Mail Application To:		Application No. _____
New Mexico Environment Department Air Quality Bureau New Source Review Unit 2048 Galisteo Santa Fe, NM 87505 Phone (505) 827-1494 http://www.nmenv.state.nm.us		AIRS No. ____-____-____ *For NMED use only*

Air Quality Permit Application And Notice Of Intent
Universal (General) to Construct or Modify

Acknowledgement: **X** I acknowledge that a pre-application meeting is available to me upon request

X Permit filing fee enclosed, Check No.: _____

Part I – General Information

I-A: Company Information

1	Company name: **University of California for the U.S. Department of Energy**		Date application notarized: **6/28/2004**
2	Facility name: **Los Alamos National Laboratory**		SIC code (4 digits): **9711**
3	Company mailing address: **Meteorology and Air Quality Group, P.O. Box 1663, MS J978, Los Alamos, NM 87545**		
4	Contact person: **Jean Dewart**	Title: **Group Leader**	
5	Phone No: **505-665-0239**	Fax No: **505-665-8858**	E-mail: **dewart@lanl.gov**

I-B: Current Facility Status

1	This application is for (check one): □ New Facility, □ Modification to an existing facility, or □ Revision **N/A**	
2	Has this facility already been constructed? **X** Yes □No	If yes, is it currently operating in New Mexico? **X** Yes □No
3	Is the plant currently shut down? □Yes **X** No	If yes, give month and year of shut down (MM/YY):
4	Was this facility constructed before 1972 and operated since 1972? **X** Yes □No	
5	Does this facility have an operating permit under 20 NMAC 2.70? **X** Yes □No	If yes, the permit No. is: **P-100**
6	Has this facility been issued a No Permit Required (NPR)?**X**Yes No	If yes, the NPR number is: **2195A**
7	Has this facility been issued a Notice of Intent (NOI)? **X**Yes No	If yes, the NOI Number is: **2597**
8	Does this facility have a construction permit (20 NMAC 2.72, Section 200.A or 200.B) **X** Yes □No	
•	If yes, the permit No. is: **2195, 2195B-R1, 2195F, 2195H**	
9	Has this facility been issued a general permit (GCP-1, GCP-2,…)? **X** Yes □No	If yes, the registration No. is: **GCP3-2195G**
10	Is this a "major source" under the PSD rules? □Yes **X** No □Unsure.	Is this a "major source" under Title V (20 NMAC
•	2.70)? **X** Yes □No □Unsure.	Is this a major modification under the PSD rules (20 NMAC 2.74)? □Yes **X** No □Unsure.
11	If *Yes* or *Unsure* to any of the questions in question No. 10, contact the AQB to see if a pre-application meeting is required.	

Table I-B: Current Facility Status (continued)

12	What is the facility's maximum input capacity, specify units (reference here and list capacities in Attachment L if more room is required)			
•	Current	Hourly: **N/A[1]**	Daily: **N/A[1]**	Annually: **N/A[1]**
•	Proposed	Hourly: **N/A[1]**	Daily: **N/A[1]**	Annually: **N/A[1]**
13	What is the facility's maximum production rate, specify units (reference here and list capacities in Attachment L, if more room is required)			
•	Current	Hourly: **N/A[1]**	Daily: **N/A[1]**	Annually: **N/A[1]**
•	Proposed	Hourly: **N/A[1]**	Daily: **N/A[1]**	Annually: **N/A[1]**

[1]The TA-11 Fuel and Wood Fire Test sites are used to simulate and test accident scenarios which involve open burning. The TA-16 Flash Pad treats metal contaminated with HE. There are no input capacity or production rates associated with these activities.

Table I-C: Facility Location Information (TA-16/TA-11)

1	Section: **32/4**	Range: **6E/6E**	Township: **19N/18N**	County: **Los Alamos**	Elevation (ft): **7,406/7,341**
2	UTM Zone: □12 or **X**13	UTMH (one tenth of a km): **379.7/380.4**		UTMV (one tenth of a km): **3967.6/3966.6**	
OR	Latitude (deg., min., sec.):		Longitude (deg., min., sec.):		
3a	Name and zip code of nearest New Mexico town: **Los Alamos 87544**				
3b	Distance and Direction from nearest New Mexico town: **Approximately 5 miles south of Los Alamos.**				
4	Detailed Driving Instructions from nearest NM town (attach a road map if necessary): The facility **entrance** is **5** (distance) miles **south** (direction) of **Los Alamos** (nearest town) **off West Jemez Rd (NM 501).**				
5	Status of land at facility (check one): □Private □Indian/Pueblo **X** Government **(Department of Energy)**				
6	Name of nearest Class I area to the facility (see Figure 1.0): **Bandelier Wilderness Area**				
7	Shortest distance from facility boundary to the boundary of the nearest Class I area (record to one tenth of a km): **2.4/1.9**				

Table I-D: Proposed Operating Schedule (Note: the operating schedule (D1, D2) shall become a condition of the permit)

1	Facility **maximum** operating ($\frac{\text{hours}}{\text{day}}$): **N/A**	($\frac{\text{days}}{\text{week}}$): **7**	($\frac{\text{weeks}}{\text{year}}$): **52**	($\frac{\text{hours}}{\text{year}}$): **N/A**			
2	Facility's maximum daily operating schedule (if less than 24 $\frac{\text{hours}}{\text{day}}$)? Start: **1 hr after sunrise**		**X** AM □PM	End: **1 hr before sunset**	AM **X** PM		
3	Month and year of anticipated start of construction: **N/A**						
4	Month and year of anticipated construction completion: **N/A**						
5	Month and year of anticipated startup of new or modified facility: **N/A**						
6	Will this facility operate at this site for more than one year? **X** Yes □No						

Table I-E: Other

1	Is this application in response to a Notice of Violation (NOV)? □Yes **X** No	
•	If yes, NOV date:	NOV Tracking No:
2	Is air quality dispersion modeling being submitted with this application? **X** Yes □No	
3	Does this facility require an "Air Toxics" permit under 20 NMAC 2.72, Part IV, Tables A and/or B in Part V? □Yes **X** No	
4	Will this facility be a source of federal Hazardous Air Pollutants? **X** Yes □No **(Not a major source)**	
•	If yes, list applicable subparts in 40 CFR 61 & 63: **40 CFR Part 61 – Subpart H**	

Part II – Required Attachments

The following Attachments are required, please label each accordingly. A complete application shall include:

Attachment A A process flow sheet and/or block diagram indicating the individual equipment, all emission points and types of control applied to those points. Numbering system should cross reference with Attachment B.

Attachment B A plot plan drawn to scale, showing emissions points, structures, tanks, and fences of property owned, leased, or under direct control of the applicant.

Attachment C All calculations used to determine both the hourly and annual controlled and uncontrolled emission rates. Reference where emission factors were obtained. If identical units are being permitted and will be subject to the same operating conditions, submit calculations for only one unit and a note specifying what other units the calculations represent.

Attachment D Information Used to Determine Emissions

- If manufacturer data are used, include specifications for emissions units and control equipment.
- If test data are used, include a copy of the complete test report. If the test data are for an emissions unit other than the one being permitted, the emission units must be identical. Test data may not be used if any difference in operating conditions of the unit being permitted and the unit represented in the test report significantly effect emission rates.
- If the most current copy of AP-42 is used, reference the section and date located at the bottom of the page. Include a copy of the page containing the emissions factors, and clearly mark the factors used in the calculations.
- If an older version of AP-42 is used, include a complete copy of the section.
- If an EPA document or other material is referenced, include a complete copy.
- Fuel specifications sheet.
- If computer models are used to estimate emissions, include an input summary (if available) and a detailed report, and a disk containing the input file(s) used to run the model. For tank-flashing emissions, include a discussion of the method used to estimate tank-flashing emissions, relative thresholds (i.e., permit or major source (NSPS, PSD or Title V)), accuracy of the model, the input and output from simulation models and software, all calculations, documentation of any assumptions used, descriptions of sampling methods and conditions, copies of any lab sample analysis.

Attachment E A map such as a 7.5 minute topographic quadrangle showing the exact location of the source. The map shall also include the following:

The UTM or Longitudinal coordinate system on both axes	An indicator showing which direction is north
A minimum radius around the plant of 5km (3.1 miles)	The nearest occupied structure(s)
Topographic features of the area	Access and haul roads
The name of the map	Facility property boundaries
A scale	The area which will be restricted to public access

Attachment F Proof of public notice; Include a copy of the certified letter receipts, a list of the places where the public notice has been posted, and: (see guidance document)

a sample of the letters sent to land owners	a sample and verification of the local postings
a sample of the letters sent to municipalities	a copy of the display ad and its affidavit of publication
a copy of the announcement sent to a local radio station	a copy of the classified ad and its affidavit of publication

Attachment G A written description of the routine operations of the facility. Include a description of how each piece of equipment will be operated, how controls will be used, and the fate of both the products and waste generated. For modifications and/or revisions, explain how the changes will affect the existing process.

Attachment H A PSD applicability determination for all sources. For PSD major sources applying for a significant permit revision, use the procedures for Determining the Net Emissions Change at a Source as specified by Table A-5 (Page A.45) of the EPA New Source Review Workshop Manual to determine if the revision is subject to PSD review.

Attachment I A discussion demonstrating compliance with each applicable state & federal regulation. If there is a state or federal regulation for your facility's source category that does not apply to your facility, explain why. For example 40 CFR 60 Subpart OOO (crushers), 40 CFR 63 Subpart HHH (HAPs), or 20 NMAC 2.74 (PSD major sources).

Attachment J A preliminary operational plan defining the measures to be taken to mitigate source emissions during malfunction, startup, or shutdown.

Attachment K An air quality dispersion modeling demonstration (if applicable) as outlined in the Air Quality Bureau's Dispersion Modeling Guidelines.

Attachment L Other relevant information. Use this attachment to clarify any part in the application that you think needs explaining. Reference the section, table, column, and/or field.

Submit the original signed and notarized copy of the application package and;

1) One working copy for department use, and
2) One copy if air dispersion modeling is included (include disks with input and output files), and
3) One copy if public notice was required, and
4) If subject to PSD review under 20 NMAC 2.74 (PSD) one copy for US EPA, one copy for each federal land manager affected (NPS, USFS, FWS, USDI), and one copy for each affected regulatory agency other than the Air Quality Bureau.

Part III – Production and Control Equipment

Table III-A: Regulated Equipment (Unit and stack numbering must correspond throughout the application package.)
Note: If applying for a NOI under 20 NMAC 2.73, equipment exemptions under 2.72, 202 do not apply, and all equipment should be listed here.

Unit No.	Manufacturer Date of Manufacture /Reconstruction. (MM/DD/YY)	Model No. Serial No.	Type (Source Description)	Capacity (Specify Units)	For Each Piece of Equipment, Check One	Applicable State Reg. (s) 20 NMAC 2.X, …	Replacing Unit No.
TA-16-FP	**N/A** **1951 / 1998 (Flash Pad)**	**N/A** **N/A**	**Concrete pad for treatment of metal and non-combustible material contaminated with HE.**	**N/A**	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To be Modified ☐ To be Replaced	**20.2.3 NMAC** **20.2.60 NMAC** **20.2.70 NMAC**	**N/A**
TA-11-WF	**N/A** **1956**	**N/A** **N/A**	**Test equipment for evaluation of fire impact scenarios.**	**N/A**	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To be Modified ☐ To be Replaced	**20.2.3 NMAC** **20.2.60 NMAC** **20.2.70 NMAC**	**N/A**
TA-11-FF	**N/A** **1956**	**N/A** **N/A**	**Test equipment for evaluation of fire impact scenarios.**	**N/A**	☒ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To be Modified ☐ To be Replaced	**20.2.3 NMAC** **20.2.60 NMAC** **20.2.70 NMAC**	**N/A**
					☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To be Modified ☐ To be Replaced		
					☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To be Modified ☐ To be Replaced		
					☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To be Modified ☐ To be Replaced		
					☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To be Modified ☐ To be Replaced		
					☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To be Modified ☐ To be Replaced		
					☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To be Modified ☐ To be Replaced		
					☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To be Modified ☐ To be Replaced		

Table III-B: 20 NMAC 2.72, 202.B Exempted Equipment (If exempt under 20 NMAC 2.72, 202.B.5, list emission rates in Table IV-A.)

(Unit and stack numbering must correspond throughout the application package.)

Note: This table is applicable only if applying for a 20 NMAC 2.72 permit. Exemptions under 20 NMAC 2.72, 202 do not apply to facilities requesting a NOI under 20 NMAC 2.73. See application form instructions and Exemptions Procedure for instructions on this form.

Unit No.	Manufac-turer / Date of Mfg. (MM/DD/YY)	Model No. / Serial No.	Type (Source Description)	Capacity (Specify Units)	For Each Piece of Equipment, Check One		Site Specific 20 NMAC 2.72.202 Exemption (e.g. 2.72.202.B.5)	Other Required Information
			N/A		Existing (unchanged) New/Additional To be Modified	To be Removed Replacement Unit To be Replaced		
					Existing (unchanged) New/Additional To be Modified	To be Removed Replacement Unit To be Replaced		
					Existing (unchanged) New/Additional To be Modified	To be Removed Replacement Unit To be Replaced		
					Existing (unchanged) New/Additional To be Modified	To be Removed Replacement Unit To be Replaced		
					Existing (unchanged) New/Additional To be Modified	To be Removed Replacement Unit To be Replaced		
					Existing (unchanged) New/Additional To be Modified	To be Removed Replacement Unit To be Replaced		
					Existing (unchanged) New/Additional To be Modified	To be Removed Replacement Unit To be Replaced		
					Existing (unchanged) New/Additional To be Modified	To be Removed Replacement Unit To be Replaced		
					Existing (unchanged) New/Additional To be Modified	To be Removed Replacement Unit To be Replaced		
					Existing (unchanged) New/Additional To be Modified	To be Removed Replacement Unit To be Replaced		

Table III-C: Emissions Control Equipment (Additional information)
(Unit and stack numbering must correspond throughout the application package.)

Unit No.	Control Equipment Description	Controlled Pollutant(s)	Controlling Emissions for Unit(s) No.	% Control by Weight	Estimation Method
	No control equipment required or feasible.				

Only list control equipment for TAPs if the TAP's PER is over its respective threshold as listed in 20 NMAC 2.72 Subpart V Tables A and B

Part IV - Emission Calculations

Table IV-A: Unit Emissions Rates List Toxic Air Pollutants (TAPs) In Table IV-C
(Unit and stack numbering must correspond throughout the application package.) Include tank-flashing emissions estimates.

	Potential emission rate (PER)[1]							Potential to emit (PTE)[2]						
Unit No.	**TSP lb/hr**	**PM10 lb/hr**	**NOx lb/hr**	**CO lb/hr**	**VOC lb/hr**	**SOx lb/hr**	**Lead H_2S lb/hr**	**TSP lb/hr**	**PM10 lb/hr**	**NOx lb/hr**	**CO lb/hr**	**VOC lb/hr**	**SOx lb/hr**	**Lead H_2S lb/hr**
	ton/yr	**ton/yr**	**ton/yr**	**ton/yr**	**ton/yr**	**ton/yr**	**ton/yr**	**ton/yr**	**ton/yr**	**ton/yr**	**ton/yr**	**ton/yr**	**ton/yr**	**ton/yr**
TA-16-FP	**0.5**	**0.5**	**0.4**	**0.1**	**0.003**	**0.001**	**N/A**	**0.5**	**0.5**	**0.4**	**0.1**	**0.003**	**0.001**	**N/A**
	0.08	**0.08**	**0.07**	**0.03**	**0.001**	**0.0001**	**N/A**	**0.08**	**0.08**	**0.07**	**0.03**	**0.001**	**0.0001**	**N/A**
TA-11-WF	**43.6**	**43.6**	**10.1**	**255**	**229**	**0.4**	**N/A**	**67.1**	**67.1**	**6.8**	**474.3**	**429.4**	**0.8**	**N/A**
	0.1	**0.1**	**0.03**	**0.6**	**0.6**	**0.001**	**N/A**	**0.7**	**0.7**	**0.07**	**4.7**	**4.3**	**0.008**	**N/A**
TA-11-FF	**11.6**	**11.6**	**23.5**	**6.8**	**0.3**	**39.2**	**N/A**	**11.6**	**11.6**	**23.5**	**6.8**	**0.3**	**39.2**	**N/A**
	0.03	**0.03**	**0.06**	**0.02**	**0.001**	**0.1**	**N/A**	**0.03**	**0.03**	**0.06**	**0.02**	**0.001**	**0.1**	**N/A**
		Note: TA-11-WF PER emissions are from current open burn application and based on burns of 1 ton/wood over 1 hour. PTE is based on burns of 7.5 tons/wood over 4 hours.												
Totals →	**55.7**	**55.7**	**34.0**	**261.9**	**229.3**	**39.6**	**N/A**	**79.2**	**79.2**	**30.7**	**481.2**	**429.7**	**40.0**	**N/A**
	0.2	**0.2**	**0.2**	**0.7**	**0.6**	**0.1**	**N/A**	**0.8**	**0.8**	**0.2**	**4.8**	**4.3**	**0.1**	**N/A**

[1] (PER) or "Potential Emission Rate" means the emission rate of a source at its maximum capacity to emit a regulated air contaminant under its physical and operational design, provided any physical or operational limitation on the capacity of the source to emit a regulated air contaminant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored or processed, shall be treated as part of its physical and operational design only if the limitation or the effect it would have on emissions is enforceable by the Department pursuant to the Air Quality Control Act or the federal Act.

[2] (PTE) or "Potential to emit" means the maximum capacity of a stationary source to emit a regulated air contaminant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a regulated air contaminant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitations or the effect it would have on emissions is federally enforceable. Secondary emissions do not count in determining the potential to emit of a stationary source. 20 NMAC 2.72, 300.E PTE does include reductions in emissions due to federally enforceable limits.

Table IV-B: Stack Exit and Fugitive[1] Emission (PTE) Rates for Pollutants and Stack Exit Conditions List Toxic Air Pollutants (TAPs) and Hazardous Air Pollutants (HAPs) In Table IV-C (Unit and stack numbering must correspond throughout the application package.) Include tank-flashing emissions estimates.

		Stack Exit Emission Rates for Criteria Pollutants							Stack Exit Conditions (Not Applicable for Fugitives)				
		TSP lb/hr	PM10 lb/hr	NOx lb/hr	CO lb/hr	VOC lb/hr	SOx lb/hr	Lead H_2S lb/hr	Orientation (H=Horizontal V=Vertical)	Height Above Ground (ft)	Flow Rate (acfm)	Moisture by Volume (%)	Inside Diameter or L ×W (ft)
Stack No.	Unit No.(s) from Table III-A	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	Rain Caps (Yes or No)	Temp. (F)	(dscfm)	Velocity (ft/sec)	
N/A	TA-16-FP	0.5	0.5	0.4	0.1	0.003	0.001	N/A	N/A	N/A	N/A	N/A	
		0.08	0.08	0.07	0.03	0.001	0.0001	N/A	N/A	N/A	N/A	N/A	N/A
N/A	TA-11-WF	67.1	67.1	6.8	474.3	429.4	0.8	N/A	N/A	N/A	N/A	N/A	
		0.7	0.7	0.07	4.7	4.3	0.008	N/A	N/A	N/A	N/A	N/A	N/A
N/A	TA-11-FF	11.6	11.6	23.5	6.8	0.3	39.2	N/A	N/A	N/A	N/A	N/A	
		0.03	0.03	0.06	0.02	0.001	0.1	N/A	N/A	N/A	N/A	N/A	N/A
									Note: All emissions are fugitive.				
Totals →		79.2	79.2	30.7	481.2	429.7	40.0	N/A					
		0.8	0.8	0.2	4.8	4.3	0.1	N/A					

[1] List all fugitives that are associated with the normal, routine, or non-emergency operation of the facility.

Table IV-C: Stack Exit Emission Rates for HAPs and TAPs (Describe Stack Exit Conditions in Table IV-B)
(Unit and stack numbering must correspond throughout the application package.) Include tank-flashing emissions estimates

Stack No.	Unit No.(s)	Specify the name of the HAP or TAP as it appears in Section 112. (b) of the 1990 CAAA or 20 NMAC 2.72 Subpart V in the space provided below.							
		HAP ☐ TAP ☐	HAP ☐ TAP ☐	HAP ☐ TAP ☐	HAP ☐ TAP ☐	HAP ☐ TAP ☐	HAP ☐ TAP ☐	HAP ☐ TAP ☐	HAP ☐ TAP ☐
		lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
		ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr
N/A	TA-16-FP	**Note: Emission estimates are shown in Attachment C for HAPs. All emissions are fugitive. TAP emissions are negligible, but are not regulated under 20.2.72 Subpart IV for these activities which are not a new source under Subpart IV.**							
N/A	TA-11-WF								
N/A	TA-11-FF								
TOTAL →									

Only list TAPs that have a PER greater than the threshold emission rate listed in 20 NMAC 2.72 Subpart V, Tables A and B

Part V – Fuel

Table V-A: Fuel Characteristics and Usage (Unit and stack numbering must correspond throughout the application package.)

Unit No.	Fuel Type (No. 2 Diesel, Natural Gas, Coal, …)	Specify Units				
		Lower Heating Value	Hourly Usage	Annual Usage	% Sulfur	% Ash
TA-11-FF	No. 2 diesel	137,000 BTU/gal	800 gal	4,000 gal	0.34	N/A
TA-11-WF	No. 2 diesel	137,000 BTU/gal	0.5 gal	2.5 gal	0.34	N/A

Part VI – Material Storage and Handling

Table VI-A: Liquid Storage Data[1] (Use additional sheets if necessary.) . (Unit and stack numbering must correspond throughout the application package.)
Include appropriate tank-flashing modeling input data. Use an addendum to this table for unlisted data categories

Tank No.	Material Name	Composition	Liquid Density (lb/gal)	Vapor Molecular Weight (lb/(lb*mol))	Average Storage Conditions		Max Storage Conditions	
					Temp-erature (°F)	True Vapor Pressure (psia)	Temp-erature (°F)	True Vapor Pressure (psia)
	N/A							

[1] If tank is to be used for storage of different materials, list all the materials, run the newest version of TANKS on each and use the material with the highest emission rate to determine PER and PTE .

Table VI-B: Liquid Storage Tank Data (Use additional sheets if necessary.) (Unit and stack numbering must correspond throughout the application package.)
Include appropriate tank-flashing modeling input data. Use an addendum to this table for unlisted data categories.

Tank No.	Date Installed/ Modified (MM/YY)	Materials Stored	Roof Type (Table VI-C)	Seal Type (Table VI-C)	Capacity[1] (bbl)	Capacity[1] (M^3)	Diameter (M)	Vapor Space (M)	Color (Table VI-C) Roof	Color (Table VI-C) Shell	Paint Condition (Table VI-C)	Annual Through-put (gal/yr)	Turn-overs per year
		N/A											

Table VI-C: Liquid Storage Tank Data Codes

Roof Type	Seal Type, Welded Tank Seal Type		Seal Type, Riveted Tank Seal Type		Roof, Shell Color	Paint Cond.
FX, Fixed Roof	1, Mechanical Shoe Seal	2, Liquid-mounted resilient seal	3, Vapor-mounted resilient seal	4, Seal Type	WH, White	Good
IF, Internal Floating Roof	A, Primary only	A, Primary only	A, Primary only	A, Mechanical shoe, primary only	AS, Aluminum (specular)	Poor
EF, External Floating Roof	B, Shoe-mounted secondary	B, Weather shield	B, Weather shield	B, Shoe mounted secondary	AD, Aluminum (diffuse)	
P, Pressure	C, Rim-mounted secondary	C, Rim-mounted secondary	C, Rim-mounted secondary	C, Rim-mounted secondary	LG, Light Gray	
					MG, Medium Gray	
					BL, Black	
					OT, Other	

[1] 0.159 M^3 = 42.0 gal = 1.00 bbl

Table VI-D: Materials Processed and Produced (Use additional sheets if necessary.)							
Material Processed				**Material Produced**			
Description	**Chemical Composition**	**Phase[1]**	**Quantity (specify units)**	**Description**	**Chemical Composition**	**Phase[1]**	**Quantity (specify units)**
N/A							

[1]G =Gas, L = Liquid, or S = Solid

Part VII – Emissions Measurement

Table VII-A: Continuous Emissions Measurement (CEM) Equipment (Use additional sheets if necessary.)
(Unit and stack numbering must correspond throughout the application package.)

Stack No.	Pollutant(s)	Manufacturer	Model No.	Serial No.	Sample Frequency	Averaging Time	Range	Sensitivity	Accuracy
	No CEMs required or proposed.								

Note: If CEM data will be used as part of a federally enforceable permit condition, or used to satisfy the requirements of a state or federal regulation, include a copy of the CEM's manufacturer specification sheet in Attachment D.

Table VII-B: Parametric Emissions Measurement Equipment (Use additional sheets if necessary.)

(Unit and stack numbering must correspond throughout the application package.)

Unit No.	Parameter/ Pollutant Measured	Location of Measurement	Unit of Measure	Acceptable Range	Frequency of Maintenance	Nature of Maintenance	Method of Recording	Averaging Time
	No parametric emissions measurement required or proposed.							

Part VIII – Certification

Company Name: **University of California for the U.S. Department of Energy**

We, **Jean Dewart, Ricardo Ortiz, and Brian Aubert**, hereby certify that the information and data submitted in this application are true and as accurate as possible, to the best of my knowledge and professional expertise and experience.

Signed this ____ day of _____, _____, upon my oath or affirmation, before a notary of the State of New Mexico

_____ _____
Signature Date

Jean Dewart **Group Leader – RRES-MAQ**
Printed Name Title

_____ _____
Signature Date

Ricardo V. Ortiz **Group Leader – ESA-WMM**
Printed Name Title

_____ _____
Signature Date

Brian Aubert **Group Leader – ESA-WR**
Printed Name Title

Scribed and sworn before me on this ____ day of _____, _____.

My authorization as a notary of the State of New Mexico expires on the

24 day of June, 2006.

_____ _____
Notary's Signature Date

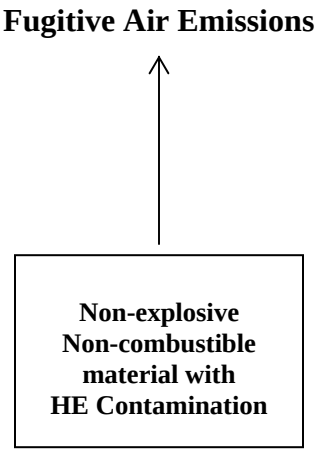
Delilah Baldonado
Notary's Printed Name

Rev 7/18/02

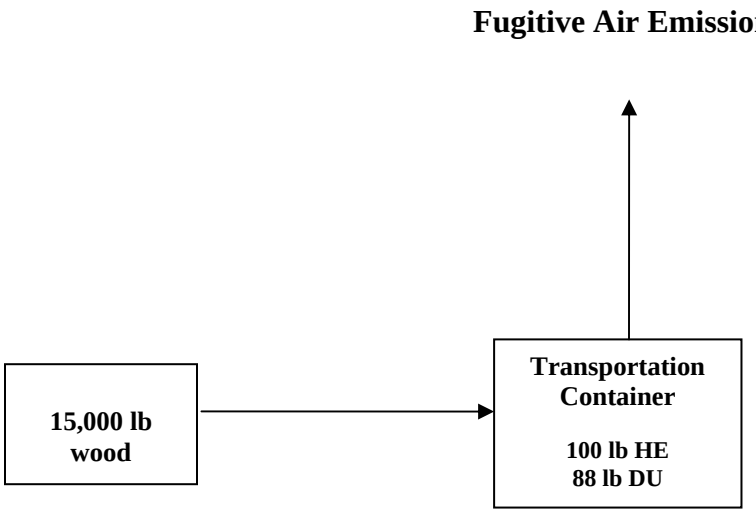
Attachment A

Process Flow Sheet

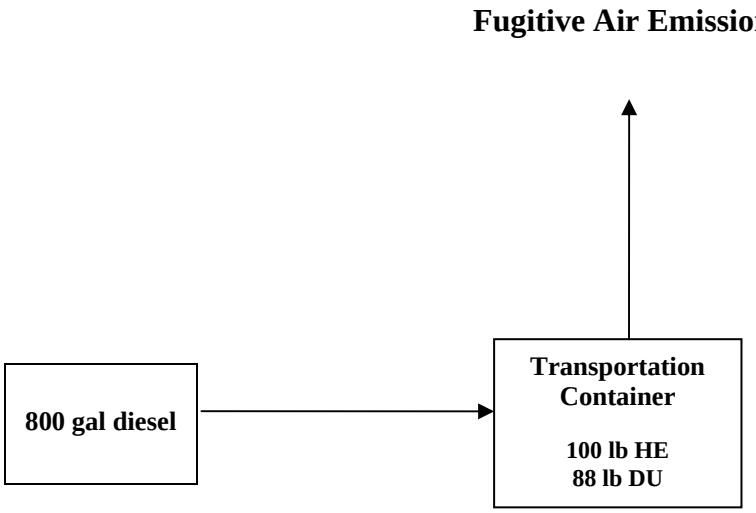
TA-16 Flash Pad Flow Sheet



TA-11 Wood Fire Testing Flow Sheet



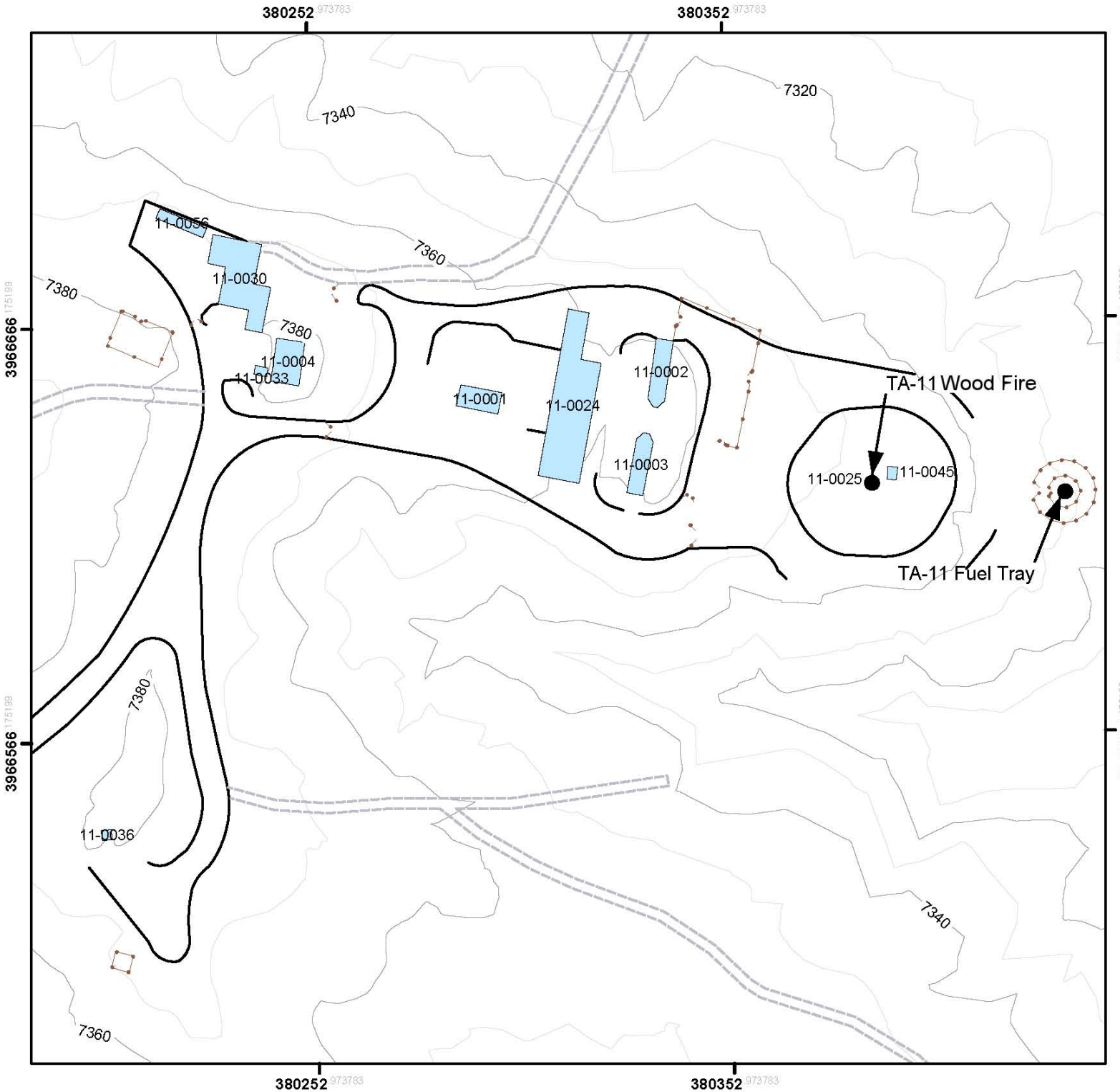
TA-11 Fuel Fire Testing Flow Sheet



Attachment B

Plot Plan

Plot Plan TA-11
Open Burn Sites



Legend

- Fence
- Dirt Roads
- Pave Road/Parking
- TA Boundary
- Buildings
- 20ft Contour
- 10ft Contour

N

RRES

Los Alamos NATIONAL LABORATORY
Est. 1943
The World's Greatest Science Protecting America

New Mexico State Plane Coordinate System
New Mexico, Central Zone, US Feet
North American Datum 1983

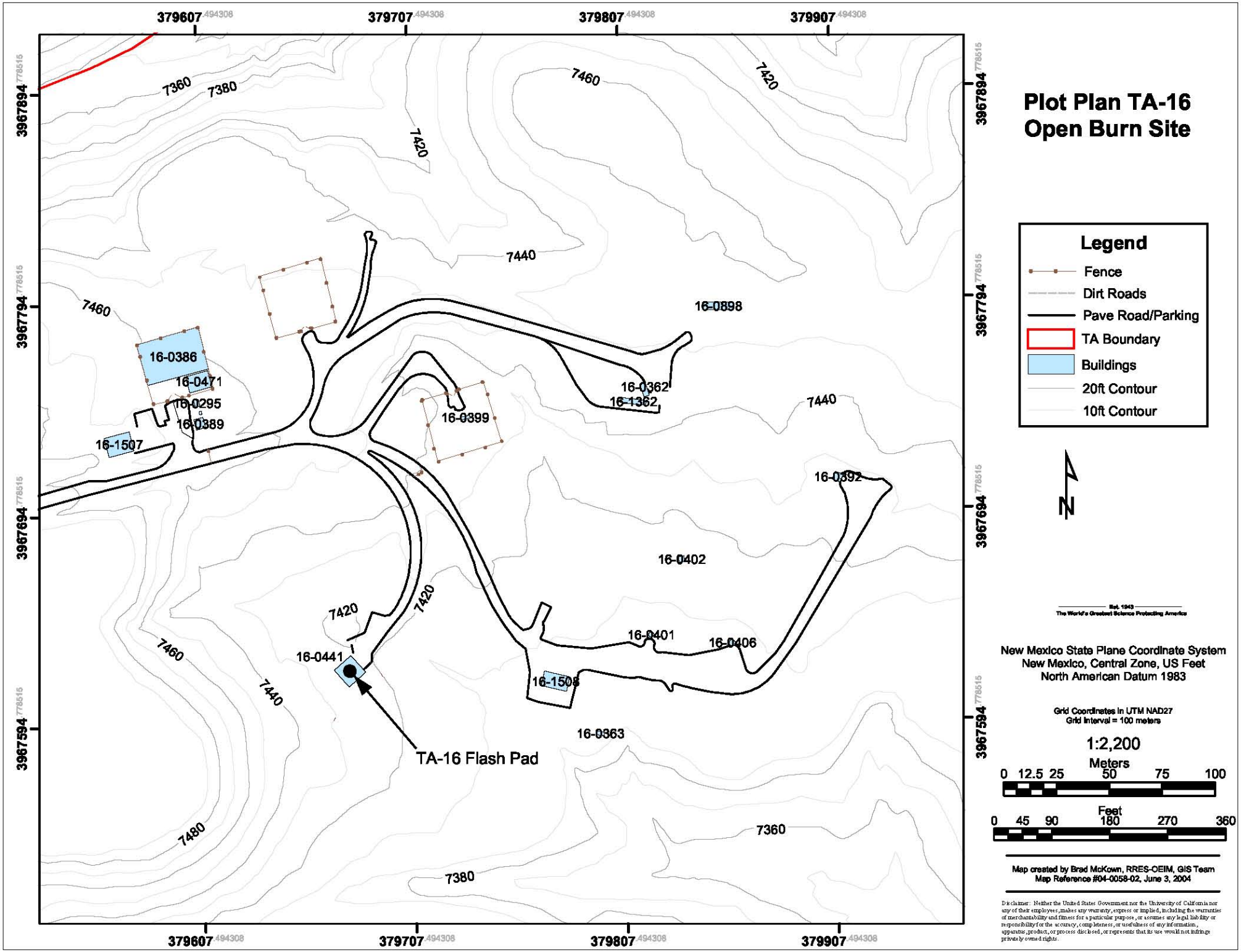
Grid Coordinates in UTM NAD27
Grid Interval = 100 meters

1:1,300

Meters
0 5 10 20 30 40

Feet
0 25 50 100 150 200

Map created by Brad McKown, RRES-OEIM, GIS Team
Map Reference #04-0058-03, May 26, 2004



Plot Plan TA-16 Open Burn Site

Legend

- Fence
- Dirt Roads
- Pave Road/Parking
- TA Boundary
- Buildings
- 20ft Contour
- 10ft Contour

N

Est. 1943
The World's Greatest Science Protecting America

New Mexico State Plane Coordinate System
New Mexico, Central Zone, US Feet
North American Datum 1983

Grid Coordinates in UTM NAD27
Grid Interval = 100 meters

1:2,200

Meters
0 12.5 25 50 75 100

Feet
0 45 90 180 270 360

Map created by Brad McKown, RRES-OEIM, GIS Team
Map Reference #04-0058-02, June 3, 2004

Attachment C

Emission Calculations

Discussion of Emission Calculations

This attachment contains emission calculations which support the values shown in the application forms for the TA-16 flashing of non-explosive HE contaminated scrap metal, and the TA-11 wood and fuel fire testing which involve open burning. This discussion provides additional explanation for the attached emission estimates.

Overview

Open burning at the TA-16 Flash Pad is currently conducted pursuant to Open Burn Permit No. TA-16-OB-2003 issued by NMED on December 27, 2002. This application is specifically for the flashing of scrap metal that has such low levels of HE that it is not explosive.

Open burning at the TA-11 wood and fuel fire test site is currently permitted under Open Burn Permit TA-11-OB-2003 issued by NMED on December 27, 2002. Existing conditions within the open burn permit limit operations and quantities of materials used in tests that are conducted. These restrictions include for the wood fire tests: 5 burns per year, with each burn allowed to use 2,000 lb of wood, 100 lb of HE, and 88 lb of depleted uranium. In this application, the quantity of wood per burn has been increased from 2,000 lb per burn to 15,000 lb per burn. For the fuel fire tests, the current restrictions in the open burn permit are: 5 burns per year, with each burn allowed to use 800 gal of fuel, 100 lb of HE, and 88 lb of depleted uranium. These quantities remain the same in this application.

Emission Factors – Open Burning of Wood

The emission factors used to estimate criteria pollutant and HAP emissions from open burning of wood are from EPA's AP-42, Chapter 1.9, Residential Fireplaces, 1996. These factors, as opposed to other AP-42 factors for wood burning in enclosed equipment, are more representative of the conditions existing for the open burning of piled wood.

Emission Factors – Open Burning of Fuel

Fuel is used in the TA-11 fuel fire tests and in small quantities as a starter fluid for the TA-11 wood fire tests. Diesel or Jet A fuel may be used. Emission estimates are based on diesel which should yield higher emissions than Jet A. Emission factors for the open burning of fuels are not readily available or commonly used, therefore emission factors from EPA's AP-42, Chapter 1.3, Fuel Oil Combustion, 1998, for distillate oil-fired boilers were used. Diesel is classified as a distillate oil. A sulfur content of 0.34% was assumed.

Emission Factors – Open Burning of High Explosives (HE)

It is possible for many different types of HE to be used in tests at TA-11 as well as be present in small quantities within scrap metal being flashed at TA-16. A review was conducted of the TA-16 burn ground activity reports in 2002 and 2003 to determine the primary explosives that were being disposed of. A majority of all HE used was from two individual explosives – HMX and TNT. Field observations indicate HMX burns cleaner and more efficiently than TNT. Therefore, TNT was determined to conservatively best represent the types of explosives that could be used.

A comparison was made between two sets of emission factors that could represent criteria pollutant emissions from open burn activities. One set of factors is from EPA's AP-42, Chapter 6.3, Explosives, 1983. The second set of factors is from the EPA approved document *Open Burn/Open Detonation Dispersion Model (OBODM) User's Guide*, 1998. The emission factors in this document were developed from emissions data collected by the Department of Defense in experiments conducted at the Dugway Proving Ground in Utah. The majority of the information collected is from tests in which small amounts of a fuel or explosive were burned or detonated, and the resulting products were sampled and assayed to quantify emissions. The AP-42 factors were found to be more conservative, i.e. higher, than those from the OBODM document and were used in estimating emissions. AP-42 did not provide a factor for SO_2, so the OBODM factor was used for this pollutant.

AP-42 does not provide emission factors for HAPs from the open burning of explosives. Thus, HAP emission factors from OBODM for TNT were used to estimate emissions.

Radionuclide Air Emission Factor and Calculations

See information in Attachment L.

Summary

The TA-16 Burn Ground mainly treats RCRA regulated wastes. However, it does treat metal and other non-combustible material with such low amounts of HE that they are not considered a hazardous waste. The non-hazardous materials are flashed to remove the trace amounts of HE before being recycled, as required by the Department of Energy Explosives Safety Manual. Emission estimates are estimated on a conservative basis to ensure maximum emission rates are used in the dispersion modeling analysis supporting this application. Although each burn could take as long as 6 hours to complete, lb/hr emission rates are calculated on the assumption all burning and associated emissions occur within 1 hour. A conservative estimate of 5 lb HE was used for the quantity that could be present within the non-combustible material for one burn. The actual value is more likely to be less than 1 lb. Potential maximum emissions from the Flash Pad were calculated as if burning the non-hazardous scrap metal occurred 365 days a year; in reality, it will occur much less frequently. The emissions are very low in comparison to

typical emission units which require permitting. The highest potential emission occurs for PM at a rate of 0.08 tons per year. Maximum emissions for CO, SO_2, NO_x, and VOC are 0.03, 0.0001, 0.07, and 0.001 tons per year respectively. Total HAP emissions are 0.0002 tons per year.

The TA-11 wood fire emission estimates are based on 5 burns allowed per year, and maximum allowed quantities of wood, HE, and diesel. Potential emissions are much lower than a typical source which requires air permitting. The highest potential emission rate occurs for CO at 4.7 tons per year. Maximum emissions for PM, SO_2, NO_x, and VOC are 0.7, 0.008, 0.07, and 4.3 tons per year respectively. Total HAP emissions are 0.0004 tons per year.

The TA-11 fuel fire emission estimates are based on 5 burns allowed per year, and maximum allowed quantities of HE and diesel. Similar to the TA-16 Flash Pad and the TA-11 wood fire, potential emissions are much lower than a typical source which requires air permitting. The highest potential emission rate occurs for SO_2 at 0.1 tons per year. Maximum emissions for PM, CO, NO_x, and VOC are 0.03, 0.02, 0.06, and 0.001 tons per year respectively. Total HAP emissions are 0.0002 tons per year.

Total combined HAP emissions from the three sites are quite low at 0.0008 tons per year. By comparison, EPA develops and implements control requirements for HAPs primarily for stationary sources with potential emissions in excess of 10 tons per year of any one HAP or 25 tons of total HAPs.

TA-16 Flash Pad - Criteria Pollutants

Material	Quantity	Pollutant	Emission Factor	Source	Emissions	Potential Emissions	Emissions per Burn	Emissions
	(lb)		(lb/lb)		(lb/hr)	(ton/yr)	(lb/quantity)	(g/sec)
High Explosives (HE)	5	PM	9.00E-02	AP-42 Ch.6.3 (1983)	4.50E-01	8.21E-02	4.50E-01	5.67E-02
		CO	2.80E-02	AP-42 Ch.6.3 (1983)	1.40E-01	2.56E-02	1.40E-01	1.76E-02
		SOx	1.40E-04	USEPA OBOD Model	7.00E-04	1.28E-04	7.00E-04	8.82E-05
		NOx	7.50E-02	AP-42 Ch.6.3 (1983)	3.75E-01	6.84E-02	3.75E-01	4.72E-02
		VOC	5.50E-04	AP-42 Ch.6.3 (1983)	2.75E-03	5.02E-04	2.75E-03	3.46E-04
					(lb/hr)	(ton/yr)	(lb/quantity)	(g/sec)
Total Criteria Pollutant Emissions		**PM**			**0.5**	**0.08**	**0.5**	**0.06**
		CO			**0.1**	**0.03**	**0.1**	**0.02**
		SOx			**0.001**	**0.0001**	**0.001**	**0.0001**
		NOx			**0.4**	**0.07**	**0.4**	**0.05**
		VOC			**0.003**	**0.001**	**0.003**	**0.0003**

Assumptions	5	lb of HE contamination, maximum per day
	1	hr for all of the contamination to burn off, for conservative emissions estimates
	365	days per year of flashing operations

TA-11 Fuel Fire Test - Criteria Pollutants

Material	Estimated Quantity per Burn	Pollutant	Emission Factor	Source	Emissions	Potential Emissions	Emissions per Burn	Emissions
	(gal)		(lb/gal)		(lb/hr)	(ton/yr)	(lb/quantity)	(g/s)
Fuel (Diesel or Kerosene)	800	PM	3.30E-03	AP-42 Ch.1.3 (1998)	2.64E+00	6.60E-03	2.64E+00	3.33E-01
		CO	5.00E-03	AP-42 Ch.1.3 (1998)	4.00E+00	1.00E-02	4.00E+00	5.04E-01
		SOx	4.90E-02	AP-42 Ch.1.3 (1998)	3.92E+01	9.80E-02	3.92E+01	4.94E+00
		NOx	2.00E-02	AP-42 Ch.1.3 (1998)	1.60E+01	4.00E-02	1.60E+01	2.02E+00
		VOC	3.40E-04	AP-42 Ch.1.3 (1998)	2.72E-01	6.80E-04	2.72E-01	3.43E-02
	(lb)		(lb/lb)		(lb/hr)	(ton/yr)	(lb/quantity)	(g/s)
High Explosives (HE)	100	PM	9.00E-02	AP-42 Ch.6.3 (1983)	9.00E+00	0.0225	9.00E+00	1.13E+00
		CO	2.80E-02	AP-42 Ch.6.3 (1983)	2.80E+00	0.007	2.80E+00	3.53E-01
		SOx	1.40E-04	USEPA OBOD Model	1.40E-02	0.000035	1.40E-02	1.76E-03
		NOx	7.50E-02	AP-42 Ch.6.3 (1983)	7.50E+00	0.01875	7.50E+00	9.45E-01
		VOC	5.50E-04	AP-42 Ch.6.3 (1983)	5.50E-02	0.0001375	5.50E-02	6.93E-03
					(lb/hr)	(ton/yr)	(lb/quantity)	(g/s)
Total Criteria Pollutant Emissions		**PM**			**11.6**	**0.03**	**11.6**	**1.5**
		CO			**6.8**	**0.02**	**6.8**	**0.9**
		SOx			**39.2**	**0.1**	**39.2**	**4.9**
		NOx			**23.5**	**0.06**	**23.5**	**3.0**
		VOC			**0.3**	**0.001**	**0.3**	**0.04**

Assumptions	1 hr burn
	5 burns per year, current restriction

TA-11 Wood Fire Test - Criteria Pollutants

Material	Estimated Quantity per Burn	Pollutant	Emission Factor	Source	Emissions	Potential Emissions	Emissions per Burn	Emissions
	(ton)		(lb/ton)		(lb/hr)	(ton/yr)	(lb/quantity)	(g/s)
Wood	7.5	PM	34.6	AP-42 Ch.1.9 (1996)	64.88	0.6488	2.60E+02	8.17E+00
		CO	252.6	AP-42 Ch.1.9 (1996)	473.63	4.7363	1.89E+03	5.97E+01
		SOx	0.4	AP-42 Ch.1.9 (1996)	0.75	0.0075	3.00E+00	9.45E-02
		NOx	2.6	AP-42 Ch.1.9 (1996)	4.88	0.0488	1.95E+01	6.14E-01
		VOC	229	AP-42 Ch.1.9 (1996)	429.38	4.2938	1.72E+03	5.41E+01
	(lb)		(lb/lb)		(lb/hr)	(ton/yr)	(lb/quantity)	(g/s)
High Explosives (HE)	100	PM	9.00E-02	AP-42 Ch.6.3 (1983)	2.2500	0.0225	9.00E+00	2.83E-01
		CO	2.80E-02	AP-42 Ch.6.3 (1983)	0.7000	0.0070	2.80E+00	8.82E-02
		SOx	1.40E-04	USEPA OBOD Model	0.0035	3.50E-05	1.40E-02	4.41E-04
		NOx	7.50E-02	AP-42 Ch.6.3 (1983)	1.8750	0.0188	7.50E+00	2.36E-01
		VOC	5.50E-04	AP-42 Ch.6.3 (1983)	0.0138	1.38E-04	5.50E-02	1.73E-03
	(gal)		(lb/gal)		(lb/hr)	(ton/yr)	(lb/quantity)	(g/s)
Starter Fluid (Diesel or Kerosene)	0.5	PM	3.30E-03	AP-42 Ch.1.3 (1998)	4.13E-04	4.1250E-06	1.65E-03	5.20E-05
		CO	5.00E-03	AP-42 Ch.1.3 (1998)	6.25E-04	6.2500E-06	2.50E-03	7.87E-05
		SOx	4.90E-02	AP-42 Ch.1.3 (1998)	6.12E-03	6.1200E-05	2.45E-02	7.71E-04
		NOx	2.00E-02	AP-42 Ch.1.3 (1998)	2.50E-03	2.5000E-05	1.00E-02	3.15E-04
		VOC	3.40E-04	AP-42 Ch.1.3 (1998)	4.25E-05	4.2500E-07	1.70E-04	5.35E-06
					(lb/hr)	(ton/yr)	(lb/quantity)	(g/s)
Total Criteria Pollutant Emissions		PM			67.1	0.7	268.5	8.5
		CO			474.3	4.7	1897.3	59.8
		SOx			0.8	0.008	3.0	0.10
		NOx			6.8	0.07	27.0	0.9
		VOC			429.4	4.3	1717.6	54.1

Assumptions	
	4 hour burn
	5 burns per year, current restriction

ESA Criteria Pollutant Summary

Pollutant	Emissions (lb/hr)	Potential Emissions (ton/yr)	Emissions (g/sec)
PM	79.2	0.78	10.0
CO	481.3	4.8	60.6
SOx	40.0	0.1	5.0
NOx	30.6	0.2	3.9
VOC	429.7	4.3	54.1

TA-16 Flashpad - HAP Emissions

Burn Activity Information

Burn duration	1	hour
HE quantity per burn	5	lb

HAP Emission Estimates - HE (TNT)

HAP	Emission Factor (lb/lb)	Emission Estimate (lb/hr)	(ton/yr)
1,3-Butadiene	1.70E-06	8.50E-06	1.55E-06
Antimony	6.70E-07	3.35E-06	6.11E-07
Benzene	4.10E-06	2.05E-05	3.74E-06
Cadmium	4.00E-05	2.00E-04	3.65E-05
Chromium	2.30E-05	1.15E-04	2.10E-05
Ethylbenzene	4.70E-07	2.35E-06	4.29E-07
Lead	9.00E-06	4.50E-05	8.21E-06
Methylene Chloride	1.80E-04	9.00E-04	1.64E-04
Styrene	1.50E-06	7.50E-06	1.37E-06
Toluene	5.10E-06	2.55E-05	4.65E-06
Hexane	9.30E-07	4.65E-06	8.49E-07
	total	1.33E-03	2.43E-04

Notes

HAP emission factors from *Open Burn/Open Detonation Dispersion Model (OBODM) User's Guide*, SERDP, April 1998.

TA-11 Fuel Fire - HAP Emissions

Burn Activity Information

Burns per year	5	
Burn duration	1	hour
Fuel quantity per burn	800	gal
HE quantity per burn	100	lb

HAP Emission Estimates - Fuel (distillate fuel oil)

HAP	Emission Factor (lb/1000 gal)	Emission Estimate (lb/hr)	(ton/yr)
Benzene	2.75E-03	2.20E-03	5.50E-06
Formaldehyde	4.80E-02	3.84E-02	9.60E-05
Naphthalene	3.30E-04	2.64E-04	6.60E-07
POM	3.30E-03	2.64E-03	6.60E-06
Arsenic	5.48E-04	4.38E-04	1.10E-06
Beryllium	4.11E-04	3.29E-04	8.22E-07
Cadmium	4.11E-04	3.29E-04	8.22E-07
Chromium	4.11E-04	3.29E-04	8.22E-07
Lead	1.23E-03	9.84E-04	2.46E-06
Manganese	8.22E-04	6.58E-04	1.64E-06
Mercury	4.11E-04	3.29E-04	8.22E-07
Nickel	4.11E-04	3.29E-04	8.22E-07
Selenium	2.06E-03	1.65E-03	4.12E-06
	total	4.89E-02	1.22E-04

Notes

All emission factors from AP-42, 9/98, Section 1.3, Fuel Oil Combustion, Tables 1.3-8 and 1.3-10, for distillate oil, except benzene and naphthalene, from EPA FIRE database.

Factors in $lb/10^{12}$ BTU converted to lb/1000 gal using fuel heat content of 137,000 BTU/gal.

TA-11 Fuel Fire - HAP Emissions continued

HAP Emission Estimates - HE (TNT)

HAP	Emission Factor (lb/lb)	Emission Estimate (lb/hr)	(ton/yr)
1,3-Butadiene	1.70E-06	1.70E-04	4.25E-07
Antimony	6.70E-07	6.70E-05	1.68E-07
Benzene	4.10E-06	4.10E-04	1.03E-06
Cadmium	4.00E-05	4.00E-03	1.00E-05
Chromium	2.30E-05	2.30E-03	5.75E-06
Ethylbenzene	4.70E-07	4.70E-05	1.18E-07
Lead	9.00E-06	9.00E-04	2.25E-06
Methylene Chloride	1.80E-04	1.80E-02	4.50E-05
Styrene	1.50E-06	1.50E-04	3.75E-07
Toluene	5.10E-06	5.10E-04	1.28E-06
Hexane	9.30E-07	9.30E-05	2.33E-07
	total	2.66E-02	6.66E-05

Notes

HAP emission factors from *Open Burn/Open Detonation Dispersion Model (OBODM) User's Guide*, SERDP, April 1998.

HAP Total Estimates - TA-11 Fuel Fire

lb/hr	ton/yr
7.55E-02	1.89E-04

TA-11 Wood Fire - HAP Emissions

Burn Activity Information

Burns per year	5	
Burn duration	4	hours
Fuel quantity per burn	0.5	gal
HE quantity per burn	100	lb
Wood quantity per burn	7.5	ton

HAP Emission Estimates - Fuel (distillate fuel oil)

HAP	Emission Factor (lb/1000 gal)	Emission Estimate (lb/hr)	(ton/yr)
Benzene	2.75E-03	3.44E-07	3.44E-09
Formaldehyde	4.80E-02	6.00E-06	6.00E-08
Naphthalene	3.30E-04	4.13E-08	4.13E-10
POM	3.30E-03	4.13E-07	4.13E-09
Arsenic	5.48E-04	6.85E-08	6.85E-10
Beryllium	4.11E-04	5.14E-08	5.14E-10
Cadmium	4.11E-04	5.14E-08	5.14E-10
Chromium	4.11E-04	5.14E-08	5.14E-10
Lead	1.23E-03	1.54E-07	1.54E-09
Manganese	8.22E-04	1.03E-07	1.03E-09
Mercury	4.11E-04	5.14E-08	5.14E-10
Nickel	4.11E-04	5.14E-08	5.14E-10
Selenium	2.06E-03	2.58E-07	2.58E-09
	total	7.64E-06	7.64E-08

Notes

All emission factors from AP-42, 9/98, Section 1.3, Fuel Oil Combustion, Tables 1.3-8 and 1.3-10, for distillate oil,except benzene and naphthalene, from EPA FIRE database.

Factors in lb/10^{12} BTU converted to lb/1000 gal using fuel heat content of 137,000 BTU/gal.

TA-11 Wood Fire - HAP Emissions continued

HAP Emission Estimates - HE (TNT)

HAP	Emission Factor (lb/lb)	Emission Estimate (lb/hr)	(ton/yr)
1,3-Butadiene	1.70E-06	4.25E-05	4.25E-07
Antimony	6.70E-07	1.68E-05	1.68E-07
Benzene	4.10E-06	1.03E-04	1.03E-06
Cadmium	4.00E-05	1.00E-03	1.00E-05
Chromium	2.30E-05	5.75E-04	5.75E-06
Ethylbenzene	4.70E-07	1.18E-05	1.18E-07
Lead	9.00E-06	2.25E-04	2.25E-06
Methylene Chloride	1.80E-04	4.50E-03	4.50E-05
Styrene	1.50E-06	3.75E-05	3.75E-07
Toluene	5.10E-06	1.28E-04	1.28E-06
Hexane	9.30E-07	2.33E-05	2.33E-07
	total	6.66E-03	6.66E-05

Notes

HAP emission factors from *Open Burn/Open Detonation Dispersion Model (OBODM) User's Guide*, SERDP, April 1998.

HAP Emission Estimates - Wood

HAP	Emission Factor (lb/ton)	Emission Estimate (lb/hr)	(ton/yr)
POM	1.60E-02	3.00E-02	3.00E-04

Notes

HAP emission factor from AP-42, 10/96, Section 1.9 Residential Fireplaces, Table 1.9-1.

HAP Total Estimates - TA-11 Wood Fire

lb/hr	ton/yr
3.67E-02	3.67E-04

Attachment D

Emissions Information

DPG Document No. DPG-TR-96-008b
April 1998

OPEN BURN/OPEN DETONATION DISPERSION MODEL (OBODM) USER'S GUIDE

Volume II. Technical Description

by

Jay R. Bjorklund[a], James F. Bowers[b]
Gregory C. Dodd[a] and John M. White[b]

[a]H. E. Cramer Company, Inc.
Sandy, Utah 84091-0411

[b]Meteorology & Obscurants Division
West Desert Test Center

WEST DESERT TEST CENTER
U.S. ARMY DUGWAY PROVING GROUND
DUGWAY, UTAH 84022-5000

SECTION 4. EMISSIONS FACTOR DATABASE

The OBODFUEL.OBD file contains a database of source information required by OBODM for 36 propellant, explosive, and pyrotechnic energetic fuels/ materials. For each fuel/material, the file contains a list of gases, volatile organic compounds, semivolatile organic compounds, and metals produced by open burning or open detonation. For each gas, compound, or metal, the file provides the molecular weight, density at 1 atmosphere and 20 °C, and emissions factor. As discussed below, the emissions factors were derived from OBOD experiments conducted at U.S. Army Dugway Proving Ground. The OBODM user can modify the OBODFUEL.OBD database file by entering updated emissions data or emissions data for new fuels or materials.

The emissions factors in the OBODFUEL.OBD file were developed from the emissions data in the 1997 OBOD Database Lite V1.2 program. The majority of the information in the 1997 Database Lite V1.2 comes from experiments in Dugway's BangBox™ facility in which small amounts of the fuel or material were burned or detonated, and the resulting gases, compounds, and metals were sampled and assayed to quantify the emissions. Limited data were also obtained from aircraft sampling of open air OBOD events during earlier OBOD programs at Dugway. Depending on the fuel/material and combustion product, the 1997 OBOD Database Lite V1.2 contains emissions factors for one to three trials. If emissions factors are available for only one trial, those emissions factors are provided in the OBODFUEL.OBD file. If emissions factors are available for two trials, OBODFUEL. OBD contains the highest emissions factor for each gas, compound, or metallic element as a safe-sided, "worst-case" estimate. If emissions factors are available for three trials, OBODFUEL.OBD contains the average emission factor for each combustion product. In some cases, two different sampling techniques were used for the same constituent. In these cases, OBODFUEL.OBD provides the highest of the average emissions factors obtained for that constituent using the two sampling methods. If a gas, compound, or metal was below the detection limit for all trials, that constituent is not included in the model database file.

The format of the OBODFUEL.OBD file is the MS-DOS text mode. The first line for each of the 36 propellant, explosive, and pyrotechnic energetic fuels and materials contains the name of the fuel/material, the estimated heat content and burn rate, and the number (N) of combustion products for which emissions data are provided. This line is followed by N lines, each listing the molecular weight, density, and emissions factors for one of the N products of combustion. Thus, OBODFUEL.OBD contains N+1 lines per propellant, explosive, or pyrotechnic energetic fuel or material. The effective heat contents and burn rates are not known for many materials. For those fuel/materials with unknown heat contents, OBODFUEL.OBD assigns a value of 1000 cal/g. This value should underestimate the actual heat release and buoyant rise for most fuels/materials, resulting in a

tendency toward overestimation of maximum ground-level impacts. No burn rates are provided if the burn rate is not known. Also, in some cases the molecular weight and/or density could not be found and are not provided.

TNT (2,4,6-Trinitrotoluene)		925		1 49	
1,3-Butadiene	54.1	0.6211		0	1.70E-06*
1-Butene	56.1	0.5951		0	1.60E-06*
1-Hexane	86.2	0.6603		0	2.20E-06*
1-Pentene	70.1	0.6405		0	1.40E-06*
Acetylene	26.0	0.6181		0	1.70E-05*
Aluminum	27.0	2.7020		0	1.30E-03*
Antimony	121.8	6.6840		0	6.70E-07*
Barium	137.3	3.5100		0	8.20E-03*
Benzene	78.1	0.8787		0	4.10E-06*
CO	28.0	0.0013		0	1.00E-02*
CO2	44.0	0.0020		0	1.50E+00*
Cadmium	112.4	8.6420		0	4.00E-05*
Chromium	52.0	7.2000		0	2.30E-05*
Copper	63.5	8.9200		0	5.00E-04*
Cyclohexane	84.2	0.7781		0	1.60E-06*
Cyclopentane	70.1	0.7500		0	4.70E-07*
Cyclopentene	68.1	0.8000		0	4.60E-07*
Ethane	30.1	0.5720		0	7.40E-07*
Ethylbenzene	106.2	0.8670		0	4.70E-07*
Ethylene	28.1	0.0013		0	2.20E-05*
Lead	207.2	11.3437		0	9.00E-06*
Methylcyclohexane	98.2	0.0000		0	5.10E-06*
Methylcyclopentane	0.0	0.0000		0	7.00E-07*
Methylenechloride	84.9	1.3266		0	1.80E-04*
NO	30.0	0.0013		0	9.70E-03*
NO2	46.0	1.4494		9360	7.60E-04*
PM10	0.0	0.0000		0	9.30E-02*
Propane	44.1	0.5005		0	3.70E-07*
Propene	42.1	0.5193		0	7.20E-06*
RDX	222.1	1.8200		0	9.60E-06*
SO2	64.1	0.0029		0	1.40E-04*
Styrene	104.2	0.9060		0	1.50E-06*
Toluene	92.2	0.8669		0	5.10E-06*
Total Alkanes (Paraffins) (e.g. Octa	114.0	0.7030		0	8.60E-06*
Total Alkenes (Olefins) (e.g. Ethyle	62.0	0.9780		0	6.00E-05*
Total Aromatics (e.g. styrene)	104.2	0.9060		0	1.60E-05*
Total Non-methane Hydrocarbons	0.0	0.0000		0	4.00E-05*
Zinc	65.4	7.1400		0	1.00E-05*
cis-2-Pentene	70.1	0.6556		0	4.60E-07*
i-Butane	58.1	0.0000		0	4.60E-07*
i-Butene	56.1	0.0000		0	3.60E-06*
i-Pentane	72.2	0.0000		0	1.40E-06*
m-Ethyltoluene	135.2	0.9391		0	4.80E-07*
n-Heptane	100.2	0.6840		0	9.50E-07*
n-Hexane	86.1	0.6548		0	9.30E-07*
n-Octane	114.2	0.7025		0	2.90E-06*
n-Pentane	72.2	0.6262		0	3.30E-06*
trans-2-Butene	125.0	1.1830		0	9.50E-07*
trans-2-Pentene	84.2	0.6942		0	4.60E-07*
Composition B (56/38/6 RDX-TNT-WAX)		1319		1 37	
1-Butene	56.1	0.5951		0	1.30E-06*
1-Hexane	86.2	0.6603		0	1.60E-06*
Acetylene	26.0	0.6181		0	1.40E-05*
Benzene	78.1	0.8787		0	2.60E-06*
CO	28.0	0.0013		0	4.20E-03*
CO2	44.0	0.0020		0	1.10E+00*
Carbon Tetrachloride	153.8	1.5940		0	3.60E-07*
Ethane	30.1	0.5720		0	1.30E-06*
Ethylbenzene	106.2	0.8670		0	2.00E-06*
Ethylene	28.1	0.0013		0	1.40E-05*
Methylcyclohexane	98.2	0.0000		0	2.30E-06*
Methylcyclopentane	0.0	0.0000		0	3.60E-07*

1.3 Fuel Oil Combustion

1.3.1 General[1-3]

Two major categories of fuel oil are burned by combustion sources: distillate oils and residual oils. These oils are further distinguished by grade numbers, with Nos. 1 and 2 being distillate oils; Nos. 5 and 6 being residual oils; and No. 4 being either distillate oil or a mixture of distillate and residual oils. No. 6 fuel oil is sometimes referred to as Bunker C. Distillate oils are more volatile and less viscous than residual oils. They have negligible nitrogen and ash contents and usually contain less than 0.3 percent sulfur (by weight). Distillate oils are used mainly in domestic and small commercial applications, and include kerosene and diesel fuels. Being more viscous and less volatile than distillate oils, the heavier residual oils (Nos. 5 and 6) may need to be heated for ease of handling and to facilitate proper atomization. Because residual oils are produced from the residue remaining after the lighter fractions (gasoline, kerosene, and distillate oils) have been removed from the crude oil, they contain significant quantities of ash, nitrogen, and sulfur. Residual oils are used mainly in utility, industrial, and large commercial applications.

1.3.2 Firing Practices[4]

The major boiler configurations for fuel oil-fired combustors are watertube, firetube, cast iron, and tubeless design. Boilers are classified according to design and orientation of heat transfer surfaces, burner configuration, and size. These factors can all strongly influence emissions as well as the potential for controlling emissions.

Watertube boilers are used in a variety of applications ranging from supplying large amounts of process steam to providing space heat for industrial facilities. In a watertube boiler, combustion heat is transferred to water flowing through tubes which line the furnace walls and boiler passes. The tube surfaces in the furnace (which houses the burner flame) absorb heat primarily by radiation from the flames. The tube surfaces in the boiler passes (adjacent to the primary furnace) absorb heat primarily by convective heat transfer.

Firetube boilers are used primarily for heating systems, industrial process steam generators, and portable power boilers. In firetube boilers, the hot combustion gases flow through the tubes while the water being heated circulates outside of the tubes. At high pressures and when subjected to large variations in steam demand, firetube units are more susceptible to structural failure than watertube boilers. This is because the high-pressure steam in firetube units is contained by the boiler walls rather than by multiple small-diameter watertubes, which are inherently stronger. As a consequence, firetube boilers are typically small and are used primarily where boiler loads are relatively constant. Nearly all firetube boilers are sold as packaged units because of their relatively small size.

A cast iron boiler is one in which combustion gases rise through a vertical heat exchanger and out through an exhaust duct. Water in the heat exchanger tubes is heated as it moves upward through the tubes. Cast iron boilers produce low pressure steam or hot water, and generally burn oil or natural gas. They are used primarily in the residential and commercial sectors.

Another type of heat transfer configuration used on smaller boilers is the tubeless design. This design incorporates nested pressure vessels with water in between the shells. Combustion gases are fired into the inner pressure vessel and are then sometimes recirculated outside the second vessel.

Table 1.3-1. CRITERIA POLLUTANT EMISSION FACTORS FOR FUEL OIL COMBUSTION[a]

Firing Configuration (SCC)[a]	SO_2[b]		SO_3[c]		NO_x[d]		CO[e]		Filterable PM[f]	
	Emission Factor (lb/10^3 gal)	EMISSION FACTOR RATING	Emission Factor (lb/10^3 gal)	EMISSION FACTOR RATING	Emission Factor (lb/10^3 gal)	EMISSION FACTOR RATING	Emission Factor (lb/10^3 gal)	EMISSION FACTOR RATING	Emission Factor (lb/10^3 gal)	EMISSION FACTOR RATING
Boilers > 100 Million Btu/hr										
No. 6 oil fired, normal firing (1-01-004-01), (1-02-004-01), (1-03-004-01)	157S	A	5.7S	C	47	A	5	A	9.19(S)+3.22	A
No. 6 oil fired, normal firing, low NO_x burner (1-01-004-01), (1-02-004-01)	157S	A	5.7S	C	40	B	5	A	9.19(S)+3.22	A
No. 6 oil fired, tangential firing, (1-01-004-04)	157S	A	5.7S	C	32	A	5	A	9.19(S)+3.22	A
No. 6 oil fired, tangential firing, low NO_x burner (1-01-004-04)	157S	A	5.7S	C	26	E	5	A	9.19(S)+3.22	A
No. 5 oil fired, normal firing (1-01-004-05), (1-02-004-04)	157S	A	5.7S	C	47	B	5	A	10	B
No. 5 oil fired, tangential firing (1-01-004-06)	157S	A	5.7S	C	32	B	5	A	10	B
No. 4 oil fired, normal firing (1-01-005-04), (1-02-005-04)	150S	A	5.7S	C	47	B	5	A	7	B
No. 4 oil fired, tangential firing (1-01-005-05)	150S	A	5.7S	C	32	B	5	A	7	B
No. 2 oil fired (1-01-005-01), (1-02-005-01), (1-03-005-01)	157S	A	5.7S	C	24	D	5	A	2	A
No.2 oil fired, LNB/FGR, (1-01-005-01), (1-02-005-01), (1-03-005-01)	157S	A	5.7S	A	10	D	5	A	2	A

Table 1.3-1. (cont.)

Firing Configuration (SCC)[a]	SO_2[b]		SO_3[c]		NO_x[d]		CO[e]		Filterable PM[f]	
	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING	Emission Factor ($lb/10^3$ gal)	EMISSION FACTOR RATING
Boilers < 100 Million Btu/hr										
No. 6 oil fired (1-02-004-02/03) (1-03-004-02/03)	157S	A	2S	A	55	A	5	A	10	B
No. 5 oil fired (1-03-004-04)	157S	A	2S	A	55	A	5	A	9.19(S)+3.22	A
No. 4 oil fired (1-03-005-04)	150S	A	2S	A	20	A	5	A	7	B
Distillate oil fired (1-02-005-02/03) (1-03-005-02/03)	142S	A	2S	A	20	A	5	A	2	A
Residential furnace (A2104004/A2104011)	142S	A	2S	A	18	A	5	A	0.4[g]	B

[a] To convert from $lb/10^3$ gal to $kg/10^3$ L, multiply by 0.120. SCC = Source Classification Code.

[b] References 1-2,6-9,14,56-60. S indicates that the weight % of sulfur in the oil should be multiplied by the value given. For example, if the fuel is 1% sulfur, then S = 1.

[c] References 1-2,6-8,16,57-60. S indicates that the weight % of sulfur in the oil should be multiplied by the value given. For example, if the fuel is 1% sulfur, then S = 1.

[d] References 6-7,15,19,22,56-62. Expressed as NO_2. Test results indicate that at least 95% by weight of NO_x is NO for all boiler types except residential furnaces, where about 75% is NO. For utility vertical fired boilers use 105 $lb/10^3$ gal at full load and normal (>15%) excess air. Nitrogen oxides emissions from residual oil combustion in industrial and commercial boilers are related to fuel nitrogen content, estimated by the following empirical relationship: lb $NO_2/10^3$ gal = 20.54 + 104.39(N), where N is the weight % of nitrogen in the oil. For example, if the fuel is 1% nitrogen, then N = 1.

[e] References 6-8,14,17-19,56-61. CO emissions may increase by factors of 10 to 100 if the unit is improperly operated or not well maintained.

[f] References 6-8,10,13-15,56-60,62-63. Filterable PM is that particulate collected on or prior to the filter of an EPA Method 5 (or equivalent) sampling train. Particulate emission factors for residual oil combustion are, on average, a function of fuel oil sulfur content where S is the weight % of sulfur in oil. For example, if fuel oil is 1% sulfur, then S = 1.

[g] Based on data from new burner designs. Pre-1970's burner designs may emit filterable PM as high as 3.0 $1b/10^3$ gal.

Table 1.3-2. CONDENSABLE PARTICULATE MATTER EMISSION FACTORS FOR OIL COMBUSTION[a]

Firing Configuration[b] (SCC)	Controls	CPM - TOT[c, d]		CPM - IOR[c, d]		CPM - ORG[c, d]	
		Emission Factor (lb/10^3 gal)	EMISSION FACTOR RATING	Emission Factor (lb/10^3 gal)	EMISSION FACTOR RATING	Emission Factor (lb/10^3 gal)	EMISSION FACTOR RATING
No. 2 oil fired (1-01-005-01, 1-02-005-01, 1-03-005-01)	All controls, or uncontrolled	1.3[d, e]	D	65% of CPM-TOT emission factor[c]	D	35% of CPM-TOT emission factor[c]	D
No. 6 oil fired (1-01-004-01/04, 1-02-004-01, 1-03-004-01)	All controls, or uncontrolled	1.5[f]	D	85% of CPM-TOT emission factor[d]	E	15% of CPM-TOT emission factor[d]	E

[a] All condensable PM is assumed to be less than 1.0 micron in diameter.

[b] No data are available for numbers 3, 4, and 5 oil. For number 3 oil, use the factors provided for number 2 oil. For numbers 4 and 5 oil, use the factors provided for number 6 oil.

[c] CPM-TOT = total condensable particulate matter.
CPM-IOR = inorganic condensable particulate matter.
CPM-ORG = organic condensable particulate matter.

[d] To convert to lb/MMBtu of No. 2 oil, divide by 140 MMBtu/10^3 gal. To convert to lb/MMBtu of No. 6 oil, divide by 150 MMBtu/10^3 gal.

[e] References: 76-78.

[f] References: 79-82.

Table 1.3-3. EMISSION FACTORS FOR TOTAL ORGANIC COMPOUNDS (TOC), METHANE, AND NONMETHANE TOC (NMTOC) FROM UNCONTROLLED FUEL OIL COMBUSTION[a]

EMISSION FACTOR RATING: A

Firing Configuration (SCC)	TOC[b] Emission Factor ($lb/10^3$ gal)	Methane[b] Emission Factor ($lb/10^3$ gal)	NMTOC[b] Emission Factor ($lb/10^3$ gal)
Utility boilers			
No. 6 oil fired, normal firing (1-01-004-01)	1.04	0.28	0.76
No. 6 oil fired, tangential firing (1-01-004-04)	1.04	0.28	0.76
No. 5 oil fired, normal firing (1-01-004-05)	1.04	0.28	0.76
No. 5 oil fired, tangential firing (1-01-004-06)	1.04	0.28	0.76
No. 4 oil fired, normal firing (1-01-005-04)	1.04	0.28	0.76
No. 4 oil fired, tangential firing (1-01-005-05)	1.04	0.28	0.76
Industrial boilers			
No. 6 oil fired (1-02-004-01/02/03)	1.28	1.00	0.28
No. 5 oil fired (1-02-004-04)	1.28	1.00	0.28
Distillate oil fired (1-02-005-01/02/03)	0.252	0.052	0.2
No. 4 oil fired (1-02-005-04)	0.252	0.052	0.2
Commercial/institutional/residential combustors			
No. 6 oil fired (1-03-004-01/02/03)	1.605	0.475	1.13
No. 5 oil fired (1-03-004-04)	1.605	0.475	1.13
Distillate oil fired (1-03-005-01/02/03)	0.556	0.216	0.34
No. 4 oil fired (1-03-005-04)	0.556	0.216	0.34
Residential furnace (A2104004/A2104011)	2.493	1.78	0.713

[a] To convert from $lb/10^3$ gal to $kg/10^3$ L, multiply by 0.12. SCC = Source Classification Code.

[b] References 29-32. Volatile organic compound emissions can increase by several orders of magnitude if the boiler is improperly operated or is not well maintained.

Table 1.3-8. EMISSION FACTORS FOR NITROUS OXIDE (N_2O), POLYCYCLIC ORGANIC MATTER (POM), AND FORMALDEHYDE (HCOH) FROM FUEL OIL COMBUSTION[a]

EMISSION FACTOR RATING: E

Firing Configuration (SCC)	Emission Factor (lb/10^3 gal)		
	N_2O[b]	POM[c]	HCOH[c]
Utility/industrial/commercial boilers			
No. 6 oil fired (1-01-004-01, 1-02-004-01, 1-03-004-01)	0.11	0.0011 - 0.0013[d]	0.024 - 0.061
Distillate oil fired (1-01-005-01, 1-02-005-01, 1-03-005-01)	0.11	0.0033[e]	0.035 - 0.061
Residential furnaces (A2104004/A2104011)	0.05	ND	ND

[a] To convert from lb/10^3 gal to kg/10^3 L, multiply by 0.12. SCC = Source Classification Code. ND = no data.
[b] References 45-46. EMISSION FACTOR RATING = B.
[c] References 29-32.
[d] Particulate and gaseous POM.
[e] Particulate POM only.

Table 1.3-10. EMISSION FACTORS FOR TRACE ELEMENTS FROM DISTILLATE FUEL OIL COMBUSTION SOURCES[a]

EMISSION FACTOR RATING: E

Firing Configuration (SCC)	Emission Factor ($lb/10^{12}$ Btu)										
	As	Be	Cd	Cr	Cu	Pb	Hg	Mn	Ni	Se	Zn
Distillate oil fired (1-01-005-01, 1-02-005-01, 1-03-005-01)	4	3	3	3	6	9	3	6	3	15	4

[a] Data are for distillate oil fired boilers, SCC codes 1-01-005-01, 1-02-005-01, and 1-03-005-01. References 29-32, 40-44 and 83. To convert from $lb/10^{12}$ Btu to pg/J, multiply by 0.43.

1.9 Residential Fireplaces

1.9.1 General[1-2]

Fireplaces are used primarily for aesthetic effects and secondarily as supplemental heating sources in houses and other dwellings. Wood is the most common fuel for fireplaces, but coal and densified wood "logs" may also be burned. The user intermittently adds fuel to the fire by hand. Fireplaces can be divided into 2 broad categories: (1) masonry (generally brick and/or stone, assembled on site, and integral to a structure) and (2) prefabricated (usually metal, installed on site as a package with appropriate duct work).

Masonry fireplaces typically have large fixed openings to the fire bed and have dampers above the combustion area in the chimney to limit room air and heat losses when the fireplace is not being used. Some masonry fireplaces are designed or retrofitted with doors and louvers to reduce the intake of combustion air during use.

Prefabricated fireplaces are commonly equipped with louvers and glass doors to reduce the intake of combustion air, and some are surrounded by ducts through which floor level air is drawn by natural convection, heated, and returned to the room. Many varieties of prefabricated fireplaces are now available on the market. One general class is the freestanding fireplace, the most common of which consists of an inverted sheet metal funnel and stovepipe directly above the fire bed. Another class is the "zero clearance" fireplace, an iron or heavy-gauge steel firebox lined inside with firebrick and surrounded by multiple steel walls with spaces for air circulation. Some zero clearance fireplaces can be inserted into existing masonry fireplace openings, and thus are sometimes called "inserts". Some of these units are equipped with close-fitting doors and have operating and combustion characteristics similar to wood stoves. (See Section 1.10, Residential Wood Stoves.)

Masonry fireplaces usually heat a room by radiation, with a significant fraction of the combustion heat lost in the exhaust gases and through fireplace walls. Moreover, some of the radiant heat entering the room goes toward warming the air that is pulled into the residence to make up for that drawn up the chimney. The net effect is that masonry fireplaces are usually inefficient heating devices. Indeed, in cases where combustion is poor, where the outside air is cold, or where the fire is allowed to smolder (thus drawing air into a residence without producing appreciable radiant heat energy), a net heat loss may occur in a residence using a fireplace. Fireplace heating efficiency may be improved by a number of measures that either reduce the excess air rate or transfer back into the residence some of the heat that would normally be lost in the exhaust gases or through fireplace walls. As noted above, such measures are commonly incorporated into prefabricated units. As a result, the energy efficiencies of prefabricated fireplaces are slightly higher than those of masonry fireplaces.

1.9.2 Emissions And Controls[1-13]

Fireplace emissions, caused mainly by incomplete combustion, include particulate matter (PM) (mainly PM less than 10 micrometers in diameter [PM-10]), carbon monoxide (CO), sulfur oxides (SO_x), nitrogen oxides (NO_x), and volatile organic compounds (VOC). Significant quantities of unburnt combustibles are produced because fireplaces are inefficient combustion devices, with high uncontrolled excess air rates and without any sort of secondary combustion. The latter is especially important in wood burning because of its high volatile matter content, typically 80 percent by dry weight.

Table 1.9-1. EMISSION FACTORS FOR WOOD COMBUSTION IN RESIDENTIAL FIREPLACES[a]
(SCC 21-04-008-001)

Device	Pollutant	Emission Factor (lb/ton)	EMISSION FACTOR RATING
Fireplace	PM-10[b]	34.6	B
	CO[c]	252.6	B
	SO_x[d]	0.4	A
	NO_x[e]	2.6	C
	N_2O[f]	0.3	E
	CO_2[g]	3400	C
	Total VOC[h]	229.0	D
	POM[j]	16 E-03	E
	Aldehydes[k,m]	2.4	E

[a] Units are in lb of pollutant/ton of dry wood burned. To convert lb/ton to kg/Mg, multiply by 0.5. SCC = Source Classification Code.
[b] References 2, 5, 7, 13; contains filterable and condensable PM; PM emissions are considered to be 100% PM-10.
[c] References 2, 4-6, 9, 11, 13.
[d] References 1, 8.
[e] References 4, 6, 9, 11; expressed as NO_2.
[f] Reference 21.
[g] References 5, 13.
[h] References 1, 4, 5. Data used to calculate the average emission factor were collected by various methods. While the emission factor may be representative of the source population in general, factors may not be accurate for individual sources.
[j] Reference 2.
[k] Data used to calculate the average emission factor were collected from a single fireplace and are not representative of the general source population.
[m] References 4, 11.

References For Section 1.9

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3. Shelton, J. W., and L. Gay, *Colorado Fireplace Report*, Colorado Air Pollution Control Division, Denver, CO, March 1987.

4. Dasch, J. M., "Particulate And Gaseous Emissions From Wood-burning Fireplaces", *Environmental Science And Technology*, *16*(10):643-67, October 1982.

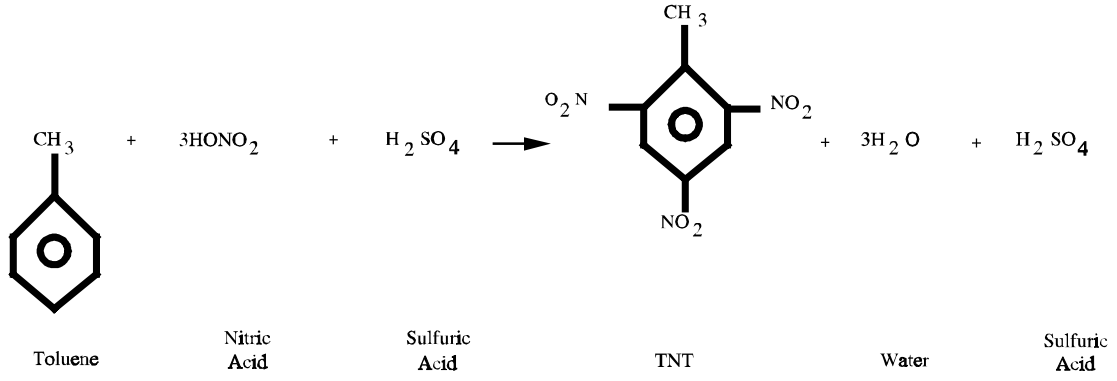
6.3 Explosives

6.3.1 General[1]

An explosive is a material that, under the influence of thermal or mechanical shock, decomposes rapidly and spontaneously with the evolution of large amounts of heat and gas. There are two major categories, high explosives and low explosives. High explosives are further divided into initiating, or primary, high explosives and secondary high explosives. Initiating high explosives are very sensitive and are generally used in small quantities in detonators and percussion caps to set off larger quantities of secondary high explosives. Secondary high explosives, chiefly nitrates, nitro compounds, and nitramines, are much less sensitive to mechanical or thermal shock, but they explode with great violence when set off by an initiating explosive. The chief secondary high explosives manufactured for commercial and military use are ammonium nitrate blasting agents and 2,4,6,-trinitrotoluene (TNT). Low explosives, such as black powder and nitrocellulose, undergo relatively slow autocombustion when set off and evolve large volumes of gas in a definite and controllable manner. Many different types of explosives are manufactured. As examples of high and low explosives, the production of TNT and nitrocellulose (NC) are discussed below.

6.3.2 TNT Production[1-3,6]

TNT may be prepared by either a continuous or a batch process, using toluene, nitric acid (HNO_3) and sulfuric acid as raw materials. The production of TNT follows the same chemical process, regardless of whether batch or continuous method is used. The flow chart for TNT production is shown in Figure 6.3-1. The overall chemical reaction may be expressed as:



The production of TNT by nitration of toluene is a 3-stage process performed in a series of reactors, as shown in Figure 6.3-2. The mixed acid stream is shown to flow countercurrent to the flow of the organic stream. Toluene and spent acid fortified with a 60 percent HNO_3 solution are fed into the first reactor. The organic layer formed in the first reactor is pumped into the second reactor, where it is subjected to further nitration with acid from the third reactor fortified with additional HNO_3. The product from the second nitration step, a mixture of all possible isomers of dinitrotoluene (DNT), is pumped to the third reactor. In the final reaction, the DNT is treated with a fresh feed of nitric acid and oleum (a solution of sulfur trioxide [SO_3] in anhydrous sulfuric acid). The crude TNT from this third nitration consists primarily of 2,4,6-trinitrotoluene. The crude TNT is washed to remove free acid, and the wash water (yellow water) is recycled to the early nitration stages. The washed TNT is

then neutralized with soda ash and treated with a 16 percent aqueous sodium sulfite (Sellite) solution to remove contaminating isomers. The Sellite waste solution (red water) from the purification process is discharged directly as a liquid waste stream, is collected and sold, or is concentrated to a slurry and incinerated. Finally, the TNT crystals are melted and passed through hot air dryers, where most of the water is evaporated. The dehydrated product is solidified, and the TNT flakes packaged for transfer to a storage or loading area.

6.3.3 Nitrocellulose Production[1,6]

Nitrocellulose is commonly prepared by the batch-type mechanical dipper process. A newly developed continuous nitration processing method is also being used. In batch production, cellulose in the form of cotton linters, fibers, or specially prepared wood pulp is purified by boiling and bleaching. The dry and purified cotton linters or wood pulp are added to mixed nitric and sulfuric acid in metal reaction vessels known as dipping pots. The reaction is represented by:

$$(C_6H_7O_2(OH)_3)_x + 3HONO_2 + H_2SO_4 \longrightarrow (C_6H_7O_2(ONO_2)_3)_x + 3H_2O + H_2SO_4$$

Cellulose	Nitric Acid	Sulfuric Acid	Nitrocellulose	Water	Sulfuric Acid

Following nitration, the crude NC is centrifuged to remove most of the spent nitrating acids and is put through a series of water washing and boiling treatments to purify the final product.

6.3.4 Emissions And Controls[2-3,5-7]

Oxides of nitrogen (NO_x) and sulfur (SO_x) are the major emissions from the processes involving the manufacture, concentration, and recovery of acids in the nitration process of explosives manufacturing. Emissions from the manufacture of nitric and sulfuric acid are discussed in other sections. Trinitromethane (TNM) is a gaseous byproduct of the nitration process of TNT manufacture. Volatile organic compound (VOC) emissions result primarily from fugitive vapors from various solvent recovery operations. Explosive wastes and contaminated packaging material are regularly disposed of by open burning, and such results in uncontrolled emissions, mainly of NO_x and particulate matter. Experimental burns of several explosives to determine "typical" emission factors for the open burning of TNT are presented in Table 6.3-1.

Table 6.3-1 (English Units). EMISSION FACTORS FOR THE OPEN BURNING OF TNT[a,b]
(lb pollution/ton TNT burned)

Type Of Explosive	Particulates	Nitrogen Oxides	Carbon Monoxide	Volatile Organic Compounds
TNT	180.0	150.0	56.0	1.1

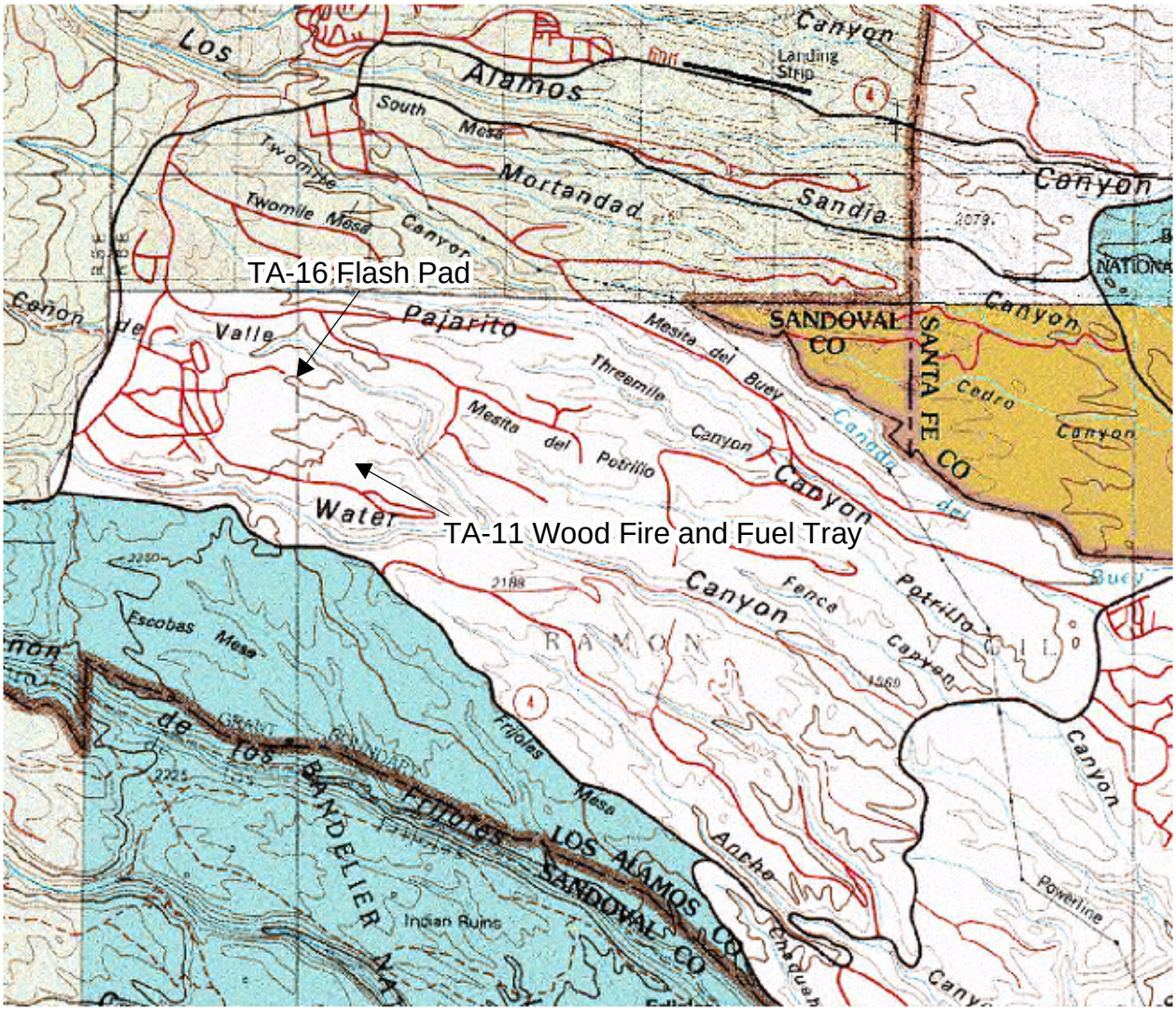
[a] Reference 7. Particulate emissions are soot. VOC is nonmethane.

[b] The burns were made on very small quantities of TNT, with test apparatus designed to simulate open burning conditions. Since such test simulations can never replicate actual open burning, it is advisable to use the factors in this Table with caution.

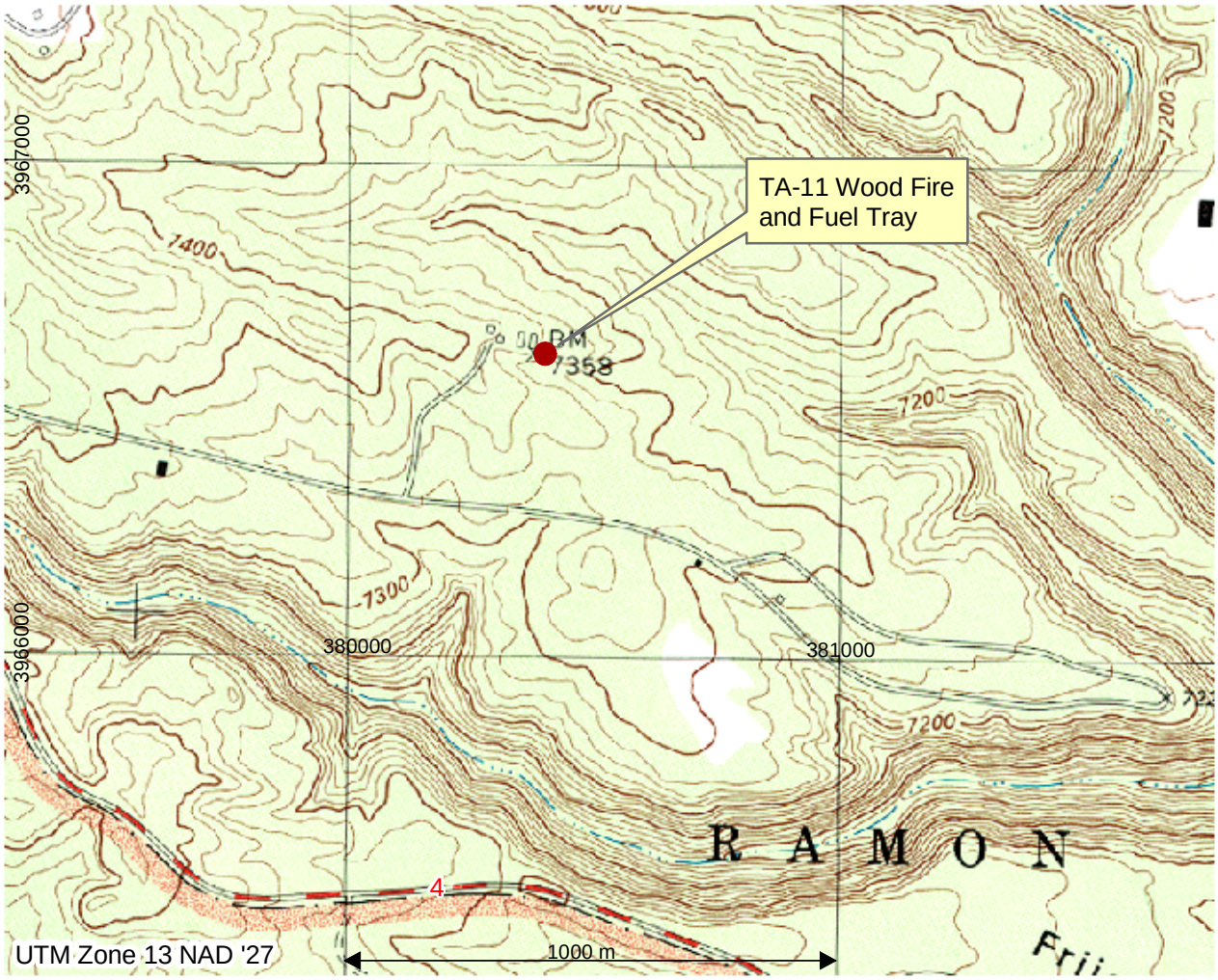
Attachment E

Site Map

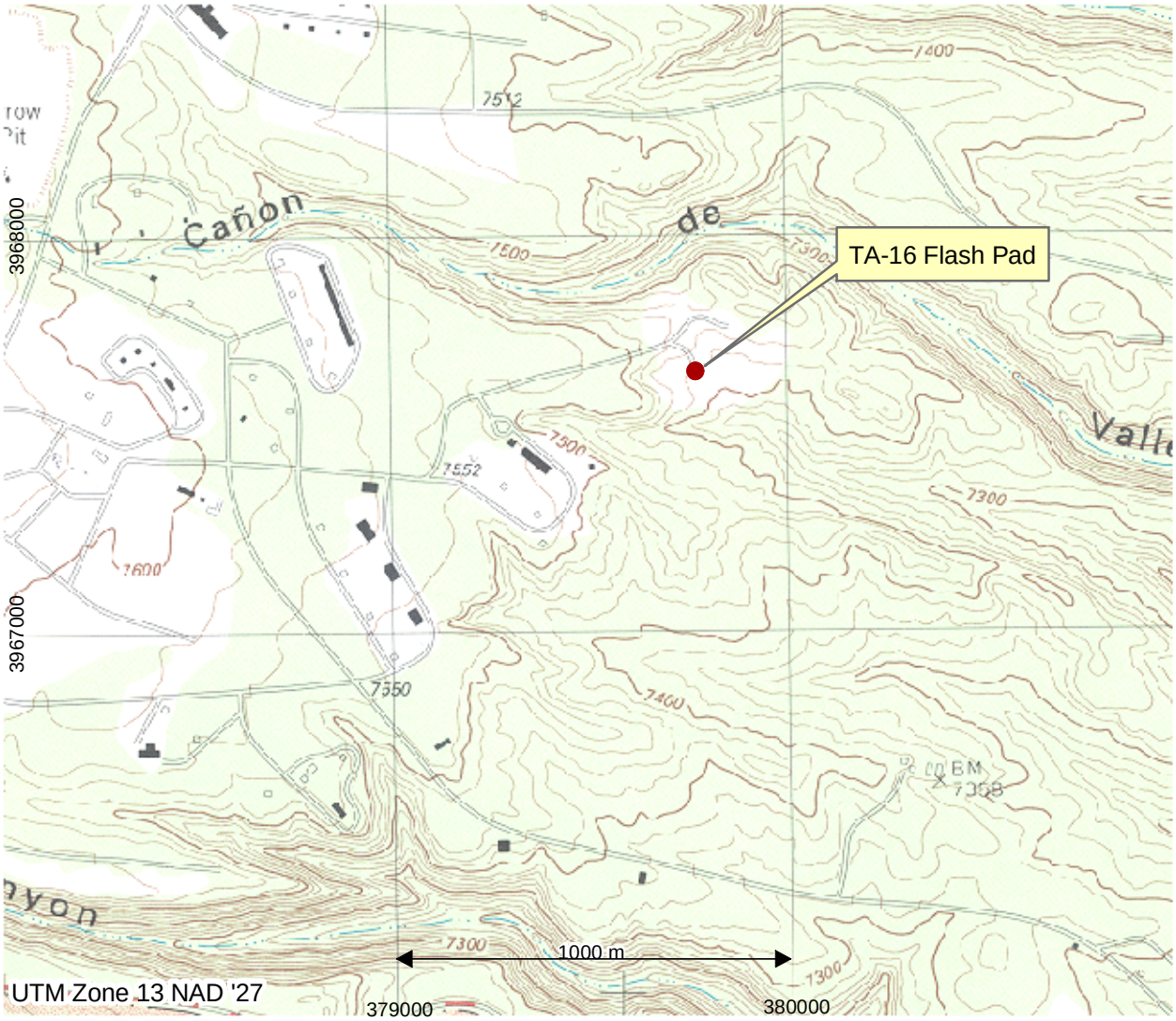
Location of Open Burn Sites at TA-11 and TA-16



Topographic Map of Open Burn Sites at TA - 11



Topographic Map of Open Burn Site at TA-16



Attachment F

Proof of Public Notice

For Newspaper, Radio, and Posting

NOTICE OF AIR QUALITY PERMIT APPLICATION

Pursuant to the requirements of Title 20 of the New Mexico Administrative Code, Chapter 2, Part 72 (20.2.72 NMAC – CONSTRUCTION PERMITS, Section 203.B), the University of California, operator of Los Alamos National Laboratory for the U.S. Department of Energy at P.O. Box 1663, MS J978, Los Alamos, New Mexico 87545 hereby announces the intent to apply to the New Mexico Environment Department, Air Quality Bureau, for an air quality permit for the Engineering Sciences and Applications (ESA) Division's TA-16 Flash Pad and TA-11 wood and fuel fire test site. An air quality permit is sought for open burning associated with treatment of scrap metal contaminated with high explosives and testing and evaluation of simulated accidents which involve impacts from fire. The expected date of application submittal to the NMED is June 30, 2004. These operations are existing activities at Los Alamos National Laboratory and are currently permitted by NMED under open burn permits No. TA-16-OB-2003 and TA-11-OB-2003.

The TA-16 Flash Pad is located in Township 19 North, Range 6 East, Section 32, approximately 5 miles south of Los Alamos in Los Alamos County. The TA-11 test site is located in Township 18 North, Range 6 East, Section 4, approximately 5 miles south of Los Alamos in Los Alamos County

The estimated plant-wide, maximum air emissions and air pollutants, from the TA-16 Flash Pad are 0.5 pounds per hour and 0.08 tons per year of particulate matter, 0.1 pounds per hour and 0.03 tons per year of carbon monoxide, 0.001 pounds per hour and 0.0001 tons per year of sulfur dioxide, 0.4 pounds per hour and 0.07 tons per year of nitrogen oxides, and 0.003 pounds per hour and 0.001 tons per year of volatile organic compounds. The estimated plant-wide, maximum air emissions and air pollutants, from the TA-11 test site are 78.7 pounds per hour and 0.7 tons per year of particulate matter, 481.1 pounds per hour and 4.7 tons per year of carbon monoxide, 40.0 pounds per hour and 0.1 tons per year of sulfur dioxide, 30.3 pounds per hour and 0.1 tons per year of nitrogen oxides, and 429.7 pounds per hour and 4.3 tons per year of volatile organic compounds. The TA-11 test site is allowed to conduct 10 tests per year. The maximum and standard operating schedules of each facility will be 1 hour after sunrise until 1 hour before sunset. The permit applicant and operator is the University of California at P.O. Box 1663, MS J978, Los Alamos, New Mexico 87545. The owner of the facility is the U.S. Department of Energy, Office of Los Alamos Site Operations, 528 35th Street, Los Alamos, NM 87544. Inquiries about the permitting process or relevant comments or questions regarding this permit application may be directed to:

Program Manager, New Source Review
New Mexico Environment Department
Air Quality Bureau
2048 Galisteo
Santa Fe, New Mexico 87505
(505) 827-1494

Please refer to the company name and site name, as used in this notice or send a copy of this notice when making inquiries since the Department might not have received the permit application at the time of this notice. The Department will also publish a legal notice later during the application review process after it has had the opportunity to review the application and the air quality impacts.

Sample Letter to Municipality, County, and Tribal Governments

CERTIFIED MAIL **XXXX XXXX XXXX XXXX**
RETURN RECEIPT REQUESTED

Dear **[Municipal, County, or Tribal Official]**

This letter is to notify you that the University of California, operator of Los Alamos National Laboratory for the U.S. Department of Energy is preparing to apply to the New Mexico Environment Department, Air Quality Bureau for an air quality permit for the Engineering Sciences and Applications (ESA) Division's TA-16 Flash Pad and TA-11 wood and fuel fire test site. This notice is a requirement of 20.2.72 NMAC – CONTRUCTION PERMITS.

We expect to submit the permit application to the New Mexico Environment Department, Air Quality Bureau on or about June 30, 2004. The TA-16 Flash Pad is located in Township 19 North, Range 6 East, Section 32, approximately 5 miles south of Los Alamos in Los Alamos County. The TA-11 test site is located in Township 18 North, Range 6 East, Section 4, approximately 5 miles south of Los Alamos in Los Alamos County.

An air quality permit is sought for open burning associated with treatment of scrap metal contaminated with high explosives and testing and evaluation of simulated accidents which involve impacts from fire. These operations are existing activities at Los Alamos National Laboratory and are currently permitted by NMED under open burn permits No. TA-16-OB-2003 and TA-11-OB-2003.

The estimated plant-wide, maximum air emissions and air pollutants, from the TA-16 Flash Pad are 0.5 pounds per hour and 0.08 tons per year of particulate matter, 0.1 pounds per hour and 0.03 tons per year of carbon monoxide, 0.001 pounds per hour and 0.0001 tons per year of sulfur dioxide, 0.4 pounds per hour and 0.07 tons per year of nitrogen oxides, and 0.003 pounds per hour and 0.001 tons per year of volatile organic compounds. The estimated plant-wide, maximum air emissions and air pollutants, from the TA-11 test site are 78.7 pounds per hour and 0.7 tons per year of particulate matter, 481.1 pounds per hour and 4.7 tons per year of carbon monoxide, 40.0 pounds per hour and 0.1 tons per year of sulfur dioxide, 30.3 pounds per hour and 0.1 tons per year of nitrogen oxides, and 429.7 pounds per hour and 4.3 tons per year of volatile organic compounds. The TA-11 test site is allowed to conduct 10 tests per year. The maximum and standard operating schedules of each facility will be 1 hour after sunrise until 1 hour before sunset. The permit applicant and operator is the University of California at P.O. Box 1663, MS J978, Los Alamos, New Mexico 87545. The owner of the facility is the U.S. Department of Energy, Office of Los Alamos Site Operations, 528 35th Street, Los Alamos, NM 87544.

Inquiries about the permitting process or relevant comments or questions regarding this permit application may be directed to:

Program Manager, New Source Review
New Mexico Environment Department
Air Quality Bureau
2048 Galisteo
Santa Fe, New Mexico 87505
(505) 827-1494

If you send written comments to the Department, please be sure to note the name of the company and the name of the site, or a copy of this letter along with your comments so that the Department can determine the permit application to which your comments refer. Also include your mailing address in your response. The Department will also publish notice later in the permit process after it has had the opportunity to review the application and its air quality impacts.

Sincerely,

Jean Dewart
Group Leader
Meteorology and Air Quality Group
Los Alamos National Laboratory
P.O. Box 1663, MS J978
Los Alamos New Mexico, 87545

List of Municipalities and Counties Requiring Certified Notification

Los Alamos County Clerk
P.O. Box 30
Los Alamos, New Mexico 87544

Governor, Cochiti Pueblo
P.O. Box 70
Cochiti Pueblo, New Mexico 87072

Sandoval County Clerk
P.O. Box 40
Bernalillo, New Mexico 87004

Santa Fe County Clerk
P.O. Box 1985
Santa Fe, New Mexico 87501

Governor, San Ildefonso Pueblo
Route 5, Box 315A
Santa Fe, New Mexico 87501

Governor, Santa Clara Pueblo
P.O. Box 580
Espanola, New Mexico 87532

Espanola City Manager
P.O. Drawer 37
Espanola, New Mexico 87532

Governor, Jemez Pueblo
P.O. Box 100
Jemez Pueblo, New Mexico 87024

Governor, Pojoaque Pueblo
Route 11, Box 71
Santa Fe, New Mexico 87501

Rio Arriba County Clerk
P.O. Box 158
Tierra Amarilla, New Mexico 87575
Or
P.O. Box 1256
Espanola, New Mexico 87532

PROOF OF POSTING

This document is to verify that a "Notice of Air Permit Application" to the New Mexico Environment Department by the University of California, operator of Los Alamos National Laboratory (LANL) for the U.S. Department of Energy, for the **Engineering Sciences and Applications (ESA) Division's TA-16 Flash Pad and TA-11 wood and fuel fire test site**, was posted at the following address:

Address where posted: *Los Alamos Public Library*
2400 Central Avenue
Los Alamos, New Mexico 87544

Name: _____ Signature: _____

Date: _____

PROOF OF POSTING

This document is to verify that a "Notice of Permit Application" to the New Mexico Environment Department by the University of California, operator of Los Alamos National Laboratory (LANL) for the U.S. Department of Energy, for the **Engineering Sciences and Applications (ESA) Division's TA-16 Flash Pad and TA-11 wood and fuel fire test site**, was posted at the following address:

Address where posted: *Los Alamos National Laboratory*
Technical Area 16, Walk-in Gate
Los Alamos, New Mexico 87545

Name: _____ Signature: _____

Date: _____

PROOF OF POSTING

This document is to verify that a "Notice of Permit Application" to the New Mexico Environment Department by the University of California, operator of Los Alamos National Laboratory (LANL) for the U.S. Department of Energy, for the **Engineering Sciences and Applications (ESA) Division's TA-16 Flash Pad and TA-11 wood and fuel fire test site**, was posted at the following address:

Address where posted: *Los Alamos County Building*
2300 Trinity Drive
Los Alamos, New Mexico 87544

Name: _____ Signature: _____

Date: _____

PROOF OF POSTING

This document is to verify that a "Notice of Permit Application" to the New Mexico Environment Department by the University of California, operator of Los Alamos National Laboratory (LANL) for the U.S. Department of Energy, for the **Engineering Sciences and Applications (ESA) Division's TA-16 Flash Pad and TA-11 wood and fuel fire test site**, was posted at the following address:

Address where posted: *U.C. Northern New Mexico and LANL*
Outreach Center Community Reading Room
1619 Central Avenue
Los Alamos, New Mexico 87544

Name: _____ Signature: _____

Date: _____

Attachment G

Project Description

Project Description

The TA-16 Flash Pad and TA-11 wood and fuel fire testing are part of LANL's Engineering Sciences and Applications (ESA) Division. The Division's mission is to provide stewardship of nuclear weapons and enable engineering technologies. Part of the mission includes testing weapon components and subsystems in operational environments they will encounter during stockpile-to-target sequences. This includes tests of accident scenarios including drop, crash, and fire.

TA-16-388 was built in 1951 and used to burn bulk HE. Construction of the TA-16 Flash Pad began in March 1998 and the first operation was in March 1999. The Flash Pad was installed to replace the existing process which used wood as a fuel source for thermal treatment. Open burning at TA-16-388 is conducted under open burn permits issued by NMED under the requirements of 20.2.60 NMAC – Open Burning. The Flash Pad is used to burn both solids and liquids contaminated with HE and bulk HE. These materials are hazardous wastes and a permit application has been submitted to the NMED Hazardous Waste Bureau. The site is regulated under hazardous waste interim status regulations until NMED issues a final permit. The Flash Pad is also used to flash non-combustible material and equipment which may be contaminated with HE and are not hazardous wastes. Propane burners are used to raise the temperature high enough to destroy any HE which may be contained in material such as piping. Since the other wastes treated at this location are regulated under Section 113 of the open burning regulation, this application is only for the flashing of non-combustible material and equipment. In addition, air emissions from the combustion of propane, although quite low, are not included in this application. Propane and air are mixed and ignited within the burner itself. This type of combustion should not be considered an open burn activity.

The TA-11 drop tower complex where wood and fuel fire testing take place was built in 1956. Open burn activities operate under open burn permits issued by NMED under the requirements of 20.2.60 NMAC – Open Burning. The purpose of these tests is to evaluate accident scenarios involving fire. Fire is a likely consequence of road, rail, or air transportation accidents. Fire tests conducted under controlled circumstances are the only direct means of assessing consequences of accidental fire scenarios through which mitigation measures can be developed. This testing and evaluation is typically done with a transportation container which has HE and DU within it to simulate the contents of shipments of concern.

Attachment H

PSD Applicability Determination

PSD Applicability Determination

This application is for an existing open burn operation that is not regulated as a stationary source subject to PSD permitting.

Attachment I

Regulatory Applicability and Compliance

Regulatory Applicability and Compliance

The analysis in this attachment describes the applicability of pertinent air quality regulations to the proposed project and compliance with those regulations which will apply.

20.2.3 NMAC – Ambient Air Quality Standards

Open burn activities at maximum permitted capacity of the TA-16 Flash Pad and TA-11 wood/fuel test site will not cause or contribute to an exceedance of any National or New Mexico Ambient Air Quality Standard. Air quality dispersion modeling was conducted which shows compliance with all ambient standards and is included in Attachment K to this application.

20.2.70 NMAC – Operating Permits

LANL was issued a final Title V operating permit on April 30, 2004. Open burn operations at LANL such as those at TA-16 and TA-11 are cited in Condition 9.1 of the permit which states: "9.1 The permittee shall comply with the conditions of 20.2.60 NMAC – Open Burning, including Open Burn permits TA-11-OB-2003, TA-14-OB-2003, TA-16-OB-2003 and TA-36-OB-2003". This general condition recognizes that the requirements of 20.2.60 NMAC are Title V applicable requirements, but also that the open burn activities are not viewed as stationary sources and as such are not included in Condition 2.0 Information and Requirements for Emissions Units of the Title V permit. Subsequent to issuance of the permit requested by this application, LANL will work with NMED to determine how to revise existing Condition 9.1 to reference the conditions in the new NSR permit.

20.2.60 NMAC – Open Burning

The TA-16 Flash Pad is subject to the conditions of open burn permit No. TA-16-OB-2003. TA-11 wood and fuel testing is subject to the conditions of open burn permit No. TA-11-OB-2003.

20.2.72 NMAC – Construction Permits

In 2003, NMED revised 20.2.60 NMAC – Open Burning and eliminated the open burn permit program under which the TA-16 Flash Pad and TA-11 testing is currently permitted. The revised 20.2.60 NMAC provides a permit-by-rule approach for certain open burn activities which are specified. Within the rule, if an activity is not allowed or specifically prohibited, Section 108 requires a construction permit be obtained under 20.2.72 NMAC. Open burning of non-hazardous waste at TA-16 and for tests TA-11 are not allowed or specifically prohibited. Although open burning at TA-16 and TA-11 is currently allowed until expiration of open burn permits No. TA-16-OB-2003 and No. TA-11-OB-2003, NMED requested LANL submit an application under 20.2.72 NMAC by June 30, 2004. This application fulfills this request.

Note that Section 108 of the open burn regulation also states: "Open burning as allowed or prohibited in this part is not considered a stationary source as defined in other parts of Title 20, Chapter 2, NMAC." This provision recognizes that although 20.2.72 NMAC is

being used for the first time to evaluate and permit an open burn activity, these activities are not subject to other air quality regulations as stationary sources.

20.2.73 NMAC – Notice of Intent and Emission Inventory Requirements
As discussed above under 20.2.72 NMAC – Construction Permits, open burn activities are not subject to other air quality requirements for stationary sources such as submission of an annual emission inventory.

20.2.77 NMAC – New Source Performance Standards
20.2.78 NMAC – Emission Standards for Hazardous Air Pollutants
20.2.82 NMAC – Maximum Achievable Control Technology Standards for Source Categories of Hazardous Air Pollutants
There are no New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP), or Maximum Achievable Control Technology Standards (MACT) which apply to these operations with one exception. The NESHAP at 40 CFR Part 61, Subpart H which regulates radionuclide emissions from DOE facilities is applicable to open burn activities at TA-11. See information in Attachment L which discusses applicability of this regulation.

Attachment J

Operational Plan for Startup, Shutdown, or Malfunction

Operational Plan for Startup, Shutdown, or Malfunction

The TA-16 Flash Pad and TA-11 site are operated under a series of operating procedures to ensure the protection of employee safety and health, protection of the environment, and fire mitigation. Operating procedures and fire mitigation documentation were included in Attachments C and D of the December 2002 open burn permit application. These documents may change over time. The most current operating procedures are available for review upon request.

Attachment K

Dispersion Modeling

Attachment K

Air Dispersion Analysis – ESA TA-16 Flash Pad and TA-11 Wood/Fuel Fire Tests

Narrative summary of the proposed construction, modification, or revision.

ESA Division has been performing open burning at Technical Area (TA) -11 and at TA-16 since the 1950's. NMED has requested LANL submit a permit application under 20.2.72 NMAC for these operations which currently operate under open burn permits. This report is a summary of the air dispersion analysis performed by LANL's Meteorology and Air Quality (MAQ) group to determine the radius of impact (ROI) of the emissions of criteria pollutants and, where warranted, the cumulative impact of all significant LANL sources for criteria pollutants whose ROI analyses reveal a significant impact.

List of file names of the model input, output, and other files used.

The following Table 1 lists the file names of the files used in this analysis.

Table 1. File Names for ISCST3 Modeling

Filename	Description
R11f16SX.inp R11f16SX.out	Input and output files for ROI evaluation of SOX emissions from open burning at TA-11 and TA-16.
R11f16TS.inp R11f16TS.out	Input and output files for ROI evaluation of TSP emissions from open burning at TA-11 and TA-16.
R11f16PM.inp R11f16PM.out	Input and output files for ROI evaluation of PM-10 emissions from open burning at TA-11 and TA-16.
C11fSX.inp C11fSX.out	Input and output files for evaluation of the cumulative impact of SOX from TA-11 fuel burning and TA-16 open burning and all significant LANL sources.
C11wTS.inp C11wTS.out	Input and output files for evaluation of the cumulative impact of TSP from TA-11 wood burning and TA-16 open burning and all significant LANL sources.
C11wPM.inp C11wPM.out	Input and output files for evaluation of the cumulative impact of PM-10 from TA-11 wood burning and TA-16 open burning and all significant LANL sources.
LOSAL95.met	The meteorological data file used in the modeling analysis
Agua Fria, Bland, Canada, Cochiti Dam, Espanola, Frijoles, Guaje Mountain, Horcado Ranch, Montosa Peak, Puje, Valle Toledo, White Rock	United States Geological Survey (USGS) digital elevation model (DEM) file used to supply terrain heights for sources, some receptors, and buildings included in the model analysis.
Discrete Receptor Coordinates	LANL generated data files for public roads within LANL and other receptor locations along the LANL boundary

Discussion of the modeling approach and justification, model options, and types of analysis.

The 2003 version of the "New Mexico Air Quality Bureau – Dispersion Modeling Guidelines" was reviewed prior to this analysis. In addition to the procedure and requirements provided in the NMAQB Guidelines, the procedures given in the EPA's Guideline on Air Quality Models (40 CFR Pt. 51, Appendix W) were followed.

Models used and their justification.

The ISCST3 model was used in the dispersion analysis. The EPA Guideline suggests the use of buoyancy induced dispersion (BID) for the modeling of sources involving the combustion of fuel; this is a regulatory default option for ISCST3.

LANL also employed a graphical user interface to the ISC model produced by Lakes Environmental to more effectively implement the ISCST3 model. There were two main model runs, one for ROI analyses and one for analyses of cumulative impacts of all significant LANL sources and comparison to NMAAQS & NAAQS.

Model options and their justification

The following modeling options were used in the dispersion analysis:

- Under source type options, we selected and used the type POINT, since it is the only source type in ISCST3 that incorporates BID. With the concurrence from NMED-AQB, we used source parameters that should reflect the behavior of emissions resulting from an open burn.

- MSGPRO —the NM Guideline recommends selecting this option when using meteorological data from the Bureau's archive. This option allows the ISCST3 model to continue running in the event missing data is encountered in the meteorological data file. With this option selected, ISCST3 treats missing data similarly to "calms". Although this option was selected, examination of the meteorological data file did not reveal any missing data.

- HE>ZI—this option addresses the potential problem that occurs when the receptor elevation is lower than stack base elevation, which can occur at Los Alamos due to the terrain complexity. In this situation, the mixing layer height (ZI), which is terrain following, may be lower than the effective plume height (HE), which is horizontal. This affects the plume "reflection" calculation in ISCST3, leading to erroneously large concentrations. By selecting this option, the model limits the plume centerline height to be less than the mixing layer height, resulting in realistic concentrations.

- The conservative "simple and complex" terrain option is selected by omitting the NOSMPL and NOCMPL keywords on the model option control pathway. Using this method allows ISCST3 to implement both simple (receptor height below stack height) and complex (receptor height above plume height) terrain algorithms when calculating concentrations. For intermediate terrain (receptor height between stack height and plume height), ISCST3 will calculate concentrations using both simple and complex terrain algorithms, and the higher of the two concentrations is selected.

A discussion of the met-data including identification of the source.

One year of meteorological data was supplied from an on-site met tower located at TA-6. The distance from the tower to the release site is about 1500 m. The file consists of hourly surface data from the LANL met-tower and mixing height data from Albuquerque International Airport.

USGS map showing the location of the facility, etc.

Electronic copies of 7.5" USGS topographical maps Agua Fria through White Rock (see Table 1) are attached to this report.

A description of the site, building dimensions and a plot plan.

Description of the site.

ESA Division performs open burning at TA-11 and TA-16. At the TA-16 Flash Pad, scrap metal contaminated with small quantities of high explosives is flashed on a concrete pad. At TA-11, wood and fuel are burned during tests of accident scenarios, although never simultaneously. Burn hours are restricted to sunrise plus one hour to sunset minus one hour, which translates, using the most extreme sunrise and sunset during the year, to 6am to 7pm. Although we model the impact on air quality using constant emissions every day during these hours, actual burns are sporadic and do not last more than a few hours during days that burning occurs.

All criteria pollutants emitted by the sources.

The criteria pollutants emitted by the source are nitrogen oxides (NOx), sulfur oxides (SOx), carbon monoxide (CO), and particulate matter, (TSP and PM_{10}). Table 2 provides the emission rates for the pollutants included in the modeling analyses. Attachment C – Emission Calculations of this application provides a complete description of the basis for these emission rates.

Table 2. Pollutant emission rates from the TA-11 and TA-16 open burn sites used in the dispersion modeling analysis, given in grams per second.

Source	NOx	CO	SOx	PM_{10}	TSP
TA-11 Open burning of fuel	2.96	0.86	4.94	1.47	1.47
TA-11 Open burning of wood	0.85	59.8	0.10	8.46	8.46
TA-16 Flash Pad	0.047	0.018	0.0001	0.057	0.057

The averaging time for each regulated pollutant.

The averaging times used in the modeling were 1 hour, 3 hours, 8 hours, 24-hours, and annual.

If modeled stack parameters differ from those listed in the report, explain why.

RRES-MAQ calculated the area of the actual rectangular burn area, and then calculated the diameter of a hypothetical circular stack that would have the same area. The stack height used in the modeling is conservatively set to zero.

Discussion of building down-wash.

Building downwash was not included in the modeling analysis for open burning at TA-11 and TA-16. Building downwash was included in the cumulative impact analyses at TA3_22_1, TA3_22_2, TA21_357, TA59_B2, TA55_B2, TA53_B2, TA50_B1, TA48_B3, 1484_B2, 1485_B2, T15_563C, TA3_38C, TA52_PS, and TURBINE. Please refer to Table 5 for more information on these sources.

A cross-reference between the sources listed in the permit and their names used in the modeling.

The TA-11 and TA-16 open burn sources were given the source identification names TA11OB and TA16OB, respectively, in the ISCST3 input files.

A description of the receptor grids, including the fence line coordinates, and any receptors on the property boundary.

The modeling domain was set with the origin (lower left-hand corner) at x = 370,000 m and y = 3950,000 m (UTM zone 13, NAD '27). This regular Cartesian grid is composed of receptors spaced 1 km apart. An inner rectangular grid of regular Cartesian receptors with origin at x = 374,500 m and y = 3958,500 m with 500 meter spacing was added to give better resolution closer to the LANL boundary. Inside the 500-km spacing grid was a set of discrete coordinates that represented the LANL fence line boundary with receptors spaced less than 50 meters apart. Within the boundary of LANL, the public has free access to East Jemez Road which runs east-west near the northern boundary of LANL and the small residential community of Royal Crest Trailer Court that is located on East Jemez Road. Receptors are included that follow East Jemez Road and outline the small, rectangular Royal Crest Trailer Court. With the exception of these receptors, no receptors were placed within the boundary of LANL. Figures 1 through 5 provide pictures of the receptors.

During the analyses of cumulative impact of the TA-16 and TA-11 open burn sources plus surrounding sources, small fine grids were added to the above grid composition to give higher resolution for regions surrounding maxima in modeled concentration. These fine grids had spacing of 100 meters. An attempt was made to keep the total number of receptors to a reasonably small number (always under 10,000) and as small as possible while effectively covering all areas of significant impact and thoroughly resolving areas where highest concentrations occurred.

Air quality standards and corrections for site elevation.

The gaseous air quality standards were corrected and converted for site elevation following the method given in the NMAQB Guidelines. The concentration conversions are given in Table 3, and the converted standards are given in Table 4.

Table 3. Concentration Conversions.

Pollutant	ppm	µg/m^3
NO_2	1.0	1499
SO_2	1.0	2087
CO	1.0	913

Table 4. Ambient Air Quality Standards.

	converted standards				
NMAAQ and NAAQ Standards	**NO_2**	**SO_2**	**CO**	**PM_{10}**	**TSP**
	µg/m^3	**µg/m^3**	**µg/m^3**	**µg/m^3**	**µg/m^3**
1-hour maximum allowable average			11960		
3-hour maximum allowable average		1044			
8-hour maximum allowable average			7940		
24-hour maximum allowable average	150	209		150	150
Annual Geometric Mean					60
Annual Arithmetic Mean	75	42		50	

A list of surrounding sources and cross reference to the names of the sources used in the modeling input.

Table 5 shows the sources that were included for the cumulative modeling analysis. These sources and the basis for associated maximum short-term emission rates are described in the LANL report *Facility-Wide Air Quality Impact Analysis, July 2003* submitted to NMED in support of the LANL Title V operating permit application. Note that the air curtain destructors included in that report are no longer in operation.

At the bottom of Table 5 is a source, TA-36, that was not included as an emissions unit in the Title V operating permit application. DX Division performs open burning at the TA-36 Sled Track. NMED has previously not regulated this activity, or the TA-16 Flash Pad or TA-11 sites, as a stationary source but rather as an open burn activity. Although the open burning at TA-36 only has a significant impact for 24-hour TSP and PM-10 emissions, we include in the cumulative modeling the total emissions of all five criteria pollutants from TA-36.

Table 5. Surrounding air emission units screened for the cumulative impact analyses.

Name and Description	ISCST3 ID
TA-3-22 Power plant stack 1	TA3_22_1
TA-3-22 Power plant stack 2	TA3_22_2
TA-15 Carpentry shop	T15_563C
TA-33 Diesel Generator	TA33_DG1
TA-21-357 Boilers (3)	TA21_B3
TA-21 Rock Crusher	TA21_RC1
TA-60 Asphalt Plant	TA60_AP1
TA-59-1 Boilers (2)	TA59_B2
TA-55-6 Boilers (2)	TA55_B2
TA-53-365 Boilers (2)	TA53_B2
TA-50-2 Boiler	TA50_B1
TA-48-1 Boilers (3)	TA48_B3
TA-16-1484 Boilers (2)	1484_B2
TA-16-1485 Boilers (2)	1485_B2
TA-3 Carpentry shop	TA3_38C
TA-52 Paper Shredder	TA52_PS
TA-3 Combustion turbine	TURBINE
TA-36 Open burn site	TA36OB

A discussion of the radius of impact determination

MAQ used the combination 1000 m/500 m/LANL-boundary grid discussed above to determine the radius of impact (ROI) of the TA-11 and TA-16 open burning sources. The resulting concentration for SO_X exceeded the significance level for the 3-hour and 24-hour averaging periods (significance levels = 25 µg/m^3 and 5 µg/m^3, respectively) when fuel is burned at TA-11. In addition, the concentrations for TSP and PM-10 exceeded the significance level for the 24-hour averaging period (significance level = 5 µg/m^3 for both TSP and PM-10) when wood is burned at TA-11. Figure 1 shows the results of the model output for the 3-hour SO_X modeling analysis for ROI. The radius of impact is about 9.4 km. The radius of impact of 24-hour SO_X has a similar radius of impact (and in the same direction, toward the ESE corner of LANL). Figure 2 shows the results of the model output for the 24-hour TSP modeling analysis for ROI. The radius of impact is about 10.7 km. The radius of impact of 24-hour PM-10 has an identical radius of impact because the source term is identical.

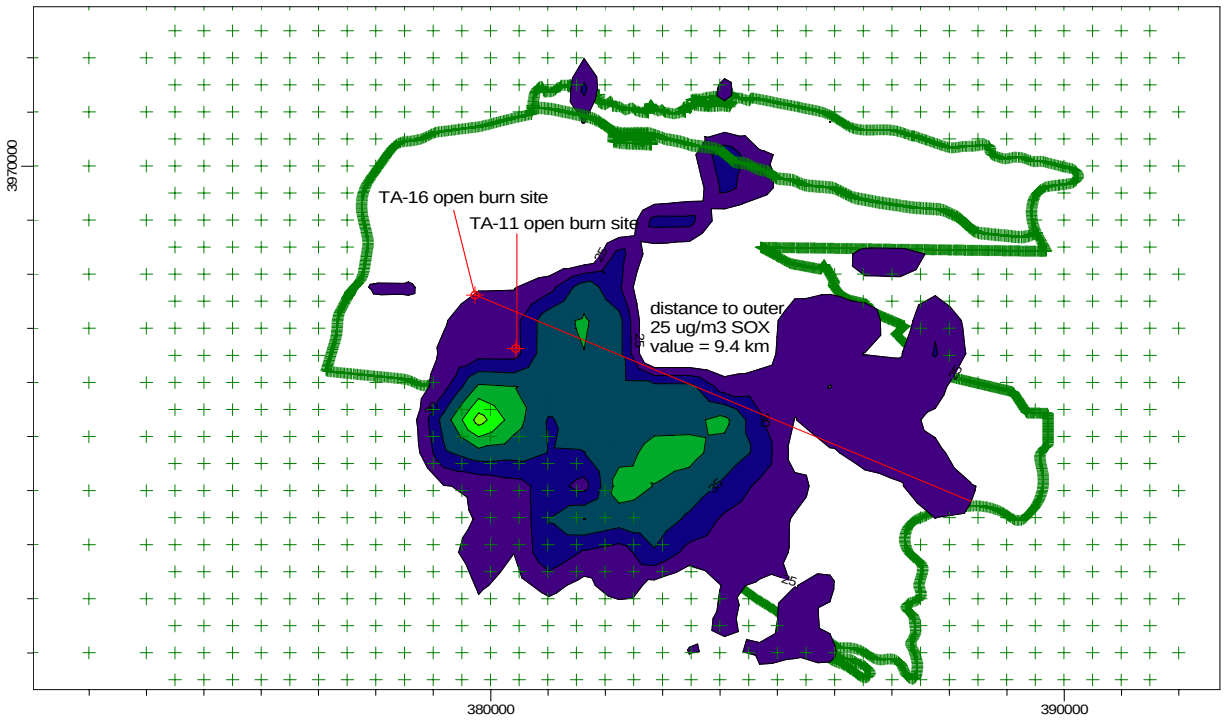


Figure 1. Graphical results of the modeling analysis for ROI determination for the 3-hour SO_X concentration for burning at TA-16 and fuel burning at TA-11. The ROI diameter is approximately 9.4 km. Contours are shown beginning at 25 ug/m3 and contour interval is 5 ug/m3.

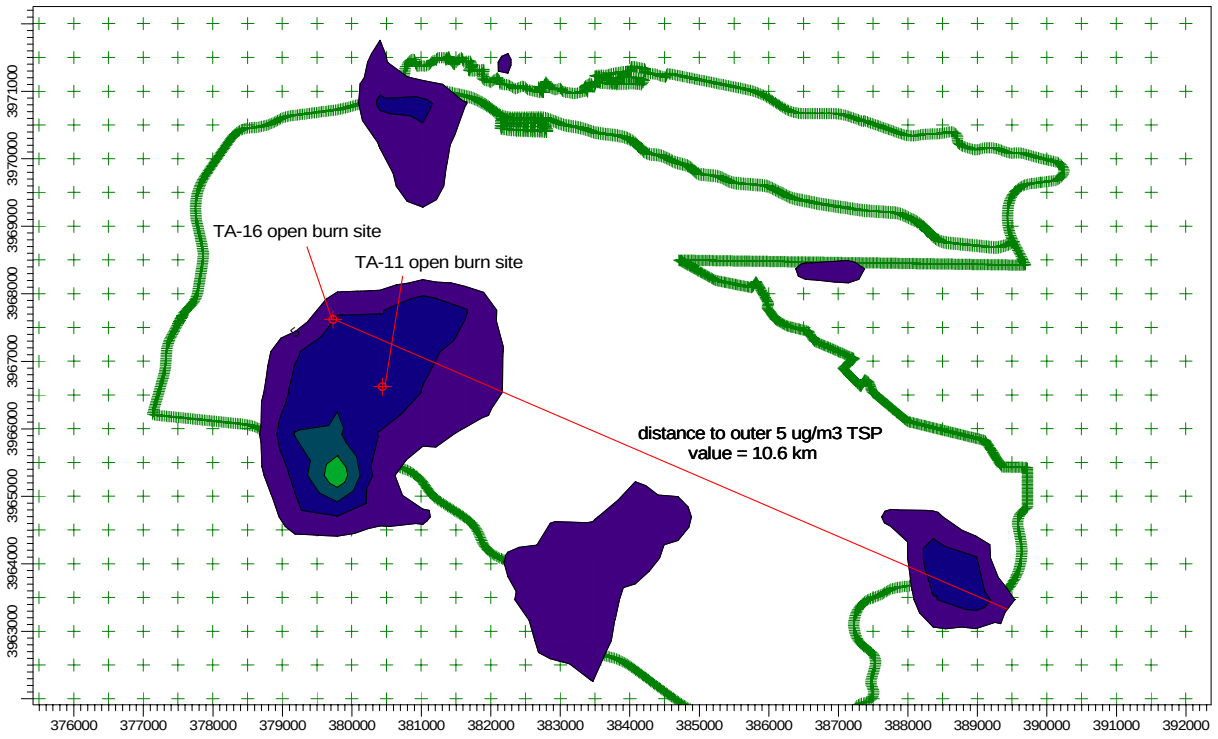


Figure 2. Graphical results of the modeling analysis for ROI determination for the 24-hour TSP concentration for burning at TA-16 and wood burning at TA-11. The ROI diameter is approximately 10.7 km. Contours are shown beginning at 5 ug/m3 and contour interval is 1 ug/m3.

The results of the ROI analysis are summarized in Tables 6 and 7 for fuel and wood burning at TA-11, respectively. The 24-hour (annual) NO_X value was multiplied by 0.4 (0.75) to estimate NO_2. The 3-hour and 24-hour SOX concentrations reached significant levels offsite for fuel burning at TA-11 and are shown in bold in Table 6. The 24-hour TSP and PM-10 concentrations reached significant levels offsite for wood burning at TA-11 and are shown in bold in Table 7.

Table 6. Highest impact of TA-11 FUEL burning and TA-16 open burning and (significance levels).

	NO_2	**SO_2**	**CO**	**PM_{10}**	**TSP**
	µg/m^3	**µg/m^3**	**µg/m^3**	**µg/m^3**	**µg/m^3**
1-hour maximum allowable average			26 (2000)		
3-hour maximum allowable average		**62.2** (25)			
8-hour maximum allowable average			5 (500)		
24-hour maximum allowable average	3.0 (5)	**12.6** (5)		3.8 (5)	3.8 (5)
Annual Geometric Mean					0.18 (1)
Annual Arithmetic Mean	0.3 (2.5)	0.61 (1)		0.18 (1)	

Table 7. Highest impact of TA-11 WOOD burning and TA-16 open burning and (significance levels).

	NO_2	**SO_2**	**CO**	**PM_{10}**	**TSP**
	µg/m^3	**µg/m^3**	**µg/m^3**	**µg/m^3**	**µg/m^3**
1-hour maximum allowable average			926 (2000)		
3-hour maximum allowable average		0.67 (25)			
8-hour maximum allowable average			202 (500)		
24-hour maximum allowable average	0.44 (5)	0.13 (5)		**11.0** (5)	**11.0** (5)
Annual Geometric Mean					0.61 (1)
Annual Arithmetic Mean	0.04 (1)	0.007 (1)		0.61 (1)	

The maximum 24-hour and annual NO_2 concentrations calculated with ISC did not exceed the significance levels given by NMAQB Guidance anywhere offsite, nor did the maximum 1-hour and 8-hour CO concentrations. Only SO_X had a significant impact when burning fuel at TA-11, and only TSP and PM-10 had a significant impact when burning wood at TA-11.

A summary of the cumulative modeling results.

A cumulative modeling analysis was conducted for all criteria pollutants which included all significant LANL sources, irrespective of their distance from TA-16 or TA-11. Modeling runs demonstrated that there would be no exceedances of the NMAAQS or NAAQS standards with the addition of open burning at TA-11 and TA-16 to pre-existing surrounding sources. Cumulative impacts on NO_2, SO_2, CO, TSP, and PM-10 show maximum concentrations that are below half of the standards. Tables 8 and 9 summarize the results for cumulative impacts on all criteria pollutants from all significant LANL sources. Table 8 reflects fuel burning at the TA-11 open burn site, and Table 9 reflects wood burning at TA-11.

Table 8. ISCST3 modeling results for cumulative impact of all significant LANL sources including FUEL burning at TA-11. Standards are in parentheses.

	NO_2 maximum Off-site concentration	**SO_2** maximum Off-site concentration	**CO** maximum Off-site concentration	**PM_{10}** maximum Off-site concentration	**TSP** maximum Off-site concentration
Averaging Period	**µg/m^3**	**µg/m^3**	**µg/m3**	**µg/m^3**	**µg/m^3**
1-hour-maximum result			863 (11987)		
3-hour-maximum result		407 (1046)			
8-hour-maximum result			108 (7961)		
24-hour-maximum result	36.2 (150)	95.7 (209)		48.6 (150)	48.6 (150)
Annual Arithmetic Mean	6.85 (75)	9.82 (42)		5.01 (60)	5.01 (60)*

Table 9. ISCST3 modeling results for cumulative impact of all significant LANL sources including WOOD burning At TA-11. Standards are in parentheses.

	NO_2 maximum Off-site concentration	**SO_2** maximum Off-site concentration	**CO** maximum Off-site concentration	**PM_{10}** maximum Off-site concentration	**TSP** maximum Off-site concentration
Averaging Period	**µg/m^3**	**µg/m^3**	**µg/m^3**	**µg/m^3**	**µg/m^3**
1-hour-maximum result			1105 (11987)		
3-hour-maximum result		371 (1046)			
8-hour-maximum result			230 (7961)		
24-hour-maximum result	36.2 (150)	91.5 (209)		51.1 (150)	51.2 (150)
Annual Arithmetic Mean	6.37 (75)	9.74 (42)		5.52 (60)	5.57 (60)*

*Arithmetic mean is greater than or equal to geometric mean. Arithmetic means are shown (5.01 and 5.57 in Tables 8 and 9, respectively) and so provide upper bounds for the geometric means.

Figure 3 shows the results for the cumulative 3-hour SO_X modeling analysis including surrounding sources. TA-11 is burning fuel (as opposed to wood) because fuel-burning at TA-11 has a much higher emission rate of SO_X than wood-burning there. The maximum concentration occurs about one kilometer from the LANL boundary within the fine grid in the upper left of Figure 1. Figure 4 shows the results for the cumulative 24-hour SO_X modeling analysis including surrounding sources. In contrast to the 3-hour impact analysis, the highest concentration is at x = 385,000 and y = 3971,200. This maximum is located in the fine grid in the upper right of Figure 4. Figure 5 shows the results for the cumulative 24-hour TSP modeling analysis including surrounding sources when TA-11 is burning wood. The highest concentration is at x = 380,247.41 and y = 3970,847, located in the fine grid in the upper left of Figure 5. The results for the cumulative 24-hour PM-10 modeling analysis are identical to those of TSP.

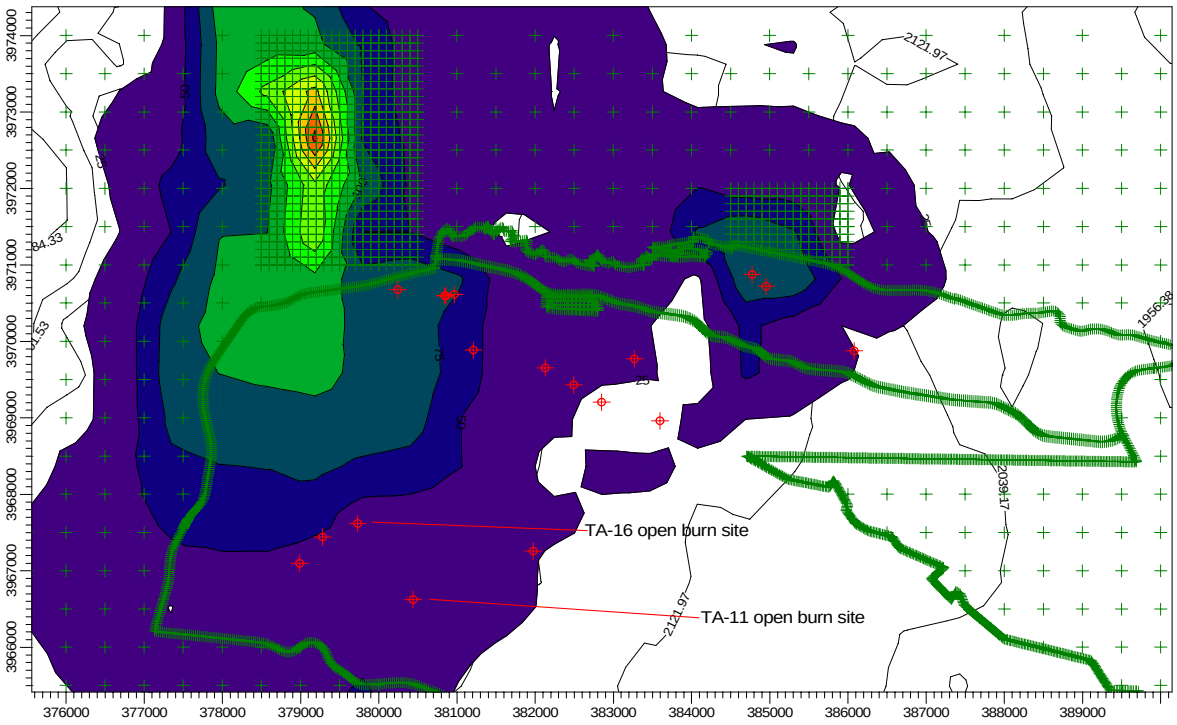


Figure 3. Graphical results of the modeling analysis for determination of the 3-hour cumulative impact of all significant LANL SO_X sources (assuming fuel burning at TA-11 open burn site). Contours are shown beginning at 25 ug/m3 and contour interval is 25 ug/m3. The cumulative impact has a maximum value of 407 ug/m3 northwest of the LANL boundary (379,500, 3972,200).

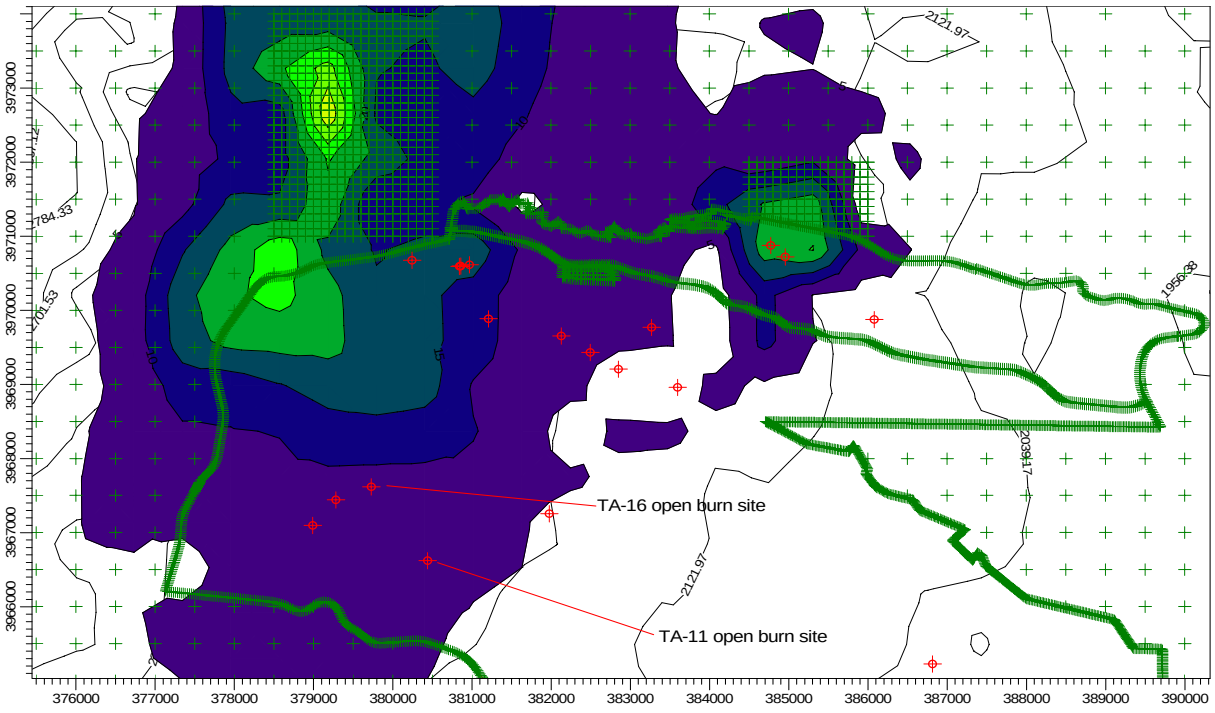


Figure 4. Graphical results of the modeling analysis for determination of the 24-hour cumulative impact of all significant LANL SO_X sources (assuming fuel burning at TA-11 open burn site). Contours are shown beginning at 5 ug/m3 and contour interval is 5 ug/m3. The maximum value of 96 ug/m3 occurs north of the LANL boundary at (385,000, 3971,200), not the same location as the 3-hour maximum.

It should be noted that the magnitude and location of the highest off site impact from all LANL permitted sources for SOx is changed from previously submitted modeling reports. This is due to the addition of the TA-11, TA-16 and TA-36 open burn sites, a proposed new combustion turbine at TA-3, and the discontinued operation of the Air Curtain Destructors.

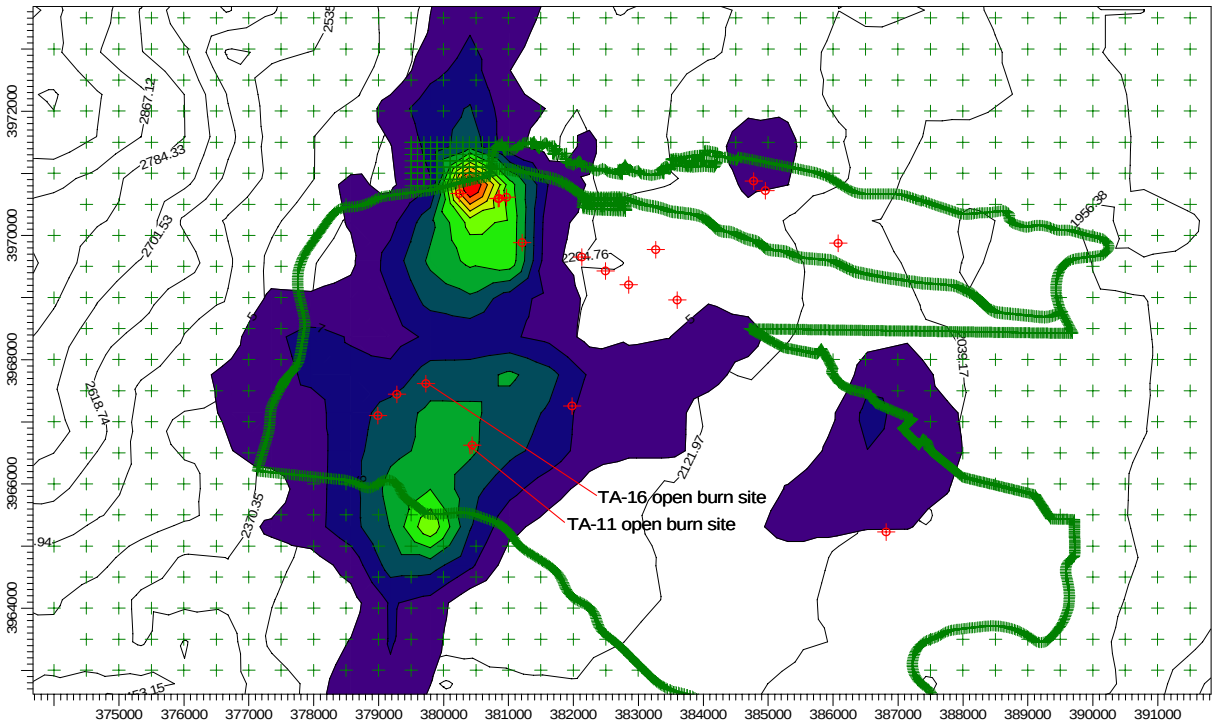


Figure 5. Graphical results of the modeling analysis for determination of the 24-hour cumulative impact of all significant LANL TSP sources (assuming wood burning at TA-11 open burn site). Contours are shown beginning at 5 ug/m3 and contour interval is 2 ug/m3. The maximum value of 51 ug/m3 occurs north of the LANL boundary at (380,247.41, 3970,847). The results for PM-10 are identical.

Attachment L

Additional Information

Radionuclide Air Emissions

LANL is an applicable source under 40 CFR 61, Subpart H – National Emissions Standard for Emissions of Radionuclides Other than Radon from Department of Energy Facilities. This regulation requires that LANL not cause any member of the public to receive more than 10 mrem/yr from airborne radionuclide emissions. The open burn activities at TA-11 may involve depleted uranium and contribute to the dose.

The maximum annual amount of depleted uranium to be used is 880 pounds (400 kg) or 0.17 Ci (specific activity is 4.38E-07 Ci/g). As prescribed in 40 CFR 61 Appendix D, emissions may be estimated by multiplying the amount used by the release factor which depends on the physical state. In this case the release factor for particulate solids is 10^{-3} and the air emissions are 1.7E-04 Ci/yr.

Dose assessments were calculated using CAP88, an EPA-approved dispersion modeling program. Based on the modeling results, the potential effective dose equivalent from the source at the nearest receptor is 1.1E-03 mrem per year and is well below the annual Radionuclide-NESHAP standard of 10 mrem. In addition, the estimated dose is well below the monitoring and permitting threshold of 0.1 mrem/yr specified in 40 CFR 61, Subpart H (NESHAP). Therefore, the project did not and does not require EPA pre-approval or emissions monitoring.