Mr. Steve Zappe, Project Leader (WIPP)
Hazardous Waste Permits Program
Hazardous Waste Bureau
New Mexico Environment Department
2905 E. Rodeo Park Drive, Bldg E
Santa Fe, New Mexico 87505-6303

Subject: Comments on Two Class 2 Permit Modification Requests Entitled Drum Age Criteria and the Ten Drum Overpack

Dear Mr. Zappe:

The purpose of this letter is to submit comments on the Class 2 DAC modification request package submitted to your office on May 1, 2001, which included the following:

1. Drum Age Criteria
2. Ten Drum Overpack

The comments are the result of public meetings held in both Artesia and Albuquerque, New Mexico on June 5 and June 7, 2001, respectively, a public outreach meeting held by CBFO in Santa Fe on June 15, 2001, and written comments submitted to the NMED by the Environmental Evaluation Group (EEG).

If you have any questions regarding this submittal, please contact Mr. Jody Plum at 234-7462.

Sincerely,

Dr. Inês R. Tray
CBFO Manager

Enclosure

cc: (with Attachment)
   C. Walker, Techlaw

cc: (without Attachment)
   J. Bearzi, NMED
   J. Kieling, NMED

CBFO:ORC:IRT:KJB 01-1306 UFC5486
DEPARTMENT OF ENERGY
CARLSBAD FIELD OFFICE
AND
WESTINGHOUSE TRU SOLUTIONS
COMMENTS ON
THE DRUM AGE CRITERIA
AND
TEN DRUM OVERPACK MODIFICATIONS
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COMMENTS ON THE DRUM AGE CRITERIA CLASS 2 PERMIT MODIFICATION

INTRODUCTION

The Permittees are providing these comments to the NMED on the Class 2 permit submittal of May 1, 2001, regarding the Drum Age Criteria. These comments are based on input from the following sources:

Written comments provided by the Environmental Evaluation Group
Verbal comments received during the Public Information Meetings
Comments solicited from representative of public interest groups during a June 15 meeting in Santa Fe.

Several of these comments resulted in proposed changes to the permit. The proposed changes are included in double underscore redline bolded and strikeout bolded format to indicate additions and deletions respectively. Proposed changes are included in Attachment A.

EEG GENERAL COMMENTS ON THE DAC MODIFICATION

EEG Comment 1:

Comments attached to the NMED’s March 26, 2001 “Final Determination” letter for the previously submitted Class 2 modification on Drum Age Criteria discuss the changes in the calculations and assumptions since the original DAC was reviewed and accepted as a part of the HWFP. These comments state (p. 3 of the attachment):

While the mathematics appears generally appropriate, NMED has a number of questions concerning assumptions, applicability, etc., which remain unanswered because NMED did not have access to the authors nor have an opportunity to interact with the Permittees after the modification was submitted. This is primarily due to the nature of the Class 2 permit modification process, which does not provide for supplementing the administrative record with information obtained from a request for supplemental information (RSI) or a notice of deficiency (NOD). [emphasis in the original]

The same conditions that led to this comment would appear to be unchanged with the submission of this new Class 2 modification request.

The letter itself stated (p. 2):

Due to its complex technical nature and in consideration of the NMED’s and the public’s comments, the Permittees may wish to resubmit this permit modification request as a Class 3 modification under 20.4.1.900 (incorporating 40 §270.42(c)) and 20.4.1.908.B(5) NMAC...If the
Permittees continue to submit technically complex changes as Class 2 modifications, they run the risk of having technically deficient requests denied on the same basis as this DAC modification request.

The new modification request appears to be at least as complex as was the modification request that was rejected in the letter, and contains proposed additions to the HWFP which appear to contain deficiencies in information related to technical matters. While none of these deficiencies appear to be such as to cause rejection of the concepts behind the proposed modifications, information not included as a part of this modification request appears to be necessary before the request can be approved.

Response:

The revised DAC modification addresses all of the comments on the original DAC modification and includes the reports that were not originally provided. Therefore, the modification was resubmitted as a Class 2 permit modification. The CBFO does not believe that additional changes to the modification are necessary as the result of this comment.

EEG Comment 2:

The modification request as submitted would institute alterations of the HWFP other than DAC changes. The request clearly notes one of these changes (clarification interpretation that drum liners are not to be considered greater-than-four-liter sealed containers); this would seem to be a separate item that should have been proposed independently, so that its approval would not be contingent on approval of the DAC changes.

Response:

The greater-than-four-liter sealed container issue is directly connected to the DAC because the calculations used to generate the various DACs demonstrate that, as long as the sample is taken inside the sealed drum liner, the drum liner does not have to be vented prior to initiating the DAC. Yet the current permit would indicate that awaiting the DAC would be necessary. Furthermore, because one common paragraph in Section B1-1a is affected by both the DAC and the 4-liter container changes, it is easier to deal with them as one item instead of as multiple items. The CBFO does not believe that additional changes to the modification are necessary as the result of this comment.

EEG Comment 3:

The request also proposes an alteration to HWFP Attachment B1-1a to allow sampling of drums with unvented rigid 90-mil liners by using a needle that penetrates the liner. The statement in the "Basis" section of the proposed modification states (p. A-3):

The Permit also contains language in Section B1-1a that states that a
A representative sample cannot be collected until the rigid poly liner has been vented to the drum. This is only applicable to samples that are taken between the drum lid and the unvented poly liner. Samples that are taken from within the rigid drum liner or through the pipe component vent hole are representative if the appropriate DAC has been met. Therefore, the language in this section has been modified to clarify this point and to ensure such sampling obtains a representative sample.

Rather than a “clarification”, this is an alteration to a practice considered unacceptable in the current HWFP, and represents a deviation from WIPP headspace gas sampling requirements that have been in effect since at least 1995. HWFP sections B1-1a(3)(i), B1-1a(3)(ii), and B1-1a(3)(iii) all contain the following statements:

The lid of the drum's 90-mil poly liner shall contain a hole for venting to the container. A representative sample cannot be collected until the poly liner has been vented. If headspace-gas samples are collected prior to venting the 90-mil poly liner, the sample is not acceptable and a nonconformance report shall be prepared, submitted, and resolved.

Change to this requirement is not a change in drum age criteria. The DAC in the proposed change would remain the same, but it is a change to sample collection methodology that should have been proposed independent of the DAC modification proposal. A separate item would have allowed approval of the DAC changes without including endorsement of unvented drum liner sampling process.

The modification request does not contain or cite any data that demonstrate that a representative sample can be taken through an unvented rigid liner. The DOE should demonstrate that a representative sample can be obtained by the method proposed.

Response:

The use of this sampling method was discussed in the responses to comments on the draft permit. At one time, the NMED rejected the approach due to concern about spreading contamination. However, in the final analysis, the requirement to sample inner containers that was in the final permit allows such sampling for unvented containers greater than 4 liters. NMED has had ample opportunity to witness this activity at RFETS where the procedure of taking a gas sample by pushing a needle through the unvented rigid drum liner has been implemented. The procedure has been audited and approved by the NMED as part of the RFETS program. The term headspace gas samples in HWFP sections B1-1a(3)(i), B1-1a(3)(ii), and B1-1a(3)(iii)

Response:

The use of this sampling method was discussed in the responses to comments on the draft permit. At one time, the NMED rejected the approach due to concern about spreading contamination. However, in the final analysis, the requirement to sample inner containers that was in the final permit allows such sampling for unvented containers greater than 4 liters. NMED has had ample opportunity to witness this activity at RFETS where the procedure of taking a gas sample by pushing a needle through the unvented rigid drum liner has been implemented. The procedure has been audited and approved by the NMED as part of the RFETS program. The term headspace gas samples in HWFP sections B1-1a(3)(i), B1-1a(3)(ii), and B1-1a(3)(iii)

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1 The Transuranic Waste Quality Assurance Program Plan (CAO-94-1010, Revision 0, November, 1995), Section 7.2.3, required that, "A sample of the headspace gas directly under the drum lid must be collected from within each drum", and also states that, "The lid of the drum's 90 mil polyethylene liner must contain a hole for venting to the drum. If headspace gas samples are collected prior to venting the 90 mil liner, a nonconformance report must be prepared, submitted, and resolved." This document was the principal source of WIPP waste characterization requirements from its promulgation until it was canceled at the time the HWFP went into effect.
refer to the headspace of the drum. The process of taking a sample from inside of an unvented rigid drum liner is not the same as the process of taking a sample from the headspace gas of the drum. However, in both cases a representative sample of the gas in the container can be taken, after waiting the appropriate DAC. For example the headspace of the container cannot be representatively sampled until the rigid drum liner has been vented. This is not changed in the proposed modification. However, the permit states in Section B1-1a that when there are sealed rigid containers, the sample must be taken inside the inner container or the inner container vented and the DAC met. The CBFO does not believe the language in the permit is clear with regard to sampling inside the poly liner. This is one of the drivers for this modification request. The proposed language clarifies the use of inner container sampling and establishes conditions that are necessary to ensure that a representative sample is collected (i.e., the appropriate Scenario 1 DAC has been met, maintaining an air-tight seal). Again, this proposed change in language is directly related to the DAC change and is being submitted as part of the DAC modification as requested by the NMED. The CBFO does not believe that additional changes to the modification are necessary as the result of this comment.

**EEG Comment 4:**

The BWXT 1999\(^2\) report included in Appendix B to the modification request states (p. 1):

> For waste in a 55-gallon drum, the most dramatic improvement in DACs would result from the elimination of the rigid drum liner, from the removal of the rigid drum liner lid, or from an increase in the size of the hole in the drum liner.

The tables in the proposed modification readily support this conclusion—the rigid drum liner is the primary factor in determining time extensions to the DAC. When rigid liners are present, the size of the opening in the drum liner lid is therefore an important consideration.

The modeling for diffusion through liner lid openings is based on an equation that uses an estimated value for the VOC diffusivity in air at low pressures (see Equations 6 and 7, p. 14, of BWXT (2000)\(^3\)). The EEG's comments on the previous DAC Class 2 modification\(^4\) noted that the difference between the two smallest opening sizes listed in the tables would result in a 36-day change to the DAC for one packaging configuration, even though the size difference "...would not be obvious even in a visual examination without a measuring device" (p. 2). The difference in the size of the two smallest

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\(^4\) Attachment to February 9, 2001 Silva-to-Zappe letter.
openings listed in the modification request (0.375-in and 0.30-in) would be less than 2 mm in diameter.

This difference would, of course, be less obvious using real time radiography (RTR), where determining the size of the opening would be much more difficult than in visual examination. Since the most commonly used RTR equipment views drums from a side angle, the presence of an opening can currently be established; accurately measuring the size of the opening, even to distinguish between a 0.75-inch diameter and a 1.0-inch diameter, may require modification of RTR equipment so that a vertical view of the drum may be necessary.

A measuring system for verification of hole size for either VE or RTR is not discussed in the proposed modification, nor is training of RTR and VE personnel to performing the additional operations that would be necessary included in the modification request. Thus, the proposed modification does not provide for verification of acceptable knowledge of rigid liner lid openings, or establishment of the value in cases where AK does not provide it. These processes should be included in the modification before it is approved. The NMED should also consider whether RTR personnel should be periodically tested on their ability to determine liner lid opening sizes accurately, as is done for their ability to discern other specific objects in waste containers.

Response:

The current HWFP requires that the 90% of steady-state criterion be met prior to collecting a headspace gas sample. The DAC established in the permit to implement this 90% criterion are based on a minimum hole size of 0.375 in. There are procedures in place at the generator/storage sites to ensure that the 0.375 in. requirement is met and confirmed through the AK and radiography/VE process. (For example, RFETS removes the lid to drums to ensure the rigid liner is vented.) The specifics of the procedures that must be used for this purpose are not called out in the existing HWFP. However, these procedures have been audited and the audit reports have are been approved by the NMED signifying that the site procedures are sufficient to ensure that the minimum hole size of 0.375 in. is met and confirmed to ensure that the existing DACs in the HWFP are being properly applied. Therefore, the modification does not proposed to change the approach to implementing this requirement and allows for the same procedures to be used for ensuring that the hole diameter has been properly determined. However, to clarify the use of the hole diameter and to ensure that it is applied in a conservative fashion, the footnote referenced by the commentor was added to the revised permit text in the new submittal. In addition, noting the hole diameter is added to the list of packaging information that must be identified in Section B1-1a. The CBFO has included an additional change to the modification as the result of this comment in item 1. b.2.
EEG Comment 5:

A second potential issue related to liner lid opening size is that the BWXT (2000) document states (p. 1):

*The current limits for DACs (Connolly et al., 1998) are categorized based on the waste form and packaging as follows:*

*Waste Types I and IV, Solidified Inorganics and Solidified Organics.*

These wastes were assumed to be packaged in two drum liner bags, in a rigid drum liner with a 0.375-inch diameter hole...

Attached is page F-1 of Connolly et al., 1998⁵, which shows that the drum liners for sludge drums (Types I and IV) in the steady-state model were assumed to have a 5.1 cm² area. This would be the equivalent of a 1.0-inch diameter opening, rather than the 0.375-inch diameter hole cited in BWXT (2000). If the assumption that the original model used a 0.375-inch diameter opening was carried through to the conclusions of the BWXT (2000) report then the DACs for S3000/S4000 containers in both the BWXT (2000) report and the proposed modification could need to be adjusted. While it appears that the quotation above was likely an erroneous entry in the document which was not carried into the modeling, there is a need to conclusively establish its impact.

Response:

The commentor correctly notes that the statements in the text of the document are not consistent. The BWXT 1999 and 2000 reports both provide the documentation that shows the hole diameters and associated DACs that were calculated using the computer software. The results for these DAC numbers based on the various hole diameters have all been calculated using the new version of the software. The results include recalculating the existing DACs of 142 and 225 days using the appropriate hole diameter. Therefore, the commentors conclusion that it was an “erroneous entry in the document which was not carried into the modeling” is correct and there is no impact to the final numbers. The CBFO does not believe that additional changes to the modification are necessary as the result of this comment.

EEG Comment 6:

*The Discussion section of the modification request describes the testing performed on the model used to establish the current HWFP DAC, then states (p. A-4):*

Additional testing is not necessary because the actual waste drum testing demonstrated that the parameters effectively describe the interactions of the VOC gas with the polyethylene used in the packaging and can be

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scaled to the size of the polyethylene bags and rigid liners used in [the] actual system being modeled using the thickness and surface area.

Thus, the testing values that were good for two values of 225 days for solidified wastes and 142 days for debris waste in the HWFP are now considered able to cover the 120 different container age values represented in Tables B1-6 through B1-10. Several of these 120 values are for only 4 days, a considerable drop from the bounding values currently in the HWFP.

The Discussion section statements on testing only references the Lockheed (1995) document. This document (Revision 1 of the Connolly, et al. document cited previously) contains brief descriptions of the tests used to build and verify the model. These were perhaps sufficient for establishing the bounding DAC values currently in the HWFP. However, these descriptions do not show that the model used to derive the proposed new DAC values was tested against actual values for the parameters that are in the proposed Tables of new DAC values. The number of containers used in the experiments that were used to build the models is not even given, nor is it clear that drums used to verify the model included ones with no rigid liner, no liner lid, variations in the liner lid hole size when present, or the variety of confinement layers present. These and other important test data would seem to be in the documents referenced by Lockheed (1995); these are the four Liekhus, et. al. references listed in the References section (p. 7-1) of Lockheed (1995). The Permittees should provide these documents to NMED so that NMED can determine if the testing was sufficient to justify the range of values submitted.

Response:

Based on the comment, there appears to be confusion regarding the use of the term "model." The commentor implies that new parameters were used in the "modeling" and that these parameters were part of the original testing and require additional testing to use for the DACs in the proposed modification. This is not the case because the mathematical representation of the physical phenomena used to calculate the DAC (i.e., model) has not been changed, nor have any of the physical constants used to represent the system (e.g., solubility in the liner material, permeability of the bag material). It is the mathematical representation of the processes that occur inside of the drum and the physical constants that were tested and validated. For example, part of the testing involved the diffusion characteristics of hydrogen and VOCs across different filter vents. This testing established that the mathematical model used to calculate the VOC diffusivity across a filter vent based on relating the VOC diffusion characteristics in air to hydrogen diffusivity across the filter is valid.

The parameters from the proposed tables of DAC values that the commentor is referring to are changes to the inputs in the computer software for the rigid drum liner hole diameter and the filter's hydrogen diffusivity and do not require validation and testing. The CBFO does not believe that additional changes to the modification are necessary as the result of this comment.
EEG Comment 7:

The testing itself did not initially completely match the model. Connolly et al., 1998, Appendix D, which discusses the establishment of the model, states (p. D-2):

A comparison of model and experimental concentration ratios in the lab scale waste drum showed good agreement except in the cases of toluene and cyclohexane. Initial model estimates of the time required for toluene to reach near steady-state conditions (90 percent of steady state ratio) was much less (37 days) than was observed (>86 days). Since the model estimate of the toluene steady-state concentration ratio was similar to actual ratio observed, it was concluded that toluene permeability used in model calculations was correct. The discrepancy between model and actual concentration ratio was attributed to Henry’s constant used in original calculations.

Since the exact variation of VOC equilibrium concentration in the drum liner with VOC mole fraction in the gas phase could not be defined without additional data, the Henry’s constants for toluene and cyclohexane used in the model calculations were adjusted until time to reach near steady-state conditions more closely approximated the experimental results.

The magnitude of the change in Henry’s constant in order for the model to meet experimental data is not given, nor is the source of the initial value for the constant provided. Since the Henry’s constant resulted in good agreement for 27 of the 29 VOCs studied, altering it to make the model fit the data for the other two may have been a questionable enterprise. Toluene was used as the primary indicator VOC in the sensitivity study (see BWXT (1999), Tables II through IV, pp. B-5 to B-7), and the modification request (p. A-2 and A-4) states that toluene was the VOC used to establish the bounding DAC values currently in the HWFP. This material should be reviewed by a qualified chemist.

Response:

The specific text referenced by the commentor is part of the 1995 report that was used as the basis for establishing the DACs in the original HWFP. This text remained in the 1998 revision of the report. The Henry’s constant is one of the physical constants that was tested as part of the original testing and validation (see response to EEG Comment 6). Toluene was also used as the primary indicator VOC for the original DAC calculations. The testing and validation of the Henry’s constant and the application of toluene as the primary indicator VOC was reviewed and approved by the NMED as part of the original permitting process. The approach to the proposed DAC modification is to ensure that the models and physical parameters used in calculating the new DACs are not changed and are therefore supported by the administrative record. Consequently, no change is proposed in the Henry’s constant or the use of toluene as the primary indicator VOC. The CBFO does not believe that additional changes to the modification
are necessary as the result of this comment.

EEG Comment 8:

The modification request states (p. A-7):

If additional packaging configurations are identified at a later date, CBFO will submit modifications to specify appropriate DAC based on the methodology in the BWXT (2000) report. Sites are being encouraged to use packaging configurations that have a DAC established whenever possible.

A companion Class 2 modification request was submitted on the same date as this DAC modification request in order to increase the WIPP hazardous waste storage volume specifically for ten drum overpack (TDOP) containers. It would seem as if there is at least one additional packaging configurations that should have been included in this modification request. Other containers currently acceptable under the HWFP may need specific DACs also; many 55-gallon drums are currently overpacked in 85-gallon drums, 100-gallon drums may be used for overpacking of "several compacted containers", and both 85-gallon and 100-gallon drums may be directly loaded with waste. The NMED should consider whether or not DAC values should be established for these containers, in their various configurations, before approving this modification request.

The December, 2000 Revision 2 of the National TRU Waste Management Plan (DOE/NTP-96-1204) states concerning newly generated wastes (Section 2.3.1.6, p. 21):

Generators should use the largest container possible when generating waste for disposal (e.g., standard waste boxes or ten drum overpack containers) because of relative characterization costs.

Until a DAC (or DACs) for TDOPs is established sites are apparently being encouraged to use a packaging configuration for which headspace gas sampling protocols have yet to be established.

Response:

The directly loaded TDOP has been added as packaging configuration 7 in the revised permit text and is only allowed as an option for debris (S5000) waste. A DAC of 40 days has been calculated for the directly loaded TDOP. The CBFO has included an

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6 The Class 1 modification of 07-20-00 allowing direct loading of 85-gallon, and all uses of 100-gallon drums, have yet to be incorporated into the HWFP on the NMED's web site. These changes are not clearly in the Class 1 classifications listed in 40 CFR 270.42 Appendix I, and may therefore eventually be excluded from the HWFP.

It may be that the DACs for 55-gallon drums also apply to 85-gallon and 100-gallon drums. However, there is no evidence presented that these containers were considered either in the BWXT (2000) document, or by the Permittees in submitting this modification request.
additional change to the modification as the result of this comment in item 1. b.14. Supporting information for the calculation of the TDOP DAC is provided in Attachment B.

EEG Comment 9:

As currently configured, the process for establishing the DAC requires a complex analysis, revised equipment needs, additional training, and records keeping that not all sites and programs will need or want to implement. This modification request would have been enhanced by inclusion of a statement allowing use of a bounding DAC condition, which if applied site-wide would allow the site to continue current practices for DACs rather than expending unnecessary resources to meet the requirements inherent in the proposed change to the HWFP. In using this option, the site would then only need additional documentation of the decision to use the bounding condition. While this is not an action that the NMED can force on to the Permittees, the current concern with reducing the costs involved in waste characterization indicate that the Permittees may want to include this concept in the modification request.

Response:

Even with the current practices for DACs, the generator storage sites must establish in their characterization program that their packaging configuration, filter vents, and liner lid holes meet the assumptions used to generate the bounding DACs in the existing HWFP to ensure that the 90% of steady-state criterion is met. In addition, this information is required by the TRAMPAC for shipments in TRUPACT II. However to provide additional flexibility in implementing the DAC, the current version of the DAC modification allows the generator/storage sites to implement a bounding packaging configuration for drums and SWBs when the information necessary to establish the particular packaging configuration on a container basis is not available. The CBFO does not believe that additional changes to the modification are necessary as the result of this comment.

EEG COMMENTS ON PROPOSED TEXT REVISIONS IN THE DAC MODIFICATION

Comments use the same alpha-numeric numbering system as are found in the DAC modification request (i.e., a.1, a.2, b.1, etc). When multiple comments relate to a single modification, an additional number will be added (a.1-1, a.1-2, etc).

b.2-1 HWFP Section B1-1a is altered to create separate Summary Category Group (SCG) S5000 (debris) waste and SCG S3000/4000 (homogeneous solids and soil/gravel) waste discussions of nearly half a page each. These are added using a format (indentation of the text) that is not in conformance with the rest of the formatting of the Waste Analysis Plan, and this could create the impression that the paragraphs following these two SCG descriptions applies to the latter SCG only. The discussions in these two additions are also identical, except for references to the appropriate Tables for Scenario 3 DACs. These two discussions should be unified into a single description,
either referencing "the appropriate Tables" or ending in a single sentence stating which tables to use for the different Summary Category Groups, and both the separate titles and the indentation formatting should be dropped.

Response:

The CBFO has made the following changes to the proposed modification text. The additional indenting is removed to ensure consistency with the remainder of the HWFP. The format follows the existing format in the HWFP to provide separate discussions for the two waste types; however, the separate subheadings for "Summary Category S5000" and "Summary Category S3000/S4000" are removed to ensure that it is clear that the paragraphs following apply to all of the SCGs.

**b.2-2** Text is added to HWFP Section B1-1a which states (p. A-18):

The DAC for Scenario 2 containers that contain filters or liner vent holes other than those listed in Table B1-7 shall be determined using footnotes "a" and "b" in Table B1-7.

The footnote lettering for Table B1-7 might change in the future, and the text should state the policy clearly--that in the absence of an exact match to criteria from Table B1-7, the next more conservative value should be used (i.e., the filter diffusivity that is close to, but smaller than, the one in question, or the next smaller liner lid opening size).

Response:

If the Table B1-7 footnote lettering changes in the future, all references to the footnote lettering will be updated, including those in the text located in HWFP Section B1-1a. The CBFO does not believe that additional changes to the modification are necessary as the result of this comment.

**b.2-3** Text is added to HWFP Section B1-1a which states (p. A-18):

If a container is designated as packaging configuration group 4 (i.e., a pipe component), the headspace gas sample must be taken from the pipe component headspace.

This could be considered a change to the headspace gas sampling method, rather than to the DAC, and if so should have been a separate item in the modification request.

The HWFP currently specifies headspace gas sampling for "drums", an apparent misnomer meaning "container", but also implying the outermost container that meets

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7 The EEG pointed out in comment 4 of the attachment to the February 9, 2000 Neill-To-Zappe letter that the WAP portion of the HWFP contains several instances where the term "drum" has been used where "container" was apparently meant. Courtesy copies of the letter and attached comments—the attachment was titled WIPP WAP
Type A requirements (currently, headspace of drums, SWBs, or TDOPs). A method for performing headspace gas sampling on overpack containers is not currently specified in the HWFP, and a more generic statement which covers not only pipe components but also such practices as the LANL system of placing drums on which headspace gas sampling has taken place into SWBs could be added to the HWFP (LANL set the precedent by shipping these SWBs before the HWFP was promulgated, but has recently resumed shipping headspaced drums in SWBs). If this proposed modification is added to the HWFP, the analogous situation of the LANL SWBs could be considered a violation of HWFP requirements that are currently more open to interpretation. The NMED should consider whether or not the statement should be added or not, and also consider whether a more generic concept should be added instead.

Response:

The statements regarding the sampling of the pipe component headspace are consistent with the current policy of conservatively applying the headspace gas concentrations of overpacked containers to the overpack headspace. Sampling the container that will be overpacked is also consistent with the requirement to sample the unvented inner containers found in HWFP Section B1-1. The statements regarding the pipe component are only to ensure that it is clear that the DACs for drums and SWBs are not based on the package containing pipe components. The CBFO does not believe that additional changes to the modification are necessary as the result of this comment.

b.2-[3] Text is added to HWFP Section B1-1a which states (p. A-19):

Generator/storage sites are to use acceptable knowledge (procedural controls, etc.) as specified in Permit attachment B4 and may use radiography and/or visual examination as specified in Permit Attachment B1 to make the determination of the appropriate sampling scenario and packaging configuration.

However, requirements for AK and RTR/VE to record their findings have not been included in the modification request (though the same paragraph requires documentation associated with headspace gas sampling). The NMED should consider whether or not AK documentation should now be required to provide information on packaging configurations as well as waste generating processes, and RTR/VE should document rigid liner lid opening sizes as well as waste matrix codes and parameter category weights.

Response:

See response to EEG Comment 9.

Inconsistencies and Editorial Errors--were provided to the Permittees also. The EEG has never received a response to the comments, and the inconsistencies and errors noted are still in the HWFP.
When sampling the rigid drum liner under Scenario 1, the sampling device must form an airtight seal with the rigid poly drum liner to ensure that a representative sample is collected (using a sampling needle connected to the sampling head to pierce the rigid liner satisfies this requirement).

This process would seem to require removing the drum lid. Since drum liner lids are not meant to establish a seal—though they may do so—so that removal of the drum lid, attaching the sampling device, and forcing the needle through the liner may produce "breathing" from the inside of the liner. Such breathing would affect the representativeness of the sample. The uncertainty as to whether or not this process occurs is part of the reason that sampling through the liner has not been used in the past. The NMED should require evidence to be presented that sampling by this method will consistently produce representative concentrations of VOC samples.

Response:

The approach proposed in the permit modification is the same approach that is currently approved by the NMED and in use at the RFETS. The specific language was provided in the modification to build on the existing language for sampling inner containers in HWFP Section B1-1 and clarify its application to the unvented rigid drum liner. The CBFO does not believe that additional changes to the modification are necessary as the result of this comment.

Sub-scenarios B 1 and B2 require sampling through unvented rigid liners. As noted in a comment above, this is a sampling methodology that has yet to be approved, and should be considered as a change to sampling methods rather than a change to criteria as to when to sample.

Response:

The sampling methodology has been approved by the NMED as part of the audited and approved program at RFETS. The language only clarifies how to apply the Scenario 1 DAC to the rigid liner and has been included in this modification to be consistent with the NMED request that related changes be submitted together. The CBFO does not believe that additional changes to the modification are necessary as the result of this comment.

The added Table B1-8, Scenario 3 Packaging Configurations, states for Packaging Configuration 1 that covered packaging configurations contain a "filtered inner lid". This would seem to mean a drum liner lid (SRS has liners with drum filters in them, according to Section 5.0 of the Connolly et al. (1998) document), but the terminology is not completely clear. NMED should ascertain whether or not this language required clarification.
Response:

The commentor correctly notes that the configurations under Table B1-8 packaging reference a “filtered inner lid.” The “filtered inner lid” is a term used for double lid drums. The configuration with the double lid drums is not the bounding case for Packaging Configuration 1 and the “filtered inner lid” term is only used to be consistent with the terminology used in the TRUCON document for double lid drums. A footnote has been added to explain that the term refers to double lid drums. The CBFO has proposed a change to the permit text in item 1. b. 14 to accommodate this comment.

b.15 Tables B1-9, Scenario 3 Drum Age Criteria (in days) Matrix for S5000 Waste By Packaging Configuration Group, and Table B1-10, a similar table for S3000/S4000 waste, have identical DACs for all entries under Packaging Configuration 1 (no confinement layers, “filtered inner lid”). In contrast to this equivalency, the current HWFP contains DAC values for S3000/S4000 wastes (solidified material and soil/gravel) that are 50% greater than those for S5000 wastes (debris) even when there are more confinement layers for the S5000 waste (five layers instead of two). The same is true for proposed Packaging Configurations 2 and 3—the solidified and soil/gravel wastes have much longer DAC than does debris wastes. As solidified and soil/gravel wastes would seem to have less surface area to diffuse from as well as a denser matrix to diffuse through, the values in the current HWFP and in Packaging Configurations 2 and 3 appear to be a more logical presentation than those in the proposed tables for Packaging Configuration 1.

The model is said to have been the same for both the current HWFP and the proposed modification DAC values. The difference noted is an indication that one of the tables in the modification request may have incorrect values for Configuration 1 DACs, even though the values in both proposed tables were accurately copied from the BWXT (2000) document. The NMED should verify that the model’s output values for Packaging Configuration 1 were accurately placed in to the BWXT (2000) document.

The same equivalency of solidified wastes and soil gravel with debris waste DAC values is also found for Packaging Configurations 4, 5 and 6, which are for pipe components (4) and SWBs (5 and 6). The same concern may apply to these configurations also. However, pipe components have a much smaller volume of waste to diffuse from, a smaller space to reach 90% of steady state concentration in, and a long DAC value (152 days) to reach the steady state condition in. This appears to simply be a bounding value. SWBs have a greater surface area for diffusion from the waste, and again the values appear to be bounding cases.

Response:

All of the numbers have been correctly provided in the Tables. The parameters that control the DAC value are the packaging, not the waste matrix because the packaging and the amount of surface area is what restricts the diffusion of the VOCs. In the case of Packaging Configuration 1, there is no packaging and therefore the DACs should be the same for both waste matrices. The commentor correctly notes that the DACs for the
SWBs and pipe components (Packaging Configurations 4, 5, and 6) are not dependent on the summary category group. The commentor also correctly notes that a conservative bounding value that is not dependent on the summary category group has been used. This is because the conservative bounding values presented include the most conservative value (i.e., longer DAC) between the summary category groups.

COMMENTS ON THE DAC MODIFICATION FROM THE MEMBERS OF THE PUBLIC AT THE ARTESIA AND ALBUQUERQUE PUBLIC MEETINGS

Public Comment 1:

What is the difference between this Drum Age Criteria mod and the one previously submitted?

Response:

This modification addresses the comments raised by the public, the NMED, and the EEG regarding the original submittal. The principle comments dealt with assuring the information used to determine the appropriate DAC was recorded in a manner that is auditable and enforceable and assuring the user (generator/storage/sites) knew clearly which DAC was appropriate for each packaging configuration and waste Summary Category Group. The CBFO does not believe that additional changes to the modification are necessary as the result of this comment.

Public Comment 2:

There was a question regarding confusion on less than or equal to 4L unvented container and drum liners—what is the problem DOE has with this?

Response:

The confusion in the permit about what is included in the definition of unvented containers greater than 4 liters needs to be cleared up since it can be interpreted as including rigid poly liners. The modification clears this up. Since the liner headspace could contain a representative sample, it would not necessarily need to be vented before sampling. This is not true for smaller unvented containers greater than 4 liters in volume if the drum contained several such smaller containers. The CBFO does not believe that additional changes to the modification are necessary as the result of this comment.

Public Comment 3:

The public requested a demonstration of how package configuration are sampled under DAC?
Response:

A demonstration was given using an empty drum and rigid liner that was available at the Public Meetings.

Public Comment 4:

A member of the public asked of the hole that is punctured in the poly liner a specific size?

Response:

A range of hole diameters are captured by the DAC modification to reflect the practices in the TRU waste complex. Since the larger the hole, the smaller the DAC, generator/storage sites are allowed to bound the diameter with the smallest value in the table which is the smallest allowed for transportation. The CBFO does not believe that additional changes to the modification are necessary as the result of this comment.

Public Comment 5:

A member of the public asked it there are tools available to sample through drums and liners.

Response:

Sampling techniques are approved and in use at RFETS. The CBFO does not believe that additional changes to the modification are necessary as the result of this comment.

Public Comment 6:

A member of the public asked how does the DAC apply to unvented containers and are there older drums that are unvented?

Response:

The DAC sets the conditions for equilibrium in the headspace of sealed and unsealed containers. The numbers are different because the presence of a filter affects the rate at which the DAC is met. This is clearly shown by the tables submitted with the modification. Unvented containers occur at INEEL and possibly other sites. These are older containers that require venting prior to shipment to the WIPP. The CBFO does not believe that additional changes to the modification are necessary as the result of this comment.

Public Comment 7:

A member of the public asked about the “Sensitivity Analysis” that was done that explains how DACs were arrived at.
Response:

The sensitivity study documented in the reports submitted with the modification request determined what parameters are important to the DAC. One of the important parameters is the size of the vent hole in the rigid liner. The results appear in the 1999 Lockheed report.

Public Comment 8:

There were several public comments regarding the relationship between the testing and the modeling in the reports.

Response:

The mathematical representation of the physical phenomena used to calculate the DAC (i.e., model) is the mathematical representation of the processes that occur inside of the drum. The physical constants associated with these processes are what were tested and validated. For example, part of the testing involved the diffusion characteristics of hydrogen and VOCs across different filter vents. This testing established that the mathematical model used to calculate the VOC diffusivity across a filter vent based on relating the VOC diffusion characteristics in air to hydrogen diffusivity across the filter is valid. The CBFO does not believe that additional changes to the modification are necessary as the result of this comment.

Public Comment 9:

A member of the public inquired about the relationship between the DAC and pipe overpacks and SWBs.

Response:

Because of the significant differences in packaging, the modification proposes separate DACs for the pipe overpack and the Standard Waste Box (SWB). This difference is due to the larger surface area for diffusion with the SWB and the limiting effects of the filter vent in the pipe overpack. This is discussed in the modification request as well as the technical reports that are attached. In addition, the CBFO has provided a DAC for the ten drum overpack with these comments. The supporting information for the TOOP is in Attachment B.

Public Comment 10:

A member of the public expressed concern regarding the determination of number of layers of confinement.

Response:

The determination of the number of layers of packaging is inherent in the use of the
TRUPACT II and must be made in accordance with Nuclear Regulatory Commission requirements. The information needed for TRUPACT II is the same information required by the permit. The sites have been accurately documenting this information for many years. The modification request requires that this documentation be available as part of the operating record established by the generator sites and the CBFO regarding waste that is shipped to WIPP.

COMMENTS FROM THE PUBLIC AT THE JUNE 15, 2001 PUBLIC OUTREACH MEETING

There were no direct question asked at this meeting. The public asked several question regarding TRUPACT II Safety Analysis Repot for Packaging Amendment 19. These included questions regarding the establishment of equilibrium within containers. Copies of Amendment 19 were made available to the public at this meeting.
COMMENTS ON THE TEN DRUM OVERPACK CLASS 2 PERMIT MODIFICATION

INTRODUCTION

The Permittees are providing these comments to the NMED on the Class 2 permit submittal of May 1, 2001, regarding the Ten Drum Overpack and the Consolidation of Container Descriptions in the Permit. These comments are based on input from the following sources:

Written comments provided by the Environmental Evaluation Group
Verbal comments received during the Public Information Meetings
Comments solicited from representative of public interest groups during a June 15 meeting in Santa Fe.

Several of these comments resulted in proposed changes to the permit. The proposed changes are included in double underscore redline bolded and strikeout bolded format to indicate additions and deletions respectively. Proposed changes are included in Attachment C.

EEG COMMENTS ON THE TDOP MODIFICATION

EEG Comment 1:

This modification request combines two separate and unconnected modifications—increasing the storage capacity in the Waste Handling Building (WHB), and consolidation of container descriptions—into the same item. The downside of listing two independent items, in the same modification request is that rejection of either item could result in rejection of the other one also.

The consolidation of container descriptions may have been combined with the storage capacity increase because it does not meet any of the 40 CFR 270.42 Appendix I allowed Class 1 or Class 2 modification types of modifications. §270.42(d) requires that any changes not specifically listed in Appendix 1 are to be submitted to the regulatory authority for determination of class, or submitted as Class 3 modifications. The EEG believes that the consolidation of container descriptions into a single part of the HWFP is a useful goal, and could be achieved by requesting that the NMED consider the proposal as a Class 2 modification.

Had the Permittees requested such a determination the NMED also might have considered the consolidation of container descriptions to be a Class 1 modification. However, as pointed out in later comments, the ineffectiveness of this submitted Class 2 modification on the issue, and the latitude with which previous Class 1 modifications have been written, indicates that the NMED should establish a policy of advance review of HWFP modifications before allowing the Permittees to implement them.
Response:

The consolidation of container descriptions could have been submitted as a Class 1, Type A.1 informational change. However, because of its relationship to the TDOP storage issue and the need to assure that the permit contains clear and consistent descriptions of permitted containers, the CBFO determined that the Class 2 process would be appropriate. The CBFO believes that there are no changes to the proposed modification text as the result of this comment.

EEG Comment 2:

Though the modification request does not clearly say so, the expansion of storage capacity is apparently so that the same number of TRUPACT-IIIs and facility pallets may be used in the various storage areas within the WHB without regard to the type of waste container placed in or on them. This would simplify the process of ensuring that the storage capacities have not been exceeded. The EEG believes that this portion of the modification request is reasonable, creates no technical complications, and is a useful change to the WIPP Hazardous Waste Facility Permit (HWFP) requirements.

Response:

No response necessary.

EEG Comment 3:

The “Discussion” section of the modification request begins (p. A-2):

Several Class 1 permit modifications have amended the original container descriptions in the HWFP.

“Amended” may not be the appropriate term; these modifications added types of containers, changed configurations that affect the radiological safety factors for the containers, and changed how waste materials would be placed in these containers.

40 CFR 270.42(a) states that only those modifications designated in Appendix I to §270.42 as Class 1 changes may be put into effect; The Permittees considered the waste container modifications to be the “administrative and informational changes” listed in Appendix I.A.1 as Class 1 changes. However, additions of container types, and altering descriptions so that safety factors may be compromised, would seem to exceed the boundaries of what should be considered as administrative and informational changes.

One example is the August 8, 2000 Class 1 modification, which added text to HWFP Attachment M1-1b that allows filters to be placed on “the body” of 55-gallon drums as well as the lid (p. A-6). Filters were originally placed on the lid in part because in that position the rim of the drum provides protection for the filter; on the body of the drum a filter would protrude into the environment so that it can be bumped, pulled, or pressed.
against, any of which could break the integrity of the drum’s containment system. The possibility of such physical disruption was not discussed in the Class 1 modification, nor was data showing that drums with filters on the body would meet the Type A container specifications required by the HWFP. At the very least, formation of seven-packs should contain specific instructions for the location of filters on the body of each of the 55-gallon drums within the seven pack. The addition allowing the filters on the body of 55-gallon drums does not appear to represent simply an administrative or informational change, but one which could affect the safety of the waste handling process.

This modification also incorporates the change to the HWFP to allow filters to be installed on the body of 55-gallon drums (see Modification C.1, p.A-5). The Permittees should provide data and an evaluation of the safety implications of installing filters on the body of the drum and NMED should consider the safety aspects.

Response:

The placement of filters on the body of 5-gallon drums was requested to cover the possibility that such configurations may be acceptable (e.g., filters in the rim of the drums). Placement notwithstanding, the requirements that the filters work and that the container still meet the applicable transportation requirements have not changed.

EEG Comment 4:

Though the “Basis” section of the modification request states that container descriptions appear in Modules III and IV, and states that these descriptions will be consolidated in Attachment M1, only changes to Module III are included in the HWFP text alterations provided in the modification request. In Module IV, Section IV.A.1.a references Module III; and Section IV.C.1 would still contain descriptions of 55-gallon, 85-gallon, and 100-gallon drums, as well as TDOPS and SWBs. These sections should also be modified.

Modification b.1 also does not reflect consolidation of container descriptions into Attachment M1. Though text is added to Attachment F-1 to state that waste containers “…are identified in Permit Attachment M1-1b”, a section of F-1 entitled “Description of Containers”, which lists container types and configurations, was retained. The section could be deleted in order to meet the expressed goal of the modification request.

The expressed intent of the modification request has not been met by the alterations to the text.

Response:

The proposed revised text was submitted to NMED earlier to provide the changes to Module III. The revision to Module IV.A.1.a is attached. The brief description in Attachment F was not removed since Attachment F is the Contingency Plan which may be used as a stand-alone document in the event of an emergency. For this reason, it was believed by the CBFO that the descriptions should remain.
EEG Comment 5:

Any accepted changes to the HWFP should be placed in the proper locations. The proposed modification a.2 (p. A-4) is cited as for "Module C.1"; there is no Module C.1 in the HWFP. The a.2 modification appears to be alterations to Module III.C.1. Similarly, modifications b.1 and c.1 (p. A-5) do not alter Attachments "F" and "M1" as stated, but more particularly they modify Attachments F-1 and M1-1b respectively.

Response:

The location issue is the result of imbedded codes in the WORDPERFECT version of the modification that was used to create the file for the Internet posting. In order to avoid confusion, the CBFO is providing the entire proposed permit text in Attachment C.

COMMENTS ON THE TDOP MODIFICATION FROM THE MEMBERS OF THE PUBLIC AT THE ARTESIA AND ALBUQUERQUE PUBLIC MEETINGS

Public Comment 1:

A member of the public asked if the storage was in the Waste Handling Building and why there was not enough storage currently. They also inquired if the capacity would be sufficient for 17 shipments per week.

Response:

The storage increase is for storage areas currently permitted in the Waste Handling Building. At the time storage capacity was requested, the use of direct loaded TDOPs was not considered. This use was approved by the Nuclear Regulatory Commission for shipment in the TRUPACT II. As the result it was necessary to obtain approval for their use within the permit. This was done as a Class 1 modification in July 2000. However, the Class 1 did not request the increased storage since such a request (of less than 25% of existing capacity) is a Class 2. The capacity increase is only necessary if nearly all shipment were TDOP containers. This is likely when sites begin sending more large size decontamination and decommissioning waste such as discarded gloveboxes

Public Comment 2:

A member of the public inquired about the difference in the capacity of a TDOP that is used as an overpack versus one that is direct filled.

Response:

As an overpack, the TDOP will hold up to ten 55-gallon drums. When direct filled, the capacity is closer to the amount contained in fourteen 55-gallon drums.
Public Comment 3:

A member of the public was confused regarding the numbering associated with the Module III change.

Response:

This is addressed in EEG Comment 4. The entire revised text from the TDOP modification is provided in Attachment C.

COMMENTS FROM THE PUBLIC AT THE JUNE 15, 2001 PUBLIC OUTREACH MEETING

There were no direct question asked at this meeting.
ATTACHMENT A
ADDITIONAL PROPOSED REVISIONS TO THE PERMIT FOR THE DAC MODIFICATION

Text has been converted to the double underline format. Changes to the permit modification are shown as bolded text.
DAC MODIFICATION

Item 1. b. 2.

b. 2. Attachment B1-1a

The Permittees shall require all headspace gas sampling be performed in an appropriate radiation containment area on waste containers that are in compliance with the container equilibrium requirements (i.e. 72 hours at 18 degrees C or higher).

Summary Category S5000

All waste containers or randomly selected containers from waste streams that meet the conditions for reduced headspace gas sampling listed in Section B-3a(1) designated as summary category S5000 (Debris waste) shall be categorized under one of the sampling scenarios shown in Table B1-5. If the container is categorized under Scenario 1, the applicable drum age criteria (DAC) from Table B1-6 must be met prior to headspace gas sampling. If the container is categorized under Scenario 2, the applicable Scenario 1 DAC from Table B1-6 must be met prior to venting the container and then the applicable Scenario 2 DAC from Table B1-7 must be met after venting the container. The DAC for Scenario 2 containers that contain filters or liner vent holes other than those listed in Table B1-7 shall be determined using footnotes “a” and “b” in Table B1-7. Containers that have not met the Scenario 1 DAC at the time of venting must be categorized under Scenario 3. Containers categorized under Scenario 3 must be placed into one of the packaging configuration groups listed in Table B1-8. If a specific packaging configuration cannot be assigned based on the data collected during characterization and confirmation, a conservative default packaging configuration of 3 for drums and 6 for SWBs must be assigned provided the drums and SWBs do not contain pipe component packaging. If a container is designated as packaging configuration group 4 (i.e., a pipe component), the headspace gas sample must be taken from the pipe component headspace. The DAC for Scenario 3 containers that contain filters or liner vent holes other than those listed in Table B1-9 shall be determined using footnotes “a” and “b” in Table B1-9. Each of the Scenario 3 containers shall be sampled for headspace gas after waiting the DAC in Table B1-9 based on its packaging configuration (note: packaging configurations 4, 5, and 6 are not summary category group dependent) a minimum of 142 days after packaging.

Summary Category S3000/S4000

All waste containers or randomly selected containers from waste streams that meet the conditions for reduced headspace gas sampling listed in Section B-3a(1) designated as
summary categories S3000 (Homogenous solids) and S4000 (Soil/gravel) shall be categorized under one of the sampling scenarios shown in Table B1-5. If the container is categorized under Scenario 1, the applicable drum age criteria (DAC) from Table B1-6 must be met prior to headspace gas sampling. If the container is categorized under Scenario 2, the applicable Scenario 1 DAC from Table B1-6 must be met prior to venting the container and then the applicable Scenario 2 DAC from Table B1-7 must be met after venting the container. The DAC for Scenario 2 containers that contain filters or liner vent holes other than those listed in Table B1-7 shall be determined using footnotes “a” and “b” in Table B1-7. Containers that have not met the Scenario 1 DAC at the time of venting must be categorized under Scenario 3. Containers categorized under Scenario 3 must be placed into one of the packaging configuration groups listed in Table B1-8. If a specific packaging configuration cannot be assigned based on the data collected during characterization and confirmation, a conservative default packaging configuration of 3 for drums and 6 for SWBs must be assigned provided the drums and SWBs do not contain pipe component packaging. If a container is designated as packaging configuration group 4 (i.e., a pipe component), the headspace gas sample must be taken from the pipe component headspace. The DAC for Scenario 3 containers that contain filters or liner vent holes other than those listed in Table B1-10 shall be determined using footnotes “a” and “b” in Table B1-10. Each of the Scenario 3 containers shall be sampled after waiting the DAC in Table B1-10 based on its packaging configuration (note: packaging configurations 4, 5, and 6 are not summary category group dependent) a minimum of 225 days after packaging.

The determination of packaging configuration consists of identifying the number of confinement layers and the identification of rigid liners when present. Generator/storage sites are to use acceptable knowledge (procedural controls, etc.) as specified in Permit Attachment B4 and may use radiography and/or visual examination as specified in Permit Attachment B1 to make the determination of the appropriate sampling scenario and packaging configuration. These drum age criteria are to ensure that the drum container contents have reached 90 percent of steady state concentration within each layer of confinement (Lockheed, 1995, BWXT 2000).

The following information must be reported in the headspace gas sampling documents for all containers from which a headspace gas sample is collected:

1. sampling scenario from Table B1-5 and associated information from Tables B1-6 and/or Table B1-7;
2. the packaging configuration from Table B1-8 and associated information from
Tables B1-9 or B1-10, including the diameter of the rigid liner vent hole and the filter hydrogen diffusivity.

3. the equilibrium time, and
4. the drum age of all containers from which a headspace gas sample is collected will be documented in headspace gas sampling documents.

All waste containers with unvented rigid containers greater than 4 liters (exclusive of rigid poly container liners), except for Waste Material Type II.2 packaged in a metal container, shall be subject to innermost layer of containment sampling or shall be vented prior to initiating drum age and equilibrium criteria. When sampling the rigid drum liner under Scenario 1, the sampling device must form an airtight seal with the rigid poly drum liner to ensure that a representative sample is collected (using a sampling needle connected to the sampling head to pierce the rigid drum liner satisfies this requirement). The configuration of the containment area and remote-handling equipment at each sampling facility are expected to differ. Headspace-gas samples will be analyzed for the analytes listed in Table B3-2 of Permit Attachment B3. If additional packaging configurations are identified, an appropriate Permit Modification will be submitted to incorporate DAC using the methodology in BWXT (2000).

b. 14. Attachment B1, Table B1-8

TABLE B1-8

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A-5
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<thead>
<tr>
<th>Packaging Configuration 4, pipe components</th>
<th>No layers of confinement inside a pipe component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 filtered inner bag, 1 filtered metal can inside a pipe component</td>
</tr>
<tr>
<td></td>
<td>2 inner bags inside a pipe component</td>
</tr>
<tr>
<td></td>
<td>2 filtered inner bags inside a pipe component</td>
</tr>
<tr>
<td></td>
<td>2 filtered inner bags, 1 filtered metal can inside a pipe component</td>
</tr>
<tr>
<td></td>
<td>2 inner bags, 1 filtered metal can inside a pipe component (bounding case)</td>
</tr>
<tr>
<td></td>
<td>No layers of confinement inside a pipe component</td>
</tr>
<tr>
<td></td>
<td>1 filtered inner bag, 1 filtered metal can inside a pipe component</td>
</tr>
<tr>
<td></td>
<td>2 inner bags inside a pipe component</td>
</tr>
<tr>
<td></td>
<td>2 filtered inner bags inside a pipe component</td>
</tr>
<tr>
<td></td>
<td>2 filtered inner bags, 1 filtered metal can inside a pipe component</td>
</tr>
<tr>
<td></td>
<td>2 inner bags, 1 filtered metal can inside a pipe component (bounding case)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Packaging Configuration 5, Standard Waste Box</th>
<th>No layers of confinement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 SWB liner bag (bounding case)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Packaging Configuration 6, Standard Waste Box</th>
<th>any combination of inner and/or liner bags that is less than or equal to 6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5 inner bags, 1 SWB liner bag (bounding case)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Packaging Configuration 7, Ten-Drum Overpack, Directly Loaded</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>any combination of inner and/or liner bags that is less than or equal to 6</td>
</tr>
<tr>
<td></td>
<td>5 inner bags, 1 SWB liner bag (bounding case)</td>
</tr>
</tbody>
</table>

If a specific packaging configuration cannot be assigned based on the data collected during characterization and confirmation, a conservative default packaging configuration of 3 for drums and 6 for SWBs must be assigned provided the drums and SWBs do not contain pipe component packaging. If pipe components are present as packaging in the drums or SWBs, the pipe components must be sampled following the requirements for packaging configuration 4.

A "filtered inner lid" is the inner lid on a double lid drum that contains a filter.
TABLE B1.9  
SCENARIO 3 DRUM AGE CRITERIA (in days) MATRIX FOR S5000 WASTE  
BY PACKAGING CONFIGURATION GROUP

<table>
<thead>
<tr>
<th>Filter H₂ Diffusivity a (mol/s/mol fraction)</th>
<th>0.3-inch Diameter Hole</th>
<th>0.375-inch Diameter Hole</th>
<th>0.75-inch Diameter Hole</th>
<th>1-inch Diameter Hole</th>
<th>No Liner Lid</th>
<th>No Liner</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.9 x 10^{-6}</td>
<td>131</td>
<td>95</td>
<td>37</td>
<td>24</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>3.7 x 10^{-6}</td>
<td>111</td>
<td>85</td>
<td>36</td>
<td>24</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>3.7 x 10^{-5}</td>
<td>28</td>
<td>28</td>
<td>23</td>
<td>19</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Packaging Configuration 2

<table>
<thead>
<tr>
<th>Filter H₂ Diffusivity a (mol/s/mol fraction)</th>
<th>0.3-inch Diameter Hole</th>
<th>0.375-inch Diameter Hole</th>
<th>0.75-inch Diameter Hole</th>
<th>1-inch Diameter Hole</th>
<th>No Liner Lid</th>
<th>No Liner</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.9 x 10^{-6}</td>
<td>175</td>
<td>138</td>
<td>75</td>
<td>60</td>
<td>30</td>
<td>11</td>
</tr>
<tr>
<td>3.7 x 10^{-6}</td>
<td>152</td>
<td>126</td>
<td>73</td>
<td>59</td>
<td>30</td>
<td>11</td>
</tr>
<tr>
<td>3.7 x 10^{-5}</td>
<td>58</td>
<td>57</td>
<td>52</td>
<td>47</td>
<td>28</td>
<td>8</td>
</tr>
</tbody>
</table>
### Packaging Configuration 3

<table>
<thead>
<tr>
<th>Filter H₂ Diffusivity a (mol/s/mol fraction)</th>
<th>Liner Lid Opening Diameter b</th>
<th>0.3-inch Diameter</th>
<th>0.375-inch Diameter</th>
<th>0.75-inch Diameter</th>
<th>1-inch Diameter</th>
<th>No Liner</th>
<th>No Liner</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.9 x 10⁻⁶</td>
<td>197</td>
<td>161</td>
<td>96</td>
<td>80</td>
<td>46</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>3.7 x 10⁻⁶</td>
<td>175</td>
<td>148 c</td>
<td>93</td>
<td>79</td>
<td>46</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>3.7 x 10⁻⁵</td>
<td>72</td>
<td>72</td>
<td>67</td>
<td>62</td>
<td>42</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

### Packaging Configuration 4

<table>
<thead>
<tr>
<th>Filter H₂ Diffusivity a (mol/s/mol fraction)</th>
<th>Headspace Sample Taken Inside Pipe Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 1.9 x 10⁻⁶</td>
<td>152</td>
</tr>
</tbody>
</table>

### Packaging Configuration 5

<table>
<thead>
<tr>
<th>Filter H₂ Diffusivity a, d (mol/s/mol fraction)</th>
<th>Headspace Sample Taken Inside SWB</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 7.4 x 10⁻⁶</td>
<td>15</td>
</tr>
</tbody>
</table>

### Packaging Configuration 6

<table>
<thead>
<tr>
<th>Filter H₂ Diffusivity a, d (mol/s/mol fraction)</th>
<th>Headspace Sample Taken Inside SWB</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 7.4 x 10⁻⁶</td>
<td>56</td>
</tr>
</tbody>
</table>

### Packaging Configuration 7

<table>
<thead>
<tr>
<th>Filter H₂ Diffusivity a, d (mol/s/mol fraction)</th>
<th>Headspace Sample Taken Inside a Directly Loaded Ten-Drum Overpack</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 3.33 x 10⁻⁵</td>
<td>40</td>
</tr>
</tbody>
</table>
The documented filter $H_2$ diffusivity must be greater than or equal to the listed value to use the DAC for the listed filter $H_2$ diffusivity (e.g., a container with a filter $H_2$ diffusivity of $4.2 \times 10^{-6}$ must use a DAC for a filter with a $3.7 \times 10^{-6}$ filter $H_2$ diffusivity).

The documented liner lid opening diameter must be greater than or equal to the listed value to use the DAC for the listed liner lid opening diameter (e.g., a container with a liner lid opening of 0.5 in must use a DAC for a liner lid opening of 0.375 in.)

A DAC of 142 days can be used for this case provided the packaging configuration does not exceed a total of 5 layers of confinement.

The filter $H_2$ diffusivity for SWBs and TDOPs is the sum of the diffusivities for all of the filters on the SWBS container because an SWBSs and TDOPs have has more than 1 filter.
ATTACHMENT B
LETTER FROM INEEL WITH 7DOP DAC CALCULATION
July 06, 2001

Mr. Robert F. Kehrman
Requirements Management
Westinghouse TRU Solutions
4021 National Parks Highway
Carlsbad, NM 88221

DRUM AGE CRITERION (DAC) FOR DIRECTLY LOADED TEN-DRUM OVERPACKS (TDOPS)

Dear Mr. Kehrman:

Attached is the requested drum age criterion determination for a directly loaded ten-drum overpack. If you have any questions please contact me at 208-526-0238 or by e-mail mjc@ine.gov.

Sincerely,

Dr. Michael J. Connolly, Department Manager
Waste Treatment

Attachment

cc: Rodney E. Arbon, INEEL, MS 4201
    Bryant K. Ford, INEEL, MS 4201
    Walter E. Newcomb, INEEL, MS 3750
    Ritchie Spangler, Roy F Weston, Inc.
    Leonard S. Sygitowicz, INEEL, MS 2510
RE: Calculation of DAC for a Ten-Drum Overpack

REFERENCES:


The following information supports the drum age criterion (DAC) permit modification for the WIPP facility in New Mexico. The DAC for a ten-drum overpack (TOOP) that has been directly loaded with waste was calculated to be 40 days. This DAC is based on the waste being packaged inside five small polymer bags and sealed inside a standard waste box (SWB) polymer liner bag. The characteristic volatile organic compound (VOC) was 1,1-dichloroethene. The calculation was made using previously described methodology (Reference 1) and computer models (References 1 and 2). Model input parameters and assumptions were consistent with those made for other waste configurations (Reference 1).

Model Input Parameters and Assumptions

- Number of TOOP filter vents: 9 (Ref. 3)
- Filter vent hydrogen diffusion characteristic: 3.7e-6 mol/s/mol fraction (Ref. 1)
- Total surface area (small bags): 14,000 cm² (Ref. 1)
- Total bag thickness (small bags): 0.063 cm (Ref. 1)
- Total surface area (Liner bag): 14,000 cm² (Ref. 1)
- Total bag thickness (Liner bag): 0.036 cm (Ref. 1)
- Void volume (Liner bag headspace): 190,000 cm³ (Ref. 1)
- Void volume (TOOP headspace): 200,000 cm³ (Ref. 1)

Model Calculations

The DAC was calculated using the original (VDRUM) and revised (VDRUM2) programs developed to calculate DAC values (Reference 2). VDRUM was used to calculate DAC values for waste packaged in a SWB (Reference 1). It was used to calculate the TDOP DAC but had to assume a rigid liner with negligible wall thickness. VDRUM2 was created to model waste packaging configurations without rigid polymer liners. Input and output files are listed as follows.

INPUT FILE to VDRUM (TDOP01)
'tdop01', 'tdop01.out', 2
'toluene', 1000., 0., 0., 0., 0.
92.1, 669.e-10, 0.0849, 591.8, 40.5, 0., 0.002857, 7.e-6, 0.
'1,1-dichloroethene', 1000., 0., 0., 0., 96.9, 110.e-10, 0., 0.513, 0.475, 0., 0.09091, 8.e-6, 0.
1.4e4, 0., 0., 0.063, 0.
1.4e4, 0., 1.9e5, 0.036, 0.
1.4e4, 150., 1e5, 0.0001, 1.4
0., 0., 1e5, 0., 0.
25., 76., 333.e-7

c Case 01: 10-drum overpack (TDOP)
c Small bags, 5 polymer bags
c One SWB liner bag
c Divide TDOP void volume between TDOP headspace and "rigid liner" headspace
c Rigid liner wall thickness = 0.0001cm (equivalent to no rigid liner present)
c D^*H2 = total H2 diff. char. across 9 SWB vents = 37.e-7 mol/s/mol fr/each

c VOC diff. char. estimated knowing D^*H2, VOC Tc, VOC Pc

OUTPUT FILE (TDOP01.OUT)
tdop01
toluene 10 815.8182 896.8104
1,1-dichloroethene 40 521.8710 576.6337

INPUT FILE to VDRUM2 (TDOP02)
tdop02, "tdop02.out"
1,3,0
'1,1-dichloroethene', 1000., 0., 0.
96.9, 110.e-10, 0., 0.513, 0.475, 0.09091, 8.e-6
14000., 0., 0., 0.063, 0.
14000., 0., 1.9e5, 0.036, 0.
0., 0., 2.e5, 0., 0., 333.e-7
25., 76., 0.9, 0.

c TDOP with waste inside 5 small bags, then SWB liner bag, 9 TDOP filter vents

OUTPUT FILE (TDOP02.OUT)
tdop02
N(days) [N] [N] @ SS 0.9 [SS] [N]
1,1-dichloroethene 40 525.21 580.07 1.0

Model Results
Both programs predict the same DAC value of 40 days. The liner bag permeable surface area assumed is approximately half the cross-sectional area of the TDOP. In addition, the placement of multiple liner bags in a TDOP would result in a much greater effective permeable surface area between the waste and the TDOP headspace. Since the calculated DAC value decreases with increasing bag permeable surface area, the DAC value is considered conservative.
ATTACHMENT C

PROPOSED REVISIONS TO THE PERMIT FOR THE TDOP MODIFICATION

The entire proposed text for the TDOP Modification is included due to confusion on section numbering in the original submittal. In addition, text has been converted to the double underline format. Changes to the permit modification text as the result of these comments are shown as bolded text.
a. 1. Module III.A.1.b

Storage locations and quantities - the Permittees may store TRU mixed waste containers in four (4) locations in the WHB Unit, as specified in Table III.A.1 below and depicted in Permit Attachment M1, Figure M1-7. The Permittees may store quantities of TRU mixed waste containers in these locations not to exceed the maximum capacities specified in Table III.A.1 below.

<table>
<thead>
<tr>
<th>Description</th>
<th>Area</th>
<th>Maximum Capacity</th>
<th>Container Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRUDOCK Storage Area</td>
<td>4,734 ft²</td>
<td>530-4 636 ft³</td>
<td>Contents of 4 TRUPACT-Ils</td>
</tr>
<tr>
<td>NE Storage Area</td>
<td>2,924 ft²</td>
<td>4856 2226 ft³</td>
<td>7 loaded facility pallets</td>
</tr>
<tr>
<td>SE (Shielded) Storage Area</td>
<td>292.5 ft²</td>
<td>265 318 ft³</td>
<td>1 loaded facility pallet</td>
</tr>
<tr>
<td>Derived Waste Storage Area</td>
<td>48 ft²</td>
<td>66.3 ft³</td>
<td>1 Standard Waste Box</td>
</tr>
<tr>
<td>Total</td>
<td>--</td>
<td><strong>2748 3246 ft³</strong></td>
<td>(77 91.9 m³)</td>
</tr>
</tbody>
</table>

a. 2. Module III.C.1.a

The Permittees shall use containers that comply with the requirements for U.S. Department of Transportation shipping container regulations (49 CFR §173 - Shippers - General Requirements for Shipment and Packaging, and 49 CFR §178 - Specifications for Packaging) for storage of TRU mixed waste at WIPP. The Permittees are prohibited from storing TRU mixed waste in any container not specified in Permit Attachment M1, Section M1-1b, as set forth below:

- **III.C.1.a Standard 55-gallon (208-liter) drum** with a gross internal volume of 7.3 ft³ (0.21 m³):

- **III.C.1.b Standard waste box (SWB)** with a gross internal volume of 66.3 ft³ (1.88 m³):
III.C.1.e Ten drum overpack (TDOP) - with a gross capacity of 160 ft³ (4.5 m³) to be direct loaded with GH-TRU mixed waste, or to contain up to ten standard 55-gallon drums or one SWB.

III.C.1.d 85-gallon (322 liter) drum - with a gross internal volume of 11.3 ft³ (0.32 m³). 85-gallon drums may be direct loaded with GH-TRU mixed or may be used for overpack contaminated 55-gallons drums containing GH TRU mixed waste or for collecting and storing derived waste.

III.C.1.e 100-gallon (379 liter) drum - with a gross internal volume of 13.4 ft³ (0.38 m³). 100-gallon drums may be direct loaded with GH-TRU mixed waste or may be used for overpack several compacted containers containing GH TRU mixed waste.

b. 1. Module IV.A.1.a

IV.A.1.a Disposal containers - the Permittees shall dispose TRU mixed waste in containers specified in Permit Condition Attachment M1-1b.

b. 2. Module IV.C.1

IV.C.1 Acceptable Disposal Containers

The Permittees shall use containers that comply with the requirements for U.S. Department of Transportation shipping container regulations (49 CFR §173 - Shippers - General Requirements for Shipment and Packaging, and 49 CFR §178 - Specifications for Packaging) for disposal of TRU mixed waste at WIPP. The Permittees are prohibited from disposing TRU mixed waste in any container not specified in Permit Attachment M1, Section M1-1b, as set forth below:

IV.C.1.a Standard 55-gallon (205 liter) drum - configured as a 7-pack or as an individual unit.

IV.C.1.b Standard waste box (SWB) - as an individual unit.
c.1. Attachment F

Containers

The waste containers that will be used at the WIPP facility are identified in Permit Attachment M1-1b. These containers qualify as "containers," in accordance with 20 NMAC 4.1.101 (incorporating 40 CFR §260.10). That is, they are "portable devices in which a material is stored, transported, treated, disposed of, or otherwise handled."

TRU mixed waste containers, containing off-site waste, will not be opened at the WIPP facility. Derived waste containers are kept closed at all times unless waste is being added or removed.

Liquid waste, including "derived waste" containing liquids, will not be emplaced in the WIPP. TRU mixed waste for emplacement in the WIPP shall contain as little residual liquid as is reasonably achievable. All internal containers (e.g., bottles, cans, etc.) will be well-drained, but may contain residual liquids. As a guideline, residual liquids in well-drained containers will be restricted to approximately one percent of the volume of the internal container. In no case shall the total liquid equal or exceed one percent of the waste container (e.g., drum or standard waste box [SWB]).

Special requirements for ignitable, reactive, and incompatible waste are addressed in 20 NMAC 4.1.500 (incorporating 40 CFR §§264.176 and 177). The RCRA Permit Treatment, Storage, and Disposal Facility Waste Acceptance Criteria (TSDF-WAC) precludes ignitable, reactive, or incompatible TRU mixed waste at the WIPP.
Description of Containers

CH TRU mixed waste containers will be either 55-gallon (gal) (208-liter (L)) drums singly or arranged into seven (7)-packs, 85-gal (321-L) drums (used as overpacks) singly or arranged into four (4)-packs, 100-gallon (379 L) drums singly or arranged into 3-packs, ten-drum overpacks (TDOP), or 66.3 ft³ (1.88 m³) SWBs.

d.1. Attachment M1

Standard 55-Gallon Drums

Standard 55-gal (208-L) drums meet the requirements for U.S. Department of Transportation (DOT) specification 7A regulations.

A standard 55-gal (208-L) drum has a gross internal volume of 7.4 cubic feet (ft³) (0.210 cubic meters (m³)). Figure M1-3 shows a standard TRU mixed waste drum. One or more filtered vents (as described in Section M1-1d(1)) will be installed in the drum lid or body to prevent the escape of any radioactive particulates and to eliminate any potential of pressurization.

Standard 55-gal (208-L) drums are constructed of mild steel and may also contain rigid, molded polyethylene (or other compatible material) liners. These liners are procured to a specification describing the functional requirements of fitting inside the drum, material thickness and tolerances, and quality controls and required testing. A quality assurance surveillance program is applied to all procurements to verify that the liners meet the specification.

Standard 55-gal (208-L) drums may be configured as a 7-pack or as an individual unit.

Standard 55-gal (208-L) drums may be used to collect derived waste.

Standard Waste Boxes

The SWBs meet all the requirements of DOT specification 7A regulations.
One or more filtered vents (as described in Section M1-1d(1)) will be installed in the standard waste box lid or body to prevent the escape of any radioactive particulates and to eliminate any potential of pressurization. They have an internal volume of 66.3 ft³ (1.88 m³). Figure M1-4 shows a SWB.

The SWB is the largest container that may be used to collect derived waste.

100-Gallon Drum

100-gal (379-L) drums meet the requirements for U.S. Department of Transportation (DOT) specification 7A regulations.

A 100-gal (379-L) drum has a gross internal volume of 13.4 cubic feet (ft³) (0.39 cubic meters (m³)). One or more filtered vents (as described in Section M1-1d(1)) will be installed in the drum lid or body to prevent the escape of any radioactive particulates and to eliminate any potential of pressurization.

100-gal (379-L) drums are constructed of mild steel and may also contain rigid, molded polyethylene (or other compatible material) liners. These liners are procured to specification describing the functional requirements fitting inside the drum, material thickness and tolerances, and quality controls and required testing. A quality assurance surveillance program is applied to all procurements to verify that the liners meet the specification.

The 100-gal (379-L) drums may be configured as a 3-pack or as an individual unit.

100-gal (379-L) drums may be used as overpacks or may be direct loaded.

Ten-Drum Overpack

The TDOP is a metal container, similar to a SWB, that meets DOT specification 7A and is certified to be noncombustible and to meet all applicable requirements for Type A packaging. The TDOP is a welded-steel, right circular cylinder, approximately 74 inches (in.) (1.9 meters (m)) high and 71 in. (1.8 m) in diameter (Figure M1-5) with a gross internal capacity of 160 ft³. The maximum loaded weight of a TDOP is 6,700 pounds.
(lbs) (3,040 kilograms (kg)). A bolted lid on one end is removable; sealing is accomplished by clamping a neoprene gasket between the lid and the body. Filter ports are located near the top of the TDOP. One or more filtered vents (as described in Section M1-1d(1)) will be installed in the ten-drum overpack lid or body to prevent the escape of any radioactive particulates and to eliminate any potential of pressurization. A TDOP may contain up to ten standard 55-gal (208-L) drums or one SWB. TDOPs may be used to overpack drums or SWBs containing CH TRU mixed waste. The TDOP may also be direct loaded with waste items that are too large to fit into either the standard 55-gallon (208-L) drum, 85-gallon drum or the SWB.

Eighty-Five Gallon Drum

The 85-gal (321-L) drums meet the requirements for DOT specification 7A regulations. One or more filtered vents (as described in Section M1-1d(1)) will be installed in the eighty-five gallon drum lid or body to prevent the escape of any radioactive particulates and to eliminate any potential of pressurization.

The 85-gal (321-L) drum overpack, which is shown in Figure M1-6, will be used primarily for overpacking contaminated 55-gal (208 L) drums at the WIPP facility.

The 85-gal (321-L) drums may be configured as a 4-pack or as an individual unit.

85-gal (321-L) drums may be direct loaded with CH TRU-mixed waste and may be used to collect or store derived waste.

Container Compatibility

All containers will be made of steel, and some will contain rigid, molded polyethylene liners. The compatibility study, documented in Appendix C1 of the WIPP RCRA Part B Permit Application (DOE, 1997a), included container materials to assure containers are compatible with the waste. Therefore, these containers meet the requirements of 20 NMAC 4.1.500 (incorporating 40 CFR §264.172).