

AIR POLLUTANT EMISSION NOTICE

PERMIT No.: _____ AIRS ID.: _____ / _____ / _____

FIRM NAME: U.S. Department of Energy, and Kaiser-Hill Company, L.L.C.
 MAIL ADDRESS: 10808 Highway 93, Unit B, Golden STATE: Colorado ZIP: 80403-8200
 PLANT NAME & LOCATION: Rocky Flats Environmental Technology Site, Section 2, Range 70W, Township 2S COUNTY: Jefferson REQUEST PORTABLE SOURCE PERMIT
 HOME-BASE FOR PORTABLE SOURCE: _____
 PERSON TO CONTACT REGARDING THIS INFORMATION: Robert C. Nininger TITLE: Manager, Environmental Media Management, Kaiser-Hill, L.L.C. PHONE: (303) 966-4663
 GENERAL DESCRIPTION OF THIS PLANT'S FUNCTION: Environmental Restoration and Waste Management E-MAIL ADDRESS: Robert.Nininger@rfets.gov

A. GENERAL INFORMATION		Normal Operation of This Source			Process Seasonal Throughput (% of Annual)				ADDITIONAL INFORMATION OR REMARKS: N/A = Not Applicable
		Hours/Day 10	Days/Week 5	Weeks/Year 52	Dec-Feb 25	Mar-May 25	Jun-Aug 25	Sep-Nov 25	

B. STACK OR VENT INFORMATION (Identify below which stack if plant has two or more; refer to attached sketch of plant layout)						
Height N/A	Diameter ft N/A	Temperature N/A	Flow Rate F N/A	Velocity ft/min N/A	Moisture N/A	Plant ID No. for Stack Various Environmental Restoration CERCLA Activities

C. FUEL INFORMATION		Design Input Rate (10 ⁹ BTU/hr)	Kind of Fuel Burned	Annual Fuel Consumption		Fuel Heating Value: (BTU/lb, BTU/gal, or BTU/scf)	Percent by Weight		Seasonal Fuel Use (% of Annual Use)				Space Htg (% Ann.)
Description of Combustion Unit	Make:			Requested level	Actual level (Data year level)		Sulfur	Ash	Dec-Feb	Mar-May	Jun-Aug	Sep-Nov	
	Model:												
	Serial No.:												

D. PROCESS INFORMATION		Raw Materials Used	Raw Materials-Annual Consumption	Design Process Rate (Specify Units/Hour)	Finished Product Description	Finished Product-Annual Output	
Description of Processing Unit	Make:	Description	Requested level Actual level (Data year level)			Requested level	Actual level (Data year level)
	Model:						
	Serial No.:						

E. POLLUTION CONTROL EQUIPMENT			Overall Collection Efficiency	ESTIMATED EMISSIONS (TONS/YEAR) AT THROUGHPUTS REQUESTED ABOVE		ACTUAL EMISSIONS (from data year)	ESTIMATION METHOD	CHECK ALL BOXES THAT APPLY <input checked="" type="checkbox"/> New or previously unreported source* <input type="checkbox"/> Requesting modification of existing permit † <input type="checkbox"/> Change in emissions, throughputs or equipment <input type="checkbox"/> Transfer of ownership † (List previous owner in REMARKS section of box A.) <input type="checkbox"/> Previous APEN is expiring † <input type="checkbox"/> Request for Emission Reduction Credit † <input type="checkbox"/> (Specify) _____ * Complete all applicable portions of APEN † Complete "Requested Level" values for permit limits
Pollutant	Type of Control Equipment			CONTROLLED	UNCONTROLLED			
	Primary	Secondary						
Particulate	N/A	N/A	164.51	164.51				
PM ₁₀	N/A	N/A	34.64	34.64				
SO _x								
NO _x								
VOC								
CO								

PLEASE USE APCD NON-CRITERIA REPORTABLE AIR POLLUTANT ADDENDUM FORM TO REPORT SUCH POLLUTANTS OR POLLUTANTS NOT LISTED ABOVE. CHECK HERE IF YOU WISH THE DIVISION TO CALCULATE YOUR EMISSIONS. SEE "EMISSION ESTIMATES" INSTRUCTIONS ON BACK.

Signature of Person Legally Authorized to Supply Data: Robert C. Nininger, Manager, Environmental Media Management, Kaiser-Hill, L.L.C. *Robert C. Nininger* DATE: 7/20/04 YEAR FOR WHICH THE ACTUAL DATA APPLIES: 2004
 Signature of Person Legally Authorized to Supply Data: Robert H. Birk, DOE, RFPO *R.H. Birk* DATE: 7/20/04 Date source began or will begin operation: July 2004

THIS NOTICE IS VALID FOR FIVE YEARS. A revised notice shall be filed prior to this expiration date, whenever a permit limitation must be modified, whenever control equipment is changed, and annually whenever a significant emission change occurs. For specific details see Regulation 3, Part A, II.C.1.

A \$119.96 FILING FEE IS REQUIRED FOR EACH NOTICE FILED. Colorado Dept. of Public Health & Environment Air Pollution Control Division 4300 Cherry Creek Drive South, APCD-SS-B1 Denver, Colorado 80246-1530 APEN # 1 of 1
 Send completed forms with fees to: For Information, Call (303) 692-3150

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**Kaiser-Hill Environmental Systems and Stewardship
Rocky Flats Environmental Technology Site**

**Environmental Restoration CERCLA APEN
Submittal Report**

July 20, 2004

Introduction

This report provides supporting information to the Colorado Department of Public Health and Environment, Air Pollution Control Division (CDPHE, APCD) for submittal of an Air Pollutant Emission Notice (APEN) form quantifying particulate emissions from numerous Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) activities supporting Site closure.

This information and the associated APEN are being transmitted to the CDPHE, APCD to meet the requirements of Colorado Air Quality Control Commission Regulation No. 3. The reportable criteria pollutants are particulates (both particulate matter less than 10 micrometers in diameter [PM10] and total particulate matter [PM]).

Background

An agreement was reached with CDPHE, APCD representatives to submit a single APEN for several similar environmental restoration (ER) CERCLA activities that have the potential to emit fugitive dust. These activities include fill material acquisition from off-site sources, restoration of the original and present landfills, and soil reconfiguration around demolished buildings. The Site-wide APEN includes a list of potential dust control measures to be utilized during soil disturbance activities (see attached dust control plan).

Fill Material Acquisition

Fill material will be used to restore the site's original grade and fill voids/basements below grade after demolition of the buildings. Approximately 100,000 cubic yards of fill material will be acquired from an off-site location to support these CERCLA activities. Please see the attached calculations for additional assumptions.

Original and Present Landfill Restoration Projects

Fill material from on site and off-site will be required to cap the landfills. Approximately 68,000 cubic yards of soil will be used from site borrow areas. An additional 80,000 cubic yards of fill material will be acquired from an off-site location to support remediation of the landfills. Please see the attached calculations for additional assumptions.

Land Configuration after Building Demolitions

Fill material from on site and off-site will be required to restore the grade around demolished buildings and to fill voids and basements below grade. Fugitive particulate emission calculations were performed for land configuration associated with the demolition of Buildings 371, 374, 444, 460, 707, 776/777, and 991. A separate APEN was submitted early in the year for similar emissions from the demolition of Building 771. Please see the attached calculations for additional assumptions.

APEN Submittal Information

An APEN form is provided with this report. Reportable particulate emissions will be generated from the above mentioned activities. Per the Rocky Flats Cleanup Agreement, a construction permit is not required for these types of activities.

Emissions

Particulate air pollutant emissions were calculated for various soil disturbance activities utilizing emission factors from the "Compilation of Air Pollutant Emission Factors," EPA, AP-42. The reported emissions listed below are uncontrolled. No credit was taken for control methodologies (watering, dust suppression techniques, etc.).

The following table provides a summary of particulate emissions from the above mentioned ER CERCLA activities:

Emissions Summary Table:

**Table of ER CERCLA Projects
Estimated Particulate Emissions (tons per year)**

Project		Paved Roads	Unpaved Roads	Backhoe	Handling	Grader	Bulldozer	Scraper	Stockpiles	Total PM	Total PM-10
Soil Acquisition	PM	91.4	-	-	0.04	-	-	-	3.2	94.64	-
	PM-10	17.8	-	-	0.02	-	-	-	1.6	-	19.42
Pres. Landfill	PM	-	8.85	0.21	0.06	0.45	0.42	-	-	9.99	-
	PM-10	-	2.26	0.08	0.03	0.15	0.08	-	-	-	2.6
881	PM	19.0	-	0.26	0.09	-	0.21	-	-	19.56	-
	PM-10	3.71	-	0.1	0.04	-	0.04	-	-	-	3.89
Orig. Landfill	PM	23.7	-	-	0.03	0.45	0.42	-	-	24.6	-
	PM-10	4.63	-	-	0.02	0.15	0.08	-	-	-	4.88
707/776/777	PM	-	4.56	0.11	0.01	-	0.21	-	-	4.89	-
	PM-10	-	1.16	0.04	0.007	-	0.04	-	-	-	1.247
991	PM	0.96	-	0.02	0.014	-	0.21	-	-	1.204	-
	PM-10	0.19	-	0.008	0.007	-	0.04	-	-	-	0.245
460/444	PM	3.71	-	0.08	0.02	-	0.21	-	-	4.02	-
	PM-10	0.72	-	0.03	0.01	-	0.04	-	-	-	0.8
371/374	PM	-	6.12	0.42	0.06	-	0.21	-	-	6.81	-
	PM-10	-	1.56	0.17	0.03	-	0.04	-	-	-	1.8
Total PM		138.77	19.53	1.10	0.32	0.90	1.89	0	3.20	164.51	-
Total PM-10		27.05	4.98	0.43	0.16	0.30	0.36	0	1.60	-	34.64

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SITE FUGITIVE DUST CONTROL PLAN

Environmental Restoration CERCLA Activities

Colorado Air Quality Control Commission Regulation No. 1 requires that a fugitive dust control plan be submitted by applicants whose source / activity results in fugitive dust emissions. The control plan must enable the source to minimize emissions of fugitive dust to a level that is technologically feasible and economically reasonable. If the control plan is not adequate in minimizing emissions a revised control plan may be required. The control plan (if acceptable to the CDPHE) will be used for enforcement purposes on the sources.

Please check the dust control measures which you propose for your activity.

I. Control of Unpaved Roads on Site

- Watering
 - Frequent (Watering Frequency of 2 or More Times Per Day)
 - As Needed
- Application of Chemical Stabilizer
- Vehicle Speed Control
 - Speeds limited to Per Site Postings mph maximum. Speed limit signs must be posted.
 - (Generally 30 mph is maximum approvable speed on site.)
- Graveling

II. Control of Disturbed Surface Areas on Site

- Watering
 - Frequent (Watering Frequency of 2 or More Times Per Day)
 - As Needed
- Application of Chemical Stabilizer
- Vehicle Speed Control
 - Speeds Limited To Per Site Postings MPH Maximum. Speed Limit Signs Must Be Posted.
- Revegetation Revegetation Must Occur Within One Year Of Soil Disturbance
 - Seeding with mulch
 - Seeding without mulch
- Furrows at right angle to prevailing wind
 - Depth of furrows _____ Inches (must be greater than 6")
- Compaction Of Disturbed Soil On A Daily Basis To Within 90 % Of Maximum Compaction (As determined by a Proctor Test).
 - Foundation areas only; or
 - All disturbed soil.
- Wind Breaks
 - Type: _____ (Example: Snow Fence, Silt Fence, etc.)
- Synthetic Or Natural Cover For Steep Slopes.
 - Type: Erosion Blankets (Netting, Mulching, etc.) As Necessary

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III. Prevention Of Mud And Dirt Carried Out Onto Paved Surfaces.

- Prevention
 - Gravel Entry Ways, As Necessary
 - Washing Vehicle Wheels, As Necessary
 - Other: _____
- Cleanup of Paved Areas Frequency: _____ Times Per Day
 - Street Sweeper
 - Hose With Water
 - Other: _____

Additional Sources of Emissions

List any other sources of emissions or control methods

Karen L. Wiemelt

Signature of Legally Authorized Person

7/20/04

Date

KAREN L. WIEMELT

Name (please print)

ER PROJECT MGR

Title

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Table of CERCLA E. R. Project Estimated Particulate Emissions (tons)

Project		Paved Roads	Unpaved Rds	Backhoe	Handling	Grader	Bulldozer	Scraper	Stockpiles	Total TSP	Total PM-10	Time-frame
991	TSP	0.96		0.02	0.014		0.21			1.204		Summer 04
	PM-10	0.19		0.008	0.007		0.04				0.245	
Soil Import	TSP	91.4			0.04				3.2	94.64		Summer 04
	PM-10	17.8			0.02				1.6		19.42	
Pres. Landfill	TSP		8.85	0.21	0.06	0.45	0.42			9.99		Summer 04
	PM-10		2.26	0.08	0.03	0.15	0.08				2.6	
881	TSP	19		0.26	0.09		0.21			19.56		Fall 04
	PM-10	3.71		0.1	0.04		0.04				3.89	
Orig. Landfill	TSP	23.7			0.03	0.45	0.42			24.6		Fall 04
	PM-10	4.63			0.02	0.15	0.08				4.88	
707/776/777	TSP		4.56	0.11	0.01		0.21			4.89		Winter04/05
	PM-10		1.16	0.04	0.007		0.04				1.247	
460/444	TSP	3.71		0.08	0.02		0.21			4.02		Fall 05
	PM-10	0.72		0.03	0.01		0.04				0.8	
371/374	TSP		6.12	0.42	0.06		0.21			6.81		Fall 05
	PM-10		1.56	0.17	0.03		0.04				1.8	
Total TSP		138.77	19.53	1.1	0.324	0.9	1.89	0	3.2	164.51		
Total PM-10		27.05	4.98	0.428	0.164	0.3	0.36	0	1.6		34.637	

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Soil Handling w/Frontend Loader or Dump Truck (AP-42, 13.2.4) - loading and unloading soil

Emission Factor Equations: $EF = k \cdot (0.0032) \cdot [(U/5)^{1.3}] / [(M/2)^{1.4}]$, lb/ton

Inputs/Assumptions:

k, particle size multiplier (AP-42, T	0.74 TSP
	0.35 PM-10
U, average wind speed (mph) =	9
M, soil moisture content (%) =	10
d, density of soil (lb/ft ³) =	117

V, volume of soil handled (yd ³)	33,000
W, weight of soil handled (ton)	5.21E+04
--> $W = V \cdot d \cdot (27 \text{ ft}^3 / 1 \text{ yd}^3) \cdot (1 \text{ to } \dots)$	-----

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project. (Note: W is calculated.)

Emission Calculations:

TSP emission factor (lb/ton) =	5.34E-04
TSP emissions (ton) =	1.39E-02

PM-10 emission factor (lb/ton) =	2.53E-04
PM-10 emissions (ton) =	6.58E-03

Excavation w/Backhoe (AP-42, Table 11.9-2) - excavation of borrow area.

Emission Factor Equations:

TSP EF = $[0.0021 \cdot (d)^{1.1}] / [(M)^{0.3}]$, lb/yd³
 PM-10 EF = $0.75 \cdot \{ [0.0021 \cdot (d)^{0.7}] / [(M)^{0.3}] \}$, lb/yd³

Inputs/Assumptions:

d, drop height (ft) =	5
M, moisture content (%) =	10
V, volume of soil excavated (yd	6500

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Emission Calculations:

TSP emission factor (lb/yd ³) =	6.18E-03
TSP emissions (ton) =	2.01E-02

PM-10 emission factor (lb/yd ³) =	2.44E-03
PM-10 emissions (ton) =	7.91E-03

Bulldozer (AP-42, Table 11.9-2) (Compacting Soil)

Emission Factor Equations: TSP EF = $5.7 \cdot (s)^{1.2} / (M)^{1.3}$, lb/hr

PM-10 EF = $0.75 \cdot [1.0 \cdot (s)^{1.5} / (M)^{1.4}]$, lb/hr

Inputs/Assumptions:

s, material silt content (%) =	8
M, moisture content (%) =	10
Hours of Operation per Day =	6
Days of Operation per Week =	5
Weeks of Operation per Year =	4

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Emission Calculations:

TSP emission factor (lb/hr) =	3.46E+00
TSP emissions (ton) =	2.08E-01
PM-10 emission factor (lb/hr) =	6.76E-01
PM-10 emissions (ton) =	4.05E-02

Total Project Emissions:

Concrete -	0.00E+00 tpy TSP	0.00E+00 tpy PM10
Paved Roads -	9.65E-01 tpy TSP	1.88E-01 tpy PM10
Soil Handling -	1.39E-02 tpy TSP	6.58E-03 tpy PM10
Backhoe -	2.01E-02 tpy TSP	7.91E-03 tpy PM10
Bulldozer -	2.08E-01 tpy TSP	4.05E-02 tpy PM10
Total	1.21E+00 tpy TSP	2.43E-01 tpy PM10

Radionuclide emissions assuming 1000 pCi/gram Pu-239

Radionuclide	pCi/gram	pCi/gram (Data)	Total Pci	Total Ci	Total Ci (Data)
Am-241	0	0	0.00E+00	0.00E+00	0.00E+00
Pu-238	0	0	0.00E+00	0.00E+00	0.00E+00
Pu-239	0	0	0.00E+00	0.00E+00	0.00E+00
Pu-240	0	0	0.00E+00	0.00E+00	0.00E+00
Pu-241	0	0	0.00E+00	0.00E+00	0.00E+00
Pu-242	0	0	0.00E+00	0.00E+00	0.00E+00
U-234	0	0	0.00E+00	0.00E+00	0.00E+00
U-235	0	0	0.00E+00	0.00E+00	0.00E+00
U-238	0	0	0.00E+00	0.00E+00	0.00E+00

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Importing 100,000 cubic yards of soil from off-Site-paved roads - July

Description:

The volume of soil to be brought in from off-site is 100,000 yd³
 Soil will be stored in individual 17yd³ piles.
 Soil will hauled in 17 yd³ trucks (33 Mg/36 tons ave. weight) about 4 miles RT on Site paved roads.
 Soil will be staged for a maximum of one year at Buildings 991 and 881..
 All 100,000 yd³ will be loaded or dumped by a truck resulting in soil handling emissions.

Paved Roads (AP-42, 13.2.1)

Emission Factor Equation: $EF = k * [(sL/2)^{0.65}] * [(W/3)^{1.5}] - C$

Inputs/Assumptions: k, particle size multiplier (AP-42, 1 0.082 TSP (<30 microns)
 0.016 PM-10 (< 10 microns)
 C, brake wear & tire wear (AP-42, 4.70E-04 lb/VMT
 sL, silt loading factor (g/m²) (AP 7.1

W, average weight of vehicle (to	36
n, number of vehicles =	1
x, number of trips per vehicle =	5,883
RT, total round trip miles travel	4
VMT, vehicle miles traveled =	2.35E+04
--> VMT=n*x*RT	-----

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project. (NOTE: VMT is calculated.)

Emission Calculations:

TSP emission factor (lb/VMT) =	7.77E+00
TSP emissions (ton) =	9.14E+01

PM-10 emission factor (lb/VMT) =	1.51E+00
PM-10 emissions (ton) =	1.78E+01

Soil Handling w/Frontend Loader or Dump Truck (AP-42, 13.2.4) - loading and unloading soil

Emission Factor Equations: $EF = k \cdot (0.0032)^k \cdot (U/5)^{1.3} / [(M/2)^{1.4}]$, lb/ton

Inputs/Assumptions: k, particle size multiplier (AP-42, T) 0.74 TSP
 0.35 PM-10
 U, average wind speed (mph) = 9
 M, soil moisture content (%) = 10
 d, density of soil (lb/ft³) = 117

V, volume of soil handled (yd³) 100,000
 W, weight of soil handled (ton) 1.58E+05
 --> $W = V \cdot d \cdot (27 \text{ ft}^3 / 1 \text{ yd}^3) \cdot (1 \text{ to } \dots)$

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project. (Note: W is calculated.)

Emission Calculations: TSP emission factor (lb/ton) = 5.34E-04
 TSP emissions (ton) = 4.22E-02

PM-10 emission factor (lb/ton) = 2.53E-04
 PM-10 emissions (ton) = 2.00E-02

Total Project Emissions:

Stockpiles -	3.20E+00 tpy TSP	1.60E+00 tpy PM10
Paved Roads -	9.14E+01 tpy TSP	1.78E+01 tpy PM10
Soil Handling -	4.22E-02 tpy TSP	2.00E-02 tpy PM10
Total	9.46E+01 tpy TSP	1.94E+01 tpy PM10

Project to Import and stockpile 100,000 yd³ of soil from off-site

Storage pile dimension calculator -- for a group of piles

Pile Volume = cu.yd.

Number of Piles =
(Total soil volume = 99994 cu.yd.)

$$V = (\pi)(r^2)(h)/3$$

$$r = (V/4/\pi)^{(1/3)}$$

$$h = (2/3)(2r)$$

$$S = (\pi)(r)(\text{SQRT}(r^2 + h^2))$$

V = volume

r = radius

h = height

S = surface area

r = 1.11 yards

r = 1.01 meters

h = 1.35 meters

S = 5.36 sq. meters

Windborne Dust Emissions Estimator

Pile Volume = 17 cubic yards

of Piles = 5882

TSP = 3.20 tons/yr

PM10 = 1.60 tons/yr

Note: each pile is disturbed twice in its lifetime--once when placed into storage, once when removed
Assume maximum storage of 1 year

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Present Landfill Remediation - July

Description: Utilize soil from new landfill borrow area.
 The volume of soil from new landfill borrow area is 68,000 yd³ (assuming all will come from borrow area)
 All 68,000 yd³ will be hauled in 12 yd³ trucks (21.4 tons ave. weight) about 0.5 mile RT on unpaved roads.
 Backhoe/trackhoe will be used for 68,000 yd³ at T371 borrow area
 Bulldozer will be used to spread and compact soil at B771/774 fill area.
 Soil handling emissions will result from loading and unloading trucks - 136,000 yd³.
 Emissions will result from graders.

Unpaved Road Emissions (AP-42, 13.2.2, 12/03)

Emission Factor Eq: $EF = k * ((s/12)^a) * ((W/3)^b)$, in lb/VMT

Emissions Equation: $E = EF * VMT$

Inputs/Assumptions:

k, from Table 13.2.2-2 =	4.9	TSP (PM-30)
	1.5	PM-10
	0.23	PM-2.5
s, % silt content =	4.8	Sand and Gravel Processing Ave.
a, from Table 13.2.2-2	0.7	TSP (PM-30)
	0.9	PM-10
	0.9	PM-2.5
b, from Table 13.2.2-2	0.45	TSP (PM-30)
	0.45	PM-10
	0.45	PM-2.5
W, average weight of vehicle (to	21.4	
w, number of wheels on vehicle	10	
n, number of vehicles =	1	
x, number of trips per vehicle =	5667	
RT, total round trip miles travel	0.5	
Total Material Volume Transpor	68,000	
VMT, vehicle miles traveled =	2.83E+03	
where $VMT = n * x * RT$	-----	

Emission Calculations:

TSP emission factor, lb/VMT =	6.25E+00
TSP emissions, tons =	8.85E+00

PM-10 emission factor, lb/VMT =	1.59E+00
PM-10 emissions, tons =	2.26E+00

PM-2.5 emission factor, lb/VMT =	2.44E-01
PM-2.5 emissions, tons =	3.46E-01

Soil Handling with Front-end Loader or Truck (AP-42, 13.2.4 - loading and unloading excavated soil.

Inputs/Assumptions: k, particle size multiplier (AP-42, T) 0.74 TSP
0.35 PM-10

Inputs/Assumptions: U, average wind speed (mph) = 9
M, soil moisture content (%) = 10
d, density of soil (lb/ft³) = 117

V, volume of soil handled (yd³) 136,000
W, weight of soil handled (ton) 2.15E+05
--> W=V*d*(27 ft³/1 yd³)*(1 to -----

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project. (Note: W is calculated.)

Emission Calculations:

TSP emission factor (lb/ton) = 5.34E-04
TSP emissions (ton) = 5.74E-02

PM-10 emission factor (lb/ton) = 2.53E-04
PM-10 emissions (ton) = 2.71E-02

Grader (AP- 42, Table 11.9-2)

Emission Factor Equation: TSP EF = 0.040*(S)^{2.5}, lb/VMT

PM-10 EF = 0.60*[0.051*(S)^{2.0}], lb/VMT

Inputs/Assumptions:

S, average vehicle speed (mph) 5
n, number of graders = 1
x, operating days per year = 20
RT, miles traveled per day per g 20
VMT, vehicle miles traveled per 4.00E+02
--> VMT = n*x*RT -----

* Items in bolded red font must be input specifically for each project. (Note: VMT is calculated.)

Emission Calculations:

TSP emission factor (lb/VMT) = 2.24E+00
TSP emissions (ton) = 4.47E-01

PM-10 emission factor (lb/VMT) = 7.65E-01
PM-10 emissions (ton) = 1.53E-01

Excavation w/Backhoe (AP-42, Table 11.9-2)

$$\text{TSP EF} = [0.0021 \cdot (d)^{1.1}] / [(M)^{0.3}], \text{ lb/yd}^3$$

Emission Factor Equations: $\text{PM-10 EF} = 0.75 \cdot \{ [0.0021 \cdot (d)^{0.7}] / [(M)^{0.3}] \}, \text{ lb/yd}^3$

Inputs/Assumptions: d, drop height (ft) = 5
M, moisture content (%) = 10
V, volume of soil excavated (yd) = 68000

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Emission Calculations:

TSP emission factor (lb/yd³) = 6.18E-03
TSP emissions (ton) = 2.10E-01

PM-10 emission factor (lb/yd³) = 2.44E-03
PM-10 emissions (ton) = 8.28E-02

Bulldozer (AP-42, Table 11.9-2) (Pushing and Compacting Soil)

Emission Factor Equations: $\text{TSP EF} = 5.7 \cdot [(s)^{1.2}] / [(M)^{1.3}], \text{ lb/hr}$

$$\text{PM-10 EF} = 0.75 \cdot [1.0 \cdot [(s)^{1.5}] / [(M)^{1.4}], \text{ lb/hr}$$

Inputs/Assumptions: s, material silt content (%) = 8
M, moisture content (%) = 10
Hours of Operation per Day = 6
Days of Operation per Week = 5
Weeks of Operation per Year = 8

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project.

Emission Calculations:

TSP emission factor (lb/hr) = 3.46E+00
TSP emissions (ton) = 4.16E-01

PM-10 emission factor (lb/hr) = 6.76E-01
PM-10 emissions (ton) = 8.11E-02

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Total Project Emissions:	TSP	PM-10
Unpaved Roads -	8.85E+00 tpy TSP	2.26E+00 tpy PM10
Soil Handling -	5.74E-02 tpy TSP	2.71E-02 tpy PM10
Graders -	4.47E-01 tpy TSP	1.53E-01 tpy PM10
Backhoe -	2.10E-01 tpy TSP	8.28E-02 tpy PM10
Bulldozer -	4.16E-01 tpy TSP	8.11E-02 tpy PM10
Total	9.98E+00 tpy TSP	2.60E+00 tpy PM10

Radionuclide emissions.

Radionuclide	pCi/gram	pCi/gram (Data)	Total Pci	Total Ci
Am-241	0	0	0.00E+00	0.00E+00
Pu-238	0	0	0.00E+00	0.00E+00
Pu-239	0	0	0.00E+00	0.00E+00
Pu-240	0	0	0.00E+00	0.00E+00
Pu-241	0	0	0.00E+00	0.00E+00
Pu-242	0	0	0.00E+00	0.00E+00
U-234	0	0	0.00E+00	0.00E+00
U-235	0	0	0.00E+00	0.00E+00
U-238	0	0	0.00E+00	0.00E+00

Soil Handling with Front-end Loader or Truck (AP-42, 13.2.4 - loading and unloading excavated soil.

Inputs/Assumptions: k, particle size multiplier (AP-42, T) 0.74 TSP
0.35 PM-10

Inputs/Assumptions: U, average wind speed (mph) = 9
M, soil moisture content (%) = 10
d, density of soil (lb/ft³) = 117

V, volume of soil handled (yd³) = 210,000
W, weight of soil handled (ton) = 3.32E+05
--> $W = V \cdot d \cdot (27 \text{ ft}^3 / 1 \text{ yd}^3) \cdot (1 \text{ to } \dots)$

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project. (Note: W is calculated.)

TSP emission factor (lb/ton) = 5.34E-04
TSP emissions (ton) = 8.86E-02

Emission Calculations:

PM-10 emission factor (lb/ton) = 2.53E-04
PM-10 emissions (ton) = 4.19E-02

Excavation w/Backhoe (AP-42, Table 11.9-2)

Emission Factor Equations: TSP EF = $\{0.0021 \cdot (d)^{1.1} / [(M)^{0.3}]\}$, lb/yd³
PM-10 EF = $0.75 \cdot \{[0.0021 \cdot (d)^{0.7} / [(M)^{0.3}]]\}$, lb/yd³

Inputs/Assumptions: d, drop height (ft) = 5
M, moisture content (%) = 10

V, volume of soil excavated (yd) = 85500

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project.

Emission Calculations:

TSP emission factor (lb/yd³) = 6.18E-03
TSP emissions (ton) = 2.64E-01

PM-10 emission factor (lb/yd³) = 2.44E-03
PM-10 emissions (ton) = 1.04E-01

Bulldozer (AP-42, Table 11.9-2) (Pushing and Compacting Soil)

Emission Factor Equations: TSP EF = $5.7 * [(s)^{1.2} / ((M)^{1.3})]$, lb/hr

PM-10 EF = $0.75 * [1.0 * ((s)^{1.5} / ((M)^{1.4})]$, lb/hr

Inputs/Assumptions:	s, material silt content (%) =	8
	M, moisture content (%) =	10
	Hours of Operation per Day =	6
	Days of Operation per Week =	5
	Weeks of Operation per Year =	4

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project.

Emission Calculations:

TSP emission factor (lb/hr) =	3.46E+00
TSP emissions (ton) =	2.08E-01

PM-10 emission factor (lb/hr) =	6.76E-01
PM-10 emissions (ton) =	4.05E-02

Total Project Emissions:

	TSP	PM-10
Paved Roads -	1.90E+01 tpy TSP	3.71E+00 tpy PM10
Soil Handling -	8.86E-02 tpy TSP	4.19E-02 tpy PM10
Backhoe -	2.64E-01 tpy TSP	1.04E-01 tpy PM10
Bulldozer -	2.08E-01 tpy TSP	4.05E-02 tpy PM10
Total	1.96E+01 tpy TSP	3.90E+00 tpy PM10

Radionuclide emissions.

Radionuclide	pCi/gram	pCi/gram (Data)	Total Pci	Total Ci
Am-241	0	0	0.00E+00	0.00E+00
Pu-238	0	0	0.00E+00	0.00E+00
Pu-239	0	0	0.00E+00	0.00E+00
Pu-240	0	0	0.00E+00	0.00E+00
Pu-241	0	0	0.00E+00	0.00E+00
Pu-242	0	0	0.00E+00	0.00E+00
U-234	0	0	0.00E+00	0.00E+00
U-235	0	0	0.00E+00	0.00E+00
U-238	0	0	0.00E+00	0.00E+00

Original Landfill Remediation - small trucks - July

Description: Utilize 80,000 yd³ of soil from off-site for cap cover.
 80,000 yd³ will be hauled in 12 yd³ trucks (19.4 Mg/21.4 tons ave. weight) about 2 miles RT on paved roads.
 6,667 loads.
 A grader will be utilized for 20 days at 20 miles per day.
 Bulldozer will be used to spread and compact soil at B881 fill area.
 Soil handling emissions will result from unloading trucks - 80,000 yd³.

Paved Roads (AP-42, 13.2.1)

Emission Factor Equation: $EF = k * [(sL/2)^{0.65}] * [(W/3)^{1.5}], (lb/VMT) - C$

Inputs/Assumptions: k, particle size multiplier (AP-42, 1 0.082 TSP (<30 microns)
 0.016 PM-10 (< 10 microns)
 C, Tire and brake wear (AP-42, 13 0.00047 lb/VMT
 sL, silt loading factor (g/m²) (AP 7.1

W, average weight of vehicle (to	21.4
n, number of vehicles =	1
x, number of trips per vehicle =	6,667
RT, total round trip miles travel	2
VMT, vehicle miles traveled =	1.33E+04
--> VMT=n*x*RT	-----

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project. (NOTE: VMT is calculated.)

Emission Calculations: TSP emission factor (lb/VMT) = 3.56E+00
 TSP emissions (ton) = 2.37E+01

PM-10 emission factor (lb/VMT) = 6.94E-01
 PM-10 emissions (ton) = 4.63E+00

Soil Handling with Front-end Loader or Truck (AP-42, 13.2.4 - loading and unloading excavated soil.

Inputs/Assumptions: k, particle size multiplier (AP-42, T) 0.74 TSP
0.35 PM-10

Inputs/Assumptions: U, average wind speed (mph) = 9
M, soil moisture content (%) = 10
d, density of soil (lb/ft³) = 117

V, volume of soil handled (yd³) 80,000
W, weight of soil handled (ton) 1.26E+05
--> W=V*d*(27 ft³/1 yd³)*(1 to -----

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project. (Note: W is calculated.)

TSP emission factor (lb/ton) = 5.34E-04
TSP emissions (ton) = 3.37E-02

Emission Calculations:

PM-10 emission factor (lb/ton) = 2.53E-04
PM-10 emissions (ton) = 1.60E-02

Grader (AP- 42, Table 11.9-2)

Emission Factor Equation: TSP EF = 0.040*(S)^{2.5}, lb/VMT

PM-10 EF = 0.60*[0.051*(S)^{2.0}], lb/VMT

Inputs/Assumptions:

S, average vehicle speed (mph) 5
n, number of graders = 1
x, operating days per year = 20
RT, miles traveled per day per g 20
VMT, vehicle miles traveled per 4.00E+02
--> VMT = n*x*RT -----

* Items in bolded red font must be input specifically for each project. (Note: VMT is calculated.)

Emission Calculations:

TSP emission factor (lb/VMT) = 2.24E+00
TSP emissions (ton) = 4.47E-01

PM-10 emission factor (lb/VMT) = 7.65E-01
PM-10 emissions (ton) = 1.53E-01

Bulldozer (AP-42, Table 11.9-2) (Pushing and Compacting Soil)

Emission Factor Equations: TSP EF = $5.7 * ((s)^{1.2}) / ((M)^{1.3})$, lb/hr

PM-10 EF = $0.75 * [1.0 * ((s)^{1.5}) / ((M)^{1.4})]$, lb/hr

Inputs/Assumptions:	s, material silt content (%) =	8
	M, moisture content (%) =	10
	Hours of Operation per Day =	6
	Days of Operation per Week =	5
	Weeks of Operation per Year =	8

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project.

Emission Calculations:

TSP emission factor (lb/hr) =	3.46E+00
TSP emissions (ton) =	4.16E-01

PM-10 emission factor (lb/hr) =	6.76E-01
PM-10 emissions (ton) =	8.11E-02

Total Project Emissions:	TSP	PM-10
Paved Roads -	2.37E+01 tpy TSP	4.63E+00 tpy PM10
Soil Handling -	3.37E-02 tpy TSP	1.60E-02 tpy PM10
Graders -	4.47E-01 tpy TSP	1.53E-01 tpy PM10
Bulldozer -	4.16E-01 tpy TSP	8.11E-02 tpy PM10
Total	2.46E+01 tpy TSP	4.88E+00 tpy PM10

Radionuclide emissions.

Radionuclide	pCi/gram	pCi/gram (Data)	Total Pci	Total Ci
Am-241	0	0	0.00E+00	0.00E+00
Pu-238	0	0	0.00E+00	0.00E+00
Pu-239	0	0	0.00E+00	0.00E+00
Pu-240	0	0	0.00E+00	0.00E+00
Pu-241	0	0	0.00E+00	0.00E+00
Pu-242	0	0	0.00E+00	0.00E+00
U-234	0	0	0.00E+00	0.00E+00
U-235	0	0	0.00E+00	0.00E+00
U-238	0	0	0.00E+00	0.00E+00

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Building 776/777/707 Backfill - Trucks on Unpaved Roads - July

Description: Utilize 35,000 yd3 of soil from North Walnut Creek borrow area.
 All 35,000 yd3 will be hauled in 12 yd3 trucks (21.4 tons ave. weight) about 0.5 mile RT on unpaved roads.
 2917 trips.
 Trackhoe/backhoe will be used at borrow area for 35,000 yd3 soil.
 Bulldozer will be used to spread and compact soil at building fill area.
 Soil handling emissions will result from trucks dumping soil at basement - 35,000 yd3.

Unpaved Road Emissions (AP-42, 13.2.2, 12/03)

Emission Factor Eq: $EF = k * ((s/12)^a * ((W/3)^b))$, in lb/VMT

Emissions Equation: $E = EF * VMT$

Inputs/Assumptions:

k, from Table 13.2.2-2 =	4.9	TSP (PM-30)
	1.5	PM-10
	0.23	PM-2.5
s, % silt content =	4.8	Sand and Gravel Processing Ave.
a, from Table 13.2.2-2	0.7	TSP (PM-30)
	0.9	PM-10
	0.9	PM-2.5
b, from Table 13.2.2-2	0.45	TSP (PM-30)
	0.45	PM-10
	0.45	PM-2.5
W, average weight of vehicle (to	21.4	
w, number of wheels on vehicle	10	
n, number of vehicles =	1	
x, number of trips per vehicle =	2917	
RT, total round trip miles travel	0.5	
Total Material Volume Transpor	35,000	
VMT, vehicle miles traveled =	1.46E+03	
where VMT = n*x*RT	-----	

Emission Calculations:

TSP emission factor, lb/VMT =	6.25E+00
TSP emissions, tons =	4.56E+00

PM-10 emission factor, lb/VMT =	1.59E+00
PM-10 emissions, tons =	1.16E+00

PM-2.5 emission factor, lb/VMT =	2.44E-01
PM-2.5 emissions, tons =	1.78E-01

Soil Handling with Front-end Loader or Truck (AP-42, 13.2.4 - loading and unloading excavated soil.

Inputs/Assumptions: k, particle size multiplier (AP-42, T 0.74 TSP
0.35 PM-10
U, average wind speed (mph) = 9
M, soil moisture content (%) = 10
d, density of soil (lb/ft³) = 117

V, volume of soil handled (yd³) = 35,000
W, weight of soil handled (ton) = 5.53E+04
--> W=V*d*(27 ft³/1 yd³)*(1 to -----

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project. (Note: W is calculated.)

Emission Calculations:

TSP emission factor (lb/ton) = 5.34E-04
TSP emissions (ton) = 1.48E-02

PM-10 emission factor (lb/ton) = 2.53E-04
PM-10 emissions (ton) = 6.98E-03

Excavation w/Backhoe (AP-42, Table 11.9-2)

Emission Factor Equations: TSP EF = [0.0021*(d)^{1.1}]/[(M)^{0.3}], lb/yd³
PM-10 EF = 0.75*{[0.0021*(d)^{0.7}]/[(M)^{0.3}]}, lb/yd³

Inputs/Assumptions: d, drop height (ft) = 5
M, moisture content (%) = 10

V, volume of soil excavated (yd) = 35000

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project.

Emission Calculations:

TSP emission factor (lb/yd³) = 6.18E-03
TSP emissions (ton) = 1.08E-01

PM-10 emission factor (lb/yd³) = 2.44E-03
PM-10 emissions (ton) = 4.26E-02

Bulldozer (AP-42, Table 11.9-2) (Pushing and Compacting Soil)

Emission Factor Equations: $TSP\ EF = 5.7 * [(s)^{1.2}] / [(M)^{1.3}]$, lb/hr

$PM-10\ EF = 0.75 * [1.0 * (s)^{1.5}] / [(M)^{1.4}]$, lb/hr

Inputs/Assumptions:	s, material silt content (%) =	8
	M, moisture content (%) =	10
	Hours of Operation per Day =	6
	Days of Operation per Week =	5
	Weeks of Operation per Year =	4

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project.

Emission Calculations:

TSP emission factor (lb/hr) =	3.46E+00
TSP emissions (ton) =	2.08E-01

PM-10 emission factor (lb/hr) =	6.76E-01
PM-10 emissions (ton) =	4.05E-02

Total Project Emissions:

	TSP	PM-10
Unpaved Roads -	4.56E+00 tpy TSP	1.16E+00 tpy PM10
Soil Handling -	1.48E-02 tpy TSP	6.98E-03 tpy PM10
Backhoe -	1.08E-01 tpy TSP	4.26E-02 tpy PM10
Bulldozer -	2.08E-01 tpy TSP	4.05E-02 tpy PM10
Total	4.89E+00 tpy TSP	1.25E+00 tpy PM10

Radionuclide emissions.

Radionuclide	pCi/gram	pCi/gram (Data)	Total Pci	Total Ci
Am-241	0	0	0.00E+00	0.00E+00
Pu-238	0	0	0.00E+00	0.00E+00
Pu-239	0	0	0.00E+00	0.00E+00
Pu-240	0	0	0.00E+00	0.00E+00
Pu-241	0	0	0.00E+00	0.00E+00
Pu-242	0	0	0.00E+00	0.00E+00
U-234	0	0	0.00E+00	0.00E+00
U-235	0	0	0.00E+00	0.00E+00
U-238	0	0	0.00E+00	0.00E+00

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Building 460/444 Backfill - July

Description: Utilize 25,000 yd³ of soil from T130 Berm and South Walnut Creek.
 25,000 yd³ will be hauled in 12 yd³ trucks (19.4 Mg/21.4 ton ave. weight) about 1 mile RT on Site paved roads.
 Backhoe/trackerhoe will be used for 25,000 yd³ at both borrow areas.
 Bulldozer will be used to spread and compact soil at building fill area.
 Soil handling emissions will result from front-end loader and unloading trucks - 50,000 yd³.

Paved Roads (AP-42, 13.2.1)

Emission Factor Equation: $EF = k * [(sL/2)^{0.65}] * [(W/3)^{1.5}] - C$, (lb/VMT)

Inputs/Assumptions: k, particle size multiplier (AP-42, 1 0.082 TSP (<30 microns)
 0.016 PM-10 (< 10 microns)
 C, tire and brake wear (AP-42, 13. 0.00047 lb/VMT
 sL, silt loading factor (g/m²) (AP 7.1

W, average weight of vehicle (to	21.4
n, number of vehicles =	1
x, number of trips per vehicle =	2,084
RT, total round trip miles travel	1
VMT, vehicle miles traveled =	2.08E+03
--> VMT=n*x*RT	-----

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project. (NOTE: VMT is calculated.)

Emission Calculations: TSP emission factor (lb/VMT) = 3.56E+00
 TSP emissions (ton) = 3.71E+00

PM-10 emission factor (lb/VMT) = 6.94E-01
 PM-10 emissions (ton) = 7.23E-01

Soil Handling with Front-end Loader or Truck (AP-42, 13.2.4 - loading and unloading excavated soil.

Inputs/Assumptions: k, particle size multiplier (AP-42, T) 0.74 TSP
0.35 PM-10

Inputs/Assumptions: U, average wind speed (mph) = 9
M, soil moisture content (%) = 10
d, density of soil (lb/ft³) = 117

V, volume of soil handled (yd³) = 50,000
W, weight of soil handled (ton) = 7.90E+04
--> $W = V * d * (27 \text{ ft}^3 / 1 \text{ yd}^3) * (1 \text{ to } \dots)$

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project. (Note: W is calculated.)

TSP emission factor (lb/ton) = 5.34E-04
TSP emissions (ton) = 2.11E-02

Emission Calculations:

PM-10 emission factor (lb/ton) = 2.53E-04
PM-10 emissions (ton) = 9.98E-03

Excavation w/Backhoe (AP-42, Table 11.9-2)

Emission Factor Equations: TSP EF = $[0.0021 * (d)^{1.1}] / [(M)^{0.3}]$, lb/yd³
PM-10 EF = $0.75 * [0.0021 * (d)^{0.7}] / [(M)^{0.3}]$, lb/yd³

Inputs/Assumptions: d, drop height (ft) = 5
M, moisture content (%) = 10

V, volume of soil excavated (yd) = 25000

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project.

Emission Calculations: TSP emission factor (lb/yd³) = 6.18E-03
TSP emissions (ton) = 7.73E-02

PM-10 emission factor (lb/yd³) = 2.44E-03
PM-10 emissions (ton) = 3.04E-02

Bulldozer (AP-42, Table 11.9-2) (Pushing and Compacting Soil)

Emission Factor Equations: $TSP\ EF = 5.7 * [(s)^{1.2}] / [(M)^{1.3}]$, lb/hr

$PM-10\ EF = 0.75 * [1.0 * [(s)^{1.5}] / [(M)^{1.4}]]$, lb/hr

Inputs/Assumptions: s, material silt content (%) = 8
 M, moisture content (%) = 10
Hours of Operation per Day = 6
Days of Operation per Week = 5
Weeks of Operation per Year = 4

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project.

Emission Calculations:

TSP emission factor (lb/hr) = 3.46E+00
TSP emissions (ton) = 2.08E-01

PM-10 emission factor (lb/hr) = 6.76E-01
PM-10 emissions (ton) = 4.05E-02

Total Project Emissions:	TSP	PM-10
Paved Roads -	3.71E+00 tpy TSP	7.23E-01 tpy PM10
Soil Handling -	2.11E-02 tpy TSP	9.98E-03 tpy PM10
Backhoe -	7.73E-02 tpy TSP	3.04E-02 tpy PM10
Bulldozer -	2.08E-01 tpy TSP	4.05E-02 tpy PM10
Total	4.01E+00 tpy TSP	8.04E-01 tpy PM10

Radionuclide emissions.

Radionuclide	pCi/gram	pCi/gram (Data)	Total Pci	Total Ci
Am-241	0	0	0.00E+00	0.00E+00
Pu-238	0	0	0.00E+00	0.00E+00
Pu-239	0	0	0.00E+00	0.00E+00
Pu-240	0	0	0.00E+00	0.00E+00
Pu-241	0	0	0.00E+00	0.00E+00
Pu-242	0	0	0.00E+00	0.00E+00
U-234	0	0	0.00E+00	0.00E+00
U-235	0	0	0.00E+00	0.00E+00
U-238	0	0	0.00E+00	0.00E+00

Building 371 Backfill - scrapers - July

Description: Utilize 136,000 yd³ of soil from B371 NE borrow area.
 All 136,000 yd³ will be hauled in 23 yd³ scrapers (40 tons ave. wt.) 0.25 mi. round trip.
 Backhoe/trackerhoe will be used for 136,000 yd³ at B371 NE borrow area
 Bulldozer will be used to spread and compact soil at B371 fill area.
 Soil handling emissions will result from scrapers dropping soil - 136,000 yd³.

Unpaved Road Emissions (AP-42, 13.2.2, 12/03)

Emission Factor Eq: $EF = k * ((s/12)^a) * ((W/3)^b)$, in lb/VMT

Emissions Equation: $E = EF * VMT$

Inputs/Assumptions:

k, from Table 13.2.2-2 =	4.9	TSP (PM-30)
	1.5	PM-10
	0.23	PM-2.5
s, % silt content =	4.8	Sand and Gravel Processing ave.
a, from Table 13.2.2-2	0.7	TSP (PM-30)
	0.9	PM-10
	0.9	PM-2.5
b, from Table 13.2.2-2	0.45	TSP (PM-30)
	0.45	PM-10
	0.45	PM-2.5
W, average weight of vehicle (to	40	
w, number of wheels on vehicle	4	
n, number of vehicles =	1	
x, number of trips per vehicle =	5913	
RT, total round trip miles travel	0.25	
Total Material Volume Transpor	136,000	
VMT, vehicle miles traveled =	1.48E+03	
where $VMT = n * x * RT$	-----	

Emission Calculations:

TSP emission factor, lb/VMT =	8.28E+00
TSP emissions, tons =	6.12E+00

PM-10 emission factor, lb/VMT =	2.11E+00
PM-10 emissions, tons =	1.56E+00

PM-2.5 emission factor, lb/VMT =	3.23E-01
PM-2.5 emissions, tons =	2.39E-01

Soil Handling with Front-end Loader or Truck (AP-42, 13.2.4 - loading and unloading excavated soil.

Inputs/Assumptions: k, particle size multiplier (AP-42, T) 0.74 TSP
0.35 PM-10

Inputs/Assumptions: U, average wind speed (mph) = 9
M, soil moisture content (%) = 10
d, density of soil (lb/ft³) = 117

V, volume of soil handled (yd³) 136,000
W, weight of soil handled (ton) 2.15E+05
--> $W = V * d * (27 \text{ ft}^3 / 1 \text{ yd}^3) * (1 \text{ to } \dots)$

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project. (Note: W is calculated.)

Emission Calculations:

TSP emission factor (lb/ton) = 5.34E-04
TSP emissions (ton) = 5.74E-02

PM-10 emission factor (lb/ton) = 2.53E-04
PM-10 emissions (ton) = 2.71E-02

Excavation w/Backhoe (AP-42, Table 11.9-2)

Emission Factor Equations: TSP EF = $0.0021 * (d)^{1.1} / [(M)^{0.3}]$, lb/yd³
PM-10 EF = $0.75 * \{0.0021 * (d)^{0.7} / [(M)^{0.3}]\}$, lb/yd³

Inputs/Assumptions: d, drop height (ft) = 5
M, moisture content (%) = 10

V, volume of soil excavated (yd) 136000

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project.

Emission Calculations:

TSP emission factor (lb/yd³) = 6.18E-03
TSP emissions (ton) = 4.20E-01

PM-10 emission factor (lb/yd³) = 2.44E-03
PM-10 emissions (ton) = 1.66E-01

33/33
 Bulldozer (AP-42, Table 11.9-2) (Pushing and Compacting Soil)

Emission Factor Equations: TSP EF = $5.7 * [(s)^{1.2} / ((M)^{1.3})]$, lb/hr

PM-10 EF = $0.75 * [1.0 * [(s)^{1.5} / ((M)^{1.4})]]$, lb/hr

Inputs/Assumptions: s, material silt content (%) = 8
 M, moisture content (%) = 10
Hours of Operation per Day = 6
Days of Operation per Week = 5
Weeks of Operation per Year = 4

* Items in regular black font are given or are used consistently site-wide and do not generally change from project to project. Items in bolded red font must be input specifically for each project.

Emission Calculations:

TSP emission factor (lb/hr) = 3.46E+00
TSP emissions (ton) = 2.08E-01

PM-10 emission factor (lb/hr) = 6.76E-01
PM-10 emissions (ton) = 4.05E-02

Total Project Emissions:

	TSP	PM-10
Unpaved Roads -	6.12E+00 tpy TSP	1.56E+00 tpy PM10
Soil Handling -	5.74E-02 tpy TSP	2.71E-02 tpy PM10
Backhoe -	4.20E-01 tpy TSP	1.66E-01 tpy PM10
Bulldozer -	2.08E-01 tpy TSP	4.05E-02 tpy PM10
Total	6.80E+00 tpy TSP	1.79E+00 tpy PM10

Radionuclide emissions.

Radionuclide	pCi/gram	pCi/gram (Data)	Total Pci	Total Ci
Am-241	0	0	0.00E+00	0.00E+00
Pu-238	0	0	0.00E+00	0.00E+00
Pu-239	0	0	0.00E+00	0.00E+00
Pu-240	0	0	0.00E+00	0.00E+00
Pu-241	0	0	0.00E+00	0.00E+00
Pu-242	0	0	0.00E+00	0.00E+00
U-234	0	0	0.00E+00	0.00E+00
U-235	0	0	0.00E+00	0.00E+00
U-238	0	0	0.00E+00	0.00E+00