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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

May 7, 2004

Mr. R. Paul Detwiler, Acting Manager
Carlsbad Field Office
Department of Energy
P.O. Box 3090
Carlsbad, New Mexico 88221-3090

Dr. Steven Warren, President
Washington TRU Solutions, LLC
P.O. Box 2078
Carlsbad, New Mexico 88221-5608

RE: FINAL DETERMINATION, CLASS 2 MODIFICATION REQUESTS
WIPP HAZARDOUS WASTE FACILITY PERMIT
EPA I.D. NUMBER NM4890139088

Dear Mr. Detwiler and Dr. Warren:

The New Mexico Environment Department (**NMED**) hereby approves with changes certain Class 2 permit modification requests (**PMRs**) to the WIPP Hazardous Waste Facility Permit as submitted to the Hazardous Waste Bureau (**HWB**) in the following document:

- Request for Class 2 Permit Modification (Two Item), Letter Dated 1/7/04, Rec'd 1/8/04

The following items were included in this submittal:

1. Packaging-Specific Drum Age Criteria for New Approved Waste Containers
2. Allow the Use of Either Track or Non-Track Mounted Conveyance Cars

These Class 2 modifications were processed by NMED in accordance with the requirements specified in 20.4.1.900 NMAC (incorporating 40 CFR §270.42(b)). They were subject to a sixty (60) day public comment period, which initially ran from January 13 through March 12, 2004 for the PMR. However, due to extenuating circumstances and at the request of the Permittees, NMED extended the public comment period until March 22, 2004. NMED received written comments from a total of six individuals and organizations during the public comment period on the PMR.

NMED hereby approves these items with changes as specified in Attachment 1. Attachment 2 provides NMED's technical basis for limiting compacted 55-gallon drums under the drum age criteria (**DAC**) PMR to those without rigid polyliners. Attachment 3 contains pages of the modified permit in the redline/strikeout format to help the reader rapidly identify each modification. Language deleted from the permit is ~~stricken out~~. Language added to the permit is highlighted in redline. Specific language changes imposed by NMED are distinguished from language changes proposed in the modification request by yellow highlighting.

NMED is transmitting a CD-ROM containing the modified files in WordPerfect 8 redline/ strikeout format as well as files with all markings and comments removed. An electronic version of the modified permit with markings removed will be publicly posted on the NMED WIPP Document Download Page at http://www.nmenv.state.nm.us/wipp/download.html the week of May 10, 2004.

NMED notes with continued concern, as shared by several commenters, the quality of PMRs submitted for consideration. The disproportionate number of NMED edits indicated in Attachment 1 for such an apparently minor modification as the facility transfer vehicle PMR potentially indicates insufficient internal review prior to submittal for public comment. Another major concern is the apparent discrepancies between the official permit and the language purported to be consistent with the official permit in the submitted PMR. Several of the changes in the facility transfer vehicle modification highlighted in yellow (indicating language imposed by NMED) are due to such discrepancies. NMED strongly urges the Permittees to ensure their PMRs are always based on the current official version of the permit, available from the NMED WIPP Document Download Page listed above

For purposes of version control, please note that NMED has established the date of these modified attachments as May 7, 2004. The effective date of the permit modification approval is your date of receipt of this letter.

NMED will provide full response to all public comments under separate cover at a later date.

If you have any questions regarding this matter, please contact Steve Zappe at (505) 428-2517.

Sincerely,

Original signed by

Charles Lundstrom
Director
Water and Waste Management Division

CL/soz

Attachment 1 – Changes to Permit Modification Requests

Attachment 2 – Concerns with Calculating DAC Values for Compacted Wastes with Rigid Liners
Attachment 3 – Redline/Strikeout Pages

cc w/o Attachment 3:
Sandra Martin, NMED HWB
John Kieling, NMED HWB
Steve Zappe, NMED HWB
Laurie King, EPA Region 6
Betsy Forinash, EPA ORIA

cc w/ all Attachments
Chuck Noble, NMED OGC
Connie Walker, Trinity Engineering
File: Red WIPP '04

Attachment 1

Changes to Permit Modification Requests

1. Packaging-Specific Drum Age Criteria for New Approved Waste Containers

Section B1-1a(1) and B1-1a(2)

- The text was modified to indicate that compacted drums with rigid liners are not acceptable for disposal, reflecting NMED's primary concern associated with the proposed PMR: inadequate justification provided by the Permittees for the DAC assigned to drums containing compacted wastes. Attachment 2 provides additional detail regarding NMED's technical concerns associated with the Permittees' rationale for assigning a DAC for the 85 and 100-gallon containers that hold compacted wastes with rigid liners.

Section B1-1a(3)

- The text was modified from the PMR to reflect the fact that compacted waste containers with rigid liners will not be accepted.

2. Allow the Use of Either Track or Non-Track Mounted Conveyance Cars

Section D-1

- The text was modified to be consistent with the rest of the PMR by replacing the phrase "conveyance loading car" with "facility transfer vehicle". Apparently, the Permittees missed this specific occurrence.

Section E-2e

- The text was modified to be consistent with the rest of the PMR by replacing the phrase "conveyance loading car" with "facility transfer vehicle". Apparently, the Permittees also missed this specific occurrence.

Section F-1, "CH Bay Operations"

- The text provided in the PMR purporting to reflect original language did not match the language in NMED's version of the permit. The PMR indicated the word "about" should be struck, whereas the actual language that should be struck is "approximately 9.5".

Section F-1, "Containment"

- The text provided in the PMR suggested several additional edits that appeared to be random deletions and additions. NMED did not incorporate any unnecessary changes beyond those reflecting the clear intent of the PMR.

Attachment M1, List of Figures

- The PMR proposed eliminating Figure M1-11, which is a drawing of a conveyance loading car with 7-packs of waste on a facility pallet. There was no justification for removing this figure. Instead, NMED retained the figure with a different caption reflecting the fact that both tracked and non-tracked facility transfer vehicles will be used, and that this figure depicted an example of the facility transfer vehicle.

Section M1-1c(1)

- The PMR proposed removing references to the waste being a specific height off the floor. NMED edited the text to be consistent with other edits, such as in Attachment F, Section F-1.
- Another edit proposed eliminating the requirement to use forklifts to transfer CH Packages into the WHB Unit, but the PMR did not specify how the CH Packages would be taken off of the transport trailer. NMED retained the requirement consistent with Section M1-1d(2), and inserted language clarifying that forklifts may be used to transfer palletized CH TRU containers to the facility transfer vehicle.
- Another edit related to facility pallets was grammatically incorrect, suggesting "fork pockets" may be moved by facility transfer vehicles. NMED inserted a separate sentence making it clear that it is the pallets themselves that may be moved by the transfer vehicles.

Section M2-2b

- The PMR proposed language suggesting the possibility that the forklift and a facility transfer vehicle could both transport facility pallets to the conveyance loading room. NMED modified the language to require one or the other.

Attachment O, Table of Contents

- The PMR proposed eliminating Appendix O4, Figure O4-7, which is a photograph of a facility pallet being loaded into the Waste Hoist Conveyance. There was no justification for eliminating a photograph depicting this activity from the permit, so NMED retained it.

Attachment 2
Concerns with Calculating DAC Values for Compacted Wastes with Rigid Liners

The Permittees calculated DAC values under packaging scenarios 7 and 8 assuming all compacted drums have the same headspace and rigid liner VOC concentrations, and that the calculated DAC is conservative for scenarios when the concentrations in the compacted drums are not identical. The reasons provided by the Permittees to support their position that the calculated DAC values are conservative are as follows:

- The super-compaction process reduces the resistance of the drum liner to VOCs because of distortion in the polymer liner;
- The net rate of liner desorption is equal to or greater than the net rate of liner adsorption; and consequently the VOC concentration will either stay the same or decrease slightly after the initial mixing within the 100-gallon drum occurs;
- Although the headspace may not be at 90% steady state after the initial mixing in the 100-gallon drum commences, the concentration upon initial mixing will be greater than the eventual 90% steady state concentration.

However, the Permittees failed to provide adequate information to justify these assertions. The Permittees did not provide adequate calculations, modeling results, or mathematical analyses to support the PMR. In addition, NMED is concerned that the VDRUM conceptual model may no longer be valid because the compacted rigid liners would be a secondary and non-constant VOC source. The Permittees have not provided appropriate conceptual analysis of the behavior of compacted polyliners. NMED has the following specific concerns:

- The Permittees have not provided adequate supporting documentation to justify their assertion that distortion of the polyliner will unequivocally reduce the resistance to VOCs. The rate of adsorption or desorption in a polymer is generally attributable to the structure of the polymer to trap VOC molecules and ease to which VOC molecules can reach the open spaces in the polymer structure. Distortion of a polymer structure does not occur the same way every time it is compacted due to elastic instability phenomena (*Thompson and Hunt, 1984).* Prediction of polymer distortion would likely require modeling code that is far more complex than the VDRUM code itself. In one case, polymer distortion could create a polyliner that has a higher rate of adsorption/desorption because the distortion created an easier pathway for VOC molecules into and out of the polymer structure and created more places for VOC molecules to be trapped. Conversely, the distortion could create a polyliner that has a lower rate of adsorption/desorption because the pathways for VOCs have been restricted and there are fewer places for the molecules to be trapped in the polymer structure. It is also likely that the compacted polymer structure could be different for each drum. The Permittees' assertion that distortion will <u>always</u> reduce resistance in the polyliner must be supported through additional and adequate experimental testing, literature citations, or polymer distortion modeling.

- The Permittees have not provided adequate supporting documentation to justify their assertion that the rate of desorption from the polyliner contained in the high concentration compacted drum will be equal to or exceed the adsorption rate of the

polyliners contained in the low concentration compacted drums. Under the bounding scenario proposed previously by NMED, there will be more polyliner material that will undergo adsorption than will undergo desorption. The net rate of polyliner VOC adsorption or desorption within the 100-gallon drum will be dependent upon the following factors:

The equilibrium coefficient of the polyliner upon compaction – NMED has previously established that it may be difficult to predict the rate of adsorption or the equilibrium coefficients of a distorted polymer; therefore, it is entirely possible that each individual drum may have a different polymer structure upon compaction. If, as the Permittees have suggested, distortion will increase the rate of desorption in the polymer, it would also suggest that the rate of adsorption in the unsaturated polyliners would increase if the same polymer distortion were assumed. The Permittees have not quantified this change in adsorption/desorption rates. Consequently, this information raises the question of whether it is possible for the rate of adsorption to increase to the point that the true mixing concentration in the void space of the drum cannot be achieved until equilibrium in the compacted drum polyliners is reached. The Permittees must provide additional information to establish that the net rate of VOC adsorption in the distorted polymer structures will not impact the DAC calculation.

The quantity of polyliner undergoing adsorption in comparison to the quantity of material undergoing desorption – As noted by EEG, the quantity of polyliner undergoing adsorption in a 100-gallon drum containing compacted drums will be greater than the quantity of material undergoing desorption. For example, in a four compacted drum scenario, there would be three times as much polymer material undergoing adsorption as there is material undergoing desorption. Therefore, unless the rate of adsorption per unit volume is significantly lower than the rate of desorption per unit volume, the overall rate of adsorption should be greater than the overall rate of desorption.

The concentration gradient between polymer VOC concentrations and the VOC void concentration at any point in time – The rate of adsorption or desorption is dependent upon the concentration gradient between the polymer VOC concentration and the void space VOC concentration. This gradient will change as a function of time and will eventually reach zero when the system is at equilibrium. The rate of adsorption or desorption is dependant to a large extent on the size of the concentration gradient. Initially, the rate of adsorption per polymer volume would exceed the rate of desorption because the adsorption concentration gradient will be greater the desorption concentration gradient. Additionally, the gross rate of adsorption over the whole container will be much greater because of the larger relative volume of polymer adsorbing VOCs. If the adsorbing volume of polymer is sufficiently large, it could be possible that the rate of adsorption could exceed the rate at which the VOC source transmits VOCs to the headspace,

in which case the headspace concentration will not reach equilibrium within the calculated DAC time. The Permittees need to conclusively demonstrate that this scenario could not happen for compacted wastes.

- The Permittees' assertion that the proposed DAC would result in headspace gas concentrations that are greater than 90 % of the steady state concentration is based on several assumptions: that the initial rate of desorption from the one saturated polyliner would be equal to or greater than the initial rate of adsorption from the other polyliners; that the rate of mixing was unaffected by adsorption from polyliners; and that the headspace concentration would not drop below the 90% steady state concentration at any time. NMED concurs that obtaining samples that are greater than 90% of the steady state equilibrium would be appropriately conservative if the Permittees can demonstrate that the concentration for a proposed DAC would indeed be greater than the 90% steady state concentration. However, a permit modification would be required to specify that concentrations must be equal to or greater than the 90% steady state equilibrium concentration.

The Permittees did consider their assumption that all compacted drums would have the same VOC concentration and came to the conclusion that a uniformly consistent VOC concentration in the compacted drums was conservative over all other scenarios. However, the technical rationale and discussion justifying the assertion that the VOC concentrations at the proposed DAC are greater than 90 % of the steady state was not adequate. Based upon the response provided by the Permittees, NMED is concerned that the Permittees have not demonstrated through modeling, literature, or mathematical analysis that the proposed DAC is unequivocally more conservative than scenarios in which the compacted drum VOC concentrations are varied. If the Permittees adequately demonstrate and justify their assertion that the VOC headspace concentration will always exceed the 90% steady state value, then NMED concurs that reporting headspace gas results that are greater than the 90 % equilibrium value would be conservative.

If the Permittees are unable to demonstrate that the VOC headspace concentrations are greater than the 90% equilibrium value at all times, then the conceptual validity of VDRUM is in question. VDRUM does not have the capacity to model multiple sources or sources that are not constant. The polyliners would act as sources because they would be emitting VOCs to the headspace. However, the polyliner concentration will be less than that of the source (as defined by the compacted drum). In addition, the source concentration of the polyliner is not constant because it is dependant upon the concentration gradient between the VOCs in the polyliner and the headspace of the drum. It is likely that the Permittees chose to indicate that the DAC as calculated is conservative because they do not have an adequate model to calculate DAC values if there are multiple sources and if any of the sources are not constant. Creating a new model to account for these multiple and non-constant sources would likely be far more difficult to conceptualize and program than the current VDRUM model. Among the sources of difficulty include:

- Accounting for the elastic instability of the drum rigid liners as they are compacted

- Calculating the changes in liner concentration and headspace concentration as function of time and as a function of the concentration gradient between each liner and the headspace gas