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Distribution

Unit Managers' Meeting: 100 Areas Remedial Action Unit/Source Operable Units

Kevin Bazzell ..... DOE-RL, RP (A3-04)
Rudy Guercia ..... DOE-RL, RP (A3-04)
Dale Jackson ..... DOE-RL, RP (A4-52)
Mary Jarvis ..... DOE-RL, RP (A5-15)
Chris Smith ..... DOE-RL, RP (A3-04)
Mike Thompson ..... DOE-RL, RP (A6-38)
Arlene Tortoso ..... DOE-RL, RP (A6-38)
Kent Westover ..... DOE-RL, RP (A3-04)

Lisa Treichel ..... DOE-HQ (EM-442)

John Price ..... WDOE (H0-57)
Noel Smith-Jackson ..... WDOE (H0-57)
Jean Vanni ..... WDOE (H0-57)
Wayne Soper ..... WDOE (H0-57)

Dennis Faulk ..... EPA (B5-01)
Richard Jaquish ..... EPA (B5-01)

Randy Acselrod ..... WDOH (B1-42)
Debora McBaugh ..... WDOW (B1-42)

Jane Borghese ..... FH (E6-35)
Mark Buckmaster ..... BHI (X3-16)
Rich Carlson ..... BHI (X0-17)
Frank Corpuz ..... BHI (X0-17)
John Darby ..... BHI (L6-06)
Rick Donahoe ..... BHI (X5-57)
Jack W. Donnelly ..... BHI (H0-17
Jon Fancher ..... CHI (X0-17)
Ella Feist ..... CHI (X0-17)
Vern Johnson ..... FH (E6-35)
Kim Koegler ..... BHI (X9-08)
Eileen Murphy-Fitch ..... FH (A4-25)
Rex Miller ..... BHI (X3-40)
Alexander Nazarali ..... BHI (X0-17)
Annie Smet ..... BHI (X0-17)
Scott Parnell ..... CHI (X5-57)
Dean Strom ..... CHI (X3-40)
Jill Thomson ..... CHI (H9-01)
Joan Woolard ..... BHI (H9-03)
Administrative Record ..... BHI (H0-09) 2 copies

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Please forward distribution list changes to Pat Ellsworth (BHI).
Phone 372-9355, plellswo@bhi-erc.com

114763

Meeting Minutes Transmittal/Approval
Unit Managers' Meeting
100 Area Remedial Action and Waste Disposal Unit/Source Operable Unit
3070 Washington Way, Richland, Washington
March 25, 2004

APPROVAL: _____ Date 6/24/04
Chris Smith/Jamie Zeisloft, RL (A3-04)
100 Area Unit Managers

APPROVAL: _____ Date 6/24/04
Michael Thompson/ Arlene Tortoso, RL (A6-38)
Waste Management Division

APPROVAL: _____ Date 6/24/04
John Price, Ecology (H0-57)
100 Aggregate Area Unit Manager

APPROVAL: _____ Date 6-24-04
Larry Gadbois, DOE (B5-01)
100 Aggregate Area Unit Manager

Meeting minutes are attached. Minutes are comprised of the following:

Attachment 1	--	Attendance Sheet
Attachment 2	--	Agenda and February Action Items
Attachment 3	--	March 100 Area Meeting Minutes and New Action Items
Attachment 4	--	WIDS Site CVP Closeout Summary Table.
Attachment 5	--	Backfill Concurrence for Septic System
Attachment 6	--	Suggested Path for Addressing Interim Safe Storage of the 105-N Reactor/109-N Facility into the CERCLA Process
Attachment 7	--	Groundwater Remedial Actions
Attachment 8	--	Pipeline Drawing
Attachment 9	--	K- Basin Groundwater Monitoring

Prepared by: Pat Ellsworth Date 6/24/04
Pat Ellsworth (H9-03)

Concurrence by: Richard A Carlson Date 6/24/04
Richard A. Carlson
BHI Remedial Action Project (X0-17)

ATTACHMENT 1

Attendance Sheet

Remedial Action and Waste Disposal Unit Managers' Meeting
Official Attendance Record – 100 Area
March 25, 2004

Please print clearly and use black ink

PRINTED NAME	ORGANIZATION	O.U. ROLE	TELEPHONE
S. W. Clark	CHI	CVP	372-9531
SW Callison	OHM	100-F Design	372-9601
M.R. SCHWAB	BHI	CVP	372-9407
Mary Hartman	PNNL	groundwater	~~943~~ 373-0028
John Pruckter	"	"	376-3977
Jon Fancher	CHI	100N RA	373-9556
Alex Nazarali	BHI	CVP	373-1915
Larry Gadbois	EPA		376-9884
E. J. Murphy Jr.	FH	TPAT	376-8868
Dennis Faulk	EPA		
Jack Donnelly	BHI	PEL-RA	373-9299
Chris Smith	DOE-RL	100 Area Project Lead	372-1544
Arlene Tortoso	DOE-RL	Groundwater UM	373-9631
John Winterhalder	FH/GRP	GRP Board	372-8144
Vernon Johnson	FH/GRP	100 GW Task Lead	373-3987

Remedial Action and Waste Disposal Unit Managers' Meeting
Official Attendance Record – 100 Area
March 25, 2004

Please print clearly and use black ink

PRINTED NAME	ORGANIZATION	O.U. ROLE	TELEPHONE
Vernon Johnson	FH	100 GW Task Lead	373-3987
Roger J. Lawdon	BHI	oversight	372-9209
R. Miller	BHI	BC	373-5876
D.N. Strom	CHI	BC	3-5519
Ella Feist	CHI	100 RA	3-2130
Bob Peterson	PNNL	100K; Aquifer Tubes	373-9020
K. Michael Thompson	DOE-RL	GW	373-0750
PG DOCTOR	BHI	RISK.	372-9570
M. Buckmaster	BHI	Comp 4	521-2089

ATTACHMENT 2

Agenda

100 AREA
UNIT MANAGERS MEETING AGENDA

Thursday, March 25, 2004

1:00 – 4:00 p.m. HS II, Rm 2-020

Administrative

- Meeting minutes status
- Review and approve last UMM minutes
- Next 100 UMM is April 22, 2004, at 1:00 – 4:00

Remedial Action

100 Area Common

- Remaining Sites ESD Status
- Remaining Sites Sampling Efforts Status
  - B/C Area Remaining Sites
  - 600 Area Remaining Sites
- Burial Ground SAP revision – language acceptable for compositing
- 100 Area RDR & SAP revisions status
- CVP status
- River Corridor Risk Assessment
- B/C Pilot
- N Eco Study

100 F, K, and Group 4

- 100 F General Status
- 100 F Design/Procurement Status – Discuss Near River Sites
- 100 K General Status

100 N

- Procurement update
- Overburden Sampling Results

100 B/C

- Burial Ground status
- Pipeline backfill status
- 118-B-10 paint/soil treatability status
- Remaining Sites RFP (100-C-9 and 100-B-14)

D&D

- Project Status

General Crossover Items

-

Review Open Action Items Log

100-NR-2 Groundwater OU

- Remediation treatment status

100-KR-4 Groundwater OU

- Remediation treatment status
- 100 K Burial Ground Soil Gas Investigation

100-HR-3 Groundwater OU

- Remediation treatment status

100-FR-3 Groundwater OU

-

100-BC-5 Groundwater OU

- Status of quarterly sampling at wells 199-B3-46 and -47

Groundwater

- 100 Area Open Action Items
- 100-Area Open forum and discussion
- Recent change in tritium concentration near KE Fuel Storage Basin
- Status of aquifer tube installation project

Other

ATTACHMENT 3

March 100 Area Meeting Minutes and New Action Items

100 Area Unit Managers Meeting Minutes

3070 George Washington Way, Conference Room 20
March 25, 2004

1:00 – 3:00 p.m.

Administrative

- Meeting Minute Status – January meeting minutes were approved and signed by those in attendance

100 Area Common

Remaining Sites Explanation of Significant Difference (ESD) – The ESD was signed by the U.S. Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology) is scheduled to sign March 31, and U.S. Department of Energy, Richland Operations Office (RL) has recommended to their management to sign the ESD. EPA noted that if this ESD is not signed in April, EPA may need to issue a new signature.

Remaining Sites Sampling Efforts Status

B/C Area Remaining Sites – Ella Feist, ERC, stated that confirmatory sampling is complete for the B/C Area miscellaneous pipelines (waste site 100-B-14 and 100-C-9). The sample results will be evaluated to determine if the site is a no-action site or requires remediation. If the site is a no-action site, the Remaining Sites Verification Package (RSVP), Draft A reports will be provided to EPA in April. EPA agreed with the strategy for evaluation and use of the pipeline data (i.e. the pipe matrix and pipeline Residual Radioactivity (RESRAD) modeling). Ecology's comments concerning the pipe matrix and RESRAD modeling are forthcoming.

- 600 Area Remaining Sites – Four sites are planned for confirmatory sampling. Sampling at one site is complete, waiting for sampling results.

- 100 Area Remedial Design Report (RDR) and Sampling and Analysis Plan (SAP) Revision Status – EPA comments were received on the SAP; comments on the RDR will be delivered soon. Ecology comments on the RDR have been transmitted, but not received. Chris Smith, RL, indicated the 45-day review period for the 100 Area RDR and SAP started when the hard copy was received the first week of March.

- Cleanup Verification Package (CVP) Status – Alex Nazarali, ERC, distributed the updated CVP Status Table (Attachment 4). Three CVPs are being finalized.

- River Corridor Risk Assessment – Dennis Faulk, EPA, asked why the river corridor and the plateau work were not being integrated. There needs to be a discussion to see

if this work should be integrated.

- N Eco Study – The spring sampling date will not be missed. The proposed change to the October 2004 delivery date for the aquatic eco-receptor does not require an ESD, will be presented to Ecology in a change notification. Assuming that Ecology agrees with the proposed change, it will be incorporated into next months UMM when Ecology attends. Mike Thompson, RL, will circulate an email providing information on what will be presented at the next UMM.

100-F, -K, and Group 4

- Group 4 – Mark Buckmaster, ERC, stated that they have made good progress on the 116-KE-4 Retention Basin and work will be done next week. They are removing overburden at the116-K-2 trench and remediation will begin in two weeks. Remediation and backfill of the 116-KE-1 and 116-KW-1 Condensate Cribs have been completed. Preliminary data received on 116-KW-1 indicate elevated levels of C-14 and tritium above the remediation action goals. A data package will be provided at the next UMM.

- 100-F Design Near River Sites – Stacey Callison, ERC, stated that there are three near-river sites in the 100-F design. Two are outfalls that are identified for remediation, the 116-F-8 outfall and the 116-F-16 PNL outfall. The third site is the 128-F-2 burn pit remaining site.

  The two adjacent outfalls each have a concrete flume extending into the river. For the 116-F-8 outfall the concrete flume is associated with the 100-F-39 river effluent pipelines site and will not be included in this remedial design. For the 116-F-16 PNNL outfall, the concrete flume is currently considered a part of the outfall site. ERC proposed reassigning the 116-F-16 outfall flume to the 100-F-39 river effluent pipeline site, consistent with the other outfall flume. EPA concurred.

- The 128-F-2 burn pit site is a remaining site located near the river that has miscellaneous debris (rebar, concrete bricks, etc.). Given the current record for burn pit sites, there is a good chance that the 128-F-2 burn pit will require remediation. Remediation would involve excavating much of the riverbank. For purposes of remedial design and if remediation is necessary the ERC proposed that the site debris be excavated as much as practical above the river high water mark and that visible and manageable debris below the high water mark and manually picked up. EPA concurred with the planned design approach. ERC will be consulting with the Washington Department of Fish and Wildlife and other applicable agencies regarding requirements and limitations necessary for these excavation activities for incorporation into design documents.

100-N

Jon Fancher, ERC, reported that a 95% Upper Confidence Limit (UCL) calculation for the 116-N-1 overburden is being prepared. Once that is complete, he will be seeking Ecology concurrence to use the overburden for backfill purposes. A Request for Proposal (RFP) for remediation of the 116-N-1 waste site has been issued. It is anticipated to award the contract in early April.

100-B/C

- Rex Miller, ERC, stated that the readiness assessment was complete allowing excavation to start at 118-B-1 burial ground. There are 22 trenches in the burial ground, the first 5 trenches have been excavated, and, work is in progress on trench number 6. The sorting process is being revised as the work proceeds. In process sampling has started and the results from the sampling agree with what was found in the 1994 burial ground treatability test. Excavation of the 118-B-1 is expected to be complete by the end of July.

- 600-232 Waste Site – Approximately 30% of the remedial action work is left to complete. This is a non-rad site with a lot of salvaging to be done on the site.

Remaining Sites Design
In the process of doing a design for remediation of the B/C remaining sites that failed to meet the cleanup criteria during confirmatory sampling.
Dean Strom, ERC, requested the signed "BC Septic Tanks Backfill Concurrence" form (Attachment 5) be entered into the Administrative Record.

Cross Over Item(s)

- No report

Groundwater

- 100-NR-2 – The pump-and-treat system operated at 100% during the reporting period. Drilling and coring was completed for a multi-depth monitoring well location at N springs.

- 100-KR-4 – The pump-and-treat system operated at 99% during the reporting period. The pump in well K-126 was lowered five feet on March 17, 2004. Since then, a pumping rate of 20 gpm has been achieved. Larry Gadbois, EPA, asked what the status was of the replacement for well K-33, and will the replacement well be at the same elevation. FH will send Larry Gadbois an email with the drilling date.

- 100-HR-3 – The pump-and-treat system operated at 99% during the operating period. Periodic shutdown of extraction wells occurred due to low water level and solenoid

valve malfunctions.

- In Situ REDOX Manipulation (ISRM) – Installation of the first phase of the planned ISRM extension was terminated as a result of new information that the ISRM appears to be breaking down. In place of the ISRM extension, a small-scale pump-and-treat system will be used to address the new chromium plume.

- 100-FR-3 Groundwater – Bob Peterson, PNNL, distributed Attachment 8 which includes the handout for "100-K Area: K-Basins Groundwater Monitoring," "Preliminary Results for Aquifer Tube Samples from 100-D Shoreline," and "Aquifer Sampling Tube Activities."

- 100-BC-5 and 100-FR-3 – Jon Fruchter, PNNL, recently sent a letter to recipients of the groundwater SAPs, transmitting page changes as discussed in the February UMM.

ATTACHMENT 4

WIDS Site Closeout Summary Table

WIDS Site CVP Closeout Summary Table

03/24/04

WIDS Site Closeout	CVP Doc. No. documenting WIDS site closeout	EPA/ Ecology WIDS Signoff	Issue Rev. 0 CVP
100 B/C Area			
116-B-13	CVP-1999-00002	7/22/99	7/1999
116-B-14	CVP-1999-00003	7/22/99	7/1999
116-C-1	CVP-1998-00006	1/21/99	1/1999
116-B-1	CVP-1999-00012	12/8/1999	12/1999
116-B-11	CVP-1999-00001	12/8/1999	12/1999
116-C-5	CVP-1999-00004	12/8/1999	12/1999
116-B-4	CVP-1999-00014	2/24/2000	3/3/2000
116-B-5	CN 111 (DOE/RL-96-017)	1/14/1997	1/14/1997
116-B-6B	CVP-1999-00017	2/24/2000	3/3/2000
116-B-9	CVP-1999-00009	2/24/2000	3/3/2000
116-B-2	CVP-1999-00015	2/24/2000	3/3/2000
116-B-3	CVP-1999-00013	2/24/2000	3/3/2000
116-B-10	CVP-1999-00010	2/24/2000	3/3/2000
116-B-12	CVP-1999-00008	2/24/2000	3/3/2000
116-C-2A	CVP-1999-00019	3/15/2000	3/28/1999
116-C-2B			
116-C-2C			
116-B-6A	CVP-1999-00011	5/17/2000	5/26/2000
116-B-16			
116-B-7	CVP-2002-00003	7/25/2002	8/6/2002
132-B-6			
132-C-2			
BC Pipeline (North)	CVP-2002-00019	12/4/2003	2/17/2004
BC Pipeline (South)	CVP-2003-00022	2/23/2004	
100-B-5	CVP-2003-00014	6/18/2003	9/11/2003
1607-B7	CVP-2003-00004	5/27/2003	7/29/2003
1607-B8	CVP-2003-00005	5/27/2003	7/29/2003
1607-B9	CVP-2003-00006	6/19/2003	8/28/2003
1607-B10	CVP-2003-00007	5/27/2003	7/29/2003
1607-B11	CVP-2003-00008	5/27/2003	7/29/2003
100-C-3	CVP-2003-00009	5/27/2003	7/28/2003
118-C-4	CVP-2003-00015	6/25/2003	9/11/2003
118-B-9	0100-B-CA-V0171	2/10/2004	
100-B-11	0100-B-CA-V0167	2/10/2004	
100-B-16	0100-B-CA-V0169		
118-B-4	CVP-2004-00002		
118-B-5	CVP-2004-00003		
118-B-10	CVP-2004-00004		
118-C-2	CVP-2004-00005		
100 D Area			
100-D-4 (107D5)	CVP-1998-00004	3/25/1999	3/1999
100-D-20 (107D3)	CVP-1998-00003	3/25/1999	3/1999
100-D-21(107D2)	CVP-1998-00002	3/25/1999	3/1999
100-D-22 (107D1)	CVP-1998-00001	3/25/1999	3/1999
1607-D2		closed	
1607-D2:1 Tile Field	CVP-1998-00005	3/25/1999	3/1999
Septic Pipelines	CVP-2000-0004	9/26/2000	9/2000
Septic Tank	CVP-1999-00005	11/23/1999	12/1999
116-DR-9	CVP-1999-00006	1/6/2000	1/2000
100-D-25			
116-D-7	CVP-1999-00007	8/15/2000	8/2000
100-D-18 (107D4)	CVP-2000-00001	9/26/2000	10/2/2000
116-DR-1	CVP-2000-00002	9/26/2000	9/27/2000
116-DR-2			
100-D-48		closed	
100-D-48:1 (Grp 2 North Pipelines)	CVP-2000-00003	3/14/2001	3/2001
100-D-48:2 (Grp 2 West Pipelines)	CVP-2000-00005	9/26/2000	10/2/2000
100-D-48:3 (Grp 3 Large Pipelines)	CVP-2000-00034	4/20/2001	4/20/2001
100-D-48:4 (Grp 3 Small Pipelines)	CVP-2000-00033	4/17/2001	4/20/2001
100-D-19	CVP-2000-00003	3/14/2001	3/2001
UPR-100-D-4			
100-D-49		closed	
100-D-49:1 (Grp 2 North Pipelines)	CVP-2000-00003	3/14/2001	3/2001
100-D-49:2 (Grp 2 East Pipelines)	CVP-2000-00005	9/26/2000	10/2/2000

WIDS Site CVP Closeout Summary Table

WIDS Site Closeout	CVP Doc. No. documenting WIDS site closeout	EPA/ Ecology WIDS Signoff	Issue Rev. 0 CVP
100 D Area (cont.)			
UPR-100-D-2	CVP-2000-00005	9/26/2000	10/2/2000
UPR-100-D-3			
100-D-5	CVP-2000-00034	4/20/2001	4/20/2001
100-D-6			
116-D-3	no CVP site rejected	5/17/2000	N/A
116-D-4	CVP-2000-00008	10/23/2000	10/31/2000
116-D-6	CVP-2000-00009	11/7/2000	11/9/2000
116-D-1A	CVP-2000-00010	3/12/2001	3/2001
116-D-1B			
100-D-46			
116-D-2	CVP-2000-00013	10/23/2000	10/25/2000
116-DR-6	CVP-2000-00014	10/23/2000	10/24/2000
116-DR-4	CVP-2000-00015	10/23/2000	10/25/2000
100-D-12	CVP-2000-00016	10/23/2000	10/26/2000
100-D-52	CVP-2000-00018	11/7/2000	11/9/2000
116-DR-7	CVP-2000-00019	9/26/2000	10/2/2000
116-D-9	CVP-2000-00012	3/23/2001	3/23/2001
105-DR Reactor	CVP02003-00016	12/15/2003	1/15/2004
118-DR-2:2			
100-D-49:4			
117-DR	CVP-2003-00018	1/29/2004	3/4/2004
100-D-23			
100-D-54			
100 H Area			
1607-H2	CVP-2000-00024	2/5/2001	2/2001
1607-H4	CVP-2000-00025	2/26/2001	2/26/2001
116-H-1	CVP-2000-00026	4/4/2001	4/11/2001
116-H-7	CVP-2000-00027	7/24/2001	8/1/2001
100-H-5	CVP-2000-00028	12/21/2000	12/21/2000
100-H-17	CVP-2000-00031	3/6/2001	3/8/2001
116-H-2			
100-H-2			
100-H-30			
100-H-21	CVP-2000-00029	3/29/2001	3/29/2001
100-H-22			
100-H-1			
100-H-24	CVP-2000-00030	5/9/2001	5/2001
116-H-3	CVP-2000-00032	4/3/2001	4/11/2001
100 N Area			
120-N-1 120-N-2 100-N-58	CVP-2001-00021	3/28/2002	4/18/2002
116-N-3	CVP-2002-00002	9/26/2002	12/23/2002
100 Area Misc. & 300 Area			
JA Jones	CVP-2001-00019	11/8/2001	12/10/2001
600-23	CVP-2001-00020	11/30/2001	12/17/2001
300-49 (Landfill 1A)	CVP-2000-00020	1/12/2003	6/9/2003
300-50 (Landfill 1B)	CVP-2000-00021	1/27/2003	6/9/2003
628-4 (Landfill 1D)	CVP-2003-00001	4/10/2003	7/23/2003
316-1(South Process Pond) & 300-262	CVP-2003-00002	4/10/2003	7/23/2003
UPR-300-FF-1, 300 RFBP			
UPR-300-32, 33, 34, 35, 36, & 37			
300 Ashpit	BHI-01132	12/1/1997	12/1/1997
300-44 UPR	BHI-01135	12/1/1997	12/1/1997
316-2 (North Process Pond), 618-12, and UPR-300-7	BHI-01298	8/19/1999	8/19/1999
316-5 (Process Trench)	BHI-01164	3/30/1998	3/30/1998
UPR-300-15, and UPR-300-19			
UPR-300-20 Through UPR-300-30, UPR-300-47, UPR-300-8, and UPR-300-9			

WIDS Site CVP Closeout Summary Table

WIDS Site Closeout	CVP Doc. No. documenting WIDS site closeout	EPA/ Ecology WIDS Signoff	Issue Rev. 0 CVP
300-45	BHI-01136	12/1/1997	12/1/1997
618-4	CVP-2003-00020	1/16/2004	
618-5	CVP-2003-00021	1/29/2004	
100 F Area			
116-F-4	CVP-2001-00006	11/8/2001	11/15/2001
116-F-5	CVP-2001-00007	8/16/2001	8/23/2001
1607-F6	CVP-2001-00010	11/8/2001	11/15/2001
UPR-100-F2	CVP-2001-00011	4/22/2002	5/7/2002
100-F-19:1	CVP-2001-00002	5/21/2002	6/10/2002
100-F-19:3			
100-F-34			
116-F-12			
100-F-40	site closed (No CVP)	2/15/2002	2/15/2002
116-F-14	CVP-2001-00009	7/11/2002	7/18/2002
100-F-2	CVP-2001-00001	7/25/2002	8/5/2002
100-F-15	CVP-2002-00001	7/25/2002	8/6/2002
100-F-4			
100-F-11			
100-F-16			
116-F-9	CVP- 2001-00008	10/16/2002	10/22/2002
116-F-2	CVP- 2001-00005	1/13/2003	3/11/2003
126-F-1	CVP- 2002-00002	1/13/2003	TBD
100-F-35	CVP-2002-00007	4/15/2003	6/16/2003
116-F-1	CVP-2002-00009	5/22/2003	11/3/2003
116-F-3	CVP-2002-00008	4/15/2003	6/16/2003
116-F-6	CVP-2002-00010	5/19/2003	11/3/2003
116-F-10	CVP-2002-00006	4/15/2003	6/16/2003
1607-F2	CVP-2002-00005	1/13/2003	3/11/2003
100-F-19:2	CVP-2001-00003	5/27/2003	9/15/2003
116-F-11			
UPR-100-F-1			
100-F-29			
UPR-100-F-3	CVP-2003-00010	6/9/2003	8/14/2003
100-F-25			
100-F-23	CVP-2003-00011	6/9/2003	8/14/2003
100-F-24	CVP-2003-00012	6/9/2003	8/14/2003
105-F Reactor	CVP-2003-00017	2/12/2004	
100 K Area			
116-K-1 Crib	CVP-2003-00024	2/17/2004	
116-KW-3 Retention Basin	CVP-2003-00023	2/23/2004	
116-KE-1			
116-KW-1			
100-K-29			
100-K-31			
100-K-32			
100-K-33			
128-K-1			

ATTACHMENT 5

Backfill Concurrence for Septic System

Krueger, Patricia E

From: Clark, Steven W
Sent: Monday, March 01, 2004 9:46 AM
To: Krueger, Patricia E
Cc: Corpuz, Franklin M; Cook, Kelly E
Subject: RE: BC Septic Tanks Backfill Concurrence

Patty: The final decision is that a copy should accompany the UMM minutes and the original should go into the project files. That should cover the problem of being able to find the document if it is needed.

Steve

-----Original Message-----
From: Cook, Kelly E
Sent: Monday, March 01, 2004 9:42 AM
To: Cook, Kelly E; Clark, Steven W
Cc: Corpuz, Franklin M
Subject: RE: BC Septic Tanks Backfill Concurrence

Frank is correct.....a copy should accompany the UMM minutes and the original should go into the project files.

Kelly E. Cook
509-373-5275
509-521-2080

-----Original Message-----
From: Cook, Kelly E
Sent: Monday, March 01, 2004 9:24 AM
To: Clark, Steven W
Cc: Cook, Kelly E
Subject: RE: BC Septic Tanks Backfill Concurrence

I believe Frank is correct.....I will do some further checking.

Kelly E. Cook
509-373-5275
509-521-2080

-----Original Message-----
From: Clark, Steven W
Sent: Monday, March 01, 2004 9:08 AM
To: Cook, Kelly E
Subject: BC Septic Tanks Backfill Concurrence

Kelly: We have the BC Septic Tanks Backfill Concurrence signed by everybody but now nobody is sure where it should ultimately be sent. We tried to have DIS put it into the project files but Frank Corpuz intervened and said it should go into the 100 Area UMM meeting minutes. We don't think that that is where past Backfill Concurrences have ended up because they would be too hard to find. Do you know if in the UMM meeting minutes is where past Backfill Concurrences have ended up? If not where should they go? The project files is the logical place, seems to me.

Steve

Waste Site: 100-B/C Septic System Overburden Soil	**BACKFILL CONCURRENCE CHECKLIST** (Concurrence to Proceed with Waste Site Backfill Operations)	Assoc. with WIDS Nos: 1607-B7, -B8, -B9, -B10, -B11

This checklist is a summary of cleanup verification results for the 100 B/C Septic System Overburden Soil. The checklist is intended as an agreement allowing the ERC subcontractor to use for backfill the 100 B/C Septic System Overburden Soil, prior to the issuance of a cleanup verification package. The lead regulatory agency has been provided copies of detailed calculations. The results are summarized below.

Regulatory Requirement	Remedial Action Goals (RAG)	Results	RAG Attained	Ref.
Direct Exposure – Radionuclides	1. Attain 15 mrem/yr dose rate above background over 1000 years.	1. Maximum dose rate was not calculated by RESRAD since all radionuclides were below Hanford Site background, or below detection limits.	Yes	A
Direct Exposure – Nonradionuclides	1. Attain individual COC RAGs.	1. All individual COC concentrations are below the RAGS.	Yes	B
Meet Nonradionuclide Risk Requirements	1. Hazard quotient of less than 1 for noncarcinogens.	1. The hazard quotients for individual nonradionuclide COCs in the overburden are less than 1.	Yes	B
	2. Cumulative hazard quotient of less than 1 for noncarcinogens.	2. The cumulative hazard quotient is 7×10^{-2} for the overburden.		B
	3. Excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens.	3. Excess cancer risk values for individual nonradionuclide COCs are less than 1×10^{-6}.		B
	4. Attain a total excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.	4. Total excess cancer risk is 7×10^{-8}, which is below 1×10^{-5}.		B
Groundwater/River Protection – Radionuclides	1. Attain single COC groundwater & river RAGS.	1. Since all radionuclides were below Hanford Site background, or below detection limits, all single COC Groundwater and river RAGs have been attained.	Yes	A, B
	2. Attain National Primary Drinking Water Regulations 4-mrem/yr (beta/gamma) dose standard to target receptor/organ.	2. Since all radionuclides were below Hanford Site background, or below detection limits, drinking water standards have been attained.		C
	3. Meet drinking water standards for alpha emitters: the more stringent of 15 pCi/L MCL or 1/25th of the derived concentration guide for DOE Order 5400.5.	3. There are no alpha emitters for this site.		B
	4. Meet total uranium standard of 21.2 pCi/L.	4. Uranium is not a COC for this site.		B
Groundwater/River Protection – Nonradionuclides	1. Attain individual nonradionuclide groundwater and river cleanup requirements.	1. All the groundwater and river RAGs have been attained.	Yes	A, B
Other Supporting Information	1. Sample variance calculation briefs.			C
	2. Sample location design calculation brief.			D

All citations above and references on attached sheet are on record with Bechtel Hanford, Inc., Document and Information Services. Above noted regulatory requirements have been attained.

BHI Task Manager	Date	BHI Project Engineer	Date	DOE Project Manager	Date
	2-19-04		2-23-04		2/25/04
			2-19-04		

Given the attached information, DOE can proceed with backfill of the site with minimal risk. Final approval that the site has met RAOs and RAGs will occur with the submittal, review, and approval of the Cleanup Verification Package by the lead regulatory agency.

EPA Project Manager	Date	Ecology Project Manager	Date
	2-25-04	N/A	N/A

Backfill Concurrence Checklist Attachments/References

Attachment/ Reference	Description
A	100-B/C Septic System Overburden Stockpiles RESRAD Calculation, Calculation No. 0100B-CA-V0202
B	100-B/C Septic System Stockpiles 95% UCL Calculation, Calculation No. 0100B-CA-V0201
C	1607-B7, B8, B9, B10, and B11 Septic System Overburden Variance Calculation, Calculation No. 0100B-CA-V0196
D	100-C-3 French Drain, 1607-B7,1607-B8, 1607-B9, 1607-B10, 1607-B11 Septic System Overburden Sampling Plan, Calculation No. 0100B-CA-V0166

Attachment A

100-B/C Septic System Overburden Stockpiles RESRAD Calculation,
Calculation No. 0100F-CA-V0202

CALCULATION COVER SHEET

Project Title 100-B/C Septic System Stockpiles Cleanup Verification **Job No.** 22192
Area 100 B/C Area
Discipline Environmental ***Calc. No.** 0100B-CA-V0202
Subject 100-B/C Septic System Overburden Stockpiles RESRAD Calculation Brief
Computer Program RESRAD **Program No.** Version 6.21

Use of this calculation by persons who do not have access to all of the pertinent facts could lead to incorrect conclusions or assumptions. Before applying this calculation in your work, this calculation must be thoroughly reviewed with appropriate and authorized Hanford site ERC personnel. Without this review, the ERC cannot assume any responsibility for the use of these calculations.

Committed Calculation ☒ **Preliminary** ☐ **Superseded** ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover – 1 pg Summary – 5 pg Attm. 1 - 24 pg Attm. 2 - 10 pg Total – 40 pages	S. W. Clark 1/26/04	J. E. Thomson 1/28/04	S. W. Callison 1-27-04	D. N. Strom 1-28-04 F. M. Corpuz	1-28-04

SUMMARY OF REVISION

*Obtain Calc. No. from DIS

December 2002

DE01-437.03

PURPOSE:

Calculate the predicted groundwater concentrations from nonradionuclide contaminants that exceed lookup values in the vadose zone soil at the 100-B/C Septic System Overburden Stockpiles over a period of 1,000 years.

GIVEN/REFERENCES:

1) Cleanup verification data from *100-B/C Septic System Stockpiles 95% UCL Calculation*, Calculation No. 0100B-CA-V0201, Rev. 0, Bechtel Hanford, Inc., Richland, Washington. All radionuclides were below Hanford site wide background or below detection limits. Therefore, no radiological dose or risk assessment was performed.
2) *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP), DOE/RL-96-17, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
3) RESidual RADioactivity (RESRAD) computer code, version 6.21, to calculate compliance with residual radioactivity guidelines, developed for the U.S. Department of Energy by the Environmental Assessment Division of Argonne National Laboratory, Argonne, Illinois.
4) Sample design data from the *100-C-3 French Drain, 1607-B7, 1607-B8, 1607-B9, 1607-B11 Septic System Overburden Sample Design*, Calculation No. 0100B-CA-V0166, Rev. 0, Bechtel Hanford, Inc., Richland, Washington.

SOLUTION:

1) A single RESRAD modeling run was performed to evaluate if the contaminant concentrations of septic tank stockpile overburden would be protective of groundwater if it was used as backfill for remediated waste site excavations in the 100-B/C area. Table 1 shows the waste site parameters used for the RESRAD modeling. The model assumes that the overburden is placed in existing remediated waste site excavations that are 4.6 m (15 ft) deep. Because the overburden may be used as backfill at several waste sites, the 100 Area generic waste site area and length parallel to aquifer flow are used for this determination (from Table B-1 of the 100 Area RDR/RAWP). All input factors for modeling are shown in the "Summary" section of the RESRAD "Mixture Sums and Single Radionuclide Guidelines" printouts in Attachment 1 to this Calculation Summary.

Table 1. Waste Site Dimensions for RESRAD Modeling

Parameter	Units	Value	Comments
Cover Depth	m	0	
Area of CZ	m^2	10,000	Generic waste site model; RDR/RAWP Table B-1
Elevation: Surface	m	141.5	
Elevation: Bottom of waste	m	136.9	
Elevation: Groundwater	m	115.8	
Thickness: Contaminated Zone	m	4.6	Generic waste site model; RDR/RAWP Table B-1
Bottom of Waste to Groundwater	m	21.1	
Length Parallel to Aquifer Flow	m	100	Generic waste site model; RDR/RAWP Table B-1

METHODOLOGY:

1) A run of RESRAD version 6.21 using radionuclide surrogates for nonradionuclides was completed for overburden soils with the applicable nonradionuclide concentrations shown in Table 2. RESRAD numerical output reports showing input overburden soil concentrations and predicted groundwater concentrations are presented in the Attachments to this calculation summary.

Table 2. Waste Site Evaluation Soil Lookup Values and Analytical Data

COPC	Soil Lookup Values Protective of Groundwater and the Columbia River [a] (mg/kg)	Nonradionuclide 95% UCL [b,c] (mg/kg)
Lead	10.2	16.0 (f)
Mercury	0.33	0.37
Cr+6	2	0.40 [d]
Aldrin	0.002	0.0033
Aroclor 1254	0.017	0.083
beta-BHC	0.002	0.0017 U [e]
Bis(2-ethylhexyl)phthalate	0.625	3.30
alpha-Chlordane	0.02	0.0017 [e]
gamma-Chlordane	0.02	0.013 [e]
DDE	0.005	0.017
DDT	0.005	0.0034 U [e]
Dieldrin	0.005	0.0034 U [e]
Endosulfan II	9.6	0.007 [d]
Endosulfan Sulfate	9.6	0.0043 [d]
Endrin ketone	0.0392	0.011 [d]

[a] Lookup values protective of groundwater and the Columbia River are based upon the 1996 version of the WAC 173-340 Method B "100 times" rule.
[b] Soil concentration values are from *100-B/C Septic System Stockpile 95% UCL Calculation*, Calculation No. 0100B-CA-V0201.
[c] Maximum value from the data set is used to model nonradionuclides for demonstration of groundwater protection; see 95% UCL calculation brief for computation of maximum values.
[d] Value was not input into RESRAD because the concentration is below remedial action goals
[e] Value was not input into RESRAD because the concentration is below Hanford Site background or below analytical detection limits.

(f) SOIL CONCENTRATION EXCEED LOOKUP VALUE OF 10.2, RESRAD MODELING DEMONSTRATE GROUND WATER PROTECTION. SEE TABLE 4.
2-25-04

2) Modeling Nonradionuclide COPCs with RESRAD: RESRAD is used to model the impact of nonradionuclide contaminants on groundwater quality as discussed in Section C3.1 of the 100 Area RDR/RAWP. Long half-life surrogate radionuclides are selected for the nonradionuclide contaminants (Table 3). The surrogates are assigned the concentration and the distribution coefficient (Kd) of the compound being simulated, then are entered into the RESRAD program. In the present evaluation RESRAD is used to predict the impact on groundwater of the maximum concentrations of detected COPCs in overburden soils.

Table 3. Radionuclide Surrogates for Nonradionuclide COPCs.

Nonradionuclide COPCs	Kd [a] Values for Nonradionuclide COPCs	Radionuclide Surrogates	Half – Life of Surrogates
Lead	30	Al-26	7.16E+05
Mercury	30	Cl-36	3.01E+05
Aldrin	48.7	Gd-152	1.08E+14
Aroclor 1254	309	Cm-248	3.39E+05
Bis(2-ethylhexyl)phthalate	111	Cs-135	3.00E+06
DDE	86.4	I-129	1.60E+07

[a] Distribution coefficient (Kd values) from the 100 Area RDR/RAWP or WAC 173-340-747(4)(c).

RESULTS:

1) Nonradionuclide Groundwater Protection

The RESRAD numerical outputs from modeling nonradionuclide COPCs with surrogate radionuclides presented in Table 4 predict that the nonradionuclide concentrations in groundwater due to residual contamination will be zero at all times. Therefore, nonradionuclide concentrations in overburden soils are predicted not to impact groundwater within 1,000 years.

Table 4. RESRAD Predicted Groundwater (Well Water) Concentrations

COPC	Predicted Groundwater Concentrations in ug/L at Each Time Slice (yr)									RAGs[a] (ug/L)
	0	1	3	10	14	30	100	300	1000	
Lead	0	0	0	0	0	0	0	0	0	4.2
Mercury	0	0	0	0	0	0	0	0	0	0.024
Aldrin	0	0	0	0	0	0	0	0	0	0.00016
Aroclor 1254	0	0	0	0	0	0	0	0	0	0.0033
Bis(2-ethylhexyl) phthalate	0	0	0	0	0	0	0	0	0	3.6
DDE	0	0	0	0	0	0	0	0	0	0.00071

[a] Value is the lowest applicable remedial action goal (RAG) based upon applicable groundwater cleanup levels or the product of the dilution-attenuation factor (a DAF of 2) and the surface water (Columbia River) cleanup level.

CONCLUSIONS:

- Modeling of the maximum concentrations of nonradionuclide contaminants in overburden soil predicts that the COPCs will not impact groundwater within 1,000 years.

ATTACHMENTS:

1. RESRAD Output: 100-B/C Septic System Overburden Stockpiles Nonradionuclides - Mixture Sums and Single Radionuclide Guidelines (24 pages)
2. RESRAD Output: 100-B/C Septic System Overburden Stockpiles Nonradionuclides - Concentration of Radionuclides (10 pages)

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 1
Summary : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

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ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 2
Summary : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Dose Conversion Factor (and Related) Parameter Summary
File: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Al-26	7.960E-05	7.960E-05	DCF2(1)
B-1	Cl-36	2.190E-05	2.190E-05	DCF2(2)
B-1	Cm-248	1.650E+00	1.650E+00	DCF2(3)
B-1	Cs-135	4.550E-06	4.550E-06	DCF2(4)
B-1	Gd-152	2.430E-01	2.430E-01	DCF2(5)
B-1	I-129	1.740E-04	1.740E-04	DCF2(6)
B-1	Pu-240	4.290E-01	4.290E-01	DCF2(7)
B-1	Pu-244+D	4.030E-01	4.030E-01	DCF2(8)
B-1	Ra-228+D	5.080E-03	5.080E-03	DCF2(9)
B-1	Th-228+D	3.450E-01	3.450E-01	DCF2(10)
B-1	Th-232	1.640E+00	1.640E+00	DCF2(11)
B-1	U-236	1.250E-01	1.250E-01	DCF2(12)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Al-26	1.460E-05	1.460E-05	DCF3(1)
D-1	Cl-36	3.030E-06	3.030E-06	DCF3(2)
D-1	Cm-248	1.360E-02	1.360E-02	DCF3(3)
D-1	Cs-135	7.070E-06	7.070E-06	DCF3(4)
D-1	Gd-152	1.610E-04	1.610E-04	DCF3(5)
D-1	I-129	2.760E-04	2.760E-04	DCF3(6)
D-1	Pu-240	3.540E-03	3.540E-03	DCF3(7)
D-1	Pu-244+D	3.320E-03	3.320E-03	DCF3(8)
D-1	Ra-228+D	1.440E-03	1.440E-03	DCF3(9)
D-1	Th-228+D	8.080E-04	8.080E-04	DCF3(10)
D-1	Th-232	2.730E-03	2.730E-03	DCF3(11)
D-1	U-236	2.690E-04	2.690E-04	DCF3(12)
D-34	Food transfer factors:			
D-34	Al-26 , plant/soil concentration ratio, dimensionless	4.000E-03	4.000E-03	RTF(1,1)
D-34	Al-26 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-04	5.000E-04	RTF(1,2)
D-34	Al-26 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-04	2.000E-04	RTF(1,3)
D-34	Cl-36 , plant/soil concentration ratio, dimensionless	2.000E+01	2.000E+01	RTF(2,1)
D-34	Cl-36 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	6.000E-02	6.000E-02	RTF(2,2)
D-34	Cl-36 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-02	2.000E-02	RTF(2,3)
D-34	Cm-248 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(3,1)
D-34	Cm-248 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(3,2)
D-34	Cm-248 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(3,3)
D-34	Cs-135 , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(4,1)
D-34	Cs-135 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(4,2)
D-34	Cs-135 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(4,3)
D-34	Gd-152 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(5,1)
D-34	Gd-152 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-03	2.000E-03	RTF(5,2)
D-34	Gd-152 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(5,3)

ATTACHMENT 1

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: HEAST 2001 Morbidity

0 Menu	Parameter	Current Value	Default	Parameter Name
D-34	I-129 , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF(6,1)
D-34	I-129 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	7.000E-03	7.000E-03	RTF(6,2)
D-34	I-129 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-02	1.000E-02	RTF(6,3)
D-34				
D-34	Pu-240 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Pu-240 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Pu-240 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(7,3)
D-34				
D-34	Pu-244+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(8,1)
D-34	Pu-244+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(8,2)
D-34	Pu-244+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(8,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(9,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(9,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(9,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(10,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(10,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(10,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(11,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(11,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(11,3)
D-34				
D-34	U-236 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(12,1)
D-34	U-236 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(12,2)
D-34	U-236 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(12,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Al-26 , fish	5.000E+02	5.000E+02	BIOFAC(1,1)
D-5	Al-26 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Cl-36 , fish	1.000E+03	1.000E+03	BIOFAC(2,1)
D-5	Cl-36 , crustacea and mollusks	1.900E+02	1.900E+02	BIOFAC(2,2)
D-5				
D-5	Cm-248 , fish	3.000E+01	3.000E+01	BIOFAC(3,1)
D-5	Cm-248 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(3,2)
D-5				
D-5	Cs-135 , fish	2.000E+03	2.000E+03	BIOFAC(4,1)
D-5	Cs-135 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(4,2)
D-5				
D-5	Gd-152 , fish	2.500E+01	2.500E+01	BIOFAC(5,1)
D-5	Gd-152 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(5,2)
D-5				
D-5	I-129 , fish	4.000E+01	4.000E+01	BIOFAC(6,1)
D-5	I-129 , crustacea and mollusks	5.000E+00	5.000E+00	BIOFAC(6,2)
D-5				
D-5	Pu-240 , fish	3.000E+01	3.000E+01	BIOFAC(7,1)
D-5	Pu-240 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(7,2)
D-5				

ATTACHMENT 1

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: HEAST 2001 Morbidity

Menu	Parameter	Current Value	Default	Parameter Name
D-5	Pu-244+D , fish	3.000E+01	3.000E+01	BIOFAC(8,1)
D-5	Pu-244+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(8,2)
D-5				
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(9,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(9,2)
D-5				
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(10,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(10,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(11,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(11,2)
D-5				
D-5	U-236 , fish	1.000E+01	1.000E+01	BIOFAC(12,1)
D-5	U-236 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(12,2)

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 5
Summary : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	1.000E+04	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	4.600E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.500E+01	2.500E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	1.400E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	3.000E+01	1.000E+02	---	T(6)
R011	Times for calculations (yr)	1.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	3.000E+02	1.000E+03	---	T(8)
R011	Times for calculations (yr)	1.000E+03	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): Al-26	1.600E+01	0.000E+00	---	S1(1)
R012	Initial principal radionuclide (pCi/g): Cl-36	3.700E-01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Cm-248	8.300E-02	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Cs-135	3.300E+00	0.000E+00	---	S1(4)
R012	Initial principal radionuclide (pCi/g): Gd-152	3.300E-03	0.000E+00	---	S1(5)
R012	Initial principal radionuclide (pCi/g): I-129	1.700E-02	0.000E+00	---	S1(6)
R012	Concentration in groundwater (pCi/L): Al-26	not used	0.000E+00	---	W1(1)
R012	Concentration in groundwater (pCi/L): Cl-36	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Cm-248	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Cs-135	not used	0.000E+00	---	W1(4)
R012	Concentration in groundwater (pCi/L): Gd-152	not used	0.000E+00	---	W1(5)
R012	Concentration in groundwater (pCi/L): I-129	not used	0.000E+00	---	W1(6)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone field capacity	1.500E-01	2.000E-01	---	FCCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	2.500E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	3.400E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.100E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.600E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	7.600E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.500E-01	2.000E-01	---	EPSZ

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Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Saturated zone field capacity	1.500E-01	2.000E-01	---	FCSZ
R014	Saturated zone hydraulic conductivity (m/yr)	5.530E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	1.250E-03	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	4.600E+00	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	2.110E+01	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.600E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.500E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, field capacity	1.500E-01	2.000E-01	---	FCUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	4.050E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	2.500E+02	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Al-26				
R016	Contaminated zone (cm**3/g)	3.000E+01	0.000E+00	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	3.000E+01	0.000E+00	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	3.000E+01	0.000E+00	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.605E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for Cl-36				
R016	Contaminated zone (cm**3/g)	3.000E+01	1.000E-01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	3.000E+01	1.000E-01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	3.000E+01	1.000E-01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.605E-04	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for Cm-248				
R016	Contaminated zone (cm**3/g)	3.090E+02	-1.000E+00	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	3.090E+02	-1.000E+00	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	3.090E+02	-1.000E+00	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.513E-05	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for Cs-135				
R016	Contaminated zone (cm**3/g)	1.110E+02	1.000E+03	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	1.110E+02	1.000E+03	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	1.110E+02	1.000E+03	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.772E-05	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)

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Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Gd-152				
R016	Contaminated zone (cm**3/g)	4.870E+01	-1.000E+00	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	4.870E+01	-1.000E+00	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	4.870E+01	-1.000E+00	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.224E-04	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for I-129				
R016	Contaminated zone (cm**3/g)	8.640E+01	1.000E-01	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	8.640E+01	1.000E-01	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	8.640E+01	1.000E-01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.255E-04	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for daughter Pu-240				
R016	Contaminated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	2.000E+03	2.000E+03	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.429E-06	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for daughter Pu-244				
R016	Contaminated zone (cm**3/g)	5.130E+01	2.000E+03	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	5.130E+01	2.000E+03	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	5.130E+01	2.000E+03	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.112E-04	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	2.000E+01	7.000E+01	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	7.000E+01	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	2.000E+01	7.000E+01	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.397E-04	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(9)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	2.000E+02	6.000E+04	---	DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+02	6.000E+04	---	DCNUCU(10,1)
R016	Saturated zone (cm**3/g)	2.000E+02	6.000E+04	---	DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.426E-05	ALEACH(10)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(10)
R016	Distribution coefficients for daughter Th-232				
R016	Contaminated zone (cm**3/g)	5.000E+00	6.000E+04	---	DCNUCC(11)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+00	6.000E+04	---	DCNUCU(11,1)
R016	Saturated zone (cm**3/g)	5.000E+00	6.000E+04	---	DCNUCS(11)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.120E-03	ALEACH(11)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(11)

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter U-236				
R016	Contaminated zone (cm**3/g)	5.000E+00	5.000E+01	---	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+00	5.000E+01	---	DCNUCU(12,1)
R016	Saturated zone (cm**3/g)	5.000E+00	5.000E+01	---	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.120E-03	ALEACH(12)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(12)
R017	Inhalation rate (m**3/yr)	7.300E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	1.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	8.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.000E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.100E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	2.700E+00	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	1.000E+02	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	3.600E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	1.970E+01	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	7.300E+01	3.650E+01	---	SOIL

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Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.500E+00	FMEAT
R018	Contamination fraction of milk	-1	-1	0.500E+00	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	1.100E+00	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	8.000E-02	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	1.000E+00	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	2.500E-01	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
C14	DCF correction factor for gaseous forms of C14	not used	8.894E+01	---	CO2F

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Site-Specific Parameter Summary (continued)

0 Menu	Parameter	User Input	Default	Used by RESRAD (if different from user input)	Parameter Name
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR1
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	not used	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)
TITL	Number of graphical time points	32	---	---	NPTS
TITL	Maximum number of integration points for dose	1	---	---	LYMAX
TITL	Maximum number of integration points for risk	5	---	---	KYMAX

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 11
Summary : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Contaminated Zone Dimensions	
Area:	10000.00 square meters
Thickness:	4.60 meters
Cover Depth:	0.00 meters

Initial Soil Concentrations, pCi/g	
Al-26	1.600E+01
Cl-36	3.700E-01
Cm-248	8.300E-02
Cs-135	3.300E+00
Gd-152	3.300E-03
I-129	1.700E-02

0

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 1.500E+01 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	1.400E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	1.825E+02	1.825E+02	1.823E+02	1.819E+02	1.816E+02	1.806E+02	1.761E+02	1.638E+02	1.272E+02
M(t):	1.217E+01	1.216E+01	1.216E+01	1.212E+01	1.211E+01	1.204E+01	1.174E+01	1.092E+01	8.481E+00

0Maximum TDOSE(t): 1.825E+02 mrem/yr at t = 0.000E+00 years

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 12
Summary : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
0
Water Independent Pathways (Inhalation excludes radon)
0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	1.780E+02	0.9755	5.143E-05	0.0000	0.000E+00	0.0000	5.266E-02	0.0003	1.624E-03	0.0000	1.682E-03	0.0000	1.364E-02	0.0001
Cl-36	5.634E-04	0.0000	3.272E-07	0.0000	0.000E+00	0.0000	1.263E+00	0.0069	1.647E+00	0.0090	1.234E+00	0.0068	6.547E-05	0.0000
Cm-248	4.861E-06	0.0000	5.530E-03	0.0000	0.000E+00	0.0000	6.366E-02	0.0003	2.309E-04	0.0000	6.267E-05	0.0000	6.592E-02	0.0004
Cs-135	8.294E-05	0.0000	6.063E-07	0.0000	0.000E+00	0.0000	5.259E-02	0.0003	4.057E-02	0.0002	2.520E-02	0.0001	1.363E-03	0.0000
Gd-152	0.000E+00	0.0000	3.238E-05	0.0000	0.000E+00	0.0000	7.487E-05	0.0000	1.282E-05	0.0000	3.388E-07	0.0000	3.103E-05	0.0000
I-129	1.481E-04	0.0000	1.194E-07	0.0000	0.000E+00	0.0000	5.290E-03	0.0000	1.101E-03	0.0000	3.758E-03	0.0000	2.740E-04	0.0000
Total	1.780E+02	0.9755	5.615E-03	0.0000	0.000E+00	0.0000	1.438E+00	0.0079	1.691E+00	0.0093	1.264E+00	0.0069	8.130E-02	0.0004

0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years
0
Water Dependent Pathways
0

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.781E+02	0.9758
Cl-36	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.145E+00	0.0227
Cm-248	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.354E-01	0.0007
Cs-135	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.198E-01	0.0007
Gd-152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.514E-04	0.0000
I-129	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.057E-02	0.0001
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.825E+02	1.0000

0*Sum of all water independent and dependent pathways.

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 13
Summary : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years
Water Independent Pathways (Inhalation excludes radon)

0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	1.780E+02	0.9755	5.141E-05	0.0000	0.000E+00	0.0000	5.264E-02	0.0003	1.623E-03	0.0000	1.682E-03	0.0000	1.364E-02	0.0001
Cl-36	5.632E-04	0.0000	3.271E-07	0.0000	0.000E+00	0.0000	1.263E+00	0.0069	1.647E+00	0.0090	1.233E+00	0.0068	6.545E-05	0.0000
Cm-248	4.864E-06	0.0000	5.530E-03	0.0000	0.000E+00	0.0000	6.365E-02	0.0003	2.309E-04	0.0000	6.267E-05	0.0000	6.592E-02	0.0004
Cs-135	8.293E-05	0.0000	6.063E-07	0.0000	0.000E+00	0.0000	5.258E-02	0.0003	4.057E-02	0.0002	2.520E-02	0.0001	1.362E-03	0.0000
Gd-152	0.000E+00	0.0000	3.237E-05	0.0000	0.000E+00	0.0000	7.485E-05	0.0000	1.282E-05	0.0000	3.387E-07	0.0000	3.102E-05	0.0000
I-129	1.481E-04	0.0000	1.194E-07	0.0000	0.000E+00	0.0000	5.289E-03	0.0000	1.101E-03	0.0000	3.758E-03	0.0000	2.740E-04	0.0000
Total	1.780E+02	0.9755	5.615E-03	0.0000	0.000E+00	0.0000	1.437E+00	0.0079	1.690E+00	0.0093	1.264E+00	0.0069	8.129E-02	0.0004

0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years
Water Dependent Pathways

0

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.781E+02	0.9758
Cl-36	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.144E+00	0.0227
Cm-248	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.354E-01	0.0007
Cs-135	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.198E-01	0.0007
Gd-152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.514E-04	0.0000
I-129	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.057E-02	0.0001
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.825E+02	1.0000

0*Sum of all water independent and dependent pathways.

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 14
Summary : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years
0
Water Independent Pathways (Inhalation excludes radon)
0

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	1.779E+02	0.9754	5.137E-05	0.0000	0.000E+00	0.0000	5.261E-02	0.0003	1.622E-03	0.0000	1.681E-03	0.0000	1.363E-02	0.0001
Cl-36	5.628E-04	0.0000	3.268E-07	0.0000	0.000E+00	0.0000	1.262E+00	0.0069	1.646E+00	0.0090	1.232E+00	0.0068	6.540E-05	0.0000
Cm-248	4.870E-06	0.0000	5.529E-03	0.0000	0.000E+00	0.0000	6.365E-02	0.0003	2.309E-04	0.0000	6.266E-05	0.0000	6.591E-02	0.0004
Cs-135	8.291E-05	0.0000	6.061E-07	0.0000	0.000E+00	0.0000	5.257E-02	0.0003	4.056E-02	0.0002	2.519E-02	0.0001	1.362E-03	0.0000
Gd-152	0.000E+00	0.0000	3.236E-05	0.0000	0.000E+00	0.0000	7.482E-05	0.0000	1.281E-05	0.0000	3.386E-07	0.0000	3.101E-05	0.0000
I-129	1.480E-04	0.0000	1.194E-07	0.0000	0.000E+00	0.0000	5.288E-03	0.0000	1.101E-03	0.0000	3.757E-03	0.0000	2.739E-04	0.0000
Total	1.779E+02	0.9755	5.614E-03	0.0000	0.000E+00	0.0000	1.436E+00	0.0079	1.689E+00	0.0093	1.263E+00	0.0069	8.127E-02	0.0004

0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years
0
Water Dependent Pathways
0

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.779E+02	0.9758
Cl-36	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.141E+00	0.0227
Cm-248	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.354E-01	0.0007
Cs-135	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.198E-01	0.0007
Gd-152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.513E-04	0.0000
I-129	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.057E-02	0.0001
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.823E+02	1.0000

0*Sum of all water independent and dependent pathways.

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 15
Summary : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	Soil fract.
Al-26	1.774E+02	0.9754	5.124E-05	0.0000	0.000E+00	0.0000	5.247E-02	0.0003	1.618E-03	0.0000	1.676E-03	0.0000	1.359E-02	0.0001
Cl-36	5.614E-04	0.0000	3.260E-07	0.0000	0.000E+00	0.0000	1.259E+00	0.0069	1.641E+00	0.0090	1.229E+00	0.0068	6.524E-05	0.0000
Cm-248	4.891E-06	0.0000	5.528E-03	0.0000	0.000E+00	0.0000	6.363E-02	0.0003	2.308E-04	0.0000	6.265E-05	0.0000	6.590E-02	0.0004
Cs-135	8.286E-05	0.0000	6.057E-07	0.0000	0.000E+00	0.0000	5.254E-02	0.0003	4.053E-02	0.0002	2.517E-02	0.0001	1.361E-03	0.0000
Gd-152	0.000E+00	0.0000	3.231E-05	0.0000	0.000E+00	0.0000	7.470E-05	0.0000	1.279E-05	0.0000	3.381E-07	0.0000	3.096E-05	0.0000
I-129	1.479E-04	0.0000	1.193E-07	0.0000	0.000E+00	0.0000	5.283E-03	0.0000	1.100E-03	0.0000	3.754E-03	0.0000	2.737E-04	0.0000
Total	1.774E+02	0.9755	5.613E-03	0.0000	0.000E+00	0.0000	1.433E+00	0.0079	1.685E+00	0.0093	1.260E+00	0.0069	8.122E-02	0.0004

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years
Water Dependent Pathways

Radio-Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathways* mrem/yr	All Pathways* fract.
Al-26	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.775E+02	0.9758
Cl-36	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.130E+00	0.0227
Cm-248	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.354E-01	0.0007
Cs-135	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.197E-01	0.0007
Gd-152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.511E-04	0.0000
I-129	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.056E-02	0.0001
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.819E+02	1.0000

*Sum of all water independent and dependent pathways.

ATTACHMENT 1

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.400E+01 years
Water Independent Pathways (Inhalation excludes radon)

Radio-Nuclide	Ground mrem/yr	Ground fract.	Inhalation mrem/yr	Inhalation fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	Soil mrem/yr	Soil fract.
Al-26	1.771E+02	0.9754	5.117E-05	0.0000	0.000E+00	0.0000	5.240E-02	0.0003	1.615E-03	0.0000	1.674E-03	0.0000	1.357E-02	0.0001
Cl-36	5.606E-04	0.0000	3.255E-07	0.0000	0.000E+00	0.0000	1.257E+00	0.0069	1.639E+00	0.0090	1.228E+00	0.0068	6.514E-05	0.0000
Cm-248	4.903E-06	0.0000	5.527E-03	0.0000	0.000E+00	0.0000	6.362E-02	0.0004	2.308E-04	0.0000	6.264E-05	0.0000	6.589E-02	0.0004
Cs-135	8.282E-05	0.0000	6.055E-07	0.0000	0.000E+00	0.0000	5.252E-02	0.0003	4.052E-02	0.0002	2.517E-02	0.0001	1.361E-03	0.0000
Gd-152	0.000E+00	0.0000	3.228E-05	0.0000	0.000E+00	0.0000	7.464E-05	0.0000	1.278E-05	0.0000	3.378E-07	0.0000	3.093E-05	0.0000
I-129	1.478E-04	0.0000	1.192E-07	0.0000	0.000E+00	0.0000	5.281E-03	0.0000	1.099E-03	0.0000	3.752E-03	0.0000	2.735E-04	0.0000
Total	1.771E+02	0.9754	5.612E-03	0.0000	0.000E+00	0.0000	1.431E+00	0.0079	1.683E+00	0.0093	1.258E+00	0.0069	8.119E-02	0.0004

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.400E+01 years
Water Dependent Pathways

Radio-Nuclide	Water mrem/yr	Water fract.	Fish mrem/yr	Fish fract.	Radon mrem/yr	Radon fract.	Plant mrem/yr	Plant fract.	Meat mrem/yr	Meat fract.	Milk mrem/yr	Milk fract.	All Pathways* mrem/yr	All Pathways* fract.
Al-26	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.772E+02	0.9758
Cl-36	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.124E+00	0.0227
Cm-248	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.353E-01	0.0007
Cs-135	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.196E-01	0.0007
Gd-152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.510E-04	0.0000
I-129	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.055E-02	0.0001
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.816E+02	1.0000

0*Sum of all water independent and dependent pathways.

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 17
Summary : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years
0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio-	ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
ÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄ
Al-26	1.761E+02	0.9754	5.087E-05	0.0000	0.000E+00	0.0000	5.210E-02	0.0003	1.606E-03	0.0000	1.664E-03	0.0000	1.350E-02	0.0001
Cl-36	5.573E-04	0.0000	3.237E-07	0.0000	0.000E+00	0.0000	1.250E+00	0.0069	1.630E+00	0.0090	1.220E+00	0.0068	6.476E-05	0.0000
Cm-248	4.950E-06	0.0000	5.524E-03	0.0000	0.000E+00	0.0000	6.358E-02	0.0004	2.307E-04	0.0000	6.260E-05	0.0000	6.585E-02	0.0004
Cs-135	8.269E-05	0.0000	6.045E-07	0.0000	0.000E+00	0.0000	5.243E-02	0.0003	4.045E-02	0.0002	2.513E-02	0.0001	1.359E-03	0.0000
Gd-152	0.000E+00	0.0000	3.217E-05	0.0000	0.000E+00	0.0000	7.437E-05	0.0000	1.273E-05	0.0000	3.366E-07	0.0000	3.082E-05	0.0000
I-129	1.475E-04	0.0000	1.190E-07	0.0000	0.000E+00	0.0000	5.270E-03	0.0000	1.097E-03	0.0000	3.744E-03	0.0000	2.730E-04	0.0000
ÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍ
Total	1.761E+02	0.9754	5.608E-03	0.0000	0.000E+00	0.0000	1.423E+00	0.0079	1.673E+00	0.0093	1.251E+00	0.0069	8.107E-02	0.0004

0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years
0 Water Dependent Pathways

0	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-	ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ		ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
ÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄ
Al-26	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.762E+02	0.9758
Cl-36	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.100E+00	0.0227
Cm-248	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.353E-01	0.0007
Cs-135	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.195E-01	0.0007
Gd-152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.504E-04	0.0000
I-129	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.053E-02	0.0001
ÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍ
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.806E+02	1.0000

0*Sum of all water independent and dependent pathways.

Attachment	1	Sheet No.	17 of 2
Originator	S. W. Clark	Date	
Chk'd By	J. E. Thomson	Date	
Calc. No.	0100B-CA-V0202	Rev. No.	0

ATTACHMENT 1

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio-														
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	1.717E+02	0.9754	4.960E-05	0.0000	0.000E+00	0.0000	5.079E-02	0.0003	1.566E-03	0.0000	1.623E-03	0.0000	1.316E-02	0.0001
Cl-36	5.434E-04	0.0000	3.155E-07	0.0000	0.000E+00	0.0000	1.218E+00	0.0069	1.589E+00	0.0090	1.190E+00	0.0068	6.314E-05	0.0000
Cm-248	5.154E-06	0.0000	5.510E-03	0.0000	0.000E+00	0.0000	6.342E-02	0.0004	2.301E-04	0.0000	6.244E-05	0.0000	6.568E-02	0.0004
Cs-135	8.213E-05	0.0000	6.004E-07	0.0000	0.000E+00	0.0000	5.208E-02	0.0003	4.018E-02	0.0002	2.495E-02	0.0001	1.349E-03	0.0000
Gd-152	0.000E+00	0.0000	3.167E-05	0.0000	0.000E+00	0.0000	7.322E-05	0.0000	1.254E-05	0.0000	3.314E-07	0.0000	3.035E-05	0.0000
I-129	1.462E-04	0.0000	1.180E-07	0.0000	0.000E+00	0.0000	5.224E-03	0.0000	1.087E-03	0.0000	3.711E-03	0.0000	2.706E-04	0.0000
Total	1.717E+02	0.9754	5.592E-03	0.0000	0.000E+00	0.0000	1.390E+00	0.0079	1.632E+00	0.0093	1.220E+00	0.0069	8.055E-02	0.0005

0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years
0 Water Dependent Pathways

0	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-														
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.718E+02	0.9758
Cl-36	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.998E+00	0.0227
Cm-248	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.349E-01	0.0008
Cs-135	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.186E-01	0.0007
Gd-152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.481E-04	0.0000
I-129	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.044E-02	0.0001
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.761E+02	1.0000

0*Sum of all water independent and dependent pathways.

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 19
Summary : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	1.597E+02	0.9753	4.614E-05	0.0000	0.000E+00	0.0000	4.725E-02	0.0003	1.457E-03	0.0000	1.510E-03	0.0000	1.224E-02	0.0001
Cl-36	5.053E-04	0.0000	2.935E-07	0.0000	0.000E+00	0.0000	1.133E+00	0.0069	1.477E+00	0.0090	1.107E+00	0.0068	5.872E-05	0.0000
Cm-248	5.716E-06	0.0000	5.469E-03	0.0000	0.000E+00	0.0000	6.295E-02	0.0004	2.284E-04	0.0000	6.198E-05	0.0000	6.519E-02	0.0004
Cs-135	8.053E-05	0.0000	5.887E-07	0.0000	0.000E+00	0.0000	5.107E-02	0.0003	3.940E-02	0.0002	2.447E-02	0.0001	1.323E-03	0.0000
Gd-152	0.000E+00	0.0000	3.029E-05	0.0000	0.000E+00	0.0000	7.004E-05	0.0000	1.199E-05	0.0000	3.169E-07	0.0000	2.903E-05	0.0000
I-129	1.426E-04	0.0000	1.150E-07	0.0000	0.000E+00	0.0000	5.094E-03	0.0000	1.060E-03	0.0000	3.619E-03	0.0000	2.639E-04	0.0000
Total	1.597E+02	0.9753	5.546E-03	0.0000	0.000E+00	0.0000	1.300E+00	0.0079	1.520E+00	0.0093	1.136E+00	0.0069	7.911E-02	0.0005

0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years
0 Water Dependent Pathways

0	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.598E+02	0.9757
Cl-36	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.718E+00	0.0227
Cm-248	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.339E-01	0.0008
Cs-135	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.163E-01	0.0007
Gd-152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.417E-04	0.0000
I-129	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.018E-02	0.0001
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.638E+02	1.0000

0*Sum of all water independent and dependent pathways.

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 20
Summary : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
0 Water Independent Pathways (Inhalation excludes radon)

0	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Radio-														
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	1.240E+02	0.9750	3.583E-05	0.0000	0.000E+00	0.0000	3.669E-02	0.0003	1.131E-03	0.0000	1.172E-03	0.0000	9.504E-03	0.0001
Cl-36	3.920E-04	0.0000	2.276E-07	0.0000	0.000E+00	0.0000	8.790E-01	0.0069	1.146E+00	0.0090	8.584E-01	0.0067	4.555E-05	0.0000
Cm-248	7.464E-06	0.0000	5.328E-03	0.0000	0.000E+00	0.0000	6.133E-02	0.0005	2.225E-04	0.0000	6.038E-05	0.0000	6.352E-02	0.0005
Cs-135	7.519E-05	0.0000	5.497E-07	0.0000	0.000E+00	0.0000	4.768E-02	0.0004	3.678E-02	0.0003	2.285E-02	0.0002	1.235E-03	0.0000
Gd-152	0.000E+00	0.0000	2.592E-05	0.0000	0.000E+00	0.0000	5.994E-05	0.0000	1.026E-05	0.0000	2.712E-07	0.0000	2.484E-05	0.0000
I-129	1.306E-04	0.0000	1.054E-07	0.0000	0.000E+00	0.0000	4.666E-03	0.0000	9.712E-04	0.0000	3.315E-03	0.0000	2.417E-04	0.0000
Total	1.240E+02	0.9750	5.391E-03	0.0000	0.000E+00	0.0000	1.029E+00	0.0081	1.185E+00	0.0093	8.858E-01	0.0070	7.457E-02	0.0006

0

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years
0 Water Dependent Pathways

0	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Radio-														
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Al-26	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.241E+02	0.9754
Cl-36	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.884E+00	0.0227
Cm-248	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.305E-01	0.0010
Cs-135	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.086E-01	0.0009
Gd-152	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.212E-04	0.0000
I-129	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.324E-03	0.0001
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.272E+02	1.0000

0*Sum of all water independent and dependent pathways.

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 21
Summary : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

0Parent (i)	Product (j)	Branch fraction*	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	1.400E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄ
Al-26	Al-26	1.000E+00	1.113E+01	1.113E+01	1.112E+01	1.109E+01	1.108E+01	1.101E+01	1.074E+01	9.988E+00	7.755E+00
0Cl-36	Cl-36	1.000E+00	1.120E+01	1.120E+01	1.119E+01	1.116E+01	1.115E+01	1.108E+01	1.080E+01	1.005E+01	7.795E+00
0Cm-248	Cm-248	1.000E+00	1.631E+00	1.631E+00	1.631E+00	1.631E+00	1.631E+00	1.630E+00	1.625E+00	1.613E+00	1.572E+00
Cm-248	Pu-244	9.174E-01	0.000E+00	4.096E-08	1.228E-07	4.091E-07	5.725E-07	1.224E-06	4.046E-06	1.184E-05	3.623E-05
Cm-248	Pu-240	9.163E-01	0.000E+00	1.743E-13	1.568E-12	1.741E-11	3.410E-11	1.563E-10	1.722E-09	1.513E-08	1.547E-07
Cm-248	U-236	9.163E-01	0.000E+00	2.500E-22	6.945E-21	2.589E-19	7.095E-19	6.925E-18	2.460E-16	5.904E-15	1.506E-13
Cm-248	Th-232	9.163E-01	0.000E+00	2.064E-32	1.583E-30	1.902E-28	7.258E-28	1.503E-26	1.737E-24	1.177E-22	8.179E-21
Cm-248	Ra-228	9.163E-01	0.000E+00	7.924E-33	1.963E-30	7.224E-28	3.627E-27	1.276E-25	2.483E-23	2.051E-21	1.535E-19
Cm-248	Th-228	9.163E-01	0.000E+00	4.719E-34	2.927E-31	2.629E-28	1.610E-27	7.936E-26	1.998E-23	1.781E-21	1.368E-19
Cm-248	äDSR(j)		1.631E+00	1.631E+00	1.631E+00	1.631E+00	1.631E+00	1.630E+00	1.625E+00	1.613E+00	1.572E+00
0Cs-135	Cs-135	1.000E+00	3.630E-02	3.630E-02	3.629E-02	3.627E-02	3.626E-02	3.620E-02	3.595E-02	3.525E-02	3.292E-02
0Gd-152	Gd-152	1.000E+00	4.589E-02	4.588E-02	4.586E-02	4.579E-02	4.575E-02	4.558E-02	4.488E-02	4.293E-02	3.674E-02
0I-129	I-129	1.000E+00	6.218E-01	6.218E-01	6.216E-01	6.211E-01	6.208E-01	6.195E-01	6.141E-01	5.989E-01	5.485E-01
ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life ó 0.5 yr) daughters.
0

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 1.500E+01 mrem/yr

0Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	1.400E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ
Al-26	1.347E+00	1.348E+00	1.349E+00	1.352E+00	1.354E+00	1.362E+00	1.397E+00	1.502E+00	1.934E+00
Cl-36	1.339E+00	1.339E+00	1.340E+00	1.344E+00	1.346E+00	1.354E+00	1.388E+00	1.493E+00	1.924E+00
Cm-248	9.195E+00	9.195E+00	9.196E+00	9.198E+00	9.199E+00	9.205E+00	9.229E+00	9.298E+00	9.543E+00
Cs-135	4.132E+02	4.132E+02	4.133E+02	4.136E+02	4.137E+02	4.144E+02	4.172E+02	4.255E+02	4.557E+02
Gd-152	*2.178E+01	*2.178E+01	*2.178E+01	*2.178E+01	*2.178E+01	*2.178E+01	*2.178E+01	*2.178E+01	*2.178E+01
I-129	2.412E+01	2.412E+01	2.413E+01	2.415E+01	2.416E+01	2.421E+01	2.443E+01	2.505E+01	2.735E+01
ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ

*At specific activity limit

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 22
Summary : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 0.000E+00 years

ONuclide (i)	Initial (pCi/g)	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
ÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ	ÄÄÄÄÄÄÄÄÄ
Al-26	1.600E+01	0.000E+00	1.113E+01	1.347E+00	1.113E+01	1.347E+00
Cl-36	3.700E-01	0.000E+00	1.120E+01	1.339E+00	1.120E+01	1.339E+00
Cm-248	8.300E-02	0.000E+00	1.631E+00	9.195E+00	1.631E+00	9.195E+00
Cs-135	3.300E+00	0.000E+00	3.630E-02	4.132E+02	3.630E-02	4.132E+02
Gd-152	3.300E-03	0.000E+00	4.589E-02	*2.178E+01	4.589E-02	*2.178E+01
I-129	1.700E-02	0.000E+00	6.218E-01	2.412E+01	6.218E-01	2.412E+01
ÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ	ÍÍÍÍÍÍÍÍÍ

*At specific activity limit

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 23
Summary : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

ONuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	1.400E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Al-26	Al-26	1.000E+00	1.781E+02	1.781E+02	1.779E+02	1.775E+02	1.772E+02	1.762E+02	1.718E+02	1.598E+02	1.241E+02
OCl-36	Cl-36	1.000E+00	4.145E+00	4.144E+00	4.141E+00	4.130E+00	4.124E+00	4.100E+00	3.998E+00	3.718E+00	2.884E+00
OCm-248	Cm-248	9.174E-01	1.354E-01	1.354E-01	1.354E-01	1.354E-01	1.353E-01	1.353E-01	1.349E-01	1.339E-01	1.305E-01
OPu-244	Cm-248	9.174E-01	0.000E+00	3.400E-09	1.020E-08	3.396E-08	4.752E-08	1.016E-07	3.358E-07	9.828E-07	3.007E-06
OPu-240	Cm-248	9.174E-01	0.000E+00	1.447E-14	1.301E-13	1.445E-12	2.830E-12	1.297E-11	1.429E-10	1.256E-09	1.284E-08
OU-236	Cm-248	9.174E-01	0.000E+00	2.075E-23	5.764E-22	2.149E-20	5.889E-20	5.748E-19	2.042E-17	4.900E-16	1.250E-14
OTh-232	Cm-248	9.174E-01	0.000E+00	0.000E+00	0.000E+00	1.575E-29	6.013E-29	1.247E-27	1.442E-25	9.769E-24	6.788E-22
ORa-228	Cm-248	9.174E-01	0.000E+00	0.000E+00	8.685E-32	5.995E-29	3.010E-28	1.059E-26	2.061E-24	1.702E-22	1.274E-20
OTh-228	Cm-248	9.174E-01	0.000E+00	0.000E+00	0.000E+00	2.177E-29	1.335E-28	6.587E-27	1.659E-24	1.478E-22	1.135E-20
OCs-135	Cs-135	1.000E+00	1.198E-01	1.198E-01	1.198E-01	1.197E-01	1.196E-01	1.195E-01	1.186E-01	1.163E-01	1.086E-01
OGd-152	Gd-152	1.000E+00	1.514E-04	1.514E-04	1.513E-04	1.511E-04	1.510E-04	1.504E-04	1.481E-04	1.417E-04	1.212E-04
OI-129	I-129	1.000E+00	1.057E-02	1.057E-02	1.057E-02	1.056E-02	1.055E-02	1.053E-02	1.044E-02	1.018E-02	9.324E-03

BRF(i) is the branch fraction of the parent nuclide.

ATTACHMENT 1

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 24
Summary : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

ONuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	1.400E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
Al-26	Al-26	1.000E+00	1.600E+01	1.599E+01	1.598E+01	1.594E+01	1.592E+01	1.583E+01	1.543E+01	1.436E+01	1.115E+01
OCl-36	Cl-36	1.000E+00	3.700E-01	3.699E-01	3.696E-01	3.687E-01	3.681E-01	3.660E-01	3.568E-01	3.318E-01	2.574E-01
OCm-248	Cm-248	9.174E-01	8.300E-02	8.300E-02	8.299E-02	8.297E-02	8.296E-02	8.291E-02	8.269E-02	8.208E-02	7.997E-02
OPu-244	Cm-248	9.174E-01	0.000E+00	6.389E-10	1.916E-09	6.382E-09	8.930E-09	1.910E-08	6.311E-08	1.847E-07	5.651E-07
OPu-240	Cm-248	9.174E-01	0.000E+00	3.383E-14	3.044E-13	3.379E-12	6.620E-12	3.034E-11	3.343E-10	2.938E-09	3.003E-08
OU-236	Cm-248	9.174E-01	0.000E+00	3.337E-22	8.998E-21	3.318E-19	9.082E-19	8.849E-18	3.140E-16	7.533E-15	1.921E-13
OTh-232	Cm-248	9.174E-01	0.000E+00	4.114E-33	3.326E-31	4.080E-29	1.562E-28	3.245E-27	3.759E-25	2.549E-23	1.772E-21
ORa-228	Cm-248	9.174E-01	0.000E+00	9.723E-35	2.268E-32	8.160E-30	4.086E-29	1.431E-27	2.781E-25	2.295E-23	1.717E-21
OTh-228	Cm-248	9.174E-01	0.000E+00	5.597E-36	3.576E-33	3.254E-30	1.995E-29	9.858E-28	2.485E-25	2.215E-23	1.702E-21
OCs-135	Cs-135	1.000E+00	3.300E+00	3.300E+00	3.299E+00	3.297E+00	3.295E+00	3.290E+00	3.268E+00	3.204E+00	2.992E+00
OGd-152	Gd-152	1.000E+00	3.300E-03	3.299E-03	3.298E-03	3.293E-03	3.290E-03	3.278E-03	3.227E-03	3.087E-03	2.642E-03
OI-129	I-129	1.000E+00	1.700E-02	1.700E-02	1.699E-02	1.698E-02	1.697E-02	1.694E-02	1.679E-02	1.637E-02	1.499E-02

BRF(i) is the branch fraction of the parent nuclide.
ORESCALC.EXE execution time = 2.28 seconds

ATTACHMENT 2

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 1
Concent : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

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Part IV: Concentration of Radionuclides
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Concentration of radionuclides in different media
Time= 0.000E+00 2
Time= 1.000E+00 3
Time= 3.000E+00 4
Time= 1.000E+01 5
Time= 1.400E+01 6
Time= 3.000E+01 7
Time= 1.000E+02 8
Time= 3.000E+02 9
Time= 1.000E+03 10

ATTACHMENT 2

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 2
Concent : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Concentration of radionuclides in environmental media
at t = 0.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/L	Surface Water pCi/L
Al-26	1.600E+01	1.600E+01	2.011E-04	0.000E+00	0.000E+00
Cl-36	3.700E-01	3.700E-01	4.652E-06	0.000E+00	0.000E+00
Cm-248	8.300E-02	8.300E-02	1.043E-06	0.000E+00	0.000E+00
Cs-135	3.300E+00	3.300E+00	4.149E-05	0.000E+00	0.000E+00
Gd-152	3.300E-03	3.300E-03	4.149E-08	0.000E+00	0.000E+00
I-129	1.700E-02	1.700E-02	2.137E-07	0.000E+00	0.000E+00
Pu-240	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-244	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-236	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 0.000E+00 years*

Radio-Nuclide	Drinking Water pCi/L	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/L	Fish pCi/kg	Crustacea pCi/kg
Al-26	0.000E+00	6.401E+01	6.405E+01	6.406E+01	6.406E+01	6.178E+00	2.305E+00	0.000E+00	0.000E+00
Cl-36	0.000E+00	7.400E+03	7.400E+03	7.400E+03	7.400E+03	3.020E+04	8.144E+03	0.000E+00	0.000E+00
Cm-248	0.000E+00	8.306E-02	8.327E-02	8.330E-02	8.330E-02	9.433E-04	9.216E-05	0.000E+00	0.000E+00
Cs-135	0.000E+00	1.320E+02	1.320E+02	1.320E+02	1.320E+02	3.188E+02	7.129E+01	0.000E+00	0.000E+00
Gd-152	0.000E+00	8.252E-03	8.261E-03	8.262E-03	8.262E-03	4.424E-03	4.209E-05	0.000E+00	0.000E+00
I-129	0.000E+00	3.401E-01	3.406E-01	3.406E-01	3.406E-01	2.216E-01	2.723E-01	0.000E+00	0.000E+00
Pu-240	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Pu-244	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Ra-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-228	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Th-232	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U-236	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

ATTACHMENT 2

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 3
Concent : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Concentration of radionuclides in environmental media
at t = 1.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/L	Surface Water pCi/L
Al-26	1.599E+01	1.599E+01	2.011E-04	0.000E+00	0.000E+00
Cl-36	3.699E-01	3.699E-01	4.650E-06	0.000E+00	0.000E+00
Cm-248	8.300E-02	8.300E-02	1.043E-06	0.000E+00	0.000E+00
Cs-135	3.300E+00	3.300E+00	4.148E-05	0.000E+00	0.000E+00
Gd-152	3.299E-03	3.299E-03	4.148E-08	0.000E+00	0.000E+00
I-129	1.700E-02	1.700E-02	2.137E-07	0.000E+00	0.000E+00
Pu-240	3.383E-14	3.383E-14	4.253E-19	0.000E+00	0.000E+00
Pu-244	6.389E-10	6.389E-10	8.032E-15	0.000E+00	0.000E+00
Ra-228	9.723E-35	9.723E-35	1.222E-39	0.000E+00	0.000E+00
Th-228	5.597E-36	5.597E-36	7.036E-41	0.000E+00	0.000E+00
Th-232	4.114E-33	4.114E-33	5.172E-38	0.000E+00	0.000E+00
U-236	3.337E-22	3.337E-22	4.195E-27	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+00 years*

Radio-Nuclide	Drinking Water pCi/L	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/L	Fish pCi/kg	Crustacea pCi/kg
Al-26	0.000E+00	6.399E+01	6.403E+01	6.404E+01	6.404E+01	6.176E+00	2.304E+00	0.000E+00	0.000E+00
Cl-36	0.000E+00	7.397E+03	7.397E+03	7.398E+03	7.398E+03	3.019E+04	8.141E+03	0.000E+00	0.000E+00
Cm-248	0.000E+00	8.305E-02	8.327E-02	8.330E-02	8.330E-02	9.433E-04	9.216E-05	0.000E+00	0.000E+00
Cs-135	0.000E+00	1.320E+02	1.320E+02	1.320E+02	1.320E+02	3.188E+02	7.128E+01	0.000E+00	0.000E+00
Gd-152	0.000E+00	8.250E-03	8.259E-03	8.260E-03	8.260E-03	4.423E-03	4.208E-05	0.000E+00	0.000E+00
I-129	0.000E+00	3.401E-01	3.405E-01	3.406E-01	3.406E-01	2.216E-01	2.723E-01	0.000E+00	0.000E+00
Pu-240	0.000E+00	3.387E-14	3.394E-14	3.039E-14	3.382E-14	1.919E-15	1.879E-17	0.000E+00	0.000E+00
Pu-244	0.000E+00	6.415E-10	6.412E-10	6.132E-10	6.466E-10	3.480E-11	3.563E-13	0.000E+00	0.000E+00
Ra-228	0.000E+00	3.215E-33	3.840E-33	1.496E-33	2.022E-33	1.394E-34	1.592E-34	0.000E+00	0.000E+00
Th-228	0.000E+00	4.871E-35	9.334E-36	6.620E-35	8.979E-35	3.365E-36	1.963E-37	0.000E+00	0.000E+00
Th-232	0.000E+00	4.966E-33	4.197E-33	4.990E-33	6.116E-33	3.666E-34	2.824E-35	0.000E+00	0.000E+00
U-236	0.000E+00	7.797E-22	8.314E-22	5.612E-22	6.665E-22	6.383E-23	1.213E-22	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

ATTACHMENT 2

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 4
Concent : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Concentration of radionuclides in environmental media
at t = 3.000E+00 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/L	Surface Water pCi/L
Al-26	1.598E+01	1.598E+01	2.009E-04	0.000E+00	0.000E+00
Cl-36	3.696E-01	3.696E-01	4.646E-06	0.000E+00	0.000E+00
Cm-248	8.299E-02	8.299E-02	1.043E-06	0.000E+00	0.000E+00
Cs-135	3.299E+00	3.299E+00	4.147E-05	0.000E+00	0.000E+00
Gd-152	3.298E-03	3.298E-03	4.146E-08	0.000E+00	0.000E+00
I-129	1.699E-02	1.699E-02	2.136E-07	0.000E+00	0.000E+00
Pu-240	3.044E-13	3.044E-13	3.827E-18	0.000E+00	0.000E+00
Pu-244	1.916E-09	1.916E-09	2.409E-14	0.000E+00	0.000E+00
Ra-228	2.268E-32	2.268E-32	2.852E-37	0.000E+00	0.000E+00
Th-228	3.576E-33	3.576E-33	4.496E-38	0.000E+00	0.000E+00
Th-232	3.326E-31	3.326E-31	4.182E-36	0.000E+00	0.000E+00
U-236	8.998E-21	8.998E-21	1.131E-25	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+00 years*

Radio-Nuclide	Drinking Water pCi/L	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/L	Fish pCi/kg	Crustacea pCi/kg
Al-26	0.000E+00	6.394E+01	6.398E+01	6.399E+01	6.399E+01	6.171E+00	2.302E+00	0.000E+00	0.000E+00
Cl-36	0.000E+00	7.392E+03	7.392E+03	7.392E+03	7.392E+03	3.017E+04	8.135E+03	0.000E+00	0.000E+00
Cm-248	0.000E+00	8.305E-02	8.326E-02	8.329E-02	8.329E-02	9.432E-04	9.215E-05	0.000E+00	0.000E+00
Cs-135	0.000E+00	1.320E+02	1.320E+02	1.320E+02	1.320E+02	3.187E+02	7.126E+01	0.000E+00	0.000E+00
Gd-152	0.000E+00	8.247E-03	8.255E-03	8.257E-03	8.257E-03	4.421E-03	4.206E-05	0.000E+00	0.000E+00
I-129	0.000E+00	3.400E-01	3.404E-01	3.405E-01	3.405E-01	2.216E-01	2.722E-01	0.000E+00	0.000E+00
Pu-240	0.000E+00	3.046E-13	3.054E-13	2.945E-13	3.050E-13	1.729E-14	1.690E-16	0.000E+00	0.000E+00
Pu-244	0.000E+00	1.920E-09	1.923E-09	1.895E-09	1.929E-09	1.074E-10	1.065E-12	0.000E+00	0.000E+00
Ra-228	0.000E+00	8.494E-31	9.032E-31	6.657E-31	7.284E-31	5.539E-32	5.134E-32	0.000E+00	0.000E+00
Th-228	0.000E+00	1.501E-32	4.461E-33	3.157E-32	3.459E-32	1.458E-33	6.929E-35	0.000E+00	0.000E+00
Th-232	0.000E+00	3.575E-31	3.355E-31	3.785E-31	4.048E-31	2.321E-32	1.397E-33	0.000E+00	0.000E+00
U-236	0.000E+00	2.199E-20	2.249E-20	1.978E-20	2.088E-20	1.932E-21	3.381E-21	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

ATTACHMENT 2

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 5
Concent : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Concentration of radionuclides in environmental media
at t = 1.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/L	Surface Water pCi/L
Al-26	1.594E+01	1.594E+01	2.004E-04	0.000E+00	0.000E+00
Cl-36	3.687E-01	3.687E-01	4.635E-06	0.000E+00	0.000E+00
Cm-248	8.297E-02	8.297E-02	1.043E-06	0.000E+00	0.000E+00
Cs-135	3.297E+00	3.297E+00	4.145E-05	0.000E+00	0.000E+00
Gd-152	3.293E-03	3.293E-03	4.139E-08	0.000E+00	0.000E+00
I-129	1.698E-02	1.698E-02	2.135E-07	0.000E+00	0.000E+00
Pu-240	3.379E-12	3.379E-12	4.248E-17	0.000E+00	0.000E+00
Pu-244	6.382E-09	6.382E-09	8.023E-14	0.000E+00	0.000E+00
Ra-228	8.160E-30	8.160E-30	1.026E-34	0.000E+00	0.000E+00
Th-228	3.254E-30	3.254E-30	4.090E-35	0.000E+00	0.000E+00
Th-232	4.080E-29	4.080E-29	5.129E-34	0.000E+00	0.000E+00
U-236	3.318E-19	3.318E-19	4.171E-24	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+01 years*

Radio-Nuclide	Drinking Water pCi/L	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/L	Fish pCi/kg	Crustacea pCi/kg
Al-26	0.000E+00	6.378E+01	6.382E+01	6.383E+01	6.383E+01	6.156E+00	2.296E+00	0.000E+00	0.000E+00
Cl-36	0.000E+00	7.373E+03	7.373E+03	7.374E+03	7.374E+03	3.010E+04	8.115E+03	0.000E+00	0.000E+00
Cm-248	0.000E+00	8.303E-02	8.324E-02	8.327E-02	8.327E-02	9.429E-04	9.213E-05	0.000E+00	0.000E+00
Cs-135	0.000E+00	1.319E+02	1.319E+02	1.319E+02	1.319E+02	3.185E+02	7.122E+01	0.000E+00	0.000E+00
Gd-152	0.000E+00	8.234E-03	8.243E-03	8.244E-03	8.244E-03	4.414E-03	4.199E-05	0.000E+00	0.000E+00
I-129	0.000E+00	3.397E-01	3.401E-01	3.402E-01	3.402E-01	2.214E-01	2.720E-01	0.000E+00	0.000E+00
Pu-240	0.000E+00	3.382E-12	3.390E-12	3.355E-12	3.390E-12	1.920E-13	1.876E-15	0.000E+00	0.000E+00
Pu-244	0.000E+00	6.388E-09	6.403E-09	6.377E-09	6.410E-09	3.611E-10	3.545E-12	0.000E+00	0.000E+00
Ra-228	0.000E+00	3.191E-28	3.259E-28	2.956E-28	3.032E-28	2.393E-29	2.074E-29	0.000E+00	0.000E+00
Th-228	0.000E+00	7.555E-30	3.580E-30	1.582E-29	1.623E-29	7.317E-31	3.314E-32	0.000E+00	0.000E+00
Th-232	0.000E+00	4.176E-29	4.100E-29	4.294E-29	4.383E-29	2.488E-30	1.310E-31	0.000E+00	0.000E+00
U-236	0.000E+00	8.241E-19	8.302E-19	7.993E-19	8.120E-19	7.428E-20	1.263E-19	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

ATTACHMENT 2

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 6
Concent : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Concentration of radionuclides in environmental media
at t = 1.400E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/L	Surface Water pCi/L
Al-26	1.592E+01	1.592E+01	2.001E-04	0.000E+00	0.000E+00
Cl-36	3.681E-01	3.681E-01	4.628E-06	0.000E+00	0.000E+00
Cm-248	8.296E-02	8.296E-02	1.043E-06	0.000E+00	0.000E+00
Cs-135	3.295E+00	3.295E+00	4.143E-05	0.000E+00	0.000E+00
Gd-152	3.290E-03	3.290E-03	4.136E-08	0.000E+00	0.000E+00
I-129	1.697E-02	1.697E-02	2.133E-07	0.000E+00	0.000E+00
Pu-240	6.620E-12	6.620E-12	8.323E-17	0.000E+00	0.000E+00
Pu-244	8.930E-09	8.930E-09	1.123E-13	0.000E+00	0.000E+00
Ra-228	4.086E-29	4.086E-29	5.136E-34	0.000E+00	0.000E+00
Th-228	1.995E-29	1.995E-29	2.508E-34	0.000E+00	0.000E+00
Th-232	1.562E-28	1.562E-28	1.963E-33	0.000E+00	0.000E+00
U-236	9.082E-19	9.082E-19	1.142E-23	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.400E+01 years*

Radio-Nuclide	Drinking Water pCi/L	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/L	Fish pCi/kg	Crustacea pCi/kg
Al-26	0.000E+00	6.369E+01	6.373E+01	6.374E+01	6.374E+01	6.147E+00	2.293E+00	0.000E+00	0.000E+00
Cl-36	0.000E+00	7.363E+03	7.363E+03	7.363E+03	7.363E+03	3.005E+04	8.103E+03	0.000E+00	0.000E+00
Cm-248	0.000E+00	8.301E-02	8.323E-02	8.326E-02	8.326E-02	9.428E-04	9.211E-05	0.000E+00	0.000E+00
Cs-135	0.000E+00	1.318E+02	1.318E+02	1.318E+02	1.318E+02	3.184E+02	7.119E+01	0.000E+00	0.000E+00
Gd-152	0.000E+00	8.227E-03	8.235E-03	8.237E-03	8.236E-03	4.410E-03	4.196E-05	0.000E+00	0.000E+00
I-129	0.000E+00	3.395E-01	3.400E-01	3.400E-01	3.400E-01	2.212E-01	2.719E-01	0.000E+00	0.000E+00
Pu-240	0.000E+00	6.625E-12	6.642E-12	6.593E-12	6.642E-12	3.762E-13	3.676E-15	0.000E+00	0.000E+00
Pu-244	0.000E+00	8.938E-09	8.960E-09	8.935E-09	8.968E-09	5.059E-10	4.960E-12	0.000E+00	0.000E+00
Ra-228	0.000E+00	1.606E-27	1.632E-27	1.517E-27	1.545E-27	1.225E-28	1.053E-28	0.000E+00	0.000E+00
Th-228	0.000E+00	4.161E-29	2.160E-29	8.458E-29	8.614E-29	3.935E-30	1.779E-31	0.000E+00	0.000E+00
Th-232	0.000E+00	1.588E-28	1.569E-28	1.623E-28	1.647E-28	9.342E-30	4.822E-31	0.000E+00	0.000E+00
U-236	0.000E+00	2.260E-18	2.273E-18	2.212E-18	2.237E-18	2.044E-19	3.461E-19	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

ATTACHMENT 2

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 7
Concent : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Concentration of radionuclides in environmental media
at t = 3.000E+01 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/L	Surface Water pCi/L
Al-26	1.583E+01	1.583E+01	1.990E-04	0.000E+00	0.000E+00
Cl-36	3.660E-01	3.660E-01	4.601E-06	0.000E+00	0.000E+00
Cm-248	8.291E-02	8.291E-02	1.042E-06	0.000E+00	0.000E+00
Cs-135	3.290E+00	3.290E+00	4.136E-05	0.000E+00	0.000E+00
Gd-152	3.278E-03	3.278E-03	4.121E-08	0.000E+00	0.000E+00
I-129	1.694E-02	1.694E-02	2.129E-07	0.000E+00	0.000E+00
Pu-240	3.034E-11	3.034E-11	3.814E-16	0.000E+00	0.000E+00
Pu-244	1.910E-08	1.910E-08	2.401E-13	0.000E+00	0.000E+00
Ra-228	1.431E-27	1.431E-27	1.800E-32	0.000E+00	0.000E+00
Th-228	9.858E-28	9.858E-28	1.239E-32	0.000E+00	0.000E+00
Th-232	3.245E-27	3.245E-27	4.079E-32	0.000E+00	0.000E+00
U-236	8.849E-18	8.849E-18	1.112E-22	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+01 years*

Radio-Nuclide	Drinking Water pCi/L	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/L	Fish pCi/kg	Crustacea pCi/kg
Al-26	0.000E+00	6.332E+01	6.336E+01	6.337E+01	6.337E+01	6.112E+00	2.280E+00	0.000E+00	0.000E+00
Cl-36	0.000E+00	7.320E+03	7.320E+03	7.320E+03	7.320E+03	2.988E+04	8.056E+03	0.000E+00	0.000E+00
Cm-248	0.000E+00	8.296E-02	8.318E-02	8.321E-02	8.321E-02	9.422E-04	9.206E-05	0.000E+00	0.000E+00
Cs-135	0.000E+00	1.316E+02	1.316E+02	1.316E+02	1.316E+02	3.179E+02	7.108E+01	0.000E+00	0.000E+00
Gd-152	0.000E+00	8.197E-03	8.206E-03	8.207E-03	8.207E-03	4.394E-03	4.181E-05	0.000E+00	0.000E+00
I-129	0.000E+00	3.388E-01	3.393E-01	3.393E-01	3.393E-01	2.208E-01	2.713E-01	0.000E+00	0.000E+00
Pu-240	0.000E+00	3.036E-11	3.044E-11	3.034E-11	3.045E-11	1.724E-12	1.685E-14	0.000E+00	0.000E+00
Pu-244	0.000E+00	1.911E-08	1.916E-08	1.914E-08	1.917E-08	1.084E-09	1.060E-11	0.000E+00	0.000E+00
Ra-228	0.000E+00	5.668E-26	5.722E-26	5.495E-26	5.539E-26	4.419E-27	3.761E-27	0.000E+00	0.000E+00
Th-228	0.000E+00	1.750E-27	1.044E-27	3.335E-27	3.362E-27	1.572E-28	7.114E-30	0.000E+00	0.000E+00
Th-232	0.000E+00	3.272E-27	3.257E-27	3.313E-27	3.336E-27	1.890E-28	9.483E-30	0.000E+00	0.000E+00
U-236	0.000E+00	2.208E-17	2.215E-17	2.187E-17	2.199E-17	2.005E-18	3.380E-18	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

ATTACHMENT 2

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 8
Concent : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Concentration of radionuclides in environmental media
at t = 1.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/L	Surface Water pCi/L
Al-26	1.543E+01	1.543E+01	1.940E-04	0.000E+00	0.000E+00
Cl-36	3.568E-01	3.568E-01	4.486E-06	0.000E+00	0.000E+00
Cm-248	8.269E-02	8.269E-02	1.040E-06	0.000E+00	0.000E+00
Cs-135	3.268E+00	3.268E+00	4.108E-05	0.000E+00	0.000E+00
Gd-152	3.227E-03	3.227E-03	4.057E-08	0.000E+00	0.000E+00
I-129	1.679E-02	1.679E-02	2.111E-07	0.000E+00	0.000E+00
Pu-240	3.343E-10	3.343E-10	4.203E-15	0.000E+00	0.000E+00
Pu-244	6.311E-08	6.311E-08	7.934E-13	0.000E+00	0.000E+00
Ra-228	2.781E-25	2.781E-25	3.496E-30	0.000E+00	0.000E+00
Th-228	2.485E-25	2.485E-25	3.124E-30	0.000E+00	0.000E+00
Th-232	3.759E-25	3.759E-25	4.725E-30	0.000E+00	0.000E+00
U-236	3.140E-16	3.140E-16	3.948E-21	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+02 years*

Radio-Nuclide	Drinking Water pCi/L	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/L	Fish pCi/kg	Crustacea pCi/kg
Al-26	0.000E+00	6.174E+01	6.178E+01	6.179E+01	6.179E+01	5.959E+00	2.223E+00	0.000E+00	0.000E+00
Cl-36	0.000E+00	7.136E+03	7.136E+03	7.137E+03	7.137E+03	2.913E+04	7.854E+03	0.000E+00	0.000E+00
Cm-248	0.000E+00	8.275E-02	8.296E-02	8.299E-02	8.299E-02	9.398E-04	9.182E-05	0.000E+00	0.000E+00
Cs-135	0.000E+00	1.307E+02	1.307E+02	1.307E+02	1.307E+02	3.157E+02	7.059E+01	0.000E+00	0.000E+00
Gd-152	0.000E+00	8.071E-03	8.079E-03	8.080E-03	8.080E-03	4.326E-03	4.116E-05	0.000E+00	0.000E+00
I-129	0.000E+00	3.359E-01	3.363E-01	3.364E-01	3.364E-01	2.189E-01	2.689E-01	0.000E+00	0.000E+00
Pu-240	0.000E+00	3.345E-10	3.354E-10	3.352E-10	3.355E-10	1.900E-11	1.856E-13	0.000E+00	0.000E+00
Pu-244	0.000E+00	6.316E-08	6.332E-08	6.331E-08	6.334E-08	3.585E-09	3.504E-11	0.000E+00	0.000E+00
Ra-228	0.000E+00	1.106E-23	1.112E-23	1.088E-23	1.091E-23	8.732E-25	7.387E-25	0.000E+00	0.000E+00
Th-228	0.000E+00	3.977E-25	2.601E-25	7.153E-25	7.169E-25	3.413E-26	1.550E-27	0.000E+00	0.000E+00
Th-232	0.000E+00	3.771E-25	3.772E-25	3.794E-25	3.801E-25	2.153E-26	1.060E-27	0.000E+00	0.000E+00
U-236	0.000E+00	7.848E-16	7.861E-16	7.833E-16	7.845E-16	7.144E-17	1.201E-16	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

ATTACHMENT 2

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 9
Concent : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Concentration of radionuclides in environmental media
at t = 3.000E+02 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/L	Surface Water pCi/L
Al-26	1.436E+01	1.436E+01	1.805E-04	0.000E+00	0.000E+00
Cl-36	3.318E-01	3.318E-01	4.172E-06	0.000E+00	0.000E+00
Cm-248	8.208E-02	8.208E-02	1.032E-06	0.000E+00	0.000E+00
Cs-135	3.204E+00	3.204E+00	4.028E-05	0.000E+00	0.000E+00
Gd-152	3.087E-03	3.087E-03	3.881E-08	0.000E+00	0.000E+00
I-129	1.637E-02	1.637E-02	2.058E-07	0.000E+00	0.000E+00
Pu-240	2.938E-09	2.938E-09	3.693E-14	0.000E+00	0.000E+00
Pu-244	1.847E-07	1.847E-07	2.322E-12	0.000E+00	0.000E+00
Ra-228	2.295E-23	2.295E-23	2.885E-28	0.000E+00	0.000E+00
Th-228	2.215E-23	2.215E-23	2.785E-28	0.000E+00	0.000E+00
Th-232	2.549E-23	2.549E-23	3.204E-28	0.000E+00	0.000E+00
U-236	7.533E-15	7.533E-15	9.471E-20	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 3.000E+02 years*

Radio-Nuclide	Drinking Water pCi/L	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/L	Fish pCi/kg	Crustacea pCi/kg
Al-26	0.000E+00	5.743E+01	5.747E+01	5.748E+01	5.748E+01	5.543E+00	2.068E+00	0.000E+00	0.000E+00
Cl-36	0.000E+00	6.637E+03	6.637E+03	6.637E+03	6.637E+03	2.709E+04	7.304E+03	0.000E+00	0.000E+00
Cm-248	0.000E+00	8.214E-02	8.235E-02	8.238E-02	8.238E-02	9.328E-04	9.114E-05	0.000E+00	0.000E+00
Cs-135	0.000E+00	1.282E+02	1.282E+02	1.282E+02	1.282E+02	3.096E+02	6.922E+01	0.000E+00	0.000E+00
Gd-152	0.000E+00	7.720E-03	7.728E-03	7.729E-03	7.729E-03	4.138E-03	3.937E-05	0.000E+00	0.000E+00
I-129	0.000E+00	3.275E-01	3.280E-01	3.280E-01	3.280E-01	2.134E-01	2.623E-01	0.000E+00	0.000E+00
Pu-240	0.000E+00	2.940E-09	2.947E-09	2.947E-09	2.948E-09	1.669E-10	1.631E-12	0.000E+00	0.000E+00
Pu-244	0.000E+00	1.848E-07	1.853E-07	1.853E-07	1.854E-07	1.049E-08	1.025E-10	0.000E+00	0.000E+00
Ra-228	0.000E+00	9.134E-22	9.177E-22	9.028E-22	9.034E-22	7.239E-23	6.114E-23	0.000E+00	0.000E+00
Th-228	0.000E+00	3.448E-23	2.311E-23	6.091E-23	6.095E-23	2.918E-24	1.327E-25	0.000E+00	0.000E+00
Th-232	0.000E+00	2.553E-23	2.557E-23	2.564E-23	2.566E-23	1.453E-24	7.117E-26	0.000E+00	0.000E+00
U-236	0.000E+00	1.884E-14	1.886E-14	1.884E-14	1.885E-14	1.716E-15	2.882E-15	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

ATTACHMENT 2

1RESRAD, Version 6.21 T« Limit = 0.5 year 01/26/2004 14:48 Page 10
Concent : 100-B/C Septic System Overburden Stockpiles Nonradionuclides
File : 100-BC_Septic_System_OB.RAD

Concentration of radionuclides in environmental media
at t = 1.000E+03 years

Radio-Nuclide	Contaminated Zone pCi/g	Surface Soil* pCi/g	Air Particulate pCi/m**3	Well Water pCi/L	Surface Water pCi/L
Al-26	1.115E+01	1.115E+01	1.401E-04	0.000E+00	0.000E+00
Cl-36	2.574E-01	2.574E-01	3.236E-06	0.000E+00	0.000E+00
Cm-248	7.997E-02	7.997E-02	1.005E-06	0.000E+00	0.000E+00
Cs-135	2.992E+00	2.992E+00	3.761E-05	0.000E+00	0.000E+00
Gd-152	2.642E-03	2.642E-03	3.321E-08	0.000E+00	0.000E+00
I-129	1.499E-02	1.499E-02	1.885E-07	0.000E+00	0.000E+00
Pu-240	3.003E-08	3.003E-08	3.775E-13	0.000E+00	0.000E+00
Pu-244	5.651E-07	5.651E-07	7.104E-12	0.000E+00	0.000E+00
Ra-228	1.717E-21	1.717E-21	2.159E-26	0.000E+00	0.000E+00
Th-228	1.702E-21	1.702E-21	2.139E-26	0.000E+00	0.000E+00
Th-232	1.772E-21	1.772E-21	2.227E-26	0.000E+00	0.000E+00
U-236	1.921E-13	1.921E-13	2.415E-18	0.000E+00	0.000E+00

*The Surface Soil is the top layer of soil within the user specified mixing zone/depth.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Concentration of radionuclides in foodstuff media
at t = 1.000E+03 years*

Radio-Nuclide	Drinking Water pCi/L	Nonleafy Vegetable pCi/kg	Leafy Vegetable pCi/kg	Fodder Meat pCi/kg	Fodder Milk pCi/kg	Meat pCi/kg	Milk pCi/L	Fish pCi/kg	Crustacea pCi/kg
Al-26	0.000E+00	4.459E+01	4.462E+01	4.463E+01	4.463E+01	4.304E+00	1.606E+00	0.000E+00	0.000E+00
Cl-36	0.000E+00	5.148E+03	5.148E+03	5.149E+03	5.149E+03	2.101E+04	5.666E+03	0.000E+00	0.000E+00
Cm-248	0.000E+00	8.003E-02	8.023E-02	8.026E-02	8.026E-02	9.089E-04	8.880E-05	0.000E+00	0.000E+00
Cs-135	0.000E+00	1.197E+02	1.197E+02	1.197E+02	1.197E+02	2.890E+02	6.463E+01	0.000E+00	0.000E+00
Gd-152	0.000E+00	6.607E-03	6.613E-03	6.615E-03	6.614E-03	3.542E-03	3.370E-05	0.000E+00	0.000E+00
I-129	0.000E+00	3.000E-01	3.004E-01	3.004E-01	3.004E-01	1.955E-01	2.402E-01	0.000E+00	0.000E+00
Pu-240	0.000E+00	3.005E-08	3.013E-08	3.013E-08	3.014E-08	1.706E-09	1.667E-11	0.000E+00	0.000E+00
Pu-244	0.000E+00	5.655E-07	5.669E-07	5.671E-07	5.671E-07	3.211E-08	3.137E-10	0.000E+00	0.000E+00
Ra-228	0.000E+00	6.838E-20	6.868E-20	6.768E-20	6.769E-20	5.425E-21	4.580E-21	0.000E+00	0.000E+00
Th-228	0.000E+00	2.625E-21	1.774E-21	4.608E-21	4.609E-21	2.210E-22	1.006E-23	0.000E+00	0.000E+00
Th-232	0.000E+00	1.773E-21	1.777E-21	1.780E-21	1.780E-21	1.008E-22	4.928E-24	0.000E+00	0.000E+00
U-236	0.000E+00	4.804E-13	4.809E-13	4.808E-13	4.809E-13	4.377E-14	7.350E-14	0.000E+00	0.000E+00

*Concentrations are at consumption time and include radioactive decay and ingrowth during storage time.
For livestock fodder, consumption time is t minus meat or milk storage time.

Concentrations in the media occurring in pathways that are suppressed are calculated using the current input parameters, i.e. using parameters appearing in the input screen when the pathways are active.

Attachment B

100-B/C Septic System Stockpiles 95% UCL Calculation, Calculation No. 0100F-CA-V0201

CALCULATION COVER SHEET

Project Title:	100-B/C Septic System Stockpiles Cleanup Verification	**Job No.**	22192
Area	100-B/C		
Discipline	Environmental	***Calc. No.**	0100B-CA-V0201
Subject	100-B/C Septic System Stockpiles 95% UCL Calculation		
Computer Program	Excel	**Program No.**	Excel 97

Use of this calculation by persons who do not have access to all of the pertinent facts could lead to incorrect conclusions or assumptions. Before applying this calculation in your work, this calculation must be thoroughly reviewed with appropriate and authorized Hanford site ERC personnel. Without this review, the ERC cannot assume any responsibility for the use of these calculations.

Committed Calculation ☒ **Preliminary** ☐ **Superseded** ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheets = 6 Total = 7	K.A. Anselm 2/9/04 K. A. Anselm	J.E. Thomson 2/9/04 J. E. Thomson T.B. Miley 2/9/04 T. B. Miley	SW Callison 2-9-04 S. W. Callison	2-11-04 D. N. Strom for F.M. Corpuz via telephone communication F. M. Corpuz	2-11-04

SUMMARY OF REVISIONS

* Obtain calc no. from DIS

Dec-02

DE01-437.03

Bechtel Hanford, Inc.

CALCULATION SHEET

Originator K. A. Anselm KAA
Project 100-B/C Septic System Stockpiles Cleanup Verification
Subject 100-B/C Septic System Stockpiles 95% UCL Calculation

Date 02/09/04
Job No. 22192

Calc. No. 0100B-CA-V0201
Checked J. E. Thomson
T. B. Miley TBM

Rev. No. 0
Date 2/9/04
2/9/04
Sheet No. 1 of 6

Summary

Purpose:
Calculate the 95% upper confidence limit (UCL) to evaluate compliance with cleanup standards for the subject site. Also, calculate the carcinogenic risk for applicable nonradionuclide analytes, perform the *Washington Administrative Code* (WAC) 173-340, (Model Toxics Control Act [MTCA]) 3-part test, if required (all nonradionuclide analytes), and calculate the relative percent difference (RPD) for each contaminant of concern (COC).

Table of Contents:

Sheets 1 to 2 - Calculation Sheet Summary
Sheets 3 to 5 - Calculation Sheet Septic System Stockpiles (Overburden) Sample Data
Sheet 6 - Calculation Sheet Split-Dup Analysis

Given/References:

1) Sample Results
2) Lookup values from Remedial Design Report/Remedial Action Work Plan (RDR/RAWP) (DOE-RL 2002). All lookup values and remedial action goals (RAGs) are taken from the RDR/RAWP and DOE-RL (2001b), unless otherwise specified.
3) DOE-RL, 2001a, *100 Area Remedial Action Sampling and Analysis Plan*, DOE/RL-96-22, Rev. 3, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
4) DOE-RL, 2001b, *Hanford Site Background: Part I, Soil Background for Nonradioactive Analytes*, DOE/RL-92-24, Vol. 1, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
5) DOE-RL, 2002, *Remedial Design Report/Remedial Action Work Plan for the 100 Area*, DOE/RL-96-17, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
6) BHI, 2001, *Instruction Guide for the Remediation of the 100 Area Waste Sites*, 0100X-IG-G0001, Rev. 5, Bechtel Hanford, Inc., Richland, Washington.
7) Model Toxics Control Act, WAC 173-340, and Statistical Guidance for Ecology Site Managers, Ecology Pub. #92-54, Washington Department of Ecology, Olympia, Washington.
8) Ecology, 1993, Statistical Guidance for Ecology Site Managers, Supplement S-6, Analyzing Site or Background Data with Below-Detection Limit or Below-PQL Values (Censored Data Sets).
9) EPA, 1994, *WSEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, EPA 540/R-94/013, U.S. Environmental Protection Agency, Washington, D.C.
10) Ecology, 2001, *Cleanup Levels and Risk Calculations Under the Model Toxics Control Act Cleanup Regulation* (CLARC Version 3.1), Publication #94-145, Updated November 2001, Washington State Department of Ecology, Olympia, Washington.

Solution:
Calculation methodology is described in Ecology Pub. #92-54, and below. Use data from attached worksheets to calculate the 95% UCL for each analyte, the carcinogenic risk, perform the WAC 173-340 3-part test for nonradionuclides, and the RPD calculations for each COC.

Calculation Description:
The subject calculations were performed on data from soil verification samples from the subject waste site. The data were entered into an EXCEL 97 spreadsheet and calculations performed by using the built-in spreadsheet functions and/or creating formulae within the cells. The statistical evaluation of data for use in accordance with the RDR/RAWP is documented by this calculation. Split and duplicate RPD results are used in evaluation of data quality and are presented in the Cleanup Verfication Package (CVP) for this site.

Methodology:
The statistical value calculated to evaluate the effectiveness of cleanup was the 95% UCL. For nonradioactive analytes with > 50% of the data below detection limits, the maximum value for the sample data was used instead of the 95% UCL. All nonradionuclide (e.g., metals) data reported as being below detection limits were set to ½ the detection limit value for calculation of the statistics (Ecology 1993). For radionuclide data, calculation of the statistics was done on the reported value. In cases where the laboratory does not report a value below the minimal detectable activity (MDA), half of the MDA is used in the calculation.

For the statistical evaluation of duplicate sample pairs, the samples are averaged before being included in the data set, after adjustments for censored data as described above.

For nonradionuclides, the WAC 173-340 statistical guidance suggests that a test for distributional form be performed on the data and the 95% UCL calculated on the appropriate distribution using Ecology software. For nonradionuclide small data sets (n < 10) and all radionuclide data sets, the calculations are performed assuming nonparametric distribution, and no test for distribution is performed.

The estimated hazard quotient (for applicable nonradionuclide COCs) is determined by dividing the statistical value (derived in this calculation) by the WAC 173-340 Method B non-carcinogenic cleanup limit. The nonradionuclide carcinogenic risk, above background, is determined by dividing the statistical value by the WAC 173-340 Method B carcinogenic cleanup limit and then multiplying by 10^{-6}. For data sets where all values are below detection, neither of these calculations are required. For nonradionuclide COCs, the estimated fraction of risk computation must be performed.

The WAC 173-340 3-part test is performed for nonradionuclide analytes only and determines if:
1) the statistical value exceeds the most stringent cleanup limit for each non-radionuclide COC,
2) greater than 10% of the raw data exceed the most stringent cleanup limit for each non-radionuclide COC,
3) the maximum value of the raw data set exceeds two times the most stringent cleanup limit for each non-radionuclide COC.

The RPD is performed when both the main value and either the duplicate or split values are above detection limits and are greater than 5 times the target detection limit (TDL). The TDL is a laboratory detection limit pre-determined for each analytical method. These detection limit requirements are located in Table II-2 of the sampling and analysis plan (DOE-RL 2001a) where they are referred to as the RDL. The RPD calculations use the following formula: RPD =[|M-S|/((M+S)/2)]*100

where, M = Main Sample Value S = Split (or duplicate) Sample Value

For quality assurance/quality control (QA/QC) split and duplicate RPD calculations, a value less than +/- 30% indicates the data compare favorably. For regulatory splits, a threshold of +/- 35% is used (EPA 1994). If the RPD is greater than +/- 30% (or +/- 35% for regulatory split data), further investigation regarding the usability of the data is performed. Additional discussion as necessary is provided in the data quality assessment section of the applicable CVP.

If regulator split comparison is required, an additional parameter is evaluated. A control limit of +/- 2 times the TDL shall be used if either the main or regulator split value is less than 5 times the TDL and above detection. In the case where only one result is greater than 5 times the TDL and the other is below, the +/- 2 times the TDL criteria applies. Therefore, the following calculation is performed as part of the evaluation for these two cases involving regulator split data: difference = main - regulator split.

If the difference is greater than +/- 2 times the TDL, then further investigation regarding the usability of the data is performed and presented in the applicable CVP data quality assessment.

Summary

Results:

The results presented in the summary tables that follow are for use in RESRAD dose/risk analysis and the CVP for this site.

Result Summary - Septic System Stockpiles (Overburden)		
Cs-137	0 (< BG)	pCi/g
Co-60	1.3E-02 U	pCi/g
Eu-152	4.7E-02 U	pCi/g
Eu-154	3.2E-02 U	pCi/g
Eu-155	0 (< BG) U	pCi/g
Lead	1.1E+01	mg/kg
Mercury	3.7E-01	mg/kg
Cr+6	4.0E-01 U	mg/kg
Aroclor 1254	3.6E+01	µg/Kg
DDT	3.4E+00 U	µg/Kg
Dieldrin	3.4E+00 U	µg/Kg
beta-BHC	1.7E+00 U	µg/Kg
Bis(2-ethylhexyl)phthalate	6.0E+02	µg/Kg
Aldrin	3.3E+00	µg/Kg
DDE	1.7E+01	µg/Kg
Endosulfan II	7.0E+00	µg/Kg
Endosulfan Sulfate	4.3E+00	µg/Kg
Endrin ketone	1.1E+01	µg/Kg
alpha-Chlordane	1.7E+00	µg/Kg
gamma-Chlordane	1.3E+01	µg/Kg

WAC 173-340 Evaluation

WAC 3-Part Test:

95% UCL > Cleanup Limit?	YES	Because of the "yes" answers to the three part test, additional assessment for protectivness will be performed using RESRAD.
> 10% above Cleanup Limit?	YES	
Any sample > 2x Cleanup Limit?	YES	

Risk Estimate:

Nonrad noncarcinogenic sum of quotients:	7.E-02
Nonrad carcinogenic risk:	7.E-08

Relative Percent Difference (RPD) Results - QA/QC Analysis
Septic System Stockpiles (Overburden)*

Analyte	Duplicate Analysis	Split Analysis
Cs-137		
Co-60		
Eu-152		
Eu-154		
Eu-155		
Lead	10.5%	6.9%
Mercury		
Cr+6		
Aroclor 1254		
DDT		
Dieldrin		
beta-BHC		
Bis(2-ethylhexyl)phthalate		
Aldrin		
DDE		
Endosulfan II		
Endosulfan Sulfate		
Endrin ketone		
alpha-Chlordane		
gamma-Chlordane		

*A blank cell indicates that RPD evaluation was not required

Bechtel Hanford, Inc.

CALCULATION SHEET

Originator	K. A. Anselm KAA	Date	02/09/04	Calc. No.	0100B-CA-V0201
Project	100-B/C Septic System Stockpiles Cleanup Verification	Job No.	22192	Checked	J. E. Thomson JET
Subject	100-B/C Septic System Stockpiles 95% UCL Calculation			Checked	T. B. Miley TBM

Rev. No. 0
Date 2/9/04
Date 2/9/04
Sheet No. 3 of 6

1 **Septic System Stockpiles (Overburden) Sample Data**

2	Sampling Area	HEIS Number	Sample Date	Cs-137			Co-60			Eu-152			Eu-154			Eu-155			Lead			Mercury		
3				pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	mg/Kg	Q	MDA	mg/Kg	Q	MDA
4	B6	J010B5	10/14/2003	3.4E-02	U	3.5E-02	2.6E-02	U	2.6E-02	7.6E-02	U	7.6E-02	9.8E-02	U	9.8E-02	7.7E-02	U	7.7E-02	9.0E+00		1.9E-01	1.0E-02	U	1.0E-02
5	Duplicate of J010B5	J010B6	10/14/2003	7.1E-02		4.3E-02	3.8E-02	U	3.8E-02	8.7E-02	U	8.7E-02	1.1E-01	U	1.1E-01	6.8E-02	U	6.8E-02	8.1E+00		1.9E-01	2.0E-02	U	2.0E-02
6	A1	J010B0	10/14/2003	4.4E-02	U	4.4E-02	4.8E-02	U	4.8E-02	1.1E-01	U	1.1E-01	1.4E-01	U	1.4E-01	1.0E-01	U	1.0E-01	7.5E+00		1.9E-01	2.0E-02	U	2.0E-02
7	A2	J010B1	10/14/2003	3.0E-02	U	3.0E-02	2.8E-02	U	2.8E-02	6.6E-02	U	6.6E-02	8.8E-02	U	8.8E-02	5.8E-02	U	5.8E-02	1.0E+01		1.7E-01	3.7E-01		1.0E-02
8	A3	J010B2	10/14/2003	4.0E-02	U	4.0E-02	3.6E-02	U	3.6E-02	8.5E-02	U	8.5E-02	1.2E-01	U	1.2E-01	9.1E-02	U	9.1E-02	1.6E+01		1.9E-01	3.0E-02		2.0E-02
9	A4	J010B3	10/14/2003	1.1E-01		5.3E-02	4.5E-02	U	4.5E-02	1.0E-01	U	1.0E-01	1.5E-01	U	1.5E-01	9.6E-02	U	9.6E-02	6.6E+00		1.9E-01	2.0E-02	U	2.0E-02
10	B5	J010B4	10/14/2003	3.6E-02		2.5E-02	2.7E-02	U	2.7E-02	5.5E-02	U	5.5E-02	8.0E-02	U	8.0E-02	5.1E-02	U	5.1E-02	5.4E+00		1.8E-01	1.0E-02	U	1.0E-02
11	B7	J010B7	10/14/2003	7.8E-02		4.6E-02	4.1E-02	U	4.1E-02	9.1E-02	U	9.1E-02	1.3E-01	U	1.3E-01	7.1E-02	U	7.1E-02	6.4E+00		1.6E-01	2.0E-02	U	2.0E-02
12	B8	J010B8	10/14/2003	3.8E-02	U	3.8E-02	3.6E-02	U	3.6E-02	8.2E-02	U	8.2E-02	1.1E-01	U	1.1E-01	9.0E-02	U	9.0E-02	1.0E+01		1.8E-01	2.0E-02	U	2.0E-02

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14 **Statistical Computation Input Data**

15	Sampling Area	HEIS Number	Sample Date	Cs-137 pCi/g	Co-60 pCi/g	Eu-152 pCi/g	Eu-154 pCi/g	Eu-155 pCi/g	Lead mg/Kg	Mercury mg/Kg
16										
17	B6	J010B5/ J010B6	10/14/2003	5.3E-02	1.6E-02	4.1E-02	5.2E-02	3.6E-02	8.6E+00	7.5E-03
18	A1	J010B0	10/14/2003	2.2E-02	2.4E-02	5.5E-02	7.0E-02	5.0E-02	7.5E+00	1.0E-02
19	A2	J010B1	10/14/2003	1.5E-02	1.4E-02	3.3E-02	4.4E-02	2.9E-02	1.0E+01	3.7E-01
20	A3	J010B2	10/14/2003	2.0E-02	1.8E-02	4.3E-02	6.0E-02	4.6E-02	1.6E+01	3.0E-02
21	A4	J010B3	10/14/2003	1.1E-01	2.3E-02	5.0E-02	7.5E-02	4.8E-02	6.6E+00	1.0E-02
22	B5	J010B4	10/14/2003	3.6E-02	1.4E-02	2.8E-02	4.0E-02	2.6E-02	5.4E+00	5.0E-03
23	B7	J010B7	10/14/2003	7.8E-02	2.1E-02	4.6E-02	6.5E-02	3.6E-02	6.4E+00	1.0E-02
24	B8	J010B8	10/14/2003	1.9E-02	1.8E-02	4.1E-02	5.5E-02	4.5E-02	1.0E+01	1.0E-02

25

26 **Statistical Computations**

27		Cs-137	Co-60	Eu-152	Eu-154	Eu-155	Lead	Mercury
28	Statistical value based on	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat.	Radionuclide data set. Use nonparametric z-stat	Small data set. Use nonparametric z-stat	>50% below detection. Default to maximum value.
29	N	8	8	8	8	8	8	8
30	% < Detection limit	50%	100%	100%	100%	100%	0%	75%
31	mean	4.4E-02	1.8E-02	4.2E-02	5.8E-02	3.9E-02	8.8E+00	5.7E-02
32	st. dev.	3.4E-02	3.8E-03	8.8E-03	1.2E-02	9.1E-03	3.2E+00	1.3E-01
33	Z-statistic	1.645	1.645	1.645	1.645	1.645	1.645	1.645
34	95% UCL on mean	6.4E-02	2.1E-02	4.7E-02	6.5E-02	4.5E-02	1.1E+01	1.3E-01
35	max value	1.1E-01	4.8E-02	1.1E-01	1.5E-01	1.0E-01	1.6E+01	3.7E-01
36	Statistical value	6.4E-02	2.1E-02	4.7E-02	6.5E-02	4.5E-02	1.1E+01	3.7E-01
37	Background	1.1	0.008	NA	0.033	0.054	NA	NA
38	Statistical value above background	0 (< BG)	1.3E-02	4.7E-02	3.2E-02	0 (< BG)	1.07E+01	3.7E-01
39	**Lookup Value - 15 mrem/yr for radionuclide**	6.2	1.4	3.3	3.0	125	NA	NA
40	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**						10.2 BG/GW/ River Protection	0.33 BG/GW/ River Protection
41	**WAC 173-340 3-PART TEST**							
42	95% UCL > Cleanup Limit?	NA	NA	NA	NA	NA	YES	YES
43	> 10% above Cleanup Limit?	NA	NA	NA	NA	NA	YES	YES
44	Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NA	NO	NO
45								
46	**EXCESS RISK EVALUATION**							
47	**WAC 173-340 Non-Carcinogenic Cleanup:**	NA	NA	NA	NA	NA	353	24
48	Hazard quotient for each nonradionuclide:	NA	NA	NA	NA	NA	3.E-02	2.E-02
49	**WAC 173-340 Carcinogenic Cleanup:**	NA	NA	NA	NA	NA	NA	NA
50	Risk for each carcinogenic nonradionuclide:	NA	NA	NA	NA	NA	NA	NA
51								
52	**WAC 173-340 Compliance?** NO						Because of the "Yes" answers to the MTCA 3-part test a more detailed assessment using RESRAD will be performed.	Because of the "Yes" answers to the MTCA 3-part test a more detailed assessment using RESRAD will be performed.
53								
54	**Nonrad noncarcinogenic index sum:** 7.E-02							
55								
56	**Nonrad carcinogenic risk:** 7.E-08							

57 BG = background
58 GW = groundwater
59 RAG = remedial action goal

Bechtel Hanford, Inc.

CALCULATION SHEET

Originator	K. A. Anselm KAA	Date	02/09/04	Calc. No.	0100B-CA-V0201
Project	100-B/C Septic System Stockpiles Cleanup Verification	Job No.	22192	Checked	J. E. Thomson JET
Subject	100-B/C Septic System Stockpiles 95% UCL Calculation			Checked	T. B. Miley TBM

Rev. No. 0
Date 2/9/04
Date 3/4/04
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Septic System Stockpiles (Overburden) Sample Data

Sampling Area	HEIS Number	Sample Date	Cr+6 mg/Kg	Q	PQL	Aroclor 1254 µg/Kg	Q	PQL	DDT µg/Kg	Q	PQL	Dieldrin µg/Kg	Q	PQL	beta-BHC µg/Kg	Q	PQL	Bis(2-ethylhexyl)phthalate µg/Kg	Q	PQL	Aldrin µg/Kg	Q	PQL
B6	J010B5	10/14/2003	4.0E-01	U	4.0E-01	1.3E+01	U	1.3E+01	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	1.7E+00	U	1.7E+00	3.3E+02	U	3.3E+02	1.7E+00	U	1.7E+00
Duplicate of J010B5	J010B6	10/14/2003	4.0E-01	U	4.0E-01	1.3E+01	U	1.3E+01	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	1.7E+00	U	1.7E+00	3.3E+02	U	3.3E+02	1.7E+00	U	1.7E+00
A1	J010B0	10/14/2003	4.0E-01	U	4.0E-01	1.3E+01	U	1.3E+01	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	1.7E+00	U	1.7E+00	1.7E+01	J	3.3E+02	1.7E+00	U	1.7E+00
A2	J010B1	10/14/2003	4.0E-01	U	4.0E-01	3.1E+01		1.3E+01	3.3E+00	U	3.3E+00	3.3E+00	U	3.3E+00	1.7E+00	U	1.7E+00	2.6E+01	J	3.3E+02	1.7E+00	U	1.7E+00
A3	J010B2	10/14/2003	4.0E-01	U	4.0E-01	8.3E+01		1.3E+01	3.3E+00	U	3.3E+00	3.3E+00	U	3.3E+00	1.7E+00	U	1.7E+00	1.7E+01	J	3.3E+02	1.7E+00	U	1.7E+00
A4	J010B3	10/14/2003	4.0E-01	U	4.0E-01	1.5E+01		1.3E+01	3.3E+00	U	3.3E+00	3.3E+00	U	3.3E+00	1.7E+00	U	1.7E+00	1.9E+01	J	3.3E+02	1.7E+00	U	1.7E+00
B5	J010B4	10/14/2003	4.0E-01	U	4.0E-01	1.3E+01	U	1.3E+01	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	1.7E+00	U	1.7E+00	3.3E+02	U	3.3E+02	1.7E+00	U	1.7E+00
B7	J010B7	10/14/2003	4.0E-01	U	4.0E-01	1.4E+01		1.3E+01	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	1.7E+00	U	1.7E+00	3.3E+02	U	3.3E+02	1.7E+00	U	1.7E+00
B8	J010B8	10/14/2003	4.0E-01	U	4.0E-01	1.3E+01	U	1.3E+01	3.3E+00	U	3.3E+00	3.3E+00	U	3.3E+00	1.7E+00	U	1.7E+00	3.3E+03	UD	3.3E+03	3.3E+00		1.7E+00

Statistical Computation Input Data

Sampling Area	HEIS Number	Sample Date	Cr+6 mg/Kg	Aroclor 1254 µg/Kg	DDT µg/Kg	Dieldrin µg/Kg	beta-BHC µg/Kg	Bis(2-ethylhexyl)phthalate µg/Kg	Aldrin µg/Kg
B6	J010B5/ J010B6	10/14/2003	2.0E-01	6.5E+00	1.7E+00	1.7E+00	8.5E-01	1.7E+02	8.5E-01
A1	J010B0	10/14/2003	2.0E-01	6.5E+00	1.7E+00	1.7E+00	8.5E-01	1.7E+01	8.5E-01
A2	J010B1	10/14/2003	2.0E-01	3.1E+01	1.7E+00	1.7E+00	8.5E-01	2.6E+01	8.5E-01
A3	J010B2	10/14/2003	2.0E-01	8.3E+01	1.7E+00	1.7E+00	8.5E-01	1.7E+01	8.5E-01
A4	J010B3	10/14/2003	2.0E-01	1.5E+01	1.7E+00	1.7E+00	8.5E-01	1.9E+01	8.5E-01
B5	J010B4	10/14/2003	2.0E-01	6.5E+00	1.7E+00	1.7E+00	8.5E-01	1.7E+02	8.5E-01
B7	J010B7	10/14/2003	2.0E-01	1.4E+01	1.7E+00	1.7E+00	8.5E-01	1.7E+02	8.5E-01
B8	J010B8	10/14/2003	2.0E-01	6.5E+00	1.7E+00	1.7E+00	8.5E-01	1.7E+03	3.3E+00

Statistical Computations

	Cr+6	Aroclor 1254	DDT	Dieldrin	beta-BHC	Bis(2-ethylhexyl)phthalate	Aldrin
Statistical value based on	>50% below detection. Default to maximum value.	Small data set. Use nonparametric z-stat.	>50% below detection. Default to maximum value.	>50% below detection. Default to maximum value.	>50% below detection. Default to maximum value.	Small data set. Use nonparametric z-stat.	>50% below detection. Default to maximum value.
N	8	8	8	8	8	8	8
% < Detection limit	100%	50%	100%	100%	100%	50%	88%
mean	2.0E-01	2.1E+01	1.7E+00	1.7E+00	8.5E-01	2.8E+02	1.2E+00
st. dev.	4.0E-09	2.6E+01	2.7E-02	2.7E-02	1.6E-08	5.6E+02	8.7E-01
Z-statistic	1.645	1.645	1.645	1.645	1.645	1.645	1.645
95% UCL on mean	2.0E-01	3.6E+01	1.7E+00	1.7E+00	8.5E-01	6.0E+02	1.7E+00
max value	4.0E-01	8.3E+01	3.4E+00	3.4E+00	1.7E+00	3.3E+03	3.3E+00
Statistical value	4.0E-01	3.6E+01	3.4E+00	3.4E+00	1.7E+00	6.0E+02	3.3E+00
Background	NA	NA	NA	NA	NA	NA	NA
Statistical value above background	4.0E-01	3.6E+01	3.4E+00	3.4E+00	1.7E+00	6.0E+02	3.3E+00
Most Stringent Cleanup Limit for nonradionuclide and RAG type	2.0 River Protection	13 PQL	3.4 PQL	3.4 PQL	5.1 PQL	625 GW Protection	1.7 PQL
WAC 173-340 3-PART TEST							
95% UCL > Cleanup Limit?	NA	YES	NA	NA	NA	NO	YES
> 10% above Cleanup Limit?	NA	YES	NA	NA	NA	YES	YES
Any sample > 2X Cleanup Limit?	NA	YES	NA	NA	NA	YES	NO
EXCESS RISK EVALUATION							
WAC 173-340 Non-Carcinogenic Cleanup:	400	1600	40000	4000	NA	1600000	24000
Hazard quotient for each nonradionuclide:	NA	2.E-02	NA	NA	NA	4.E-04	1.E-04
WAC 173-340 Carcinogenic Cleanup:	2.1	NA	2940	62.5	556	71400	58.8
Risk for each carcinogenic nonradionuclide:	NA	NA	NA	NA	NA	8.E-09	6.E-08
WAC 173-340 Compliance? NO	Because hexavalent chromium was not detected in any of the verification samples, the 3-part test and excess risk are not calculated.	Because of the "Yes" answers to the MTCA 3-part test a more detailed assessment using RESRAD will be performed.	Because DDT was not detected in any of the verification samples, the 3-part test and excess risk are not calculated.	Because dieldrin was not detected in any of the verification samples, the 3-part test and excess risk are not calculated.	Because beta-BHC was not detected in any of the verification samples, the 3-part test and excess risk are not calculated.	Although a high value was reported in one sample, it was a nondetect. All the detected values are below the PQL.	Because of the "Yes" answers to the MTCA 3-part test a more detailed assessment using RESRAD will be performed.
Nonrad noncarcinogenic index sum: 7.E-02							
Nonrad carcinogenic risk: 7.E-08							

BG = background
BHC = 1,2,3,4,5,6-hexachlorocyclohexane
DDT = dichlorodiphenyltrichloroethane
GW = groundwater
PQL = practical quantitation limit
RAG = remedial action goal

Bechtel Hanford, Inc.

CALCULATION SHEET

Originator	K. A. Anselm KAA	Date	02/09/04	Calc. No.	0100B-CA-V0201
Project	100-B/C Septic System Stockpiles Cleanup Verification	Job No.	22192	Checked	J. E. Thomson JET
Subject	100-B/C Septic System Stockpiles 95% UCL Calculation			Checked	T. B. Miley TBM

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1 Septic System Stockpiles (Overburden) Sample Data

2	Sampling	HEIS	Sample	DDE			Endosulfan II			Endosulfan Sulfate			Endrin ketone			alpha-Chlordane			gamma-Chlordane		
3	Area	Number	Date	µg/Kg	Q	PQL	µg/Kg	Q	PQL	µg/Kg	Q	PQL	µg/Kg	Q	PQL	µg/Kg	Q	PQL	µg/Kg	Q	PQL
4	B6	J010B5	10/14/2003	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	1.7E+00	U	1.7E+00	1.7E+00	U	1.7E+00
5	Duplicate of J010B5	J010B6	10/14/2003	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	1.7E+00	U	1.7E+00	1.7E+00	U	1.7E+00
6	A1	J010B0	10/14/2003	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	1.7E+00	U	1.7E+00	1.7E+00	U	1.7E+00
7	A2	J010B1	10/14/2003	3.3E+00	U	3.3E+00	3.3E+00	U	3.3E+00	3.3E+00	U	3.3E+00	3.3E+00	U	3.3E+00	1.7E+00	U	1.7E+00	1.7E+00	U	1.7E+00
8	A3	J010B2	10/14/2003	3.3E+00	U	3.3E+00	3.3E+00	U	3.3E+00	3.3E+00	U	3.3E+00	3.3E+00	U	3.3E+00	1.7E+00	U	1.7E+00	1.7E+00	U	1.7E+00
9	A4	J010B3	10/14/2003	3.3E+00	U	3.3E+00	3.3E+00	U	3.3E+00	3.3E+00	U	3.3E+00	3.3E+00	U	3.3E+00	1.7E+00	U	1.7E+00	1.7E+00	U	1.7E+00
10	B5	J010B4	10/14/2003	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	1.7E+00	U	1.7E+00	1.7E+00	U	1.7E+00
11	B7	J010B7	10/14/2003	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	1.7E+00	U	1.7E+00	1.7E+00	U	1.7E+00
12	B8	J010B8	10/14/2003	1.7E+01		3.4E+00	7.0E+00		3.4E+00	4.3E+00		3.4E+00	1.1E+01		3.4E+00	1.7E+00	.I	1.7E+00	1.3E+01	.I	1.7E+00

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14 Statistical Computation Input Data

15	Sampling	HEIS	Sample	DDE	Endosulfan II	Endosulfan Sulfate	Endrin ketone	alpha-Chlordane	gamma-Chlordane
16	Area	Number	Date	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
17	B6	J010B5/ J010B6	10/14/2003	1.7E+00	1.7E+00	1.7E+00	1.7E+00	8.5E-01	8.5E-01
18	A1	J010B0	10/14/2003	1.7E+00	1.7E+00	1.7E+00	1.7E+00	8.5E-01	8.5E-01
19	A2	J010B1	10/14/2003	1.7E+00	1.7E+00	1.7E+00	1.7E+00	8.5E-01	8.5E-01
20	A3	J010B2	10/14/2003	1.7E+00	1.7E+00	1.7E+00	1.7E+00	8.5E-01	8.5E-01
21	A4	J010B3	10/14/2003	1.7E+00	1.7E+00	1.7E+00	1.7E+00	8.5E-01	8.5E-01
22	B5	J010B4	10/14/2003	1.7E+00	1.7E+00	1.7E+00	1.7E+00	8.5E-01	8.5E-01
23	B7	J010B7	10/14/2003	1.7E+00	1.7E+00	1.7E+00	1.7E+00	8.5E-01	8.5E-01
24	B8	J010B8	10/14/2003	1.7E+01	7.0E+00	4.3E+00	1.1E+01	1.7E+00	1.3E+01

25

26 Statistical Computations

27		DDE	Endosulfan II	Endosulfan Sulfate	Endrin ketone	alpha-Chlordane	gamma-Chlordane
28	Statistical value based on	>50% below detection. Default to maximum value.	>50% below detection. Default to maximum value.	>50% below detection. Default to maximum value.	>50% below detection. Default to maximum value.	>50% below detection. Default to maximum value.	>50% below detection. Default to maximum value.
29	N	8	8	8	8	8	8
30	% < Detection limit	88%	88%	88%	88%	88%	88%
31	mean	3.6E+00	2.3E+00	2.0E+00	2.8E+00	9.6E-01	2.4E+00
32	st. dev.	5.4E+00	1.9E+00	9.3E-01	3.3E+00	3.0E-01	4.3E+00
33	Z-statistic	1.645	1.645	1.645	1.645	1.645	1.645
34	95% UCL on mean	6.7E+00	3.4E+00	2.5E+00	4.8E+00	1.1E+00	4.9E+00
35	max value	1.7E+01	7.0E+00	4.3E+00	1.1E+01	1.7E+00	1.3E+01
36	Statistical value	1.7E+01	7.0E+00	4.3E+00	1.1E+01	1.7E+00	1.3E+01
37	Background	NA	NA	NA	NA	NA	NA
38	Statistical value above background	1.7E+01	7.0E+00	4.3E+00	1.1E+01	1.7E+00	1.3E+01
39	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**	3.4 PQL	11.2 River Protection	11.2 River Protection	3.4 PQL	1.7 PQL	1.7 PQL
40	**WAC 173-340 3-PART TEST**						
41	95% UCL > Cleanup Limit?	YES	NO	NO	YES	NO	YES
42	> 10% above Cleanup Limit?	YES	NO	NO	YES	NO	YES
43	Any sample > 2X Cleanup Limit?	YES	NO	NO	YES	NO	YES
44							
45	**EXCESS RISK EVALUATION**						
46	**WAC 173-340 Non-Carcinogenic Cleanup:**	NA	480000	480000	240000	40000	40000
47	Hazard quotient for each nonradionuclide:	NA	1.E-05	9.E-06	5.E-05	4.E-05	3.E-04
48	**WAC 173-340 Carcinogenic Cleanup:**	2940	NA	NA	NA	2860	2860
49	Risk for each carcinogenic nonradionuclide:	6.E-09	NA	NA	NA	6.E-10	5.E-09
50							
51	**WAC 173-340 Compliance?** NO	Because of the "Yes" answers to the MTCA 3-part test a more detailed assessment using RESRAD will be performed.			Because of the "Yes" answers to the MTCA 3-part test a more detailed assessment using RESRAD will be performed.		Because of the "Yes" answers to the MTCA 3-part test a more detailed assessment using RESRAD will be performed.
52	**Nonrad noncarcinogenic index**						
53	**sum:** 7.E-02						
54							
55	**Nonrad carcinogenic risk:** 7.E-08						

56 .I = Interference on one analytical column only. Result is reported from remaining analytical column.
57 BG = background
58 DDE = dichlorodiphenyldichloroethylene
59 GW = groundwater

PQL = practical quantitation limit
RAG = remedial action goal

Bechtel Hanford, Inc.

CALCULATION SHEET

Originator:	K. A. Anselm KAA	Date:	02/09/04	Calc. No.:	0100B-CA-V0201
Project:	100-B/C Septic System Stockpiles Cleanup Verification	Job No.:	22192	Checked by:	J. E. Thomson JET
Subject:	100-B/C Septic System Stockpiles 95% UCL Calculation				T. B. Miley TBM

Rev. No.	0
Date:	2/9/04
Date:	2/9/04
Sheet:	6 of 6

Split-Dup Analysis

Septic System Stockpiles (Overburden) Results:

Composite Area	HEIS Number	Cs-137			Co-60			Eu-152			Eu-154			Eu-155			Lead			Mercury			Cr+6		
		pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	mg/Kg	Q	MDA	mg/Kg	Q	MDA	mg/Kg	Q	MDA
B6	J010B5	3.4E-02	U	3.5E-02	2.6E-02	U	2.6E-02	7.6E-02	U	7.6E-02	9.8E-02	U	9.8E-02	7.7E-02	U	7.7E-02	9.0E+00		1.9E-01	1.0E-02	U	1.0E-02	4.0E-01	U	4.0E-01
Duplicate of J010B5	J010B6	7.1E-02		4.3E-02	3.8E-02	U	3.8E-02	8.7E-02	U	8.7E-02	1.1E-01	U	1.1E-01	6.8E-02	U	6.8E-02	8.1E+00		1.9E-01	2.0E-02	U	2.0E-02	4.0E-01	U	4.0E-01
Split of J010B5	J010C0	5.8E-02		1.8E-02	5.6E-03	U	1.8E-02	-1.3E-02	U	4.7E-02	-1.8E-02	U	5.7E-02	5.4E-02	U	4.6E-02	8.4E+00		1.4E-01	3.4E-02	U	3.4E-02	3.5E-01	U	3.5E-01

Septic System Stockpiles (Overburden) Analysis:

(TDL)		0.1	0.05	0.1	0.1	0.1	1	0.5	0.5
Duplicate Analysis	Both> MDA?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)
	Both >5xTDL?						Yes (calc RPD)		
	RPD						10.5%		
Split Analysis	Both> MDA?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)
	Both >5xTDL?						Yes (calc RPD)		
	RPD						6.9%		

Septic System Stockpiles (Overburden) Results (continued):

Composite Area	HEIS Number	Aroclor 1254			DDT			Dieldrin			beta-BHC			Bis(2-ethylhexyl) phthalate			Aldrin			DDE			Endosulfan II		
		µg/Kg	Q	MDA	µg/Kg	Q	PQL	µg/Kg	Q	PQL	µg/Kg	Q	PQL	µg/Kg	Q	PQL	µg/Kg	Q	PQL	µg/Kg	Q	PQL	µg/Kg	Q	PQL
B6	J010B5	1.3E+01	U	1.3E+01	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	1.7E+00	U	1.7E+00	3.3E+02	U	3.3E+02	1.7E+00	U	1.7E+00	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00
Duplicate of J010B5	J010B6	1.3E+01	U	1.3E+01	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	1.7E+00	U	1.7E+00	3.3E+02	U	3.3E+02	1.7E+00	U	1.7E+00	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00
Split of J010B5	J010C0	8.0E+00	U	8.0E+00	3.5E-01	U	3.3E+00	3.8E-01	U	3.3E+00	3.0E-01	U	3.0E-01	3.4E+01	U	3.3E+02	3.4E-01	U	3.4E-01	3.2E-01	U	3.2E-01	2.9E-01	U	2.9E-01

Septic System Stockpiles (Overburden) Analysis (continued):

(TDL)		17	3.3	3.3	3.3	3.3	3.3	3.3	3.3
Duplicate Analysis	Both> MDA?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	Both >5xTDL?								
	RPD								
Split Analysis	Both> MDA?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	Both >5xTDL?								
	RPD								

Septic System Stockpiles (Overburden) Results (continued):

Composite Area	HEIS Number	Endosulfan Sulfate			Endrin ketone			alpha-Chlordane			gamma-Chlordane		
		µg/Kg	Q	MDA	µg/Kg	Q	PQL	µg/Kg	Q	PQL	µg/Kg	Q	PQL
B6	J010B5	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	1.7E+00	U	1.7E+00	1.7E+00	U	1.7E+00
Duplicate of J010B5	J010B6	3.4E+00	U	3.4E+00	3.4E+00	U	3.4E+00	1.7E+00	U	1.7E+00	1.7E+00	U	1.7E+00
Split of J010B5	J010C0	3.3E-01	U	3.3E-01	4.6E-01	U	4.6E-01	3.2E-01	U	1.7E+00	3.2E-01	U	1.7E+00

Septic System Stockpiles (Overburden) Analysis (continued):

(TDL)		3.3	3.3	16.5	16.5
Duplicate Analysis	Both> MDA?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	Both >5xTDL?				
	RPD				
Split Analysis	Both> MDA?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	Both >5xTDL?				
	RPD				

Attachment C

1607-B7, B8, B9, B10, and B11 Septic System Overburden Variance Calculation, Calculation No. 0100B-CA-V0196

CALCULATION COVER SHEET

Project Title	100 BC Remedial Action		**Job No.** 22192
Area	100-BC		
Discipline	Environmental		***Calc. No.** 0100B-CA-V0196
Subject	1607-B7, B8, B9, B10, and B11 Septic Systems Overburden Variance Calculation		
Computer Program	Excel	**Program No.** Excel 97	

Use of this calculation by persons who do not have access to all of the pertinent facts could lead to incorrect conclusions or assumptions. Before applying this calculation in your work, this calculation must be thoroughly reviewed with appropriate and authorized Hanford site ERC personnel. Without this review, the ERC cannot assume any responsibility for the use of these calculations.

Committed Calculation X **Preliminary** **Superseded**

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover - 1 Calculations - 3	11-18-03	11/24/03	11-25-03		12-4-03
	Total - 4	D.N. Strom	D.W. Shea	S.W.Callison	F.M. Corpuz	

SUMMARY OF REVISIONS

* Obtain Calc. No. from DIS.

CALCULATION SHEET

Bechtel Hanford Inc.

Originator	D.N. Strom	Date	11/18/2003	Calc. No.	0100B-CA-V0196	Rev. No.	0
Project	100 BC Remedial Action	Job No.	22192	Checked	D.W. Shea	Date	11/24/03
Subject	1607-B7, B8, B9, B10, and B11 Septic Systems Overburden Variance Calculation					Sheet No.	1 of 3

Conclusion:

The required number of samples calculated (1) for the decision unit is less than the default number (4 samples) specified in "100 Area Remedial Action Sampling and Analysis Plan" (DOE/RL-96-22, Rev 3). Therefore, the default number of samples will be collected from the Discovery Areas at 100-BC Pipeline Remediation Project.

Problem:

Calculate the number of verification samples required for the 100 BC Pipeline Project as required by "100 Area Remedial Action Sampling and Analysis Plan" (DOE/RL-96-22, Rev 3) and "Instruction Guide for the Remediation of 100 Areas Waste Sites" (0100X-IG-G0001, Rev 4).

Given:

1) Sample locations for the 1607-B7, B8, B9, B10, and B11 Septic Systems are identified on the 100-BC Sample Design, Calculation number 0100B-CA-V0166 Rev. 0.
2) Lookup values from DOE/RL-96-22, Rev. 3 and from DOE/RL-96-17, Rev. 4.
3) Sample Design requirements from DOE/RL-96-22, Rev 3 and 0100X-IG-G0001, Rev 4.
4) Analytical data from samples were collected on 10-13-03 under Chain of Custody B01-052-189.

Solution:

Calculation methodology is described in Appendix A of DOE/RL-96-22, Rev 3. Data from attached worksheets are used to calculate the required number of closeout samples. This site has no radioemitting contaminants of concern, consequently, the variance calculation is based on the concentration of metals (as determined by ICP). The metals chosen for the variance calculation are contaminates of concern based upon process knowledge, are representative of the contamination distribution, and were the analytes used for the variance calculation in previous septic system remediations. See variance calculations 0100H-CA-V0007, 0100H-CA-V0008, and 0100F-CA-V0013 for the 1607-H2, the 1607-H4, and the 1607-F6 septic systems respectively.

Sheet No.	Contents	Topic
1	Calculation Sheet 1	Conclusion, Problem, Given, Solution, and Contents
2	Calculation Sheet 2	Required Number of Samples Calculation
3	Calculation Sheet 3	Required Number of Samples Calculation (Continued)

Statistical Evaluation of Analytical Data

Decision Unit: 100-BC Sample Areas: A & B

The required number of samples resulting from the calculation is highlighted at the bottom of the page.

Each value is reflective of the specific analyte evaluated.

The highest value of the three evaluations is used to determine the required number of samples as compared against the default of four

Sample locations are from Calculation 0100B-CA-V0166, Rev. 0.

Mean, Standard Deviation, and Number of Samples formulas are from DOE/RL-96-22, Appendix A.

Sample values from ICP analysis

			Constituent					
Sample #	Sample Date	Location	Hg	Q	Cr	Q	Pb	Q
			mg/kg		mg/kg		mg/kg	
Look-up Value (HT) ==========>			**24.0**		**80,000.0**		**353.0**	
J01005	10/13/2003	O-A1-02	0.02	U	12		905	
J01006	10/13/2003	O-A1-03	0.02	U	14.8		11.9	
J01007	10/13/2003	O-A1-04	0.02	U	13.4		5.8	
J01008	10/13/2003	O-A1-10	0.01	U	10.4		3.9	U
J01009	10/13/2003	O-A1-13	0.02	U	10.1		6.4	
J01010	10/13/2003	O-A1-16	0.02	U	12.9		3.9	U
J01011	10/13/2003	O-A2-03	0.02	U	12.9		4	U
J01012	10/13/2003	O-A2-06	0.02	U	14.3		5.1	
J01013	10/13/2003	O-A2-07	1.6		12.8		31.5	
J01014	10/13/2003	O-A2-10	0.24		14.1		11.1	
J01015	10/13/2003	O-A2-14	0.02		12.4		7.9	
J01016	10/13/2003	O-A2-15	0.01	U	12.4		12.1	
J01017	10/13/2003	O-A3-01	0.1		11		10	
J01018	10/13/2003	O-A3-02	0.12		12.9		44.6	
J01019	10/13/2003	O-A3-04	0.01	U	13.5		11.7	
J01020	10/13/2003	O-A3-05	0.1		15.7		45.1	
J01021	10/13/2003	O-A3-09	0.01	U	14.8		5.6	
J01022	10/13/2003	O-A3-11	0.02	U	21.7		9.9	
J01023	10/13/2003	O-A4-03	0.02	U	12.6		3.7	U
J01024	10/13/2003	O-A4-04	0.01	U	13.7		3.8	U
J01025	10/13/2003	O-A4-07	0.01	U	12.6		3.6	U
J01026	10/13/2003	O-A4-09	0.02	U	11.8		4.2	
J01027	10/13/2003	O-A4-12	0.02	U	12.9		4.7	
J01028	10/13/2003	O-A4-13	0.02	U	12.7		8.3	
J01029	10/13/2003	O-B5-01	0.02	U	12.5		3.8	U
J01030	10/13/2003	O-B5-02	0.02	U	11.9		3.7	U
J01031	10/13/2003	O-B5-05	0.01	U	12.3		5	
J01032	10/13/2003	O-B5-07	0.01	U	12		3.9	U
J01033	10/13/2003	O-B5-13	0.01	U	12.5		3.8	U
J01034	10/13/2003	O-B5-15	0.01	U	11.6		3.8	U
J01035	10/13/2003	O-B6-01	0.01	U	12.8		3.9	U
J01036	10/13/2003	O-B6-10	0.02	U	10		4.6	
J01037	10/13/2003	O-B6-12	0.02	U	10.7		6.7	
J01038	10/13/2003	O-B6-13	0.01	U	13.1		6.5	
J01039	10/13/2003	O-B6-15	0.02	U	13		12.5	
J01040	10/13/2003	O-B6-16	0.01	U	12.7		3.9	U
J01041	10/13/2003	O-B7-01	0.01	U	12.7		3.9	U
J01042	10/13/2003	O-B7-03	0.02	U	13.6		9.4	
J01043	10/13/2003	O-B7-04	0.01	U	12.5		6.7	
J01044	10/13/2003	O-B7-05	0.02	U	11.9		5	
J01045	10/13/2003	O-B7-08	0.01	U	15.1		4.2	
J01046	10/13/2003	O-B7-11	0.02	U	13.8		11	
J01047	10/13/2003	O-B8-02	0.01	U	12.3		5.5	
J01048	10/13/2003	O-B8-03	0.01	U	11.9		8.2	
J01049	10/13/2003	O-B8-04	0.02	U	12.6		10.2	

Sample values from ICP analysis (Continued)

Sample #	Sample Date	Location	Hg mg/kg	Q	Cr mg/kg	Q	Pb mg/kg	Q
			Constituent					
Look-up Value (HT) ==========>			**24.0**		**80,000.0**		**353.0**	
J01050	10/13/03	O-B8-08	0.01	U	**21.1**		**79.1**	
J01051	10/13/03	O-B8-12	0.01	U	**13.4**		**5.1**	
J01052	10/13/03	O-B8-13	0.02	U	**12.7**		**7.3**	

Mean (LV) ==========>		0.07		12.91		30.61
Standard Deviation (S) ==========>		0.25		1.88		140.30
α (5%) ==========>		1.65		1.65		1.65
β (20%) ==========>		0.84		0.84		0.84
Number of Samples ==========>		1		1		2

Attachment D

100-C-3 French Drain, 1607-B7,1607-B8, 1607-B9, 1607-B10, 1607-B11
Septic System Overburden Sampling Plan, Calculation No. 0100B-CA-V0166

CALCULATION COVER SHEET

Project Title:	**100-C-3 French Drain, 1607-B7,1607-B8, 1607-B9, 1607-B10, 1607-B11 Septic System Overburden Sample Design**	**Job No.**	**22192**
Area	**100-B/C**		
Discipline	**Environmental Engineering**	**Calc. No.**	**0100B-CA-V0166**
Subject	**100-C-3 French Drain, 1607-B7,1607-B8, 1607-B9, 1607-B10, 1607-B11 Septic System Overburden Sampling Plan**		
Computer Program	**Excel**	**Program No.**	**Excel 97**

Use of this calculation by persons who do not have access to all of the pertinent facts could lead to incorrect conclusions or assumptions. Before applying this calculation in your work, this calculation must be thoroughly reviewed with appropriate and authorized Hanford site ERC personnel. Without this review, the ERC cannot assume any responsibility for the use of these calculations.

Committed Calculation ☒ **Preliminary** ☐ **Superseded** ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sht Calc = 2 Shts Attach1 = 1 Sht Attach2 = 1 Sht Attach3 = 2 Shts Total = 7 Shts	G. Cruz 7/9/03	C.A. Bentz 7/15/03	D.N. Strom 7-16-03	F.M. Corpuz 7-23-03	7-23-03

SUMMARY OF REVISIONS	

*Obtain Calc. No. from DIS

DE01-437.03

January 2003

Bechtel Hanford, Inc. **CALCULATION SHEET**

Originator G. Cruz **Date** 7/9/2003 **Calc. No.** 0100B-CA-V0166 **Rev. No.** 0

Project 100-C-3 French Drain, 1607-B7,1607-B8, 1607-B9, 1607-B10, 1607-B11 Septic System Overburden Sample Design **Job No.** 22192 **Checked** AB **Date** 7/15/03

Subject 100-C-3 French Drain, 1607-B7,1607-B8, 1607-B9, 1607-B10, 1607-B11 Septic System Overburden Sampling Plan **Sheet No.** 1 of 2

1	**Problem:**	Calculate and display required sampling nodes in concurrence with 100 Area
2		SAP DOE/RL-96-22 Rev. 3 for verification and closure.
3		
4	**Given:**	-SAP (DOE/RL-96-22 Rev. 3) and IG (0100X-IG-G0001 Rev. 4) requirements
5		-Overburden Sampling Area (Surface area of each zone determined from CAD program,
6		Attachment 3, Sht 1 of 2, CAD file 1BC:070803A, 100-C-3 French Drain Overburden Sampling Plan)
7		-Overburden Sampling Area (Surface area of each zone determined from CAD program,
8		Attachment 3, Sht 2 of 2, CAD file 1BC:070803B, Septic System Overburden Sampling Plan)
9		
10	**SAP and IG Requirements:**	
11		-Develop a 16 node sampling grid for the sampling area
12	Shallow Zone	-Use appendix A of the IG to determine which six of the sixteen will be sampled
13		to collect HPGe and clean up verification samples
14		
15		-Develop a 16 node sampling grid for the sampling area
16	Overburden:	-Use appendix A of the IG to determine which six of the sixteen will be sampled
17		to collect HPGe and clean up verification samples
18		
19		-Develop a 16 node sampling grid for the sampling area
20	Deep Zone:	-Use appendix A of the IG to determine which four of the sixteen will be sampled
21		to collect HPGe and clean up verification samples
22		
23	**Determination of Overburden Sampling Grid:**	
24		
25	Overburden Sampling Grid Area determined from Table 5-1, IG	
26	Attachment 2, Number of Decision Subunits Based on Area (Converted to Sq Meters)	
27		
28	Total Area:	212.44 m^2
29	Area of Decision Subunits (total 1 subunit)	212.44 m^2
30		
31	Decision Subunit divided into 4 Sampling Areas:	53.11 m^2
32		
33	Sampling Areas divided into a 16 node grid (node numbers 1-16):	3.31 m^2
34		
35	Nodes to be Sampled (as determined from Attachment 1, Table A-1, Sample Grid Point Lookup Table)	
36		See Attachment 3, Sht 1 of 2, 100-C-3 French Drain Overburden Sampling Plan,
37		for Sample Location Table
38		
39		
40		
41		
42		
43		
44		

Bechtel Hanford, Inc. **CALCULATION SHEET**

Originator G. Cruz Date 7/9/2003 Calc. No. 0100B-CA-V0166 Rev. No. 0

Project 100-C-3 French Drain, 1607-B7,1607-B8, 1607-B9, 1607-B10, 1607-B11 Septic System Overburden Sample Design Job No. 22192 Checked CAB Date 7/15/03

Subject 100-C-3 French Drain, 1607-B7,1607-B8, 1607-B9, 1607-B10, 1607-B11 Septic System Overburden Sampling Plan Sheet No. 2 of 2

Determination of Overburden Sampling Grid:

Overburden Sampling Grid Area determined from Table 5-1, IG
Attachment 2, Number of Decision Subunits Based on Area (Converted to Sq Meters)

Total Area:	4211.27	m^2
Area of Decision Subunits (total 2 subunits)	2105.63	m^2
Decision Subunits divided into 4 Sampling Areas:	526.40	m^2
Sampling Areas divided into a 16 node grid (node numbers 1-16):	32.90	m^2

Nodes to be Sampled (as determined from Attachment 1, Table A-1, Sample Grid Point Lookup Table)
See Attachment 3, Sht 2of2, Septic System Overburden Sampling Plan,
for Sample Location Table

Bechtel Hanford, Inc.

Originator G. Cruz Date 7/9/2003 Calc. No. 0100B-CA-V0166 Rev. No. 0

Project 100-C-3 French Drain, 1607-B7,1607-B8, 1607-B9, 1607-B10, 1607-B11 Septic System Overburden Sample Design Job No. 22192 Checked CAB Date 7/15/03

Subject 100-C-3 French Drain, 1607-B7,1607-B8, 1607-B9, 1607-B10, 1607-B11 Septic System Overburden Sampling Plan Sheet No 1 of 1

ATTACHMENT 1

Sample Grid Point Lookup Table.

Default Plan	Sampling Area 1	Sampling Area 2	Sampling Area 3	Sampling Area 4	Sampling Area 5	Sampling Area 6	Sampling Area 7	Sampling Area 8	Sampling Area 9	Sampling Area 10
HPGe/Closeout	3	6	1	4	5	1	3	3	4	16
HPGe/Closeout	4	7	11	3	15	15	5	13	10	10
HPGe/Closeout	16	3	2	7	7	10	11	4	3	14
HPGe/Closeout	10	15	4	12	1	13	4	8	16	4
HPGe	2	14	5	9	13	12	8	2	14	8
HPGe	13	10	9	13	2	16	1	12	5	3
Not Sampling	6	1	10	8	14	4	16	5	8	6
Not Sampling	1	9	13	1	10	5	12	1	1	15
Not Sampling	9	12	7	5	6	2	6	7	15	9
Not Sampling	15	16	15	14	16	6	2	15	11	1
Not Sampling	8	13	8	10	12	11	13	14	2	12
Not Sampling	5	2	3	11	4	3	9	10	7	11
Not Sampling	7	11	14	15	11	14	14	6	13	2
Not Sampling	11	4	6	2	9	7	7	11	9	7
Not Sampling	12	8	16	16	3	8	15	9	6	13
Not Sampling	14	5	12	6	8	9	10	16	12	5

** **Note:** Grid nodes for each sampling area in each waste site should be numbered consistently, e.g., begin numbering the nodes in the northwesternmost node. Then number consecutively left to right as shown in ~~Fig. 5-1~~ of this IG

Table A-1

DMS
7-16-03

Bechtel Hanford, Inc.

Originator G. Cruz Date 7/9/2003 Calc. No. 0100B-CA-V0166 Rev. No. 0

Project 100-C-3 French Drain, 1607-B7,1607-B8, 1607-B9, 1607-B10, 1607-B11 Septic System Overburden Sample Design Job No. 22192 Checked CAB Date 7/15/03

Subject 100-C-3 French Drain, 1607-B7,1607-B8, 1607-B9, 1607-B10, 1607-B11 Septic System Overburden Sampling Plan Sheet No. 1 of 1

ATTACHMENT 2

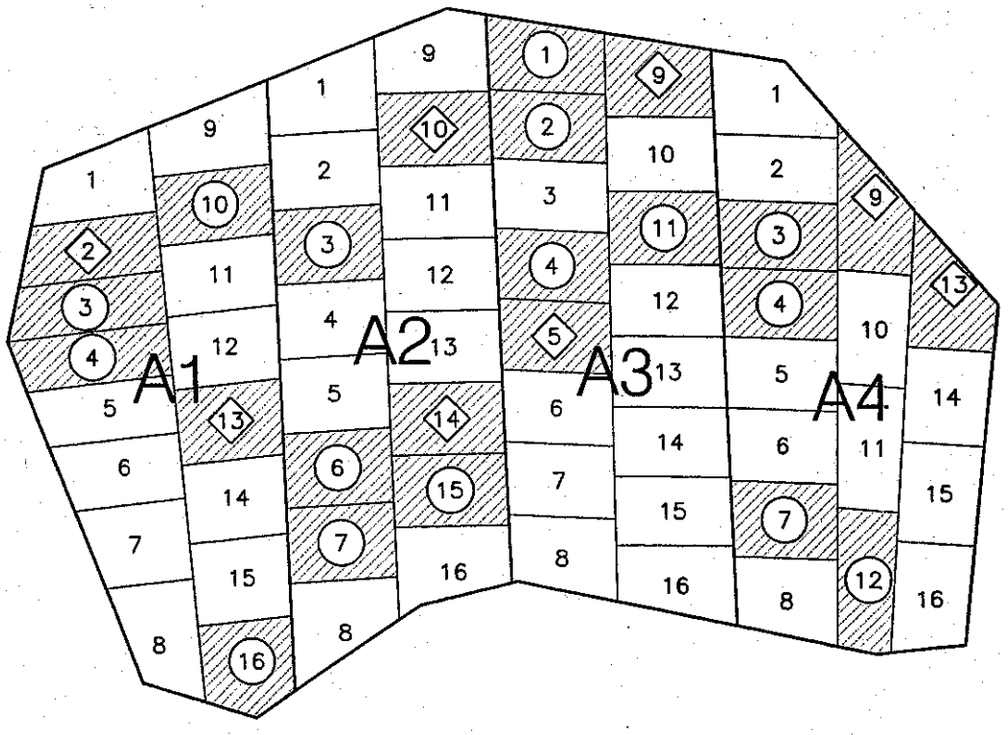
Number of Decision Subunits Based on Area.

Area of Primary Decision Unit (m2)	Number of Subunits
<1,394	1
>1,394 to <2,326	2
>2,326 to <3,256	3
>3,256 to <4,186	4
>4,186 to <9,303	2
>9,303 to <13,024	3
>13,024 to <16,745	4
>16,745 to <20,466	5
>20,466	ROUNDa (Area/3,720)
a ROUND is an integer rounding function.	

SQUARE METERS.

2. SAMPLES ARE TAKEN FROM THE APPROXIMATE CENTER OF EACH NODE.

3. THE OVERBURDEN CONSISTS OF SAMPLING AREAS A1, A2, A3 & A4 WITHIN DECISION SUBUNIT 1.



LEGEND

GAMMA ENERGY ANALYSIS & CLOSEOUT VERIFICATION SAMPLING NODE

GAMMA ENERGY ANALYSIS SAMPLING NODE

SAMPLE LOCATION TABLE

DECISION SUBUNIT	SAMPLING AREA	SAMPLE NODE	NORTHING	EASTING
1	A1	O-A1-2	143968.54	565383.73
		O-A1-3	143967.39	565383.65
		O-A1-4	143966.37	565383.79
		O-A1-10	143969.49	565386.33
		O-A1-13	143965.09	565386.60
		O-A1-16	143960.18	565386.97
	A2	O-A2-3	143968.66	565388.63
		O-A2-6	143964.11	565388.78
		O-A2-7	143962.59	565388.83
		O-A2-10	143970.99	565390.77
		O-A2-14	143965.10	565390.97
		O-A2-15	143963.64	565391.02
	A3	O-A3-1	143972.49	565393.04
		O-A3-2	143971.03	565393.08
		O-A3-4	143968.21	565393.15
		O-A3-5	143966.77	565393.18
		O-A3-9	143972.06	565395.36
		O-A3-11	143968.97	565395.43
	A4	O-A4-3	143968.82	565397.74
		O-A4-4	143967.43	565397.76
		O-A4-7	143963.01	565397.81
		O-A4-9	143969.59	565399.73
		O-A4-12	143961.78	565399.51
		O-A4-13	143967.81	565401.32

Attachment 3
Originator G. CRUZ
Chk'd By CJB
Calc. No. D100B-CA-V0166

Sheet No. 1 of 2
Date 7/9/03
Date 7/15/03
Rev. No. 0

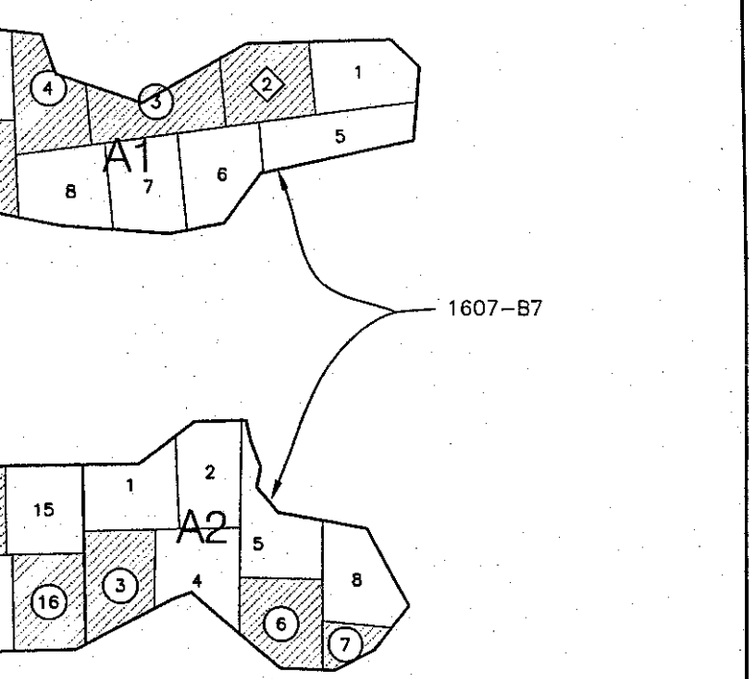
ATTACHMENT 3

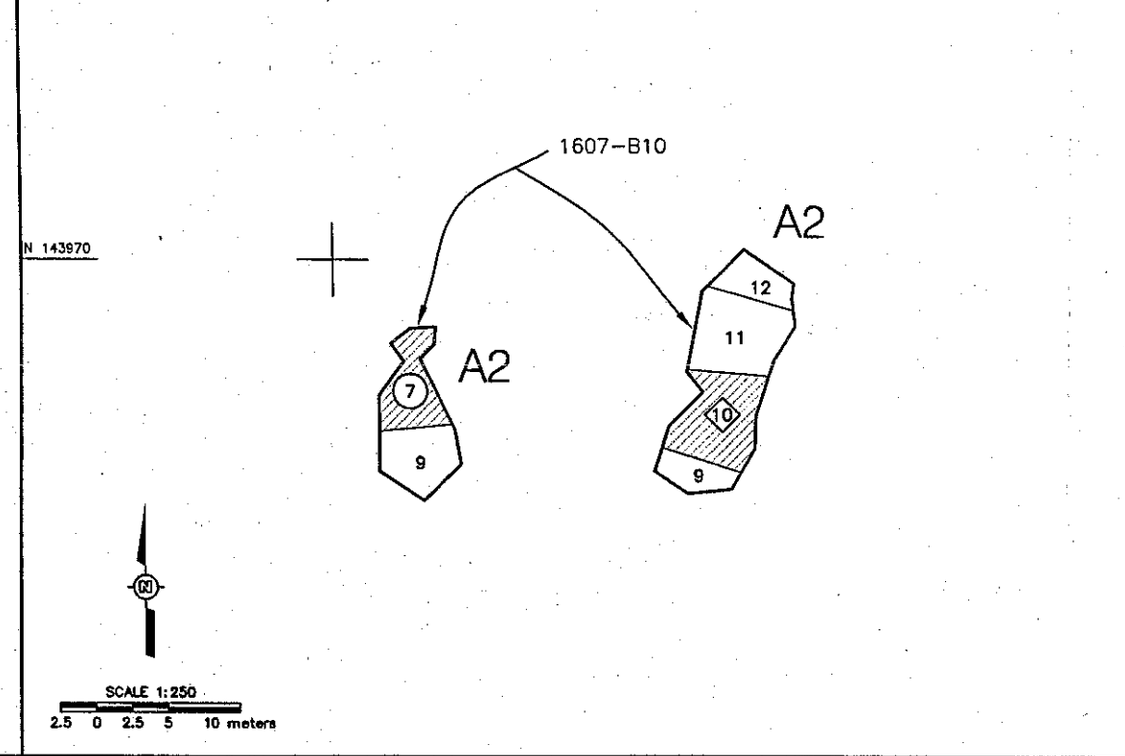
SCALE 1:150

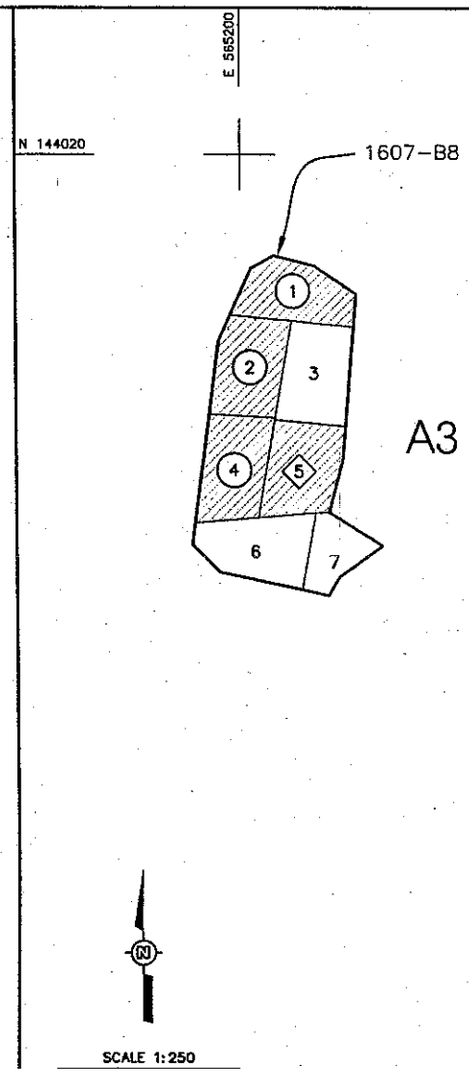
U.S DEPARTMENT OF ENERGY
DOE FIELD OFFICE, RICHLAND
HANFORD ENVIRONMENTAL RESTORATION PROGRAM

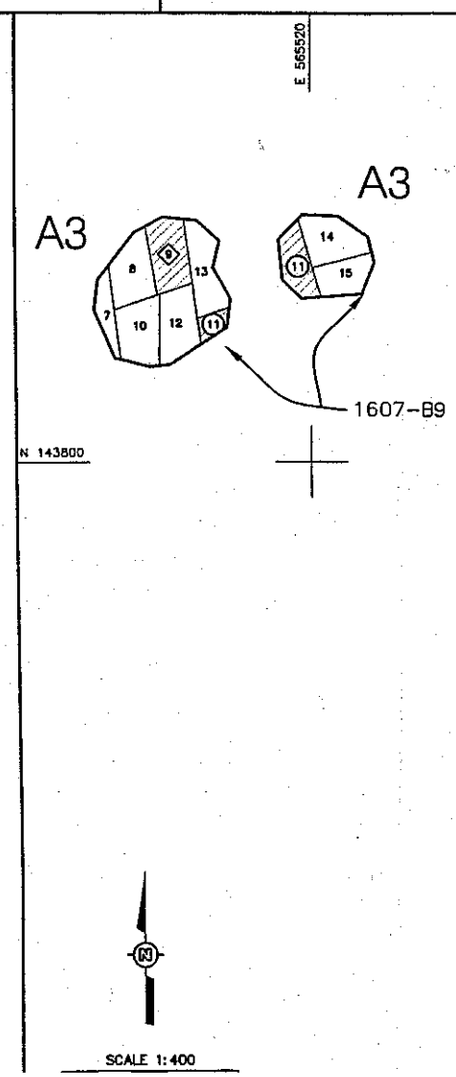
100 B/C AREA
100 AREA REMEDIAL DESIGN
100-C-3 FRENCH DRAIN

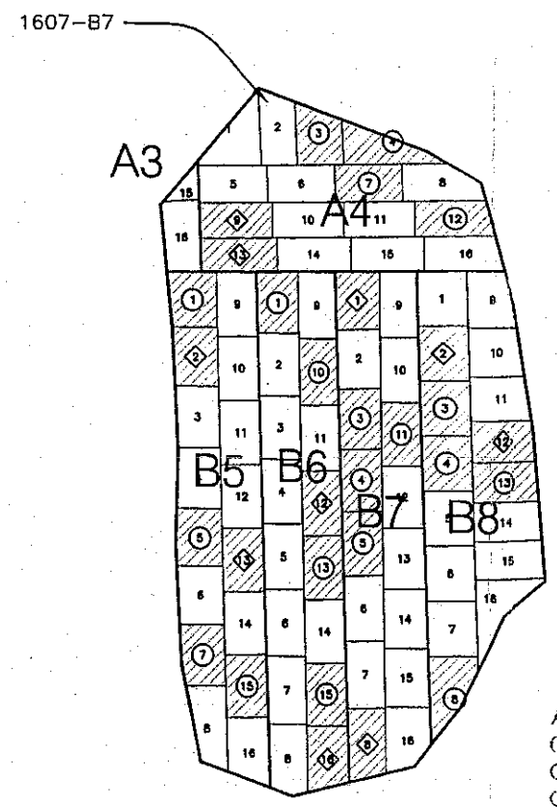
2. SAMPLES WILL BE TAKEN FROM THE APPROXIMATE CENTER OF EACH NODE.
3. THE OVERBURDEN CONSISTS OF SAMPLING AREAS A1, A2, A3, AND A4 WITHIN DECISION SUBUNIT 1. AREAS B5, B6, B7, AND B8 WITHIN DECISION SUBUNIT 2.











LEGEND

GAMMA ENERGY ANALYSIS/CLOSEOUT VERIFICATION SAMPLING NODE

GAMMA ENERGY ANALYSIS SAMPLING NODE

SAMPLE LOCATION TABLE

DECISION SUBUNIT	SAMPLING AREA	SAMPLE NODE	NORTHING	EASTING
1	A1	O-A1-2	144716.17	564874.75
		O-A1-3	144714.93	564866.91
		O-A1-4	144715.87	564859.49
		O-A1-10	144710.29	564854.53
		O-A1-13	144687.35	564853.80
		O-A1-16	144680.43	564859.21
	A2	O-A2-3	144681.56	564884.17
		O-A2-6	144678.94	564875.42
		O-A2-7	144677.51	564879.90
		O-A2-7	143960.96	564755.40
		O-A2-10	143959.34	564777.00
		O-A2-14	144061.00	564981.22
		O-A2-15	144081.11	564986.72
		O-A2-15	144050.51	564980.35
	A3	O-A3-1	144046.91	564980.47
		O-A3-1	144010.38	565203.87
		O-A3-2	144005.02	565200.80
		O-A3-4	143997.82	565199.44
		O-A3-5	143997.71	565204.03
		O-A3-9	143823.44	565504.22
		O-A3-11	143815.56	565509.12
		O-A3-11	143822.12	565518.52
	A4	O-A4-3	143825.74	565600.38
		O-A4-4	143824.81	565608.89
		O-A4-7	143820.12	565606.09
		O-A4-9	143816.87	565590.84
		O-A4-12	143816.13	565815.79
		O-A4-13	143811.97	565591.10
2	B5	O-B5-1	143806.89	565585.78
		O-B5-2	143800.49	565586.08
		O-B5-5	143780.24	565586.39
		O-B5-7	143767.24	565588.59
		O-B5-13	143777.81	565591.28
		O-B5-15	143763.82	565591.51
	B6	O-B6-1	143806.60	565595.43
		O-B6-10	143798.83	565600.13
		O-B6-12	143784.16	565600.34
		O-B6-13	143776.98	565600.45
		O-B6-15	143762.91	565600.65
		O-B6-16	143755.72	565600.73
	B7	O-B7-1	143806.90	565604.63
		O-B7-3	143793.65	565604.87
		O-B7-4	143786.79	565604.95
		O-B7-5	143779.77	565605.03
		O-B7-8	143757.41	565605.28
		O-B7-11	143791.88	565609.62
	B8	O-B8-2	143800.94	565614.41
		O-B8-3	143794.78	565614.53
		O-B8-4	143788.63	565614.65
		O-B8-8	143762.39	565615.16
		O-B8-12	143791.09	565620.91
		O-B8-13	143786.49	565621.00

Attachment 3 — Sheet No. 2 of 2
Originator G. Cruz — Date 7/9/03
Ck'd By [illegible] — Date 7/15/03
Calc. No. 0100B-CA-V0166 — Rev. No. 0

ATTACHMENT 3

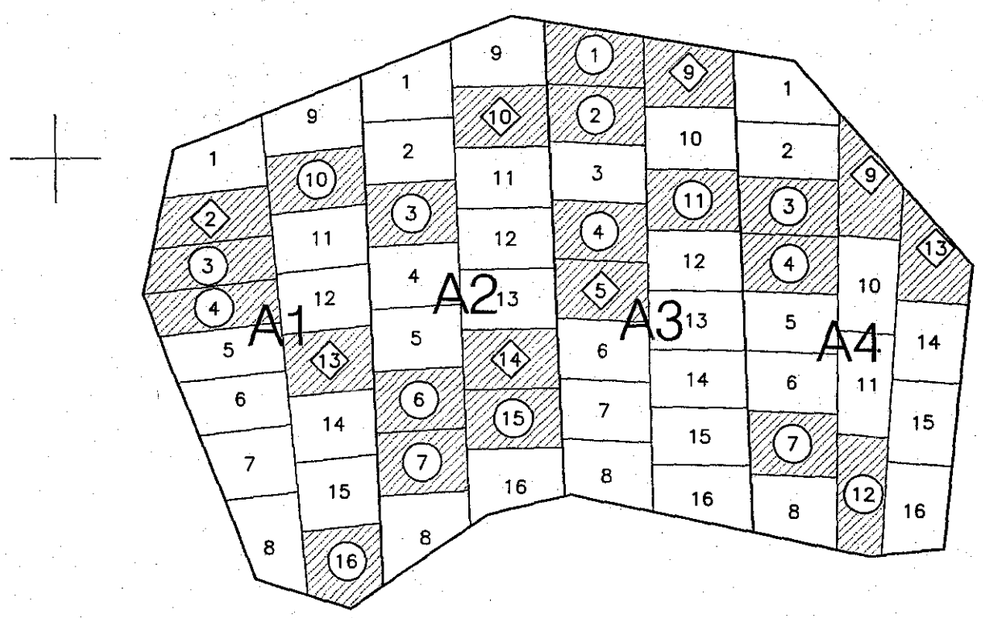
U.S DEPARTMENT OF ENERGY
DOE FIELD OFFICE, RICHLAND

100 B/C AREA
1607-B7, B8, B9, B10, & B11

1BC:070803A

E 565380

N 143970



SCALE 1:150

1.5 0 1.5 3 6 meters

U.S DEPARTMENT OF ENERGY
DOE FIELD OFFICE, RICHLAND
HANFORD ENVIRONMENTAL RESTORATION PROGRAM

NOTES

1. OVERBURDEN NODE AREAS ARE APPROXIMATELY 3.31 SQUARE METERS.
2. SAMPLES ARE TAKEN FROM THE APPROXIMATE CENTER OF EACH NODE.
3. THE OVERBURDEN CONSISTS OF SAMPLING AREAS A1, A2, A3 & A4 WITHIN DECISION SUBUNIT 1.

LEGEND

GAMMA ENERGY ANALYSIS & CLOSEOUT VERIFICATION SAMPLING NODE

GAMMA ENERGY ANALYSIS SAMPLING NODE

SAMPLE LOCATION TABLE

DECISION SUBUNIT	SAMPLING AREA	SAMPLE NODE	NORTHING	EASTING
1	A1	O-A1-2	143968.54	565383.73
		O-A1-3	143967.39	565383.65
		O-A1-4	143966.37	565383.79
		O-A1-10	143969.49	565386.33
		O-A1-13	143965.09	565386.60
		O-A1-16	143960.18	565386.97
	A2	O-A2-3	143968.66	565388.63
		O-A2-6	143964.11	565388.78
		O-A2-7	143962.59	565388.83
		O-A2-10	143970.99	565390.77
		O-A2-14	143965.10	565390.97
		O-A2-15	143963.64	565391.02
	A3	O-A3-1	143972.49	565393.04
		O-A3-2	143971.03	565393.08
		O-A3-4	143968.21	565393.15
		O-A3-5	143966.77	565393.18
		O-A3-9	143972.06	565395.36
		O-A3-11	143968.97	565395.43
	A4	O-A4-3	143968.82	565397.74
		O-A4-4	143967.43	565397.76
		O-A4-7	143963.01	565397.81
		O-A4-9	143969.59	565398.73
		O-A4-12	143961.78	565399.51
		O-A4-13	143967.81	565401.32

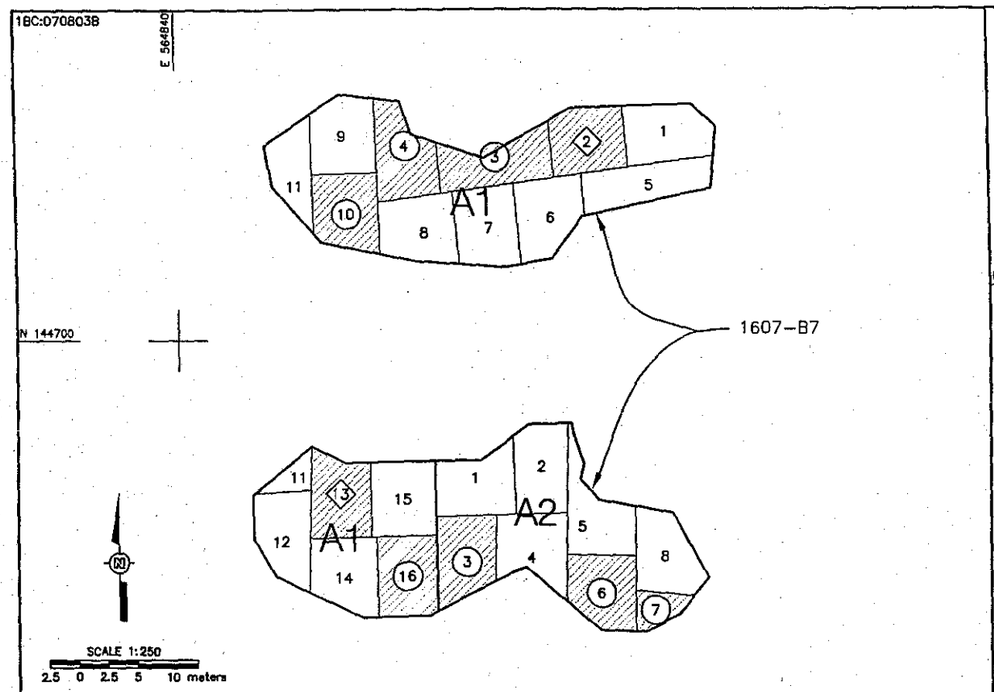
Attachment 3
Originator G. CRD
Chk'd By
Calc. No. 0100B-CA-V0166

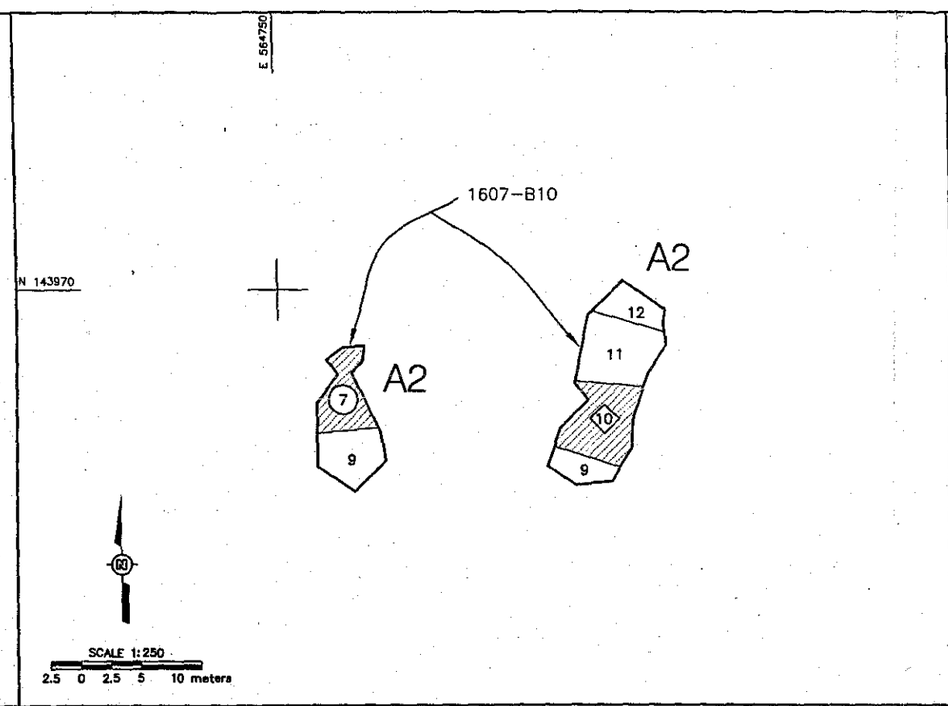
Sheet No. 1 of 2
Date 7/9/03
Date 7/15/03
Rev. No. 0

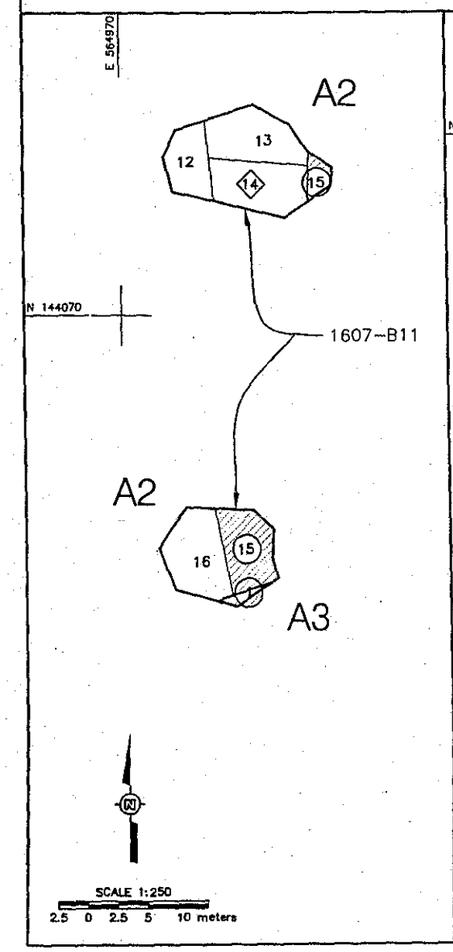
ATTACHMENT 3

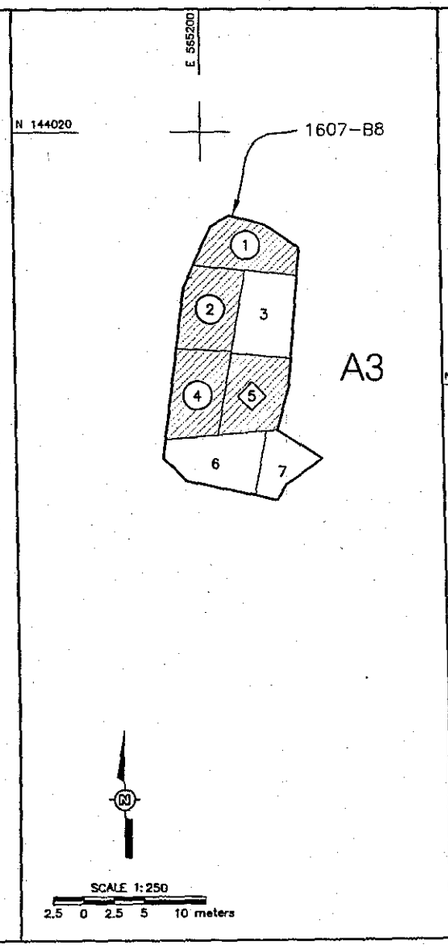
100 B/C AREA
100 AREA REMEDIAL DESIGN
100-C-3 FRENCH DRAIN
OVERBURDEN SAMPLING PLAN

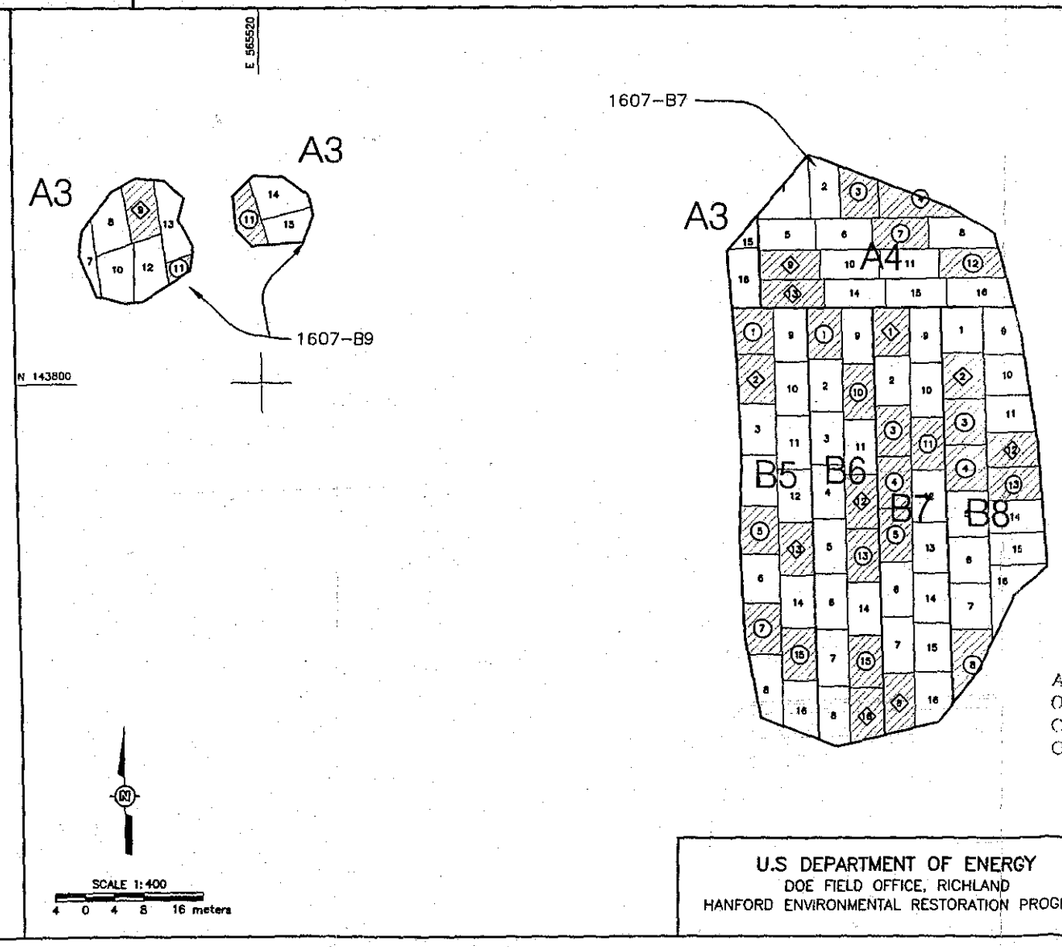
1BC:070803B











NOTES

1. OVERBURDEN NODE AREAS ARE APPROXIMATELY 32.90 SQUARE METERS.
2. SAMPLES WILL BE TAKEN FROM THE APPROXIMATE CENTER OF EACH NODE.
3. THE OVERBURDEN CONSISTS OF SAMPLING AREAS A1, A2, A3, AND A4 WITHIN DECISION SUBUNIT 1. AREAS B5, B6, B7, AND B8 WITHIN DECISION SUBUNIT 2.

LEGEND

GAMMA ENERGY ANALYSIS/CLOSEOUT VERIFICATION SAMPLING NODE

GAMMA ENERGY ANALYSIS SAMPLING NODE

SAMPLE LOCATION TABLE

DECISION SUBUNIT	SAMPLING AREA	SAMPLE NODE	NORTHING	EASTING
1	A1	0-A1-2	144716.17	564874.75
		0-A1-3	144714.93	564866.91
		0-A1-4	144715.87	564859.49
		0-A1-10	144710.29	564854.53
		0-A1-13	144697.35	564853.80
		0-A1-16	144680.43	564859.21
	A2	0-A2-3	144681.56	564884.17
		0-A2-6	144678.94	564875.42
		0-A2-7	144677.51	564879.90
		0-A2-7	143960.98	564755.40
		0-A2-10	143959.34	564777.00
		0-A2-14	144061.00	564981.22
		0-A2-15	144081.11	564986.72
		0-A2-16	144050.51	564980.35
	A3	0-A3-1	144046.91	564980.47
		0-A3-1	144010.36	565203.87
		0-A3-2	144005.02	565200.80
		0-A3-4	143997.82	565199.44
		0-A3-5	143997.71	565204.03
		0-A3-9	143823.44	565504.22
		0-A3-11	143815.56	565509.12
		0-A3-11	143822.12	565518.52
	A4	0-A4-3	143825.74	565600.36
		0-A4-4	143824.81	565608.89
		0-A4-7	143820.12	565606.09
		0-A4-9	143815.87	565590.84
		0-A4-12	143816.13	565615.79
		0-A4-13	143811.97	565591.10
2	B5	0-B5-1	143806.86	565585.78
		0-B5-2	143800.49	565586.08
		0-B5-5	143760.24	565586.39
		0-B5-7	143767.24	565586.59
		0-B5-13	143777.81	565591.28
		0-B5-15	143763.82	565591.51
	B6	0-B6-1	143806.60	565595.43
		0-B6-10	143798.83	565600.13
		0-B6-12	143784.16	565600.34
		0-B6-13	143778.96	565600.45
		0-B6-15	143762.91	565600.65
		0-B6-16	143755.72	565600.73
	B7	0-B7-1	143806.90	565604.63
		0-B7-3	143793.85	565604.87
		0-B7-4	143786.78	565604.95
		0-B7-5	143779.77	565605.03
		0-B7-8	143757.41	565605.28
		0-B7-11	143791.68	565609.82
	B8	0-B8-2	143800.94	565614.41
		0-B8-3	143794.78	565614.53
		0-B8-4	143788.63	565614.65
		0-B8-8	143762.39	565615.16
		0-B8-12	143791.09	565620.91
		0-B8-13	143786.49	565621.00

Attachment 3 — Sheet No. 2 of 2
Originator G.C.R.Z — Date 7/9/03
Chk'd By CJB — Date 7/15/03
Calc. No. 0100B-CA-V0166 — Rev. No. 0

ATTACHMENT 3

U.S DEPARTMENT OF ENERGY
DOE FIELD OFFICE, RICHLAND
HANFORD ENVIRONMENTAL RESTORATION PROGRAM

100 B/C AREA
1607-B7, B8, B9, B10, & B11
SEPTIC SYSTEM OVERBURDEN
SAMPLING PLAN

ATTACHMENT 6

Suggested Path for Addressing Interim Safe Storage of the 105-N Reactor/109-N Facility into the CERCLA

Suggested Path for Addressing Interim Safe Storage of the 105-N Reactor/ 109-N Facility into the CERCLA Process

Introduction:

On December 10, 2003 members of Bechtel Hanford, Inc. met to discuss the regulatory "path forward" for addressing the interim safe storage of the 105-N Reactor and the 109-N facility. Some of the questions raised during this meeting were as follows:

1. "Since a National Environmental Policy Act (NEPA) Environmental Impact Statement (EIS) was performed for the "other" reactors, does one need to be performed for N?" If so can/ should the existing EIS be modified?

2. Is CERCLA the best path for the 105-N Reactor and the 109-N facility? If so, do we write an Engineering Evaluation Cost Analysis (EE/CA) (non-time critical removal action) or perform a Remedial Investigation Feasibility Study (RI/FS) (remedial action)?

3. What are the current Tri-Party Agreement Commitments for N Reactor?

Responses to Questions/ Issues:

In response to the first issue, *"Since an Environmental Impact Statement (EIS) was performed for the "other" reactors, does one need to be performed for N?" If so, can/ should the existing EIS be modified?"* The answer to this question is maybe. The decommissioning of the N-Reactor (which includes 109-N) was specifically excluded from the current EIS. Reviewer comments on the EIS (Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington (DOE/EIS-0119F)) requested the inclusion of N Reactor in the decommissioning plans. The response to the comments was "The N-Reactor is not now available for decommissioning; however, at an appropriate time the N-Reactor will be decommissioned and appropriate NEPA documentation prepared."

Should there be a proposal to dismantle the reactor under the Atomic Energy Act (AEA) authority, an EIS would be one method of evaluating the impacts of that action. With regards to the question on whether the existing EIS could be revised to include N-Reactor, the opinion of those in attendance at the meeting, was that the current EIS, which was conducted on behalf of the other eight reactors (B, C, D, DR, F, H, KE, and KW) is too old to be revised to include N-Reactor. If the decision were made to pursue EIS coverage at the N-Reactor, a new document would most likely need to be written.

Still, an EIS would not be required prior to conducting a CERCLA removal action to achieve interim safe storage of the reactor provided that NEPA values are addressed within the CERCLA documentation authorizing the work.

ATTACHMENT 7

Groundwater Remedial Actions

100 AREA UMM – March 2004
Groundwater Remedial Actions

Groundwater operations and related highlights for February 16 through March 21 are summarized as follows:

100-NR-2

- The pump and treat system operated at 100 % of planned operation during the report period. Average flow rate was 63 gpm.

- A revised schedule for the DQO to determine additional data needs for determining aquatic and riparian impacts was prepared and presented to Ecology. Scoping samples will be collected along the shoreline this March to cover the spring season and again in fall after the DQO and formal SAP are completed.

- Low water levels have necessitated switching back and forth from extraction well N-75 to N-105A to maintain the system design flow rate (Attachment A).

- Drilling and coring was completed for a multi-depth monitoring well location at N springs near the center of the strontium-90 plume (Attachment A). Core samples are being used in the apatite and phytoremediation lab studies.

100-KR-4

- The pump and treat system operated at 99.3% of planned operation during the report period. Average flow rate for the reporting period was 284 gpm (average flow based on cumulative total for FY04 is 270 gpm).

- Hexavalent chromium and specific conductance results for the January monthly sample from well K-130 were 83 ug/L and 444 uS/cm, respectively.

- The pump in well K-126 was lowered by 5 ft on 3/17/04. Since then a pumping rate of 20 gpm with 12 to 13 ft of drawdown has been maintained. At 20 gpm the water level is within about 1 ft of the low level trip. Maximum sustainable pumping rate appears to be in the 21 - 22 gpm range.

100-HR-3

- The HR-3 pump and treat system operated at 99.9 % of planned operation during the report period. Average flow rate during report period was 161 gpm (average based on cumulative total for FY04 is 178 gpm). Periodic shutdown of extraction wells occurred due to low water level and solenoid valve malfunctions.

- ISRM:

  - An ISRM focus group met at Hanford on March 2nd, 3rd and 4th to review performance issues and to make recommendations for corrective actions. A draft final report is expected in March.

  - Installation of the first phase of the planned ISRM extension was terminated based on analysis of existing and new monitoring results suggesting breakthrough.

  - In place of the ISRM extension, it was agreed to proceed with a small scale pump and treat system to address the new chromium plume (Attachment B). The temporary pump and treat system will initially use existing wells and will be operational by the end of July. Three new wells for performance monitoring and or to expand the extraction network will be drilled during FY04. The objectives of the new pump and treat expansion are to :

    - ✓ prevent further impact to the river in the central shoreline region, and

    - ✓ mass reduction (a 50 gpm system should remove about 10 kg/month)

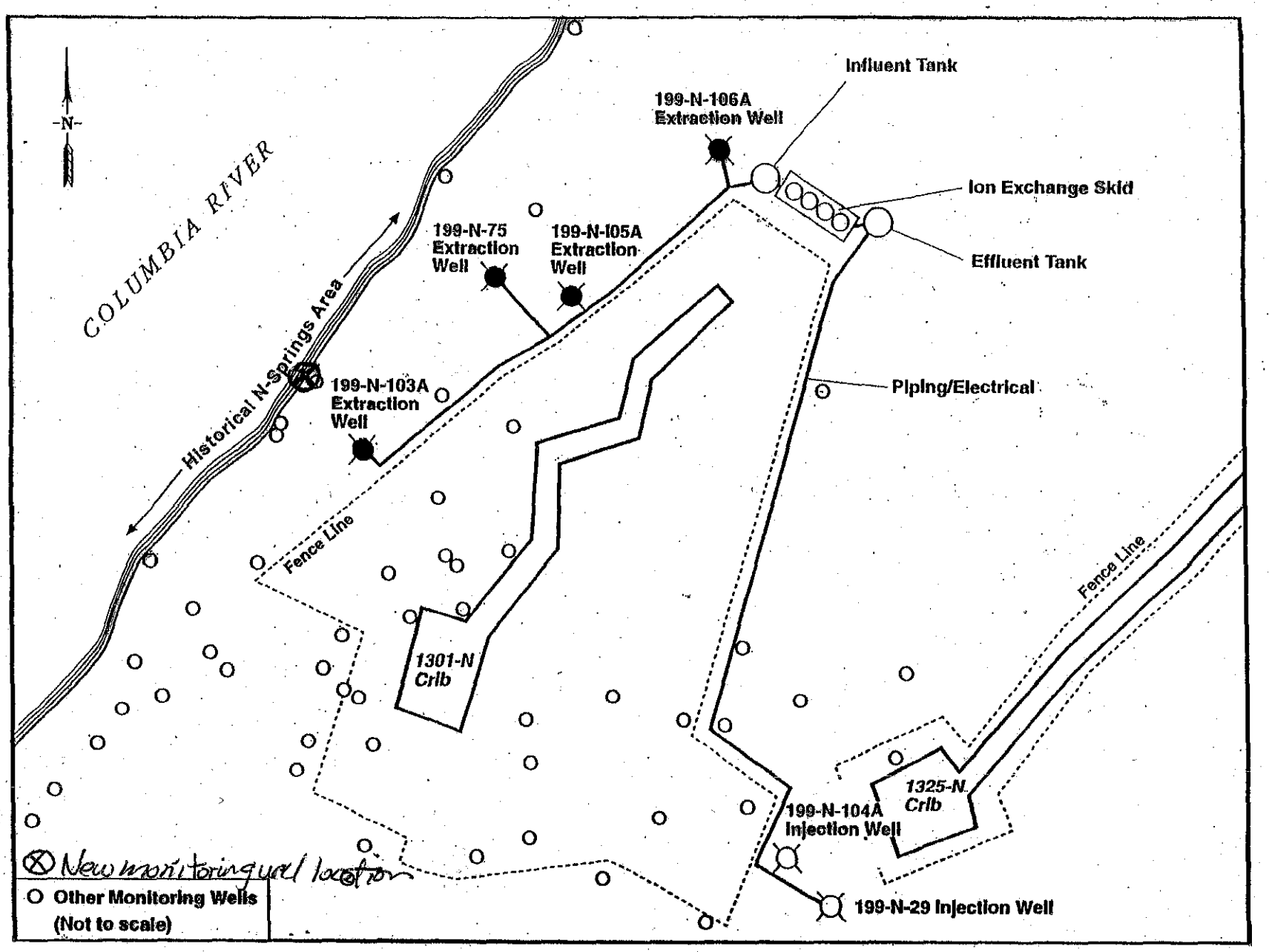
  - Follow-up characterization work will be conducted on the existing ISRM based on review panel recommendations.

- Continuous monitoring of water levels in the new wells near the 182 D reservoir showed that the mound created by the reservoir leak has nearly dissipated in response to lower water levels in the reservoir. Apparently major leakage from the reservoir occurs only when the water level exceeds about 8 ft.

ATTACHMENT 8

Pipeline Drawing

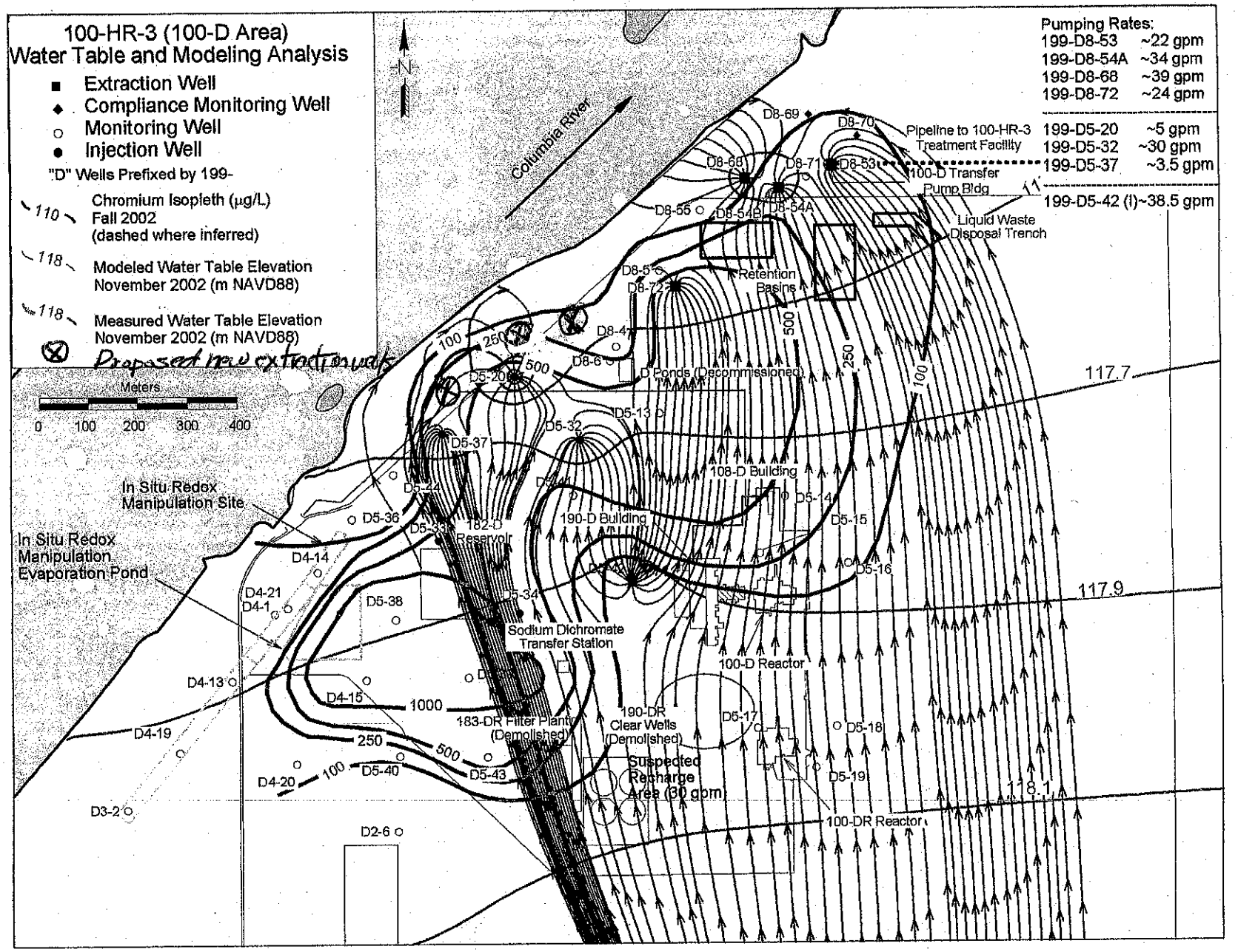
ATTACHMENT A



E9802016.2

Figure 2. Layout of the N-Springs Pump-and-Treat System.

ATTACHMENT B



ATTACHMENT 9

K-Basin Groundwater Monitoring

100-K Area: K-Basins Groundwater Monitoring

Bob Peterson, PNNL (373-9020)

KE Fuel Storage Basin

- Results are available for samples collected in late January 2004. Tritium concentrations continue to decrease from the recent "pulse" of higher concentrations that appeared during 2003.
- No evidence of remobilization of KE Condensate Crib contaminants as a consequence of remedial action to remove the crib in December 2003 (completed in February 2003).
- Note: Sludge removal scheduled to start at KE Basin North Load Out Pit soon. Need for changes in monitoring activities is being reviewed.

KW Fuel Storage Basin

- Constant or gradually declining tritium concentrations for January 2004 samples.
- Again, no evidence of remobilization of KW Condensate Crib contaminants as a consequence of remedial action to remove the crib in December 2003 (completed in February 2003).
- Proposed location for new monitoring well between the KW reactor and the river (replacement for well 199-K-33) has been approved by DOE and forwarded to FHI.

100-K Burial Ground Issue

- Most recent tritium result shows a continuing decrease from peak concentrations seen in late 2001/early 2002.
    - Current concentration is ~18,000 pCi/L, which is just below the drinking water standard.

Preliminary Results for Aquifer Tube Samples from 100-D Shoreline

Bob Peterson, PNNL (373-9020)

New information for 100-D Area from this year's sampling event includes:

- Hexavalent chromium concentrations appear to be generally lower than in previous years. Trend charts showing all data for the 100-D shoreline will be forthcoming.
- Sulfate, an indicator of ISRM injections, is elevated along the ISRM segment of shoreline, showing that groundwater affected by the ISRM has reached the river.
- Hexavalent chromium along the central segment is definitely elevated above standards at several sites, and concentrations appear to be consistent with what is observed in adjacent monitoring wells.
- Hexavalent chromium along the pump-n-treat segment are below the drinking water standard (100 ug/L), but remain above the criteria for protection of aquatic organisms (22 ug/L) at several locations.
- The four sites equipped with riverbed aquifer tubes installed during the early stages of the ISRM (i.e., tubes at 3- and 6-foot depths just offshore) have been refurbished and all are producing good water samples.

Aquifer Sampling Tube Activities

Bob Peterson, PNNL (373-9020)

Fiscal Year 2004 Sampling Event

- Sampling of all existing and newly-installed tubes is complete, with the exception of the 100-F Area, which will be sampled during the week of March 29.
- More tubes have been sampled this year than in previous years, providing data for several projects, including:
    - Performance monitoring of the interim remedial actions
    - 100-BC-5 pilot risk assessment
    - Long-term monitoring of operable unit conditions where interim actions are not underway.
- New data to better describe the vertical distribution of hexavalent chromium along the interim action segments have been obtained, and will be useful in characterizing the impact of bank storage on the quality of groundwater discharging to the river.
- Although some maintenance/preservation work remains to be done on several existing tube sites, they have survived as useful monitoring facilities well beyond their expected lifetime!

Interpretation and Reporting

- Currently assembling all tube status information; field parameters data; and field screening results for hexavalent chromium and sulfate, into a spreadsheet.
    - A report will subsequently be published later this year after all analytical results have been received, and interpretations of trends completed.
- HEIS database is being populated with historical data from tubes, data which has previously only been available as a printed report (special thanks to Roger Schreck!).
    - This will help in determining concentration trends at strategic locations (e.g., adjacent to interim remedial action sites).