Paul Clark – Allied Environmental
Steve Galitzer – KSU
Tom Conley – BEH



April 29, 2010

Kansas Department of Health and Environment
Bureau of Waste Management
1000 SW Jackson, Suite 320
Topeka, Kansas 66612-1366

Attn: Ms. Christy McCormick:

RE: Old Chemical Waste Landfill
Kansas State University
Manhattan, Kansas
AEC Project# 09124:0544

Dear Ms. McCormick:

This document serves as the Corrective Measures Study (CMS) Workplan for the Old Chemical Waste Landfill (OCWLF) located at Kansas State University, Manhattan, Kansas. This workplan responds to the KDHE's letter dated March 25, 2010 and focuses on the streamlined remedial alternatives evaluation approached discussed with the KDHE and EPA during a telephone conference held April 15, 2010. The KDHE has indicated that, from this point in the project forward, the provisions of the RCRA Corrective Action Plan (CAP) [OSWER Directive 9902.3-2A May 1994] will be used to guide the regulatory approach to the site. A CMS is required to communicate the remedial objectives and alternatives for the OCWLF site to both the regulatory agencies and the public. Such studies are conducted according to a workplan having the numbered elements (taken directly from the RCRA CAP) shown below, followed immediately by the tasks or approach that Allied Environmental Consultants will take, on behalf of K-State to prepare the OCWLF CMS:

1. A site-specific description of the overall purpose of the Corrective Measure Study;

The purpose of the OCWLF CMS will be to document the evaluation of the following focused remedial alternatives:

- Landfill removal (waste segregation, waste stabilization/treatment, containerization, shipping & disposal)
- Phased Groundwater Response to include (1) mid-plume remedial system technology (interceptor trench, granulated activated carbon unit, equalization tank, oxidation modules, permitted discharge options) to address VOCs and 1,4-Dioxane; and, (2) Distal Plume End monitoring, focused extents investigation, and other potential remedy evaluation.

Additionally, related sections of the CMS will expand on the following topics for each of the OCWLF remedies:

- a) Be protective of human health and the environment;
- b) Attain media cleanup standards (discussed below);
- c) Control the source(s) of releases so as to reduce or eliminate to the extent practicable, future release that may pose a threat to human health and the environment;
- d) Comply with any applicable standards for management of wastes; and,
- e) Other factors (remedy selection decision factors).

Additionally, the proposed remedies will be evaluated according to the following Remedy Selection Decision Factors:

- 1) Long-term reliability and effectiveness;
- 2) Reduction in toxicity, mobility, radioactivity, and/or volume of wastes;
- 3) Short-term effectiveness;
- 4) Implementability; and,
- 5) Cost.

2. A description of the corrective measure objectives, including proposed target media cleanup standards (e.g., promulgated federal and state standards, risk derived standards) and points of compliance or a description of how a risk assessment will be performed (e.g., guidance documents);

The remedial objectives for the OCWLF Site include:

- Waste Materials: Source removal, stabilization/treatment, off-site disposal (mixed low level radiation waste landfill) or destruction (incineration) at permitted and licensed facility. The removal must account for asbestos considerations.
- Soils: Residential Soil Cleanup Standards for soil beneath and around the waste cells in the OCWLF.
- Radioactivity: Site background levels of radiation for the sidewalls and bottom of the landfill (for unrestricted use and removing landfill from K-State Rad. Materials License; demonstrated in final status survey – landfill location).
- Groundwater: Kansas Risk-based Standards presented in the 2007 version of the RSK manual for mid-plume area, and monitoring/focused extents investigation/future remedy evaluation as needed for the distal plume end (principally for 1,4-Dioxane, again to RSK values, 80 ppb). The groundwater response must also address radiation levels above background that may exist downgradient of the landfill (e.g., Tritium at MW-4).

The point of compliance for the OCWLF is the entire plume area and levels of constituents of concern occurring above RSK values. The distal end of the plume currently represents a data gap which will eventually be addressed by a focused investigation, but the regulatory agencies are allowing mid-plume corrective actions to occur first as a means to provide an expedited response.

3. A description of the specific corrective measure technologies and/or corrective measure alternatives which will be studied;

The CMS will focus on:

- Physical source removal and off-site disposal for wastes and affected soils in and around the landfill;
- Groundwater mid-plume treatment system consisting of GAC, oxidation, discharge under permit;
- Distal plume end monitoring, extents investigation, and remedy evaluation.

4. A description of the general approach to investigating and evaluating potential corrective measures;

The evaluation will focus on the regulatory requirements promulgated by the Nuclear Regulatory Commission (NRC), EPA - RCRA, KDHE, and DOT, etc., as requested in Item 1.d., above. These considerations will likely drive a majority of costs (or cost estimates) for this project.

5. A detailed description of any proposed pilot, laboratory and/or bench scale studies;

Pilot and Bench-scale studies are not contemplated for this focused approach.

6. A proposed outline for the CMS Report including a description of how information will be presented;

The outline provided in the RCRA CAP will be followed to the extent possible, given the streamlined approach being taken for this site.

- A. Introduction /Purpose
- B. Description of Current Conditions
- C. Corrective Action Objectives
- D. Identification, Screening and Development of Corrective Measure Alternatives
- E. Evaluation of a Final Corrective Measure Alternative
- F. Recommendation by a Permittee/Respondent for a Final Corrective Measure Alternative
- G. Public Involvement Plan

The CMS will indicate that prior investigations and remedial alternatives have been performed and explain what was found and provided the rationale for the selected approach (i.e., principally removal is required due to the provisions of 10 CFR 61, and to cease the continued release of groundwater contamination).

Engineering cost estimates will be prepared for the selected alternatives using information solicitations and discussions with vendors, including costs for viable disposal options, or engineering estimates (based on RS Means and/or research) when vendor quotations are not available. As mixed low-level radioactive waste will be present in the removed materials, issues such as receiving facility radiation licensing, Western Interstate Nuclear Compact states, etc., must be addressed.

The Public Involvement Plan will be either provided for inclusion in the CMS by the KDHE or will be deferred to the KDHE (in the CMS) for implementation.

7. A description of overall project management including overall approach, levels of authority (include organization chart), lines of communication, project schedules, budget and personnel. Include a description of qualifications for personnel directing or performing the work.

These issues were discussed at the April 9, 2010 meeting held between K-State, KDHE BEH, KDHE BWM, and the USEPA. Additional documents will cover some of these items, and the CMS or they will be addressed in the Decommissioning & Remedial Plan.

Sincerely,
ALLIED ENVIRONMENTAL CONSULTANTS, INC.



Jeff M. Wilson.
Project Manager



Paul R. Clark, P.G.
Director in Charge

c: Lisa Gotto: USEPA
Steve Galitzer: K-State University
Kelly Phillips: K-State University
Ron Bridges: K-State University



Mark Parkinson, Governor
Roderick L. Bremby, Secretary

DEPARTMENT OF HEALTH
AND ENVIRONMENT

www.kdheks.gov

March 25, 2010

Vice President Bruce Shubert
Administration and Finance
Kansas State University
105 Anderson Hall
Manhattan, Kansas 66506-0116

**RE: Additional submittals required
Old Chemical Waste Landfill
Kansas State University - Manhattan
EPA ID NO. #KSD980632772**

Dear Mr. Shubert:

The Kansas Department of Health and Environment (KDHE) mailed a letter to KSU on February 19, 2010 to outline what needs to be submitted to approve the remedial action timeline and the decommissioning plan. Following discussions with the Environmental Protection Agency (EPA), KDHE would like to expand on those comments:

1. The facility must document the evaluation of viable corrective measures technologies to address the soil and ground water contamination at this site. Consistent with the *RCRA Corrective Action Plan (CAP)* (OSWER Directive 9902.3-2A) a Corrective Measures Study (CMS) work plan outlining the proposed corrective measures technologies to be evaluated along with the criteria for evaluation is needed prior to the decommissioning plan. For the soil contamination, it is not necessary to evaluate several remedial technologies as the proposed excavation plan has proven effective at other sites with similar contamination. Consistent with the CAP, a streamlined or highly focused CMS is appropriate for the soil contamination at this site.

For each remedy which warrants evaluation, KSU will be required to document how the potential remedy will comply with each of the General Standards for Remedies listed below:

- a. Be protective of human health and the environment;
- b. Attain media cleanup standards set by the KDHE;

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CURTIS STATE OFFICE BUILDING, 1000 SW JACKSON ST., TOPEKA, KS 66612-1366
Voice 785-291-3132 Fax 785-296-8909 <http://www.kdhe.state.ks.us/waste>

- c. Control the source(s) of releases so as to reduce or eliminate, to the extent practicable, further releases that may pose a threat to human health and the environment;
- d. Comply with any applicable standards for management of wastes; and
- e. Other Factors (Remedy Selection Decision Factors).

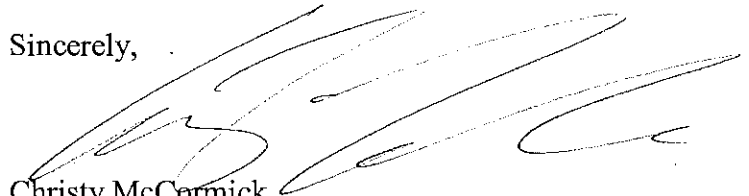
Any remedy proposed by KSU that meets the four General standards listed above will need to be evaluated according to the Remedy Selection Decision Factors:

- a. Long-term reliability and effectiveness;
 - b. Reduction in the toxicity, mobility or volume of wastes;
 - c. Short-term effectiveness;
 - d. Implementability; and
 - f. Cost.
2. EPA requests that KSU provide isoconcentration maps and time series graphs for all semi-annual reports. The attachments need to be provided for the semi-annual report starting with the spring 2010 sampling event.

KDHE is requesting a CMS work plan be submitted to KDHE in lieu of the draft groundwater interim remediation plan requested in KDHE's February 19, 2010. The CMS work plan will be due to KDHE on April 30, 2010. The CMS Report and final timeline will be due May 31, 2010. To further expedite the progress to groundwater remediation, the DP and the CMS report will be public noticed when both reports are finalized. KDHE would like to remind KSU that the DP will include designs for both the groundwater remediation and the landfill removal action.

If there are any questions regarding this letter, please call me at (785) 296-6597.

Sincerely,



Christy McCormick
Environmental Scientist
Hazardous Waste Permits Section
Bureau of Waste Management

cc: Bill Bider – BWM
Lisa Gotto – EPA Region 7/RCAP
Jennifer Nichols – KDHE/NCDO
Paul Clark – Allied Environmental
Steve Galitzer – KSU



KANSAS

DEPARTMENT OF HEALTH
AND ENVIRONMENT

Mark Parkinson, Governor
Roderick L. Bremby, Secretary

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February 19, 2010

Certified Mail No. 7002 0860 0000 2221 1119

Vice President Bruce Shubert
Administration and Finance
Kansas State University
105 Anderson Hall
Manhattan, Kansas 66506-0116

**RE: Draft Remedial Design & Remedial Action Timeline
Old Chemical Waste Landfill
Kansas State University - Manhattan
EPA ID NO. #KSD980632772**

Dear Mr. Shubert:

The Kansas Department of Health and Environment (KDHE), Bureau of Waste Management (BWM), Bureau of Environmental Health (BEH), and the United States Environmental Protection Agency (EPA) received the above referenced timeline on January 29, 2010 in regards to the Old Chemical Waste Landfill (OCWLF) at Kansas State University (KSU). After discussions with EPA regarding the OCWLF, KDHE has the following comments:

1. KDHE would like all aspects of remedial action at the Old Chemical Waste Landfill (OCWLF) to be included in the Decommissioning Plan (DP). Although different aspects under the umbrella of the DP can be addressed in separate documents, it must include the remediation for ground water as well as the removal action at the landfill.
2. Once the draft DP is considered complete by KDHE, the DP will be put on 30-day public notice prior to final approval. Please add this public notice period to the timeline.
3. KDHE will not be approving or signing the Health and Safety Plan associated with the DP. Therefore, line items 33, 34 and 35 may be deleted from the timeline.
4. Line item 82 lists the OCWLF as "available for unrestricted use" on June 6, 2014. KDHE interprets this to mean that no further action will occur at this site beyond the proposed date. Considering this to be the date that KSU is pushing for to have

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unrestricted use at this site, KDHE emphasizes that a ground water remediation system must be installed as soon as possible in order to provide time for the system to work. While removal of the landfill may remove the source area, it will not resolve the offsite ground water contamination that has already occurred. KDHE will not agree to release the site for unrestricted use until the ground water meets the clean up goals established in the DP. Currently, 6.1 µg/L is considered the screening value for 1,4-Dioxane. With respect to the radioactive materials license, the radiological criteria specified in K.A.R. 28-35-205 apply. KDHE in consultation with EPA would like to remind KSU that additional ground water investigation may be necessary before no further action can be approved.

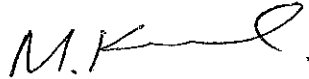
5. The remedial activities section does not give any period of time for monitoring after the removal of the landfill. If ground water monitoring is included in one of the line items in the timeline, please make a clarification as to which line item includes ground water monitoring.
6. Please clarify the difference between line item 45 and 46.
7. KDHE requests that lines 50, 51, and 52 be reworded to say "KDHE Draft Outline review."
8. Based on the draft timeline provided to KDHE, we understand that KSU is considering the installation of Accelerated Remediation Technology (ART) wells for ground water remediation. Based on recent EPA publications, "Treatment Technologies for 1,4 Dioxane: Fundamentals And Field Applications" (EPA-542-R-06-009) and "Emerging Contaminant - 1,4 Dioxane; Fact Sheet" (EPA 505-F-09-006), there are other more technologically viable and cost effective options available for the treatment of contaminated ground water at this site. Therefore, KDHE in consultation with USEPA strongly recommends KSU evaluate other remediation technologies prior to selecting the most appropriate ground water remediation technology for this site. In addition, KDHE would like the DP to include a comparison and contrast of different methods to show that multiple methods were taken into consideration and the most appropriate remediation technology was chosen.
9. Due to the expanding nature of the ground water plume and the ability of 1,4-Dioxane to migrate rapidly, the interim ground water remediation needs to begin as soon as possible. This is necessary for meeting the Government Performance and Results Act (GPRA) CA 750 (ground water release under control) goals for this site. Therefore, KDHE requests the submittal of a draft ground water interim remediation plan no later than May 31, 2010.

BEH would like to remind KSU that when this timeline is approved by KDHE, KSU's radioactive materials license number 38-C011-01 will be amended to incorporate the timeline by reference. K.A.R. 28-35-204 (d) states that decommissioning of a facility will occur not later than 24 months following the initiation of decommissioning of the facility. KSU notified KDHE

that the OCWLF would be decommissioned in a letter received by KDHE on February 18, 2009. Therefore, KSU has until February 18, 2011 to complete decommissioning of the OCWLF. However, K.A.R. 28-35-204 (c) states that if more than 24 months is needed for the decommissioning, a justification for the delay must be submitted. BEH will accept a final approved timeline as a justification for delay and recommends that the modifications requested in this letter be implemented immediately so the final time line can be approved. Please submit the final project timeline by May 31, 2010 with projected draft DP submittal by July 31, 2010.

With this timeline headed into the final stages of approval, your expedited response on this matter is requested. For any technical clarification please contact Christy McCormick at (785) 296-6597. For any other questions, please contact Mostafa Kamal at (785) 296-1609, or Tom Conley at (785) 296-1565. In addition, should there be a need, KDHE is willing to meet with KSU to provide additional guidance in this matter. Your continued cooperation with KDHE is appreciated.

Sincerely,



Mostafa Kamal, PE, CPM
Chief, Hazardous Waste Permits Section
Bureau of Waste Management



Thomas A. Conley, CHP, CPM
Chief, Radiation, Asbestos and Right to Know Section
Bureau of Environmental Health

cc: Steve Galitzer – KSU
Paul Clark – Allied Environmental
Bill Bider – BWM
Lisa Gotto – EPA Region 7/RCAP/AWMD
Jennifer Nichols – KDHE/NCDO/Waste Programs

February 19, 2010

Kansas Department of Health and Environment
Bureau of Waste Management
Ms. Christy McCormick
1000 SW Jackson, Suite 320
Topeka, Kansas 66612-1366

cmccormick@kdheks.gov



Bureau of Environmental Health
Mr. David Whitfill, P.E., CHP
1000 SW Jackson St., Suite 330
Topeka, Kansas 66612-1365

dwhitfill@kdheks.gov

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FEB 19 2010

Subject: Kansas State University - Old Chemical Waste Landfill
Addendum: Background Radiation Survey and Dose Modeling Report
MW-30(I) Radiological Sampling Results
AEC File No. 10006:0544

BUREAU OF WASTE MANAGEMENT

Dear Ms. McCormick & Mr. Whitfill:

Allied Environmental Consultants, Inc. (AEC), on behalf of Kansas State University (KSU) conducted radiological sampling of soil and groundwater at monitoring well MW-30(I), located near to the Old Chemical Waste Landfill (OCWLF) located in Manhattan, Kansas. This sampling event was conducted in response to comments issued by the Kansas Department of Health and Environment (KDHE) on the *Background Radiation Survey and Dose Modeling Report* in a letter dated November 12, 2009. To address the KDHE concerns, AEC conducted additional radiological sampling as described in a letter dated November 25, 2009.

In a conversation with KDHE BEH (David Whitfill) on January 15, 2010, it was clarified that tritium was of primary importance regarding the additional sampling due to an anomalous elevated result (above background but below levels of regulatory concern) from a groundwater sample collected from MW-30(I) in October 2008. KDHE further suggested that AEC request a laboratory review of the spurious analytical result.

This report presents the results of the radiological sampling of soil and groundwater at MW-30(I) and constitutes an addendum to the Background Radiation Survey and Dose Modeling Report.

Field Sampling

Groundwater

AEC mobilized to the Site on January 20, 2010 and collected a groundwater sample from MW-30(I) for radiological analytical testing. A KDHE representative (Christy McCormick) was present to observe the sampling. The groundwater sample was appropriately labeled, placed in cooler with completed chain-of-custody, secured with a custody seal, and shipped overnight to Eberline Analytical in Oak Ridge, Tennessee for laboratory testing for gross alpha, gross beta, and gamma spectroscopy.

Soil

Soil sampling was conducted on January 20, 2010 using the direct push collection method. Environmental Priority Services, Inc. (EPS), of Salina, Kansas advanced one probe to allow collection of one soil sample from between 7 and 8-feet below ground surface (bgs) and one sample from between 12 and 13-feet bgs. These depths correspond to approximately 1.5 above and 2.5 feet below the observed water level of 9.7 feet bgs. The probe was offset approximately 2 feet west of monitoring well MW-30(I). The soil samples were appropriately labeled, placed in cooler with completed chain-of-custody, secured with a custody seal, and shipped overnight to Eberline Analytical in Oak Ridge, Tennessee for laboratory testing for gross alpha, gross beta, gamma spectroscopy, and tritium.

Data Validation

The laboratory analytical data were reviewed for quality control at Eberline Analytical and for quality assurance (validation) by AEC. Information reviewed for validation included holding times, duplicate analysis, minimal detection limits, calibration standards, uncertainty limits, laboratory control sample analyses, and replicate results. AEC determined that the data are of acceptable quality and validity and are acceptable for use.

Laboratory Results

Groundwater

The results of the radiological analytical testing of a groundwater sample collected from MW-30(I) are provided in Table 1 below:

Table 1: Summary of Groundwater Radiological Analytical Testing Results

MW-30(I) Groundwater		
Analysis	Result	Units
Gross Alpha	6.62E+00	pCi/L
Gross Beta	1.13E+01	pCi/L
AC-228	(< 3.23E+01)	pCi/L
BI-214	(< 1.79E+01)	pCi/L
PA-234M	(< 1.09E+03)	pCi/L
PB-212	(<1.11E+01)	pCi/L
PB-214	(<1.48E+1)	pCi/L
TH-234	(<1.05E+02)	pCi/L
TL-208	(<2.68E+01)	pCi/L
Tritium	(<3.06E+02)	pCi/L

The values posted in Table 1 are either the actual reported results from the analytical laboratory or the Minimal Detected Activity (MDA) if the reported results were less than the MDA. Analytical results less than the MDA, by definition, do not meet 95% confidence criteria. The actual laboratory report from Eberline is large and not included in this report. A copy of the laboratory report is kept on file at AEC and is available upon request.

During the Fall 2008 groundwater sampling event, laboratory analysis of a sample collected from MW-30(I) indicated a value of tritium of 5,925 pCi/L. At KDHE's suggestion, AEC requested Eberline Analytical to review the validity of the reported value for tritium. The following is the response to this request from Mr. Michael R. McDougall of Eberline Analytical is as follows:

Respectfully, after technically reviewing the Tritium result for your sample number MW-30, sample date, 10/15/2008 1:23:00 PM, it is apparent that this result is bias positive due to a static discharge while counting. This is a common occurrence during beta liquid scintillation counting of Tritium and frequently causes positive biases. In the case of this sample results for this sample should be qualified or rejected if appropriate. I am attaching a copy of the spectral data which is indicative of this condition.

A copy of the spectral data provided by Eberline Analytical is provided in Attachment A.

Soil

The results of the radiological analytical testing of groundwater samples obtained from MW-30(I)a collected from 7 to 8 feet bgs and from 12 to 13 ft bgs are provided in Table 2 below:

**Table 2 – Summary of Soil
 Radiological Analytical Testing Results**

Sample ID	Analysis	Result	Units
MW-30(l) 7-8	Gross Alpha	4.17E+00	pCi/g
MW-30(l) 12-13	Gross Alpha	4.59E+00	pCi/g
MW-30(l) 7-8	Gross Beta	3.83E+00	pCi/g
MW-30(l) 12-13	Gross Beta	2.74E+00	pCi/g
MW-30(l) 7-8	AC-228	2.29E+00	pCi/g
MW-30(l) 7-8	BI-214	1.42E+00	pCi/g
MW-30(l) 7-8	PA-234M	2.28E+00	pCi/g
MW-30(l) 7-8	PB-212	2.62E+00	pCi/g
MW-30(l) 7-8	PB-214	1.65E+00	pCi/g
MW-30(l) 7-8	TH-234	(< 2.38E+00)	pCi/g
MW-30(l) 7-8	TL-208	2.30E+00	pCi/g
MW-30(l) 12-13	AC-228	2.08E+00	pCi/g
MW-30(l) 12-13	BI-214	1.26E+00	pCi/g
MW-30(l) 12-13	PA-234M	5.80E+00	pCi/g
MW-30(l) 12-13	PB-212	2.13E+00	pCi/g
MW-30(l) 12-13	PB-214	1.49E+00	pCi/g
MW-30(l) 12-13	TH-234	(< 2.64+00)	pCi/g
MW-30(l) 12-13	TL-208	1.95E+00	pCi/g

The values posted in Table 1 are either the actual reported results from the analytical laboratory or the Minimal Detected Activity (MDA) if the reported results were less than the MDA. Analytical results less than the MDA, by definition, do not meet 95% confidence criteria. The actual laboratory report from Eberline is large and not included in this report. A copy of the laboratory report is kept on file at AEC and is available upon request.

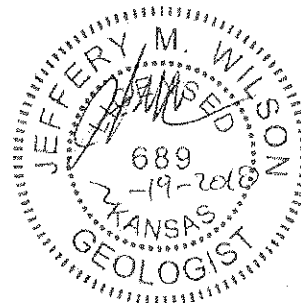
Conclusions

Soil and groundwater sampling conducted at monitoring well MW-30(l) adjacent to the OCWLF did not detect radiological constituents at levels above regulatory concern or above the background levels reported in the *Background Radiation Survey and Dose Modeling Report*. Furthermore, a review of elevated levels of tritium in a groundwater sample collected from MW-30(l) in October, 2008 reveal the reported tritium levels to be an artifact of analysis and should be disregarded.

Sincerely,
ALLIED ENVIRONMENTAL CONSULTANTS, INC.

Jeff M. Wilson, P.G.
 Project Manager

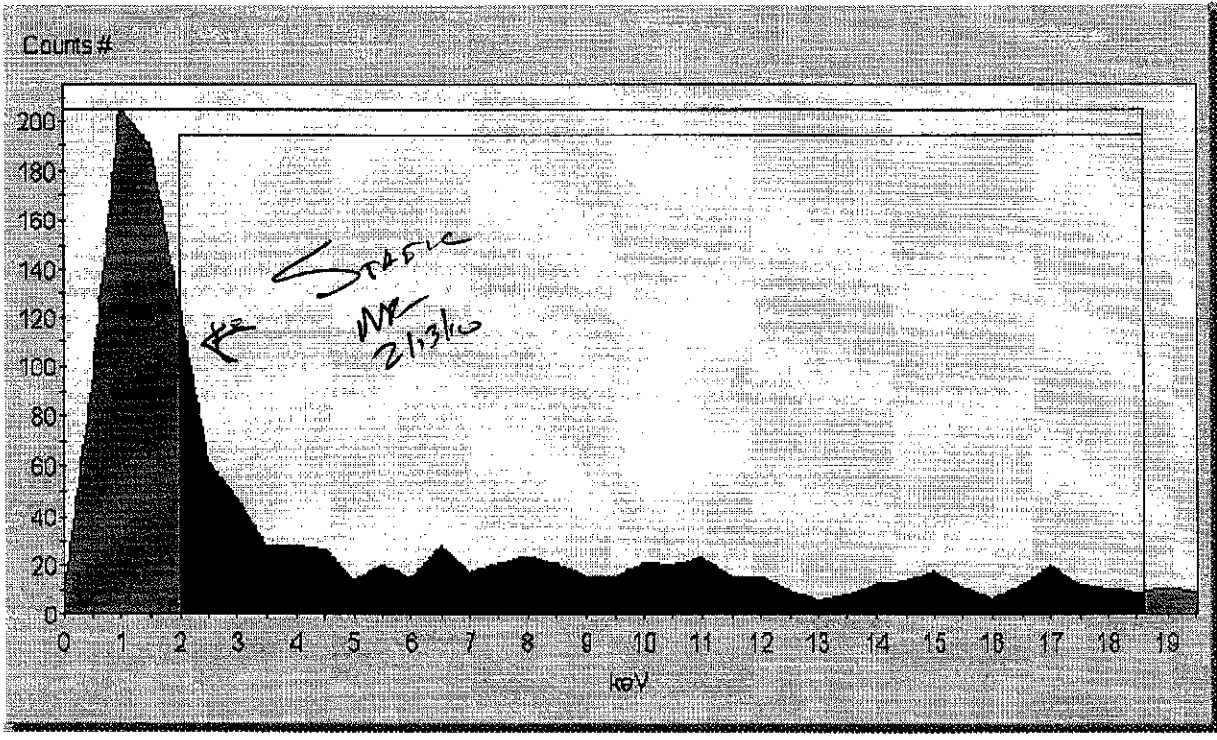
c: Kelly Phillips, K-State (klp@ksu.edu)
 Lisa Gotto, USEPA, (gotto.lisa@epa.gov)
 Steve Galitzer, K-State (galitz@ksu.edu)



Attachment A
EBERLINE ANALYTICAL
SPECTRAL DATA

08-10139-1-H3-06S 1 1 6 41 25 0 253.83
30.00 11/4/2008 10:33:06 PM

SpectraView Block Data



08-10139-1-H3-07S 1 1 7 15 13 0 256.78
30.00 11/4/2008 11:05:08 PM

SpectraView Block Data



KANSAS

Kathleen Sebelius, Governor
Roderick L. Bremby, Secretary

DEPARTMENT OF HEALTH
AND ENVIRONMENT

www.kdheks.gov

December 18, 2009

Vice President Bruce Shubert
Administration and Finance
Kansas State University
105 Anderson Hall
Manhattan, Kansas 66506-0116

**RE: Background Radiation Survey & Dose Modeling Report
Old Chemical Waste Landfill
Kansas State University - Manhattan
EPA ID NO. #KSD980632772**

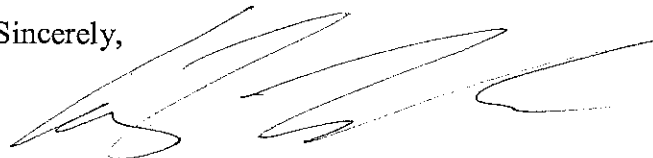
Dear Mr. Shubert:

The Kansas Department of Health and Environment (KDHE), Bureau of Waste Management (BWM) and the Bureau of Environmental Health (BEH), received the above referenced report on October 5, 2009 and issued comments on the report on November 12, 2009. KDHE subsequently received Kansas State University's (KSU) response to KDHE's comments on November 25, 2009. KDHE's comments on the November 25, 2009 letter are:

1. KDHE is pleased that KSU will be re-sampling to capture the data that was omitted in the last report. KDHE would like to have the results of this re-sampling submitted no later than February 18, 2010.
2. KDHE does not find the timeline presented in Response 6 acceptable. KDHE requests a proposed project time line starting January 1, 2010 that will start with the remedial design work plan and end with corrective action complete. KDHE is aware that funds may not be available for this clean-up until fiscal year 2011, however, a schedule is necessary for all parties involved so that all parties know what actions will take place and when. This schedule may be changed over time as needed. Please submit a new timeline to KDHE by January 18, 2010.
3. BEH would like to remind KSU that the commitments made in the Background Radiation Survey and Dose Modeling Report are noted and progress towards meeting them will be evaluated during the next license inspection.

If there are any questions regarding this letter, please contact either Christy McCormick at (785) 296-6597 or David Whitfill at (785) 296-1989.

Sincerely,



Christy McCormick
Environmental Scientist
Hazardous Waste Permits Section
Bureau of Waste Management

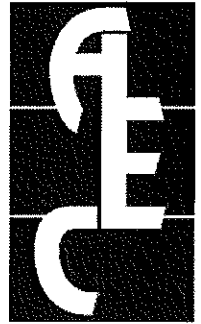


David Whitfill, P.E., CHP
Supervisor, Radioactive Materials Inspection Unit
Radiation and Asbestos Control Section
Bureau of Environmental Health

cc: Bill Bider – BWM
Lisa Gotto – EPA Region 7/RCAP
Jennifer Nichols – KDHE/NCDO
Paul Clark – Allied Environmental
Steve Galitzer – KSU
Tom Conley - BEH

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NOV 30 2009



November 25, 2009

Kansas Department of Health and Environment
Bureau of Environmental Health
1000 SW Jackson Street, Suite 330
Topeka, Kansas 66612-1365

BUREAU OF WASTE MANAGEMENT

Attention: Mr. David J. Whitfill, P.E., CHP
Supervisor, Radioactive Materials Inspection Unit

Reference: Background Radiation Survey & Dose Modeling Report
Kansas State University Old Chemical Waste Landfill
AEC File No. 09028:0544

Dear Mr. Whitfill:

This letter responds to comments issued by the Kansas Department of Health and Environment (KDHE) regarding the Background Radiation Survey & Dose Modeling Report dated October 2009 for the Old Chemical Waste Landfill (OCWLF) at Kansas State University in Manhattan, Kansas. The KDHE received the report on October 5, 2009 and issued comments on November 12, 2009. Thank you for your prompt reply.

As we understand, the November 12, 2009 letter provides comments issued by the Bureaus of Waste Management (BWM) and Environmental Health (BEH). We have numbered and abridged the comments to facilitate this response. Please advise immediately if we have misrepresented KDHE's intent.

Comment 1: The report does not include soil and groundwater data requested by the KDHE in a December 11, 2008 comment letter for analysis of volatile organic compounds (VOCs) from sampling points SP-E, SP-D, SP-C, SP-B, and SP-A. K-State had committed to collecting these samples in a response letter dated February 13, 2009 and had provided replacement pages to include these samples within the approved work plan. Please provide the sample results or an explanation as to why the sample results are not available for reporting.

Response 1: Our review of the replacement pages to the approved work plan prepared by Allied Environmental Consultants (AEC) in February 2009, the February 13, 2009 response letter, and our field work notes indicate that the samples were not collected due wholly to an omission by AEC. The work plan does not expressly stipulate collection or VOC analysis of these samples, but the response letter is very specific. Per our discussion on November 17, 2009 with the BWM, AEC will mobilize to the OCWLF to collect the requested soil and groundwater samples, and submit these samples for VOC analysis at no cost to K-State or the State of Kansas. We will provide a written report addendum to transmit the results accordingly, also at no cost to K-State or the State of Kansas. The soil samples will be collected using the same probing contractor that performed the initial work, and the groundwater samples will be collected using the temporary piezometers installed during the original investigation due to the lack of groundwater yield to the original probe holes. This work will be coordinated with the evaluation of radiation levels detected at MW-30(I) referenced in Comment 2 of this letter.

Comment 2: The KDHE requires K-State to evaluate the source of elevated radiation levels detected at sample location MW-30(I). The evaluation should consider sources potentially attributable to geologic deposits, secondary sources, or errors within the existing data. Sampling frequency may also need to increase for this sample location.

Response 2: The report section discussing the findings for MW-30(I) referenced tritium instead of gross alpha, as indicated in Table 3-2 of the report. The reference should read "gross alpha," as shown on the replacement page (see attached: New Page 10.pdf). The following tabulation summarizes all radiation data for MW-30(I) collected since the installation date of July 2008 through the Background Survey. The data show that during the October 2008 sampling event, levels of gross alpha emitters in groundwater samples from MW-30(I) were above MCL; but below the MCL in July, 2009. As stated in the revised text, based on elevated gross radiation levels observed in wells removed from any source areas, naturally occurring geologic materials are the most plausible explanation (for the observed gross alpha radiation levels).

MW-30(I)			
Analyte (pCi/L)	Oct-08	Jul-09	MCL
Gross Alpha	21.31	14.3	15
Gross Beta	11.84	< (6.16)	50
Tritium	5,925	< (589)	20000

To further evaluate the elevated gross alpha radiation levels we will collect two geologic samples from above the water table and within the well screen depth interval adjacent to and side gradient of MW-30(I) during the mobilization to collect the VOC samples as described in Response 1 above. The proposed probe location would be to the east-southeast of MW-30(I). Groundwater from MW-30(I) will also be sampled during the probe work for comparison. Please advise if the KDHE accepts this proposed evaluation.

Comment 3: If K-State seeks to release the site for unrestricted use per K.A.R. 28-35-205, the residual radioactivity, including residual activity within groundwater sources of drinking water, as distinguishable from background, the Total Effective Dose Equivalent (TEDE) to a member of the critical group must not exceed 0.25 millisievert or 25 mrem/year. The residual radioactivity also has to be reduced to levels as low as reasonably achievable (ALARA).

Response 3: K-State does intend the site to be available for unrestricted use and agrees that the appropriate TEDE value should be 25 mrem/year per K.A.R. 28-35-205. The decommissioning plan will reference the 25 mrem/year value and not the 50 mrem/year cited in the work plan, as well as reference the ALARA standard. The dose modeling in the Background Radiation Survey Report estimated TEDE values of two (2) mrem/year for an adult and 14.3 mrem/year for an infant, which is below the 25 mrem/year for unrestricted use.

Comment 4: The KDHE cannot approve decommissioning plans unless the licensee demonstrates that decommissioning will be completed as soon as practicable and that the health and safety of the workers and the public will be protected. Note that decommissioning plans calling for completing decommissioning activities more than 24 months after receiving plan approval must justify the need for additional time.

Response 4: K-State will submit a decommissioning plan as soon as practicable following completion of the remedial design. At a minimum, this design is necessary to plan for and estimate the cost of the relocation of utilities, relocation of the Hazardous Waste Storage Building and landfill removal. Since decommissioning will require the removal of the landfill, this expenditure requires approval of the Board of Regents. The expenditure has been placed on the Capital Improvements Five Year Plan as required by the State of Kansas. Given the economic state of the Kansas government, we expect that no funds will be available for at least three years; therefore, removal of the landfill will not start until fiscal year 2013.

Comment 5: Please provide an analysis of applicable or relevant and appropriate requirements under State and Federal programs, including a review of possible asbestos disposal in the OCWLF which would require additional notification, sampling, and contingency plan requirements.

Response 5: An analysis of applicable or relevant and appropriate requirements (ARARs) was conducted as part of work completed in 2007 for the OCWLF. We will review and update the ARARs for regulatory changes as part of the initial phase of work in the remedial design, and will include Kansas asbestos regulations in this review. Once the ARARs for the OCWLF are updated, the remedial design will proceed to evaluate compliance requirements with each specific ARAR in planning for removal activities. The costs associated with compliance will also be estimated during the remedial design. The Decommissioning Plan will include a discussion of the ARARs and address how each ARAR will be satisfied. The cost estimates developed during the remedial design will be included in a Financial Plan prepared to assist the K-State Vice President of Administration & Finance in securing the necessary funding for remediation.

As preparatory work regarding KDHE's comment, K-State reviewed the available chemical inventories for asbestos and indicates there is no mention of asbestos materials or minerals being delivered to and disposed of in the landfill. K-State also indicates that asbestos-containing building materials would not have been sent to the OCWLF since there were other options available at the time. K-State also iterates that the landfill was intended only for chemical waste and not construction waste.

Comment 6: Please provide an updated project timeline of planned activities for the OCWLF, including the expected date of submission of the decommissioning plan.

Response 6: The decommissioning plan will be submitted as soon as practicable; however, given the present economic stress of the Kansas government, we expect that no funds will be available for at least three years. Until the removal of the landfill, monitoring will continue as agreed. In an attempt to remediate the plume of contamination, K-State will install two ART wells in fiscal year 2011 or sooner depending on availability of funds. K-State has requested a proposal from AEC to perform the remedial design, prepare the Decommissioning Plan and Site Health & Safety Plan, and work with the KDHE to resolve concerns with the decommissioning of the landfill. The project timeline shown below is tentative pending the State issuing a new contract for environmental consulting services for the landfill.

Timeline Element	Duration	Completed From Start
Remedial Design – Groundwater	2 months	Month 3
Interim Response Measure Plan – Groundwater with financial data	3 weeks	Month 3.5 - 4
Remedial Design - Landfill	4 -5 months	Month 5
Remedial Cost Estimation / Financial Plan Preparation	6 months	Month 6
Removal Health and Safety Plan Development	7 months	Month 7
Develop Decommissioning Plan / KDHE Review	2 months	Month 8
Meeting with KDHE to discuss Decommissioning Plan	1 to 2 Days	Month 9
Final revision / publish Decommissioning Plan for Approval With applicable signatures.	2 Weeks	Month 10

The timeline does not account for possible installation of a groundwater treatment system. The Financial Plan depends on the cost estimates prepared during the remedial design and the groundwater system design. A draft Financial Plan will communicate how K-State will fund the multi-million dollar removal action with the KDHE and also allow K-State to refine funding requests with the Board of Regents.

The Decommissioning Plan will include a remediation/removal timeline that will either show completion within the prescribed 24 months from approval, or provide the rationale for and request an approval of additional time. Preliminary discussions with vendors having the expertise and capabilities to perform this work suggest that the 2-year timeframe will be sufficient to complete removal and the final status survey for the excavation. The groundwater concern may require the additional time to achieve the TEDE and ALARA values.

K-State, as the licensee, respectfully requests the KDHE to address all future letters to Vice President Bruce Shubert, VP for Administration & Finance, with copies sent to Dr. Steve Galitzer and the EPA. The respective addresses are listed below. Also, all technical reports are being copied to Ms. Lisa Gotto at the request of the US EPA.

Sincerely,
ALLIED ENVIRONMENTAL CONSULTANTS, INC.



Paul R. Clark, P.G.

C: Ms. Christy McCormick, KDHE BWM, 1000 SW Jackson, Suite 320, Topeka, KS 66620
Ms. Lisa Gotto, US EPA Region 7, AWMD/RCAP, 901 N. 5th Street, Kansas City, KS 66101
Vice President Bruce Shubert, Kansas State University, Administration & Finance, 105 Anderson Hall, Manhattan, Kansas 66506-0116
Dr. Steve Galitzer & Ms. Kelly Phillips, Kansas State University, EH&S Dept., 108 Edwards Hall, Manhattan, Kansas 66506-4809

Sample ID	GROSS ALPHA (pCi/L)	GROSS BETA (pCi/L)	GROSS GAMMA (pCi/L)	C-14 (pCi/L)	TRITIUM (pCi/L)
Adjacent and/or Downgradient					
SP-B	4.03	6.92	< (4.43)	< (14.54)	< (413)
SP-C	3.33	5.05	< (5.09)	< (14.66)	< (405)
SP-D	12.50	10.30	< (4.80)	< (14.62)	418
SP-E	6.84	5.61	< (5.40)	< (14.56)	< (429)
SP-P	10.80	4.86	< (4.97)	29.60	< (423)
SW	2.86	14.70	< (5.24)	< (17.12)	< (630)
MW-30I	14.30	< (6.16)	< (8.69)	< (16.57)	< (589)
Ave.: Adj. / Downgradient	7.81	7.66	5.52	17.38	472
Site-wide Average	6.95	5.87	5.61	16.00	490

< (value) = < (MDA) = < (Minimal Detected Activity)

The values posted in Table 3-2 are either the actual reported results from the analytical laboratory or the MDA if the reported results were less than the MDA. Analytical results less than the MDA, by definition, do not meet 95% confidence criteria. Therefore, averages were calculated using the largest value of either the actual reported analytical results or the MDA.

The results of the laboratory analytical testing in Table 3-2 show non-detect equivalence for tritium, carbon-14, and gamma activity. The results for gross alpha and gross beta analysis indicate background equivalent activity to only slightly positive activity. The analysis for the sample from MW-30I is near the EPA MCL of 15 pCi/L for gross alpha activity. Similarly, the analysis for the sample collected from SP-D, also adjacent and/or downgradient the landfill shows a value of 12.5 pCi/L. However, Well D and GP-A, both outside the influence of the OCWLF, show levels of alpha activity approaching the MCL of 15 pCi/L (13.2 and 10.1 pCi/L, respectively). This indicates that alpha radionuclide emitters are naturally occurring in the groundwater at the site at levels approaching EPA drinking water standards.

Based on the results in Table 3-2, there is no significant difference between the average values of the three groups. However, these data indicate that the two highest values of alpha emitters occur at the two wells farthest removed from the site (Well D and MW-30I), one upgradient and one downgradient. Therefore, based on these results, the elevated levels of radioactivity detected historically downgradient of the site may not differ significantly from naturally occurring groundwater at the site. Historical groundwater monitoring results have shown levels of gross alpha radiation at MW-30I above recommended guidelines of 15 pCi/L during the October 2008 sampling event with a value of 20.31 pCi/L. Based on its location (across a groundwater divide), it is unlikely that the elevated gross alpha levels observed at MW-30I are attributable to the OCWLF and are most likely due to naturally occurring alpha emitters in the geologic materials. Note that the validation of the radiological analytical data from the Background Radiation Survey did not identify elevated minimal detected activity, counting uncertainties or other indications of spurious analytical results.

The laboratory analytical testing for the groundwater samples collected from Well F did not detect VOCs at levels above the method reporting limits. The laboratory analytical results for the groundwater sample obtained from GP-D detected acetone (22.9 ug/l), methylethylketone (2.1 ug/l), and toluene (0.35 ug/l), below KDHE RSK (residential scenario) levels of 260 ug/l, 820 ug/l, and 1000 ug/l, respectively.

~~*



Mark Parkinson, Governor
Roderick L. Bremby, Secretary

DEPARTMENT OF HEALTH
AND ENVIRONMENT

www.kdheks.gov

Division of Health

November 12, 2009

Paul R. Clark, P.G.
Allied Environmental Consultants, Inc.
The Anawalt House
1109 N. Topeka
P.O. Box 234
Wichita KS 67214

Dear Mr. Clark:

This letter is in response to the Background Radiation Survey & Dose Modeling Report, AEC file No. 09028:0544 dated October 2009 for the Old Chemical Waste Landfill (OWCLF) at Kansas State University in Manhattan, Kansas received on October 5, 2009.

Only two groundwater samples (Well F and GP-D) were reported as analyzed for VOCs in the Background Radiation Survey & Dose Modeling Report. In KDHE's comments on the work plan for this survey dated December 11, 2008, KDHE requested in addition to the two wells, groundwater and soil from sampling points SP-E, SP-D, SP-C, SP-B, and SP-A also be analyzed for VOCs. In KSU's response dated February 13, 2009, KSU acknowledged they would add these samples to the work plan. Please provide these sample results if they were erroneously omitted from the report. If the samples were never analyzed for VOCs, please provide an explanation in your response.

It is expected the source of the elevated tritium at sample location MW-301 be aggressively investigated. It may be necessary to increase the sampling frequency. Three likely causes are the underlying geology is not completely understood, a secondary source is present which needs to be identified, or there were errors during sample collection or analysis.

Reference is made to the 50 mR/h limit discussed in the work plan. If the intent is to release this site for unrestricted use per K.A.R. 28-35-205, the residual radioactivity that is distinguishable from background radiation must be such that the TEDE to an average member of the critical group does not exceed 0.25 millisievert or 25 mrem per year, including the residual radioactivity from groundwater sources of drinking water. The residual radioactivity also has to be reduced to levels that are as low as reasonably achievable (ALARA). It is expected this will be addressed in the forthcoming decommissioning plan that will be submitted in accordance with the requirements specified in K.A.R. 28-35-204.

BUREAU OF ENVIRONMENTAL HEALTH
1000 SW JACKSON ST., Suite 330, TOPEKA, KS 66612-1365
Voice - 785-368-7391 Email - BEH@kdheks.gov

For decommissioning plans calling for completion of decommissioning more than 24 months after plan approval, the plan shall include a justification for the delay. The proposed decommissioning plan shall not be approved unless the licensee demonstrates the decommissioning will be completed as soon as practicable and that the health and safety of the workers and the public will be protected.

Please note the decommissioning plan and release criteria specified in our regulations do not necessarily ensure compliance with other State or Federal requirements. One area of concern is the possibility of asbestos disposal in the OCWLF which would require additional notification, sampling, and contingency plan requirements.

Please provide an updated project timeline of planned activities for the OCWLF, including the expected date of submission for the decommissioning plan. KDHE looks forward to your response to this letter, due no later than 14 days from the postmark. If you have any questions concerning this or any other matter, please do not hesitate to contact me at 785-296-1989 or Christy McCormick at 785-296-6597.

Sincerely,



David J. Whitfill, P.E., CHP

Supervisor, Radioactive Materials Inspection Unit
Radiation and Asbestos Control Section
Bureau of Environmental Health
Kansas Department of Health and Environment

dwhitfill@kdheks.gov

cmccormick@kdheks.gov

cc: Lisa Gotto, EPA Region 7



RECEIVED

OCT 05 2009

October 2, 2009

BUREAU OF WASTE MANAGEMENT

Kansas Department of Health and Environment
Curtis State Office Building
1000 SW Jackson Street
Topeka, Kansas 66612-1366

Attention: Mr. Thomas A. Conley, RRPT, CHP
Bureau of Air & Radiation, Suite 330
Chief, Radiation and Asbestos Control Section, and

Ms. Christy McCormick
Bureau of Waste Management, Suite 320
Hazardous Waste Permits Section

Subject: Radioactive Materials License#: 38-C011-01
Old Chemical Waste Landfill (OCWLF), Kansas State University
Background Radiation Survey and Dose Modeling Report Submittal
AEC File No. 09028:0544

Dear Mr. Conley:

Please find enclosed one copy of the Draft Old Chemical Waste Landfill Background Radiation Survey and Dose Modeling Report for your review. Please contact myself or Jeff Wilson at (316) 262-5698 if you have any questions or comments.

Sincerely,

ALLIED ENVIRONMENTAL CONSULTANTS INC.

A handwritten signature in black ink, appearing to read 'Paul R. Clark'.

Paul R. Clark, P.G.
Project Manager

C: Ms. Kelly Phillips (K-State) (unbound copy)
Mr. Lisa Gotto (EPA)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

22 SEP 2009

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Article Number: 7008 3230 0002 1855 3160

RECEIVED

SEP 24 2009

Dr. Steven Galitzer
Director
Public Safety
108 Edwards
Manhattan, KS 66506-4801

BUREAU OF WASTE MANAGEMENT

RE: Kansas State University Chemical Waste Landfill
2020 Corrective Action Universe

Dear Dr. Galitzer:

The U.S. Environmental Protection Agency (EPA) Region 7 has compiled a list of all facilities deemed appropriate and important to address using the Resource Conservation and Recovery Act's (RCRA) Corrective Action Program. Because this set of facilities has national remediation goals which will culminate in the year 2020, it is referred to as the 2020 Corrective Action Universe. **Your facility is part of this 2020 Universe.** As a result, EPA expects that a final remedy will be in place (i.e., remedy construction completed) at your facility by 2020 (although actual attainment of cleanup goals through remedy implementation may take a while longer). If we haven't already done so, we will be working with you to develop a plan and a schedule that achieves this goal before 2020.

Your facility has been included in the 2020 Universe because either:

- It already belongs to the 2008 Corrective Action Baseline
- It has a RCRA permit obligation
- EPA has determined that it needs cleanup under the RCRA Corrective Action Program because your facility has generated, treated, stored or disposed of hazardous waste and may have releases of hazardous waste and/or hazardous constituents to the environment

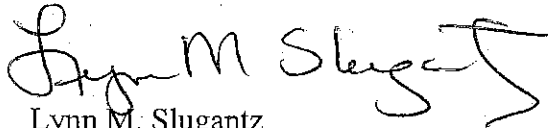
Inclusion on this list does not imply failure on your part to meet any legal obligation, nor should it be construed as an adverse action against you. It only means that EPA has identified your facility and every other facility in the 2020 Corrective Action



Universe as needing to complete RCRA Corrective Action. Our national program goal is to largely address these cleanup obligations before the end of 2020. Accordingly, progress will be measured for each facility in the 2020 Universe. The list of facilities is posted on the U.S. EPA's web site at <http://www.epa.gov/correctiveaction>.

EPA will work to address remediation concerns at your facility in a manner consistent with your plans for the property. If you believe that facility-wide corrective actions are already complete for your site or if you have further questions regarding this letter, please contact Lisa Gotto, (Project Manager), at (913) 551-7210, or myself at (913) 551-7883.

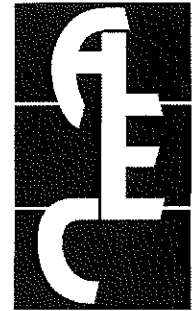
Sincerely,



Lynn M. Slugantz
Chief

RCRA Corrective Action and Permits Branch

cc: Christy McCormick
KDHE



June 11, 2009

Kansas Department of Health and Environment
Bureau of Waste Management
Attention: Ms. Christy McCormick
1000 SW Jackson Street, Suite 320
Topeka, Kansas 66612-1366

Subject: Spring 2009 Sampling & Background Radiation Field Work
Change In Scope of Work
Old Chemical Waste Landfill - Kansas State University
AEC File No. 09028:0544

Dear Ms. McCormick:

Per our discussion on June 8, 2009, Allied has provided a change order to Kansas State University to add eight temporary piezometers that will allow collection of the groundwater samples from locations SP-A, SP-B, SP-C, SP-D, SP-E, GP-C, GP-D, and GP-E. The original soil probe points yielded insufficient quantities of water for the requisite sample volume (i.e., 1 gallon) due to excessive silt.

The water collection point for SP-A will be relocated to the east of the soil probe placed last week due to encountering suspected chemical waste from 4 to 7 feet below grade. We will use the relocated point and two additional soil probes to evaluate the extent of waste between the Hazardous Waste Building and MW-1D. The balance of probes immediately surrounding the landfill encountered only native soil suggesting that the landfill is within the northwest 1/3 acre of the fenced enclosure. Also, the alpha, beta, gamma detector scans of soil cores were at or below background measurements and the two surface gamma surveys were at or below background values. Finally, we collected a full gallon of water for MW-30 to perform gross-alpha, beta, gamma, carbon-14, and tritium confirmation analyses of the fall 2008 result.

We will allow the piezometers to remain in place until sample results are available. Assuming re-sampling is not needed, the piezometers will be abandoned according to Kansas drilling regulations.

We are currently planning on being in the field Monday June 15, 2009 and anticipate concluding the background radiation fieldwork on June 17, 2009.

Please call with any questions.

Sincerely,
ALLIED ENVIRONMENTAL CONSULTANTS, INC.

A handwritten signature in black ink, appearing to read 'Paul R. Clark', is written over the typed name.

Paul R. Clark, P.G.
Project Manager

C: Mr. Tom Conley, 1000 SW Jackson St. Suite 310, Topeka, Kansas 66612-1366
Ms. Kelly Phillips 108 Edwards Hall, Kansas State University, Manhattan, Kansas 66506-4809



Mark Parkinson, Governor
Roderick L. Bremby, Secretary

DEPARTMENT OF HEALTH
AND ENVIRONMENT

www.kdheks.gov

May 27, 2009

Dr. Steven Galitzer, Director
Environmental Health and Safety
Kansas State University
Department of Environmental Health and Safety
108 Edwards Hall
Manhattan, Kansas 66506-4809

**RE: TPH Sampling
Chemical Waste Landfill
Kansas State University - Manhattan
EPA ID NO. #KSD980632772**

Dear Dr. Galitzer:

The Kansas Department of Health and Environment (KDHE), Bureau of Waste Management (BWM) received a request to remove TPH analysis from the spring 2009 semi-annual sampling event on May 22, 2009 for the Old Chemical Waste Landfill at Kansas State University (KSU). Instead, KSU will sample for TPH during the fall 2009 sampling event. In addition, Kansas State University (KSU) is requesting to make this a permanent change to the sampling plan. KDHE tentatively approves KSU's request for this sampling event with the condition that TPH continue to be sampled on a semi-annual basis at MW-4. Final approval will occur when replacement pages are submitted to KDHE and then subsequently approved.

If there are any questions, please contact me at (785) 296-6597.

Sincerely,

Christy McCormick
Environmental Scientist
Hazardous Waste Permits Section

cc: Bill Bider – BWM
Lisa Gotto – EPA Region 7/RCAP
Jennifer Nichols – KDHE/NCDO
Paul Clark – Allied Environmental
Kelly Phillips – KSU
Tom Conley - BAR

BUREAU OF WASTE MANAGEMENT
CURTIS STATE OFFICE BUILDING, 1000 SW JACKSON ST., STE. 320, TOPEKA, KS 66612-1366
Voice 785-296-1600 Fax 785-296-8909 www.kdheks.gov/waste



May 21, 2009

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MAY 22 2009

BUREAU OF WASTE MANAGEMENT

Kansas Department of Health and Environment
Bureau of Waste Management
Attention: Ms. Christy McCormick
1000 SW Jackson Street, Suite 320
Topeka, Kansas 66612-1366

Subject: Sampling & Analysis Variance – Old Chemical Waste Landfill
Kansas State University
AEC File No. 09026:0544

Dear Ms. McCormick:

As we have discussed, AEC plans to postpone collecting samples for the TPH analysis shown in Table D-2 in Volume III of the Quality Assurance Project Plan (QAPP) until the Annual Event scheduled in the fall of 2009. We desire to make this a permanent change, pending KDHE's review. While we believe that TPH is an apparent contaminant of concern, the historical values suggest that an annual monitoring event will be sufficient for this parameter similar to the other Table D-1 constituents. As such, the Semi-Annual events performed each spring will be limited to sampling the volatile organic compounds listed in Table D-2 VOCs. We are also interested in collecting the groundwater radioactivity samples during the spring events every even-numbered year instead of the fall events, as stated in the QAPP. If this is acceptable, we will revise the QAPP accordingly.

During this spring event, we will also collect a groundwater VOC sample from Well F as part of the Background Radiation Survey. Please advise if you wish to receive a split for this or any of the samples. Sampling will begin May 26 and conclude May 29, 2009. Well F will be sampled early in the event as it will

Please call with any questions.

Sincerely,
ALLIED ENVIRONMENTAL CONSULTANTS, INC.

A handwritten signature in black ink, appearing to read 'Paul R. Clark'.

Paul R. Clark, P.G.
Project Manager

Enclosures

c: Mrs. Kelly Phillips 108 Edwards Hall, Kansas State University, Manhattan, Kansas 66506-4809
Mr. Tom Conley, 1000 SW Jackson St. Suite 310, Topeka, Kansas 66612-1366



Kathleen Sebelius, Governor
Roderick L. Bremby, Secretary

DEPARTMENT OF HEALTH
AND ENVIRONMENT

www.kdheks.gov

April 9, 2009

Dr. Steven Galitzer, Director
Environmental Health and Safety
Kansas State University
Department of Environmental Health and Safety
108 Edwards Hall
Manhattan, Kansas 66506-4809

**RE: Background Radiation Survey & Dose Modeling Work Plan
Old Chemical Waste Landfill
Kansas State University - Manhattan
EPA ID NO. #KSD980632772**

Dear Dr. Galitzer:

The Kansas Department of Health and Environment (KDHE), Bureau of Waste Management (BWM), received the revisions to the Background Radiation Survey & Dose Modeling Work Plan for the Old Chemical Waste Landfill at Kansas State University. BWM and the Bureau of Air and Radiation (BAR) have no further revisions to the work plan and the work plan is approved.

If there are any questions, please contact me at (785) 296-6597.

Sincerely,

Christy McCormick
Environmental Scientist
Hazardous Waste Permits Section

cc: Bill Bider – BWM
Lisa Gotto – EPA Region 7/RCAP
Jennifer Nichols – KDHE/NCDO
Paul Clark – Allied Environmental
Kelly Phillips – KSU
Tom Conley - BAR

DIVISION OF ENVIRONMENT
Bureau of Waste Management
CURTIS STATE OFFICE BUILDING, 1000 SW JACKSON ST., STE. 320, TOPEKA, KS 66612-1366
Voice 785-291-3132 Fax 785-296-8909 <http://www.kdhe.state.ks.us/waste>



February 13, 2009

Kansas Department of Health and Environment
Bureau of Air & Radiation
Radiation and Asbestos Control Section
Curtis State Office Building
1000 SW Jackson Street, Suite 310
Topeka, Kansas 66612-1366

RECEIVED

FEB 18 2009

Bureau of Air and Radiation

Attention: Mr. Thomas Conley

Subject: Response to Comments
Background Radiation Survey & Dose Modeling Work Plan
Old Chemical Waste Landfill; Kansas State University
AEC File No. 08136:0544

RECEIVED

MAR 30 2009

OLD CHEMICAL WASTE LANDFILL

Dear Mr. Conley:

This letter responds to the KDHE's comment letter dated December 11, 2008, regarding the Background Radiation Survey & Dose Modeling Work Plan for the Old Chemical Waste Landfill (OCWLF) at Kansas State University; Manhattan, Kansas. The specific comments are summarized below followed by our responses in italics. Replacement pages or additional documents are attached to this letter, as cited in the respective responses.

1. We do expect KSU to prepare a decommissioning plan for this site. We need a schedule for submission of the decommissioning plan.

K-State has elected to remove the OCWLF and return the site to unrestricted use status. However, due to present funding constraints, this action will occur in the future once adequate funds are available. Until that time, K-State is committed to preparing a decommissioning plan to guide the removal of waste from the OCWLF and over-excavate adjacent contaminated soil, as may be necessary. The decommissioning plan will also address a remedial approach to address downgradient groundwater contamination.

K-State will begin preparing the decommissioning plan this month and will submit the document 45 days after publishing the findings of the background radiation survey, which will likely affect cleanup goals. Additionally, as K-State must work through the State Regent's system to finance large projects, we will prepare a Financial Plan that describes the funding mechanisms necessary to meet the goals of the decommissioning plan. It is our intention to publish both documents concurrently once we have completed negotiation with the KDHE regarding the scope of the final removal action. A meeting with BAR and BWM is proposed no later than 15 days following publication of the radiation survey and dose modeling findings.

2. KDHE requests VOC sampling from the soil and groundwater on SP-E, SP-D, SP-C, SP-B, SP-A.

The requested sampling has been added to the work plan (see the revised pages enclosed with this letter).

3. KDHE requests additional VOC sampling of soil and groundwater to the south and south east of the Hazardous Waste Storage Building.

We have added a VOC groundwater sample to the SP-A location (as stated above) and we have adjusted the location and have added a groundwater VOC sample for SP-L (see revised figure). Discussions with KDHE BWM indicate that these adjustments will satisfy the intent of their comment.

4. Sampling needs to be done under the slab of the hazardous waste building and the asphalt parking lot. KDHE requests one soil and groundwater sample from inside the Hazardous Waste Storage building and under the asphalt parking lot. A preliminary characterization of the source term by actual sampling could be very beneficial in preparing the decommissioning plan.

Sampling point SP-L has been relocated to the asphalt area outside the building and both soil and groundwater will be collected from this location. While K-State agrees that sampling the soil and groundwater beneath the building may provide some value to the investigation, we would prefer to avoid penetrating the epoxy-coated floor of the hazardous materials building. Additionally, sampling may release radon gas, VOC vapors, or chemical residuals, and this potential would require an upgrade in safety levels for field personnel (i.e., from Level D to Level C or B). The action could also potentially create a release of radioactive water to the concrete slab during sampling and thereby generate an additional source that must be managed when the building is removed (or before). K-State is also concerned that a landfill release into the building or near the door could halt the daily operations which would cause a backlog in the hazardous waste management system. Based on the site history, an approximate 4-foot thick cap of clay separates the building from the landfill. Groundwater can mound under this condition and exert a pressure that could drive water flow up through the probe hole and pool on the floor, thereby requiring a cleanup response or contaminate the overlying cap and/or concrete. Maintaining the cap intact while the building is removed and then slowly excavated could relieve any pressure and thereby increase control during the final removal action.

5. Just a note with regards to future placement of monitoring wells and evaluating the adequacy of existing monitoring wells should the Decommissioning occur over an extended period of time. There is a requirement in Part 61 for early detection of a release of material:

§ 61.53 Environmental Monitoring.

(d) After the disposal site is closed, the licensee responsible for post-operational surveillance of the disposal site shall maintain a monitoring system based on the operating history and the closure and stabilization of the disposal site. The monitoring system must be capable of providing early warning of releases of radionuclides from the disposal site before they leave the site boundary.

It is not uncommon to have leachate monitoring capability for individual trenches in engineered burial sites.

Discussion with KDHE BAR indicates this comment was provided for general information. However, K-State appreciates the comment and recognizes that the OCWLF was not an engineered burial site. This recognition and consideration that monitoring could potentially never cease if the landfill were to be left in place is the primary driver for K-State to remove the landfill. Be that as it may, monitoring well MW-4 is thought to be within 50 feet of the landfill trenches and has (and will likely) continue to serve the early warning location. If, however, the background radiation survey indicates a need for additional monitoring wells until remediation can occur, K-State will negotiate proposed locations with the KDHE.

6. KDHE does not need any VOC sampling from Well F. The background VOC sample already scheduled for GP-D is sufficient.

K-State appreciates this gesture, but we feel that if GP-D exhibits VOC detections, then a point further from the landfill may be necessary. Sampling Well F concurrently with GP-D should address this concern.

7. KSU needs to provide more information on what type of geoprobe that will be used for the soil and groundwater sampling. In addition, KSU needs to provide KDHE with the name of the contractor performing the work.

Presently, we have a quote from Environmental Probing Service (EPS) of Salina. EPS has a number of Geoprobe-brand hydraulic probe units, including a track-mounted unit, which has been used at the site in the past. The industry-standard technology relies on a pneumatic hammer to drive stainless steel probe rods into the ground, and the tools are used in the fashion described in the work plan.

8. KDHE requests KSU revise the 5th paragraph on page eleven to state, "The GPS device will provide sufficient resident time..."

The wording has been revised for clarity.

9. We will need copies of instrument calibration procedures as part of the plan.


The instruments in question will be rental units, and the vendors have two or three units of each type that could be provided. An equipment manual will be requested for each unit, and the manufacturer's calibration procedures will be followed, if field calibration is required for proper operation. A copy of the manufacturer's field calibration procedures will be provided in the report of findings. Annual or routine calibration certificates will be requested for each rental unit that is to be factory or bench calibrated, and copies will be provided in the report of findings. For those units supplied with check sources, the source id, will be recorded and also provided in the report of findings.

10. Just a minor spelling note: modeling (no second L)

The word has been corrected.

We hope that these responses address the KDHE's concerns. Please call the undersigned with any questions.

Sincerely,
ALLIED ENVIRONMENTAL CONSULTANTS, INC.


Paul R. Clark, P.G.
Project Manager

KANSAS STATE UNIVERSITY


Dr. Steve Galitzer, Director
Environmental Health & Safety Department

Enclosures

C: Mrs. Kelly Phillips 108 Edwards Hall, Kansas State University, Manhattan, Kansas 66506-4809



Kathleen Sebelius, Governor
Roderick L. Bremby, Secretary

DEPARTMENT OF HEALTH
AND ENVIRONMENT

www.kdheks.gov

Division of Environment

December 11, 2008

Paul R. Clark, P.G.
Allied Environmental Consultants Inc.
1109 N Topeka
Wichita KS 67214

RECEIVED

DEC 12 2008

DEPARTMENT OF HEALTH AND ENVIRONMENT

Dear Mr. Clark:

This letter is in response to the submittal of the Background Radiation Survey & Dose Modeling Work Plan for the Old Chemical Waste Landfill located at Kansas State University; Manhattan, Kansas (AEC File No. 08136:0544, November 2008). The review was conducted jointly by the Bureau of Air and Radiation and the Bureau of Waste Management. Specific comments follow:

1. We do expect KSU to prepare a decommissioning plan for this site. We need a schedule for submission of the decommissioning plan.
2. KDHE requests VOC sampling from the soil and groundwater on SP-E, SP-D, SP-C, SP-B, SP-A.
3. KDHE requests additional VOC sampling of soil and groundwater to the south and south east of the Hazardous Waste Storage Building.
4. Sampling needs to be done under the slab of the hazardous waste building and the asphalt parking lot. KDHE requests one soil and groundwater samples from inside the Hazardous Waste Storage Building and under the asphalt parking lot. A preliminary characterization of the source term by actual sampling could be very beneficial in preparing the decommissioning plan.
5. Just a note with regards to future placement of monitoring wells and evaluating the adequacy of existing monitoring wells should the Decommissioning occur over an extended period of time. There is a requirement in Part 61 for early detection of a release of material:

§ 61.53 Environmental monitoring.

Bureau of Air & Radiation
Radiation and Asbestos Control Section
CURTIS STATE OFFICE BUILDING, 1000 SW JACKSON ST., STE. 310, TOPEKA, KS 66612-1366
Voice 785-296-6024 Fax 785-296-7455

(d) After the disposal site is closed, the licensee responsible for post-operational surveillance of the disposal site shall maintain a monitoring system based on the operating history and the closure and stabilization of the disposal site. The monitoring system must be capable of providing early warning of releases of radionuclides from the disposal site before they leave the site boundary.

It is not uncommon to have leachate monitoring capability for individual trenches in engineered burial sites.

5. KDHE does not need any VOC sampling from Well F. The background VOC sample already scheduled for GP-D is sufficient.

6. KSU needs to provide more information on what type of geoprobe that will be used for the soil and groundwater sampling. In addition, KSU needs to provide KDHE with the name of the contractor performing the work.

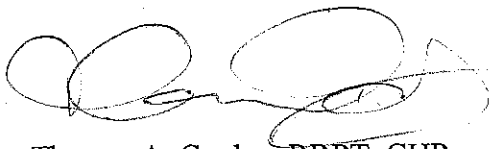
7. KDHE requests KSU revise the 5th paragraph on page eleven to state, "The GPS device will provide sufficient resident time..."

8. We will need copies of instrument calibration procedures as part of the plan.

9. Just a minor spelling note: modeling (no second L)

If you have any questions concerning this or any other matter, please do not hesitate to contact this office.

Sincerely,



Thomas A. Conley, RRPT, CHP
Section Chief, Radiation and Asbestos Control
Kansas Department of Health and Environment
Phone: (785) 296-1565
email: tconley@kdhe.state.ks.us

David J. Whitfill, P.E., CHP
Supervisor, Radioactive Materials Inspection Unit
Radiation and Asbestos Control Section
Bureau of Air and Radiation
Kansas Department of Health and Environment
785-296-1989
dwhitfill@kdheks.gov

Christy McCormick
Kansas Department of Health and Environment
Bureau of Waste Management
785-296-6597
CMccormick@kdheks.gov

Steve Galitzer - Director of Public Safety
Kansas State University
108 Edwards
Manhattan, Kansas 66506

November 17, 2008

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NOV 18 2008

Bureau of Air and Radiation

KSTATE

Kansas State University

Thomas A. Conley, CHP
Bureau of Air & Radiation
Radiation Control Program
Radiation and Asbestos Control Section
Kansas Department of Health and Environment
1000 SW Jackson St. Ste. 310
Topeka, KS 66612-1366

Division of Public Safety
108 Edwards Hall
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Dear Tom,

This letter is to verify that the University Radiation Safety Committee at Kansas State University approved the "Background Radiation Survey & Dose Modeling Work Plan" for proposed work at the Old Chemical Waste Landfill at KSU. The plan was emailed to each member on Wednesday, November 12, 2008 and approved by email vote received by the University Radiation Safety Officer on Thursday and Friday, November 13-14, 2008.

Sincerely,



J. Ernest Minton, Chair
Radiation Safety Committee

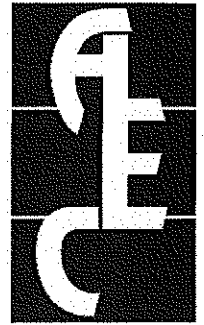
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NOV 19 2008

BUREAU OF WASTE MANAGEMENT



Ronald L. Bridges
Radiation Safety Officer



November 17, 2008

RECEIVED

Kansas Department of Health and Environment
Bureau of Air & Radiation
Curtis State Office Building
1000 SW Jackson Street, Suite 310
Topeka, Kansas 66612-1366

NOV 18 2008

BUREAU OF WASTE MANAGEMENT

Attention: Mr. Thomas A. Conley, RRPT, CHP
Chief, Radiation and Asbestos Control Section

Subject: Radioactive Materials License#: 38-C011-01
Old Chemical Waste Landfill (OCWLF), Kansas State University
Work Plan Submittal
AEC File No. 08136:0544

Dear Mr. Conley:

Please find two copies of the Background Radiation Survey and Dose Modeling Work Plan to guide fieldwork at the subject facility. We are submitting this document on the behalf of Kansas State University and the Radiation Safety Committee per their letter dated November 17, 2008 (attached for reference).

While this submittal fulfills one of the stipulations presented in K-State's October 15, 2008 response letter, it also is intended to open a dialogue with KDHE to guide subsequent actions once additional data are available. The work plan also accounts for fieldwork not contemplated in the response letter. The additional work includes a gamma radiation survey and additional soil analyses to evaluate for radiation very near the landfill and volatile organic compounds in groundwater upgradient the landfill. Finally, we are including two gamma survey procedures in the work plan pending instrument availability discussions with rental companies. Instrument selection will be resolved soon and we are working with the Geoprobe vendor regarding tentative start dates once comments are resolved and the work plan is approved.

We look forward to your review of this document. Please do not hesitate to contact us with questions.

Sincerely,

ALLIED ENVIRONMENTAL CONSULTANTS INC.

Paul R. Clark, P.G.
Project Manager

C: Ms. Christy McCormick (KDHE BWM) – 1 Copy
Dr. Steven Galitzer (K-State) – letter only
Ms. Kelly Phillips (K-State) – letter only
Mr. Ron Bridges (K-State) – letter only



Received via email on 11/7/08

November 7, 2008

Kansas Department of Health and Environment
Bureau of Air & Radiation
Curtis State Office Building
1000 SW Jackson Street, Suite 310
Topeka, Kansas 66612-1366

Attention: Mr. Thomas A. Conley, RRPT, CHP
Chief, Radiation and Asbestos Control Section

Subject: Radioactive Materials License#: 38-C011-01
Old Chemical Waste Landfill (OCWLF), Kansas State University
Work Plan Submittal Delay
AEC File No. 08136:0544

Dear Mr. Conley:

Thank you for speaking with me this morning regarding submission of the Background Radiation Survey & Dose Modeling Work Plan. Per our discussion, we are hereby requesting to extend the work plan submittal one week until November 18, 2008 to provide sufficient review time by the K-State Radiation Safety Committee.

Please contact the undersigned with any questions.

Respectfully yours,

ALLIED ENVIRONMENTAL CONSULTANTS INC.

A handwritten signature in black ink, appearing to read 'P. R. Clark', is written over the typed name.

Paul R. Clark, P.G.
Project Manager

C: Ms. Christy McCormick (KDHE BWM)
Dr. Steven Galitzer (K-State)
Ms. Kelly Phillips (K-State)
Mr. Ron Bridges (K-State)



K A N S A S

RODERICK L. BREMBY, SECRETARY

DEPARTMENT OF HEALTH AND ENVIRONMENT

KATHLEEN SEBELIUS, GOVERNOR

RECEIVED

OCT 27 2008

BUREAU OF WASTE MANAGEMENT

October 27, 2008

Dr. Steven Galitzer, Director
Department of Environmental Health and Safety
108 Edwards Hall
Kansas State University
Manhattan KS 66506-4809

Ref: Radioactive Materials License #: 38-C011-01

And

Paul R. Clark, P.G.
Allied Environmental Consultants, Inc.
Anawalt House
1109 N. Topeka Street
Wichita, Kansas 67214

Dear Dr. Galitzer and Mr. Clark:

This is to acknowledge the receipt of your reply dated October 15, 2008, to our letter dated September 8, 2008, regarding the Old Chemical Waste Landfill (OCWLF) and Radioactive Materials License, number 38-C011-01.

The corrective measures, procedures and statements outlined in your reply have been reviewed and appear to be acceptable subject to review of your work plan to be submitted within 15 calendar days. This information will be included in your license file.

To further clarify, please note that in our review of your work plan we will use a number of resources including but not limited to Nuclear Regulatory Commission regulatory guides, 10 CFR 61, and experiences of our peers. Also note the work plan once approved will become a binding condition on the Kansas State University radioactive materials license. Additional conditions on the license may be imposed as necessary to ensure the protection of the public and environment in accordance with K.A.R. 28-35-183a. "Conditions imposed upon any specific license."

DIVISION OF ENVIRONMENT
Bureau of Air & Radiation
Radiation and Asbestos Control Section
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f you have any questions concerning this or any other matter, please do not hesitate to contact this office.

Sincerely,



Thomas A. Conley, RRPT, CHP
Chief, Radiation and Asbestos Control Section
Phone: 785-296-1565
Email: tconley@kdhe.state.ks.us

cc: Thomas M. Rawson, Vice President
Christy McCormick, KDHE Bureau of Waste Management



Department of Environmental
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October 15, 2008

Kansas Department of Health and Environment
Bureau of Air & Radiation
Curtis State Office Building
1000 SW Jackson Street, Suite 310
Topeka, Kansas 66612-1366

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OCT 16 2008

BUREAU OF WASTE MANAGEMENT

Attention: Mr. Thomas A. Conley, RRPT, CHP
Chief, Radiation and Asbestos Control Section

Subject: Response to Comments

Old Chemical Waste Landfill (OCWLF), Kansas State University
AEC File No. 06198-4:0544

Dear Mr. Conley:

We have received your letter dated September 8, 2008, regarding Radioactive Materials License #38-C011-01 as it relates to the Old Chemical Waste Landfill (OCWLF). We perceive the letter as harsh given the relatively little correspondence or direction provided by BAR to date, but please let us be clear, K-State, and our consultant AEC, wish to cooperate with BAR and provide the data and information that will comply with the regulations when asked to do so.

We are pleased that KDHE's letter dated September 8, 2008 provides clear direction regarding the specific information required. In the following responses, we state how we will comply with the citations and BAR's comments (K-State's responses are shown in italics following each citation).

1. K.A.R. 28-35-214b. Compliance with dose limits for individual members of the public, requires:
 - (a.) The licensee or registrant shall make or cause to be made surveys of radiation levels in unrestricted and controlled areas and radioactive materials in effluents released to unrestricted and controlled areas to demonstrate compliance with the dose limits for individual members of the public in K.A.R. 28-35-214a.
 - (b.) A licensee or registrant shall show compliance with the annual dose limit in K.A.R. 28-35-214a by:
 - (1.) Demonstrating by measurement or calculation that the total effective dose equivalent to the individual likely to receive the highest dose from the licensed or registered operation does not exceed the annual dose limit; or,
 - (2.) Demonstrating that:

- (A.) The annual average concentrations of radioactive material released in gaseous and liquid effluents at the boundary of the unrestricted area do not exceed the values specified in appendix B, table II published in "Kansas Department of Health and Environment Appendices to Part 4; Standards for Protection Against Radiation", effective April 1994, and
- (B.) If an individual were continually present in an unrestricted area, the dose from external sources would not exceed 0.02 mSv (0.002 rem) in an hour and 0.50 mSv (0.05 rem) in a year.

Response: The regulations cited by the BAR (shown above) are clear, concise, and K-State has not performed the work (to date) necessary to meet the regulation. According to Section 1.1 of the Radiological Evaluation, the purpose of the report was to

"...negotiate future sampling requirements for radionuclides with the KDHE; develop human safety protocols and need for work exclusion zones; and, establish the need for general public safety with respect to the anthropogenic radionuclides potentially emanating from the OCWLF. Final decisions meeting with the KDHE's concurrence regarding these issues will be used by the K-State OCWLF Project Team to revise the Quality Assurance Project Plan (QAPP) prepared to control activities at the OCWLF site."

K-State issued the evaluation as an initial survey of radiation from across the site (all monitoring wells, surface water, and vegetation), and not as a complete assessment. The evaluation determined that radioactive isotopes (chiefly Tritium and ¹⁴C) were migrating from the OCWLF via groundwater. Furthermore the evaluation indicated that uptake by vegetation was not a concern. We were anticipating an open dialogue with BAR to discuss the need for additional assessment based on these findings. Unfortunately, we did not understand BAR's intent in issuing comment 17 was to reflect the citation listed in the September 8, 2008 letter, and had that occurred at that time, K-State would have responded differently. Be that as it may K-State will perform the following to meet the intent of K.A.R. 28-35-214b:

- 1. Prepare a work plan for BAR's review and acceptance to measure background radiation levels in soil and groundwater at specific locations for comparison with samples collected adjacent to and downgradient of the OCWLF and for use in comparison with modeling results. The work plan will be provided within 15 calendar days following this letter, if acceptable. Furthermore, K-State will expedite the sampling (i.e., complete sampling within 2-weeks work plan approval) to avoid prolonging this issue. The work plan will list specific radionuclides for analysis in both the background and near landfill samples, based on the finding listed in the Radiological Evaluation report.*

2. *Perform modeling using either the RESRAD, RESRAD-OFFSITE, or both models to determine the total effective dose equivalent to the individual likely to receive the highest dose. For this, we propose the following source terms and scenarios:*
 - i. *Source terms – minimum of Tritium and ¹⁴C in groundwater, with default RESRAD values for uptake (drinking the water); plus those miscellaneous isotopes that may be measured in the new soil samples for contact or inadvertent ingestion;*
 - ii. *Residential use scenario in unrestricted areas;*
 - iii. *K-State workers in controlled areas;*
 - iv. *Other criteria/parameters as may be required by BAR.*
3. *Prepare a report of findings to summarize the background survey, near landfill soil survey, and methods and findings of the RESRAD modeling.*

2. K.A.R. 28-35-217b "General" states in part:

- (a.) Each licensee or registrant shall make, or cause to be made, surveys that:
 - (1.) Provide measurements or evaluations demonstrating compliance with these regulations; and
 - (2.) Are necessary under the circumstances to evaluate:
 - (A.) Radiation levels;
 - (B.) Concentrations or quantities of radioactive material; and
 - (C.) The potential radiological hazards that could be present.

As stated above in the response for comment 1, K-State will perform background sampling at a minimum of three existing groundwater monitoring wells for comparison with groundwater both in and downgradient of the control area (fenced enclosure). We will also conduct soil sampling to determine radionuclide concentrations in three background locations and three locations adjacent the landfill along the margins of the landfill (either at the fence line or within 50-feet of the downgradient edge). Three soil aliquots will be collected at nominal 2-ft centers until groundwater is encountered. Each aliquot will be analyzed for the parameter list agreed to with the BAR.

3. K.A.R. 28-35-204 "Decommissioning Plan", states in part:

- (b.) The proposed decommissioning plan for the facility or site, or separate building or outdoor area, shall include the following:
 - (1.) A description of the conditions of the facility or site sufficient to reevaluate the acceptability of the plan;
 - (2.) A description of the planned decommissioning operations;
 - (3.) A description of the methods used to ensure the protection of workers and the environment against radiation hazards during decommissioning;
 - (4.) A description of the radiation survey planned to demonstrate compliance with subsection (e) or with K.A.R. 28-35-205; and

- (5.) An updated, detailed cost estimate of decommissioning, comparison of that estimate with the present funds set aside for decommissioning, and a plan for ensuring the availability of adequate funds for completion of the decommissioning.

We appreciate BAR's willingness to accept the CRP and Radiological Evaluation with the QAPP (when accepted) as a decommissioning plan. However, none of these documents were ever intended to serve as a decommission plan nor was K-State ever asked to provide such a document. We will be happy to prepare a document that is specifically defined as the Decommissioning Plan for the OCWLF to ensure that we comply with K.A.R. 28-35-204. The eventual document may reference the CRP, radiological survey report (both existing and future), and the QAPP, but will address each point under the regulation.

4. K.A.R. 28-35-148. Deliberate misconduct, prohibits a contractor who provides services that relate to a licensee's activities from submitting to the department or licensee information relating to the licensee's operations that the contractor knows to be incomplete or inaccurate in some respect. K.A.R. 28-35-148(c) further states: "Any person who violates the requirements of this regulation may be subject to enforcement action pursuant to K.S.A. 48-1613, and amendments thereto."

K-State has always been straight forward and honest with KDHE since the RCRA disclosure of the OCWLF as we intend to discuss with you in person.

The following items address the points listed on page 4 of 4 of your letter:

- a) Confirmation or clarification from KSU of the items listed:
 - a. Assessment of doses to the public

Please see our response to Comment 1, above.

- b. Location and determination of background samples

We will prepare a work plan for your review and discuss to our mutual agreement the locations of background samples.

- c. Long term radiological monitoring

We will revise the QAPP, per the findings of the background and soil sampling effort, with consideration also given to the results presented in the Radiological Evaluation (which already are shown in the parameter list of the QAPP)

Confirmation or clarification from AEC on the item listed:

- d. The submission of incorrect or incomplete information

Please see the response to Comment 4, above.

- b) Action taken to correct the items

As stipulated in this letter.

- c) Date when action is expected to be completed and the items mentioned above brought into compliance

K-State will deliver a work plan for your consideration and review 15 calendar days following our meeting on October 15, 2008, if acceptable. The remainder of the tasks will be completed as specified in the work plan schedule.

- d) Action taken to prevent the items from reoccurring

Following our meeting, it is our intent that we keep lines of communication open between K-State, AEC, BAR and BWM.

Thank you for your consideration in this matter. We look forward to discussing these items with you in person on October 15, 2008.

Sincerely,



Dr. Steven Galitzer, Director
Department of Environmental Health & Safety

Enclosures

cc: Dr. Thomas M. Rawson
Mrs. Kelly Phillips
Dr. Ronald Bridges
Ms. Christi McCormick, 1000 SW Jackson Street, Suite 320, Topeka, KS 66612-1366
Mr. Paul Clark, AEC, P.O. Box 234, Wichita, KS 67201-0234

Division of Public Safety

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Manhattan, KS 66506-4809
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Fax: 785-532-1981
<http://www.ksu.edu/safety>

September 19, 2008

Christy McCormick
Bureau of Waste Management
1000 SW Jackson St., Suite 320
Kansas Department of Health and Environment
Topeka, KS 66612-1366

RECEIVED

RE: Closure of old monitoring wells and well improvements

SEP 22 2008

BUREAU OF WASTE MANAGEMENT

Ms. McCormick,

Associated Environmental will be closing two old monitoring wells that were installed in the 1990s. The wells have not been used for over 10 years. One well is located next to MW-12 and the other is located on the current Sheep Farm, which has been purchased by the KSU Foundation. The Foundation began construction on their new building this month. The wells are depicted on the enclosed map. The wells will be closed in accordance with the KDHE, Bureau of Water, well closure procedures. Associated's well closing procedure is attached.

In addition to this work, Associated will be modifying well 16. As you know, well 16 frequently flows with the smallest amount of rain. This is creating a swamp in that area. A j-plug was put into the well casing; however, water continued to fill the outer casing. Associated will determine whether the well casing has a hole in it and fix it accordingly. If the casing is altered, the well will be resurveyed at a later date.

Associated will also be replacing the pads for wells 8, 9, 14, 15, 16, 17, 20 and 23.

The appropriate PPE will be worn during the work. All Associated employees involved in field work have current HAZWOPER and Radiation Safety Training, as required by the QAPP. Copies of their certificates are in my office at B008, Edwards Hall.

If you have any questions, please contact me at (785) 532-5856.

Sincerely,



Kelly Phillips
Environmental Manager

cc: Paul Clark, Allied Environmental Consultants

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SEP 16 2008

BUREAU OF WASTE MANAGEMENT



K A N S A S

RODERICK L. BREMBY, SECRETARY

KATHLEEN SEBELIUS, GOVERNOR

DEPARTMENT OF HEALTH AND ENVIRONMENT

September 8, 2008

Dr. Steven Galitzer, Director
Department of Environmental Health and Safety
108 Edwards Hall
Kansas State University
Manhattan KS 66506-4809

Ref: Radioactive Materials License #: 38-C011-01

And

Paul R. Clark, P.G.
Allied Environmental Consultants, Inc.
Anawalt House
1109 N. Topeka Street
Wichita, Kansas 67214

Dear Dr. Galitzer and Mr. Clark:

We have completed a review of the Kansas State University (KSU) Radiological Evaluation of the Old Chemical Waste Landfill (OCWLF), revised July 14, 2008, under Kansas Radioactive Materials License, number 38-C011-01. Based on the results of this review, it appears that certain aspects of the radiological evaluation are not in full compliance with Kansas Radiation Protection Regulations and/or specific conditions of the above license in that:

1. K.A.R. 28-35-214b. Compliance with dose limits for individual members of the public, requires:

(a) The licensee or registrant shall make or cause to be made surveys of radiation levels in unrestricted and controlled areas and radioactive materials in effluents released to unrestricted and controlled areas to demonstrate compliance with the dose limits for individual members of the public in K.A.R. 28-35-214a.

(b) A licensee or registrant shall show compliance with the annual dose limit in K.A.R. 28-35-214a by:

(1) demonstrating by measurement or calculation that the total effective dose equivalent to the individual likely to receive the highest dose from the licensed or registered operation does not exceed the annual dose limit; or

DIVISION OF ENVIRONMENT
Bureau of Air & Radiation

Radiation and Asbestos Control Section

CURTIS STATE OFFICE BUILDING, 1000 SW JACKSON ST., STE 310, TOPEKA, KS 66612-1366

Voice 785-296-1560

Fax 785-296-0984

<http://www.kdhe.state.ks.us/radiation>

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(2) demonstrating that:

(A) the annual average concentrations of radioactive material released in gaseous and liquid effluents at the boundary of the unrestricted area do not exceed the values specified in appendix B, table II published in "Kansas Department of Health and Environment Appendices to Part 4: Standards for Protection Against Radiation", effective April 1994; and

(B) if an individual were continually present in an unrestricted area, the dose from external sources would not exceed 0.02 mSv (0.002 rem) in an hour and 0.50 mSv (0.05 rem) in a year.

Contrary to this regulation, KSU has not properly addressed the impacts of doses to the public from radiological releases to unrestricted areas. The response to this item provided by Allied Environmental Consultants, Inc., (AEC) is inadequate. Specifically, the statement that "Given the lack of continuity in the pathways, an off-site dose assessment is not warranted in this case" is incorrect and in violation of regulatory requirements.

To reiterate our comment for item (17) found in the KSU response dated July 14, 2008: "In addition, the KSU Radiological Evaluation does not provide a dose assessment supporting the assertion that the OCWLF and surrounding areas meet the Kansas criterion for unrestricted use. Acceptable methods for performing such a dose assessment include, but are not limited to, the RESRAD and the RESRAD-OFFSITE modeling. Therefore, please revise this text and include a dose assessment supporting the statements."

2. K.A.R. 28-35-217b "General" states in part:

(a) Each licensee or registrant shall make, or cause to be made, surveys that:

(1) provide measurements or evaluations demonstrating compliance with these regulations; and

(2) are necessary under the circumstances to evaluate:

(A) radiation levels;

(B) concentrations or quantities of radioactive material; and

(C) the potential radiological hazards that could be present.

Contrary to this requirement KSU and AEC have failed to include adequate background samples in their sampling program, which precludes the possibility of evaluating the radiological conditions to demonstrate compliance with the regulations. The statements by AEC that generic published backgrounds and the backgrounds performed by the analysis laboratory are sufficient to determine the OCWLF background is incorrect. In order to adequately assess the radiological conditions in unrestricted areas surrounding the OCWLF, background wells and soil samples must be located in areas not affected by the OCWLF. The current "background" well located in close proximity to the upstream border of the landfill is inadequate due to cross contamination during back flooding events.

DIVISION OF ENVIRONMENT

Bureau of Air & Radiation

Radiation and Asbestos Control Section

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3. K.A.R. 28-35-204 "Decommissioning Plan", states in part:

(b) The proposed decommissioning plan for the facility or site, or separate building or outdoor area, shall include the following:

- (1) A description of the conditions of the facility or site sufficient to evaluate the acceptability of the plan;
- (2) a description of the planned decommissioning operations;
- (3) a description of the methods used to ensure the protection of workers and the environment against radiation hazards during decommissioning;
- (4) a description of the radiation survey planned to demonstrate compliance with subsection (e) or with K.A.R. 28-35-205; and
- (5) an updated, detailed cost estimate of decommissioning, comparison of that estimate with the present funds set aside for decommissioning, and a plan for ensuring the availability of adequate funds for completion of the decommissioning.

The OCWLF is considered inactive and therefore the regulatory requirements of K.A.R. 28-35-204 apply. Specifically, a decommissioning plan is required. The KSU Comprehensive Remedial Plan (CRP) received July 28, 2008, and Radiological evaluation of the OCWLF prepared by Allied Environmental Consultants when approved will meet this requirement.

In addition, the State of Kansas is a US NRC Agreement State and is required to maintain compatibility with federal regulations through the adoption of regulations or other legally binding means such as consent agreements or license conditions. Federal regulations that may apply with regards to the OCWLF include 10CFR61. Of particular note are requirements for long term stability of the site (10CFR61.44) and environmental monitoring to evaluate the long term effects, stability and the need for mitigative measures including the prevention of ground water intrusion (10CFR61.53).

Contrary to the above requirements the CRP, Quality Assurance Project Plan (QAPP) and radiological evaluation do not adequately address the long term radiological monitoring which will be performed to ensure the adequacy of any remediation activities. Specifically, on-going assessment of dose to the general public and the collection of adequate background data.

4. K.A.R. 28-35-148. Deliberate misconduct, prohibits a contractor who provides services that relate to a licensee's activities from submitting to the department or licensee information relating to the licensee's operations that the contractor knows to be incomplete or inaccurate in some respect. K.A.R. 28-35-148(c) further states: "Any person who violates the requirements of this regulation may be subject to enforcement action pursuant to K.S.A. 48-1613, and amendments thereto."

Based on AEC's statements that an off-site dose assessment is not warranted and that generic backgrounds are adequate, both of which are contrary to specific instructions given by KDHE, it appears that AEC has provided to the licensee and the department, information which it knows to be incorrect or incomplete.

You are required to respond in writing within thirty days of receipt of this notice. This response shall include the following:

- a) Confirmation or clarification from KSU of the items listed:
 - a. Assessment of doses to the public
 - b. Location and determination of background samples
 - c. Long term radiological monitoring
- b) Confirmation or clarification from AEC of the item listed:
 - a. The submission of incorrect or incomplete information
- c) Action taken to correct the items.
- d) Date when the action is expected to be completed and the items mentioned above brought into compliance.
- e) Action taken to prevent the items from reoccurring.

Please note, the QAPP will not receive approval from the Bureau of Air and Radiation until these violations are resolved.

If you have any questions concerning this or any other matter, please do not hesitate to contact this office.

Sincerely,



Thomas A. Conley, RRPT, CHP
Chief, Radiation and Asbestos Control Section
Phone: 785-296-1565
Email: tconley@kdhe.state.ks.us

cc: Thomas M. Rawson, Vice President
Christy McCormick, KDHE Bureau of Waste Management



Kathleen Sebelius, Governor
Roderick L. Bremby, Secretary

DEPARTMENT OF HEALTH
AND ENVIRONMENT

www.kdheks.gov

MEMORANDUM

TO: Kansas State University File

THROUGH: Brad Roberts, Mostafa Kamal

FROM: Christy McCormick

SUBJECT: Site Visit, July 28 & 29, 2008

On July 28, 2008, Christy McCormick traveled to the Kansas State University (KSU) Old Chemical Waste Landfill in Manhattan to observe the drilling of additional monitoring wells. Present were Paul Clark of Allied Environmental, Kelly Phillips of KSU, and two drillers from Associated Environmental. Due to lightning in the area, drilling was delayed until 11:00 am. The first well drilled was northwest of the BIVAP building. The well was drilled to approximately 36 feet before auger refusal.

On July 29, 2008, KDHE, Allied, KSU, and Associated personnel met to drill the second well directly south of the BIVAP building. This well was supposed to be a shallow well due to speculation that bedrock would be at approximately 30 feet. However, Associated drilled down to approximately 60 feet before hitting bedrock. It was decided by KDHE that this well would be the deep well that was originally going to be placed adjacent to MW 24. KDHE instructed Allied and Associated to drill an additional shallow well next to the deep well to create a well cluster south of the BIVAP building.

Pictures are attached to the memo to show the approximate well locations in relation to the current buildings in the area.

**KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF ENVIRONMENT**

**Bureau of Waste Management
Harzardous Waste Permits**

Photos have not been altered except to change the size of the file.

Site	<u>Kansas State University—Old Chemical Waste Landfill</u>	EPA/SW/Co	<u>KSD980632772</u>
Address:	<u>2200 Kimball Avenue</u>	City:	<u>Manhattan</u>
County:	<u>Riley</u>	Camera:	<u>Fujifilm Fine Pix E510</u>
Legal:	<u>NW ¼ SE ¼ Sec. 1 T10S R7E</u>	Taken By:	<u>Christy McCormick</u>

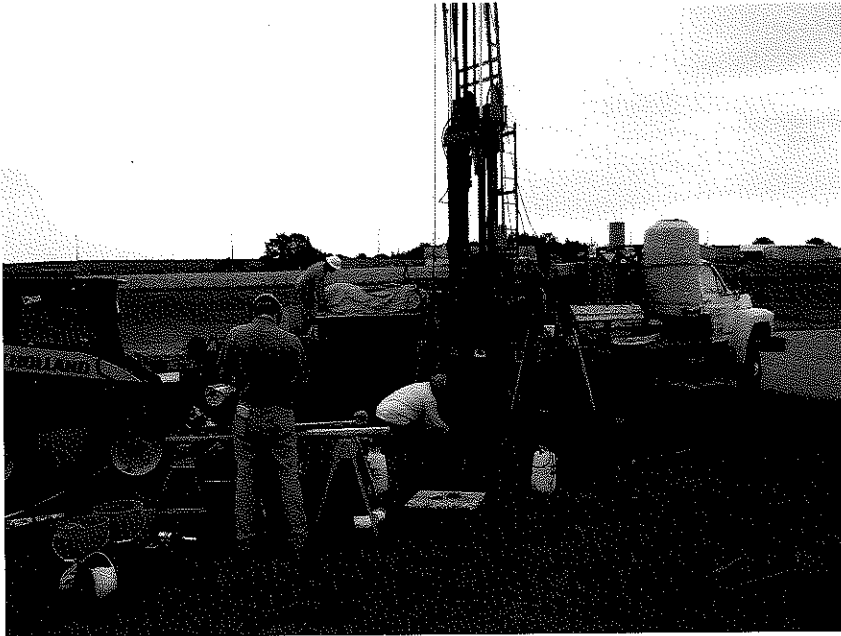


Photo Number:	<u>1</u>
Date:	<u>07/28/08</u>
Time:	<u>11:00 am</u>
Direction Faced:	<u>North</u>
Weather	<u>Cloudy</u>

Comments:

Well NW of BIVAP Building.



Photo Number:	<u>2</u>
Date:	<u>07/28/08</u>
Time:	<u>11:00 am</u>
Direction Faced:	<u>SE</u>
Weather	<u>Cloudy</u>

Comments:

Well NW of BIVAP Building.

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT
DIVISION OF ENVIRONMENT

Bureau of Waste Management
Harzardous Waste Permits

Photos have not been altered except to change the size of the file.

Site	Kansas State University—Old Chemical Waste Landfill	EPA/SW/Co	KSD980632772
Address:	2200 Kimball Avenue	City:	Manhattan
County:	Riley	Camera:	Fujifilm Fine Pix E510
Legal:	NW ¼ SE ¼ Sec. 1 T10S R7E	Taken By:	Christy McCormick



Photo Number:	3
Date:	07/29/08
Time:	1:30 pm
Direction Faced:	East
Weather	cloudy

Comments:

Well South of BIVAP Building.



Photo Number:	4
Date:	07/29/08
Time:	1:30 pm
Direction Faced:	SW
Weather	cloudy

Comments:

Well South of BIVAP Building.