1R - 427-91

WORKPLANS

DATE:
1-15-06

R. T. HICKS CONSULTANTS, LTD.

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266-0745

January 15, 2006

Mr. Wayne Price
New Mexico Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

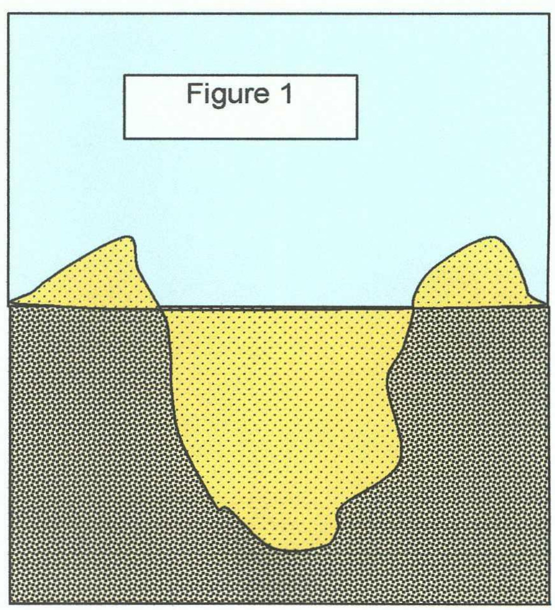
RE: Corrective Action Plan
EME E-5 Junction Box Site
T20S-R37E-Section 5, Unit Letter E
NMOCD Case No. 1R0427-91

Dear Wayne:

RICE Operating Company (ROC) has retained R.T. Hicks Consultants, Ltd. (Hicks Consultants) to submit this corrective action plan (CAP) for the above-referenced site. The majority of the information regarding this site was submitted to NMOCD in our July 13, 2005 submission. In direct response to your November 22, 2005 letter (attached), we propose the following actions to complete the Corrective Action Plan.

Proposed Remedy to Prevent Migration of Residual Constituents in the Vadose Zone

We propose a monolithic evapotranspiration (ET) cover as the closure method for the E-5 Junction Box site. As you may remember, Mr. Mark Miller discussed this type of landfill cover at last week's stakeholder's meeting for the Surface Waste Management Rules. An ET cover minimizes infiltration by providing temporary water storage capacity within the cover and eventual water removal by evaporation and transpiration. ET cover configurations vary depending on local conditions, but typically consist of a relatively porous soil layer capped with a 1-2 foot thick topsoil layer. The fine-grained soil layer provides the necessary water storage capacity and then the native species planted on the topsoil cause evapotranspiration and reduce infiltration into underlying soil horizons. The attached EPA Fact Sheet describes in more detail how this cover operates.

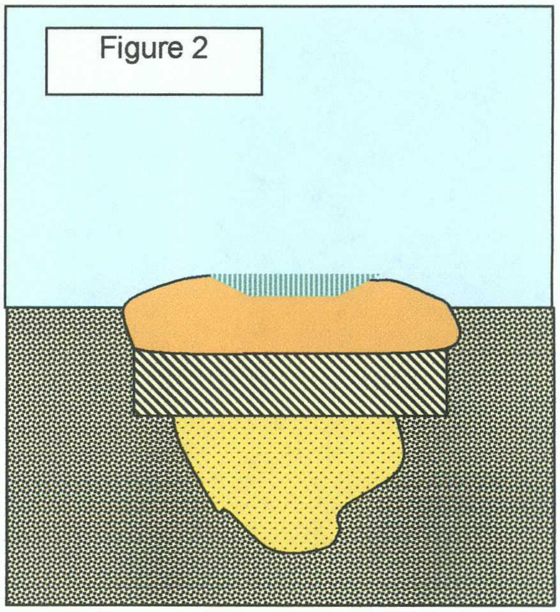


The closure plan is quite simple. Currently the site appears similar to Figure 1 where dirt piles remain around the excavation. Consistent with EPA design criteria for a monolithic evaportranspiration barrier, ROC will

1. Enlarge the excavation to a depth of about 3 feet, creating a 2-foot wide bench around the existing excavation.
2. Place a 2-foot layer of clay in the excavation and compact this material only slightly. This clay layer is the "fine grained layer" shown in Figure 2 of the EPA Fact Sheet. The attached EPA fact sheet states the following on page 5 in reference to soil layers, including the fine grained layer shown in Figure 2 of the Fact Sheet:

> *Compaction impacts bulk density, which in turn affects the storage capacity of the soil and the growth of roots. One key aspect of construction is minimizing the amount of compaction during placement. Higher bulk densities may reduce the storage capacity of the soil and inhibit growth of roots (Chadwick and others 1999; Hauser, Weand, and Gill 2001).*

3. Over the clay layer is about 2 feet of topsoil, which will be "patch seeded" with native species of grass. In a separate communication to Hicks Consultants, Dr. Kerry Sublette of the University of Tulsa stated that creating small patches (1-3 feet in diameter) of a grass community can be a more effective method of re-vegetation than broadcast seeding simply because it is easier to encourage growth of small patches through the addition of mulch and extra water. Once the 3-4 patch communities are established on the site, they spread rapidly.



Our Figure 2 shows the final design of the E-5 ET cover. The yellow diagonal striped material is the loosely compacted clay layer that will serve to hold infiltrated precipitation. The brown material overlying the clay is the topsoil, which will be seeded as proposed. The topsoil layer will be graded to shed excess precipitation. However, extending 1-2 feet away from each area of the patch seeding the topsoil will be "dimpled" to direct excess rainfall to the grass community. This dimpling is grossly exaggerated in Figure 2 in order to display our intent.

Groundwater Monitoring Plan

Continued monitoring of major ions and total dissolved solids (TDS) is recommended at a annual frequency as monitoring of these constituents at the E-5 site are also part of the groundwater monitoring activities for nearby ROC sites (P-6, M-5, and N-5). Analysis for BTEX concentrations should be suspended, as there has been no indication of dissolved hydrocarbons since the groundwater monitoring program began in May 2002 (15 consecutive quarters).

Because we plan on employing the same ET cover design for many other sites, including the Lovington Abo-1G site that is currently undergoing surface restoration, we ask that you review this design concept quickly. Thank you for your attention to this matter.

Sincerely,
R.T. Hicks Consultants, Ltd.

Randall Hicks

Randall Hicks
Principal

Copy: Kristin Farris Pope

Evapotranspiration Landfill Cover Systems Fact Sheet

INTRODUCTION

Alternative final cover systems, such as evapotranspiration (ET) cover systems, are increasingly being considered for use at waste disposal sites, including municipal solid waste (MSW) and hazardous waste landfills when equivalent performance to conventional final cover systems can be demonstrated. Unlike conventional cover system designs that use materials with low hydraulic permeability (barrier layers) to minimize the downward migration of water from the cover to the waste (percolation), ET cover systems use water balance components to minimize percolation. These cover systems rely on the properties of soil to store water until it is either transpired through vegetation or evaporated from the soil surface. Compared to conventional cover systems, ET cover systems are expected to be less costly to construct. While ET cover systems are being proposed, tested, or have been installed at a number of waste disposal sites, field performance data and design guidance for these cover systems are limited (Benson and others 2002; Hauser, Weand, and Gill 2001).

This fact sheet provides a brief summary of ET cover systems, including general considerations in their design, performance, monitoring, cost, current status, limitations on their use, and project-specific examples. It is intended to provide basic information to site owners and operators, regulators, consulting engineers, and other interested parties about these potential design alternatives. An on-line database has been developed that provides more information about specific projects using ET covers, and is available at *http://cluin.org/products/altcovers*. Additional sources of information are also provided.

The information contained in this fact sheet was obtained from currently available technical literature and from discussions with site managers. It is not intended to serve as guidance for design or construction, nor indicate the appropriateness of using ET final cover systems at a particular site. The fact sheet does not address alternative materials (for example, geosynthetic clay liners) for use in final cover systems, or other alternative cover system designs, such as asphalt covers.

Online Database:
http://cluin.org/products/altcovers

BACKGROUND

Final cover systems are used at landfills and other types of waste disposal sites to control moisture and percolation, promote surface water runoff, minimize erosion, prevent direct exposure to the waste, control gas emissions and odors, prevent occurrence of disease vectors and other nuisances, and meet aesthetic and other end-use purposes. Final cover systems are intended to remain in place and maintain their functions for an extended period of time.

In addition, cover systems are also used in the remediation of hazardous waste sites. For example, cover systems may be applied to source areas contaminated at or near the ground surface or at abandoned dumps. In such cases, the cover system may be used alone or in conjunction with other technologies to contain the waste (for example, slurry walls and groundwater pump and treat systems).

The design of cover systems is site-specific and depends on the intended function of the final cover – components can range from a single-layer system to a complex multi-layer system. To

This fact sheet is intended solely to provide general information about evapotranspiration covers. It is not intended, nor can it be relied upon, to create any rights enforceable by any party in litigation with the United States. Use or mention of trade names does not constitute endorsement or recommendation for use.

United States Environmental Protection Agency

Solid Waste and Emergency Response (5102G)

EPA 542-F-03-015
September 2003
www.epa.gov
http://cluin.org

soil layer to retain water until it is either transpired through vegetation or evaporated from the soil surface. A conceptual design of a monolithic cover system is shown in Figure 2. Exhibit 1 provides an example of a full-scale monolithic cover at a MSW landfill.

Capillary barrier cover systems consist of a finer-grained soil layer (like that of a monolithic cover system) overlying a coarser-grained material layer, usually sand or gravel, as shown conceptually in Figure 3. The differences in the unsaturated hydraulic properties between the two layers minimize percolation into the coarser-grained (lower) layer under unsaturated conditions. The finer-grained layer of a capillary barrier cover system has the same function as the monolithic soil layer; that is, it stores water until it is removed from the soil by evaporation or transpiration mechanisms. The coarser-grained layer forms a capillary break at the interface of the two layers, which allows the finer-grained layer to retain more water than a monolithic cover system of equal thickness. Capillary forces hold the water in the finer-grained layer until the soil near the interface approaches saturation. If saturation of the finer-grained layer occurs, the water will move relatively quickly into and through the coarser-grained layer and to the waste below. Exhibit 2 provides an example of a capillary barrier field demonstration at a MSW landfill (Dwyer 2003, Stormont 1997).

Figure 2. Conceptual Design of a Monolithic ET Final Cover

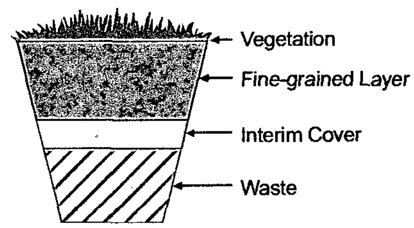


Exhibit 1. Monolithic ET Cover at Lopez Canyon Sanitary Landfill, Los Angeles, CA

Site type: Municipal solid waste landfill
Scale: Full-scale
Cover design: The ET cover was installed in 1999 and consists of a 3-foot silty sand/clayey sand layer, which overlies a 2-foot foundation layer. The cover soil was placed in 18-inch lifts and compacted to 95 percent with a permeability of less than $3x10^{-5}$ cm/s. Native vegetation was planted, including artemesia, salvia, lupines, sugar bush, poppy, and grasses.
Regulatory status: In 1998, Lopez Canyon Sanitary Landfill received conditional approval for an ET cover, which required a minimum of two years of field performance data to validate the model used for the design. An analysis was conducted and provided the basis for final regulatory approval of the ET cover. The cover was fully approved in October 2002 by the California Regional Water Quality Control Board - Los Angeles Region.
Performance data: Two moisture monitoring systems were installed, one at Disposal Area A and one at Disposal Area ABplus in May and November 1999, respectively. Each monitoring system has two stacks of time domain reflectometry probes that measure soil moisture at 24-inch intervals to a maximum depth of 78 inches, and a station for collecting weather data. Based on nearly 3 years of data, there is generally less than a 5 percent change in the relative volumetric moisture content at the bottom of the cover compared to nearly 90 percent change near the surface. This implies that most of the water infiltrating the cover is being removed via evapotranspiration and is not reaching the bottom of the cover.
Modeling: The numerical model UNSAT-H was used to predict the annual and cumulative percolation through the cover. The model was calibrated with 12 months of soil moisture content and weather data. Following calibration, UNSAT-H predicted a cumulative percolation of 50 cm for the ET cover and 95 cm for a conventional cover over a 10-year period. The model predicted an annual percolation of approximately 0 cm for both covers during the first year. During years 3 through 10 of the simulation, the model predicted less annual percolation for the ET cover than for the conventional cover.
Maintenance activities: During the first 18 months, irrigation was conducted to help establish the vegetation. Once or twice a year, brush is cleared to comply with Fire Department regulations. Prior to the rainy season, an inspection is conducted to check and clear debris basins and deck inlets. No mowing activities or fertilizer applications have been conducted or are planned.
Cost: Costs were estimated at $4.5 million, which includes soil importation, revegetation, quality control and assurance, construction management, and installation and operation of moisture monitoring systems.
Sources: City of Los Angeles 2003, Hadj-Hamou and Kavazanjian 2003.
More information available at http://cluin.org/products/altcovers

their corresponding soil properties have been understood for many years, their application as final cover systems for landfills has emerged only within the past 10 years. Limited performance data are available on which to base applicability or equivalency decisions (Dwyer 2003; Dwyer, Stormont, and Anderson 1999; Hauser and Weand 1998).

Numerical models are used to predict the performance and assist in the design of final cover systems. The availability of models used to conduct water balance analyses of ET cover systems is currently limited, and the results can be inconsistent. For example, models such as Hydrologic Evaluation of Landfill Performance (HELP) and Unsaturated Water and Heat Flow (UNSAT-H) do not address all of the factors related to ET cover system performance. These models, for instance, do not consider percolation through preferential pathways; may underestimate or overestimate percolation; and have different levels of detail regarding weather, soil, and vegetation. In addition, HELP does not account for physical processes, such as matric potential, that generally govern unsaturated flow in ET covers. Further information about numerical models is provided under the Performance and Monitoring section of this fact sheet (Dwyer 2003; Weand and others 1999; Khire, Benson, and Bosscher 1997).

GENERAL CONSIDERATIONS

The design of ET cover systems is based on providing sufficient water storage capacity and evapotranspiration to control moisture and water percolation into the underlying waste. The following considerations generally are involved in the design of ET covers.

Climate – The total amount of precipitation over a year, as well as its form and distribution, determines the total amount of water storage capacity needed for the cover system. The cover may need to accommodate a spring snowmelt event that causes the amount of water at the cover to be relatively high for a short period of time or conditions during cool winter weather with persistent, light precipitation. Storage capacity is particularly important if the event occurs when local vegetation is dormant, yielding less evapotranspiration. Other factors related to climate that are important to cover design are temperature, atmospheric pressure, and relative humidity (Benson 2001; EPA 2000a; Hauser, Weand, and Gill 2001).

Soil type – Finer-grained materials, such as silts and clayey silts, are typically used for monolithic ET cover systems and the top layer of a capillary barrier ET cover system because they contain finer particles and provide a greater storage capacity than sandy soils. Sandy soils are typically used for the bottom layer of the capillary barrier cover system to provide a contrast in unsaturated hydraulic properties between the two layers. Many ET covers are constructed of soils that include clay loam, silty loam, silty sand, clays, and sandy loam.

The storage capacity of the soil varies among different types of soil, and depends on the quantity of fine particles and the bulk density of the soil. Compaction impacts bulk density, which in turn affects the storage capacity of the soil and the growth of roots. One key aspect of construction is minimizing the amount of compaction during placement. Higher bulk densities may reduce the storage capacity of the soil and inhibit growth of roots (Chadwick and others 1999; Hauser, Weand, and Gill 2001).

Soil thickness – The thickness of the soil layer(s) depends on the required storage capacity, which is determined by the water balance at the site. The soil layers need to accommodate extreme water conditions, such as snowmelts and summer thunderstorms, or periods of time during which ET rates are low and plants are dormant. Monolithic ET covers have been constructed with soil layers ranging from 2 feet to 10 feet. Capillary barrier ET covers have been constructed with finer-grained layers ranging from 1.5 feet to 5 feet, and coarser-grained layers ranging from 0.5 foot to 2 feet.

Vegetation types – Vegetation for the cover system is used to promote transpiration and minimize erosion by stabilizing the surface of the cover. Grasses (wheatgrass and clover), shrubs (rabbitbrush and sagebrush), and trees (willow and hybrid poplar) have been used on ET covers. A mixture of native plants consisting of warm- and cool-season species usually is planted, because native vegetation is more tolerant than imported vegetation to regional conditions, such as extreme weather and disease. The combination of warm- and cool-season species provides water uptake throughout the entire growing season, which enhances transpiration. In addition, native vegetation is usually planted, because these species are less likely to disturb the natural ecosystem (Dwyer, Stormont, and Anderson 1999; EPA 2000a).

Soil and organic properties – Nutrient and salinity levels affect the ability of the soil to support vegetation. The soil layers need to be capable of providing nutrients to promote vegetation growth and maintain the vegetation system. Low nutrient or high salinity levels can be detrimental to vegetation growth, and if present, supplemental nutrients may need to be added to promote vegetation growth. For example, at Fort Carson, Colorado, biosolids were added to a monolithic ET cover to increase organic matter and provide a slow release of nitrogen to enhance vegetation growth. In addition, topsoil promotes

Exhibit 3. Alternative Landfill Cover Demonstration (ALCD)

The U.S. Department of Energy (DOE) has sponsored the ALCD, which is a large-scale field test of two conventional designs (RCRA Subtitle C and Subtitle D) and four alternative landfill covers (monolithic ET cover, capillary barrier ET cover, geosynthetic clay liner cover, and anisotropic [layered capillary barrier] ET cover). The test was conducted at Sandia National Laboratories, located on Kirtland Air Force Base in Albuquerque, New Mexico, with cover design information available at *http://www.sandia.gov/Subsurface/factshts/ert/alcd.pdf.* The ALCD has collected information on construction, cost, and performance that is needed to compare alternative cover designs with conventional covers. The RCRA covers were constructed in 1995, and the ET covers were constructed in 1996. All of the covers are 43 feet wide by 328 feet long and were seeded with native vegetation. The purpose of the project is to use the performance data to help demonstrate equivalency and refine numerical models to more accurately predict cover system performance (Dwyer 2003).

The ALCD has collected data on percolation using a lysimeter and soil moisture to monitor cover performance. Total precipitation (precip.) and percolation (perc.) volumes based on 5 years of data are provided below. The ET covers generally have less percolation than the Subtitle D cover for each year shown below. More information on the ALCD cover performance can be found in Dwyer 2003.

	1997 (May 1 - Dec 31)		1998		1999		2000		2001		2002 (Jan 1 - Jun 25)	
	Precip. (mm)	Perc. (mm)	Precip. (mm)	Perc. (mm)	Precip. (mm)	Perc. (mm)	Precip. (mm)	Perc. (mm)	Precip. (mm)	Perc. (mm)	Precip. (mm)	Perc. (mm)
Monolithic ET	267.00	0.08	291.98	0.22	225.23	0.01	299.92	0.00	254.01	0.00	144.32	0.00
Capillary barrier ET	267.00	0.54	291.98	0.41	225.23	0.00	299.92	0.00	254.01	0.00	144.32	0.00
Anisotropic (layered capillary barrier) ET	267.00	0.05	291.98	0.07	225.23	0.14	299.92	0.00	254.01	0.00	144.32	0.00
Geosynthetic clay liner	267.00	0.51	291.98	0.19	225.23	2.15	299.92	0.00	254.01	0.02	144.32	0.00
Subtitle C	267.00	0.04	291.98	0.15	225.23	0.02	299.92	0.00	254.01	0.00	144.32	0.00
Subtitle D	267.00	3.56	291.98	2.48	225.23	1.56	299.92	0.00	254.01	0.00	144.32	0.74

Monitoring systems – Lysimeters are installed underneath a cover system, typically as geomembrane liners backfilled with a drainage layer and shaped to collect water percolation. Water collected in the lysimeter is directed toward a monitoring point and measured using a variety of devices (for example, tipping bucket, pressure tranducers). Lysimeters have been used in the ALCD and ACAP programs for collecting performance data for ET cover systems.

Soil moisture monitoring can be used to determine moisture content at discrete locations in cover systems and to evaluate changes over time in horizontal or vertical gradients. Soil moisture is measured using methods to determine relative humidity, soil matrix potential, and resistance. Table 1 presents examples of non-destructive techniques that have been used to assess soil moisture content of ET cover systems. A high soil moisture value indicates that the water content of the cover system is approaching its storage capacity, thereby increasing the potential for percolation. Soil moisture is especially important for capillary barrier ET cover systems; when the finer-grained layer becomes saturated, the capillary barrier can fail resulting in water percolating through the highly permeable layer to the waste below (Hakonson 1997).

Maintaining the effectiveness of the cover system for an extended period of time is another important performance criterion for ET covers as well as conventional covers. Short-term and long-term performance monitoring of a final cover system includes settlement effects, gas emissions, erosion or slope failure, and other factors.

Numerical models – While there are limitations to numerical models, as previously described, they have been used to predict cover performance and assist in the design of ET cover systems. Numerical models have been used to compare the expected performance of ET cover systems to conventional cover systems. By entering multiple parameters and evaluating the design of cover systems, designs can be modified until specific performance results are achieved. The numerical model HELP is the most widely used water balance model for landfill cover design. UNSAT-H and HYDRUS-2D are two other numerical models that have been used frequently for the design of ET covers. HELP and UNSAT-H are in the public domain, while HYDRUS-2D is available from the International Ground Water Modeling Center in Golden, CO *http://typhoon.mines.edu* (Dwyer 2003; Khire, Benson, and Bosscher 1997).

Recent studies have compared available numerical models and found that cover design depends on site-specific factors, such as climate and cover type, and that no single model is adequate to accurately predict the performance of all ET covers. Several of the studies identified are: intercode comparisons for simulating water balance of surficial sediments in semi-arid regions, which compared results of seven numerical models for nonvegetated, engineered covers in semiarid regions; water balance measurements and computer simulations of landfill covers, which evaluated ALCD cover performance and predicted results from HELP and UNSAT-H; and field hydrology and model predictions for final covers in the ACAP, which compared performance results with those predicted by HELP and UNSAT-H (Scanlon and others 2002; Dwyer 2003; Roesler, Benson, and Albright 2002).

COST

Limited cost data are available for the construction and operation and maintenance (O&M) of ET cover systems. The available construction cost data indicate that these cover systems have the potential to be less expensive to construct than conventional cover systems. Factors affecting the cost of construction include availability of materials, ease of installation, and project scale. Locally available soils, which are usually less costly than imported clay soils, are typically used for ET cover systems. In addition, the use of local materials generally minimizes transportation costs (Dwyer 2003, EPA 2000a).

While the construction cost for an ET cover is expected to be less than that for a conventional cover, uncertainty exists about the costs for O&M after construction. Several factors affecting the O&M cost include frequency and level of maintenance (for example, irrigation and nutrient addition), and activities needed to address erosion and biointrusion. In addition, when comparing the costs for ET and conventional covers, it is important to consider the types of components for each cover and their intended function. For example, it would generally not be appropriate to compare the costs for a conventional cover with a gas collection layer to an ET cover with no such layer. Additional information about the costs for specific ET cover systems is provided in project profiles, discussed below under Technology Status.

TECHNOLOGY STATUS

A searchable on-line database has been developed with information about ET cover systems and is available at *http://cluin.org/products/altcovers*. As of September 2003, the database contained 56 projects with monolithic ET cover systems and 21 projects with capillary barrier ET cover systems; these systems have been proposed, tested, or installed at 64 sites located throughout the United States, generally from Georgia to Oregon. Some sites have multiple projects, and some projects have multiple covers and/or cover types.

The database provides project profiles that include site background information (for example, site type, climate, precipitation), project information (for example, purpose, scale, status), cover information (for example, design, vegetation, installation), performance and cost information, points of contact, and references. Table 2 provides a summary of key information from the database for 34 recent projects with monolithic ET or capillary barrier ET covers.

In addition to this on-line database, several ongoing federal and state initiated programs are demonstrating and assessing the performance of ET cover systems. The following programs provide performance data, reports, and other useful information to help evaluate the applicability of ET designs for final cover systems.

- Alternative Landfill Cover Demonstration – See Exhibit 3 for more information or *http://www.sandia.gov/Subsurface/factshts/ert/alcd.pdf*
- Alternative Cover Assessment Program – See Exhibit 4 for more information or *http://www.acap.dri.edu*
- Interstate Technology and Regulatory Council – Published a report called *Technology Overview Using Case Studies of Alternative Landfill Technologies and Associated Regulatory Topics*; March 2003. For further information, see *http://www.itrcweb.org*

Stormont, John C. 1997. "Incorporating Capillary Barriers in Surface Cover Systems." Environmental Science and Research Foundation. *Proceedings, Landfill Capping in the Semi-Arid West: Problems, Perspectives, and Solutions.* Grand Teton National Park, Wyoming. May 21 through 22. ESRF-019. Pages 39 through 51.

EPA. 1989. Technical Guidance Document: "Final Covers on Hazardous Waste Landfills and Surface Impoundments." EPA/530-SW-89-047. July.

EPA. 1991. "Seminar Publication, Design and Construction of RCRA/CERCLA Final Covers." EPA/625/4-91/025. May.

EPA. 1992. "Subtitle D Clarification." *40 CFR 257 & 258.* Federal Register pages 28626 through28632. June.

EPA. 2000a. *Introduction to Phytoremediation.* Office of Research and Development. Washington, DC. EPA/600/R-99/107. February.

EPA. 2000b. "Operating Industries Inc. Final Construction As Built Report." May.

Weand, B.L., and others. 1999. "Landfill Covers for Use at Air Force Installations." AFCEE. Brooks Air Force Base, Texas. February.

NOTICE

Preparation of this fact sheet has been funded wholly or in part by the U.S. Environmental Protection Agency under Contract Number 68-W-02-034. For more information regarding this fact sheet, please contact Mr. Kelly Madalinski, EPA, at (703) 603-9901 or madalinski.kelly@epa.gov.

This fact sheet is available for viewing or downloading from EPA's Hazardous Waste Cleanup Information (CLU-IN) web site at http://cluin.org. Hard copies are available free of charge from:

U.S. EPA/National Service Center for Environmental Publications (NSCEP)
P.O. Box 42419
Cincinnati, OH 45242-2419
Telephone: (513) 489-8190 or (800) 490-9198
Fax: (513) 489-8695

ACKNOWLEDGMENT

Special acknowledgment is given to the following individuals for their review and thoughtful suggestions to support the preparation of this fact sheet: David Carson (EPA), Steve Rock (EPA), Ken Skahn (EPA), Steve Wall (EPA), Greg Mellama (U.S. Army Corps of Engineers), Joey Trotsky (U.S. Navy), Bill Albright (Desert Research Institute), Craig Benson (University of Wisconsin-Madison), Steve Dwyer (Sandia National Laboratory), Glendon Gee (Pacific Northwest National Laboratory), Tanya Goldfield (City of Los Angeles), Charles Johnson (Colorado Department of Public Health), Doug Walters (City of Los Angeles), and Tom Hakonson (Environmental Evaluation Services, LLC).

NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

BILL RICHARDSON
Governor
Joanna Prukop
Cabinet Secretary

Mark E. Fesmire, P.E.
Director
Oil Conservation Division

RECEIVED
JUL 18 2005
RICE OPERATING
HOBBS, NM

July 13, 2005

Carolyn Doran Haynes
Rice Operating Company (ROC)
122 West Taylor
Hobbs, New Mexico 88240

Re: Zachary Hinton EOL
UL O Sec 12-Ts22S-R37E
OCD case # 1R0426-36

Dear Ms. Haynes:

The New Mexico Oil Conservation Division (NMOCD) is in receipt of Rice Operating Company's (ROC) letter dated June 29, 2005 requesting that OCD reconsider requiring an abatement plan for the above referenced site. The OCD technical staff has reviewed the documents submitted and determined that ROC did not properly investigate or remediate the vadose zone or groundwater which was impacted from the site's operations. The facts in this case are as follows:

1. ROC discovered in 2002 that its operations had caused groundwater contamination.
2. The groundwater beneath the site still exceeds the groundwater standards for Chlorides and TDS.
3. The groundwater contamination was never delineated.
4. Contamination still remains in the vadose zone.

Therefore, you are hereby ordered to submit an abatement plan pursuant to OCD Rule 19 as required in my letter dated May 05, 2005. Failure to perform the above requested actions will result in OCD setting this case for a compliance hearing in front of an OCD hearing examiner. The OCD will ask for corrective actions and civil penalties.

Sincerely;

Daniel Sanchez-Enforcement and Compliance Manager

Xc: Roger Anderson-Environmental Bureau Chief
OCD Hobbs Office

NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

BILL RICHARDSON
Governor
Joanna Prukop
Cabinet Secretary

Mark E. Fesmire, P.E.
Director
Oil Conservation Division

RECEIVED
JUL 18 2005
RICE OPERATING
HOBBS, NM

July 13, 2005

Carolyn Doran Haynes
Rice Operating Company (ROC)
122 West Taylor
Hobbs, New Mexico 88240

Re: Zachary Hinton EOL
UL O Sec 12-Ts22S-R37E
OCD case # 1R0426-36

Dear Ms. Haynes:

The New Mexico Oil Conservation Division (NMOCD) is in receipt of Rice Operating Company's (ROC) letter dated June 29, 2005 requesting that OCD reconsider requiring an abatement plan for the above referenced site. The OCD technical staff has reviewed the documents submitted and determined that ROC did not properly investigate or remediate the vadose zone or groundwater which was impacted from the site's operations. The facts in this case are as follows:

1. ROC discovered in 2002 that its operations had caused groundwater contamination.
2. The groundwater beneath the site still exceeds the groundwater standards for Chlorides and TDS.
3. The groundwater contamination was never delineated.
4. Contamination still remains in the vadose zone.

Therefore, you are hereby ordered to submit an abatement plan pursuant to OCD Rule 19 as required in my letter dated May 05, 2005.* *Failure to perform the above requested actions will result in OCD setting this case for a compliance hearing in front of an OCD hearing examiner. The OCD will ask for corrective actions and civil penalties.

Sincerely;

Daniel Sanchez-Enforcement and Compliance Manager

Xc: Roger Anderson-Environmental Bureau Chief
OCD Hobbs Office