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CH2MHILL

SMO-002-08
February 4, 2008

Mr. Don Pfister, Director
U.S. Department of Energy
Miamisburg Closure Project
175 Tri-County Parkway
Springdale, OH 45246

Attention: Paul Lucas

Subject: **CONTRACT NO. DE-AC24-03OH20152**; Section F.7 Contract Closeout; C.2.3.6, Post Closure Support of Regulatory Documents, Parcel 6, 7, & 8

Dear Mr. Pfister:

Paul Lucas from your office authorized the release of the following documents for Public Review:

- Parcel 6, 7, & 8 Residual Risk Evaluation, September 2007 Response to Public Comments

If you or members of your staff have any questions regarding the documents, or if additional support is needed, please contact Ken Armstrong at 937-608-8238.

Sincerely,

Virginia L. Matis
Contract Closeout Office Manager
CH2M HILL Mound, Inc.

cc: T. Fischer, USEPA, (1) w/attachments
B. Nickel, OEPA, (2) w/attachments
Joseph Crombie, ODH, (1) w/attachments
M. Wojciechowski, Tetra Tech, (1) w/attachments
Kathy Gunckle, SM Stoller (1) w/attachments
K. Armstrong, CH2M Hill, (1) w/attachments
DCC (1) w/attachments

The Mound Core Team
955 Mound Ave
Miamisburg, Ohio 45343

Mrs. Ellen Stanfier
Environmental Coordinator
Public Works Department
600 North Main Street
Miamisburg, Ohio 45342

Dear Mrs. Stanfier

The Core Team, consisting of the U.S. Department of Energy Closure Project (DOE-MCP), U.S. Environmental Protection Agency (USEPA), and Ohio Environmental Protection Agency (OEPA), appreciates your review of the Parcel 6, 7, and 8 Residual Risk Evaluation, Public Draft, September 2007. Enclosed is our response to comments that you provided on September 27, 2007.

Should you require additional detail, please contact Paul Lucas at (513) 633-3366 and we will gladly arrange a meeting or telephone conference.

Sincerely,

DOE/MCP: Paul C Lucas 1/31/08
Paul C. Lucas, Remedial Project Manager

USEPA: Timothy J Fischer 1/31/08
Timothy J. Fischer, Remedial Project Manager

OEPA: Brian K Nickel 1/31/08
Brian K. Nickel, Project Manager

Response to City of Miamisburg Comments on
Parcel 6, 7, and 8 Residual Risk Evaluation
Public Review Draft
September 2007

Comment #1
The RRE focuses solely on site workers and construction workers for the risk calculations. While these two scenarios have been deemed appropriate for site exposures, the Parcel 6, 7 and 8 RRE includes offsite locations that could have a risk impact, such as the seeps located on public (City of Miamisburg) and private properties. The City respectfully requests that the same risk calculations be developed and executed for both residential and recreational scenarios that could result from the offsite seeps. The City of Miamisburg would appreciate the documentation that off-site risk is at acceptable levels.

Response #1
The Core Team understands the City's concern over the risk associated with the off site seeps. Although not part of the Parcel 6, 7 and 8 RRE, the Core Team has evaluated the risk associated with surface water concentrations of TCE and Tritium and continues to monitor these concentrations as part of the Long Term Ground Water Monitoring Plan. Although the Core Team could not foresee an exposure scenario that includes typical residential default values for exposures to the seeps on the North West hillside adjacent to the Mound Site, we have reviewed a likely recreational scenario and found that under these conditions, the seeps are protective of human health. For your review, we have provided (Attachment A) the assumptions associated with the scenario and the pertinent equations used to calculate risk.

Comment #2
Based on conversations with you, it is our understanding that there will be no Institutional Controls imposed on off-site properties. This includes, but is not limited to, the seeps on the northwest side of the site. We understand that the seeps will continue to be monitored for contaminant levels, and if any contaminant exceeds the "trigger levels" set by the Core Team, additional study and potential remediation will be implemented.

Response #2
This is a true statement. The current draft version of the Proposed Plan for Parcel 6, 7, and 8 does not propose any Institutional Controls associated with the off-site seeps. The document proposes continued monitoring of the seeps and down gradient wells. In addition, trigger points are proposed as well as actions to be taken if these trigger points are exceeded. This document is currently under review by the Core Team and will be available for Public comment prior to finalizing the Record of Decision for Parcels 6, 7, and 8.

Comment #3
The City understands that a plume of contamination exists in the groundwater under the site. The RRE assumes that this groundwater contamination is trending downward; however, current sampling, particularly in the light of the excavation activities in OU-1, doesn't conclusively support a clean end state for the groundwater. Provided that the contamination plume is contained on-site, this should not impact off-site properties or receptors. As the RRE does not include the groundwater contamination exposure in the calculations, the City will assume that the DOE will maintain the contaminated plume within the site boundaries. If the plume would escape from the site, immediate notification must be made to the City so that off-site receptors can be notified and provided alternative drinking water.

Response #3
Historically, the Mound Site Environmental Management programs have monitored numerous wells in the bedrock and in the BVA on and near the Mound Plant. The program did not identify any areas of concern in Parcels 6 and 7; however, the monitoring program did reveal two areas of concern related to Parcel 8.

Groundwater monitoring Wells 0315 and 0347 have indicated TCE levels above established MCL guidelines. The wells both show recent TCE concentrations in excess of the MCL of 5 µg/L (micrograms per liter) or 5 ppb (parts per billion). Recent concentrations in Well 0347 have ranged between 15 and 33.2 ppb while those in Well 0315 have ranged from 5 to 14 ppb. Past data do not offer a clear indication of a trend although it does appear that concentrations may have stabilized in both wells.

The current draft version of the Proposed Plan for Parcel 6, 7, and 8 proposes continued monitoring of these wells. Trigger points as well as actions to be taken if these trigger points are exceeded are also proposed. This document is currently under review by the Core Team and will be available for Public comment prior to finalizing the Record of Decision for Parcels 6, 7, and 8.

Other wells in the bedrock and in the BVA on and near the Mound Plant, such as OU-1 have similar groundwater monitoring requirements dictated by the specific Record of Decision. These requirements are passed through to the specific Ground Water Monitoring Plan. The Core Team will continue to review monitoring date in order to assure that ground water from the Mound Site remains protective to offsite receptors.

Attachment A
Discussion of Risk
Offsite Seeps

Summary of Recreational Scenario

An evaluation was performed to assess the degree of risk that various concentrations of tritium and TCE present in surface water from the seeps. A hypothetical recreational scenario was created to evaluate a conservative estimate of risk. The scenario assumes that an adult (age 28) and a child (age 6) visit the seeps while hiking on the North West hillside near the Mound Site once per week for 3 years. On each visit they collect and consume a day's quantity of drinking water. While collecting the water 5% of their body is exposed to the water and contaminants are dermally absorbed. Other assumptions and factors used in the calculation are shown in Table 1 below.

Table 1 - Recreational Scenario Exposure Assumptions

Description	Value	Units
EF - Exposure Frequency	5.200E+01	days/yr
ED - Exposure Duration	3.000E+00	yrs
ET - Event Time	0.5	hr/day
t_{event} - Duration of exposure event	0.5	hr
IR - Ingestion Rate Child (1 - 6 yrs)	1.000E+00	L/day
IR - Ingestion Rate Adult (7 -30 yrs)	2.000E+00	L/day
SA - Surface Area Child (4-6yrs)	2800	cm2
SA - Surface Area Adult (25-54)	5700	cm2
BW - Body Weight Child (4-6yrs)	31	Kg
BW - Body Weight Adult (25-54)	85	kg
K_p - Permeability Factor for tritium	1.5E-05	m/hr
EF - Event Frequency	1	events/day
Fraction Absorbed	1	unitless
T - Lag time for TCE	0.58	hr
Surface Area Exposure Percentage	0.05	unitless
Oral RfD (TCE)	1.1E-02	mg/kg-d
Slope Factor (TCE)	1.30E-02	kg-day/mg
Slope Factor (Tritium)	5.07E-14	risk/pCi

Summary of Results

Based on the equations provided later in the text, tritium and TCE concentrations were calculated for each potential risk range (10E-04, 10E-05, and 10E-06) and for each potential receptor (Table 2). Data from Table 2 is graphically displayed in Figures 1 and 2. Current Tritium and TCE concentrations in the offsite seeps are approximately 50,000 pCi/L and 5 ppb (5E-03 ppm). Data since 1999 is presented in Figures 3 and 4. As one can see from the table below, this concentrations would represents a risk less than 1.00E-06 for Tritium and a risk between 10E-05 and 10E-6 for TCE.

Table 2 – Allowable Tritium and TCE Concentrations by Risk Range

	Allowable Tritium Concentration (pCi/L)		
	Risk Level		
	1.00E-06	1.00E-05	1.00E-04
Recreational (child)	1.2617E+05	1.2617E+06	1.2617E+07
Recreational (adult)	6.3085E+04	6.3085E+05	6.3085E+06

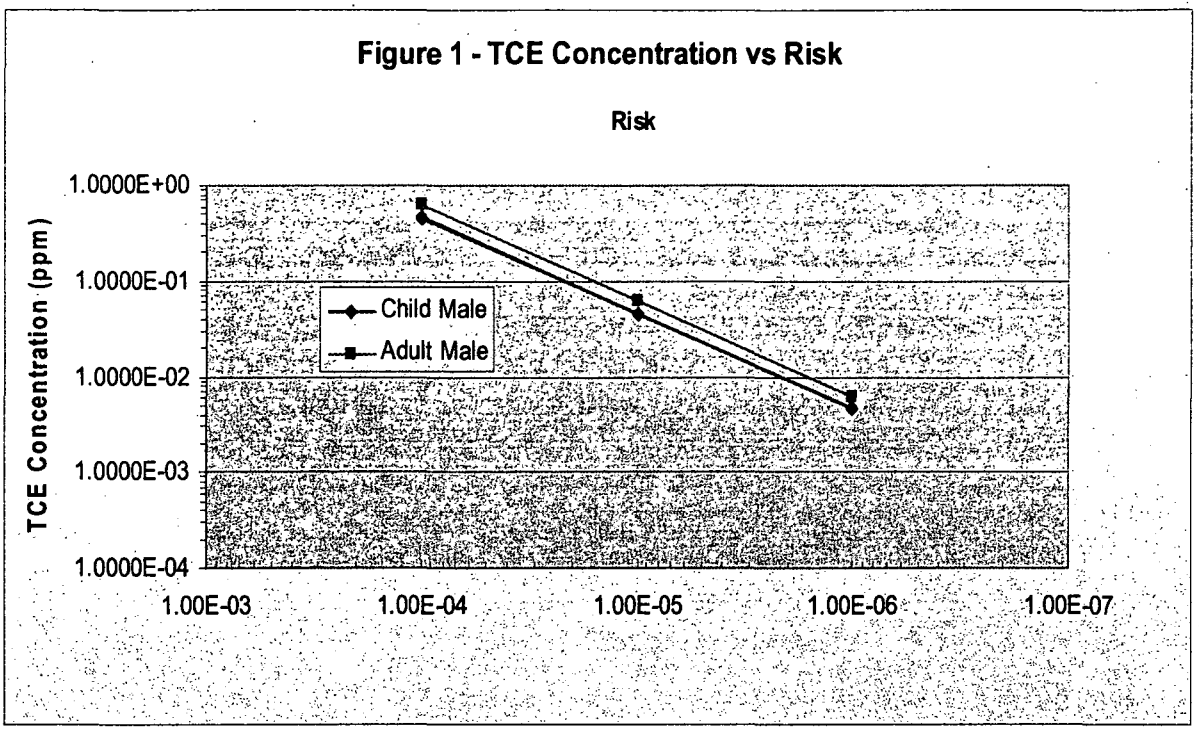
	Allowable TCE Concentration (mg/L or ppm)		
	Cancer Risk Level		
	1.00E-06	1.00E-05	1.00E-04
Recreational (child)	4.6655E-03	4.6655E-02	4.6655E-01
Recreational (adult)	6.3778E-03	6.3778E-02	6.3778E-01
	Non-cancer Risk Level, HQ		
	6.99E-03	6.99E-02	6.99E-01

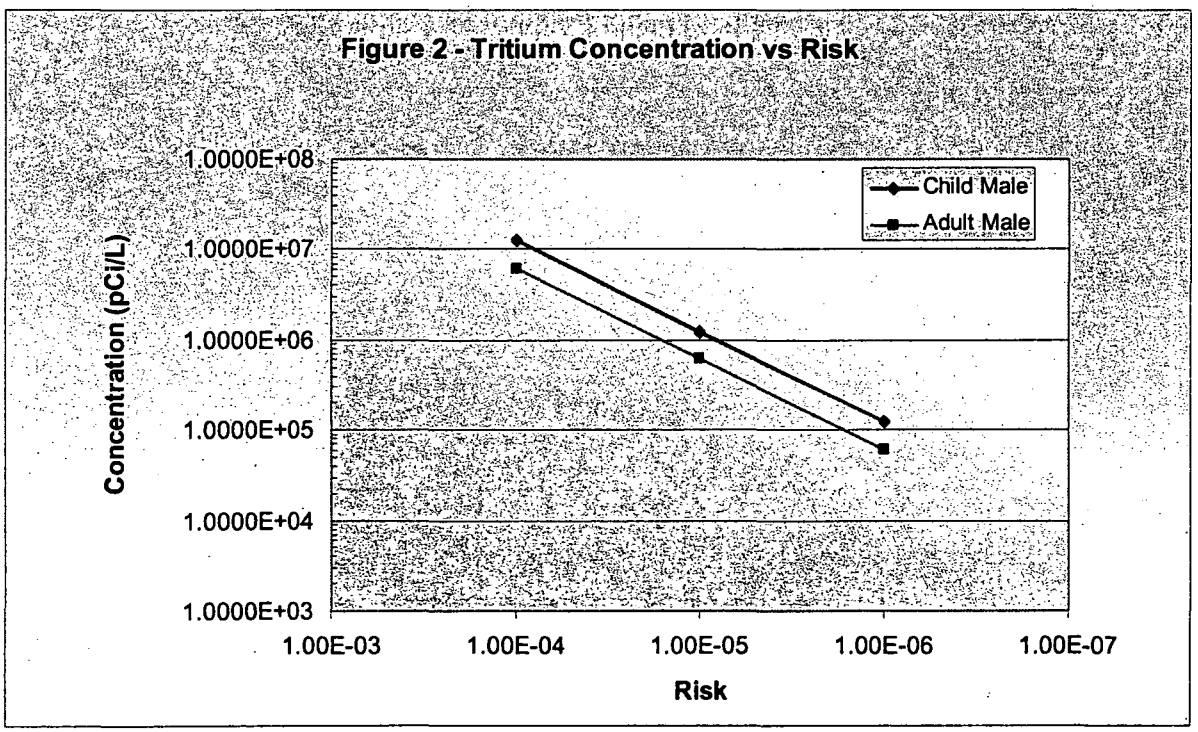
Note:

At the current concentrations (below) a child would have to drink 378 L (100 gal) of seep water per day to get a 10E-4 exposure to tritium and 23 L (6 gal) of seep water per day to get a 10E-4 exposure to TCE.

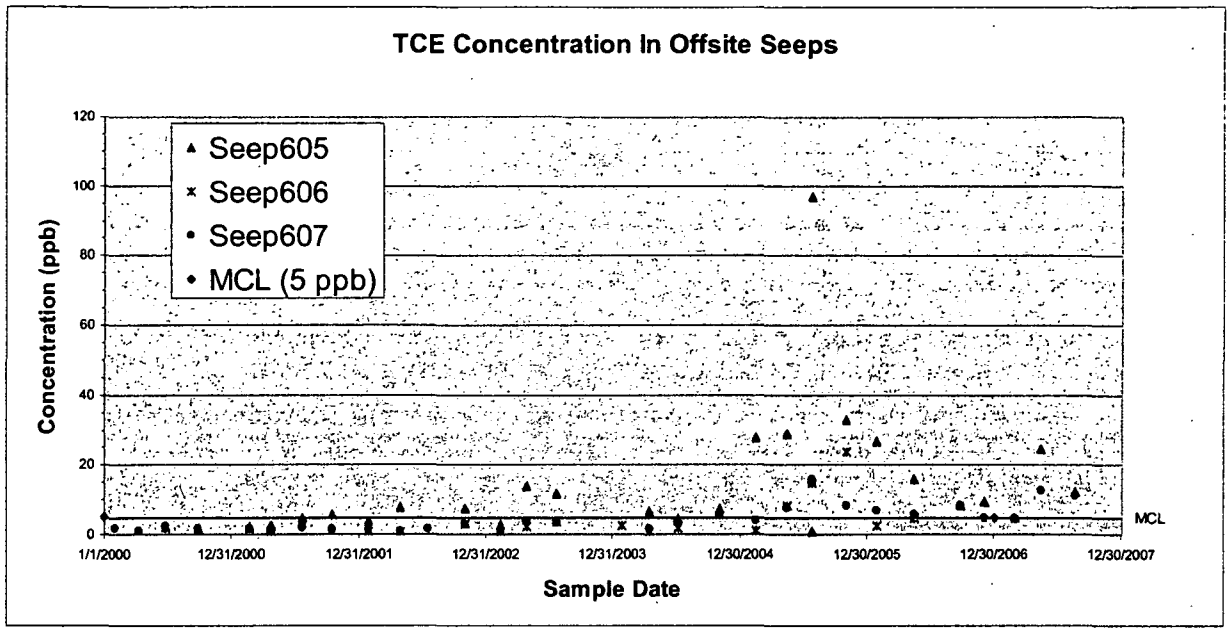
Contaminant	Seep	Sample Date	Concentration
Tritium	605	5/17/07	33,400 pCi/
TCE	605	5/17/07	24.7 ug/L

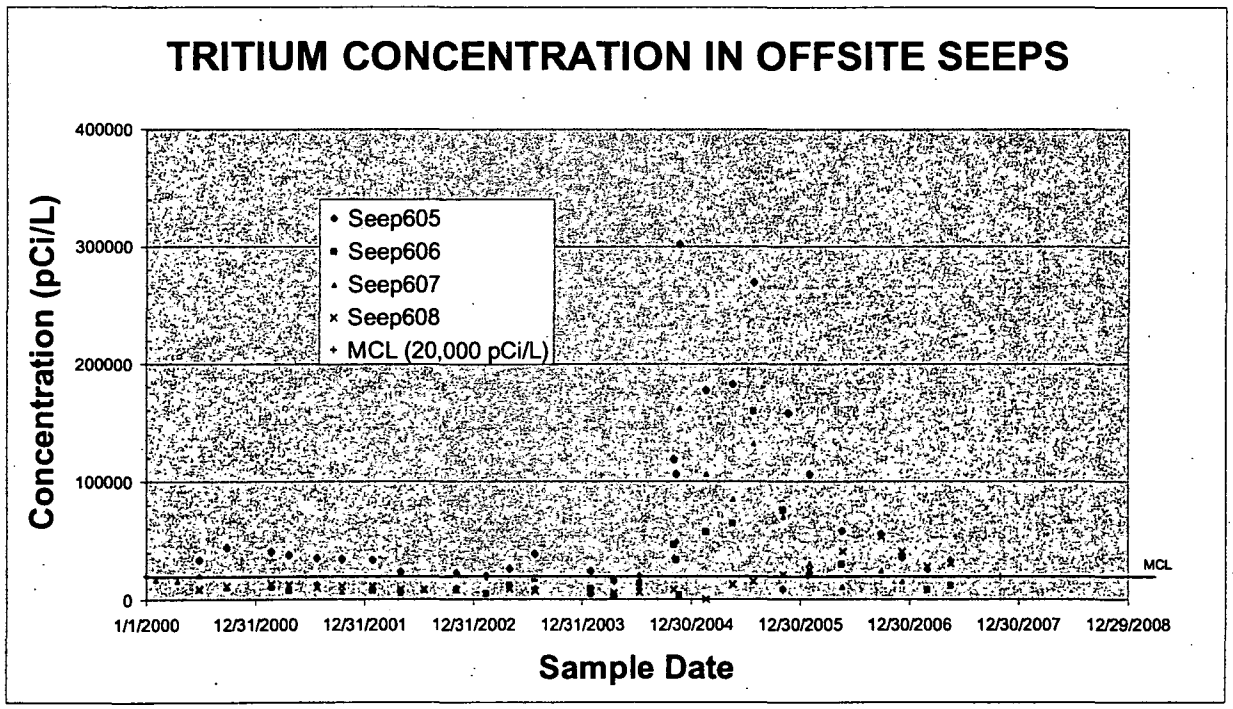
Seep Concentration vs Risk





Current Seep Data





Equations Used for Intake from Non-Radioactive Contaminants

Ingestion or Inhalation

For non-radioactive contaminants, the basic equation for calculating intakes from ingestion (soil or water) or inhalation is:

$$\text{Ingestion Intake (mg/kg-d)} = \frac{C \times IR \times EF \times ED \times CF}{BW \times AT}$$

Where

C	=	concentration of chemical in medium (mg/kg, mg/L, or mg/m3)
IR	=	ingestion of inhalation rate (mg/d or L/d)
EF	=	Exposure Frequency (d/yr)
ED	=	Exposure Duration (yr)
CF	=	Conversion Factor (as appropriate)
BW	=	Body Weight (kg)
AT	=	Average Time (yr x 365 d/yr)

Dermal Exposure

For non-radioactive contaminants, the basic equation for dermal exposures to water is:

$$\text{Dermal Intake (mg/kg-d)} = \frac{DA_{event} \times EV \times EF \times SA \times ED}{BW \times AT}$$

Where

$$\text{(for *organics) } DA_{event} = 2 \times K_p \times C_w \sqrt{\frac{10^{-3}\ L/cm^3 \times 6 \times T \times t_{event}}{\pi}}$$

$$\text{(for inorganics) } DA_{event} = K_p \times C_w \times t_{event} \times 10^{-3}\ L/cm^3$$

*Note: TCE is an organic solvent

C_w	=	Concentration of chemical in medium (typically mg/kg, mg/L, or mg/m3)
K_p	=	Chemical – specific permeability coefficient (cm/hr)
SA	=	Skin surface area available for contact (cm^3)
T	=	Chemical specific lag time (hr)
t_{event}	=	Duration of exposure event (hr)
EV	=	Events per day (d^{-1})
EF	=	Exposure Frequency (d/yr)
ED	=	Exposure Duration (yr)
BW	=	Body Weight (kg)
AT	=	Average Time (yr x 365 d/yr)

Equations Used for Intake from Radioactive Contaminants

Ingestion

For radioactive contaminants, the basic equation for calculating intakes from ingestion (soil or water) is:

Ingestion Intake (pCi) = C x IR x EF x ED x CF

Where

C	=	Concentration of chemical in medium (pCi/L or pCi/g)
IR	=	Ingestion Rate(mg/d or L/d)
EF	=	Exposure Frequency (d/yr)
ED	=	Exposure Duration (yr)
CF	=	Conversion Factor (as appropriate)

Dermal Exposure

For radioactive contaminants, the basic equation for dermal exposures to water is:

Dermal Intake (pCi) = C x SA x K_p x EF x ED x ET x 1000(L/m^3)

C	=	Concentration of chemical in medium (typically pCi/L)
SA	=	Skin surface area available for contact (m^2)
K_p	=	Chemical – specific permeability coefficient (m/hr)
EF	=	Exposure Frequency (d/yr)
ED	=	Exposure Duration (yr)
ET	=	Duration of Event (hr/d)

Equations Used for Hazard Quotient and Risk Calculations

Hazard Quotient

For non-cancer causing contaminants the risk (Hazard Quotient) associated with a dermal and ingestion intake is:

$$\text{Hazard Quotent} = \frac{\text{intake (mg/kg-d}}{\text{Reference Dose (mg/kg-d)}}$$

Carcinogenic Risk

For cancer causing contaminants the risk associated with a dermal and ingestion intake is:

Risk = (Dermal Intake x Slope $\text{Factor}_{\text{absorbed dose}}$) + (Ingestion Intake x Slope $\text{Factor}_{\text{ingestion}}$)

Where: The Slope $\text{Factor}_{\text{absorbed dose}}$ = $\frac{\text{Slope Factor}_{\text{ingestion}}}{\text{GI}_{\text{absorbtion efficiency}}}$

References:

DOE, Mound 2000 Residual Risk Methodology, January 6, 1997, Revision 0

EPA, Estimated Per Capita Water Ingestion and Body Weight in the United States, EPA-822-R-00-001, October 2004

Hazardous Ranking System, www.epa.gov/osp/bosc/work0502/preuss.ppt

Radionuclide Table: Radionuclide Carcinogenicity – Slope Factors, www.epa.gov/radiation/heast/doc/heast2_table_4-d2_0401.pdf

EPA, Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual, Interim Final, EPA/540/1-89/002, December 1989