NOTICE:

"BEST AVAILABLE COPY"

PORTIONS OF THE FOLLOWING DOCUMENT ARE ILLEGIBLE

The Administrative Record Staff

18100

ER/WM&I DDT

000062154

Source/Driver (Name & Number from ISP, IAG milestone, Mgmt Action, Corres Control, etc)

Closure # (Outgoing Correspondence Control #, if applicable)

Due Date

L Peterson-Wright
Originator Name

R S Luker
QA Approval

J E Law
A M Parker
Contractor Manager(s)

S Hahn
Kaiser-Hill Program Manager(s)

T. G. Hedahl
Kaiser-Hill Director

Document Subject

KH00003NS1A

OPERABLE UNIT 7 (OU 7), MAY 8, 1996 MEETING MINUTES – AMP-066-96

May 14, 1996

96-RM-ER-0088-KH

Discussion and/or Comments.

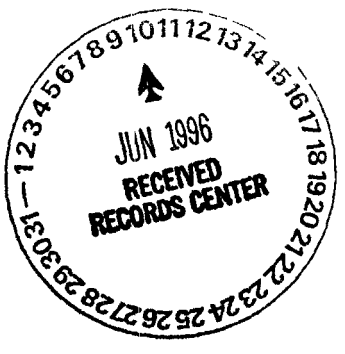
This letter transfers minutes from a meeting held with the Environmental Protection Agency (EPA), the Colorado Department of Public Health and Environment (CDPHE), Kaiser-Hill, L L C and Rocky Mountain Remediation Services, L L C representatives on May 8, 1996 Comments from the EPA and partial comments from the CDPHE on the March 8, 1996 draft of the Operable Unit 7 Interim Measure/Interim Remedial Action Decision Document and Proposed Plan were received at the meeting

The timing of closure of Operable Unit 7 based on current budget scenarios was discussed It was agreed that opening a public participation period for the Interim Measure/Interim Remedial Action was not appropriate at this time

If you have any questions concerning this transmittal, please contact Ann Tyson at extension 4829

LPW dql

cc
J E Law
A M Parker
L J Peterson-Wright
A M Tyson
RMRS Records



1/30

ADMIN RECORD

ER/WM & I DDT 7/95

CORRES CONTROL
OUTGOING LTR NO

E ORDER #

)-RF 0313120

DIST	LTR	ENC
SUSSEN, STAN		
L TONY		
D, BOB		
JOHN		
I, VIK		
TINEZ, LEN		
NALLY, JIM		
AY, BOB		
IIEN, GEORGE		
R, NANCY		
RHEIS GARY		
LER, CAL		
ahl, T G	X	X
d, Russ		
more, Drew		
, Kent		
n, Steve	X	X
nedy Colburn		
oud, Russ		
er, Gary		
ben, Ann		
nauer, Annette		
melt, Karen		
RRES CONTROL	X	X
MIN RECRD/080		
AFFIC		
TS/T130G		

CLASSIFICATION		
NI		
CLASSIFIED		
NFIDENTIAL		
CRET		

JTHORIZED CLASSIFIER SIGNATURE
empt per CEX-266-95
ite 5-16-96

REPLY TO RFP CC NO

ACTION ITEM STATUS
PARTIAL/OPEN
CLOSED

LTR APPROVALS

ORIG & TYPIST INITIALS
SJH bag

-46469 (Rev 4/25/95)

KAISER•HILL COMPANY

May 16, 1996

96-RF-03120

Jessie M Roberson, Assistant Manager
ES&H Program Assessment
DOE, RFFO

Attn Dave George

OPERABLE UNIT 7 (OU 7) MAY 8, 1996 MEETING MINUTES – TGH-112-96

This letter transfers minutes from a meeting held with the Environmental Protection Agency (EPA), the Colorado Department of Public Health and Environment (CDPHE), Kaiser-Hill, L L C and Rocky Mountain Remediation Services, L L C representatives on May 8, 1996 Comments from the EPA and partial comments from the CDPHE on the March 8, 1996 draft of the Operable Unit 7 Interim Measure/Interim Remedial Action Decision Document and Proposed Plan were received at the meeting

The timing of closure of Operable Unit 7, based on current budget scenarios, was discussed It was agreed that opening a public participation period for the Interim Measure/Interim Remedial Action was not appropriate at this time

you have any questions concerning this transmittal, please contact Stephen Hahn, of my staff, at extension 9888

Tim G Hedahl

G Hedahl, Director
R/WM & I Operations

JH bag

ıg and 1 cc - J M Roberson

tachment
, Stated

E Law - RMRS
L McAnally - RMRS
M Parker - RMRS
M Tyson - RMRS

aiser-Hill Company, L L C
ourier Address Rocky Flats Environmental Technology Site, State Hwy 93 and Cactus, Rocky Flats, CO 80007 • 303 966 7000
lailing Address P O Box 464, Golden, Colorado 80402-0464

Operable Unit Seven
Meeting Minutes of May 8, 1996

Introduction

A meeting was held with Kaiser-Hill L L C (K-H), Rocky Mountain Remediation Services, L L C (RMRS), Colorado Department of Public Health (CDPHE), and Environmental Protection Agency (EPA) representatives on May 8, 1996 to discuss issues concerning Operable Unit Seven (OU 7) The purpose of the meeting was to receive CDPHE and EPA comments on the March 8, 1996 draft of the Interim Measure/Interim Response Action Decision Document (IM/IRA DD) and Proposed Plan (PP) and discuss Sitewide issue impacts on the OU 7 Closure

Discussion

Kaiser-Hill opened the meeting by presenting an overview of the OU 7 project with respect to Sitewide issues

Specifically

Kaiser-Hill presented information concerning the remaining capacity of the Present Landfill Based on the current mounding plan and historical waste volumes, the Present Landfill will reach capacity in approximately 12-18 months Construction of the New Sanitary Landfill is scheduled for completion by January 1997 However, the opening of the New Sanitary Landfill may be tied to the completion of the Option B implementation of off-site water sources, which is currently 9 months behind schedule Offsite disposal of sanitary waste is also under consideration

K-H stated that Environmental Restoration Risk Prioritization System, presented as Attachment Four to the Rocky Flats Cleanup Agreement (RFCA), was applied to the Individual Hazardous Substance Sites (IHSSs) within Operable Unit Seven The risk prioritization was completed using two separate evaluations, a screening level risk assessment and an evaluation of secondary criteria including safety, waste, cost and schedule estimates The Present Landfill (IHSS 114) and IHSS 203 were ranked 18th, with a total priority ranking of 10 and only a minor risk reduction estimate

K-H also stated that the current Site baseline, Accelerated Site Action Plan (ASAP) 3, indicates that budget will not be available to begin Interim Measure Construction until after fiscal year (FY) 2008

To ensure that the present landfill is kept in a protective state until that time, an outline of an Operations Plan was prepared by RMRS and presented to the attendees The Operations Plan addressed vegetation, security, inspections, groundwater and methane monitoring, and leachate management The leachate will be managed using the current passive seep interception and treatment system It was acknowledged that the passive seep interception and treatment system was designed as a temporary system with a design life of only 12-18 months

The meeting attendees then discussed the future of the IM/IRA DD Approaches to maximize the utilization of work completed to date and reduce costs were reviewed

Even though the public needs to be kept informed, EPA stated that it would be premature to open the public comment period for the IM/IRA DD and PP, since interim landfill closure measures may not get funded RMRS suggested that a fact sheet be prepared and issued, outlining the landfill closure plans In addition, response to EPA and CDPHE comments would be prepared during FY 1996, however, actual document revision would occur later when planning activities resume for closure of OU 7

Comments were then received from EPA on the IM/IRA DD and PP Partial comments were received from CDPHE with the remainder scheduled for receipt this Friday, May 10, 1996 EPA expressed concern that the comments by EPA and CDPHE may not be incorporated into the document when actual closure becomes funded A preface page can be added to the document to reference the comments that are to be considered when the detailed design phase of the project is restarted

Actions

A follow-up meeting has been scheduled for May 16, 1996 at 10 00 to discuss interim solutions surrounding the interim solutions The meeting will be held at the EPA conference center

Attendees

Name	Company	Phone Number
Nina Churchman	EPA	421-6257
Chris Dayton	Kaiser-Hill	966-9887
Stephen Hahn	Kaiser-Hill	966-9888
Doug Ikenberry	CDPHE	692-3389
Ann Sieben	Kaiser-Hill	966-9886
Carl Spreng	CDPHE	692-3358
Ann Tyson	RMRS	966-4829
Laurie Peterson-Wright	RMRS	966-2689

1.0 INTRODUCTION

Gannett Fleming, Inc received the revised draft decision document (DD) for the interim measure/interim removal action (IM/IRA) for Operable Unit (OU) 7 at the U S Department of Energy (DOE) Rocky Flats Environmental Technology Site (RFETS) in Jefferson County, Colorado This document was received from the U S Environmental Protection Agency (EPA) under Regional Oversight Contract (ROC) 4, work assignment 8-03. Gannett Fleming and ROC 4 team firm Dynamac Corporation reviewed the document for technical adequacy, compliance with guidance, and response to comments from EPA on the draft document. This review document is divided into comments on the human health and ecological risk assessment components of the revised DD The comments are further divided into general comments pertaining to a risk assessment as a whole and specific comments that refer to a particular part of the risk assessment. Responses to comments on the first draft DD were also evaluated for adequacy and additional comments provided where the response was inadequate Comments on the remainder of the DD will be provided under separate cover

2.0 HUMAN HEALTH RISK ASSESSMENT

2.1 General Comments

1) The adequacy of the human health risk assessment is dependent on open space being the future land use The comments in this review rely on acceptance of that scenario by all parties involved Based on that acceptance, the methods used to evaluate the human health risks are appropriate If that scenario is not agreed on by all of the parties involved, the comments on the first draft DD should be implemented

2) The revised DD describes a method for identifying outliers that may be acceptable but could not be verified with the information in the revised DD

2.2 Responses to EPA Comments

Executive Summary

Comment 1 The acceptability of the response to the comment is dependent on the acceptability of the open space scenario If all entities agree to use of an open space scenario as the basis for the human health risk assessment, the response and proposed methods are adequate

2) The text states that leachate currently enters the landfill pond containing polycyclic aromatic hydrocarbons (PAH) well above the Colorado water quality standards for those constituents The ecological risk assessment seems to minimize the risk posed by PAHs on the aquatic community because of dilution currently provided by the landfill pond and the assertion that the seep will not surface in the future More detail should be provided regarding movement of the seep contaminants following implementation of the IM/IRA, with consideration of changes to the hydrologic system that will result from removal of the landfill dam

3) All tables should have units clearly identified Units used in the text should be consistent with those in tables For example, text usually discusses concentrations in water as micrograms per liter (ug/L). The tables, however, provide data in milligrams per liter (mg/L) It also appears that conversions from micrograms to milligrams were sometimes incorrect All numbers in all tables should be verified

4) The DD refers frequently to mitigation for the loss of wetlands that will result from the implementation of the IM/IRA No details of that mitigation are provided, however The issue appears to rely on a yet-to-be-signed memorandum of agreement, apparently between DOE, EPA, the U S. Army Corps of Engineers, and the state of Colorado The text should identify options available for mitigation and those recommended for the IM/IRA

3.2 Specific Comments

1) Page 3-5, Paragraph 5 The text suggests that a seep is always an intermittent aquatic community The rationale for this assumption is not clear Many seeps, including the seep to the landfill pond, have continuous flow throughout the year, which makes the seep a perennial water body The aquatic community found in the seep should reflect the year-round nature of the water supply The text should be revised

2) Page 3-6, Paragraph 1 The text states that the "Clean Water Act's AWQC (ambient water quality criteria) chose not to set barium standards for aquatic organisms Soluble and toxic forms of barium in freshwater or marine ecosystems were thought unlikely due to the physical and chemical properties of barium Therefore, EPA chose not to set freshwater or marine AWQC " A citation should be provided for these statements It is generally EPA's position to not set water quality standards for chemicals where insufficient data are available A determination that barium does not create a toxicity problem would be more likely to be reflected in a high AWQC rather than no criterion The lack of a standard does not indicate a lack of risk

3) Page 3-31, Table 3-15 Table 3-15 appears to compare contaminant concentrations in groundwater with surface water quality standards to assess ecological risk in the event the water reached the surface in a spring or seep The water quality standards listed for lead, methylene chloride, tetrachloroethene, and trichloroethene appear to be too high by

distinguish between old and new The plan to ignore treatment of groundwater contamination should be reevaluated

Comment 6 - The response does not provide any information regarding mitigation for the loss of OU 7 wetlands, other than to say it is included in the memorandum of agreement for establishment of a wetland bank

Comment 7 - It appears that incorrect water quality standards are still used in the revised DD

COMMENTS TO REFETS RESPONSES REGARDING OU 7 REVISED DRAFT IM/IRA DD AND CLOSURE PLAN (MARCH 1996)

Response to EPA J.2.2 Ecological Risk Assessment Comment 1 states In addition, the mean values for iron are less than the mean for background, and the maximum values are also less than the background maximum

> Background values should be obtained from locations that are hydraulically upgradient from all potential contaminant sources Please disclose background locations and their spacial relation to known contaminant sources

Response to EPA J.2.3 Landfill Design Comment 1 states: In general, factors that influence clay layer desiccation include the clay mineralogy, plasticity, sand content, initial moisture content, temperature variations, nature of the clay's contact with overlying geomembrane or underlying surface, and overburden pressures These factors have been investigated by several researchers, and it has been suggested that a clay layer having a lower swelling potential, lower plasticity index, lower initial moisture content, and a thicker vegetative soil cover which provides sufficient temperature insulation and overburden pressure to maintain a tight contact between the clay and the overlying geomembrane will be less likely to desiccate than a clay layer that does not have these characteristics

The low-permeability soil layer proposed for Alternative E is intended to incorporate many of the factors identified above to reduce the potential for clay desiccation compared to the clay layer proposed in Alternative G

> Dessicated and fissured clays may have a coefficient of permeability of 1E-05 cm/sec (Soil Mechanics, R,F, Craig, 2nd Edition, 1978) which is equal to that proposed for Alternative E Clayey gravels typically have a coefficient of permeability greater than 5E-08 cm/sec (Civil Engineering Reference Manual, Fourth Edition, 1986) However, gravels could promote penetration of the overlying FML The soil type(s) proposed for use in Alternative E must be specified
>
> Soils compacted at water contents less than optimum ("dry of optimum") tend to have relatively high hydraulic conductivity whereas soils compacted at water contents greater than optimum ("wet of optimum") tend to have a low hydraulic conductivity It is usually preferable to compact the soil wet of optimum to achieve minimal hydraulic conductivity (Design and Construction of RCRA/CERCLA Final Covers, EPA/625/4-91/025, Seminar Publication)
> The ability of fissures or holes to heal in a soil depends largely upon soil moisture content, soil plasticity, the size of the fissure or hole, and ambient stress Wetter, more plastic soils have a greater healing capability (USDI, 1974) (Design, Construction, and Evaluation of Clay Liners for Waste Management Facilities, EPA/530/SW-86/007F, November 1988)

The higher the water content of the soil and the higher the plasticity of the soil, the greater is the shrinkage potential from desiccation There are two ways to provide the required protection after construction One way is to bury the liner beneath an adequate depth of soil overburden, another technique is to place a geomembrane over the soil If a geomembrane liner is placed on a soil liner to form a composite, it is often convenient to overbuild the soil liner (i e , make it thicker than necessary) and then to scrape away a few inches of potentially desiccated surficial soil just before the geomembrane is placed (Design and Construction of RCRA/CERCLA Final Covers, EPA/625/4-91/025, Seminar Publication)

Clay liners may be subject to developing desiccation cracks during and immediately after installation The clay may be protected from desiccation after construction by installing a synthetic membrane, by installing 1 to 2 feet of soil, or for surface impoundments, by putting liquids into the impoundment immediately after construction (Design, Construction, and Evaluation of Clay Liners for Waste Management Facilities, EPA/538/SW-86/007F, November 1988)

Desiccation is not an insurmountable problem and drying of clay can be minimized by using appropriate construction methods and QA/QC procedures

Also, EPA guidance (Design and Construction of RCRA/CERCLA Final Covers) recommends that the low hydraulic conductivity geomembrane/soil layer be 60 cm (2 feet) as shown in Alternative 9 (Figure 6-4) of the August 24, 1995 draft document All March 1996 draft document alternatives provide for only one foot depth of "low permeability" soil An additional foot of material will mitigate dessication damage thereby increasing protection

Colorado Hazardous Waste Regulations, 6 CCR 1007-3, Section 265 318(a)(5) states At final closure of the landfill or upon closure of any cell, the owner or operator must cover the landfill or cell with a final cover designed and constructed to Have a Permeability less than or equal to the permeability of any bottom liner system or natural subsoils present Section 264 301(c)(1)(i)(B) indicates that the compacted soil component of the bottom liner system must have a hydraulic conductivity of no more than 1E-07 cm/sec The revised draft document indicates that test samples from shallow subsurface soils drilled near the landfill are classified as fat clay (i e , highly plastic clay) These soils correspond to "impervious" soils, e,g , homogeneous clays below the zone of weathering which have coefficients of permeabilities less than 1E-07 cm/sec (An Introduction to Geotechnical Engineering, Robert D Holtz and William D Kovacs, 1981)

Given identical site conditions, a suitably lined landfill would be expected to have less contaminant migration than the present landfill since it will not incorporate a bottom liner For this reason, it is particularly imperative that cover soils with a coefficient of permeability of no more than 1E-07 cm/sec be used for the low permeability zone layer

11

Response to EPA J.2.3 Landfill Design Comment 2 states However, we are concerned that in the long run a highly plastic, high moisture content clay (Alternative 9) will eventually dry and crack

> Your concerns should translate into expending greater effort towards determining the evaporative zone depth at the sight and reporting the results in the revised draft decision document

Response to EPA J.2.3 Landfill Design Comment 2 states We concur that if a large defect occurs in the FMC that a 1 x 10^{-5} cm/sec clay will allow considerably more water to infiltrate than a 1 x 10^{-7} clay.

> A 1 x 10^{-5} "low permeability" soil will also allow considerably more water to infiltrate than a 1 x 10^{-7} clay.

Response to EPA J.2.3 Landfill Design Comment 3 states In comparing the permeability of the cover system with the permeability of the subsurface, we have utilized the permeability values for the subsurface that were based on field scale tests and the composite permeability of the FMC and the low-permeability soil We do not believe that it is appropriate to compare the permeability of the low-permeability soil directly below a samll defect (1 cm in diameter considered typical for a good CQA program) and the field-scale permeability values As stated above, large ruptures during construction should be located and repaired as part of the CQA program Large ruptures after construction should be noted during regurlar inspections and could be repaired

> The above response fails to address the original comment regarding the conditions which create the potential for the "bathtub" effect to occur

Response to EPA J.2.3 Landfill Design Comment 4 states We concur that differential settlement can occur at the OU 7 landfill as a result of waste settlement However, the grading plan for the landfill requires the placement of up to 15 ft of fill to achieve surface water drainage This fill will be placed prior to cover construction and will act to minimize localized differential settlement Only long-term regional settlements will put the liner components into compression, minimizing the potential for cracking

> The above response fails to address the original comment regarding giving the advantages of the self-healing properties of clay and the potential for differential settlement adequate consideration in the IM/IRA
>
> Also, the placement of up to 15 ft of fill will tend to increase localized differential settlement rather than to minimize it The effect of differential settlement will tend to put the liner components into tension rather than compression

Response to EPA J.2.3 Landfill Design Comment 7 states Additionally, it is believed that the gas emitted from the waste will have a high moisture content and will not significantly promote desiccation in either design

The above statement adds credence to the necessity for requiring chemical compatibility testing of the low permeability zone cover components

Response to EPA J.2.3 Landfill Design Comment 8 states Further refinement of the design layer thickness will occur during the final design effort where issues such as frost burial depth, evaporative zone depth, burrowing animal depth, and plant root depth will specifically be addressed

Please see reply to first EPA J.2 3 Landfill Design Comment 2

Response to State Comment 13 states Based on the future land-use scenario (open-space), the leachate contained-in groundwater neither presents an excess human health risk of cancer greater than 1E-06 nor does it constitute a Hazard Index greater than 1 In addition, although leachate will continue to drain from the landfill mass for several years, there will be no exposure pathway for an open-space recreational user because the leachate will remain in the subsurface and will not be discharged to surface water unless it is treated

As previously transmitted, leachate will likely continue to contaminate various **environmental** media after the actions prescribed in this document have been implemented Also, burrowing animals will be subject to direct contact with leachate draining from the landfill mass A system which collects leachate at the source and subsequent treatment/disposal of the leachate must be included in the document

Response to State Comment 14 states The reference to a contingency plan will be removed because leachate treatment will be evaluated explicitly in the revised IM/IRA DD

Please see above reply to Response to Comment 13

Response to State Comment 15 states The referenced standard states that "the owner must close the facility in a manner that.. controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of. leachate " A focused risk assessment for the leachate showed no risk to human health An ecological risk assessment indicated unacceptable risk for direct contact Therefore, in the IM/IRA DD, alternatives were developed that control, minimize, or eliminate the post-closure escape of leachate Alternatives include cap, slurry wall, treatment of the leachate and elimination of the exposure pathway

The Revised Draft IM/IRA document neglects to evaluate small mammal exposure to burrow leachate The exposure pathway can only be eliminated by the collection of leachate at the source and subsequent treatment/disposal of leachate References to the "elimination of the exposure pathway" alternative other than by leachate collection followed by treatment/disposal should be deleted from the text

Response to State Comment 21 states Richardson and Koerner (1987) lists geonets and geotextiles suitable for use in gas venting systems

Our review of the above referenced document does not indicate listing of geonets suitable for use in gas venting systems On the contrary, the above referenced document states Geonets are extruded nets formed by extruding and bonding up to three layers of polymer rods oriented at acute angles to each other They have significant capacity of planar flow and are commonly used with geotextiles to form systems for **leachate or surface water collection/removal.**

Daniel and Koerner (September, 1993 Technical Guidance Document QA and QC for Waste Containment Facilities, EPA/600/R-93/182) states Geonets are unitized sets of parallel ribs positioned in layers such that **liquid** can be transmitted within their open spaces. Thus their primary function is drainage

Figure 6-2 indicates exclusive use of a geotextile/geonet/geotextile type geocomposite as a gas collection system which is situated directly beneath the low permeability soil layer This configuration promotes excessive geotextile intrusion into the geonet apertures (e g , as a result of overlying soil compaction operations) which could adversely impact flowrate

Exclusive use of geocomposites which employ a geonet component for the proposed gas collector system is unconventional and unacceptable EPA guidance (Design and Construction of RCRA/CERCLA Final Covers and Requirements for Hazardous Waste Landfill Design, Construction, and Closure) indicates that a gas collection system composed of perforated pipes encased by granular soils is recommended Solid pipes (as opposed to gravel columns) are connected to the perforated pipes for gas venting or conveyance to treatment facilities if required

Response to State Comment 21 states. Once surface water has migrated through the cover section, it will ultimately migrate into the waste, regardless of whether it flows in the gravel columns or directly through the general fill placed to achieve the design surface grades The only impact of the gravel columns will be to decrease the time for that water to reach the waste

Surficial moisture must not circumvent the cover barrier system via migration thru the gravel column conduits Also, gravel columns would be subject to clogging from sediments carried by surficial runoff as it penetrates the cover layers This situation could adversely impact the effectiveness of the proposed gas collection system The effectiveness of using gravel columns for transport of landfill gas to a potential treatment system is also questionable Solid pipes should be used in lieu of gravel columns to convey landfill gas and to inhibit accelerated percolation of surface water into the underlying waste

Response to State Comment 25 states The frost depth in the area of OU 7 is 3 ft

A review of the literature indicates that the frost protection layer in this region should be at least 1 25 meters (Introductory Soil Mechanics and Foundations Geotechnical Engineering, G F Sowers, 4th Edition, 1979) The total depth of the cover materials above the low permeability zone layer should be a minimum

of 1 25 meters (4 1 feet) This thickness will also help minimize low permeability zone layer material desiccation after construction

Response to State Comment 25 states A review of site-specific biologic conditions at OU 7 indicates that a biotic barrier is necessary However, the geosynthetic drainage layer also serves this purpose

> The proposed geosynthetic drainage layer and the underlying FMC may be subject to damage/malfunction resulting from burrowing animal activity EPA guidance (Requirements for Hazardous Waste Landfill Design, Construction, and Closure) states A biotic barrier is a gravel and rock layer designed to prevent the intrusion of burrowing animals into the landfill area. This protection is primarily necessary around the cap but, in some cases, may also be needed at the bottom of the liner Animals cannot generally penetrate a FMC, but they can widen an existing hole or tear the material where it has wrinkled
>
> EPA guidance (Design and Construction of RCRA/CERCLA Final Covers) also states Plant roots or burrowing animals (collectively called biointruders) may disrupt the drainage and the low hydraulic conductivity layers to interfere with the drainage capability of the layers A 90-cm (3-ft) biotic barrier of cobbles directly beneath the top vegetation layer may stop the penetration of some deep-rooted plants and the invasion of burrowing animals
>
> An appropriate biota layer must be included in the cover design to protect the proposed geosynthetic drainage layer Alternatively, a properly designed cobble/gravel biota layer may also serve as the surface water collection/drainage layer However, a suitable bedding material would be necessary to protect the underlying FMC

Response to State Comment 26 states Richardson and Koerner (1987) lists geonets and geotextiles suitable for use in gas venting systems

> Please see first reply to Response to Comment 21 above

Response to State Comment 30 states The permeability of soils can range from 1E+2 to 1E-9 cm/sec (Cedergren 1977) A soil with a permeability of 1E-5 cm/sec is on the lower end of this range and is indicated as a "poor drainage" material Therefore, a soil with a permeability of 1E-5 cm/sec can be classified as "low permeability" However, we do realize that there are soils with lower permeabilities

> See reply to Response to EPA J 2 3 Landfill Design Comment 1
>
> A "poor drainage" soil is a poor drainage soil and is not considered to be a "low permeability" soil A coefficient of permeability of 1E-07 or less distinguishes "impervious" soils (An Introduction to Geotechnical Engineering, Robert D Holtz and William D Kovacs, 1981) We acknowledge that a coefficient of

permeability equal to 1E-05 qualifies as a "poor" drainage material A coefficient of permeability equal to 1E-07 qualifies as a "practically impervious" drainage material (An Introduction to Geotechnical Engineering, Holtz and Kovacs, 1981) and must be used as a minimum criteria for the low permeability zone cover soils

Response to State Comment 30 states We have selected a low-permeability soil with a permeability classification of 1E-5 to 1E-9 cm/sec because that is a realistic permeability value that any soil could achieve in the long run in a cover application where it is exposed to the effects of weathering

The above statement is debatable Capping Option E, which employs a soil with a coefficient of permeability of approximately 1E-5 to 1E-7 (not 1E-9) cm/sec, was selected for use in the detailed analysis. However, the low permeability zone layer soil must have a coefficient of permeability of **no more than** 1E-7 cm/sec

Response to State Comment 30 states· The results are presented in the text and indicate that the performance of a cover section with a GCL or a low-permeablity soil are similar

The suggested use of a GCL was not intended to replace the low-permeability soil but to supplement it Moreover, modeling indicates that the annual leakage rate of Cover Option E (Single Barrier FMC with a Low-Permeablity Cover) is about 8,000 times greater than the annual leakage rate of Cover Option F (Composite-Barrier FMC and GCL Cover)

Response to State Comment 34 states Further refinement for the design layer thicknesses will occur during the Title II design where issues such as frost burial depth, evaporation zone depth, burrowing aniamal depth, and plant root depth will be specifically addressed

Evidently, further refinement for the design layer material types also needs to occur prior to the Title II design

Frost burial depth is currently being specifically addressed (See Response to State Comment 25 above) Evaporation zone depth should also be addressed now since it affects the potential for low permeability zone layer desiccation which is the primary basis given for not selecting compacted clay

Response to State Comment 35 states Placement of soil materials over geosynthetics can be performed without damage to the geosynthetics with good construction quality assurance (CQA) monitoring and control

Compacting a single 1-ft lift of soil materials over geosynthetics may not provide sufficient cushion to prevent geonet damage or eliminate intrusion of adjacent materials into the geonet apertures during construction

Response to State Comment 35 states Intrusion of adjacent materials into geonet apertures in a geocomposite is affected by the type of overlying geotextile and the amount of soil overburden

placed on top of the geocomposite

> Intrusion of adjacent materials into the geonet aperatures is also affected by the energy imparted to the overlying soils as a result of required compaction operations See above reply

Response to State Comment 35 states In addition, geosynthetic material specifications and CQA plan must also consider compatibility of soil materials and placement practices with the geosynthetics

> The above response fails to address why installation requirements for the "low permeability" soil would be less rigorous than those of a full clay liner The document should also state that the CQA plan will also include soil placement practices

Response to State Comment 36 states The leakage rate for Alternative 7 cover is greater than the Alternative 9 cover; however, when both leakage rates are compared as a percent of the average annual rainfall they both perform at a similar level

> The comparison of leakage rates as a percent of the average annual rainfall is not valid This analysis neglects to consider the acute impacts of saturated conditions which prevail during the spring runoff/snowmelt time frame This analysis also neglects interflow effects Moreover, the annual leakage rate of Cover Option E (Single-Barrier FMC with a Low-Permeability Cover) is about 16 times greater than the annual leakage rate of Cover Option G (Composite-Barrier FMC and Clay Cover)

Response to State Comment 37 states In general, factors that influence clay layer desiccation include the clay mineralogy, plasticity, sand content, initial moisture content, temperature variations, nature of clay's contact with overlying geomembrane

> Please see reply to Response to EPA J 2 3 Landfill Design Comment 1 above

Response to State Comment 38 states Compatibility testing for a new clay material to be used for clay layer repairs may not be a major concern due to the fact that the clay layer is placed above the waste layer

> Response to State Comment 21 states "Some infiltration of gas into the soil layer will occur but the majority of the gas will flow through the openings in the geonet and the geotextile " Also, seasonal fluctuations, capillary action and interflow also may cause groundwater contact with the clay layer These factors indicate that chemical compatibility of the low permeability zone layer material will be required

Response to State Comment 39 states The low-permeability soil will require moisture conditioning during placement

17

Please see reply to Response to State Comment 35 above.

Response to State Comment 41 states As described in the response to Comment 2 of the Executive Summary, the preferred alternative for groundwater/leachate control is natural attentuation and seep water discharge to groundwater

Please see reply to Response to State Comment 13 above A release of seep water (F039 listed hazardous waste) to environmental media is not considered a control Also, intentionally redirecting the seep discharge towards the ground water table and burying the seep is not considered natural attenuation

Response to State Comment 42 states A focused risk assessment for the leachate showed no risk to human health An ecological risk assessment indicated unacceptable risk for direct contact Therefore, in the IM/IRA DD, alternatives were developed that control, minimize, or eliminate the post-closure escape of leachate Alternatives include cap, slurry wall, treatment of the leachate and elimination of the exposure pathway

Please see replies to Responses to State Comments 13, 15 and 41 above

Response to State Comment 48 states. In general, settlement is a function of waste thickness and waste type

Settlement is also a function of loads placed above the waste material

Response to State Comment 48 states We concur there is a possibility of local settlement that might result in localized ponding but we feel that this is remote due to the thickness of general fill, which will further consolidate the waste, and components of the waste that reduce settlement potential, such as the construction debris component and the daily cover soil components

The addition of general fill, construction debris and daily cover soil will either increase loading or increase void space resulting in greater (not less) potential differential settlement After cover installation, waste consolidation causes (rather than diminishes) differential settlement

Response to State Comment 48 states However, these localized settlements are observable on the surface and are relatively easy to repair

Localized settlements may cause damage to or malfunction of proposed cover components (e g , geosynthetic materials) which may not be easy to repair

Response to State Comment 48 states Any localized settlement will be repaired as described in the Postclosure Plan

We await submittal of the draft Postclosure Plan for our review

The revised draft decision document states Postclosure inspection and

maintenance activities include routine facility inspections and repairs, evaluate the revegetation success, repair of the vegetative cover due to erosion damage, maintenance of surveyed waste management area boundary markers, and inspection and maintenance of monitoring systems

The revised draft decision document text should also include post closure repair of **all** cover components due to **settlement** and erosional damage

Response to State Comment 51 states: The manufacturer's product data, conformance sampling protocols, sample frequency, and types of tests to be performed will be called out in the Title II design specifications and construction quality assurance plan

The Title II design specifications should also incorporate the manufacturer's installation procedures.

Response to State Comment 52 states As described in the response to Comment 2 of the Executive Summary, the preferred alternative for groundwater/leachate control is natural attenuation and seep water discharge to groundwater

Please see replies to Responses to State Comments 13, 15, and 41 above

Response to State Comment 57 states The referenced standard states that "the owner "

Please see reply to Response to State Comment 15 above

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
JEFFERSON COUNTY, COLORADO

REVIEW OF REVISED DRAFT OPERABLE UNIT 7 DECISION DOCUMENT LANDFILL DESIGN, GROUNDWATER MODELING, APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Prepared for

U S Environmental Protection Agency
Region 8 Federal Facilities Program
Denver, Colorado

Work Assignment No	8-03
EPA Region	8
Date Prepared	April 1, 1996
Contract No	68-W5-0020
Gannett Fleming No	30665 002 0001
Prepared by	Gannett Fleming, Inc (Diane Birk)
Telephone No	410/433-8832
EPA Primary Contact	Gary Kleeman
Telephone No	303/312-6571

30

1.0 INTRODUCTION

Gannett Fleming, Inc received the revised draft decision document for the interim measure/interim removal action (IM/IRA) for Operable Unit (OU) 7 at the U S Department of Energy (DOE) Rocky Flats Environmental Technology Site (RFETS) in Jefferson County, Colorado This document was received from the U S Environmental Protection Agency (EPA) under Regional Oversight Contract (ROC) 4, work assignment 8-03 Gannett Fleming reviewed the document for technical adequacy and compliance with guidance This review document is divided into general comments pertaining to the document as a whole, except for the human health and ecological risk assessments, and specific comments that refer to a specific part of the document. Comments on the human health and ecological risk assessments were provided under separate cover

2.0 GENERAL COMMENTS

This section presents general comments on the landfill design, groundwater modeling, and applicable or relevant and appropriate requirements (ARARs)

2.1 Landfill Design

1 Water-balance equations are reported to predict that 60 percent of groundwater inflow will be cut off by capping the landfill (Section 2 3 6, page 2-15, paragraph 1) Not all the flow witnessed at the seep, however, is attributable to inflow as evidenced by the difference in flow seen at the seep while adjacent alluvial well 0786 was dry (Section 2 3 3, page 2-11, paragraph 3) As decomposition continues within the present landfill, leachate will also continue to be generated This, perhaps, accounts for some of the flow present at the seep when alluvial well 0786 is dry If Hydrologic Evaluation of Landfill Performance (HELP) and other groundwater models predict a continuation of flow, eventual attenuation of seep flow should be explained when the presence of peat and manure in the unconsolidated engineered fill will not decrease either the volume or rate of inflow and leachate

2 The presumptive remedy for landfills containing primarily municipal waste includes leachate collection and treatment as a component of source containment (EPA 1993) The selected alternative which envisions leachate percolating into groundwater is not treatment The addition of peat and manure to a granular fill as described in Section 5 4 4 of the document will address treatment of a small number of the hazardous substances found in the leachate, but not the more serious contamination components For reasons discussed in the specific comments, information is required to explain how leachate will discharge to groundwater or if it will join surface waters If leachate joins surface water, the groundwater contaminant transport simulations do not adequately describe the movement of the various contaminants to the point of compliance

3 There is an inconsistency with regard to the East Landfill Pond and dam While the text states that the pond will be drained and the dam removed, data input for both the groundwater flow and contaminant transport models use a boundary coincident with the dam If the dam were to remain

and the pond filled with the proposed gravel mixture, some outlet structure would be needed to relieve the inevitable build up of stormwater, groundwater, and leachate within the gravel in a controlled manner Otherwise, there is nothing in the design to prevent the gravel filled pond from becoming saturated and overflowing the dam Any overflow would be a release to surface water, which should be treated under the presumptive remedy The document should be revised to address the effectiveness of alternatives which would impound the seep within the gravel fill behind the dam

2.2 Groundwater Modeling

1 A few problems with the groundwater and contaminant transport models are discussed in a general nature within specific comments on development and analysis of the remedy alternatives. Specific comments on each of the models are also included in Section 3 of this report. Revisions to the models are necessary to support conclusions drawn and decisions made with respect to ARAR compliance and the landfill cap performance

2.3 Applicable or Relevant and Appropriate Requirements

1 Statements that ARARs are met are not supported by the documentation Specific comments require some revision to the documentation and will also require revision to discussions regarding ARAR compliance

3.0 SPECIFIC COMMENTS

1 **Page 5-15, Section 5.2.1, Paragraph 6** The 12-inch low-permeability soil layer of Option E can not be directly compared with the 24-inch clay layer of Option G because of their disparate thicknesses The section stresses that the low-permeability soil layer is preferable over clay because gradation, moisture content, and compaction requirements are less rigid then those for a clay layer, but on page J-10, Section J 2 3, the response to comment 1 stresses that a low-permeability soil is more water tight than clay This latter statement, attributed to unnamed researchers, is not supported by a citation nor is it supported by HELP model results Further, EPA guidance (1989) recommends 60 cm, about 24 inches, of a low-permeability soil layer below a flexible membrane cover for final covers over landfills containing hazardous waste The EPA guidance definition of a low-permeability soil, however, is one meeting 1 00 E^{-7} centimeters per second (cm\sec) not 1 00 E^{5} cm/sec

As supported by the borehole geologic logs in Appendix A and Figure 2-8 plotting hydraulic conductivity for each geologic unit on OU 7, soil meeting a maximum 1 00 E^{5} cm/sec permeability requirement is essentially the regular dirt found on site Since the low permeability soil layer is intended to act as a barrier, it should provide more of an infiltration retardance than the on-site soil likely used as daily cover by landfill operations

Continuing in this vein, the Colorado Hazardous Waste Act (CHWA) requires that a landfill have permeability less than the natural subsoil or bottom liner (6 CCR 1007-3 Part 265 310) Support documentation indicates that the weathered bedrock under this landfill has a permeability of 1 00 E^{7} cm/sec The low permeability soil as a barrier layer is not, therefore, less permeable than the natural substratum

2 **Page 5-5, Section 5.2.1, Paragraph 4 and Page 5-30, Table 5-1** The text on page 5-5, paragraph 4 states that a native seed mixture for the vegetation cover will be selected by a site ecologist Table 5-1, however, calls for only tall-prairie grasses There is no documentation to support a conclusion that tall-prairie grasses will provide an adequate stabilized vegetative cover or if prairie grasses are native to northern Jefferson County, Colorado A survey of the native vegetation must be taken of the area during the early phases of design and, from the survey, a seed mixture selected which will provide diverse vegetation with sufficient cover, moisture retention, and erosion control to meet soil conservation requirements while requiring little maintenance

3 **Page 5-27, Section 5.4.4, Paragraph 1 and Figures 5-2, 5-2a, and 5-2b** The description for discharge of leachate to groundwater does not sufficiently clarify what mechanism will prevent leachate bubbling through the gravel/manure fill mixture from eroding a surface channel once the East Landfill Pond embankment is removed Even if the leachate escapes the fill by seeping into weathered bedrock (Section 2 3 2, page 2-10, paragraph 1), the natural ground slope indicates perched groundwater could resurface farther downstream

4 **Page 5-27, Section 5.4.4, Paragraph 2** The contaminant transport model inputs do not sufficiently correspond to a discharge to groundwater scenario For this reason, the statement that "leachate contaminant concentrations are greatly attenuated and generally meet ARARs" at the point of compliance is not supported

5 **Page 5-27, Section 5.4.4, Paragraph 2** The gravel/manure fill mixture should operate similar to an anaerobic wetland in its ability to reduce metal contaminants The mix would be improved by adding sulfate reducing bacteria (SRB) similar to the system described in Section 5 4 3, beginning pages 5-24, "Engineered Wetlands" The appropriateness of adding SRBs and whether periodic maintenance would require replacement of the manure or SRB should be addressed

6 **Page 6-7, Section 6.2.2, Paragraph 4** The statement that "[l]eachate treatment will not be needed because ARARs will be met at the point of compliance" for seep water discharge to groundwater does not agree with the evaluation of discharge to groundwater in Section 5 4 4, page 5-27, paragraph 2 Section 5 4 4 states that ARARs are "generally" met The contaminant transport model as run predicts that iron concentrations will not meet ARAR limits at the point of compliance Further, the model input parameters do not reflect the material through which contaminated leachate will travel and, therefore, predicted results for manganese, ammonia, and all the organic contaminants are questionable No justification for an ARAR waiver has been provided within the analysis The text should be corrected

7 **Page 6-7, Section 6 2.2, Paragraph 4** There is no support in the report that the surface water pathway will truly be eliminated If the East Landfill Pond dam is removed, it is much more reasonable that leachate seeping from under the landfill cap through the high permeability unconsolidated engineered fill will continue a lateral path and daylight into No Name Gulch rather than percolate into the low permeability alluvial fill Leachate will likely continue untreated into Walnut Creek exposing fish, animals and humans to the contaminants carried along The design, as such, does not offer much protection for human health and the environment nor meet all of the remedial action objectives As evaluated, levels of some contaminants will be exceeded Even though ARARs exceedances are not excessive, any exceedance is significant The design should be reassessed

8 **Page 6-8, Section 6 2 2, Paragraph 1 and Page 6-9, Paragraph 3** See the two preceding comments

23

9 **Page 6-10, Section 6.2.2, Paragraph 4** It is not reasonable to place the low permeability soil layer in a single 12-inch lift, as described in the text To insure a proper 95 percent compaction, the layer should be placed in two 6-inch lifts

10 **Page 6-17, Section 6.3.1, Paragraph 1** If by placing a cap over the landfill, the 2 gallons per minute (gpm) total flow will be decreased by half (2 gpm - ½(2 gpm) = 1 gpm) and construction of a slurry wall is predicted to further decrease total flow by 1 gpm (1 gpm - 1 gpm = 0 gpm), it seems coupling a slurry wall with the landfill cap would essentially eliminate groundwater flow through the landfill contaminants The statement that "the slurry wall decreases groundwater flow by only an additional 1 gpm" (emphasis added) should be clarified Considering that some treatment of leachate may be required to meet ARARs after the contaminant transport model is rerun, the benefit of a slurry wall for reducing the volume and rate of leachate production may outweigh the cost of constructing it

11 **Page 7-3, Section 7.2.1, Last Paragraph** See comments above related to conclusions concerning discharge of seep water to groundwater, results of the contaminant transport simulation, and whether ARARs will be met at the point of compliance

12 **Page C-3, Section C.5.1, Paragraph 1** Figure 7-3A, a section cut through the proposed landfill cover, indicates that the East Landfill Pond dam will be removed If the dam is to be removed, it seems that the groundwater model for the "cap only" and the "cap and north slurry wall" scenarios should not use low hydraulic conductivity cells to define the boundary where the dam currently exists

13 **Page D-6, Section D.3.3** The hydraulic conductivity selected for contaminant transport modeling uses a value representative for the valley fill alluvium of 7 3 feet per day (ft/day) or 2 6 E^{3} cm/sec An appropriate value, however, would be 28 3 ft/day or 2 00 E^{-2} cm/sec which corresponds to the unconsolidated "engineered fill" selected for placement above weathered bedrock in place of East Landfill Pond More than 70 percent of the distance between well 0786 and the point of compliance, well 4087, will be this engineered fill under the selected corrective action The model should be rerun using a revised seepage velocity

14 **Page F-4, Section F.1.2, Last Paragraph and Table F-1** It is not a reasonable assumption that soil present on site and intended to be used for the 1 00 E^{5} cm/sec low-permeability barrier soil layer has the same porosity, field capacity, and wilting point as a 1 00 E^{7} cm/sec clay brought in from offsite According to the boring logs in Appendix A, the majority of soil suitable for the low-permeability layer are Type CL (Borings 52694, 52894, and 53794) Values used for the low permeability barrier soil layer field capacity and wilting point are too high The model should be revised and rerun for Alternative 7 to reflect the landfill cover being evaluated as Option E

15 **Page F-3, Section F.1 2, Paragraph 4** The value for manufacturer defects in the flexible membrane liner material, related as a number of flaws per acre (flaw/acre), as recommended by the HELP Model User's Guide is misstated A table in Section 3 6 on page 34 of the User's Guide recommends a pinhole deflect density of 1 to 4 for a "good" installation quality The last sentence of the first full paragraph of page 34 further recommends that "reasonably conservative estimates of the defect densities should be specified to determine the maximum probable leakage quantities" (Emphasis added) These recommended defect density numbers are supported by research by Giroud and Bonaparte, cited in the HELP Model Engineering Documentation in Section 4 16 1, page 78, first paragraph To quote, "Giroud and Bonaparte (1989) recommend using a flaw density of 1 flaw/acre for intensively monitored projects A flaw density of 10 flaws/acre or more is

possible when quality assurance is limited to spot checks or when environmental difficulties are encountered during construction "

A "good" installation quality is reasonable for the model runs The selection of 0 5 flaw/acre is neither conservative nor representative of defect frequency encountered by researchers. The model should be rerun for Alternatives 5, 7, 8, and 9 using a minimum of 1 flaw/acre and the evaluation of these alternatives and their associated Section 5 screening should be revised accordingly If 1 flaw/acre is used in the model and to insure such a value is representative, the design specifications regarding quality control and inspection of the flexible membrane liner manufacture and placement should be rigorous

4.0 REFERENCES

CHWA Hazardous Waste Regulation, 6 CCR 1007-3, Colorado Department of Health, August 1992

EPA, 1989 Technical Guidance Document· Final covers on Hazardous Waste Landfills and Surface Impoundments EPA/530-SW-89-047, July

EPA, 1993 Presumptive Remedy for CERCLA Municipal Landfill Sites U S Environmental Protection Agency, Office of Solid Waste and Emergency Response, Directive No 9355 0-49FS, September

EPA, 1994 The Hydrologic Evaluation of Landfill Performance (HELP) Model, Version 3, U S Environmental Protection Agency, September

EPA Comments on the Revised Draft of the
IM/IRA Decision Document and Closure Plan for OU7
May 1996

Page	Comment
ES-1	1stP, last sentence: "...,including implementing a leachate collection and treatment accelerated action, disposing of investigation-derived..."
ES-1	4thP, 1st sentence: For clarification "Remaining pathways, including 1) surface and...areas, 2)landfill leachate..., and 3)groundwater...assessment process.
1-4	Section 1.3.3: Please specify which wells will be abandoned. This section says 26/54 will be abandoned but Fig. 8-1 shows only 12 wells remaining during closure. What will happen to the other 16 wells?
2-1	4th P-Wouldn't it be more accurate to indicate that there is some chance the new landfill will not open or that the timing is somewhat uncertain.
2-13	4thP, next-to-last sentence: "phenomena" to "phenomenon"
2-15	1stP, section 2.3.6., 2nd sentence: What indications do you have that No Name Gulch will continue to be a losing stream if the dam is removed and the leachate flows downgradient?
2-27+	It would be helpful somewhere in the document if you could specify the isomer of the compound, e.g. is the trichloroethane detected in the UHSU GW 1,1,2 or 1,1,1?
2-49	Was no Cd detected in the LHSU GW?
Fig. 2-9 & 2-10	These 2 figures indicate that there is very little information on groundwater movement except within about 300' of the OU. Although it appears likely that all of the groundwater flows into No Name Gulch, this cannot be concluded from the information given. DOE either needs to install additional piezometers to confirm the GW gradient or it should add at least 2 more wells to its post-closure monitoring plan (roughly to the northeast and southeast of OU7) to monitor GW movement in the future. The minimum number of wells, 1 upgradient and 3 downgradient, is not sufficient to answer post closure concerns at this OU.
3-2	Section 3.2, 3rd P: The interpretation of how F039 waste changes from a listed waste to "leachate 'contained-in' environmental media'" is not correct. The only way to remove its listing as F039 is to delist it. It is not a contaminated medium. It is a listed waste. Contaminated media containing hazardous wastes are different.

6-5 Describe in detail how the water in the East Landfill Pond will be removed.

6-8 Approx. the 5th P ("The cover for Alternative 2 meets all...") Because this landfill is closing, it is not required to meet EPA requirements for a Subtitle C cap as described in Sections 264 and 265. Including this statement here is confusing and gives the appearance that DOE will be doing less then it is supposed to. This statement should be eliminated.

6-17 1stP, Section 6.3.1, 2nd sentence. If the cap eliminates 1/2 the total flow of 2 gpm and the slurry wall eliminates another 1 gpm, then the flow will be negligible to none. These two controls, the cap and the slurry wall are relatively equal which is not reflected in this sentence. Secondly, are these numbers correct?

7-2 3rdP, 2nd sentence: This sentence does not agree with the next to last sentence on p. 8-2 regarding removal or burial in place of the leachate treatment system.

7-5 Why isn't reference EPA (1989e) included in the list of documents re: HW landfills?

8-1 1stP, last 2 sentences: "Specific closure requirements for interim status landfills are...requirements for hazardous waste storage units."

8-3 4th P-How can the landfill be closed in the spring and summer of 1997 when right now it is targeted to go through closure in 1998. This is in part based on the delay in the Title II design.

8-4 Section 8.1.7.: Since the plan is to remove the water in the East Landfill pond during closure, why does this paragraph state that the water level in the pond will be lowered? Is this an interim action prior to removal?

8-7 "Point of Compliance", 1st sentence: "Postclosure groundwater-monitoring requirements are applicable, relevant..." (compliance with 265, Subpart F is a requirement for interim status landfills during postclosure, 265.310(b)(3)).

8-7 last sentence: Recommended substitution, "Well 53194 will also be monitored to detect releases from the landfill."

8-8 4th P-Well 5887 does not appear on Fig. 8-1 or 8-2. 4th P-Well 4087 has been dry 35 out of the 80 times the water table elevation has been measured (based on the hydrograph dated 4/4/95). This includes 3 periods when the well was dry for six months or more; Sept 88-Feb 89, Sept 90-Apr 91, and Nov 92-Feb 93, which means that it

would not have been possible to perform the postclosure quarterly monitoring of the upgradient and downgradient wells as described in Section 8. For these reasons, this well is not an acceptable post closure monitoring well.

8-8 4th and 5th P-These 2 paragraphs do not agree on the groundwater monitoring during post-closure. The 4th paragraph states that there will be 3 upgradient wells. The 5th paragraph states that only one upgradient well will be monitored. The status of these wells and which will be sampled during post closure must be clarified.

8-11 The closure timeline does not agree with the fact that no funds have been set aside in FY96 for design.

8-12 Table 8-2 should include the quarterly monitoring of the 1 upgradient and 3 downgradient wells as described on p. 8-8.

8-13 Because iron is the only parameter which might exceed ARARs at the point of compliance (p.3-13), Fe should be added to Table 8-3.

Draft Proposed Plan

1 Comments should be sent to EPA as it will have the lead for OU7 as soon as it is approved.

2 1st column, last P: Dates for the public comment period need to be revised.

2 2nd column, last sentence: see comment for p. 2-1

3 1st column, last sentence: "Response actions...leachate-collection trench, <u>two slurry walls</u>, and a passive..."

3 2nd column, 3rd P, 2nd sentence is very confusing. Perhaps just rephrasing "analytes do not exceed ARARs" would help.

4 2nd column, #1, 1st sentence: "criteria" to "criterion"
2nd column, #5, 1st sentence: "present" to "presents"
2nd column, #7: The difference between $10.5M, $11.7M, and $11.4M does not appear to be significant.

General There is no discussion of the two upgradient plumes associated with OU6 in this document. In the Technical Memorandum for OU7 dated 9/94 on p. v in the Executive Summary, it states that these plumes will be addressed along with OU10 and OU6. Please discuss in detail where and how these plumes will be addressed.

NOTE TO: Nina Churchman

FROM: Susan Griffin

SUBJECT: OU7 Revised Draft IM/IRA

GENERAL

The OU7 revised draft IM/IRA which you asked me to review evaluated exposure of human open-space receptors to leachate seep water, leachate-contaminated groundwater emerging as surface water, and surface soils downgradient of the landfill. The document did not find any unacceptable risks to this receptor.

The draft IM/IRA also evaluated exposure of various terrestrial and vegetation receptors to surface and subsurface soils; and aquatic receptors to leachate seep water and groundwater downgradient emerging as surface water. A conservative screening approach rather than a comprehensive ecological risk assessment was done. Hazard Indices which exceeded 1 were found for exposure of vegetation to nitrate/nitrite in the subsurface soil (HI=1,047), exposure of small mammals to toluene in the air of subsurface burrows (HI=5), exposure of aquatic receptors to PAHs and metals in the leachate seep water (HI's up to 7,900) and exposure of aquatic receptors to selenium where groundwater contacts surface water (HI=48). These risks were dismissed by the authors because of data outliers (nitrate in leachate) or poor quality habitat. Their arguments sounded reasonable, but you may want to examine the validity yourself.

Although the surface water and sediments in East Landfill Pond were mentioned on pages 2-21 and 2-22 as having contaminants of concern, I did not find an evaluation of these media in Chapter 3. Were these media to be evaluated elsewhere?

SPECIFIC COMMENTS

1. Page 3-6, Section 3.3.3, 2nd paragraph

The last sentence states that EPA guidance says that dermal exposure to metals and radionuclides should not be quantified. This is incorrect and should be removed from the text. It would, however, be appropriate to state that dermal exposure to metals in soils is considered to be negligible in comparison to exposure via other pathways, and is generally addressed qualitatively rather than quantitatively in Region 8.

2. Page 3-8, 1st paragraph and Table 3-4

A matrix factor of 0.5 is used for the bioavailability of arsenic from soil. This is inappropriate and should be removed from the text. Also, the risk calculation for arsenic should be redone using a matrix effect of 1. Page 3-8 cites the 1993

Freeman study as the basis for the 0.5 matrix variable. The Freeman study was conducted on smelter-derived copper, zinc, and iron-arsenic oxide in a cemented matrix (arsenic surrounded by an insoluble matrix). DOE was provided with a copy of EPA's Clark Fork River Guidance which discussed a number of arsenic bioavailablity studies which exhibited widely disparate results depending on the form of arsenic present. The guidance specifically recommends that changes in bioavailability not be made without either the conduction of a site-specific bioavailability study and/or the collection of geochemical speciation data. None of this data was ever collected at Rocky Flats. It is wholly inappropriate to pick a bioavailability adjustment factor without the scientific basis for doing so. It should also be noted that EPA and CDPHE recently sent a joint letter to DOE specifically stating that risk assessments which used soil matrix factors without the prior consent of both EPA and CDPHE would be rejected.

3. Page 3-18, last paragraph

The third sentence states that iron is a nontoxic constituent. This is absolutely incorrect and should be revised. Dose makes the poison. Acute effects associated with ingestion of elevated doses of iron include vomiting, ulceration of the GI tract, renal and hepatic damage, and death. Chronic exposure is associated with blood disorders, abnormal liver function, endocrine and cardiovascular effects. It would be more appropriate to state that the concentrations of iron present would not pose an unacceptable risk to humans. Region 8 uses 0.26 mg/kg/day as the screening toxicity value (much like a RfD) for iron based on the US RDA.

3. Page 3-22, Table 3-3 and page 3-30, Table 3-14

The toxicity value for nitrate (nitrate is an order of magnitude less toxic that nitrite) was used to develop the risk-based remediation goal for nitrite and nitrate. Although analytical labs have the capability to analyze for nitrites and nitrates separately, Rocky Flats chose not to do so. Either evidence should be provided which substantiates that nitrate is the dominant form present in soil, or the remediation goal should be based on nitrate to be prudent in the face of a significant data gap.

4. Page 3-24, Table 3-7

The oral slope factor for arsenic on IRIS is now 1.5, not 1.75.

5. Tables 3-14, Table 3-15

The units for groundwater are listed as ug/l on Table 3-14 and mg/l on Table 3-15. The units should be corrected.