Los Alamos National Laboratory

Environment, Safety and Health Division
P.O. Box 1663, Mail Stop K491
Los Alamos, New Mexico 87545
(505) 667-4218 / FAX: (505) 665-3811

Date: July 29, 1999
Refer to: ESH-DO:99-163

Mr. John Volkerding
Air Quality Bureau
New Mexico Environment Department
2048 Galisteo
Santa Fe, NM 87505

Dear Mr. Volkerding:

Enclosed is an open burning permit application for the prescribed burn of a wood pile at TA-16. Prescribed burning is requested for this pile in order to eliminate the contaminated wood pile and to reduce the volume of contaminated waste.

This application request is for a one-day burn scheduled sometime in the summer or fall of 1999 or the spring of 2000. When the burn is scheduled, you will be notified and invited to view the burn.

Additional information for the proposed burn plan, emissions estimates, and impact analyses are included along with the permit application. The application and attachments satisfy the information requirements specified under Title 20, Chapter 2.60 of the New Mexico Administrative Code for Open Burning.

If you have any questions concerning this permit application for the prescribed burning of the wood pile at TA-16, please contact Leland Maez from the Laboratory's Air Quality Group at 665-1240.

Sincerely,

Dennis Erickson
Division Director

Sincerely,

James Gourdoux
Fire Marshal

Enc: a/s

Cy: R. Valdez, DOE-LAAO, MS A316
S. Fong, DOE-LAAO, MS A316
D. Tucker, LAFD, Los Alamos
D. Webb, ESH-20, MS M887
D. Woitte, LC/GL, MS A187
D. Stavert, ESH-17, MS J978
L. Maez, ESH-17, MS J978
ESH-17 File, J978
ESH-DO File

6180

LANL TA-16 1999

State of New Mexico
ENVIRONMENT DEPARTMENT
AIR QUALITY BUREAU
2048 Galisteo
Santa Fe, New Mexico 87505
Telephone (505) 827-1494
Fax (505) 827-1523

GARY E. JOHNSON
GOVERNOR

PETER MAGGORIE
SECRETARY

12 August, 1999

Leland Maez
ESH-17
LANL
Los Alamos, NM

RE: TA-16 Open Burn Application

Dear Mr. Maez;

I have reviewed the open burn application dated July 29, 1999 and referred to as ESH-DO:99-163. Attached please find the signed approved open burn application.

I appreciate the invitation to observe the burn and do look forward to that opportunity. If you have any further questions or comments please feel free to contact me at the address below or at 505-827-1494 x1496.

Sincerely;

J. M. Volkerding

John M. Volkerding
Environmental Specialist
Enforcement

ATTACHMENT A

ADDITIONAL INFORMATION

Objectives: The proposed burn event must accomplish the following:

- Eliminate contaminated wood pile; and
- Reduce the amount of contaminated waste.

Purpose: Mitigate the hazard associated with a wood pile, potentially contaminated with depleted uranium (DU), that was collected as a result of wild fire prevention measures. Contamination is suspect due to the nature of activities historically performed at the site from which the wood was removed.

Date Burning Requested: One burn event to take place in the summer or fall of 1999 or the spring of 2000 and to be completed on a single day.

Alternatives to Burning and Why Alternatives are Not Feasible: 20 NMAC 2.60 – *Open Burning* requires that alternatives to open burning be used when appropriate. However, for the following reasons, burning the wood pile is the method of choice to achieve the objectives:

- Varying amounts or rock, concrete, and rebar mixed in with the wood make chipping impractical; and
- DU shrapnel imbedded in the wood could contaminate and damage the chipper.

Burn Organization:

Fire Coordinator - Los Alamos Fire Department

Burn Personnel - Los Alamos Fire Department

Emergency Response Coordinator - Gene Darling
Emergency Management and Response
Los Alamos National Laboratory

Air Emissions Coordinator - Leland Maez
ESH-17 Air Quality
Los Alamos National Laboratory

Smoke Management: A number of procedures will be performed prior to and during burning in order to reduce emission impacts. These include the following:

- Assessing atmospheric conditions (wind speed, direction, and stability)
  - Continuous monitoring through the use of meteorological data taken from the main meteorological tower located 3 km from the burn site
  - Burn only when meteorological conditions are within those used in the SASEM impact modeling studies shown in Attachment B of this document
  - Begin burn in late morning when down slope drainage winds have ceased and prevailing winds are out of the South/Southeast
  - End burns in early afternoon to allow adequate time for smoldering and smoke abatement to occur before down-slope draining begins (late afternoon/early evening)
  - Burn only when meteorological conditions are such that impairment of visibility across highway 501, highway 4, and the air strip East of town is not impacted

- Appropriate fuel conditions
  - Ambient temperature: 50-80 °F
  - Relative humidity: 15-30%
  - Fuel moisture:

1 hr	15%
10 hr (spring)	16%
10 hr (fall)	20%
100 hr	11-18%

Particulate Monitoring Location: Continuous PM_{10} emissions data will be collected for the duration of the burn. The monitor will be placed at a location sighted to receive maximum smoke impacts from South/Southeasterly winds. Filters from the monitor will be analyzed by the New Mexico Environment Department.

Firing Plan: The fire will be started with a torch to set off diesel fuel poured on the wood pile. Compressed air foam will be used as a holding method.

Contingency Plan: Should the burn escape the allowable area and grow beyond the capabilities of the holding forces, the escape will be declared a wild fire. The burn boss will notify the Santa Fe Zone Dispatch, Los Alamos Fire Department, the Department of Energy, and the District Ranger thereby implementing an Escape Fire Situation Analysis.

Air Emissions: The following table indicates the amount of pollutants estimated to be released from the proposed burn event.

Pollutant	Emission Factors* (lb/ton of wood burned)	Emissions (lb)
CO_2	252	52,164
NO_x	2.6	538
PM_{total}	40	8,280
SO_x	0.4	83
VOC	19.8	4,099
DU	0.05% of the uranium mass burned**	2.84E-04

*Unless otherwise noted: Air Chief, EFIG/EMAD/OAQPS/EPA, Version 4.0, July 1995
**Pacific Northwest Laboratory study

Air emission estimates for open burning are based on a wood pile of 1500 m^3. The quantity of wood available for burning was estimated assuming that loosely piled mound consisted of 25% by volume wood with a density of 0.5 g/cm^3 (from CRC Handbook of Chemistry and Physics, 62nd edition, p. F-1).

The DU air emissions result from the particles and shrapnel that are potentially lodged in the wood from historical projectile firing activities. Monitoring studies confirm that volumes of 20 cords have contained as much as 50 grams of DU lodged as shrapnel. Through extrapolation it is estimated that the woodpile (103 cords) potentially contains 259 g of DU. A study conducted by Pacific Northwest Laboratory found the fractional airborne release of uranium during controlled burning to be between 0.05 and 0.003 percent of the uranium mass burned. Assuming the conservative release fraction, the potential release is 0.129 g or 5.66E-08 Ci of DU (Specific Activity is 4.38E-07 Ci/g).

Impacts: The impacts from this burn event were estimated using SASEM for the particulate matter impact (Attachment B) and HOTSPOT for the radiological impact (Attachment C). DU was modeled as the following:

Radionuclide	Fraction of Parent Activity
U-238	75%
Th-234	75%
Pa-235	75%
U-234	25%

ATTACHMENT B

SASEM Impact Modeling

Your input values from SASEM are:	
1. Fire/site name	TA-16 WOOD PILE
2. Date of the burn	No date
3. Burn type of the fire	PILED
4. Fuel type of the fire	WOOD
5. Size of the fire	1 piles
6. Fuel loading of the fire site	13250. cu ft
7. Fireline intensity	1450.0 Btu/ft/sec
8. Burn duration	4.00 hours
9. Meteorology type	PRESCRIBED
10. Prescribed wind speed, minimum	2.0 mi/hr
Prescribed wind speed, maximum	10.0 mi/hr
11. Prescribed wind direction, minimum ...	E
Prescribed wind direction, maximum ...	ESE
12. Prescribed dispersion day minimum	EXC
Prescribed dispersion day maximum	FAIR
13. Average mixing height	1000. meters

Sensitive Receptor Information			
Receptor Number	Receptor Name	Receptor Distance	Receptor Direction
1	Los Alamos	3.0	SSW
2	Bandelier	1.0	WNW

The SASEM calculated emission statistics are:

Pollutant of interest	Particulates (TSP and PM10)
Emission factor	17.92 g/kg
Emission rate	56.09 g/s/pile
Total particulates emitted	0.9 tons
Proportion of fuel consumed	50. %
Heat content of fuel specified	7000. Btu/lb
Residence time of fire front	960. s
Heat release rate for a plume	12173249. cal/s
Persistence factor for concentration	0.17
Proportion of smoke which rises	60. %
Proportion of total particulates in PM10	80. %

Disp Day	Wind Speed (MPH)	Maximum Concen (ug/m**3)	Distance to Maximum Concen (mi)	Exceedences of Standards TSP* Distance Downwind From (mi)	To (mi)	PM10* From (mi)	To (mi)	Plume Rise (m)
EXC	2.0	1.7	2.87	NO VIOLATION		NO VIOLATION		1689.
EXC	3.0	2.3	2.00	NO VIOLATION		NO VIOLATION		1126.
EXC	4.0	3.0	1.54	NO VIOLATION		NO VIOLATION		845.
EXC	5.0	3.6	1.26	NO VIOLATION		NO VIOLATION		676.
EXC	6.0	4.1	1.07	NO VIOLATION		NO VIOLATION		563.
EXC	7.0	4.7	0.93	NO VIOLATION		NO VIOLATION		483.
EXC	8.0	5.3	0.83	NO VIOLATION		NO VIOLATION		422.
EXC	9.0	5.8	0.74	NO VIOLATION		NO VIOLATION		375.
EXC	10.0	6.3	0.68	NO VIOLATION		NO VIOLATION		338.
GOOD	5.0	2.7	2.72	NO VIOLATION		NO VIOLATION		676.
GOOD	6.0	3.2	2.22	NO VIOLATION		NO VIOLATION		563.
GOOD	7.0	3.7	1.88	NO VIOLATION		NO VIOLATION		483.
GOOD	8.0	4.2	1.62	NO VIOLATION		NO VIOLATION		422.
GOOD	9.0	4.7	1.42	NO VIOLATION		NO VIOLATION		375.
GOOD	10.0	5.2	1.27	NO VIOLATION		NO VIOLATION		338.
FAIR	7.0	1.3	9.65	NO VIOLATION		NO VIOLATION		483.
FAIR	8.0	1.6	7.62	NO VIOLATION		NO VIOLATION		422.
FAIR	9.0	2.0	6.18	NO VIOLATION		NO VIOLATION		375.
FAIR	10.0	2.3	5.13	NO VIOLATION		NO VIOLATION		338.

* The primary TSP standard is 150. micrograms per cubic meter.
The primary PM10 standard is 150. micrograms per cubic meter.

Receptor No.	Name	Dist (mi)	Dir	Disp Day	Wind Speed (MPH)	Range of Wind Dir	P&K* Visual Range (mi)	Kosh** Visual Range (mi)
1	Los Alamos	3.00	SSW	EXC	2.0	E -ESE	NO IMPACT	
1	Los Alamos	3.00	SSW	EXC	3.0	E -ESE	NO IMPACT	
1	Los Alamos	3.00	SSW	EXC	4.0	E -ESE	NO IMPACT	
1	Los Alamos	3.00	SSW	EXC	5.0	E -ESE	NO IMPACT	
1	Los Alamos	3.00	SSW	EXC	6.0	E -ESE	NO IMPACT	
1	Los Alamos	3.00	SSW	EXC	7.0	E -ESE	NO IMPACT	
1	Los Alamos	3.00	SSW	EXC	8.0	E -ESE	NO IMPACT	
1	Los Alamos	3.00	SSW	EXC	9.0	E -ESE	NO IMPACT	
1	Los Alamos	3.00	SSW	EXC	10.0	E -ESE	NO IMPACT	
1	Los Alamos	3.00	SSW	GOOD	5.0	E -ESE	NO IMPACT	
1	Los Alamos	3.00	SSW	GOOD	6.0	E -ESE	NO IMPACT	
1	Los Alamos	3.00	SSW	GOOD	7.0	E -ESE	NO IMPACT	
1	Los Alamos	3.00	SSW	GOOD	8.0	E -ESE	NO IMPACT	
1	Los Alamos	3.00	SSW	GOOD	9.0	E -ESE	NO IMPACT	
1	Los Alamos	3.00	SSW	GOOD	10.0	E -ESE	NO IMPACT	
1	Los Alamos	3.00	SSW	FAIR	7.0	E -ESE	NO IMPACT	
1	Los Alamos	3.00	SSW	FAIR	8.0	E -ESE	NO IMPACT	
1	Los Alamos	3.00	SSW	FAIR	9.0	E -ESE	NO IMPACT	
1	Los Alamos	3.00	SSW	FAIR	10.0	E -ESE	NO IMPACT	
2	Bandelier	1.00	WNW	EXC	2.0	E -ESE	NO IMPACT	
2	Bandelier	1.00	WNW	EXC	3.0	E -ESE	NO IMPACT	
2	Bandelier	1.00	WNW	EXC	4.0	E -ESE	NO IMPACT	
2	Bandelier	1.00	WNW	EXC	5.0	E -ESE	NO IMPACT	
2	Bandelier	1.00	WNW	EXC	6.0	E -ESE	NO IMPACT	
2	Bandelier	1.00	WNW	EXC	7.0	E -ESE	NO IMPACT	
2	Bandelier	1.00	WNW	EXC	8.0	E -ESE	NO IMPACT	
2	Bandelier	1.00	WNW	EXC	9.0	E -ESE	NO IMPACT	
2	Bandelier	1.00	WNW	EXC	10.0	E -ESE	NO IMPACT	
2	Bandelier	1.00	WNW	GOOD	5.0	E -ESE	NO IMPACT	
2	Bandelier	1.00	WNW	GOOD	6.0	E -ESE	NO IMPACT	
2	Bandelier	1.00	WNW	GOOD	7.0	E -ESE	NO IMPACT	
2	Bandelier	1.00	WNW	GOOD	8.0	E -ESE	NO IMPACT	
2	Bandelier	1.00	WNW	GOOD	9.0	E -ESE	NO IMPACT	
2	Bandelier	1.00	WNW	GOOD	10.0	E -ESE	NO IMPACT	
2	Bandelier	1.00	WNW	FAIR	7.0	E -ESE	NO IMPACT	
2	Bandelier	1.00	WNW	FAIR	8.0	E -ESE	NO IMPACT	
2	Bandelier	1.00	WNW	FAIR	9.0	E -ESE	NO IMPACT	
2	Bandelier	1.00	WNW	FAIR	10.0	E -ESE	NO IMPACT	

* Packham, D. R. and R. G. Vines, 1978, JAPCA 28:790-795.
**Koshmieder, 1924, Beitr. Phys. Freien Atm., 12:33-54.
and EPA, 1979, EPA-450/5-79-008.

Based on TSP emission rates

ATTACHMENT C

HOTSPOT Impact Modeling

Details/Assumptions of DU run

Used HOTSPOT code Version 8

Stability class D
Wind Speed = 2 m/s
No mixing layer
Deposition Velocity = 1 cm/s
No plume rise
Release height = 4 m
Instantaneous release

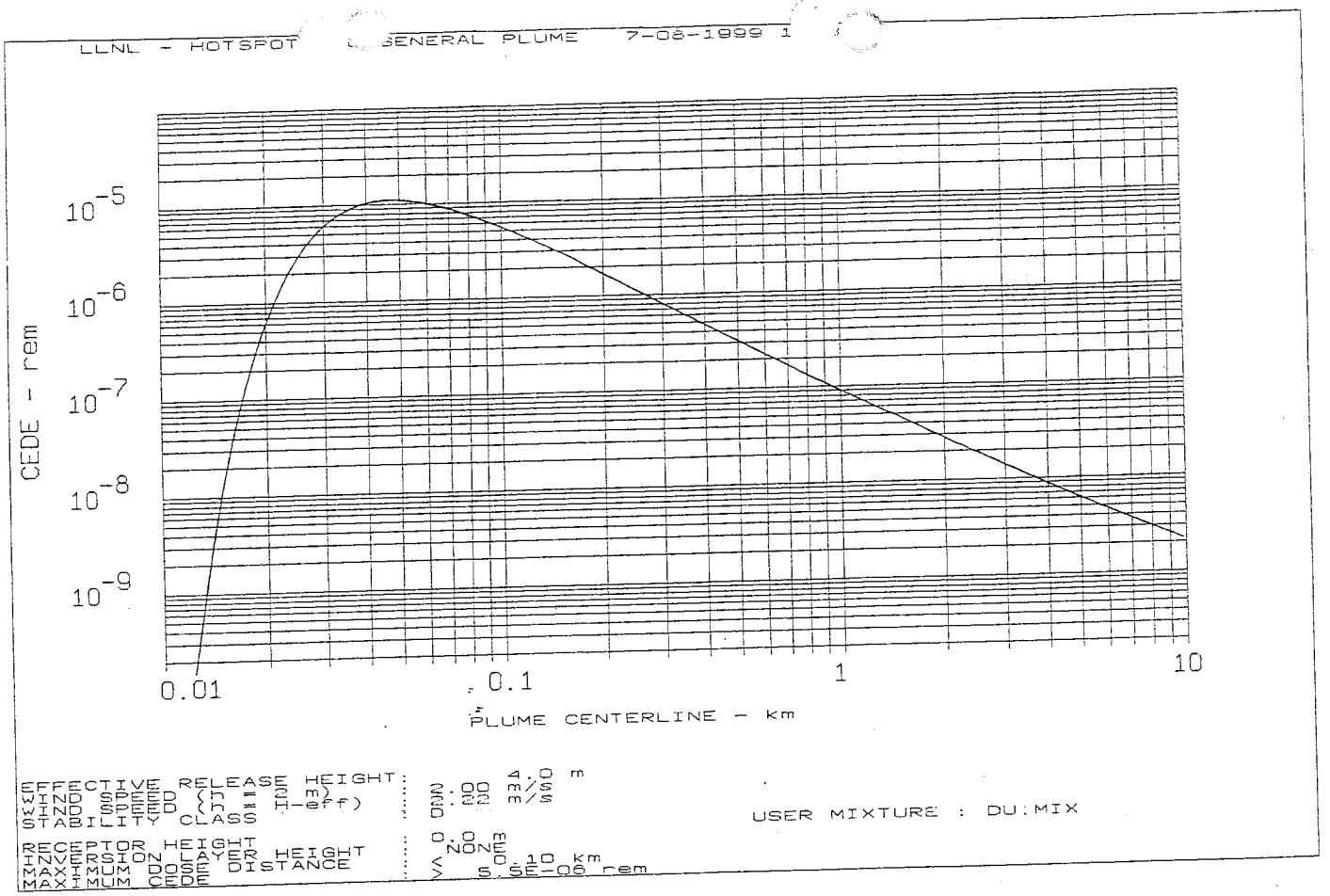
Assumes plume centerline goes over receptor

D = 4.000 km
DEP = 3.8E-09 uCi/m^2
CHI = 3.8E-13 (Ci-s)/m^3
50-YR DOSE COMMITMENT:

EFFECTIVE DOSE EQUIVALENT	8.8E-09 rem

HOTSPOT 8.0 GENERAL PLUME 7-08-1999 14:28

USER MIXTURE : DU.MIX EFFECTIVE RELEASE HEIGHT : 4.00 m
WIND SPEED (h=2 m): 2.0 m/s
WIND SPEED (h=H-eff): 2.2 m/s
STABILITY CLASS : D RECEPTOR HEIGHT : 0.0 m
INVERSION LAYER HEIGHT : NONE
SAMPLE TIME : 10.000 min
MAXIMUM DOSE DISTANCE : < 0.10 km MAXIMUM CEDE : > 5.5E-06 rem


LLNL - HOTSPOT GENERAL PLUME 7-08-1999 1
CEDE - rem
10^{-5}
10^{-6}
10^{-7}
10^{-8}
10^{-9}
0.01
0.1
1
10
PLUME CENTERLINE - km
EFFECTIVE RELEASE HEIGHT ..... 4.0 m
WIND SPEED (AT 10 m) ..... 2.00 m/s
WIND SPEED (AT 2 m eff) ..... 1.20 m/s
STABILITY CLASS ..... D
RECEPTOR HEIGHT ..... 0.0 m
INVERSION LAYER HEIGHT ..... NONE
MAXIMUM DOSE DISTANCE ..... > 5.10 km
MAXIMUM CEDE ..... 5.5E-06 rem
USER MIXTURE : DU:MIX

	50-y CEDE (rem/μCi)	breathing rate (m^3/s)	conversion DCF (rem-m3/Ci-S)
U-238	120	3.33E-04	4.00E+04
Th-234	0.033	3.33E-04	1.10E+01
Pa-234	0.00074	3.33E-04	2.46E-01

Du.mix

* HOTSPOT MIXTURE DATABASE
*
* The following criticality release inventory is associated
* with a stanard depleted uranium mix. Deposition velocity is assumed
to equal 1.
*
*

Nuclide Number 1

Radionuclide	: U-238
Particle Class	: Y
Halflife (Years)	: 4.5E+09
SUBMERSION	(rem-m3)/(Ci-sec)
50-yr CEDE	: 4.0000E+04
Skin	: 0.0000E+00
Lung	: 0.0000E+00
Thyroid	: 0.0000E+00
Surface Bone	: 0.0000E+00
Red Marrow	: 0.0000E+00
Liver	: 0.0000E+00
Spleen	: 0.0000E+00
Gonads	: 0.0000E+00
Breast	: 0.0000E+00
Curies Released	: 4.2000E-08
Release Fraction	: 1.0000E+00
Deposition Velocity (cm/sec)	: 1.0000E+00

Nuclide Number 2

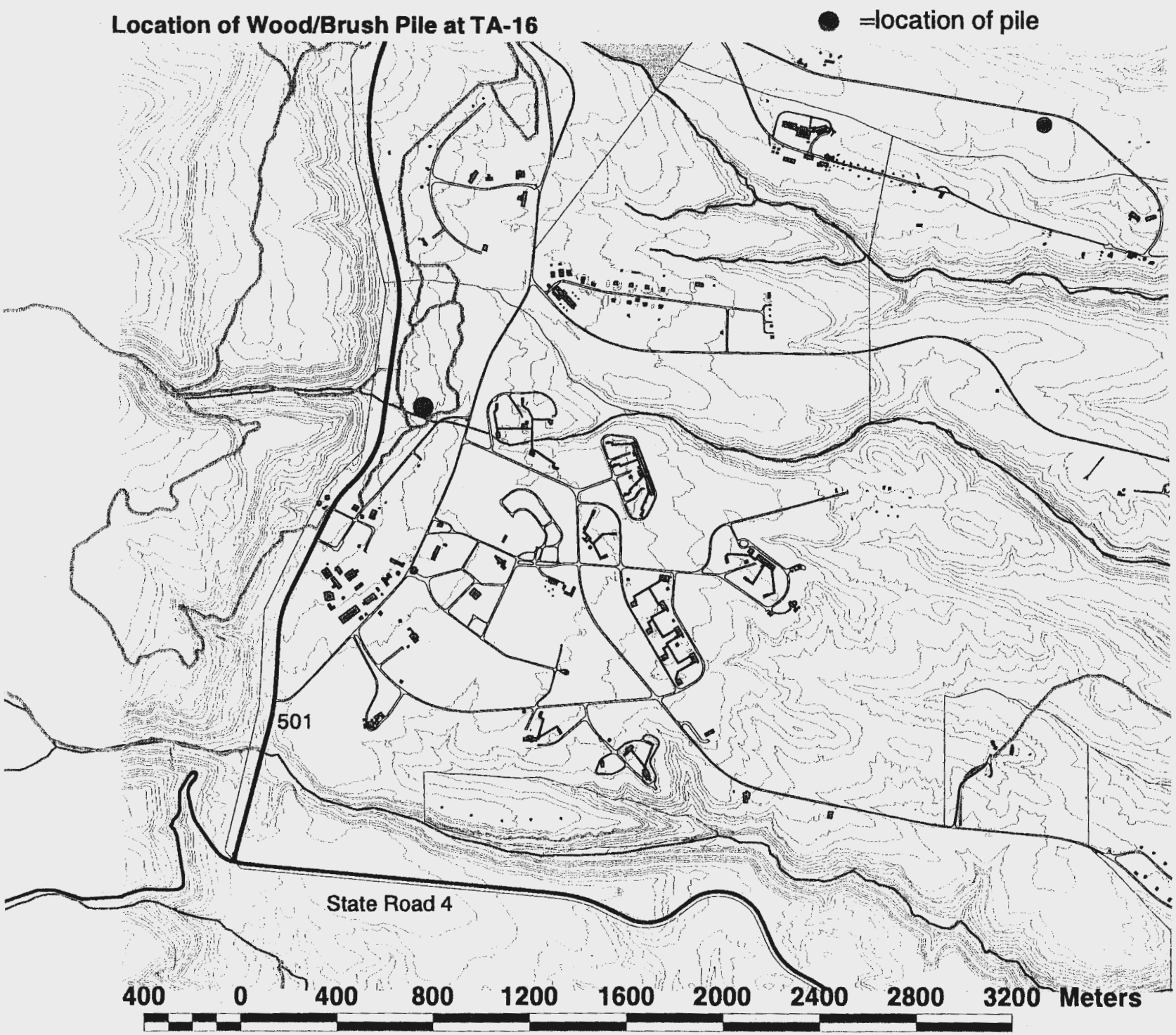
Radionuclide	: Th-234
Particle Class	: Y
Halflife (Years)	: 6.60E-02
SUBMERSION	(rem-m3)/(Ci-sec)
50-yr CEDE	: 1.1000E+01
Skin	: 0.0000E+00
Lung	: 0.0000E+00
Thyroid	: 0.0000E+00
Surface Bone	: 0.0000E+00
Red Marrow	: 0.0000E+00
Liver	: 0.0000E+00
Spleen	: 0.0000E+00

		Du.mix
Spleen	:	0.0000E+00
Gonads	:	0.0000E+00
Breast	:	0.0000E+00
Curies Released	:	1.4000E-08
Release Fraction	:	1.0000E+00
Deposition Velocity (cm/sec)	:	1.0000E+00

ATTACHMENT D

Picture and Map

Wood Pile at TA-16


Location of Wood/Brush Pile at TA-16
=location of pile
N
501
State Road 4
400 0 400 800 1200 1600 2000 2400 2800 3200 Meters

STATE OF NEW MEXICO
Environment
Department

PERMIT NO. _____
(AQB assigned)

NEW MEXICO ENVIRONMENT DEPARTMENT/AIR QUALITY BUREAU
PERMIT APPLICATION AND REPORTING OF OPEN BURNING FOR
PRESCRIBED/PRESCRIBED NATURAL FIRE AREAS

PERMITTEE: USDA___ USDI___ BLM___ MILITARY___ DOE X PRIVATE___ OTHER___

ADMINISTRATIVE UNIT: Los Alamos National Laboratory COUNTY: Los Alamos

CONTACT: Leland Maez PHONE: (505)665-1240

NAME OF BURN: Wood Pile Burn @ TA-16 LOCATION: T:19N R:6E S:30
(Township, Range, Section)

PROPOSED ACREAGE n/a FUEL LOADING DETERMINATION METHOD Estimated Volume

TYPE OF FUEL Cut Ponderosa Pine and Mixed Conifer and slash TONS/ACRE 207 tons

Is burn likely to impact a smoke sensitive area? Yes___ No X
If yes, please attach a map of smoke sensitive areas (Include distance and direction).

Smoke sensitive areas include: Class I areas as well as other scenic and important views, urban and rural population centers, hospitals, nursing homes, schools, transportation facilities such as roads, highways, and airports, recreational areas, and other locations that may be sensitive to smoke impacts for health, safety, and/or aesthetic reasons.

Signed _____ Date 30 JUL 1999
Dennis Erickson, ESH Division Director — Name and Title — James Gourdoux, Fire Marshal

Submit to: New Mexico Environment Department, Air Quality Bureau
2048 Galisteo
Santa Fe, NM 87505

This application has been received by the New Mexico Environment Department and is
APPROVED X **DENIED** ___ **for the following reasons:** _____

This permit is approved for the following dates: August 12 1999 — August 12, 2000
and is subject to the conditions set forth in 20 NMAC 2.60 and the following conditions:

1) notify the Bureau 7 least 24 hours prior to the burn
2) follows the smoke management & particulate monitoring conditions listed in the permit application

The Department reserves the right to cancel this permit at any time if the public interest so warrants it. The holder of this permit is therefore cautioned and charged that he/she, and he/she alone, assumes full responsibility to exercise the utmost care and judgement before igniting any prescribed fires. The Environment Department hereby disclaims any and all liability of itself or it's agents that might be incurred by petitioner's acts.

Signed _____ Date 8/12/99
Name and Title

NMED 8/96 White - Applicant; Canary - Applicant Main Office; Pink - Air Quality Bureau;