



Department of Energy

Carlsbad Field Office
P. O. Box 3090
Carlsbad, New Mexico 88221
November 13, 2000

ENTERED



Mr. Steve Zappe, WIPP Project Leader
Hazardous Waste Permits Program
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department
2044-A Galisteo
Santa Fe, New Mexico 87505

Subject: Notice of Class 1 Permit Modifications to the Hazardous Waste Facility Permit, Permit
Number: NM4890139088-TSDF

Dear Mr. Zappe:

The purpose of this letter is to transmit Class 1 Permit Modifications. Pursuant to 20.4.1.900 New Mexico Administrative Code (NMAC) (incorporating 30 CFR §270.41 and 270.42), the U.S. Department of Energy, Carlsbad Field Office and the Westinghouse Government Environmental Services Company, Waste Isolation Division hereby submit this notice of a Class 1 modification to the Waste Isolation Pilot Plant Hazardous Waste Facility Permit, Permit Number: NM4890139088-TSDF.

The identified changes are minor in nature and serve to keep the permit current with facility operations. The changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to be the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Please contact Mr. Jody Plum, of my staff at (505) 234-7462 should you have any questions regarding this permit modification notice.

Sincerely,

Dr. Inés R. Triay, Manager
Carlsbad Field Office

Mr. J. L. Epstein, General Manager
Westinghouse Waste Isolation Division

Enclosure

cc w/o enclosure:
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J. Kieling, NMED
C. Walker, TechLaw



Mr. Steve Zappe

-2-

November 13, 2000

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**Notice of RCRA Class 1 Permit Modification
in Accordance with 20.4.1.900 NMAC
(incorporating 40 CFR Part 270)**

**Waste Isolation Pilot Plant
Carlsbad, New Mexico**

November 13, 2000

**Notice of RCRA Class 1 Permit Modification
in Accordance with 20.4.1.900 NMAC (incorporating 40 CFR Part 270)**

Consistent with requirements of 20.4.1.900 New Mexico Administrative Code (NMAC) (hereafter referred to as Part 270 or Section 270.XX) the U.S. Department of Energy, Carlsbad Area Office is submitting to the New Mexico Environment Department (NMED) a notice of Class 1 modifications to the Hazardous Waste Facility Permit (NM4890139088-TSDF) for the Waste Isolation Pilot Plant (WIPP). Specifically, this information is provided to comply with the requirements of Section 270.42(a)(1).

The modifications are listed in Table 1. Listed information includes a reference to the applicable section of the permit, a brief description of each item, and the class of the item, as identified in Appendix I to Section 270.42. The relevant permit modification category, as identified in Appendix I, is provided as well. A more complete description of the Class 1 modifications are provided in Attachment A. Several of these modifications are the result of discussions with the NMED regarding Class 1 modifications that were previously submitted. The NMED requested that changes be made in several of the previous modifications to clarify the change or to resolve other difficulties identified by the NMED. Each is discussed separately in Attachment A.

The identified changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment and the modified permit is no less stringent than the current permit.

Table 1. Class 1 Hazardous Waste Facility Permit Modification

No.	Affected Permit Section	Item	Category	Attachment 1 Page #
1	a. Attach. B1	Drum Age Criteria	A..3	A-1

Attachment A

Descriptions of the Hazardous Waste Facility Class 1 Permit Modification

Item 1

Description:

Establish the drum age criteria (DAC) necessary for taking a representative headspace gas sample based on packaging configuration groups.

Basis:

In responses to comments on both the draft Permit and the revised draft Permit, the NMED established three points regarding the DAC values:

1. Drum age must assure headspace gas has reached 90% steady-state to preclude the necessity to collect samples from innermost layers of confinement.
2. Additional studies and experimental studies are required to justify alternative values.
3. Standardized values retain simplicity within the Permit.

These additional criteria are based on analysis and studies of specific packaging configurations anticipated to be typical of mixed TRU waste packaging. In addition, the results are applied simply through the addition of look-up tables to the Permit.

Section B1-1a of the Permit establishes that a DAC must be met "to ensure that the drum contents have reached 90 percent of steady state concentration within each layer of confinement." The section also establishes a DAC for S5000 (Debris) waste as a minimum of 142 days after packaging and a DAC for S3000 (Homogeneous solids) and S4000 (Soil/gravel) waste as a minimum of 225 days after packaging. These DACs only considered the time necessary to meet the 90 percent of steady state concentration criterion for a conservative bounding packaging configuration for each of the summary category groups and did not consider other packaging configurations that occur in transuranic (TRU) waste drums.

This permit modification establishes additional criteria in the form of packaging configuration DACs to ensure that DACs for packaging configurations other than the bounding configurations are established based on the 90 percent of steady state criterion. This modification also includes packaging configuration DACs for drums containing pipe components, which were not considered in the original analysis used to establish the DACs.

The packaging configuration DACs proposed in this modification were developed using the same model and calculation methodology as that used in developing the DACs using the bounding packaging configuration. The proposed packaging configuration DACs include the same 142 and 225 day DACs for the packaging configuration used in the original bounding analysis and does not reduce any of the requirements for meeting the DAC to ensure 90 percent of steady state concentration within each layer of confinement has been reached. Therefore this modification presents additional criteria that must be met based on

the individual packaging configurations using a functionally equivalent methodology to ensure 90 percent of steady state concentrations are established.

In addition, this modification proposes to eliminate an inconsistency within the permit when using the term "unvented rigid container greater than 4 liters." The way this term is used implies that the drum liner is considered an unvented container greater than 4 liters, which is inconsistent with the referenced INEEL report (Lockheed 1995). To address this inconsistency, the permit modification establishes three different sampling scenarios for containers subject to headspace gas sampling.

The Permit also contains language in Sections B1-1a(3)(i), B1-1a(3)(ii), and B1-1a(3)(iii) that states that a representative sample cannot be collected until the poly-liner has been vented to the drum. This is only applicable to samples that are taken between the drum lid and the liner. Samples that are taken from within the drum liner are representative if the appropriate DAC has been met. Therefore, the language in this section has been modified to address this inconsistency as well.

Discussion:

Section B1-1a of the Permit establishes that the DAC must be met "to ensure that the drum contents have reached 90 percent of steady state concentration within each layer of confinement." The section also establishes the DACs for S5000 (Debris) waste as a minimum of 142 days after packaging and for S3000 (Homogeneous solids) and S4000 (Soil/gravel) waste as a minimum of 225 days after packaging. These values are based on the results of the Lockheed (1995) report. This document describes the model and methodology used to establish the 142 and 225 day DACs. This document based the final DACs on a conservative bounding packaging configuration and sampling time that would cause the DAC to be the longest. This approach was used to make the process of determining the DAC to be as simple as possible.

The DAC is a variable with a unique value for each packaging configuration. The DAC values in the Permit of 142 days and 225 days were based on the bounding packaging configurations (i.e. those representing the highest resistance to VOC transport and thus longest DACs) and toluene was used as the bounding VOC based on its prevalence, as reported by DOE sites, and slow transport characteristics. A computer program was used to calculate the DAC values for the bounding packaging configurations. The computer program represents a VOC transport model that calculates the transient VOC gas-phase concentrations throughout a waste drum. The model consists of a series of material balance equations describing the transient VOC transport across layers of confinement in a container. The primary mechanisms for gas transport across a confinement layer are permeation across a polymeric layer, diffusion through air across an opening in the layer, and diffusion through a filter vent in the case of a drum filter or filtered bag. One or all of these mechanisms of transport may be operating depending on the characteristics of the confinement layer. The governing equations for the model are presented in Lockheed (1995) and BWXT (2000)¹. The model was validated with actual drum VOC testing data as documented in Lockheed (1995).

¹ BWXT (2000) is included as Attachment B.

There are three different sampling scenarios that are applicable to containers subject to headspace gas sampling. These scenarios are:

- a. Drums that are unvented and are sampled under the rigid liner (if present) at the time of venting.
- b. Drums that have been packaged for a specified period of time sufficient to achieve equilibrium conditions (i.e., met the DAC for Scenario 1 drums) and then are vented, but not sampled at the time of venting.
- c. Containers (i.e., drums, SWBs, and pipe components) that are initially packaged in a vented condition and sampled in the container headspace.

In addition to the bounding packaging configuration, the DACs that are established in the Permit are based on the bounding scenario. Because drums that fall under Scenario 1 have been packaged for a long period of time, the DACs for drums under Scenario 1 were calculated based on the most restrictive packaging configuration, which is 6 layers of confinement for S3000/S4000 waste and 2 layers of packaging for S5000 waste. Table 1 contains the matrix of DACs that are applicable to containers that are covered under Scenario 1. The statements in B1-1a(3)(i), B1-1a(3)(ii), and B1-1a(3)(iii) that a representative sample cannot be collected unless the drum liner is vented do not apply to samples taken for Scenario 1. This is because meeting the Scenario 1 DAC ensures that a representative sample may be collected, provided it is collected from within the drum liner.

Scenario 2 is for drums that are not sampled at the time of venting. Because a Scenario 2 drum has already reached equilibrium conditions prior to venting, the initial condition used to determine the DAC applicable after venting is based on equilibrium conditions rather than the zero concentration conditions of Scenario 3. However, if an unvented drum has not reached equilibrium (i.e., not met the Scenario 1 DAC) prior to venting, the drum must be classified under Scenario 3. Table 2 contains the Scenario 2 DAC matrix.

To evaluate the development of DACs for Scenario 3, a survey of U.S. Department of Energy (DOE) sites expected to generate and package CH-TRU waste in the future and a review of TRUCON codes was conducted. This review indicated that the packaging configurations can be summarized under a number of common configurations (BWXT 2000). These common configurations were divided into the two major categories: (1) packaging configurations of containers belonging to summary categories S3000 (Homogenous solids) and S4000 (Soil/gravel), and (2) packaging configurations of containers belonging to summary category S5000 (Debris waste).

Table 3 lists the packaging configurations applicable to Scenario 3 that were considered, with the bounding configuration (i.e., the configuration that results in the longest DAC) identified. In addition to the drum packaging configurations, packaging configurations for the pipe component and standard waste box (SWB) were evaluated. The pipe component is a metal pipe with a filtered lid that contains waste and conceptually is similar to a small drum in its configuration. The pipe component is then overpacked in a drum for shipment and disposal. Similarly to other overpacked containers (e.g., drums inside of a standard waste box), the headspace gas sampling for pipe components is focused on the headspace of the pipe component, which then must be conservatively assigned to the overpacked

container (in this case the drum).

Therefore, the pipe component was modeled like a drum and a DAC established for sampling the pipe component. Therefore, after the DAC is met, the sample must be taken from the pipe component headspace and conservatively assigned to the overpack drum.

The VOC transport model computer program was used to generate a matrix of packaging-specific DAC values for Scenario 3 (Tables 4 and 5). The bounding DAC value of 225 days (summary categories S3000 (Homogenous solids) and S4000 (Soil/gravel)) is part of the matrix, because the original bounding configurations used remain bounding for that packaging configuration. The DAC of 142 days (summary category S5000 (Debris waste) with 5 layers of confinement) has been updated to 148 days because 6 layers of confinement represent the bounding case for packaging configuration 3; however, the 142 day DAC is valid as long as the packaging configuration does not exceed a total of 5 layers of confinement.

To obtain the appropriate DAC value of a container, the sampling scenario is identified and then, if applicable, the actual container packaging configuration is assigned to one of the packaging configuration groups. The DAC for the container is then located on the applicable sampling scenario matrix by looking up the entry that corresponds to the appropriate summary category group, bounding packaging configuration, filter diffusivity, and rigid drum liner hole size of the container being evaluated.

The permit currently implies that if a container has met the DAC in an unvented condition and the headspace gas sample is not taken at the time of venting, the DAC must be re-met prior to sampling. This implication comes from the reference to unvented rigid containers greater than 4 liters. It can be interpreted that the reference to unvented sealed rigid containers greater than 4 liters includes the drum liner. This is not the case. The DAC reports indicate that if the drum has met the Scenario 1 DAC in an unvented condition, a specific waiting period (i.e., Scenario 2 DAC) is needed for re-equilibration of the headspace gas after venting the drum liner if a sample is not taken at the time of venting. This contradicts the implication in the permit regarding 4 liter sealed containers. Therefore, the language in this permit modification relative to sampling Scenario 2 revises the permit to eliminate this potential inconsistency.

If additional packaging configurations are identified at a later date, a Class 1 Permit modification will be submitted to incorporate an appropriate DAC. Sites are encouraged to use packaging configurations that have a DAC established whenever possible.

References

BWXT, 2000, Determination of Drum Age Criteria and Prediction Factors Based on Packaging Configurations, INEEL/EXT-2000-01207, October 2000, Liekhus, K.J., S.M. Djordjevic, M. Devarakonda, and M.J. Connolly, Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho.

Lockheed Idaho Technologies Company, 1995, Position for Determining Gas Phase Volatile Organic Compound Concentrations in Transuranic Waste Containers, INEL-95/0109/Revision 1, M.J. Connolly, et. al.

Table 1. Scenario 1 DAC Matrix

Summary Category Group	DAC (days)
S3000/S4000	127
S5000	53

Table 2. Scenario 2 DAC Matrix

	Summary Category Group S3000/S4000				Summary Category Group S5000			
Filter H ₂ Diffusivity	Liner Lid Opening Diameter				Liner Lid Opening Diameter (in)			
(mol/s/mol fraction)	0.30	0.375	0.75	1.0	0.30	0.375	0.75	1.0
1.9 x 10 ⁻⁶	36	30	23	22	29	22	13	12
3.7 x 10 ⁻⁶	30	25	19	18	25	20	12	11
3.7 x 10 ⁻⁵	13	11	11	11	7	6	6	4

Table 3
Scenario 3 Packaging Configurations

Packaging Configuration Group	Covered Packaging Configurations
Packaging Configuration 1, drums	<ul style="list-style-type: none"> • No layers of confinement, filtered inner lid • No inner bags, no liner bags (bounding case)
Packaging Configuration 2, drums	<ul style="list-style-type: none"> • 1 inner bag • 1 filtered inner bag • 1 liner bag • 1 filtered liner bag • 1 inner bag, 1 liner bag • 1 filtered inner bag, 1 filtered liner bag • 2 inner bags • 2 filtered inner bags • 2 inner bags, 1 liner bag • 2 filtered inner bags, 1 filtered liner bag • 3 inner bags • 3 filtered inner bags • 3 filtered inner bags, 1 filtered liner bag • 3 inner bags, 1 liner bag (bounding case)
Packaging Configuration 3, drums	<ul style="list-style-type: none"> • 2 liner bags • 2 filtered liner bags • 1 inner bag, 2 liner bags • 1 filtered inner bag, 2 filtered liner bags • 2 inner bags, 2 liner bags • 2 filtered inner bags, 2 filtered liner bags • 3 filtered inner bags, 2 filtered liner bags • 4 inner bags • 3 inner bags, 2 liner bags • 4 inner bags, 2 liner bags (bounding case)
Packaging Configuration 4, pipe components	<ul style="list-style-type: none"> • No layers of confinement inside a pipe component • 1 filtered inner bag, 1 filtered metal can inside a pipe component • 2 inner bags inside a pipe component • 2 filtered inner bags inside a pipe component • 2 filtered inner bags, 1 filtered metal can inside a pipe component • 2 inner bags, 1 filtered metal can inside a pipe component (bounding case)
Packaging Configuration 5, Standard Waste Box	<ul style="list-style-type: none"> • No layers of confinement • 1 SWB liner bag (bounding case)
Packaging Configuration 6, Standard Waste Box	<ul style="list-style-type: none"> • any combination of inner and/or liner bags that is less than or equal to 6 • 5 inner bags, 1 SWB liner bag (bounding case)

Table 4
Scenario 3 Drum Age Criteria (in days) Matrix for S3000 and S4000 Waste
by Packaging Configuration Group

Packaging Configuration 1						
Filter H ₂ Diffusivity (mol/s/mol fraction)	Liner Lid Hole Size				No Liner Lid	No Liner
	0.3-inch Diameter Hole	0.375- inch Diameter Hole	0.75-inch Diameter Hole	1-inch Diameter Hole		
1.9 x 10 ⁻⁶	131	95	37	24	4	4
3.7 x 10 ⁻⁶	111	85	36	24	4	4
3.7 x 10 ⁻⁵	28	28	23	19	4	4

Packaging Configuration 2						
Filter H ₂ Diffusivity (mol/s/mol fraction)	Liner Lid Hole Size				No Liner Lid	No Liner
	0.3-inch Diameter Hole	0.375- inch Diameter Hole	0.75-inch Diameter Hole	1-inch Diameter Hole		
1.9 x 10 ⁻⁶	213	175	108	92	56	18
3.7 x 10 ⁻⁶	188	161	105	90	56	17
3.7 x 10 ⁻⁵	80	80	75	71	49	10

Packaging Configuration 3						
Filter H ₂ Diffusivity (mol/s/mol fraction)	Liner Lid Hole Size				No Liner Lid	No Liner
	0.3-inch Diameter Hole	0.375- inch Diameter Hole	0.75-inch Diameter Hole	1-inch Diameter Hole		
1.9 x 10 ⁻⁶	283	243	171	154	107	34
3.7 x 10 ⁻⁶	253	225	166	151	106	31
3.7 x 10 ⁻⁵	121	121	115	110	84	13

Packaging Configuration 4	
Filter H ₂ Diffusivity (mol/s/mol fraction)	Headspace Sample Taken Inside Pipe Component
> 1.9 x 10 ⁻⁶	152

Packaging Configuration 5	
Filter H ₂ Diffusivity ^a (mol/s/mol fraction)	Headspace Sample Taken Inside SWB
> 7.4 x 10 ⁻⁶	15

Packaging Configuration 6	
Filter H ₂ Diffusivity ^a (mol/s/mol fraction)	Headspace Sample Taken Inside SWB
> 7.4 x 10 ⁻⁶	56

^a The filter H₂ diffusivity for SWBs is the sum of the diffusivities for all of the filters on the SWB because an SWB has more than 1 filter.

Table 5
Scenario 3 Drum Age Criteria (in days) Matrix for S5000 Waste
by Packaging Configuration Group

Packaging Configuration 1						
Filter H₂ Diffusivity (mol/s/mol fraction)	Liner Lid Hole Size				No Liner Lid	No Liner
	0.3-inch Diameter Hole	0.375- inch Diameter Hole	0.75-inch Diameter Hole	1-inch Diameter Hole		
1.9×10^{-6}	131	95	37	24	4	4
3.7×10^{-6}	111	85	36	24	4	4
3.7×10^{-5}	28	28	23	19	4	4

Packaging Configuration 2						
Filter H₂ Diffusivity (mol/s/mol fraction)	Liner Lid Hole Size				No Liner Lid	No Liner
	0.3-inch Diameter Hole	0.375- inch Diameter Hole	0.75-inch Diameter Hole	1-inch Diameter Hole		
1.9×10^{-6}	175	138	75	60	30	11
3.7×10^{-6}	152	126	73	59	30	11
3.7×10^{-5}	58	57	52	47	28	8

Packaging Configuration 3						
Filter H₂ Diffusivity (mol/s/mol fraction)	Liner Lid Hole Size				No Liner Lid	No Liner
	0.3-inch Diameter Hole	0.375- inch Diameter Hole	0.75-inch Diameter Hole	1-inch Diameter Hole		
1.9×10^{-6}	197	161	96	80	46	16
3.7×10^{-6}	175	148 ^a	93	79	46	16
3.7×10^{-5}	72	72	67	62	42	10

Packaging Configuration 4	
Filter H₂ Diffusivity (mol/s/mol fraction)	Headspace Sample Taken Inside Pipe Component
$> 1.9 \times 10^{-6}$	152

Packaging Configuration 5	
Filter H ₂ Diffusivity ^b (mol/s/mol fraction)	Headspace Sample Taken Inside SWB
> 7.4 x 10 ⁻⁶	15

Packaging Configuration 6	
Filter H ₂ Diffusivity ^b (mol/s/mol fraction)	Headspace Sample Taken Inside SWB
> 7.4 x 10 ⁻⁶	56

^a 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.

^b The filter H₂ diffusivity for SWBs is the sum of the diffusivities for all of the filters on the SWB because an SWB has more than 1 filter.

Revised Permit Text:

a. 1. Attachment B1

List of Tables

Table	Title
B1-1	Gas Sample Containers and Holding Times
B1-2	Summary of Drum Field QC Headspace Sample Frequencies
B1-3	Summary of Sampling Quality Control Sample Acceptance Criteria
B1-4	Sampling Handling Requirements for Homogeneous Solids and Soil/Gravel
B1-5	Headspace Gas Drum Age Criteria Sampling Scenarios
B1-6	Scenario 1 Drum Age Criteria (In Days) Matrix
B1-7	Scenario 2 Drum Age Criteria (In Days) Matrix
B1-8	Scenario 3 Packaging Configurations
B1-9	Scenario 3 Drum Age Criteria (In Days) Matrix for S5000 Waste By Packaging Configuration Group
B1-10	Scenario 3 Drum Age Criteria (In Days) Matrix for S3000 and S4000 Waste By Packaging Configuration Group

a. 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 18E C or higher). 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 or 2, the applicable drum age criteria (DAC) from Tables B1-6 and B1-7 must be met prior to headspace gas sampling. Containers categorized under Scenario 3 must be placed into one of the packaging configuration groups listed in Table B1-8. 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. 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. 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 or 2, the applicable drum age criteria (DAC) from Tables B1-6 and B1-7 must be met prior to headspace gas sampling. Containers categorized under Scenario 3 must be placed into one of the packaging configuration groups listed in Table B1-8. 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. 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. 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 equilibrium time and 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, except for drum liners and/or 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. 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.

a. 3. Attachment B1-1a(3)(i)

- The lid of the drum's 90-mil poly liner shall contain a hole for venting to the drum. A representative sample cannot be collected until the poly-liner has been vented to the drum, **unless the DAC for Scenario 1 is met and the sample is collected from inside the drum liner**. If headspace-gas samples are collected **from outside the drum liner** prior to venting the 90-mil poly liner, the sample is not acceptable and a nonconformance report shall be prepared, submitted, and resolved. Nonconformance procedures are outlined in Permit Attachment B3.

a. 4. Attachment B1-1a(3)(ii)

- The lid of the drum's 90-mil poly liner shall contain a hole for venting to the drum. A representative sample cannot be collected until the poly-liner has been vented to the drum, **unless the DAC for Scenario 1 is met and the sample is collected from inside the drum liner**. If headspace-gas samples are collected **from outside the drum liner** prior to venting the 90-mil poly liner, the sample is not acceptable and a nonconformance report shall be prepared, submitted, and resolved. Nonconformance procedures are outlined in Permit Attachment B3.

a. 5. Attachment B1-1a(3)(iii)

- The lid of the drum's 90-mil poly liner shall contain a hole for venting to the drum. A representative sample cannot be collected until the poly-liner has been vented to the container, **unless the DAC for Scenario 1 is met and the sample is collected from inside the drum liner**. If headspace-gas samples are collected **from outside the drum liner** prior to venting the 90-mil poly liner, the sample is not acceptable and a nonconformance report shall be prepared, submitted, and resolved. Nonconformance procedures are outlined in Permit Attachment B3.

a. 6. Attachment B1-6

BWXT, 2000, Determination of Drum Age Criteria and Prediction Factors Based on Packaging Configurations, INEEL/EXT-2000-01207, October 2000, Liekhus, K.J., S.M. Djordjevic, M. Devarakonda, and M.J. Connolly, Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho.

a. 7. Attachment B1, Table B1-5

TABLE B1-5

HEADSPACE GAS DRUM AGE CRITERIA SAMPLING SCENARIOS

Scenario	Description
1	Drums that are unvented and are sampled under the rigid liner (if present) at the time of venting.
2	Drums that have been packaged for a specified period of time sufficient to achieve equilibrium conditions (i.e., met the DAC for Scenario 1 drums) and then are vented, but not sampled at the time of venting.
3	Containers (i.e., drums, SWBs, and pipe components) that are initially packaged in a vented condition and sampled in the container headspace.

a. 8. Attachment B1, Table B1-6

TABLE B1-6

SCENARIO 1 DRUM AGE CRITERIA (in days) MATRIX

Summary Category Group	DAC (days)
S3000/S4000	127
S5000	53

a. 9. Attachment B1, Table B1-7

TABLE B1-7

SCENARIO 2 DRUM AGE CRITERIA (in days) MATRIX

	Summary Category Group S3000/S4000				Summary Category Group S5000			
Filter H ₂ Diffusivity (mol/s/mol fraction)	Liner Lid Opening Diameter				Liner Lid Opening Diameter (in)			
	0.30	0.375	0.75	1.0	0.30	0.375	0.75	1.0
1.9 x 10 ⁻⁶	36	30	23	22	29	22	13	12
3.7 x 10 ⁻⁶	30	25	19	18	25	20	12	11
3.7 x 10 ⁻⁵	13	11	11	11	7	6	6	4

**TABLE B1-8
SCENARIO 3 PACKAGING CONFIGURATIONS**

Packaging Configuration Group	Covered Packaging Configurations
Packaging Configuration 1, drums	<ul style="list-style-type: none"> • No layers of confinement, filtered inner lid • No inner bags, no liner bags (bounding case)
Packaging Configuration 2, drums	<ul style="list-style-type: none"> • 1 inner bag • 1 filtered inner bag • 1 liner bag • 1 filtered liner bag • 1 inner bag, 1 liner bag • 1 filtered inner bag, 1 filtered liner bag • 2 inner bags • 2 filtered inner bags • 2 inner bags, 1 liner bag • 2 filtered inner bags, 1 filtered liner bag • 3 inner bags • 3 filtered inner bags • 3 filtered inner bags, 1 filtered liner bag • 3 inner bags, 1 liner bag (bounding case)
Packaging Configuration 3, drums	<ul style="list-style-type: none"> • 2 liner bags • 2 filtered liner bags • 1 inner bag, 2 liner bags • 1 filtered inner bag, 2 filtered liner bags • 2 inner bags, 2 liner bags • 2 filtered inner bags, 2 filtered liner bags • 3 filtered inner bags, 2 filtered liner bags • 4 inner bags • 3 inner bags, 2 liner bags • 4 inner bags, 2 liner bags (bounding case)
Packaging Configuration 4, pipe components	<ul style="list-style-type: none"> • No layers of confinement inside a pipe component • 1 filtered inner bag, 1 filtered metal can inside a pipe component • 2 inner bags inside a pipe component • 2 filtered inner bags inside a pipe component • 2 filtered inner bags, 1 filtered metal can inside a pipe component • 2 inner bags, 1 filtered metal can inside a pipe component (bounding case)
Packaging Configuration 5, Standard Waste Box	<ul style="list-style-type: none"> • No layers of confinement • 1 SWB liner bag (bounding case)
Packaging Configuration 6, Standard Waste Box	<ul style="list-style-type: none"> • any combination of inner and/or liner bags that is less than or equal to 6 • 5 inner bags, 1 SWB liner bag (bounding case)

TABLE B1-9
SCENARIO 3 DRUM AGE CRITERIA (in days) MATRIX FOR S5000 WASTE
BY PACKAGING CONFIGURATION GROUP

Packaging Configuration 1						
Filter H₂ Diffusivity (mol/s/mol fraction)	Liner Lid Hole Size				No Liner Lid	No Liner
	0.3-inch Diameter Hole	0.375-inch Diameter Hole	0.75-inch Diameter Hole	1-inch Diameter Hole		
1.9×10^{-6}	131	95	37	24	4	4
3.7×10^{-6}	111	85	36	24	4	4
3.7×10^{-5}	28	28	23	19	4	4

Packaging Configuration 2						
Filter H₂ Diffusivity (mol/s/mol fraction)	Liner Lid Hole Size				No Liner Lid	No Liner
	0.3-inch Diameter Hole	0.375-inch Diameter Hole	0.75-inch Diameter Hole	1-inch Diameter Hole		
1.9×10^{-6}	175	138	75	60	30	11
3.7×10^{-6}	152	126	73	59	30	11
3.7×10^{-5}	58	57	52	47	28	8

Packaging Configuration 3						
Filter H₂ Diffusivity (mol/s/mol fraction)	Liner Lid Hole Size				No Liner Lid	No Liner
	0.3-inch Diameter Hole	0.375-inch Diameter Hole	0.75-inch Diameter Hole	1-inch Diameter Hole		
1.9×10^{-6}	197	161	96	80	46	16
3.7×10^{-6}	175	148 ^a	93	79	46	16
3.7×10^{-5}	72	72	67	62	42	10

Packaging Configuration 4	
Filter H₂ Diffusivity (mol/s/mol fraction)	Headspace Sample Taken Inside Pipe Component
$> 1.9 \times 10^{-6}$	152

Packaging Configuration 5	
Filter H ₂ Diffusivity ^b (mol/s/mol fraction)	Headspace Sample Taken Inside SWB
> 7.4 x 10 ⁻⁶	15

Packaging Configuration 6	
Filter H ₂ Diffusivity ^b (mol/s/mol fraction)	Headspace Sample Taken Inside SWB
> 7.4 x 10 ⁻⁶	56

^a 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.

^b The filter H₂ diffusivity for SWBs is the sum of the diffusivities for all of the filters on the SWB because an SWB has more than 1 filter.

TABLE B1-10
SCENARIO 3 DRUM AGE CRITERIA (in days) MATRIX FOR S3000 AND S4000 WASTE
BY PACKAGING CONFIGURATION GROUP

Packaging Configuration 1						
Filter H₂ Diffusivity (mol/s/mol fraction)	0.3-inch Diameter Hole	0.375- inch Diameter Hole	0.75- inch Diameter Hole	1-inch Diameter Hole	No Lid	No Liner
1.9×10^{-6}	131	95	37	24	4	4
3.7×10^{-6}	111	85	36	24	4	4
3.7×10^{-5}	28	28	23	19	4	4

Packaging Configuration 2						
Filter H₂ Diffusivity (mol/s/mol fraction)	0.3-inch Diameter Hole	0.375- inch Diameter Hole	0.75-inch Diameter Hole	1-inch Diameter Hole	No Lid	No Liner
1.9×10^{-6}	213	175	108	92	56	18
3.7×10^{-6}	188	161	105	90	56	17
3.7×10^{-5}	80	80	75	71	49	10

Packaging Configuration 3						
Filter H₂ Diffusivity (mol/s/mol fraction)	0.3-inch Diameter Hole	0.375- inch Diameter Hole	0.75-inch Diameter Hole	1-inch Diameter Hole	No Lid	No Liner
1.9×10^{-6}	283	243	171	154	107	34
3.7×10^{-6}	253	225	166	151	106	31
3.7×10^{-5}	121	121	115	110	84	13

Packaging Configuration 4	
Filter H₂ Diffusivity (mol/s/mol fraction)	Headspace Sample Taken Inside Pipe Component
$> 1.9 \times 10^{-6}$	152

Packaging Configuration 5	
Filter H ₂ Diffusivity ^a (mol/s/mol fraction)	Headspace Sample Taken Inside SWB
> 7.4 x 10 ⁻⁶	15

Packaging Configuration 6	
Filter H ₂ Diffusivity ^a (mol/s/mol fraction)	Headspace Sample Taken Inside SWB
> 7.4 x 10 ⁻⁶	56

^a The filter H₂ diffusivity for SWBs is the sum of the diffusivities for all of the filters on the SWB because an SWB has more than 1 filter.

Attachment B

**Determination of Drum Age Criteria and Prediction Factors Based on Packaging
Configurations INEEL/EXT-2000-01207**