

**POTENTIAL OFFSITE RADIOLOGICAL DOSES ESTIMATED
FOR THE PROPOSED DIVINE STRAKE EXPERIMENT,
NEVADA TEST SITE**

December 2006

Revision 0

**Prepared for:
U.S. Department of Energy
National Nuclear Security Administration
Nevada Site Office
Under Contract No. DE-AC52-06NA25946**

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Executive Summary

An assessment of the potential radiation dose that residents offsite of the Nevada Test Site (NTS) might receive from the proposed Divine Strake experiment was made to determine compliance with Subpart H of Part 61 of Title 40 of the Code of Federal Regulations, *National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities*. The Divine Strake experiment, proposed by the Defense Threat Reduction Agency, consists of a detonation of 700 tons of heavy ammonium nitrate fuel oil-emulsion above the U16b Tunnel complex in Area 16 of the NTS. Both natural radionuclides suspended, and historic fallout radionuclides resuspended from the detonation, have potential to be transported outside the NTS boundary by wind. They may, therefore, contribute radiological dose to the public. Subpart H states “Emissions of radionuclides to the ambient air from Department of Energy facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr” (Title 40 of the Code of Federal Regulations [CFR] §61.92) where mrem/yr is millirem per year. Furthermore, application for U.S. Environmental Protection Agency (EPA) approval of construction of a new source or modification of an existing source is required if the effective dose equivalent, caused by all emissions from the new construction or modification, is greater than or equal to 0.1 mrem/yr (40 CFR §61.96).

In accordance with Section 61.93, a dose assessment was conducted with the computer model CAP88-PC, Version 3.0. In addition to this model, a dose assessment was also conducted by the National Atmospheric Release Advisory Center (NARAC) at the Lawrence Livermore National Laboratory. This modeling was conducted to obtain dose estimates from a model designed for acute releases and which addresses terrain effects and uses meteorology from multiple locations.

Potential radiation dose to a hypothetical maximally exposed individual at the closest NTS boundary to the proposed Divine Strake experiment, as estimated by the CAP88-PC model, was 0.005 mrem with wind blowing directly towards that location. Boundary dose, as modeled by NARAC, ranged from about 0.006 to 0.007 mrem. Potential doses to actual offsite populated locations were generally two to five times lower still, or about 40 to 100 times lower than the 0.1 mrem level at which EPA approval is required pursuant to Section 61.96.

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List of Acronyms and Abbreviations

ANFO	ammonium nitrate fuel oil-emulsion
CAP88-PC	Clean Air Act Assessment Package – 1988
CFR	Code of Federal Regulations
°C	degrees Celcius
Ci	Curie
DOE	U.S. Department of Energy
DTED	Digital Terrain Elevation Data
DTRA	Defense Threat Reduction Agency
EPA	U.S. Environmental Protection Agency
fps	feet per second
ft	feet
kg	kilogram
km	kilometer
LLNL	Lawrence Livermore National Laboratory
m	meter
m ²	square meter
mrem	milli-Roentgen equivalent man
NARAC	National Atmospheric Release Advisory Center
NESHAP	National Emission Standards for Hazardous Air Pollutants
NTS	Nevada Test Site
pCi/g	pico-Curies per gram
PM10	particulate matter less than 10 micrometers in diameter
PST	Pacific Standard Time
s	second
UCI	upper confidence interval
UTC	Universal Coordinated Time

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1 INTRODUCTION

The Defense Threat Reduction Agency (DTRA) plans to conduct an experiment at the U16b Tunnel in Area 16 of the Nevada Test Site (NTS). The experiment, called Divine Strake, will consist of a single detonation of 700 tons (English) of heavy ammonium nitrate fuel oil-emulsion (ANFO) (593 tons trinitrotoluene equivalent) (U.S. Department of Energy [DOE], 2006a). Though no nuclear testing activities of any type were conducted within one mile of the U16b Tunnel (DOE, 2000), the area was subject to fallout from global and NTS nuclear tests. Resuspension of this fallout could travel beyond the NTS boundary where it might contribute to the radiological dose of the public. In addition to man-made radionuclides, the U.S. Environmental Protection Agency (EPA) suggested that the assessment of potential radiological dose also include naturally occurring radionuclides in soils suspended as a result of the explosion (Rosenblum, 2006). This report describes how DOE and DTRA calculated the potential radiological dose to persons residing outside the NTS boundary from radionuclides suspended by the proposed Divine Strake experiment.

Under the Clean Air Act, the National Emission Standards for Hazardous Air Pollutants (NESHAP) were established to control certain pollutants. Subpart H of Part 61 of Title 40 of the Code of Federal Regulations (CFR) states, "Emissions of radionuclides to the ambient air from Department of Energy facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr" (40 CFR §61.92). It is also required that an application for EPA approval of construction of a new source or modification of an existing source be submitted if the effective dose equivalent caused by all emissions from the new construction or modification is equal to or greater than 1 percent of the 10 millirem per year (rem/yr) standard (≥ 0.1 mrem/yr) set in 40 CFR §61.96. Potential dose from the proposed Divine Strake experiment estimated from models are compared with the limit of 10 mrem/yr and to the 0.1-mrem/yr level at which an application for EPA approval is required. Releases of radionuclides to the air from the NTS have been reported annually to the EPA since 1992 in NESHAP reports.

2 METHODS

2.1 Clean Air Act Assessment Package – 1988 (CAP88-PC)

As specified by Section 61.93, compliance with NESHAP shall be determined and effective dose equivalent values to members of the public calculated using the computer model CAP88-PC, AIRDOS-PC, or other procedures for which EPA has granted prior approval. The use of CAP88-PC has been the most widely used model at facilities within the DOE complex. On February 21, 2006, the EPA announced acceptance of Version 3.0 of the CAP88-PC model for use in demonstrating compliance with the requirements of Subpart H of Part 61 (Federal Register, Vol. 71, pages 8854 - 8856). Version 3.0 of CAP88-PC was one of the models used here to calculate the potential dose to the public from the proposed Divine Strake experiment.

CAPP88-PC uses a modified Gaussian plume equation to estimate dispersal of radionuclide releases. This Gaussian plume model is one of the most commonly used models in government guidebooks, and results have been shown to agree well with experimental data (Shroff, 2006). Since the model was designed for chronic low-level releases, external dose and intake

assumptions in the model result in a higher, and therefore more conservative, estimate of potential dose to offsite residents when applied to a sudden release like that from the proposed Divine Strake experiment. CAP88-PC does not consider the effects of complex terrain; however, impacts from terrain are expected to be negligible because the size of the proposed Divine Strake experiment release area is small compared with the distances to offsite individuals (Shroff, 2006). Also, potential terrain effects are diminished due to the high release momentum, and therefore, plume height. The National Atmospheric Release Advisory Center (NARAC) modeling described in Section 2.2 of this report addresses issues of the acute release and terrain effects.

Two CAP88-PC runs are described in this report. The only difference between the two is the wind directional speeds used. Wind data are described in the following section. An earlier CAP88-PC run is described in Appendix C. This was based on literature values from historic data for source term whereas the CAP88-PC modeling described in the body of this report is based on site characterization data collected specifically for this purpose (DOE, 2006c). Results from the modeling presented in Appendix C fall between the modeled results based on the site characterization data.

Prior to modeling potential dose from the proposed Divine Strake experiment, the Modtest sample case described in the CAP88-PC Version 3.0 User Guide, was run on the same computer and software installation used for dose estimations from the proposed Divine Strake experiment. Results of this test were identical to those from the published example (Shroff, 2006), thereby providing an additional measure of quality assurance. The *Synopsis* and *Dose and Risk Equivalent Summary* Reports from the Modtest run are provided in Appendix D for comparison with those given in Appendix G of the CAP88-PC Version 3.0 Users Guide (Shroff, 2006).

2.1.1 CAP88-PC Inputs

Source Term Area

The crater created by the proposed Divine Strake experiment is predicted to be 98 feet (ft) (30 meters [m]) in radius (DOE, 2006a). However, particulates are expected to be suspended from the blast over a much larger area. The source term area used in the CAP88-PC modeling was the same as that used for sampling during site characterization (DOE, 2006b), specifically an area of 292,000 square meters (m²) (circle with radius of 1,000 ft or about 300 m). The release height above ground level was set to the minimum allowed by CAP88-PC (0.01 m) since the release is from ground level.

Source Term

The source term used in modeling is listed in Table 1. Radionuclide concentrations (in picocuries per gram [pCi/g]) in material suspended from the proposed Divine Strake experiment were taken as the maximum upper confidence interval (UCI) for each radionuclide listed in the *Site Characterization Report of the Divine Strake Experiment at the Nevada Test Site* (DOE, 2006c). These concentrations were multiplied by the total amount of particulate matter less than 10 micrometers in diameter (PM10) predicted to be suspended from the proposed Divine Strake explosion [17.55 tons (English)] (DOE, 2006a). For radionuclides that are part of a decay chain, secular equilibrium was assumed and the maximum UCI within the chain was assumed for the entire decay chain. All specific radionuclides listed in Section 4 of the site characterization

report (DOE, 2006c) were used as source term regardless of the number of samples that had non-detections.

Buildup

Because the CAP88-PC model is designed for continuous chronic releases, the default buildup value is 100 years. This means the model allows 100 years for the buildup of short-lived progeny in the environment before potential doses are calculated. While the proposed Divine Strake experiment would be a short-term release, the 100 year buildup value was used as it is the approach specified in the basis model for CAP88-PC (the NUREG 1.109 approach [U.S. Nuclear Regulatory Commission, 1977]) and therefore the approach accepted for demonstrating compliance. The 100 year buildup time is conservative (increases potential dose). In this case, changes in buildup time make a small difference in the calculated dose because progeny within decay chains were assumed to be in equilibrium for the source term for the proposed Divine Strake experiment.

Meteorology

Ambient temperature = 13.2 degrees Celsius (°C) (2005 average temperature in Area 16)

Humidity = 3.4 grams per cubic meter (average moisture concentration measured by atmospheric moisture samplers on the NTS 2000 – 2002)

Precipitation = 3 centimeters (cm)

Wind: Because it was not known when the proposed Divine Strake experiment would occur, two wind data sets were used. The first represented the worse case scenario with the average actual wind speed and stability class (Class E) observed on the NTS for January 1999 – 2005 (6 knots or 3.1 meters per second [m/s]) going in a single direction 100 percent of the time. The second data set used actual stability classes, wind speed, and wind directions in Area 16 of the NTS for all of 2005. The single direction wind file with the relatively low wind speed experienced in January results in a higher (more conservative) dose estimate while the 2005 wind conditions result in a low estimate due to portions of the wind going in all directions over the release period. These two estimates bound the wind conditions expected.

Momentum

The initial upward momentum of the dust cloud used with CAP88-PC was 4000 m/s (13,000 feet per second [fps]). This is an approximation for very large quantities of blasting agents which is accepted in the commercial industry (GlobalSecurity.org, 2006).

Mixing Height

The mixing height used was 3,000 m. This represents the 2,510 m cloud top obtained from Lawrence Livermore National Laboratory's (LLNL's) Hotspot model which was then rounded off to one significant figure.

Table 1. Source term used for modeling potential dose from the proposed Divine Strake experiment

Analyte	Concentration for Source Term (pCi/g) ^a	Source Term (Ci) ^b	Analyte	Concentration for Source Term (pCi/g) ^a	Source Term (Ci) ^b
Al-26	8.03E-02	1.28E-06	U-235	4.23E+00	6.73E-05
Am-241	7.19E-01	1.14E-05	Th-231	4.23E+00	6.73E-05
Be-7	5.31E-01	8.45E-06	Pa-231	4.23E+00	6.73E-05
Cm-243	4.36E-01	6.94E-06	Ac-227	4.23E+00	6.73E-05
Co-58	4.02E-02	6.40E-07	Th-227	4.17E+00	6.64E-05
Co-60	7.63E-02	1.21E-06	Fr-223	5.92E-02	9.43E-07
Cs-134	3.62E-01	5.76E-06	Ra-223	4.23E+00	6.73E-05
Cs-137	5.50E-01	8.76E-06	Rn-219	4.23E+00	6.73E-05
Ba-137m	5.50E-01	8.76E-06	Po-215	4.23E+00	6.73E-05
Eu-152	4.52E-01	7.20E-06	Pb-211	4.23E+00	6.73E-05
Eu-154	3.51E-01	5.59E-06	Bi-211	4.23E+00	6.73E-05
Eu-155	2.18E-01	3.47E-06	Tl-207	4.22E+00	6.71E-05
H-3	8.19E+03 (pCi/L H-3 only)	1.30E-05 ^c	Po-211	1.18E-02	1.89E-07
K-40	1.81E+01	2.88E-04	U-238	3.02E+00	4.81E-05
Nb-94	6.78E-02	1.08E-06	Th-234	3.02E+00	4.81E-05
Pu-238	5.15E-02	8.20E-07	Pa-234m	3.02E+00	4.81E-05
Pu-239	2.05E+00	3.26E-05	Pa-234	3.93E-03	6.25E-08
Sb-125	1.83E-01	2.91E-06	U-234	3.02E+00	4.81E-05
Sr-90	1.95E-01	3.10E-06	Th-230	3.02E+00	4.81E-05
Y-90	1.95E-01	3.10E-06	Ra-226	3.02E+00	4.81E-05
Th-232	1.86E+00	2.96E-05	Rn-222	3.02E+00	4.81E-05
Ra-228	1.86E+00	2.96E-05	Po-218	3.02E+00	4.81E-05
Ac-228	1.86E+00	2.96E-05	Pb-214	3.02E+00	4.81E-05
Th-228	1.86E+00	2.96E-05	At-218	6.04E-04	9.62E-09
Ra-224	1.86E+00	2.96E-05	Bi-214	3.02E+00	4.81E-05
Rn-220	1.86E+00	2.96E-05	Po-214	3.02E+00	4.81E-05
Po-216	1.86E+00	2.96E-05	Pb-210	3.02E+00	4.81E-05
Pb-212	1.86E+00	2.96E-05	Bi-210	3.02E+00	4.81E-05
Bi-212	1.86E+00	2.96E-05	Po-210	3.02E+00	4.81E-05
Po-212	1.19E+00	1.90E-05			
Tl-208	6.70E-01	1.07E-05			

^a pCi/g = pico Curie per gram: Maximum UCI for each radionuclide listed in the site characterization report (DOE, 2006c) were used. For radionuclides that are part of a decay chain, secular equilibrium was assumed and the maximum UCI within the chain was assumed for the entire decay chain.

^b Ci = Curie: Concentration for source term multiplied by mass of PM10 material (15,921,093 g).

^c Tritium associated with soil moisture. Assumed 10 percent moisture (gravimetric).

Distances

Distances entered into CAP88-PC are listed in Table 2 and correspond with distances in kilometers (km) to populated locations outside the NTS boundary. The exception to this is at the closest NTS boundary which is due east of the proposed Divine Strake experiment. There is no public access there due to the U.S. Air Force's Nevada Test and Training Range, but the location was used as a worst case for a hypothetical offsite resident.

Food Source Scenario

The food source scenario selected for the CAP88-PC modeling was the rural scenario. EPA default values for this scenario were used. The rural scenario results in the highest dose calculation due to the assumption that all food (vegetable, milk, and meat) were produced within the assessment area (i.e., no food was imported).

Table 2. Bearing and distance from the proposed Divine Strake experiment: Latitude 37.0234811°, Longitude 116.1819632° (NAD 83)

Location	Distance (km)	Bearing (Degrees)	Sector
Eastern NTS Boundary	22.60	90.00	E
Amargosa Valley	46.71	204.15	SSW
American Silica	48.94	154.43	SSE
Springdale	51.12	271.08	W
U.S. Ecology	53.27	240.21	WSW
Beatty	54.36	251.08	WSW
Crystal	58.78	179.31	S
Amargosa Center	59.11	208.56	SSW
Tolicha Peak	61.71	298.81	WNW
Cactus Springs	63.60	139.57	SE
Indian Springs	67.53	136.92	SE
Sarcobatus Flat	69.59	285.80	WNW
Medlin's Ranch	70.34	52.60	NE
Ash Meadows	73.52	188.03	S
Stateline Area	75.75	196.05	SSW
Penoyer Farm	76.38	22.11	NNE
Cold Creek	78.44	149.26	SSE
SNV Prison	79.13	134.46	SE
Rachel	79.45	27.98	NNE

2.2 NARAC Modeling

NARAC provides tools and services that map the spread of hazardous material accidentally or intentionally released into the atmosphere. Located at the University of California's LLNL, NARAC is a national support and resource center for planning, preparedness, real-time emergency response, and threat assessments involving nuclear, radiological, chemical, biological, or natural emissions. NARAC predictions provide information on affected areas and populations (NARAC.llnl.gov, 2006).

The NARAC emergency response system consists of a coupled suite of meteorological and dispersion models. The data assimilation model, Atmospheric Data Assimilation and Parametrization Techniques, constructs variables such as mean winds, pressure, precipitation, temperature, and turbulence, using a variety of interpolation methods and atmospheric parameterizations. Non-divergent wind fields are produced by an adjustment procedure based on the variational principle and a finite-element discretization. The dispersion model, Lagrangian Operational Dispersion Integrator, solves the three-dimensional advection-diffusion equation using a Lagrangian stochastic, Monte Carlo method. LODI includes methods for simulating the processes of mean wind advection, turbulent diffusion, radioactive decay and production, wet deposition, gravitational settling, dry deposition, and buoyant/momentum plume rise. The models are coupled to NARAC databases providing topography, geographical data, and health risk levels. Real-time meteorological observational data, and global and mesoscale forecast model predictions are available. For more information on NARAC, models, and their testing and evaluation see <http://narac.llnl.gov/modeling.php> (NARAC.llnl.gov, 2006).

Radionuclide transport and potential dose to persons from the proposed Divine Strake experiment were modeled by NARAC for releases beginning on two representative days in January, one during 2005 and one during 2006 (see Meteorology below).

2.2.1 NARAC Inputs

Source Term Area

The source term area used was the same as that described above: a circle with radius rounded to the nearest hundred meters (radius = 300 m).

Source Term

The source term used was the same as described above and listed in Table 1.

Meteorology

Since it is not known when the proposed Divine Strake experiment will be conducted, meteorology was used from the month of January because, in general, it would provide a higher (more conservative) dose estimate due to average winds blowing in a more northerly direction, lower average wind speeds, and more stable conditions. Specific meteorological data used were from two days in January. The first was January 15, 2005; the second was January 20, 2006. The time of day the models started was 1600 Universal Coordinated Time (UTC), or 0800

Pacific Standard Time (PST). Data from all available meteorological stations on the NTS plus many off of the NTS were used (see Appendix B for figures showing meteorological stations).

Population Estimates

Population within estimated plume areas was provided using a database from Los Alamos National Laboratory. The database includes U.S. Census Bureau residential data and business population data (from the State Business Directory). It includes estimates of day-night worker migration, thereby providing a population density database that accounts for time-of-day population variation for the entire United States on a 250-m resolution grid (McPherson and Brown, 2003).

Terrain Source

The National Imagery and Mapping Agency has developed standard digital datasets, known as Digital Terrain Elevation Data (DTED). DTED are a uniform matrix of terrain elevation values that provide basic quantitative data for systems and applications that require terrain elevation, slope, and/or surface roughness information.

3 RESULTS

3.1 CAP88-PC

Model results from CAP88-PC are provided in Appendix A and summarized in Table 3. The worst case scenario (wind blowing directly at a hypothetical resident at the closest distance along the east NTS boundary) would result in a dose of 0.005 mrem or 20 times lower than the level at which EPA approval is required. Though the closest NTS boundary was the eastern boundary, potential dose would be very similar at the western boundary (assuming wind blowing towards that direction) given the proposed Divine Strake experiment is nearly centered between the eastern (22.6 km away) and western (23.5 km away) NTS boundaries. The closest offsite population is Amargosa Valley, 46.7 km to the south-southwest of the proposed Divine Strake experiment. Based on this modeling, wind blowing directly towards Amargosa Valley during the proposed Divine Strake experiment would result in a potential dose of 0.002 mrem, about 50 times lower than the level at which EPA approval is required. Release requirements set for the experiment call for surface wind to be blowing from the southwest (240 degrees) through the southeast (120 degrees) at less than 25 miles per hour (DOE, 2006a). In this direction, Medlin's Ranch, Penoyer Farm, and Rachel are the closest populated locations potentially downwind from the experiment. CAP88-PC predicted potential doses of 0.0011, 0.0010, and 0.00096 mrem, respectively, at these locations with wind blowing directly at them.

Over 67 percent of the potential dose predicted by CAPP88-PC was from nuclides in the ^{235}U chain. Dose from radionuclides in the ^{232}Th and ^{238}U chains accounted for 11 and 8 percent, of the total dose, respectively. Average concentrations of ^{238}U and ^{235}U reported in the site characterization report for the proposed Divine Strake experiment (DOE, 2006c) are within the range expected for natural uranium (EPA, 1994) and concentration ratios of these averages also suggest natural uranium. The highest contributor to dose from a purely man-made radionuclide was ^{239}Pu which accounted for 9 percent of the total.

Table 3. Potential dose (mrem) to offsite residents from the proposed Divine Strake experiment based on CAP88-PC Version 3.0 predictions

Location	Distance (km)	Sector^(a)	Potential Dose if Wind Blowing Directly at Location (mrem)	Potential Dose if Wind Blowing at Annual Average Conditions (mrem)
Eastern NTS Boundary	22.60	E	5.0E-03	2.8E-04
Amargosa Valley	46.71	SSW	2.1E-03	3.6E-05
American Silica	48.94	SSE	1.9E-03	5.4E-05
Springdale	51.12	W	1.8E-03	7.4E-05
U.S. Ecology	53.27	WSW	1.7E-03	7.8E-05
Beatty	54.36	WSW	1.7E-03	7.5E-05
Crystal	58.78	S	1.5E-03	3.1E-05
Amargosa Center	59.11	SSW	1.4E-03	2.0E-05
Tolicha Peak	61.71	WNW	1.3E-03	2.1E-05
Cactus Springs	63.60	SE	1.3E-03	9.2E-05
Indian Springs	67.53	SE	1.2E-03	8.5E-05
Sarcobatus Flat	69.59	WNW	1.1E-03	1.8E-05
Medlin's Ranch	70.34	NE	1.1E-03	3.1E-05
Ash Meadows	73.52	S	1.1E-03	1.7E-05
Stateline Area	75.75	SSW	1.0E-03	1.1E-05
Penoyer Farm	76.38	NNE	1.0E-03	4.0E-05
Cold Creek	78.44	SSE	9.7E-04	1.8E-05
SNV Prison	79.13	SE	9.6E-04	6.7E-05
Rachel	79.45	NNE	9.6E-04	3.8E-05

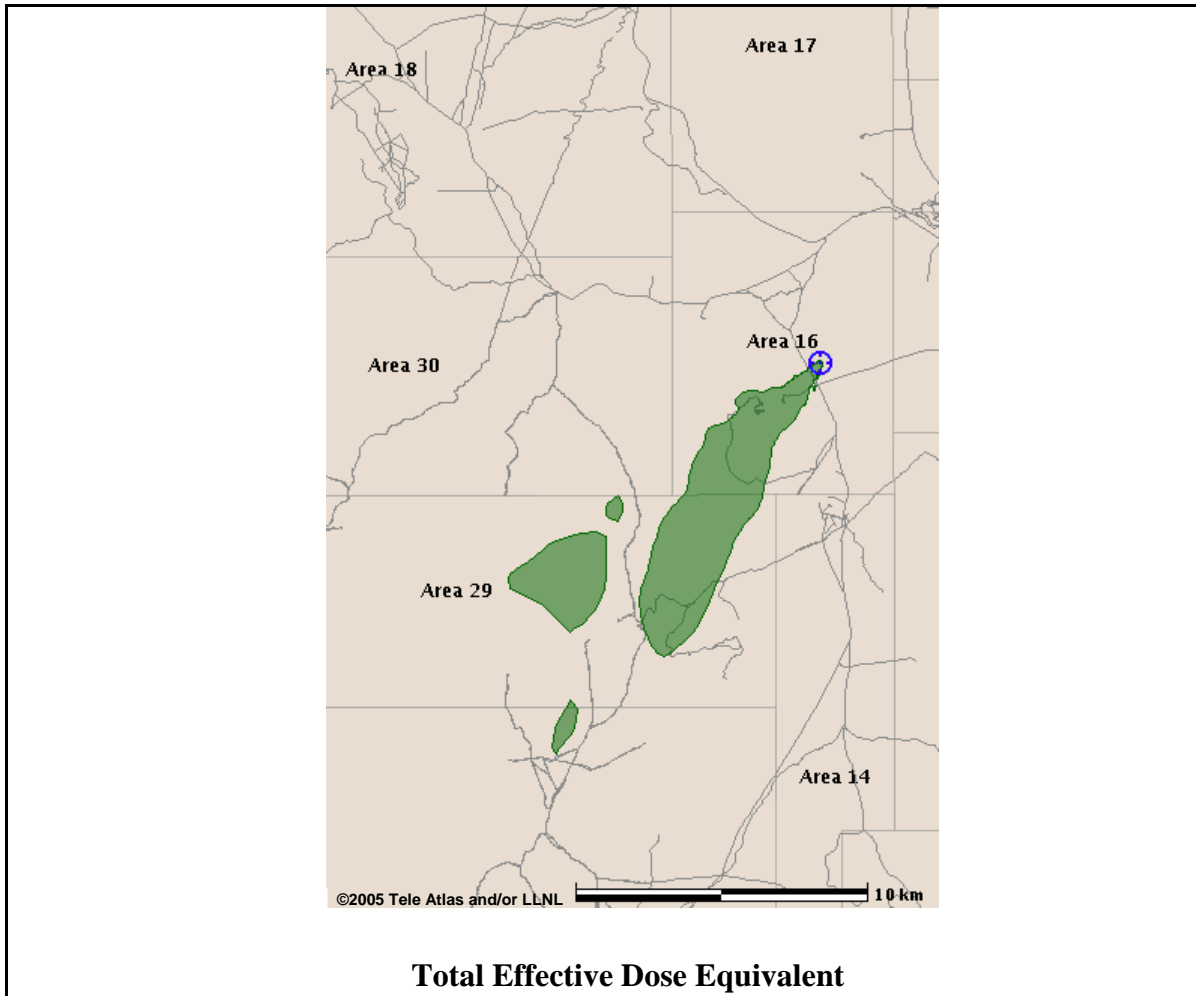
(a) E=east, NE=northeast, NNE=north-northeast, S=south, SE=southeast, SSE=south-southeast, SSW=south-southwest, W=west, WNW=west-northwest, WSW=west-southwest

3.2 NARAC

Input to and output from the NARAC models are provided in Appendix B. Because of meteorological conditions on days modeled, plume movement generally moved southwest. This was due to mid-level wind conditions. Potential dose from the proposed experiment are displayed in Figure 1 for conditions on January 15, 2005, and in Figure 2 for conditions on January 20, 2006. The modeled dose area extended from the release point out to 60 km but the edge of the 0.01 mrem dose area extended to less than 25 km from the release point and was inside the NTS boundaries. The approximate predicted dose value at the NTS boundary for January 15, 2005, was 0.006 mrem and on January 20, 2006, was 0.007 mrem. In both cases, potential dose was well below the 0.1-mrem level at which EPA approval is required. Though meteorological conditions on days modeled resulted in the plume moving towards the NTS south and western boundary, potential dose would be very similar at the eastern boundary (assuming similar wind blowing towards that direction) given the proposed Divine Strake experiment is nearly centered between the eastern (22.6 km away) and western (23.5 km away) boundaries.

4 CONCLUSION

Potential radiation dose to a hypothetical maximally exposed individual at the closest NTS boundary to the proposed Divine Strake experiment as estimated by the CAP88-PC model was 0.005 mrem with wind blowing directly towards that location. Boundary dose as modeled by NARAC ranged from 0.006 to 0.007 mrem. Potential doses to actual offsite populated locations were generally two to five times lower still, or about 40 to 100 times lower than the 0.1-mrem level at which EPA approval is required per 40 CFR §61.96.



	Description	Dose (mrem) Distance (km) Area (km ²)
	Maximum value about 18 times lower than 10 mrem dose limit for emissions to air.	1.0E-02 to 5.6E-01 mrem 16.3 km 31.7 km ²

Figure 1. NARAC modeled release using meteorology from January 15, 2005. Potential dose within the range displayed is completely within the NTS boundaries. Boundary dose based on this modeling was about 0.006 mrem.

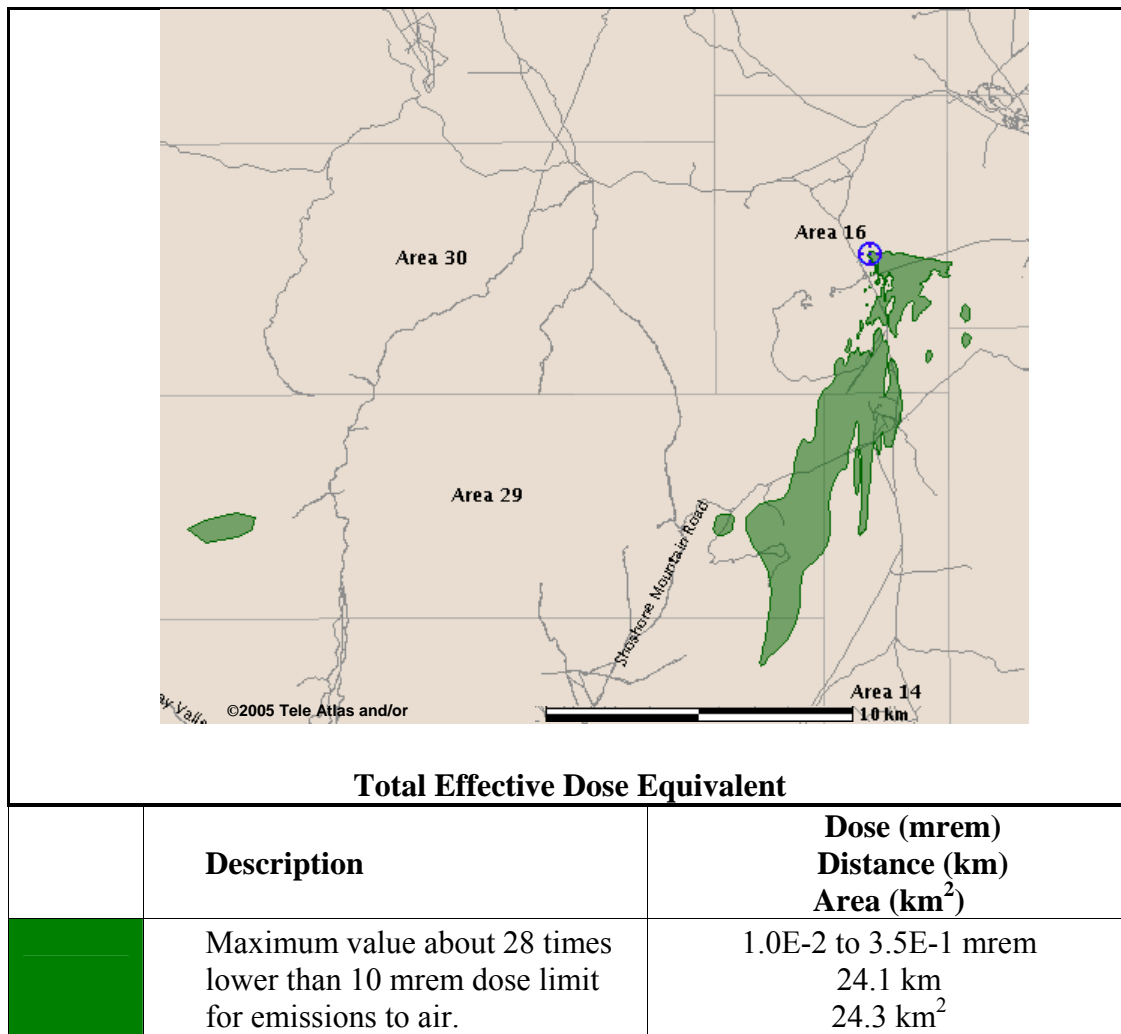


Figure 2. NARAC modeled release using meteorology from January 20, 2006. Potential dose within the range displayed is completely within the NTS boundaries. Boundary dose based on this modeling was about 0.007 mrem.

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5 REFERENCES

DOE, see U.S. Department of Energy.

EPA, see U.S. Environmental Protection Agency.

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Appendix A

**CAP88-PC Version 3.0 Modeling Output for the Proposed
Divine Strake Experiment**

October 2006

**Source term Values Based on Maximum Upper Confidence
Intervals from Site Characterization**

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Individual Assessment

Oct 26, 2006 08:38 am

Facility: U16B
Address: Area 16
City: Mercury
State: NV Zip: 89023

Source Category: Divine Strake Experiment
Source Type: Area
Emission Year: 2006

**Comments: Dose from the proposed Divine Strake experiment:
Single wind direction used. Source used was
maximum upper confidence interval reported in
DOE/NV-1177 and total PM10**

Effective Dose Equivalent
(mrem/year)

4.98E-03

At This Location: 22600 Meters South Southeast

Dataset Name: DS SNJV Max UCI
Dataset Date: 10/26/2006 7:32:00 AM
Wind File: C:\Program Files\CAP88-PC30\WindLib\Divine S

Oct 26, 2006 08:38 am

SYNOPSIS
Page 1

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 22600 Meters South Southeast
Lifetime Fatal Cancer Risk: 1.61E-09

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
Adrenals	1.33E-04
B Surfac	1.47E-04
Breasts	7.37E-03
St Wall	1.37E-04
ULI Wall	1.49E-04
Kidneys	1.29E-04
Lungs	1.41E-04
Ovaries	1.38E-04
R Marrow	1.59E-04
Spleen	2.01E-04
Thymus	2.15E-04
Uterus	7.38E-04
Bld Wall	7.46E-04
Brain	1.52E-04
Esophagu	2.02E-04
SI Wall	1.33E-04
LLI Wall	4.37E-04
Liver	1.78E-03
Muscle	1.49E-04
Pancreas	2.19E-04
Skin	1.38E-04
Testes	1.43E-04
Thyroid	1.37E-04
EFFEC	4.98E-03

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SYNOPSIS
Page 2

RADIONUCLIDE EMISSIONS DURING THE YEAR 2006

Nuclide	Type	Size	Source	
			#1 Ci/y	TOTAL Ci/y
Cs-137	F	1	8.8E-06	8.8E-06
Ba-137m	M	1	8.8E-06	8.8E-06
Am-241	M	1	1.1E-05	1.1E-05
Pu-238	M	1	8.2E-07	8.2E-07
Pu-239	M	1	3.3E-05	3.3E-05
Sr-90	M	1	3.1E-06	3.1E-06
Y-90	M	1	3.1E-06	3.1E-06
K-40	M	1	2.9E-04	2.9E-04
Th-232	S	1	3.0E-05	3.0E-05
Ra-228	M	1	3.0E-05	3.0E-05
Ac-228	M	1	3.0E-05	3.0E-05
Th-228	S	1	3.0E-05	3.0E-05
Ra-224	M	1	3.0E-05	3.0E-05
Rn-220	G	0	3.0E-05	3.0E-05
Po-216	M	1	3.0E-05	3.0E-05
Pb-212	M	1	3.0E-05	3.0E-05
Bi-212	M	1	3.0E-05	3.0E-05
Po-212	M	1	1.9E-05	1.9E-05
Tl-208	M	1	1.1E-05	1.1E-05
U-238	M	1	4.8E-05	4.8E-05
Th-234	S	1	4.8E-05	4.8E-05
Pa-234m	M	1	4.8E-05	4.8E-05
Pa-234	M	1	6.2E-08	6.2E-08
U-234	M	1	4.8E-05	4.8E-05
Th-230	S	1	4.8E-05	4.8E-05
Ra-226	M	1	4.8E-05	4.8E-05
Rn-222	G	0	4.8E-05	4.8E-05
Po-218	M	1	4.8E-05	4.8E-05
Pb-214	M	1	4.8E-05	4.8E-05
At-218	M	1	9.6E-09	9.6E-09
Bi-214	M	1	4.8E-05	4.8E-05
Po-214	M	1	4.8E-05	4.8E-05
Pb-210	M	1	4.8E-05	4.8E-05
Bi-210	M	1	4.8E-05	4.8E-05
Po-210	M	1	4.8E-05	4.8E-05
U-235	M	1	6.7E-05	6.7E-05
Th-231	S	1	6.7E-05	6.7E-05
Pa-231	M	1	6.7E-05	6.7E-05
Ac-227	M	1	6.7E-05	6.7E-05
Th-227	S	1	6.6E-05	6.6E-05
Fr-223	M	1	9.4E-07	9.4E-07
Ra-223	M	1	6.7E-05	6.7E-05
Rn-219	G	0	6.7E-05	6.7E-05
Po-215	M	1	6.7E-05	6.7E-05
Pb-211	M	1	6.7E-05	6.7E-05

Bi-211	M	1	6.7E-05	6.7E-05
Tl-207	M	1	6.7E-05	6.7E-05
Po-211	M	1	1.9E-07	1.9E-07
Al-26	M	1	1.3E-06	1.3E-06
Be-7	M	1	8.4E-06	8.4E-06
Cm-243	M	1	6.9E-06	6.9E-06
Co-58	M	1	6.4E-07	6.4E-07
Co-60	M	1	1.2E-06	1.2E-06
Cs-134	F	1	5.8E-06	5.8E-06
Eu-152	M	1	7.2E-06	7.2E-06
Eu-154	M	1	5.6E-06	5.6E-06
Eu-155	M	1	3.5E-06	3.5E-06
Nb-94	M	1	1.1E-06	1.1E-06
Sb-125	M	1	2.9E-06	2.9E-06
H-3	V	0	1.3E-05	1.3E-05

SITE INFORMATION

Temperature: 13 degrees C
Precipitation: 3 cm/y
Humidity: 3 g/cu m
Mixing Height: 3000 m

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SYNOPSIS
Page 3

SOURCE INFORMATION

Source Number: 1

Source Height (m): 0.01
Area (sq m): 292000

Plume Rise
Momentum (m/s): 4000.00
(Exit Velocity)

AGRICULTURAL DATA

	Vegetable	Milk	Meat
	_____	_____	_____
Fraction Home Produced:	0.700	0.400	0.440
Fraction From Assessment Area:	0.300	0.600	0.560
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

22600 46710 48940 49330 51120 53270 54360 58780 59110 61710
63600 67530 69590 70340 73520 75750 76380 78440 79130 79450

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Oct 26, 2006 08:38 am

Facility: U16B
Address: Area 16
City: Mercury
State: NV Zip: 89023

Source Category: Divine Strake Experiment
Source Type: Area
Emission Year: 2006

**Comments: Dose from the proposed Divine Strake experiment:
Single wind direction used. Source used was
maximum upper confidence interval reported in
DOE/NV-1177 and total PM10.**

Dataset Name: DS SNJV Max UCI
Dataset Date: 10/26/2006 7:32:00 AM
Wind File: . C:\Program Files\CAP88-PC30\WindLib\Divine
Stake\6KNTE.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
Adrenals	1.33E-04
B Surfac	1.47E-04
Breasts	7.37E-03
St Wall	1.37E-04
ULI Wall	1.49E-04
Kidneys	1.29E-04
Lungs	1.41E-04
Ovaries	1.38E-04
R Marrow	1.59E-04
Spleen	2.01E-04
Thymus	2.15E-04
Uterus	7.38E-04
Bld Wall	7.46E-04
Brain	1.52E-04
Esophagu	2.02E-04
SI Wall	1.33E-04
LLI Wall	4.37E-04
Liver	1.78E-03
Muscle	1.49E-04
Pancreas	2.19E-04
Skin	1.38E-04
Testes	1.43E-04
Thyroid	1.37E-04
EFFEC	4.98E-03

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	1.48E-04
INHALATION	4.71E-03
AIR IMMERSION	1.37E-08
GROUND SURFACE	1.20E-04
INTERNAL	4.86E-03
EXTERNAL	1.20E-04
TOTAL	4.98E-03

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SUMMARY
Page 2

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
Cs-137	1.23E-06
Ba-137m	2.04E-06
Am-241	1.23E-04
Np-237	0.00E+00
Pa-233	0.00E+00
U-233	0.00E+00
Th-229	0.00E+00
Ra-225	0.00E+00
Ac-225	0.00E+00
Fr-221	0.00E+00
At-217	0.00E+00
Bi-213	0.00E+00
Po-213	0.00E+00
Pb-209	0.00E+00
Tl-209	0.00E+00
Pu-238	9.79E-06
U-234	4.42E-05
Th-230	1.77E-04
Ra-226	6.01E-05
Rn-222	1.04E-12
Po-218	1.78E-10
Pb-214	5.10E-06
Bi-214	2.98E-05
Po-214	1.63E-09
Pb-210	3.28E-05
Bi-210	1.89E-06
Po-210	4.66E-05
At-218	9.43E-16
Sr-90	8.57E-07
Y-90	1.46E-07
K-40	4.88E-05
Th-232	1.91E-04
Ra-228	4.64E-05
Ac-228	1.20E-05
Th-228	3.02E-04
Ra-224	2.28E-05
Rn-220	6.20E-13
Po-216	2.04E-10
Pb-212	3.01E-06
Bi-212	3.08E-06
Po-212	0.00E+00
Tl-208	1.35E-05
U-238	3.64E-05
Th-234	2.87E-07

Appendix A

Pa-234m	2.21E-06
Pa-234	1.17E-11
Al-26	1.36E-06
Be-7	7.67E-08
Cm-243	5.68E-05
Am-243	0.00E+00
Np-239	0.00E+00
Pu-239	4.23E-04
U-235	5.89E-05
Th-231	4.54E-07
Pa-231	1.63E-03
Ac-227	1.27E-03
Th-227	1.79E-04
Ra-223	1.35E-04
Rn-219	2.02E-10
Po-215	4.82E-09
Pb-211	2.91E-06
Bi-211	1.26E-06
Tl-207	1.59E-06
Po-211	6.74E-14
Fr-223	3.33E-08
Co-58	8.51E-08
Co-60	1.19E-06
Cs-134	4.40E-06
Eu-152	8.62E-08
Gd-152	0.00E+00
Eu-154	7.95E-08
Eu-155	8.48E-08
Nb-94	6.92E-07
Sb-125	4.87E-07
Te-125m	3.06E-09
H-3	4.29E-10
TOTAL	4.98E-03

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SUMMARY
Page 3

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
Esophagu	4.16E-12
Stomach	1.20E-11
Colon	3.97E-11
Liver	1.39E-10
LUNG	1.22E-09
Bone	8.15E-11
Skin	1.96E-12
Breast	1.04E-11
Ovary	1.69E-11
Bladder	1.00E-11
Kidneys	8.67E-12
Thyroid	9.61E-13
Leukemia	2.23E-11
Residual	4.40E-11
Total	1.61E-09
TOTAL	3.23E-09

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	5.73E-11
INHALATION	1.50E-09
AIR IMMERSION	7.41E-15
GROUND SURFACE	5.89E-11
INTERNAL	1.55E-09
EXTERNAL	5.89E-11
TOTAL	1.61E-09

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Cs-137	6.18E-13
Ba-137m	1.10E-12
Am-241	1.94E-11
Np-237	0.00E+00
Pa-233	0.00E+00
U-233	0.00E+00
Th-229	0.00E+00
Ra-225	0.00E+00
Ac-225	0.00E+00
Fr-221	0.00E+00
At-217	0.00E+00
Bi-213	0.00E+00
Po-213	0.00E+00
Pb-209	0.00E+00
Tl-209	0.00E+00
Pu-238	1.70E-12
U-234	3.62E-11
Th-230	8.96E-11
Ra-226	4.21E-11
Rn-222	5.66E-19
Po-218	9.74E-17
Pb-214	2.74E-12
Bi-214	1.58E-11
Po-214	8.92E-16
Pb-210	1.48E-11
Bi-210	1.10E-12
Po-210	3.64E-11
At-218	4.58E-22
Sr-90	5.06E-13
Y-90	1.85E-14
K-40	3.31E-11
Th-232	8.38E-11
Ra-228	1.99E-11
Ac-228	6.37E-12
Th-228	2.58E-10
Ra-224	1.95E-11
Rn-220	3.39E-19
Po-216	1.12E-16
Pb-212	2.05E-12
Bi-212	1.43E-12
Po-212	0.00E+00
Tl-208	7.36E-12
U-238	2.97E-11
Th-234	2.24E-13

Pa-234m	3.55E-13
Pa-234	7.48E-18
Al-26	7.41E-13
Be-7	4.20E-14
Cm-243	1.17E-11
Am-243	0.00E+00
Np-239	0.00E+00
Pu-239	6.69E-11
U-235	4.71E-11
Th-231	2.08E-13
Pa-231	1.55E-10
Ac-227	3.33E-10
Th-227	1.55E-10
Ra-223	1.14E-10
Rn-219	1.09E-16
Po-215	2.64E-15
Pb-211	1.07E-12
Bi-211	6.91E-13
Tl-207	2.03E-13
Po-211	3.69E-20
Fr-223	1.38E-14
Co-58	4.70E-14
Co-60	6.75E-13
Cs-134	2.36E-12
Eu-152	4.21E-14
Gd-152	0.00E+00
Eu-154	3.98E-14
Eu-155	4.50E-14
Nb-94	3.81E-13
Sb-125	2.67E-13
Te-125m	1.39E-15
H-3	2.64E-16
TOTAL	1.61E-09

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SUMMARY
Page 5INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

Distance (m)							
Direction	22600	46710	48940	49330	51120	53270	54360
N	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
NNW	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
NW	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
WNW	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
W	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
WSW	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
SW	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
SSW	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
S	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
SSE	5.0E-03	2.1E-03	1.9E-03	1.9E-03	1.8E-03	1.7E-03	1.7E-03
SE	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
ESE	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
E	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
ENE	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
NE	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
NNE	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12

Distance (m)							
Direction	58780	59110	61710	63600	67530	69590	70340
N	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
NNW	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
NW	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
WNW	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
W	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
WSW	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
SW	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
SSW	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
S	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
SSE	1.5E-03	1.4E-03	1.3E-03	1.3E-03	1.2E-03	1.1E-03	1.1E-03
SE	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
ESE	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
E	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
ENE	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
NE	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
NNE	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12

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SUMMARY

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INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

Direction	Distance (m)					
	73520	75750	76380	78440	79130	79450
N	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
NNW	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
NW	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
WNW	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
W	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
WSW	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
SW	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
SSW	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
S	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
SSE	1.1E-03	1.0E-03	1.0E-03	9.7E-04	9.6E-04	9.6E-04
SE	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
ESE	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
E	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
ENE	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
NE	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12
NNE	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12	6.3E-12

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SUMMARY
Page 7INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Distance (m)							
Direction	22600	46710	48940	49330	51120	53270	54360
N	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
NNW	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
NW	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
WNW	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
W	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
WSW	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
SW	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
SSW	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
S	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
SSE	1.6E-09	6.7E-10	6.3E-10	6.2E-10	5.9E-10	5.6E-10	5.4E-10
SE	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
ESE	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
E	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
ENE	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
NE	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
NNE	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18

Distance (m)							
Direction	58780	59110	61710	63600	67530	69590	70340
N	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
NNW	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
NW	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
WNW	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
W	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
WSW	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
SW	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
SSW	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
S	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
SSE	4.7E-10	4.6E-10	4.3E-10	4.2E-10	3.9E-10	3.7E-10	3.7E-10
SE	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
ESE	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
E	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
ENE	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
NE	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
NNE	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18

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SUMMARY
Page 8INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)					
Direction	73520	75750	76380	78440	79130	79450
N	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
NNW	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
NW	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
WNW	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
W	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
WSW	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
SW	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
SSW	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
S	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
SSE	3.4E-10	3.3E-10	3.3E-10	3.2E-10	3.1E-10	3.1E-10
SE	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
ESE	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
E	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
ENE	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
NE	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18
NNE	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18	4.0E-18

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

W E A T H E R D A T A

Non-Radon Individual Assessment
Oct 26, 2006 08:38 am

Facility: U16B
Address: Area 16
City: Mercury
State: NV Zip: 89023

Source Category: Divine Strake Experiment
Source Type: Area
Emission Year: 2006

**Comments: Dose from the proposed Divine Strake experiment:
Single wind direction used. Source used was
maximum upper confidence interval reported in
DOE/NV-1177 and total PM10.**

Dataset Name: DS SNJV Max UCI
Dataset Date: 10/26/2006 7:32:00 AM
Wind File: C:\Program Files\CAP88-PC30\WindLib\Divine
Stake\6KNTE.WND

Oct 26, 2006 08:38 am

WEATHER
Page 1

HARMONIC AVERAGE WIND SPEEDS (WIND TOWARDS)

Pasquill Stability Class

Dir	A	B	C	D	E	F	G	Wind Freq
N	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NNW	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NW	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WNW	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
W	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WSW	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SW	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SSW	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
S	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SSE	0.000	0.000	0.000	0.000	3.089	0.000	0.000	1.000
SE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ESE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ENE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NNE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

ARITHMETIC AVERAGE WIND SPEEDS (WIND TOWARDS)

Pasquill Stability Class

Dir	A	B	C	D	E	F	G
N	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NNW	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NW	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WNW	0.000	0.000	0.000	0.000	0.000	0.000	0.000
W	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WSW	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SW	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SSW	0.000	0.000	0.000	0.000	0.000	0.000	0.000
S	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SSE	0.000	0.000	0.000	0.000	3.089	0.000	0.000
SE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ESE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ENE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NNE	0.000	0.000	0.000	0.000	0.000	0.000	0.000

FREQUENCIES OF STABILITY CLASSES (WIND TOWARDS)

Pasquill Stability Class							
Dir	A	B	C	D	E	F	G
N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NNW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WNW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
W	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WSW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SSW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SSE	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000
SE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ESE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ENE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NNE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000

ADDITIONAL WEATHER INFORMATION

Average Air Temperature: 13.2 degrees C
286.36 K
Precipitation: 3.0 cm/y
Humidity: 3.0 g/cu m
Lid Height: 3000 meters
Surface Roughness Length: 0.010 meters
Height Of Wind Measurements: 10.0 meters
Average Wind Speed: 3.089 m/s

Vertical Temperature Gradients:

STABILITY E 0.073 k/m
STABILITY F 0.109 k/m
STABILITY G 0.146 k/m

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

GENERAL DATA

Non-Radon Individual Assessment

Oct 26, 2006 08:38 am

Facility: U16B
Address: Area 16
City: Mercury
State: NV Zip: 89023

Source Category: Divine Strake Experiment
Source Type: Area
Emission Year: 2006

**Comments: Dose from the proposed Divine Strake experiment:
Single wind direction used. Source used was
maximum upper confidence interval reported in
DOE/NV-1177 and total PM10.**

Dataset Name: DS SNJV Max UCI
Dataset Date: 10/26/2006 7:32:00 AM
Wind File: C:\Program Files\CAP88-PC30\WindLib\Divine
Stake\6KNTE.WND

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

Nuclide	Clearance Type	Particle Size (microns)	Scavenging Coefficient (per second)	Dry Deposition Velocity (m/s)
Cs-137	F	1	3.00E-07	1.80E-03
Ba-137m	M	1	3.00E-07	1.80E-03
Am-241	M	1	3.00E-07	1.80E-03
Np-237	M	1	3.00E-07	1.80E-03
Pa-233	M	1	3.00E-07	1.80E-03
U-233	M	1	3.00E-07	1.80E-03
Th-229	S	1	3.00E-07	1.80E-03
Ra-225	M	1	3.00E-07	1.80E-03
Ac-225	M	1	3.00E-07	1.80E-03
Fr-221	M	1	3.00E-07	1.80E-03
At-217	M	1	3.00E-07	1.80E-03
Bi-213	M	1	3.00E-07	1.80E-03
Po-213	M	1	3.00E-07	1.80E-03
Pb-209	M	1	3.00E-07	1.80E-03
Tl-209	M	1	3.00E-07	1.80E-03
Pu-238	M	1	3.00E-07	1.80E-03
U-234	M	1	3.00E-07	1.80E-03
Th-230	S	1	3.00E-07	1.80E-03
Ra-226	M	1	3.00E-07	1.80E-03
Rn-222	G	0	0.00E+00	0.00E+00
Po-218	M	1	3.00E-07	1.80E-03
Pb-214	M	1	3.00E-07	1.80E-03
Bi-214	M	1	3.00E-07	1.80E-03
Po-214	M	1	3.00E-07	1.80E-03
Pb-210	M	1	3.00E-07	1.80E-03
Bi-210	M	1	3.00E-07	1.80E-03
Po-210	M	1	3.00E-07	1.80E-03
At-218	M	1	3.00E-07	1.80E-03
Sr-90	M	1	3.00E-07	1.80E-03
Y-90	M	1	3.00E-07	1.80E-03
K-40	M	1	3.00E-07	1.80E-03
Th-232	S	1	3.00E-07	1.80E-03
Ra-228	M	1	3.00E-07	1.80E-03
Ac-228	M	1	3.00E-07	1.80E-03
Th-228	S	1	3.00E-07	1.80E-03
Ra-224	M	1	3.00E-07	1.80E-03
Rn-220	G	0	0.00E+00	0.00E+00
Po-216	M	1	3.00E-07	1.80E-03
Pb-212	M	1	3.00E-07	1.80E-03
Bi-212	M	1	3.00E-07	1.80E-03
Po-212	M	1	3.00E-07	1.80E-03
Tl-208	M	1	3.00E-07	1.80E-03
U-238	M	1	3.00E-07	1.80E-03
Th-234	S	1	3.00E-07	1.80E-03

Pa-234m	M	1	3.00E-07	1.80E-03
Pa-234	M	1	3.00E-07	1.80E-03
Al-26	M	1	3.00E-07	1.80E-03
Be-7	M	1	3.00E-07	1.80E-03
Cm-243	M	1	3.00E-07	1.80E-03
Am-243	M	1	3.00E-07	1.80E-03
Np-239	M	1	3.00E-07	1.80E-03
Pu-239	M	1	3.00E-07	1.80E-03
U-235	M	1	3.00E-07	1.80E-03
Th-231	S	1	3.00E-07	1.80E-03
Pa-231	M	1	3.00E-07	1.80E-03
Ac-227	M	1	3.00E-07	1.80E-03
Th-227	S	1	3.00E-07	1.80E-03
Ra-223	M	1	3.00E-07	1.80E-03
Rn-219	G	0	0.00E+00	0.00E+00
Po-215	M	1	3.00E-07	1.80E-03
Pb-211	M	1	3.00E-07	1.80E-03
Bi-211	M	1	3.00E-07	1.80E-03
Tl-207	M	1	3.00E-07	1.80E-03
Po-211	M	1	3.00E-07	1.80E-03
Fr-223	M	1	3.00E-07	1.80E-03
Co-58	M	1	3.00E-07	1.80E-03
Co-60	M	1	3.00E-07	1.80E-03
Cs-134	F	1	3.00E-07	1.80E-03
Eu-152	M	1	3.00E-07	1.80E-03
Gd-152	M	1	3.00E-07	1.80E-03
Eu-154	M	1	3.00E-07	1.80E-03
Eu-155	M	1	3.00E-07	1.80E-03
Nb-94	M	1	3.00E-07	1.80E-03
Sb-125	M	1	3.00E-07	1.80E-03
Te-125m	M	1	3.00E-07	1.80E-03
H-3	V	0	0.00E+00	0.00E+00

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

Nuclide	DECAY CONSTANT (PER DAY)			TRANSFER COEFFICIENT	
	Radio- active (1)	Surface	Water	Milk (2)	Meat (3)
Cs-137	6.32E-05	5.48E-05	0.00E+00	1.00E-02	5.00E-02
Ba-137m	3.91E+02	5.48E-05	0.00E+00	5.00E-04	2.00E-04
Am-241	4.39E-06	5.48E-05	0.00E+00	2.00E-06	5.00E-05
Np-237	8.87E-10	5.48E-05	0.00E+00	1.00E-05	1.00E-03
Pa-233	2.57E-02	5.48E-05	0.00E+00	5.00E-06	5.00E-06
U-233	1.20E-08	5.48E-05	0.00E+00	4.00E-04	8.00E-04
Th-229	2.58E-07	5.48E-05	0.00E+00	5.00E-06	1.00E-04
Ra-225	4.68E-02	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Ac-225	6.93E-02	5.48E-05	0.00E+00	2.00E-06	2.00E-05
Fr-221	2.08E+02	5.48E-05	0.00E+00	8.00E-03	3.00E-02
At-217	1.85E+06	5.48E-05	0.00E+00	1.00E-02	1.00E-02
Bi-213	2.19E+01	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Po-213	1.43E+10	5.48E-05	0.00E+00	4.00E-04	5.00E-03
Pb-209	5.11E+00	5.48E-05	0.00E+00	3.00E-04	8.00E-04
Tl-209	4.54E+02	5.48E-05	0.00E+00	3.00E-03	2.00E-02
Pu-238	2.16E-05	5.48E-05	0.00E+00	1.00E-06	1.00E-04
U-234	7.76E-09	5.48E-05	0.00E+00	4.00E-04	8.00E-04
Th-230	2.46E-08	5.48E-05	0.00E+00	5.00E-06	1.00E-04
Ra-226	1.19E-06	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Rn-222	1.81E-01	5.48E-05	0.00E+00	0.00E+00	0.00E+00
Po-218	3.27E+02	5.48E-05	0.00E+00	4.00E-04	5.00E-03
Pb-214	3.72E+01	5.48E-05	0.00E+00	3.00E-04	8.00E-04
Bi-214	5.02E+01	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Po-214	3.64E+08	5.48E-05	0.00E+00	4.00E-04	5.00E-03
Pb-210	8.51E-05	5.48E-05	0.00E+00	3.00E-04	8.00E-04
Bi-210	1.38E-01	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Po-210	5.01E-03	5.48E-05	0.00E+00	4.00E-04	5.00E-03
At-218	2.99E+04	5.48E-05	0.00E+00	1.00E-02	1.00E-02
Sr-90	6.52E-05	5.48E-05	0.00E+00	2.00E-03	1.00E-02
Y-90	2.60E-01	5.48E-05	0.00E+00	6.00E-05	2.00E-03
K-40	1.48E-12	5.48E-05	0.00E+00	7.00E-03	2.00E-02
Th-232	1.35E-13	5.48E-05	0.00E+00	5.00E-06	1.00E-04
Ra-228	3.30E-04	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Ac-228	2.71E+00	5.48E-05	0.00E+00	2.00E-06	2.00E-05
Th-228	9.92E-04	5.48E-05	0.00E+00	5.00E-06	1.00E-04
Ra-224	1.89E-01	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Rn-220	1.08E+03	5.48E-05	0.00E+00	0.00E+00	0.00E+00
Po-216	3.99E+05	5.48E-05	0.00E+00	4.00E-04	5.00E-03
Pb-212	1.56E+00	5.48E-05	0.00E+00	3.00E-04	8.00E-04
Bi-212	1.65E+01	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Po-212	1.96E+11	5.48E-05	0.00E+00	4.00E-04	5.00E-03
Tl-208	3.25E+02	5.48E-05	0.00E+00	3.00E-03	2.00E-02
U-238	4.25E-13	5.48E-05	0.00E+00	4.00E-04	8.00E-04

Th-234	2.88E-02	5.48E-05	0.00E+00	5.00E-06	1.00E-04
Pa-234m	8.53E+02	5.48E-05	0.00E+00	5.00E-06	5.00E-06
Pa-234	2.48E+00	5.48E-05	0.00E+00	5.00E-06	5.00E-06
Al-26	2.65E-09	5.48E-05	0.00E+00	2.00E-04	5.00E-04
Be-7	1.30E-02	5.48E-05	0.00E+00	2.00E-06	5.00E-03
Cm-243	6.66E-05	5.48E-05	0.00E+00	2.00E-06	2.00E-05
Am-243	2.57E-07	5.48E-05	0.00E+00	2.00E-06	5.00E-05
Np-239	2.94E-01	5.48E-05	0.00E+00	1.00E-05	1.00E-03
Pu-239	7.88E-08	5.48E-05	0.00E+00	1.00E-06	1.00E-04
U-235	2.70E-12	5.48E-05	0.00E+00	4.00E-04	8.00E-04
Th-231	6.52E-01	5.48E-05	0.00E+00	5.00E-06	1.00E-04
Pa-231	5.79E-08	5.48E-05	0.00E+00	5.00E-06	5.00E-06
Ac-227	8.71E-05	5.48E-05	0.00E+00	2.00E-06	2.00E-05
Th-227	3.70E-02	5.48E-05	0.00E+00	5.00E-06	1.00E-04
Ra-223	6.06E-02	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Rn-219	1.51E+04	5.48E-05	0.00E+00	0.00E+00	0.00E+00
Po-215	3.36E+07	5.48E-05	0.00E+00	4.00E-04	5.00E-03
Pb-211	2.76E+01	5.48E-05	0.00E+00	3.00E-04	8.00E-04
Bi-211	4.66E+02	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Tl-207	2.09E+02	5.48E-05	0.00E+00	3.00E-03	2.00E-02
Po-211	1.16E+05	5.48E-05	0.00E+00	4.00E-04	5.00E-03
Fr-223	4.58E+01	5.48E-05	0.00E+00	8.00E-03	3.00E-02
Co-58	9.79E-03	5.48E-05	0.00E+00	2.00E-03	3.00E-02
Co-60	3.60E-04	5.48E-05	0.00E+00	2.00E-03	3.00E-02
Cs-134	9.20E-04	5.48E-05	0.00E+00	1.00E-02	5.00E-02
Eu-152	1.32E+00	5.48E-05	0.00E+00	6.00E-05	2.00E-03
Gd-152	1.76E-17	5.48E-05	0.00E+00	6.00E-05	2.00E-03
Eu-154	1.78E+00	5.48E-05	0.00E+00	6.00E-05	2.00E-03
Eu-155	2.16E-04	5.48E-05	0.00E+00	6.00E-05	2.00E-03
Nb-94	9.35E-08	5.48E-05	0.00E+00	2.00E-06	3.00E-07
Sb-125	6.85E-04	5.48E-05	0.00E+00	1.00E-04	1.00E-03
Te-125m	1.20E-02	5.48E-05	0.00E+00	5.00E-04	7.00E-03
H-3	1.54E-04	5.48E-05	0.00E+00	0.00E+00	0.00E+00

FOOTNOTES:

- (1) Fraction of animal's daily intake of nuclide which appears in each L of milk (days/L)
 - (2) Fraction of animal's daily intake of nuclide which appears in each kg of meat (days/kg)
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VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

Nuclide	CONCENTRATION UPTAKE FACTOR		GI UPTAKE FRACTION	
	Forage (1)	Edible (2)	Inhalation	Ingestion
Cs-137	1.00E+00	2.00E-01	1.00E+00	1.00E+00
Ba-137m	1.00E-01	1.00E-02	2.00E-01	2.00E-01
Am-241	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Np-237	1.00E-01	2.00E-02	5.00E-04	5.00E-04
Pa-233	1.00E-01	1.00E-02	5.00E-04	5.00E-04
U-233	1.00E-01	2.00E-03	2.00E-02	2.00E-02
Th-229	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Ra-225	2.00E-01	4.00E-02	2.00E-01	2.00E-01
Ac-225	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Fr-221	1.00E-01	3.00E-02	1.00E+00	1.00E+00
At-217	9.00E-01	2.00E-01	1.00E+00	1.00E+00
Bi-213	5.00E-01	1.00E-01	5.00E-02	5.00E-02
Po-213	1.00E-01	1.00E-03	1.00E-01	1.00E-01
Pb-209	1.00E-01	4.00E-03	2.00E-01	2.00E-01
Tl-209	6.00E-01	2.00E-01	1.00E+00	1.00E+00
Pu-238	1.00E-01	1.00E-03	5.00E-04	5.00E-04
U-234	1.00E-01	2.00E-03	2.00E-02	2.00E-02
Th-230	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Ra-226	2.00E-01	4.00E-02	2.00E-01	2.00E-01
Rn-222	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Po-218	1.00E-01	1.00E-03	1.00E-01	1.00E-01
Pb-214	1.00E-01	4.00E-03	2.00E-01	2.00E-01
Bi-214	5.00E-01	1.00E-01	5.00E-02	5.00E-02
Po-214	1.00E-01	1.00E-03	1.00E-01	1.00E-01
Pb-210	1.00E-01	4.00E-03	2.00E-01	2.00E-01
Bi-210	5.00E-01	1.00E-01	5.00E-02	5.00E-02
Po-210	1.00E-01	1.00E-03	1.00E-01	1.00E-01
At-218	9.00E-01	2.00E-01	1.00E+00	1.00E+00
Sr-90	4.00E+00	3.00E-01	3.00E-01	3.00E-01
Y-90	1.00E-01	2.00E-03	1.00E-04	1.00E-04
K-40	3.00E+00	3.00E-01	1.00E+00	1.00E+00
Th-232	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Ra-228	2.00E-01	4.00E-02	2.00E-01	2.00E-01
Ac-228	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Th-228	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Ra-224	2.00E-01	4.00E-02	2.00E-01	2.00E-01
Rn-220	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Po-216	1.00E-01	1.00E-03	1.00E-01	1.00E-01
Pb-212	1.00E-01	4.00E-03	2.00E-01	2.00E-01
Bi-212	5.00E-01	1.00E-01	5.00E-02	5.00E-02
Po-212	1.00E-01	1.00E-03	1.00E-01	1.00E-01
Tl-208	6.00E-01	2.00E-01	1.00E+00	1.00E+00
U-238	1.00E-01	2.00E-03	2.00E-02	2.00E-02

Th-234	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Pa-234m	1.00E-01	1.00E-02	5.00E-04	5.00E-04
Pa-234	1.00E-01	1.00E-02	5.00E-04	5.00E-04
Al-26	1.00E-01	4.00E-03	1.00E-02	1.00E-02
Be-7	1.00E-01	4.00E-03	5.00E-03	5.00E-03
Cm-243	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Am-243	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Np-239	1.00E-01	2.00E-02	5.00E-04	5.00E-04
Pu-239	1.00E-01	1.00E-03	5.00E-04	5.00E-04
U-235	1.00E-01	2.00E-03	2.00E-02	2.00E-02
Th-231	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Pa-231	1.00E-01	1.00E-02	5.00E-04	5.00E-04
Ac-227	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Th-227	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Ra-223	2.00E-01	4.00E-02	2.00E-01	2.00E-01
Rn-219	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Po-215	1.00E-01	1.00E-03	1.00E-01	1.00E-01
Pb-211	1.00E-01	4.00E-03	2.00E-01	2.00E-01
Bi-211	5.00E-01	1.00E-01	5.00E-02	5.00E-02
Tl-207	6.00E-01	2.00E-01	1.00E+00	1.00E+00
Po-211	1.00E-01	1.00E-03	1.00E-01	1.00E-01
Fr-223	1.00E-01	3.00E-02	1.00E+00	1.00E+00
Co-58	2.00E+00	8.00E-02	1.00E-01	1.00E-01
Co-60	2.00E+00	8.00E-02	1.00E-01	1.00E-01
Cs-134	1.00E+00	2.00E-01	1.00E+00	1.00E+00
Eu-152	1.00E-01	2.00E-03	5.00E-04	5.00E-04
Gd-152	1.00E-01	2.00E-03	5.00E-04	5.00E-04
Eu-154	1.00E-01	2.00E-03	5.00E-04	5.00E-04
Eu-155	1.00E-01	2.00E-03	5.00E-04	5.00E-04
Nb-94	1.00E-01	1.00E-02	1.00E-02	1.00E-02
Sb-125	1.00E-01	1.00E-02	1.00E-01	1.00E-01
Te-125m	1.30E+00	1.00E-01	3.00E-01	3.00E-01
H-3	0.00E+00	0.00E+00	1.00E+00	1.00E+00

- FOOTNOTES: (1) Concentration factor for uptake of nuclide
from soil for pasture and forage
(in pCi/kg dry weight per pCi/kg dry soil)
- (2) Concentration factor for uptake of nuclide
from soil by edible parts of crops
(in pCi/kg wet weight per pCi/kg dry soil)
-

DECAY CHAIN ACTIVITIES

Nuclide	Stack	Activity at 500. seconds	Activity at 100.00 years
Cs-137	1	8.7600E-06	2.9690E-06
Ba-137m	1	8.3360E-06	2.8070E-06
Am-241	1	1.1400E-05	3.8820E-06
Np-237	1	0.0000E+00	0.0000E+00
Pa-233	1	0.0000E+00	0.0000E+00
U-233	1	0.0000E+00	0.0000E+00
Th-229	1	0.0000E+00	0.0000E+00
Ra-225	1	0.0000E+00	0.0000E+00
Ac-225	1	0.0000E+00	0.0000E+00
Fr-221	1	0.0000E+00	0.0000E+00
At-217	1	0.0000E+00	0.0000E+00
Bi-213	1	0.0000E+00	0.0000E+00
Po-213	1	0.0000E+00	0.0000E+00
Pb-209	1	0.0000E+00	0.0000E+00
Tl-209	1	0.0000E+00	0.0000E+00
Pu-238	1	8.2000E-07	2.7880E-07
U-234	1	4.8100E-05	1.6380E-05
Th-230	1	4.8100E-05	1.6380E-05
Ra-226	1	4.8100E-05	1.6380E-05
Rn-222	1	4.8100E-05	1.6370E-05
Po-218	1	4.8100E-05	1.6370E-05
Pb-214	1	4.8100E-05	1.6370E-05
Bi-214	1	4.8100E-05	1.6370E-05
Po-214	1	4.8090E-05	1.6370E-05
Pb-210	1	4.8100E-05	1.6380E-05
Bi-210	1	4.8100E-05	1.6370E-05
Po-210	1	4.8100E-05	1.6380E-05
At-218	1	9.6200E-09	0.0000E+00
Sr-90	1	3.1000E-06	1.0500E-06
Y-90	1	3.1000E-06	1.0500E-06
K-40	1	2.8800E-04	9.8100E-05
Th-232	1	2.9600E-05	1.0080E-05
Ra-228	1	2.9600E-05	1.0080E-05
Ac-228	1	2.9600E-05	1.0080E-05
Th-228	1	2.9600E-05	1.0080E-05
Ra-224	1	2.9600E-05	1.0080E-05
Rn-220	1	2.9600E-05	1.0080E-05
Po-216	1	2.9600E-05	1.0080E-05
Pb-212	1	2.9600E-05	1.0080E-05
Bi-212	1	2.9600E-05	1.0080E-05
Po-212	1	1.8960E-05	6.4560E-06
Tl-208	1	1.0650E-05	3.6200E-06
U-238	1	4.8100E-05	1.6380E-05
Th-234	1	4.8100E-05	1.6380E-05
Pa-234m	1	4.8000E-05	1.6340E-05
Pa-234	1	6.2500E-08	0.0000E+00
Al-26	1	1.2800E-06	4.3600E-07

Be-7	1	8.4490E-06	1.2920E-06
Cm-243	1	6.9400E-06	2.3510E-06
Am-243	1	0.0000E+00	0.0000E+00
Np-239	1	0.0000E+00	0.0000E+00
Pu-239	1	3.2600E-05	1.1100E-05
U-235	1	6.7300E-05	2.2920E-05
Th-231	1	6.7300E-05	2.2910E-05
Pa-231	1	6.7300E-05	2.2920E-05
Ac-227	1	6.7300E-05	2.2920E-05
Th-227	1	6.6400E-05	2.2600E-05
Ra-223	1	6.7300E-05	2.2850E-05
Rn-219	1	6.7300E-05	2.2850E-05
Po-215	1	6.7300E-05	2.2850E-05
Pb-211	1	6.7300E-05	2.2850E-05
Bi-211	1	6.7300E-05	2.2850E-05
Tl-207	1	6.7110E-05	2.2780E-05
Po-211	1	1.8840E-07	0.0000E+00
Fr-223	1	9.3970E-07	3.1610E-07
Co-58	1	6.4000E-07	7.2630E-08
Co-60	1	1.2100E-06	4.0060E-07
Cs-134	1	5.7600E-06	1.8260E-06
Eu-152	1	7.1450E-06	6.6930E-09
Gd-152	1	0.0000E+00	0.0000E+00
Eu-154	1	5.5330E-06	2.5710E-09
Eu-155	1	3.4700E-06	1.1620E-06
Nb-94	1	1.0800E-06	3.6790E-07
Sb-125	1	2.9100E-06	9.3920E-07
Te-125m	1	0.0000E+00	7.8250E-08
H-3	1	1.3000E-05	4.3740E-06

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

HUMAN INHALATION RATE	
Cubic centimeters/hr	9.17E+05
SOIL PARAMETERS	
Effective surface density (kg/sq m, dry weight) (Assumes 15 cm plow layer)	2.15E+02
BUILDUP TIMES	
For activity in soil (years)	1.00E+02
For radionuclides deposited on ground/water (days)	3.65E+04
DELAY TIMES	
Ingestion of pasture grass by animals (hr)	0.00E+00
Ingestion of stored feed by animals (hr)	2.16E+03
Ingestion of leafy vegetables by man (hr)	3.36E+02
Ingestion of produce by man (hr)	3.36E+02
Transport time from animal feed-milk-man (day)	2.00E+00
Time from slaughter to consumption (day)	2.00E+01
WEATHERING	
Removal rate constant for physical loss (per hr)	2.90E-03
CROP EXPOSURE DURATION	
Pasture grass (hr)	7.20E+02
Crops/leafy vegetables (hr)	1.44E+03
AGRICULTURAL PRODUCTIVITY	
Grass-cow-milk-man pathway (kg/sq m)	2.80E-01
Produce/leafy veg for human consumption (kg/sq m)	7.16E-01
FALLOUT INTERCEPTION FRACTIONS	
Vegetables	2.00E-01
Pasture	5.70E-01
GRAZING PARAMETERS	
Fraction of year animals graze on pasture	4.00E-01
Fraction of daily feed that is pasture grass when animal grazes on pasture	4.30E-01

Oct 26, 2006 08:38 am

GENERAL

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VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

ANIMAL FEED CONSUMPTION FACTORS	
Contaminated feed/forage (kg/day, dry weight)	1.56E+01
DAIRY PRODUCTIVITY	
Milk production of cow (L/day)	1.10E+01
MEAT ANIMAL SLAUGHTER PARAMETERS	
Muscle mass of animal at slaughter (kg)	2.00E+02
Fraction of herd slaughtered (per day)	3.81E-03
DECONTAMINATION	
Fraction of radioactivity retained after washing for leafy vegetables and produce	5.00E-01
FRACTIONS GROWN IN GARDEN OF INTEREST	
Produce ingested	1.00E+00
Leafy vegetables ingested	1.00E+00
INGESTION RATIOS:	
IMMEDIATE SURROUNDING AREA/TOTAL WITHIN AREA	
Vegetables	7.00E-01
Meat	4.40E-01
Milk	4.00E-01
MINIMUM INGESTION FRACTIONS FROM OUTSIDE AREA	
(Minimum fractions of food types from outside area listed below are actual fixed values.)	
Vegetables	0.00E+00
Meat	0.00E+00
Milk	0.00E+00
HUMAN FOOD UTILIZATION FACTORS	
Produce ingestion (kg/y)	1.76E+02
Milk ingestion (L/y)	1.12E+02
Meat ingestion (kg/y)	8.50E+01
Leafy vegetable ingestion (kg/y)	1.80E+01
SWIMMING PARAMETERS	
Fraction of time spent swimming	0.00E+00
Dilution factor for water (cm)	1.00E+00

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Individual Assessment
Nov 27, 2006 05:40 pm

Facility: U16B
Address: Area 16
City: Mercury
State: NV Zip: 89023

Source Category: Divine Strake Experiment
Source Type: Area
Emission Year: 2006

**Comments: Dose from the proposed Divine Strake experiment:
2005 average wind conditions used. Source used
was maximum upper confidence interval reported in
DOE/NV-1177 and total PM10.**

Effective Dose Equivalent
(mrem/year)

1.06E-03

At This Location: 22600 Meters East Southeast

Dataset Name: DS SNJV Max UCI
Dataset Date: 10/26/2006 8:58:00 AM
Wind File: C:\Program Files\CAP88-PC30\WindLib\Divine S

Nov 27, 2006 05:40 pm

SYNOPSIS

Page 1

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 22600 Meters East Southeast
Lifetime Fatal Cancer Risk: 3.42E-10

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
Adrenals	2.83E-05
B Surfac	3.15E-05
Breasts	1.56E-03
St Wall	2.92E-05
ULI Wall	3.17E-05
Kidneys	2.76E-05
Lungs	3.02E-05
Ovaries	2.95E-05
R Marrow	3.41E-05
Spleen	4.33E-05
Thymus	4.59E-05
Uterus	1.56E-04
Bld Wall	1.58E-04
Brain	3.25E-05
Esophagu	4.30E-05
SI Wall	2.85E-05
LLI Wall	9.30E-05
Liver	3.78E-04
Muscle	3.17E-05
Pancreas	4.66E-05
Skin	2.95E-05
Testes	3.05E-05
Thyroid	2.92E-05
EFFEC	1.06E-03

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SYNOPSIS
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RADIONUCLIDE EMISSIONS DURING THE YEAR 2006

Nuclide	Type	Size	Source	
			#1 Ci/y	TOTAL Ci/y
Cs-137	F	1	8.8E-06	8.8E-06
Ba-137m	M	1	8.8E-06	8.8E-06
Am-241	M	1	1.1E-05	1.1E-05
Pu-238	M	1	8.2E-07	8.2E-07
Pu-239	M	1	3.3E-05	3.3E-05
Sr-90	M	1	3.1E-06	3.1E-06
Y-90	M	1	3.1E-06	3.1E-06
K-40	M	1	2.9E-04	2.9E-04
Th-232	S	1	3.0E-05	3.0E-05
Ra-228	M	1	3.0E-05	3.0E-05
Ac-228	M	1	3.0E-05	3.0E-05
Th-228	S	1	3.0E-05	3.0E-05
Ra-224	M	1	3.0E-05	3.0E-05
Rn-220	G	0	3.0E-05	3.0E-05
Po-216	M	1	3.0E-05	3.0E-05
Pb-212	M	1	3.0E-05	3.0E-05
Bi-212	M	1	3.0E-05	3.0E-05
Po-212	M	1	1.9E-05	1.9E-05
Tl-208	M	1	1.1E-05	1.1E-05
U-238	M	1	4.8E-05	4.8E-05
Th-234	S	1	4.8E-05	4.8E-05
Pa-234m	M	1	4.8E-05	4.8E-05
Pa-234	M	1	6.2E-08	6.2E-08
U-234	M	1	4.8E-05	4.8E-05
Th-230	S	1	4.8E-05	4.8E-05
Ra-226	M	1	4.8E-05	4.8E-05
Rn-222	G	0	4.8E-05	4.8E-05
Po-218	M	1	4.8E-05	4.8E-05
Pb-214	M	1	4.8E-05	4.8E-05
At-218	M	1	9.6E-09	9.6E-09
Bi-214	M	1	4.8E-05	4.8E-05
Po-214	M	1	4.8E-05	4.8E-05
Pb-210	M	1	4.8E-05	4.8E-05
Bi-210	M	1	4.8E-05	4.8E-05
Po-210	M	1	4.8E-05	4.8E-05
U-235	M	1	6.7E-05	6.7E-05
Th-231	S	1	6.7E-05	6.7E-05
Pa-231	M	1	6.7E-05	6.7E-05
Ac-227	M	1	6.7E-05	6.7E-05
Th-227	S	1	6.6E-05	6.6E-05
Fr-223	M	1	9.4E-07	9.4E-07
Ra-223	M	1	6.7E-05	6.7E-05
Rn-219	G	0	6.7E-05	6.7E-05
Po-215	M	1	6.7E-05	6.7E-05
Pb-211	M	1	6.7E-05	6.7E-05

Bi-211	M	1	6.7E-05	6.7E-05
Tl-207	M	1	6.7E-05	6.7E-05
Po-211	M	1	1.9E-07	1.9E-07
Al-26	M	1	1.3E-06	1.3E-06
Be-7	M	1	8.4E-06	8.4E-06
Cm-243	M	1	6.9E-06	6.9E-06
Co-58	M	1	6.4E-07	6.4E-07
Co-60	M	1	1.2E-06	1.2E-06
Cs-134	F	1	5.8E-06	5.8E-06
Eu-152	M	1	7.2E-06	7.2E-06
Eu-154	M	1	5.6E-06	5.6E-06
Eu-155	M	1	3.5E-06	3.5E-06
Nb-94	M	1	1.1E-06	1.1E-06
Sb-125	M	1	2.9E-06	2.9E-06
H-3	V	0	1.3E-05	1.3E-05

SITE INFORMATION

Temperature:	13 degrees C
Precipitation:	3 cm/y
Humidity:	3 g/cu m
Mixing Height:	3000 m

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SOURCE INFORMATION

Source Number: 1

 Source Height (m): 0.01
 Area (sq m): 292000
 Plume Rise
 Momentum (m/s): 4000.00
 (Exit Velocity)

AGRICULTURAL DATA

	Vegetable	Milk	Meat
	_____	_____	_____
Fraction Home Produced:	0.700	0.400	0.440
Fraction From Assessment Area:	0.300	0.600	0.560
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
 Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

22600	46710	48940	49330	51120	53270	54360	58780	59110	61710
63600	67530	69590	70340	73520	75750	76380	78440	79130	79450

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Nov 27, 2006 05:40 pm

Facility: U16B
Address: Area 16
City: Mercury
State: NV Zip: 89023

Source Category: Divine Strake Experiment
Source Type: Area
Emission Year: 2006

**Comments: Dose from the proposed Divine Strake experiment:
2005 average wind conditions used. Source used
was maximum upper confidence interval reported in
DOE/NV-1177 and total PM10.**

Dataset Name: DS SNJV Max UCI
Dataset Date: 10/26/2006 8:58:00 AM
Wind File: . C:\Program Files\CAP88-PC30\WindLib\Divine
Stake\05MEDA21.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
Adrenals	2.83E-05
B Surfac	3.15E-05
Breasts	1.56E-03
St Wall	2.92E-05
ULI Wall	3.17E-05
Kidneys	2.76E-05
Lungs	3.02E-05
Ovaries	2.95E-05
R Marrow	3.41E-05
Spleen	4.33E-05
Thymus	4.59E-05
Uterus	1.56E-04
Bld Wall	1.58E-04
Brain	3.25E-05
Esophagu	4.30E-05
SI Wall	2.85E-05
LLI Wall	9.30E-05
Liver	3.78E-04
Muscle	3.17E-05
Pancreas	4.66E-05
Skin	2.95E-05
Testes	3.05E-05
Thyroid	2.92E-05
EFFEC	1.06E-03

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	3.22E-05
INHALATION	9.98E-04
AIR IMMERSION	3.00E-09
GROUND SURFACE	2.55E-05
INTERNAL	1.03E-03
EXTERNAL	2.55E-05
TOTAL	1.06E-03

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SUMMARY
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NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
Cs-137	2.71E-07
Ba-137m	4.32E-07
Am-241	2.61E-05
Np-237	0.00E+00
Pa-233	0.00E+00
U-233	0.00E+00
Th-229	0.00E+00
Ra-225	0.00E+00
Ac-225	0.00E+00
Fr-221	0.00E+00
At-217	0.00E+00
Bi-213	0.00E+00
Po-213	0.00E+00
Pb-209	0.00E+00
Tl-209	0.00E+00
Pu-238	2.07E-06
U-234	9.36E-06
Th-230	3.76E-05
Ra-226	1.28E-05
Rn-222	6.85E-13
Po-218	3.76E-11
Pb-214	1.08E-06
Bi-214	6.31E-06
Po-214	3.45E-10
Pb-210	7.04E-06
Bi-210	3.99E-07
Po-210	9.91E-06
At-218	2.00E-16
Sr-90	1.88E-07
Y-90	3.10E-08
K-40	1.05E-05
Th-232	4.05E-05
Ra-228	9.95E-06
Ac-228	2.54E-06
Th-228	6.39E-05
Ra-224	4.82E-06
Rn-220	4.07E-13
Po-216	4.32E-11
Pb-212	6.38E-07
Bi-212	6.53E-07
Po-212	0.00E+00
Tl-208	2.86E-06
U-238	7.71E-06
Th-234	6.11E-08

Appendix A

Pa-234m	4.70E-07
Pa-234	2.48E-12
Al-26	2.88E-07
Be-7	1.63E-08
Cm-243	1.20E-05
Am-243	0.00E+00
Np-239	0.00E+00
Pu-239	8.95E-05
U-235	1.25E-05
Th-231	9.63E-08
Pa-231	3.46E-04
Ac-227	2.68E-04
Th-227	3.80E-05
Ra-223	2.85E-05
Rn-219	1.32E-10
Po-215	1.02E-09
Pb-211	6.17E-07
Bi-211	2.68E-07
Tl-207	3.37E-07
Po-211	1.43E-14
Fr-223	7.06E-09
Co-58	1.80E-08
Co-60	2.52E-07
Cs-134	9.41E-07
Eu-152	1.83E-08
Gd-152	0.00E+00
Eu-154	1.68E-08
Eu-155	1.80E-08
Nb-94	1.47E-07
Sb-125	1.03E-07
Te-125m	6.51E-10
H-3	3.00E-10
TOTAL	1.06E-03

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SUMMARY
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CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
Esophagu	8.86E-13
Stomach	2.56E-12
Colon	8.52E-12
Liver	2.94E-11
LUNG	2.59E-10
Bone	1.73E-11
Skin	4.15E-13
Breast	2.21E-12
Ovary	3.59E-12
Bladder	2.13E-12
Kidneys	1.85E-12
Thyroid	2.05E-13
Leukemia	4.75E-12
Residual	9.39E-12
Total	3.42E-10
TOTAL	6.84E-10

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	1.25E-11
INHALATION	3.17E-10
AIR IMMERSION	1.62E-15
GROUND SURFACE	1.25E-11
INTERNAL	3.29E-10
EXTERNAL	1.25E-11
TOTAL	3.42E-10

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Cs-137	1.37E-13
Ba-137m	2.33E-13
Am-241	4.12E-12
Np-237	0.00E+00
Pa-233	0.00E+00
U-233	0.00E+00
Th-229	0.00E+00
Ra-225	0.00E+00
Ac-225	0.00E+00
Fr-221	0.00E+00
At-217	0.00E+00
Bi-213	0.00E+00
Po-213	0.00E+00
Pb-209	0.00E+00
Tl-209	0.00E+00
Pu-238	3.61E-13
U-234	7.66E-12
Th-230	1.90E-11
Ra-226	8.95E-12
Rn-222	3.72E-19
Po-218	2.06E-17
Pb-214	5.82E-13
Bi-214	3.35E-12
Po-214	1.89E-16
Pb-210	3.17E-12
Bi-210	2.34E-13
Po-210	7.73E-12
At-218	9.70E-23
Sr-90	1.11E-13
Y-90	3.92E-15
K-40	7.21E-12
Th-232	1.77E-11
Ra-228	4.27E-12
Ac-228	1.35E-12
Th-228	5.47E-11
Ra-224	4.14E-12
Rn-220	2.23E-19
Po-216	2.37E-17
Pb-212	4.35E-13
Bi-212	3.03E-13
Po-212	0.00E+00
Tl-208	1.56E-12
U-238	6.30E-12
Th-234	4.78E-14

Pa-234m	7.52E-14
Pa-234	1.58E-18
Al-26	1.57E-13
Be-7	8.90E-15
Cm-243	2.48E-12
Am-243	0.00E+00
Np-239	0.00E+00
Pu-239	1.42E-11
U-235	9.97E-12
Th-231	4.42E-14
Pa-231	3.28E-11
Ac-227	7.05E-11
Th-227	3.28E-11
Ra-223	2.42E-11
Rn-219	7.16E-17
Po-215	5.60E-16
Pb-211	2.26E-13
Bi-211	1.47E-13
Tl-207	4.30E-14
Po-211	7.81E-21
Fr-223	2.92E-15
Co-58	9.98E-15
Co-60	1.43E-13
Cs-134	5.05E-13
Eu-152	8.92E-15
Gd-152	0.00E+00
Eu-154	8.43E-15
Eu-155	9.54E-15
Nb-94	8.08E-14
Sb-125	5.65E-14
Te-125m	2.97E-16
H-3	1.85E-16
TOTAL	3.42E-10

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SUMMARY
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INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

Direction	Distance (m)						
	22600	46710	48940	49330	51120	53270	54360
N	3.5E-04	1.1E-04	1.0E-04	9.9E-05	9.3E-05	8.7E-05	8.3E-05
NNW	1.7E-04	4.9E-05	4.6E-05	4.6E-05	4.3E-05	4.0E-05	3.9E-05
NW	1.3E-04	3.9E-05	3.7E-05	3.6E-05	3.4E-05	3.2E-05	3.1E-05
WNW	1.3E-04	4.2E-05	3.9E-05	3.9E-05	3.7E-05	3.4E-05	3.3E-05
W	2.9E-04	8.5E-05	7.9E-05	7.8E-05	7.4E-05	6.8E-05	6.6E-05
WSW	3.3E-04	9.8E-05	9.1E-05	9.0E-05	8.5E-05	7.8E-05	7.5E-05
SW	3.5E-04	9.8E-05	9.1E-05	8.9E-05	8.4E-05	7.8E-05	7.4E-05
SSW	1.3E-04	3.6E-05	3.3E-05	3.3E-05	3.1E-05	2.8E-05	2.7E-05
S	1.8E-04	5.2E-05	4.8E-05	4.7E-05	4.4E-05	4.1E-05	3.9E-05
SSE	2.3E-04	5.8E-05	5.4E-05	5.3E-05	5.0E-05	4.7E-05	4.5E-05
SE	7.3E-04	2.1E-04	2.0E-04	1.9E-04	1.8E-04	1.7E-04	1.6E-04
ESE	1.1E-03	3.4E-04	3.1E-04	3.1E-04	2.9E-04	2.7E-04	2.6E-04
E	2.8E-04	8.7E-05	8.1E-05	8.0E-05	7.6E-05	7.1E-05	6.8E-05
ENE	1.6E-04	4.8E-05	4.5E-05	4.4E-05	4.2E-05	3.9E-05	3.7E-05
NE	2.3E-04	7.0E-05	6.5E-05	6.5E-05	6.1E-05	5.7E-05	5.5E-05
NNE	3.1E-04	1.0E-04	9.5E-05	9.4E-05	8.9E-05	8.3E-05	8.0E-05

Direction	Distance (m)						
	58780	59110	61710	63600	67530	69590	70340
N	6.8E-05	6.7E-05	5.4E-05	5.2E-05	4.8E-05	4.6E-05	4.5E-05
NNW	3.2E-05	3.2E-05	2.6E-05	2.5E-05	2.3E-05	2.2E-05	2.2E-05
NW	2.6E-05	2.5E-05	2.0E-05	1.9E-05	1.8E-05	1.7E-05	1.7E-05
WNW	2.7E-05	2.7E-05	2.1E-05	2.1E-05	1.9E-05	1.8E-05	1.8E-05
W	5.2E-05	5.0E-05	3.7E-05	3.5E-05	3.3E-05	3.1E-05	3.1E-05
WSW	6.0E-05	5.8E-05	4.3E-05	4.1E-05	3.8E-05	3.7E-05	3.6E-05
SW	5.8E-05	5.6E-05	4.0E-05	3.8E-05	3.5E-05	3.4E-05	3.3E-05
SSW	2.1E-05	2.0E-05	1.5E-05	1.4E-05	1.3E-05	1.3E-05	1.3E-05
S	3.1E-05	3.0E-05	2.2E-05	2.1E-05	1.9E-05	1.9E-05	1.8E-05
SSE	3.6E-05	3.4E-05	2.5E-05	2.4E-05	2.2E-05	2.1E-05	2.1E-05
SE	1.3E-04	1.3E-04	9.6E-05	9.2E-05	8.5E-05	8.1E-05	8.0E-05
ESE	2.2E-04	2.1E-04	1.7E-04	1.6E-04	1.5E-04	1.4E-04	1.4E-04
E	5.6E-05	5.4E-05	4.3E-05	4.2E-05	3.8E-05	3.7E-05	3.6E-05
ENE	3.1E-05	3.0E-05	2.4E-05	2.3E-05	2.1E-05	2.0E-05	2.0E-05
NE	4.6E-05	4.5E-05	3.6E-05	3.5E-05	3.2E-05	3.1E-05	3.1E-05
NNE	6.7E-05	6.5E-05	5.4E-05	5.2E-05	4.8E-05	4.6E-05	4.5E-05

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SUMMARY
Page 6INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)					
Direction	73520	75750	76380	78440	79130	79450
N	4.2E-05	4.0E-05	4.0E-05	3.8E-05	3.8E-05	3.7E-05
NNW	2.1E-05	2.0E-05	2.0E-05	1.9E-05	1.9E-05	1.9E-05
NW	1.6E-05	1.5E-05	1.5E-05	1.5E-05	1.5E-05	1.4E-05
WNW	1.7E-05	1.6E-05	1.6E-05	1.6E-05	1.5E-05	1.5E-05
W	2.9E-05	2.8E-05	2.7E-05	2.6E-05	2.6E-05	2.6E-05
WSW	3.4E-05	3.2E-05	3.2E-05	3.1E-05	3.0E-05	3.0E-05
SW	3.1E-05	3.0E-05	2.9E-05	2.8E-05	2.8E-05	2.7E-05
SSW	1.2E-05	1.1E-05	1.1E-05	1.1E-05	1.1E-05	1.1E-05
S	1.7E-05	1.6E-05	1.6E-05	1.5E-05	1.5E-05	1.5E-05
SSE	2.0E-05	1.9E-05	1.9E-05	1.8E-05	1.8E-05	1.8E-05
SE	7.5E-05	7.2E-05	7.1E-05	6.8E-05	6.7E-05	6.6E-05
ESE	1.3E-04	1.3E-04	1.3E-04	1.2E-04	1.2E-04	1.2E-04
E	3.4E-05	3.3E-05	3.2E-05	3.1E-05	3.1E-05	3.0E-05
ENE	1.9E-05	1.8E-05	1.8E-05	1.7E-05	1.7E-05	1.7E-05
NE	2.9E-05	2.7E-05	2.7E-05	2.6E-05	2.6E-05	2.6E-05
NNE	4.2E-05	4.1E-05	4.0E-05	3.9E-05	3.8E-05	3.8E-05

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SUMMARY
Page 7INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Distance (m)							
Direction	22600	46710	48940	49330	51120	53270	54360
N	1.1E-10	3.5E-11	3.3E-11	3.2E-11	3.0E-11	2.8E-11	2.7E-11
NNW	5.5E-11	1.6E-11	1.5E-11	1.5E-11	1.4E-11	1.3E-11	1.3E-11
NW	4.2E-11	1.3E-11	1.2E-11	1.2E-11	1.1E-11	1.1E-11	1.0E-11
WNW	4.3E-11	1.4E-11	1.3E-11	1.3E-11	1.2E-11	1.1E-11	1.1E-11
W	9.3E-11	2.8E-11	2.6E-11	2.5E-11	2.4E-11	2.2E-11	2.1E-11
WSW	1.1E-10	3.2E-11	3.0E-11	2.9E-11	2.8E-11	2.6E-11	2.5E-11
SW	1.1E-10	3.2E-11	2.9E-11	2.9E-11	2.7E-11	2.5E-11	2.4E-11
SSW	4.3E-11	1.2E-11	1.1E-11	1.1E-11	1.0E-11	9.3E-12	8.9E-12
S	6.0E-11	1.7E-11	1.6E-11	1.5E-11	1.4E-11	1.3E-11	1.3E-11
SSE	7.5E-11	1.9E-11	1.8E-11	1.7E-11	1.6E-11	1.5E-11	1.5E-11
SE	2.4E-10	6.8E-11	6.3E-11	6.3E-11	5.9E-11	5.5E-11	5.3E-11
ESE	3.4E-10	1.1E-10	1.0E-10	1.0E-10	9.5E-11	8.9E-11	8.6E-11
E	9.1E-11	2.8E-11	2.6E-11	2.6E-11	2.5E-11	2.3E-11	2.2E-11
ENE	5.3E-11	1.6E-11	1.5E-11	1.4E-11	1.4E-11	1.3E-11	1.2E-11
NE	7.4E-11	2.3E-11	2.1E-11	2.1E-11	2.0E-11	1.9E-11	1.8E-11
NNE	1.0E-10	3.3E-11	3.1E-11	3.1E-11	2.9E-11	2.7E-11	2.6E-11

Distance (m)							
Direction	58780	59110	61710	63600	67530	69590	70340
N	2.2E-11	2.2E-11	1.8E-11	1.7E-11	1.6E-11	1.5E-11	1.5E-11
NNW	1.1E-11	1.0E-11	8.5E-12	8.2E-12	7.6E-12	7.3E-12	7.2E-12
NW	8.4E-12	8.2E-12	6.7E-12	6.4E-12	6.0E-12	5.8E-12	5.7E-12
WNW	9.0E-12	8.8E-12	7.1E-12	6.8E-12	6.3E-12	6.1E-12	6.0E-12
W	1.7E-11	1.6E-11	1.2E-11	1.2E-11	1.1E-11	1.0E-11	1.0E-11
WSW	2.0E-11	1.9E-11	1.4E-11	1.4E-11	1.3E-11	1.2E-11	1.2E-11
SW	1.9E-11	1.8E-11	1.3E-11	1.3E-11	1.2E-11	1.1E-11	1.1E-11
SSW	7.0E-12	6.8E-12	5.0E-12	4.8E-12	4.5E-12	4.3E-12	4.2E-12
S	1.0E-11	9.8E-12	7.3E-12	7.0E-12	6.4E-12	6.2E-12	6.1E-12
SSE	1.2E-11	1.1E-11	8.3E-12	8.0E-12	7.4E-12	7.1E-12	7.0E-12
SE	4.2E-11	4.1E-11	3.1E-11	3.0E-11	2.8E-11	2.7E-11	2.6E-11
ESE	7.0E-11	6.8E-11	5.5E-11	5.3E-11	4.9E-11	4.7E-11	4.6E-11
E	1.8E-11	1.8E-11	1.4E-11	1.4E-11	1.3E-11	1.2E-11	1.2E-11
ENE	1.0E-11	9.8E-12	7.9E-12	7.6E-12	7.0E-12	6.7E-12	6.6E-12
NE	1.5E-11	1.5E-11	1.2E-11	1.1E-11	1.1E-11	1.0E-11	1.0E-11
NNE	2.2E-11	2.1E-11	1.8E-11	1.7E-11	1.6E-11	1.5E-11	1.5E-11

Nov 27, 2006 05:40 pm

SUMMARY
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 INDIVIDUAL LIFETIME RISK (deaths)
 (All Radionuclides and Pathways)

Direction	Distance (m)					
	73520	75750	76380	78440	79130	79450
N	1.4E-11	1.3E-11	1.3E-11	1.3E-11	1.2E-11	1.2E-11
NNW	6.8E-12	6.6E-12	6.5E-12	6.3E-12	6.2E-12	6.2E-12
NW	5.4E-12	5.2E-12	5.1E-12	4.9E-12	4.9E-12	4.8E-12
WNW	5.7E-12	5.4E-12	5.4E-12	5.2E-12	5.1E-12	5.1E-12
W	9.5E-12	9.1E-12	9.0E-12	8.6E-12	8.5E-12	8.5E-12
WSW	1.1E-11	1.1E-11	1.0E-11	1.0E-11	9.9E-12	9.8E-12
SW	1.0E-11	9.8E-12	9.7E-12	9.2E-12	9.1E-12	9.0E-12
SSW	4.0E-12	3.8E-12	3.8E-12	3.6E-12	3.6E-12	3.6E-12
S	5.7E-12	5.4E-12	5.4E-12	5.2E-12	5.1E-12	5.0E-12
SSE	6.6E-12	6.3E-12	6.2E-12	6.0E-12	5.9E-12	5.9E-12
SE	2.4E-11	2.3E-11	2.3E-11	2.2E-11	2.2E-11	2.2E-11
ESE	4.3E-11	4.1E-11	4.1E-11	3.9E-11	3.9E-11	3.8E-11
E	1.1E-11	1.1E-11	1.1E-11	1.0E-11	1.0E-11	1.0E-11
ENE	6.2E-12	6.0E-12	5.9E-12	5.7E-12	5.6E-12	5.6E-12
NE	9.5E-12	9.1E-12	9.0E-12	8.6E-12	8.5E-12	8.5E-12
NNE	1.4E-11	1.3E-11	1.3E-11	1.3E-11	1.2E-11	1.2E-11

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

W E A T H E R D A T A

Non-Radon Individual Assessment
Nov 27, 2006 05:40 pm

Facility: U16B
Address: Area 16
City: Mercury
State: NV Zip: 89023

Source Category: Divine Strake Experiment
Source Type: Area
Emission Year: 2006

**Comments: Dose from the proposed Divine Strake experiment:
2005 average wind conditions used. Source used
was maximum upper confidence interval reported in
DOE/NV-1177 and total PM10.**

Dataset Name: DS SNJV Max UCI
Dataset Date: 10/26/2006 8:58:00 AM
Wind File: C:\Program Files\CAP88-PC30\WindLib\Divine
Stake\05MEDA21.WND

Nov 27, 2006 05:40 pm

WEATHER

Page 1

HARMONIC AVERAGE WIND SPEEDS (WIND TOWARDS)

Pasquill Stability Class

Dir	A	B	C	D	E	F	G	Wind Freq
N	0.954	1.436	1.909	3.479	3.841	1.260	0.772	0.096
NNW	1.007	1.123	1.652	4.429	3.911	1.870	0.772	0.038
NW	1.007	0.906	2.223	2.500	3.969	1.665	0.772	0.023
WNW	0.772	0.953	1.017	1.876	3.802	2.175	0.772	0.020
W	0.846	0.849	1.067	1.474	3.430	1.734	0.772	0.033
WSW	0.772	0.841	1.092	1.696	3.332	1.708	0.772	0.041
SW	0.772	0.897	0.994	2.624	3.611	1.327	0.772	0.045
SSW	0.897	0.953	1.044	2.502	3.701	1.098	0.772	0.022
S	0.772	0.915	1.175	1.559	3.938	1.251	0.772	0.029
SSE	0.807	1.136	2.226	2.268	3.430	1.557	0.772	0.042
SE	0.924	1.184	2.061	2.824	3.794	1.622	0.772	0.127
ESE	1.007	1.326	2.102	2.818	3.795	2.023	0.772	0.189
E	1.330	1.332	1.744	3.228	3.341	2.026	0.772	0.059
ENE	1.046	1.710	3.060	2.663	3.976	1.611	0.772	0.049
NE	1.781	2.116	3.395	2.969	3.902	1.625	0.772	0.080
NNE	1.089	1.369	2.902	3.997	4.006	1.573	0.772	0.108

ARITHMETIC AVERAGE WIND SPEEDS (WIND TOWARDS)

Pasquill Stability Class

Dir	A	B	C	D	E	F	G
N	1.263	2.349	3.930	6.572	4.017	1.769	0.772
NNW	1.372	1.905	3.155	6.254	4.069	2.283	0.772
NW	1.372	1.252	3.087	4.444	4.111	2.152	0.772
WNW	0.772	1.447	1.929	3.419	3.987	2.431	0.772
W	0.997	1.172	1.754	2.944	3.665	2.199	0.772
WSW	0.772	1.132	1.897	4.032	3.570	2.182	0.772
SW	0.772	1.132	1.629	4.852	3.830	1.849	0.772
SSW	1.132	1.447	1.711	4.493	3.906	1.536	0.772
S	0.772	1.221	2.272	3.330	4.088	1.757	0.772
SSE	0.884	1.630	3.292	4.093	3.665	2.069	0.772
SE	1.195	1.839	3.308	4.613	3.980	2.120	0.772
ESE	1.372	2.129	3.047	4.305	3.981	2.363	0.772
E	1.852	2.001	3.138	4.818	3.579	2.364	0.772
ENE	1.447	2.741	4.929	4.926	4.116	2.111	0.772
NE	2.229	3.090	4.580	5.348	4.063	2.123	0.772
NNE	1.522	2.307	4.289	5.784	4.137	2.082	0.772

FREQUENCIES OF STABILITY CLASSES (WIND TOWARDS)

Pasquill Stability Class							
Dir	A	B	C	D	E	F	G
N	0.0152	0.0900	0.0899	0.5056	0.1330	0.1026	0.0637
NNW	0.0104	0.0940	0.0522	0.3135	0.2683	0.1082	0.1534
NW	0.0170	0.0852	0.0397	0.2271	0.3127	0.1703	0.1480
WNW	0.0204	0.0544	0.0680	0.1632	0.1904	0.3473	0.1564
W	0.0325	0.0365	0.0447	0.0731	0.1137	0.4719	0.2277
WSW	0.0292	0.0324	0.0259	0.1394	0.1527	0.3899	0.2305
SW	0.0029	0.0439	0.0615	0.1584	0.1847	0.3285	0.2201
SSW	0.0303	0.0969	0.1212	0.1938	0.1636	0.1999	0.1943
S	0.0325	0.1490	0.0557	0.2601	0.0882	0.2469	0.1676
SSE	0.0511	0.1407	0.0958	0.2138	0.0894	0.1598	0.2494
SE	0.0178	0.0903	0.0724	0.2602	0.1638	0.2214	0.1742
ESE	0.0105	0.0999	0.0584	0.2413	0.2104	0.2604	0.1190
E	0.0225	0.1356	0.1127	0.3025	0.0971	0.2145	0.1151
ENE	0.0215	0.2287	0.2580	0.2229	0.0753	0.1049	0.0888
NE	0.0348	0.2775	0.1928	0.2490	0.0963	0.0864	0.0632
NNE	0.0296	0.1507	0.1530	0.4284	0.1037	0.0950	0.0395
TOTAL	0.0214	0.1201	0.0980	0.2783	0.1510	0.2013	0.1298

ADDITIONAL WEATHER INFORMATION

Average Air Temperature: 13.2 degrees C
 286.36 K
 Precipitation: 3.0 cm/y
 Humidity: 3.0 g/cu m
 Lid Height: 3000 meters
 Surface Roughness Length: 0.010 meters
 Height Of Wind Measurements: 10.0 meters
 Average Wind Speed: 3.230 m/s

Vertical Temperature Gradients:

STABILITY E 0.073 k/m
 STABILITY F 0.109 k/m
 STABILITY G 0.146 k/m

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

GENERAL DATA

Non-Radon Individual Assessment

Nov 27, 2006 05:40 pm

Facility: U16B
Address: Area 16
City: Mercury
State: NV Zip: 89023

Source Category: Divine Strake Experiment
Source Type: Area
Emission Year: 2006

**Comments: Dose from the proposed Divine Strake experiment:
2005 average wind conditions used. Source used
was maximum upper confidence interval reported in
DOE/NV-1177 and total PM10.**

Dataset Name: DS SNJV Max UCI
Dataset Date: 10/26/2006 8:58:00 AM
Wind File: C:\Program Files\CAP88-PC30\WindLib\Divine
Stake\05MEDA21.WND

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

Nuclide	Clearance Type	Particle Size (microns)	Scavenging Coefficient (per second)	Dry Deposition Velocity (m/s)
Cs-137	F	1	3.00E-07	1.80E-03
Ba-137m	M	1	3.00E-07	1.80E-03
Am-241	M	1	3.00E-07	1.80E-03
Np-237	M	1	3.00E-07	1.80E-03
Pa-233	M	1	3.00E-07	1.80E-03
U-233	M	1	3.00E-07	1.80E-03
Th-229	S	1	3.00E-07	1.80E-03
Ra-225	M	1	3.00E-07	1.80E-03
Ac-225	M	1	3.00E-07	1.80E-03
Fr-221	M	1	3.00E-07	1.80E-03
At-217	M	1	3.00E-07	1.80E-03
Bi-213	M	1	3.00E-07	1.80E-03
Po-213	M	1	3.00E-07	1.80E-03
Pb-209	M	1	3.00E-07	1.80E-03
Tl-209	M	1	3.00E-07	1.80E-03
Pu-238	M	1	3.00E-07	1.80E-03
U-234	M	1	3.00E-07	1.80E-03
Th-230	S	1	3.00E-07	1.80E-03
Ra-226	M	1	3.00E-07	1.80E-03
Rn-222	G	0	0.00E+00	0.00E+00
Po-218	M	1	3.00E-07	1.80E-03
Pb-214	M	1	3.00E-07	1.80E-03
Bi-214	M	1	3.00E-07	1.80E-03
Po-214	M	1	3.00E-07	1.80E-03
Pb-210	M	1	3.00E-07	1.80E-03
Bi-210	M	1	3.00E-07	1.80E-03
Po-210	M	1	3.00E-07	1.80E-03
At-218	M	1	3.00E-07	1.80E-03
Sr-90	M	1	3.00E-07	1.80E-03
Y-90	M	1	3.00E-07	1.80E-03
K-40	M	1	3.00E-07	1.80E-03
Th-232	S	1	3.00E-07	1.80E-03
Ra-228	M	1	3.00E-07	1.80E-03
Ac-228	M	1	3.00E-07	1.80E-03
Th-228	S	1	3.00E-07	1.80E-03
Ra-224	M	1	3.00E-07	1.80E-03
Rn-220	G	0	0.00E+00	0.00E+00
Po-216	M	1	3.00E-07	1.80E-03
Pb-212	M	1	3.00E-07	1.80E-03
Bi-212	M	1	3.00E-07	1.80E-03
Po-212	M	1	3.00E-07	1.80E-03
Tl-208	M	1	3.00E-07	1.80E-03
U-238	M	1	3.00E-07	1.80E-03
Th-234	S	1	3.00E-07	1.80E-03

Pa-234m	M	1	3.00E-07	1.80E-03
Pa-234	M	1	3.00E-07	1.80E-03
Al-26	M	1	3.00E-07	1.80E-03
Be-7	M	1	3.00E-07	1.80E-03
Cm-243	M	1	3.00E-07	1.80E-03
Am-243	M	1	3.00E-07	1.80E-03
Np-239	M	1	3.00E-07	1.80E-03
Pu-239	M	1	3.00E-07	1.80E-03
U-235	M	1	3.00E-07	1.80E-03
Th-231	S	1	3.00E-07	1.80E-03
Pa-231	M	1	3.00E-07	1.80E-03
Ac-227	M	1	3.00E-07	1.80E-03
Th-227	S	1	3.00E-07	1.80E-03
Ra-223	M	1	3.00E-07	1.80E-03
Rn-219	G	0	0.00E+00	0.00E+00
Po-215	M	1	3.00E-07	1.80E-03
Pb-211	M	1	3.00E-07	1.80E-03
Bi-211	M	1	3.00E-07	1.80E-03
Tl-207	M	1	3.00E-07	1.80E-03
Po-211	M	1	3.00E-07	1.80E-03
Fr-223	M	1	3.00E-07	1.80E-03
Co-58	M	1	3.00E-07	1.80E-03
Co-60	M	1	3.00E-07	1.80E-03
Cs-134	F	1	3.00E-07	1.80E-03
Eu-152	M	1	3.00E-07	1.80E-03
Gd-152	M	1	3.00E-07	1.80E-03
Eu-154	M	1	3.00E-07	1.80E-03
Eu-155	M	1	3.00E-07	1.80E-03
Nb-94	M	1	3.00E-07	1.80E-03
Sb-125	M	1	3.00E-07	1.80E-03
Te-125m	M	1	3.00E-07	1.80E-03
H-3	V	0	0.00E+00	0.00E+00

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

Nuclide	DECAY CONSTANT (PER DAY)			TRANSFER COEFFICIENT	
	Radio- active (1)	Surface	Water	Milk (2)	Meat (3)
Cs-137	6.32E-05	5.48E-05	0.00E+00	1.00E-02	5.00E-02
Ba-137m	3.91E+02	5.48E-05	0.00E+00	5.00E-04	2.00E-04
Am-241	4.39E-06	5.48E-05	0.00E+00	2.00E-06	5.00E-05
Np-237	8.87E-10	5.48E-05	0.00E+00	1.00E-05	1.00E-03
Pa-233	2.57E-02	5.48E-05	0.00E+00	5.00E-06	5.00E-06
U-233	1.20E-08	5.48E-05	0.00E+00	4.00E-04	8.00E-04
Th-229	2.58E-07	5.48E-05	0.00E+00	5.00E-06	1.00E-04
Ra-225	4.68E-02	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Ac-225	6.93E-02	5.48E-05	0.00E+00	2.00E-06	2.00E-05
Fr-221	2.08E+02	5.48E-05	0.00E+00	8.00E-03	3.00E-02
At-217	1.85E+06	5.48E-05	0.00E+00	1.00E-02	1.00E-02
Bi-213	2.19E+01	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Po-213	1.43E+10	5.48E-05	0.00E+00	4.00E-04	5.00E-03
Pb-209	5.11E+00	5.48E-05	0.00E+00	3.00E-04	8.00E-04
Tl-209	4.54E+02	5.48E-05	0.00E+00	3.00E-03	2.00E-02
Pu-238	2.16E-05	5.48E-05	0.00E+00	1.00E-06	1.00E-04
U-234	7.76E-09	5.48E-05	0.00E+00	4.00E-04	8.00E-04
Th-230	2.46E-08	5.48E-05	0.00E+00	5.00E-06	1.00E-04
Ra-226	1.19E-06	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Rn-222	1.81E-01	5.48E-05	0.00E+00	0.00E+00	0.00E+00
Po-218	3.27E+02	5.48E-05	0.00E+00	4.00E-04	5.00E-03
Pb-214	3.72E+01	5.48E-05	0.00E+00	3.00E-04	8.00E-04
Bi-214	5.02E+01	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Po-214	3.64E+08	5.48E-05	0.00E+00	4.00E-04	5.00E-03
Pb-210	8.51E-05	5.48E-05	0.00E+00	3.00E-04	8.00E-04
Bi-210	1.38E-01	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Po-210	5.01E-03	5.48E-05	0.00E+00	4.00E-04	5.00E-03
At-218	2.99E+04	5.48E-05	0.00E+00	1.00E-02	1.00E-02
Sr-90	6.52E-05	5.48E-05	0.00E+00	2.00E-03	1.00E-02
Y-90	2.60E-01	5.48E-05	0.00E+00	6.00E-05	2.00E-03
K-40	1.48E-12	5.48E-05	0.00E+00	7.00E-03	2.00E-02
Th-232	1.35E-13	5.48E-05	0.00E+00	5.00E-06	1.00E-04
Ra-228	3.30E-04	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Ac-228	2.71E+00	5.48E-05	0.00E+00	2.00E-06	2.00E-05
Th-228	9.92E-04	5.48E-05	0.00E+00	5.00E-06	1.00E-04
Ra-224	1.89E-01	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Rn-220	1.08E+03	5.48E-05	0.00E+00	0.00E+00	0.00E+00
Po-216	3.99E+05	5.48E-05	0.00E+00	4.00E-04	5.00E-03
Pb-212	1.56E+00	5.48E-05	0.00E+00	3.00E-04	8.00E-04
Bi-212	1.65E+01	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Po-212	1.96E+11	5.48E-05	0.00E+00	4.00E-04	5.00E-03
Tl-208	3.25E+02	5.48E-05	0.00E+00	3.00E-03	2.00E-02
U-238	4.25E-13	5.48E-05	0.00E+00	4.00E-04	8.00E-04

Th-234	2.88E-02	5.48E-05	0.00E+00	5.00E-06	1.00E-04
Pa-234m	8.53E+02	5.48E-05	0.00E+00	5.00E-06	5.00E-06
Pa-234	2.48E+00	5.48E-05	0.00E+00	5.00E-06	5.00E-06
Al-26	2.65E-09	5.48E-05	0.00E+00	2.00E-04	5.00E-04
Be-7	1.30E-02	5.48E-05	0.00E+00	2.00E-06	5.00E-03
Cm-243	6.66E-05	5.48E-05	0.00E+00	2.00E-06	2.00E-05
Am-243	2.57E-07	5.48E-05	0.00E+00	2.00E-06	5.00E-05
Np-239	2.94E-01	5.48E-05	0.00E+00	1.00E-05	1.00E-03
Pu-239	7.88E-08	5.48E-05	0.00E+00	1.00E-06	1.00E-04
U-235	2.70E-12	5.48E-05	0.00E+00	4.00E-04	8.00E-04
Th-231	6.52E-01	5.48E-05	0.00E+00	5.00E-06	1.00E-04
Pa-231	5.79E-08	5.48E-05	0.00E+00	5.00E-06	5.00E-06
Ac-227	8.71E-05	5.48E-05	0.00E+00	2.00E-06	2.00E-05
Th-227	3.70E-02	5.48E-05	0.00E+00	5.00E-06	1.00E-04
Ra-223	6.06E-02	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Rn-219	1.51E+04	5.48E-05	0.00E+00	0.00E+00	0.00E+00
Po-215	3.36E+07	5.48E-05	0.00E+00	4.00E-04	5.00E-03
Pb-211	2.76E+01	5.48E-05	0.00E+00	3.00E-04	8.00E-04
Bi-211	4.66E+02	5.48E-05	0.00E+00	1.00E-03	2.00E-03
Tl-207	2.09E+02	5.48E-05	0.00E+00	3.00E-03	2.00E-02
Po-211	1.16E+05	5.48E-05	0.00E+00	4.00E-04	5.00E-03
Fr-223	4.58E+01	5.48E-05	0.00E+00	8.00E-03	3.00E-02
Co-58	9.79E-03	5.48E-05	0.00E+00	2.00E-03	3.00E-02
Co-60	3.60E-04	5.48E-05	0.00E+00	2.00E-03	3.00E-02
Cs-134	9.20E-04	5.48E-05	0.00E+00	1.00E-02	5.00E-02
Eu-152	1.32E+00	5.48E-05	0.00E+00	6.00E-05	2.00E-03
Gd-152	1.76E-17	5.48E-05	0.00E+00	6.00E-05	2.00E-03
Eu-154	1.78E+00	5.48E-05	0.00E+00	6.00E-05	2.00E-03
Eu-155	2.16E-04	5.48E-05	0.00E+00	6.00E-05	2.00E-03
Nb-94	9.35E-08	5.48E-05	0.00E+00	2.00E-06	3.00E-07
Sb-125	6.85E-04	5.48E-05	0.00E+00	1.00E-04	1.00E-03
Te-125m	1.20E-02	5.48E-05	0.00E+00	5.00E-04	7.00E-03
H-3	1.54E-04	5.48E-05	0.00E+00	0.00E+00	0.00E+00

FOOTNOTES:

- (1) Fraction of animal's daily intake of nuclide which appears in each L of milk (days/L)
 - (2) Fraction of animal's daily intake of nuclide which appears in each kg of meat (days/kg)
-

VALUES FOR RADIONUCLIDE-DEPENDENT PARAMETERS

Nuclide	CONCENTRATION UPTAKE FACTOR		GI UPTAKE FRACTION	
	Forage (1)	Edible (2)	Inhalation	Ingestion
Cs-137	1.00E+00	2.00E-01	1.00E+00	1.00E+00
Ba-137m	1.00E-01	1.00E-02	2.00E-01	2.00E-01
Am-241	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Np-237	1.00E-01	2.00E-02	5.00E-04	5.00E-04
Pa-233	1.00E-01	1.00E-02	5.00E-04	5.00E-04
U-233	1.00E-01	2.00E-03	2.00E-02	2.00E-02
Th-229	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Ra-225	2.00E-01	4.00E-02	2.00E-01	2.00E-01
Ac-225	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Fr-221	1.00E-01	3.00E-02	1.00E+00	1.00E+00
At-217	9.00E-01	2.00E-01	1.00E+00	1.00E+00
Bi-213	5.00E-01	1.00E-01	5.00E-02	5.00E-02
Po-213	1.00E-01	1.00E-03	1.00E-01	1.00E-01
Pb-209	1.00E-01	4.00E-03	2.00E-01	2.00E-01
Tl-209	6.00E-01	2.00E-01	1.00E+00	1.00E+00
Pu-238	1.00E-01	1.00E-03	5.00E-04	5.00E-04
U-234	1.00E-01	2.00E-03	2.00E-02	2.00E-02
Th-230	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Ra-226	2.00E-01	4.00E-02	2.00E-01	2.00E-01
Rn-222	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Po-218	1.00E-01	1.00E-03	1.00E-01	1.00E-01
Pb-214	1.00E-01	4.00E-03	2.00E-01	2.00E-01
Bi-214	5.00E-01	1.00E-01	5.00E-02	5.00E-02
Po-214	1.00E-01	1.00E-03	1.00E-01	1.00E-01
Pb-210	1.00E-01	4.00E-03	2.00E-01	2.00E-01
Bi-210	5.00E-01	1.00E-01	5.00E-02	5.00E-02
Po-210	1.00E-01	1.00E-03	1.00E-01	1.00E-01
At-218	9.00E-01	2.00E-01	1.00E+00	1.00E+00
Sr-90	4.00E+00	3.00E-01	3.00E-01	3.00E-01
Y-90	1.00E-01	2.00E-03	1.00E-04	1.00E-04
K-40	3.00E+00	3.00E-01	1.00E+00	1.00E+00
Th-232	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Ra-228	2.00E-01	4.00E-02	2.00E-01	2.00E-01
Ac-228	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Th-228	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Ra-224	2.00E-01	4.00E-02	2.00E-01	2.00E-01
Rn-220	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Po-216	1.00E-01	1.00E-03	1.00E-01	1.00E-01
Pb-212	1.00E-01	4.00E-03	2.00E-01	2.00E-01
Bi-212	5.00E-01	1.00E-01	5.00E-02	5.00E-02
Po-212	1.00E-01	1.00E-03	1.00E-01	1.00E-01
Tl-208	6.00E-01	2.00E-01	1.00E+00	1.00E+00
U-238	1.00E-01	2.00E-03	2.00E-02	2.00E-02

Th-234	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Pa-234m	1.00E-01	1.00E-02	5.00E-04	5.00E-04
Pa-234	1.00E-01	1.00E-02	5.00E-04	5.00E-04
Al-26	1.00E-01	4.00E-03	1.00E-02	1.00E-02
Be-7	1.00E-01	4.00E-03	5.00E-03	5.00E-03
Cm-243	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Am-243	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Np-239	1.00E-01	2.00E-02	5.00E-04	5.00E-04
Pu-239	1.00E-01	1.00E-03	5.00E-04	5.00E-04
U-235	1.00E-01	2.00E-03	2.00E-02	2.00E-02
Th-231	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Pa-231	1.00E-01	1.00E-02	5.00E-04	5.00E-04
Ac-227	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Th-227	1.00E-01	1.00E-03	5.00E-04	5.00E-04
Ra-223	2.00E-01	4.00E-02	2.00E-01	2.00E-01
Rn-219	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Po-215	1.00E-01	1.00E-03	1.00E-01	1.00E-01
Pb-211	1.00E-01	4.00E-03	2.00E-01	2.00E-01
Bi-211	5.00E-01	1.00E-01	5.00E-02	5.00E-02
Tl-207	6.00E-01	2.00E-01	1.00E+00	1.00E+00
Po-211	1.00E-01	1.00E-03	1.00E-01	1.00E-01
Fr-223	1.00E-01	3.00E-02	1.00E+00	1.00E+00
Co-58	2.00E+00	8.00E-02	1.00E-01	1.00E-01
Co-60	2.00E+00	8.00E-02	1.00E-01	1.00E-01
Cs-134	1.00E+00	2.00E-01	1.00E+00	1.00E+00
Eu-152	1.00E-01	2.00E-03	5.00E-04	5.00E-04
Gd-152	1.00E-01	2.00E-03	5.00E-04	5.00E-04
Eu-154	1.00E-01	2.00E-03	5.00E-04	5.00E-04
Eu-155	1.00E-01	2.00E-03	5.00E-04	5.00E-04
Nb-94	1.00E-01	1.00E-02	1.00E-02	1.00E-02
Sb-125	1.00E-01	1.00E-02	1.00E-01	1.00E-01
Te-125m	1.30E+00	1.00E-01	3.00E-01	3.00E-01
H-3	0.00E+00	0.00E+00	1.00E+00	1.00E+00

- FOOTNOTES: (1) Concentration factor for uptake of nuclide
from soil for pasture and forage
(in pCi/kg dry weight per pCi/kg dry soil)
- (2) Concentration factor for uptake of nuclide
from soil by edible parts of crops
(in pCi/kg wet weight per pCi/kg dry soil)
-

DECAY CHAIN ACTIVITIES

Nuclide	Stack	Activity at 500. seconds	Activity at 100.00 years
Cs-137	1	8.7600E-06	2.9690E-06
Ba-137m	1	8.3360E-06	2.8070E-06
Am-241	1	1.1400E-05	3.8820E-06
Np-237	1	0.0000E+00	0.0000E+00
Pa-233	1	0.0000E+00	0.0000E+00
U-233	1	0.0000E+00	0.0000E+00
Th-229	1	0.0000E+00	0.0000E+00
Ra-225	1	0.0000E+00	0.0000E+00
Ac-225	1	0.0000E+00	0.0000E+00
Fr-221	1	0.0000E+00	0.0000E+00
At-217	1	0.0000E+00	0.0000E+00
Bi-213	1	0.0000E+00	0.0000E+00
Po-213	1	0.0000E+00	0.0000E+00
Pb-209	1	0.0000E+00	0.0000E+00
Tl-209	1	0.0000E+00	0.0000E+00
Pu-238	1	8.2000E-07	2.7880E-07
U-234	1	4.8100E-05	1.6380E-05
Th-230	1	4.8100E-05	1.6380E-05
Ra-226	1	4.8100E-05	1.6380E-05
Rn-222	1	4.8100E-05	1.6370E-05
Po-218	1	4.8100E-05	1.6370E-05
Pb-214	1	4.8100E-05	1.6370E-05
Bi-214	1	4.8100E-05	1.6370E-05
Po-214	1	4.8090E-05	1.6370E-05
Pb-210	1	4.8100E-05	1.6380E-05
Bi-210	1	4.8100E-05	1.6370E-05
Po-210	1	4.8100E-05	1.6380E-05
At-218	1	9.6200E-09	0.0000E+00
Sr-90	1	3.1000E-06	1.0500E-06
Y-90	1	3.1000E-06	1.0500E-06
K-40	1	2.8800E-04	9.8100E-05
Th-232	1	2.9600E-05	1.0080E-05
Ra-228	1	2.9600E-05	1.0080E-05
Ac-228	1	2.9600E-05	1.0080E-05
Th-228	1	2.9600E-05	1.0080E-05
Ra-224	1	2.9600E-05	1.0080E-05
Rn-220	1	2.9600E-05	1.0080E-05
Po-216	1	2.9600E-05	1.0080E-05
Pb-212	1	2.9600E-05	1.0080E-05
Bi-212	1	2.9600E-05	1.0080E-05
Po-212	1	1.8960E-05	6.4560E-06
Tl-208	1	1.0650E-05	3.6200E-06
U-238	1	4.8100E-05	1.6380E-05
Th-234	1	4.8100E-05	1.6380E-05
Pa-234m	1	4.8000E-05	1.6340E-05
Pa-234	1	6.2500E-08	0.0000E+00
Al-26	1	1.2800E-06	4.3600E-07

Be-7	1	8.4490E-06	1.2920E-06
Cm-243	1	6.9400E-06	2.3510E-06
Am-243	1	0.0000E+00	0.0000E+00
Np-239	1	0.0000E+00	0.0000E+00
Pu-239	1	3.2600E-05	1.1100E-05
U-235	1	6.7300E-05	2.2920E-05
Th-231	1	6.7300E-05	2.2910E-05
Pa-231	1	6.7300E-05	2.2920E-05
Ac-227	1	6.7300E-05	2.2920E-05
Th-227	1	6.6400E-05	2.2600E-05
Ra-223	1	6.7300E-05	2.2850E-05
Rn-219	1	6.7300E-05	2.2850E-05
Po-215	1	6.7300E-05	2.2850E-05
Pb-211	1	6.7300E-05	2.2850E-05
Bi-211	1	6.7300E-05	2.2850E-05
Tl-207	1	6.7110E-05	2.2780E-05
Po-211	1	1.8840E-07	0.0000E+00
Fr-223	1	9.3970E-07	3.1610E-07
Co-58	1	6.4000E-07	7.2630E-08
Co-60	1	1.2100E-06	4.0060E-07
Cs-134	1	5.7600E-06	1.8260E-06
Eu-152	1	7.1450E-06	6.6930E-09
Gd-152	1	0.0000E+00	0.0000E+00
Eu-154	1	5.5330E-06	2.5710E-09
Eu-155	1	3.4700E-06	1.1620E-06
Nb-94	1	1.0800E-06	3.6790E-07
Sb-125	1	2.9100E-06	9.3920E-07
Te-125m	1	0.0000E+00	7.8250E-08
H-3	1	1.3000E-05	4.3740E-06

VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

HUMAN INHALATION RATE	
Cubic centimeters/hr	9.17E+05
SOIL PARAMETERS	
Effective surface density (kg/sq m, dry weight) (Assumes 15 cm plow layer)	2.15E+02
BUILDUP TIMES	
For activity in soil (years)	1.00E+02
For radionuclides deposited on ground/water (days)	3.65E+04
DELAY TIMES	
Ingestion of pasture grass by animals (hr)	0.00E+00
Ingestion of stored feed by animals (hr)	2.16E+03
Ingestion of leafy vegetables by man (hr)	3.36E+02
Ingestion of produce by man (hr)	3.36E+02
Transport time from animal feed-milk-man (day)	2.00E+00
Time from slaughter to consumption (day)	2.00E+01
WEATHERING	
Removal rate constant for physical loss (per hr)	2.90E-03
CROP EXPOSURE DURATION	
Pasture grass (hr)	7.20E+02
Crops/leafy vegetables (hr)	1.44E+03
AGRICULTURAL PRODUCTIVITY	
Grass-cow-milk-man pathway (kg/sq m)	2.80E-01
Produce/leafy veg for human consumption (kg/sq m)	7.16E-01
FALLOUT INTERCEPTION FRACTIONS	
Vegetables	2.00E-01
Pasture	5.70E-01
GRAZING PARAMETERS	
Fraction of year animals graze on pasture	4.00E-01
Fraction of daily feed that is pasture grass when animal grazes on pasture	4.30E-01

Nov 27, 2006 05:40 pm

GENERAL

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VALUES FOR RADIONUCLIDE-INDEPENDENT PARAMETERS

ANIMAL FEED CONSUMPTION FACTORS	
Contaminated feed/forage (kg/day, dry weight)	1.56E+01
DAIRY PRODUCTIVITY	
Milk production of cow (L/day)	1.10E+01
MEAT ANIMAL SLAUGHTER PARAMETERS	
Muscle mass of animal at slaughter (kg)	2.00E+02
Fraction of herd slaughtered (per day)	3.81E-03
DECONTAMINATION	
Fraction of radioactivity retained after washing for leafy vegetables and produce	5.00E-01
FRACTIONS GROWN IN GARDEN OF INTEREST	
Produce ingested	1.00E+00
Leafy vegetables ingested	1.00E+00
INGESTION RATIOS:	
IMMEDIATE SURROUNDING AREA/TOTAL WITHIN AREA	
Vegetables	7.00E-01
Meat	4.40E-01
Milk	4.00E-01
MINIMUM INGESTION FRACTIONS FROM OUTSIDE AREA	
(Minimum fractions of food types from outside area listed below are actual fixed values.)	
Vegetables	0.00E+00
Meat	0.00E+00
Milk	0.00E+00
HUMAN FOOD UTILIZATION FACTORS	
Produce ingestion (kg/y)	1.76E+02
Milk ingestion (L/y)	1.12E+02
Meat ingestion (kg/y)	8.50E+01
Leafy vegetable ingestion (kg/y)	1.80E+01
SWIMMING PARAMETERS	
Fraction of time spent swimming	0.00E+00
Dilution factor for water (cm)	1.00E+00

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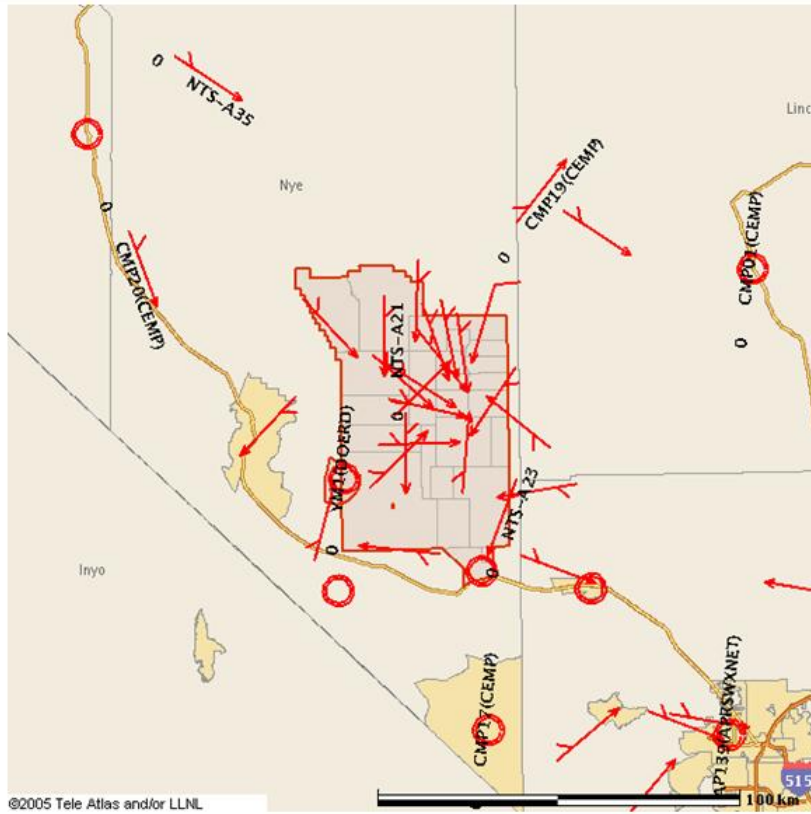
Appendix B

NARAC Modeling Input and Output for the Proposed Divine Strake Experiment

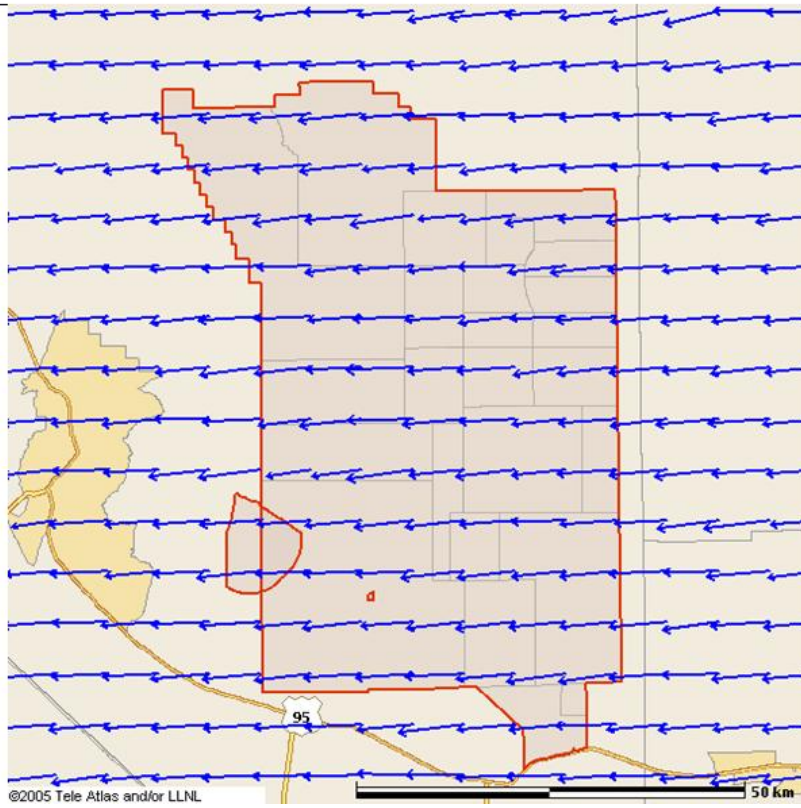
Example Scenario Assumptions

- **Explosive Geometry:** *provided by requestor*
 - 1000 m height, 300 m radius
- **Release Times:** 1600 UTC, 15 Jan 2005 and 20 Jan 2006
- **Source Amount:** *provided by requestor*
 - All material released in respirable sized particles
- **Location:** *provided by requestor*
 - 37.02348 N 116.181963 W
- **Weather: Meteorological observations**
 - NTS and WMO stations beginning 1600 UTC 15 Jan 2005
 - NTS and WMO stations beginning 1600 UTC 20 Jan 2006
- **Population Estimates:** LANL Day/Night Population
- **Terrain Source:** DTED (Digital Terrain Elevation Data)
- **Models used:** LLNL/NARAC

Jan 15, 2005 – surface winds at release start

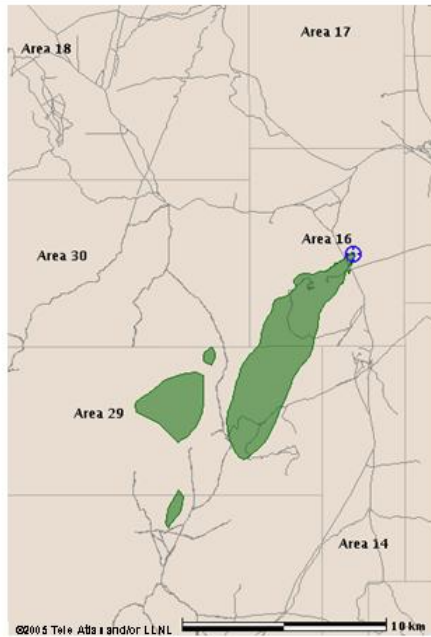


Jan 15, 2005 – midlevel winds at release start





Total Effective Dose Equivalent



Map Size: 31.1 km by 31.1 km Id: Production\EVENT_12117\wvs_0\prodexec_8\mrem
 NARAC Operations: (NARAC Staff); narac@llnl.gov; 925-424-6465
 Not approved for further distribution

Effects and Actions		
Description	(mrem) Extent Area	Population
10% of the 0.1 mrem level at which EPA approval is required.	>0.01 16.3km 31.7 km2	0

Areas and counts in the table are cumulative.

Effects or contamination from January 15, 2006 16:00 UTC to January 19, 2006 16:00 UTC at 10.0 m.

Release Location: 37.023481 N, 116.181963 W

Material: AM-241 + daughters + TH-230 + PU-238 + PA-234M + U-234 + PA-234 + RA-226 + PB-212 + PO-216 + BI-212 + TL-208 + PO-212 + RA-223 + FR-223 + AC-227 + TH-227 + PO-215 + RA-224 + TH-234 + PB-211 + BI-211 + TL-207 + PO-218 + TH-231 + PA-231 + U-238 + CO-60 + TH-232 + RA-228 + AC-228 + PB-214 + BI-214 + PO-214 + K-40 + PO-210 + PB-210 + BI-210 + TH-228 + PU-239 + U-235 + Y-90 + SR-90 + CS-134 + CO-58 + BA-137M + CS-137 + H-3 + CM-243 + EU-154 + NB-94 + BE-7 + PO-211 + AL-26 + SB-125 + RN-222 + RN-220 + RN-219 + AT-218 + EU-155 + EU-152

Generated On: November 28, 2006 01:14 UTC

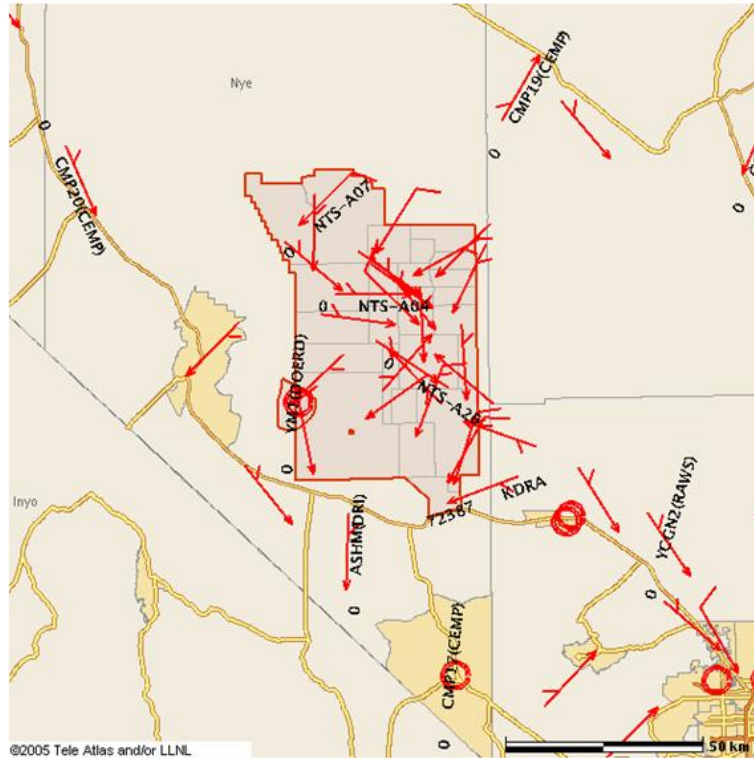
Model: ADAPT/LODI

Comments: Release starting at 1/15/2006 16:00 UTC

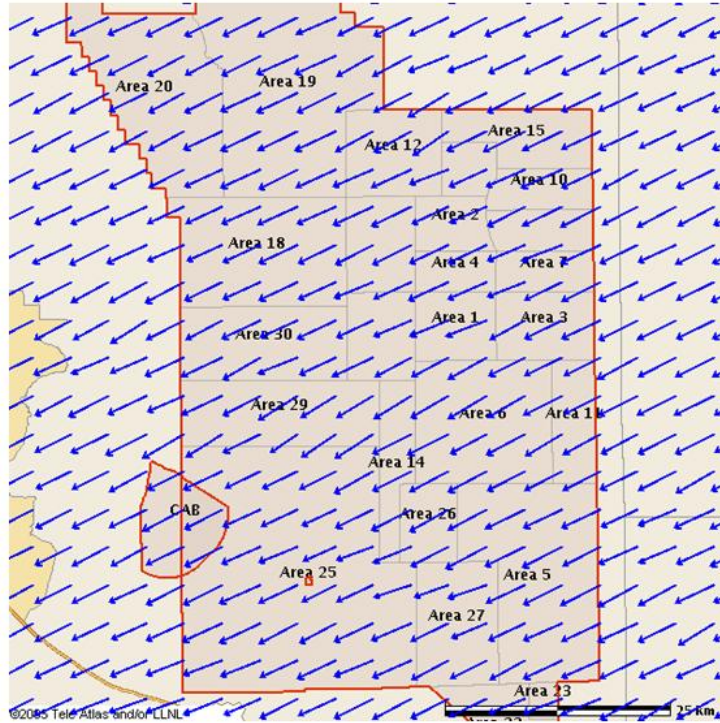
met obs at

1/15/2005 16:00 UTC; 1/15/2005 16:15 UTC; 1/15/2005 16:30 UTC;
 1/15/2005 16:45 UTC; 1/15/2005 17:00 UTC; 1/15/2005 17:15 UTC;
 1/15/2005 17:30 UTC; 1/15/2005 17:45 UTC

Jan 20, 2006 – surface winds at release start



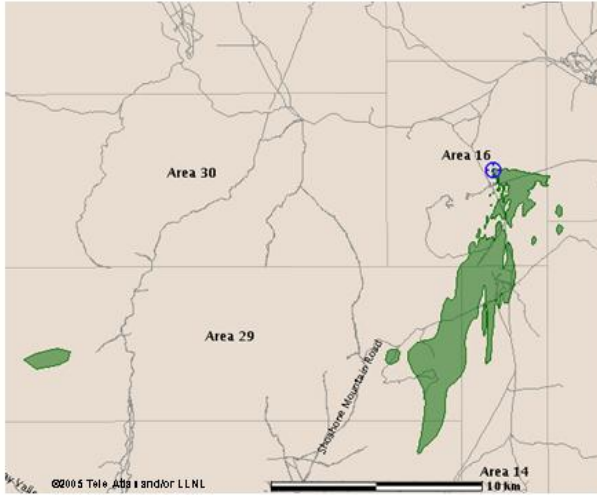
Jan 20, 2006 – midlevel winds at release start





Total Effective Dose Equivalent

Jan 20, 2006 Example Assessment



Map Size: 29.5 km by 29.5 km Id: Production\EVENT_12117\ws_1\prodexec_10\mrem
 NARAC Operations: (NARAC Staff); narac@lnl.gov; 925-424-6465
 Not approved for further distribution

Effects and Actions		
Description	(mrem) Extent Area	Population
10% of the 0.1 mrem level at which EPA approval is required.	>0.01 24.1km 24.3 km ²	0
Areas and counts in the table are cumulative.		

Effects or contamination from January 20, 2006 16:00 UTC to January 24, 2006 16:00 UTC at 10.0 m.

Release Location: 37.023481 N, 116.181963 W

Material: AM-241 + daughters + TH-230 + PU-238 + PA-234M + U-234 + PA-234 + RA-226 + PB-212 + PO-216 + BI-212 + TL-208 + PO-212 + RA-223 + FR-223 + AC-227 + TH-227 + PO-215 + RA-224 + TH-234 + PB-211 + BI-211 + TL-207 + PO-218 + TH-231 + PA-231 + U-238 + CO-60 + TH-232 + RA-228 + AC-228 + PB-214 + BI-214 + PO-214 + K-40 + PO-210 + PB-210 + BI-210 + TH-228 + PU-239 + U-235 + Y-90 + SR-90 + CS-134 + CO-58 + BA-137M + CS-137 + H-3 + CM-243 + EU-154 + NB-94 + BE-7 + PO-211 + AL-26 + SB-125 + RN-222 + RN-220 + RN-219 + AT-218 + EU-155 + EU-152

Generated On: November 26, 2006 20:53 UTC

Model: ADAPTL0DI

Comments: Release starting at 1/20/2006 16:00 UTC

met obs at
 1/20/2006 16:00 UTC; 1/20/2006 16:15 UTC; 1/20/2006 16:30 UTC;
 1/20/2006 16:45 UTC; 1/20/2006 17:00 UTC; 1/20/2006 17:15 UTC;
 1/20/2006 17:30 UTC; 1/20/2006 17:45 UTC

Appendix C

CAP88-PC Version 3.0 Modeling Output for the Proposed Divine Strake Experiment

June 2006

**Literature Values (Pre-site Characterization) Used for
Source term**



ANALYSIS/CALCULATION (A/C) COVER SHEET

Project Title: Divine Strake	Project/Tracking No.:	Analysis/Calculation No.: NESH-55	
Subject: Divine Strake Experiment			Functional Class:
Analysis/Calculation Status Designation: <input checked="" type="checkbox"/> Preliminary <input type="checkbox"/> Confirmed <input type="checkbox"/> Superseded			
Computer Program/Title	Mainframe/PC	Program No.	Version/Release No.
CAP88-PC	PC		3.0
Hotspot	PC		2.06
Bearing and Distance Program	PC		1.0

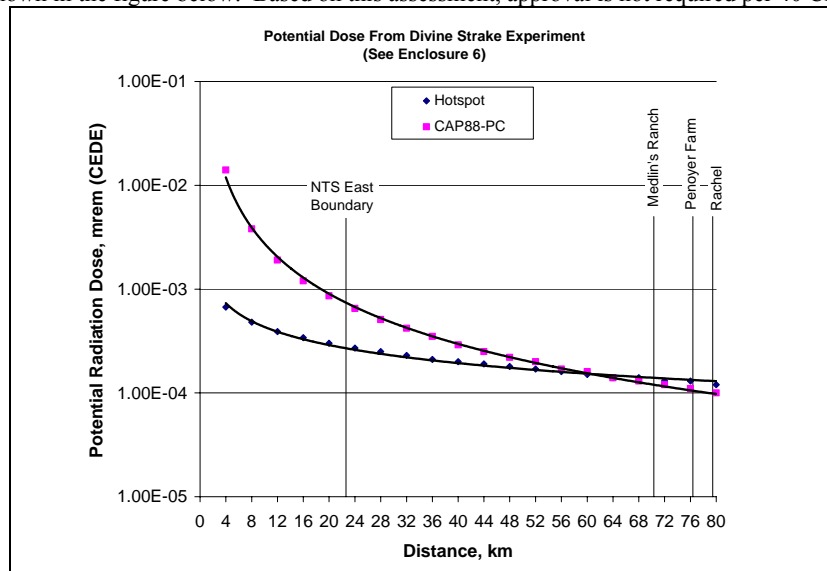
Purpose and Objective:

An assessment of the radiation doses that could occur to offsite residents from the dust created by the Divine Strake experiment was conducted to determine whether the experiment would be in conformance with the National Emission Standards for Air Pollutants (NESHAP), Title 40 of Code of Federal Regulations, Part 61, Subpart H. During the Divine Strake experiment, 700 tons of ammonium nitrate fuel oil (ANFO) emulsion will be detonated over the U-16b tunnel complex. Conservative assumptions were used for estimating the air emissions (Enclosure 2) to determine the potential dose with CAP88-PC software and whether EPA approval would be required. If the dose (CEDE) is ≥ 0.1 mrem/yr, EPA approval is required.

Since the CAP88-PC model is normally used for chronic continuous radioactive releases, the dose assessment was also made with Hotspot, a model designed by LLNL for explosions and releases occurring over a period less than a few hours.

Summary of Conclusion:

Based upon the radiation doses estimated by the CAP88-PC and Hotspot atmospheric diffusion models, the committed effective dose equivalent (CEDE) to the hypothetical maximally exposed individual (MEI) at the eastern NTS boundary, would be less than 1 μ rem. Other off-site locations are also shown in the figure below. Based on this assessment, approval is not required per 40 CFR 61.96.



Record of Revisions

Rev No.	Reason for Revision	Date	Prepared	Checked	Approval
0		6/15/2006	Frank Grossman	Ron Warren	Charles Lohrstorfer

Bechtel Nevada ENGINEERING DEPARTMENT		ANALYSIS/CALCULATION (A/C) COVER SHEET																							
Project: Divine Strake		Analysis/Calculation No.: NESH-55																							
Subject: Divine Strake Experiment		Sheet Revision: 0																							
Prepared: (Initial/Date) Signature on Original	Checked: (Initial/Date) 1																								
<p>Given:</p> <p>Nevada state plane coordinates for Divine Strake (NAD27, central Nevada); Northing 827828, Easting 641694 (from ArcGIS software)</p> <p>TNT equivalence to 700 tons of ammonium nitrate fuel emulsion = 593 tons (DOE/EA-1550, May 2006)</p> <p>Bearings and distances to off-site populated locations with 80 km of Divine Strake (Enclosure 1)</p> <p>Quantity of PM10 generated by explosion, 17.55 tons (DOE/EA-1550, May 2006)</p> <p>CAP88-PC Inputs:</p> <p>Radioactive source term based upon estimated background concentrations (see Enclosure 2) :</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Radionuclide</th> <th>Emission (Ci)</th> </tr> </thead> <tbody> <tr> <td>Am-241</td> <td>5.7E-05</td> </tr> <tr> <td>Co-60</td> <td>7.4E-05</td> </tr> <tr> <td>Cs-137^a</td> <td>2.4E-04</td> </tr> <tr> <td>Pu-238</td> <td>1.1E-04</td> </tr> <tr> <td>Pu-239</td> <td>2.8E-04</td> </tr> <tr> <td>Sr-90^a</td> <td>3.6E-04</td> </tr> <tr> <td>K-40</td> <td>3.2E-04</td> </tr> <tr> <td>Th-232^a</td> <td>5.4E-05</td> </tr> <tr> <td>U-235^a</td> <td>4.8E-07</td> </tr> <tr> <td>U-238^a</td> <td>6.1E-05</td> </tr> </tbody> </table> <p>^a Decay chain included assuming all in secular equilibrium.</p> <p>Surface area effected by the experiment = 2,827 square meters sq m (from revised Environmental Assessment for Divine Strake)</p> <p>Initial upward momentum of dust cloud, 1000 (m/s) (low end of range in detonation velocities of high explosives, approximately 3,300 feet per second (fps) to over 29,900 fps specified by Jeff Slotnick, "Explosive Forces of Improvised Explosive Devices" (website URL http://securitydriver.com/aic/stories/article-114.html)</p> <p>Ambient temperature, 30 degrees Celsius (average expected temperature for months of June, July, and August in Area 16)</p> <p>Humidity, 6 g/cu m (average moisture concentration during June, July, and August from Substation 3545 HTO air sampler)</p> <p>Mixing height, 3000 m (2510 m cloud top from Hotspot rounded off to one significant figure)</p> <p>Wind file created for one direction, wind speed range of 7-10 knots (4.4 m/s, avg), and stability class C</p> <p>Distances of calculated doses at intervals of 4 km out to 80 km</p> <p>Hotspot Inputs:</p> <p>Same radioactive source term</p> <p>Wind speed, 4.4 m/s</p> <p>High explosive, 1.19 E+06 lb (593 tons TNT equivalent)</p> <p>Atmospheric stability classification, C</p> <p>Calculation of committed effective dose equivalents (CEDEs):</p> <p>The outputs from the CAP88-PC and Hotspot calculations using the above source terms and other input parameters are shown as Enclosures 3, 4 and 5, respectively. The CEDEs computed by both computer models are plotted versus distance in Enclosure 6.</p> <p>Enclosures:</p> <ol style="list-style-type: none"> Bearing and Distance from U-16b, Divine Strake Source term used for modeling potential radionuclide release from the Divine Strake experiment CAP88-PC Version 3.0 Synopsis Report, dated June 14, 2006 CAP88-PC Version 3.0 Dose and Risk Equivalent Summaries, dated June 14, 2006 Hotspot Table Output, dated June 15, 2006 Plot of Potential Dose from Divine Strake Experiment 				Radionuclide	Emission (Ci)	Am-241	5.7E-05	Co-60	7.4E-05	Cs-137 ^a	2.4E-04	Pu-238	1.1E-04	Pu-239	2.8E-04	Sr-90 ^a	3.6E-04	K-40	3.2E-04	Th-232 ^a	5.4E-05	U-235 ^a	4.8E-07	U-238 ^a	6.1E-05
Radionuclide	Emission (Ci)																								
Am-241	5.7E-05																								
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Cs-137 ^a	2.4E-04																								
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Pu-239	2.8E-04																								
Sr-90 ^a	3.6E-04																								
K-40	3.2E-04																								
Th-232 ^a	5.4E-05																								
U-235 ^a	4.8E-07																								
U-238 ^a	6.1E-05																								

ENCLOSURE 1

Bearing and Distance from U-16b, Divine Strake, Northing 827828, Easting 641694

Location Sector	Distance (km)	Bearing	
NTS East Boundary	22.6	90.00	E
Amargosa Valley	46.71	204.15	SSW
Springdale	51.12	271.08	W
U.S. Ecology	53.27	240.21	WSW
Beatty	54.36	251.08	WSW
Crystal	58.78	179.31	S
Amargosa Center	59.11	208.56	SSW
Tolicha Peak	61.71	298.81	WNW
Cactus Springs	63.6	139.57	SE
Indian Springs	67.53	136.92	SE
Sarcobatus Flat	69.59	285.8	WNW
Medlin's Ranch*	70.34	52.6	NE
Ash Meadows	73.52	188.03	S
Stateline Area	75.75	196.05	SSW
Penoyer Farm*	76.38	22.11	NNE
Cold Creek	78.44	149.26	SSE
SNV Prison	79.13	134.46	SE
Rachel*	79.45	27.98	NNE

*Potentially downwind of Divine Strake

Enclosure 2

Source term used for modeling potential radionuclide release from the Divine Strake experiment

Soil Emissions

Soil expected to be emitted was expressed in two ways to obtain a radionuclide source term. The first was the PM10 value of 17.55 tons predicted for the Divine Strake experiment and listed in Table 2 of Appendix C of the *Environmental Assessment for the Divine Strake Experiment* (U.S. Department of Energy, 2006). The second was the surface area of the crater predicted for the Divine Strake experiment (30 m diameter = 2,827 m²) (U.S. Department of Energy, 2006). The application of radionuclide concentrations to these values is described below.

Radionuclides

It was the intention of this assessment to assemble published data on man-made radionuclide concentrations in soil from samples either collected in Area 16 of the NTS or that were analogous to soil in the area of the Divine Strake experiment. Also, concentrations of naturally occurring radionuclides were taken from values listed by the EPA for background levels in soil (U.S. Environmental Protection Agency, 1994). From this compilation of concentrations, maximum values (not including nuclear test locations) were selected for use in modeling potential dose to persons from emissions from the Divine Strake experiment. Radionuclide concentration data and references are listed in **Table 1** with shaded emission values being those selected for use in modeling. Radionuclide concentrations expressed as pCi/g soil were multiplied by the predicted mass of PM10 to obtain the total potential radionuclide emission. Radionuclide concentrations expressed as nCi/m² were multiplied by the predicted surface area of the crater to obtain the total potential radionuclide emission.

In addition to using the highest radionuclide concentrations reported, potential radionuclide emissions from Divine Strake were further maximized by assuming 100% of the activity associated with soil was emitted to air for transport offsite and no adjustments were made for the physical decay of radionuclides (values taken as reported). This is especially conservative for ⁶⁰Co with its 5.26 year half-life (data ranging from 1983 to 2002) and, to a lesser extent, for ¹³⁷Cs (30 year half-life) and ⁹⁰Sr (27.7 year half-life).

Three samples of soil and limestone from the Divine Strake excavation were collected on May 24, 2006 by Bechtel Nevada Environmental Technical Services. These samples were screened with a Canberra XtRa coaxial germanium detector (Model GX5520, SN 4945016) to provide some data (Table 2) supporting the assertion that values listed in Table 1 are conservatively high.

Table 1. Radionuclide emission assumed from the Divine Strake experiment. Shaded emission values were used to model potential dose.

Amount	Units	Radionuclide	Concentration	Concentration Units	Radionuclide Concentration Reference	Comments	Emission (Ci)
15921093 ^a	PM10 (g)	²⁴¹ Am	0.048	pCi/g	U.S. Department of Energy, 2006	background soil around U-16a muckpile	7.6E-07
2827 ^b	m ²	²⁴¹ Am	20	nCi/m ²	McArthur, 1991	value estimated for Area 16	5.7E-05
15921093 ^a	PM10 (g)	⁶⁰ Co	0.1	pCi/g	U.S. Department of Energy, 2006	background soil around U-16a muckpile	1.6E-06
2827 ^b	m ²	⁶⁰ Co	3	nCi/m ²	McArthur, 1991	value estimated for Area 16	8.5E-06
2827 ^b	m ²	⁶⁰ Co	26	nCi/m ²	Bluitt, 1983	contour A in Figure 8	7.4E-05
15921093 ^a	PM10 (g)	¹³⁷ Cs	7	pCi/g	U.S. Department of Energy, 2006	background soil around U-16a muckpile	1.1E-04
2827 ^b	m ²	¹³⁷ Cs ^c	85	nCi/m ²	McArthur, 1991	based on measurements along Mid-Valley road	2.4E-04
2827 ^b	m ²	¹³⁷ Cs	81	nCi/m ²	CDC & National Cancer Institute, 2005	from NTS & global fallout	2.3E-04
2827 ^b	m ²	¹³⁷ Cs	84	nCi/m ²	Bluitt, 1983	contour C in Figure 7	2.4E-04
15921093 ^a	PM10 (g)	⁴⁰ K	20	pCi/g	U.S. Environmental Protection Agency, 1994	max of range reported	3.2E-04
15921093 ^a	PM10 (g)	²³⁸ Pu	0.002	pCi/g	U.S. Department of Energy, 2006	background soil around U-16a muckpile	3.2E-08
2827 ^b	m ²	²³⁸ Pu	40.5	nCi/m ²	McArthur, 1991	inventory reported in Table A-2 divided by area reported	1.1E-04
15921093 ^a	PM10 (g)	²³⁹ Pu	0.24	pCi/g	U.S. Department of Energy, 2006	background soil around U-16a muckpile	3.8E-06
2827 ^b	m ²	²³⁹ Pu	100	nCi/m ²	McArthur, 1991	inventory reported in Table A-2 divided by area reported	2.8E-04
2827 ^b	m ²	²³⁹ Pu	2.7	nCi/m ²	CDC & National Cancer Institute, 2005	from NTS fallout	7.6E-06
15921093 ^a	PM10 (g)	⁹⁰ Sr	1.17	pCi/g	U.S. Department of Energy, 2006	background soil around U-16a muckpile	1.9E-05
2827 ^b	m ²	⁹⁰ Sr ^c	127	nCi/m ²	McArthur, 1991	inventory reported in Table A-2 divided by area reported	3.6E-04
2827 ^b	m ²	⁹⁰ Sr	27	nCi/m ²	CDC & National Cancer Institute, 2005	from NTS fallout	7.6E-05
15921093 ^a	PM10 (g)	²³² Th ^c	3.4	pCi/g	U.S. Environmental Protection Agency, 1994	max of range reported	5.4E-05
15921093 ^a	PM10 (g)	²³⁵ U ^c	0.03	pCi/g	U.S. Environmental Protection Agency, 1994	max of range reported	4.8E-07
15921093 ^a	PM10 (g)	²³⁸ U ^c	3.8	pCi/g	U.S. Environmental Protection Agency, 1994	max of range reported	6.1E-05
					Hendricks, et al., 1999	detected ¹³⁷ Cs at a U-16a vent line, otherwise no anomalies	

^a Total PM10 estimated to be released during Divine Strake (17.55 tons) (U.S. Department of Energy, 2006)

^b Predicted crater area (U.S. Department of Energy, 2006)

^c Decay chain included in estimated emission assuming all in secular equilibrium.

Table 2. Radionuclides detected in samples collected by BN Environmental Technical Services (May 24, 2006) from material excavated from the pit for the Divine Strake experiment.

Sample No.	Description	Radio-nuclide	Result (pCi/g)	Error (2s) (pCi/g)	MDC (pCi/g)
EM00010380	Grab Sample of Soil removed during excavation of Divine Strake pit	⁴⁰ K	14.7	2.04	1.86
		²¹² Pb	1.1	0.16	0.25
		²¹⁴ Bi	1.8	0.21	0.26
		²¹⁴ Pb	2.2	0.22	0.28
EM00010381	Grab sample of limestone taken from material removed from the excavation of Divine Strake pit	⁴⁰ K	7.8	1.39	1.50
		²¹² Pb	0.6	0.10	0.19
		²¹⁴ Pb	0.8	0.14	0.24
EM00010381	Grab Sample of Soil removed during excavation of Divine Strake pit	⁴⁰ K	11.5	1.81	1.88
		²¹² Pb	0.64	0.09	0.18
		²¹⁴ Bi	1.6	0.21	0.21
		²¹⁴ Pb	1.9	0.16	0.25

References

- Bluitt, C. M., 1986. *An Aerial Radiological Survey of Areas 16 and 30 Nevada Test Site*. EGG-10282-1118, EG&G Energy Measurements, Inc., Las Vegas, NV.
- CDC & National Cancer Institute, 2005. *Report on the Feasibility of a Study of the Health Consequences to the American Population from Nuclear Weapons Tests Conducted by the United States and Other Nations, Volume 1*. Department of Health and Human Services, Centers for Disease Control and Prevention (CDC) and the National Cancer Institute, CDC: Atlanta, GA.
- Hendricks, T. J., and S. R. Riedhauser, 1999. *An Aerial Radiological Survey of the Nevada Test Site*. DOE/NV/11718-324. Bechtel Nevada, Las Vegas, NV.
- McArthur, R. D., 1991. *Radionuclides in Surface Soil at the Nevada Test Site*. DOE/NV/10845-02. Water Resources Center Publication 45077, Desert Research Institute, University of Nevada System, Las Vegas, NV.
- U.S. Department of Energy, 2006. *Large-scale, Open-air Explosive Detonation Divine Strake at the Nevada Test Site, Revised Environmental Assessment*. DOE/EA-1550, National Nuclear Security Administration, Nevada Site Office, Las Vegas, NV.
- U.S. Environmental Protection Agency, 1994. *Technical Support Document for the Development of Radionuclide Cleanup Levels for Soil*. EPA 402-R-96-011 A, Office of Radiation and Indoor Air, Washington, DC.

ENCLOSURE 3

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Individual Assessment
Jun 14, 2006 08:46 pm

Facility: U16B
Address: Area 16
City: Mercury
State: NV Zip: 89023

Source Category: Divine Strake Experiment
Source Type: Area
Emission Year: 2006

Comments: Cap88 run to check potential dose
from Divine Strake

Effective Dose Equivalent
(mrem/year)

1.36E-02

At This Location: 4000 Meters North

Dataset Name: Divine Strake
Dataset Date: 6/14/2006 7:43:00 PM

Wind File: C:\Program Files\CAP88-PC30\Wndfiles\Divine Stake\7-10KNTC.WND

Jun 14, 2006 08:46 pm

SYNOPSIS

Page 1

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 4000 Meters North
Lifetime Fatal Cancer Risk: 3.90E-09

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
Adrenals	5.21E-04
B Surfac	5.75E-04
Breasts	2.06E-02
St Wall	5.32E-04
ULI Wall	5.70E-04
Kidneys	5.04E-04
Lungs	5.51E-04
Ovaries	5.48E-04
R Marrow	6.21E-04
Spleen	8.16E-04
Thymus	6.39E-04
Uterus	3.59E-03
Bld Wall	1.86E-03
Brain	5.94E-04
Esophagu	7.42E-04
SI Wall	5.24E-04
LLI Wall	2.47E-03
Liver	6.71E-03
Muscle	5.67E-04
Pancreas	8.03E-04
Skin	5.36E-04
Testes	5.62E-04
Thyroid	5.41E-04
EFFEC	1.36E-02

Jun 14, 2006 08:46 pm

SYNOPSIS
Page 2

RADIONUCLIDE EMISSIONS DURING THE YEAR 2006

Nuclide	Type	Size	Source	TOTAL
			#1 Ci/y	Ci/y
Co-60	M	1	7.4E-05	7.4E-05
Cs-137	F	1	2.4E-04	2.4E-04
Ba-137m	M	1	2.4E-04	2.4E-04
Am-241	M	1	5.7E-05	5.7E-05
Pu-238	M	1	1.1E-04	1.1E-04
Pu-239	M	1	2.8E-04	2.8E-04
Sr-90	M	1	3.6E-04	3.6E-04
Y-90	M	1	3.6E-04	3.6E-04
K-40	M	1	3.2E-04	3.2E-04
Th-232	S	1	5.4E-05	5.4E-05
Ra-228	M	1	5.4E-05	5.4E-05
Ac-228	M	1	5.4E-05	5.4E-05
Th-228	S	1	5.4E-05	5.4E-05
Ra-224	M	1	5.4E-05	5.4E-05
Rn-220	G	0	5.4E-05	5.4E-05
Po-216	M	1	5.4E-05	5.4E-05
Pb-212	M	1	5.4E-05	5.4E-05
Bi-212	M	1	5.4E-05	5.4E-05
Po-212	M	1	3.5E-05	3.5E-05
Tl-208	M	1	1.9E-05	1.9E-05
U-235	M	1	4.8E-07	4.8E-07
Th-231	S	1	4.8E-07	4.8E-07
Pa-231	M	1	4.8E-07	4.8E-07
Ac-227	M	1	4.8E-07	4.8E-07
Th-227	S	1	4.7E-07	4.7E-07
Fr-223	M	1	6.7E-09	6.7E-09
Ra-223	M	1	4.8E-07	4.8E-07
Rn-219	G	0	4.8E-07	4.8E-07
Po-215	M	1	4.8E-07	4.8E-07
Pb-211	M	1	4.8E-07	4.8E-07
Bi-211	M	1	4.8E-07	4.8E-07
Tl-207	M	1	4.8E-07	4.8E-07
Po-211	M	1	1.3E-09	1.3E-09
U-238	M	1	6.1E-05	6.1E-05
Th-234	S	1	6.1E-05	6.1E-05
Pa-234m	M	1	6.1E-05	6.1E-05
Pa-234	M	1	7.9E-08	7.9E-08
U-234	M	1	6.1E-05	6.1E-05
Th-230	S	1	6.1E-05	6.1E-05
Ra-226	M	1	6.1E-05	6.1E-05
Rn-222	G	0	6.1E-05	6.1E-05
Po-218	M	1	6.1E-05	6.1E-05
Pb-214	M	1	6.1E-05	6.1E-05
At-218	M	1	1.2E-08	1.2E-08
Bi-214	M	1	6.1E-05	6.1E-05

Po-214	M	1	6.1E-05	6.1E-05
Pb-210	M	1	6.1E-05	6.1E-05
Bi-210	M	1	6.1E-05	6.1E-05
Po-210	M	1	6.1E-05	6.1E-05

SITE INFORMATION

Temperature:	30 degrees C
Precipitation:	1 cm/y
Humidity:	6 g/cu m
Mixing Height:	3000 m

Jun 14, 2006 08:46 pm

SYNOPSIS
Page 3

SOURCE INFORMATION

Source Number: 1

Source Height (m): 0.10
Area (sq m): 2827.00

Plume Rise
Momentum (m/s): 1000.00
(Exit Velocity)

AGRICULTURAL DATA

	Vegetable	Milk	Meat
	_____	_____	_____
Fraction Home Produced:	0.700	0.400	0.440
Fraction From Assessment Area:	0.300	0.600	0.560
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

4000 8000 12000 16000 20000 24000 28000 32000 36000 40000
44000 48000 52000 56000 60000 64000 68000 72000 76000 80000

ENCLOSURE 4

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment

Jun 14, 2006 08:46 pm

Facility: U16B
Address: Area 16
City: Mercury
State: NV Zip: 89023

Source Category: Divine Strake Experiment
Source Type: Area
Emission Year: 2006

Comments: Cap88 run to check potential dose
from Divine Strake

Dataset Name: Divine Strake
Dataset Date: 6/14/2006 7:43:00 PM
Wind File: C:\Program Files\CAP88-PC30\Wndfiles\Divine Stake\7-
10KNTC.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
Adrenals	5.21E-04
B Surfac	5.75E-04
Breasts	2.06E-02
St Wall	5.32E-04
ULI Wall	5.70E-04
Kidneys	5.04E-04
Lungs	5.51E-04
Ovaries	5.48E-04
R Marrow	6.21E-04
Spleen	8.16E-04
Thymus	6.39E-04
Uterus	3.59E-03
Bld Wall	1.86E-03
Brain	5.94E-04
Esophagu	7.42E-04
SI Wall	5.24E-04
LLI Wall	2.47E-03
Liver	6.71E-03
Muscle	5.67E-04
Pancreas	8.03E-04
Skin	5.36E-04
Testes	5.62E-04
Thyroid	5.41E-04
EFFEC	1.36E-02

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	5.87E-04
INHALATION	1.26E-02
AIR IMMERSION	5.38E-08
GROUND SURFACE	4.96E-04
INTERNAL	1.31E-02
EXTERNAL	4.96E-04
TOTAL	1.36E-02

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SUMMARY
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NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
Co-60	1.31E-04
Cs-137	5.98E-05
Ba-137m	1.01E-04
Am-241	1.11E-03
Np-237	0.00E+00
Pa-233	0.00E+00
U-233	0.00E+00
Th-229	0.00E+00
Ra-225	0.00E+00
Ac-225	0.00E+00
Fr-221	0.00E+00
At-217	0.00E+00
Bi-213	0.00E+00
Po-213	0.00E+00
Pb-209	0.00E+00
Tl-209	0.00E+00
Pu-238	2.37E-03
U-234	1.01E-04
Th-230	4.06E-04
Ra-226	1.37E-04
Rn-222	2.02E-12
Po-218	4.06E-10
Pb-214	1.17E-05
Bi-214	6.80E-05
Po-214	3.71E-09
Pb-210	7.48E-05
Bi-210	4.31E-06
Po-210	1.07E-04
At-218	2.16E-15
Pu-239	6.56E-03
U-235	7.59E-07
Th-231	5.84E-09
Pa-231	2.10E-05
Ac-227	1.63E-05
Th-227	2.29E-06
Ra-223	1.73E-06
Rn-219	2.20E-12
Po-215	6.11E-11
Pb-211	3.70E-08
Bi-211	1.60E-08
Tl-207	2.02E-08
Po-211	8.68E-16
Fr-223	3.22E-11
Sr-90	1.78E-04
Y-90	3.06E-05
K-40	9.71E-05
Th-232	6.30E-04
Ra-228	1.52E-04
Ac-228	3.93E-05
Th-228	9.95E-04
Ra-224	7.50E-05
Rn-220	1.73E-12
Po-216	6.69E-10
Pb-212	9.90E-06
Bi-212	1.01E-05
Po-212	0.00E+00
Tl-208	4.44E-05
U-238	8.33E-05
Th-234	6.57E-07
Pa-234m	5.06E-06
Pa-234	2.68E-11
TOTAL	1.36E-02

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
Esophagu	1.07E-11
Stomach	3.56E-11
Colon	1.22E-10
Liver	5.91E-10
LUNG	2.52E-09
Bone	2.01E-10
Skin	7.06E-12
Breast	3.43E-11
Ovary	4.82E-11
Bladder	2.55E-11
Kidneys	1.53E-11
Thyroid	2.82E-12
Leukemia	1.48E-10
Residual	1.32E-10
Total	3.90E-09
TOTAL	7.80E-09

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	2.63E-10
INHALATION	3.39E-09
AIR IMMERSION	2.91E-14
GROUND SURFACE	2.46E-10
INTERNAL	3.65E-09
EXTERNAL	2.46E-10
TOTAL	3.90E-09

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SUMMARY
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NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Co-60	7.43E-11
Cs-137	3.01E-11
Ba-137m	5.43E-11
Am-241	1.76E-10
Np-237	0.00E+00
Pa-233	0.00E+00
U-233	0.00E+00
Th-229	0.00E+00
Ra-225	0.00E+00
Ac-225	0.00E+00
Fr-221	0.00E+00
At-217	0.00E+00
Bi-213	0.00E+00
Po-213	0.00E+00
Pb-209	0.00E+00
Tl-209	0.00E+00
Pu-238	4.13E-10
U-234	8.28E-11
Th-230	2.05E-10
Ra-226	9.63E-11
Rn-222	1.10E-18
Po-218	2.23E-16
Pb-214	6.27E-12
Bi-214	3.61E-11
Po-214	2.04E-15
Pb-210	3.38E-11
Bi-210	2.53E-12
Po-210	8.34E-11
At-218	1.05E-21
Pu-239	1.04E-09
U-235	6.06E-13
Th-231	2.68E-15
Pa-231	1.99E-12
Ac-227	4.29E-12
Th-227	1.98E-12
Ra-223	1.47E-12
Rn-219	1.19E-18
Po-215	3.35E-17
Pb-211	1.36E-14
Bi-211	8.77E-15
Tl-207	2.57E-15
Po-211	4.75E-22
Fr-223	2.73E-17
Sr-90	1.05E-10
Y-90	3.87E-12
K-40	6.58E-11
Th-232	2.76E-10
Ra-228	6.53E-11
Ac-228	2.09E-11
Th-228	8.51E-10
Ra-224	6.44E-11
Rn-220	9.45E-19
Po-216	3.67E-16
Pb-212	6.75E-12
Bi-212	4.70E-12
Po-212	0.00E+00
Tl-208	2.42E-11
U-238	6.81E-11
Th-234	5.12E-13
Pa-234m	8.11E-13
Pa-234	1.71E-17
TOTAL	3.90E-09

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

Distance (m)

Direction	4000	8000	12000	16000	20000	24000	28000
N	1.4E-02	3.8E-03	1.9E-03	1.2E-03	8.6E-04	6.5E-04	5.1E-04
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Distance (m)

Direction	32000	36000	40000	44000	48000	52000	56000
N	4.2E-04	3.5E-04	2.9E-04	2.5E-04	2.2E-04	2.0E-04	1.7E-04
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

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SUMMARY
Page 6INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)					
Direction	60000	64000	68000	72000	76000	80000
N	1.6E-04	1.4E-04	1.3E-04	1.2E-04	1.1E-04	1.0E-04
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

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SUMMARY
Page 7INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Distance (m)							
Direction	4000	8000	12000	16000	20000	24000	28000
N	3.9E-09	1.1E-09	5.5E-10	3.5E-10	2.5E-10	1.9E-10	1.5E-10
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Distance (m)							
Direction	32000	36000	40000	44000	48000	52000	56000
N	1.2E-10	1.0E-10	8.5E-11	7.3E-11	6.4E-11	5.7E-11	5.1E-11
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

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SUMMARY
Page 8INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)					
Direction	60000	64000	68000	72000	76000	80000
N	4.5E-11	4.1E-11	3.8E-11	3.4E-11	3.2E-11	2.9E-11
NNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
W	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
WSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
S	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SSE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
SE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ESE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
E	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
ENE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NNE	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

W E A T H E R D A T A

Non-Radon Individual Assessment

Jun 14, 2006 08:46 pm

Facility: U16B
Address: Area 16
City: Mercury
State: NV Zip: 89023

Source Category: Divine Strake Experiment
Source Type: Area
Emission Year: 2006

Comments: Cap88 run to check potential dose
from Divine Strake

Dataset Name: Divine Strake
Dataset Date: 6/14/2006 7:43:00 PM
Wind File: C:\Program Files\CAP88-PC30\Wndfiles\Divine Stake\7-
10KNTC.WND

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WEATHER
Page 1

HARMONIC AVERAGE WIND SPEEDS (WIND TOWARDS)

Pasquill Stability Class

Dir	A	B	C	D	E	F	G	Wind Freq
N	0.000	0.000	4.373	0.000	0.000	0.000	0.000	1.000
NNW	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NW	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WNW	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
W	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WSW	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SW	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SSW	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
S	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SSE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ESE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ENE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NNE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

ARITHMETIC AVERAGE WIND SPEEDS (WIND TOWARDS)

Pasquill Stability Class

Dir	A	B	C	D	E	F	G
N	0.000	0.000	4.373	0.000	0.000	0.000	0.000
NNW	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NW	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WNW	0.000	0.000	0.000	0.000	0.000	0.000	0.000
W	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WSW	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SW	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SSW	0.000	0.000	0.000	0.000	0.000	0.000	0.000
S	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SSE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ESE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ENE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NNE	0.000	0.000	0.000	0.000	0.000	0.000	0.000

FREQUENCIES OF STABILITY CLASSES (WIND TOWARDS)

Pasquill Stability Class							
Dir	A	B	C	D	E	F	G
N	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000
NNW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WNW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
W	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
WSW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SSW	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SSE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ESE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ENE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NNE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000

ADDITIONAL WEATHER INFORMATION

Average Air Temperature: 30.0 degrees C
 303.16 K
 Precipitation: 1.0 cm/y
 Humidity: 6.0 g/cu m
 Lid Height: 3000 meters
 Surface Roughness Length: 0.010 meters
 Height Of Wind Measurements: 10.0 meters
 Average Wind Speed: 4.373 m/s

Vertical Temperature Gradients:

STABILITY E 0.073 k/m
 STABILITY F 0.109 k/m
 STABILITY G 0.146 k/m

ENCLOSURE 5

Hotspot Version 2.06 General Explosion
Jun 15, 2006 07:05 AM

Source Term : DS UserMix Sourceterm Co max.mix (Mixture Scale
Factor = 1.0000E+00)

Wind Speed (h=10 m) : 4.4 m/s
Distance Coordinates : All distances are on the Plume Centerline
High Explosive : 1.19E+06 Pounds of TNT
Debris Cloud Top : 2510 m

UNMITIGATED BLAST DAMAGE

IABTI safe distance : 9445 m (30987 ft)
Eardrum ruptures and incapacitation (5 psi) : 460 m - 730 m (1511 ft -
2396 ft)
Lung damage and complete incapacitation (10 psi) : 317 m - 485 m (1040 ft -
1590 ft)
Onset of lethality (25 psi) : 205 m - 319 m (672 ft -
1045 ft)

Note: minimum range corresponds to side-on pressure and maximum range
corresponds to reflected overpressure generated using
Sandia National Laboratories BLAST model.

Stability Class : C
Receptor Height : 1.5 m
Inversion Layer Height : None
Sample Time : 10.000 min
Breathing Rate : 3.33E-04 m3/sec

TEDE includes : Inhalation dose + Submersion
Maximum Dose Distance : 0.010 km
MAXIMUM TEDE : 1.44E-06 rem
Inner Contour Dose : 1.0 rem
Middle Contour Dose : 0.500 rem
Outer Contour Dose : 0.100 rem
Exceeds Inner Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer Dose Out To : Not Exceeded

Appendix C

DISTANCE km (hour:min)	T E D E (rem)	TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (uCi/m2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME
4.000	6.7E-07	1.1E-10	3.3E-07	6.4E-13	00:17
8.000	4.8E-07	8.0E-11	2.3E-07	4.3E-13	00:35
12.000	3.9E-07	6.4E-11	1.9E-07	3.4E-13	00:53
16.000	3.4E-07	5.5E-11	1.6E-07	2.8E-13	01:11
20.000	3.0E-07	4.8E-11	1.4E-07	2.4E-13	01:28
24.000	2.7E-07	4.4E-11	1.3E-07	2.2E-13	01:46
28.000	2.5E-07	4.0E-11	1.2E-07	1.9E-13	02:04
32.000	2.3E-07	3.7E-11	1.1E-07	1.8E-13	02:22
36.000	2.1E-07	3.4E-11	9.9E-08	1.6E-13	02:40
40.000	2.0E-07	3.2E-11	9.3E-08	1.5E-13	02:57
44.000	1.9E-07	3.0E-11	8.7E-08	1.4E-13	03:15
48.000	1.8E-07	2.8E-11	8.2E-08	1.3E-13	03:33
52.000	1.7E-07	2.6E-11	7.7E-08	1.2E-13	03:51
56.000	1.6E-07	2.5E-11	7.3E-08	1.2E-13	04:09
60.000	1.5E-07	2.4E-11	6.9E-08	1.1E-13	04:26
64.000	1.4E-07	2.3E-11	6.6E-08	1.1E-13	04:44
68.000	1.4E-07	2.1E-11	6.3E-08	1.0E-13	05:02
72.000	1.3E-07	2.1E-11	6.0E-08	9.6E-14	05:20
76.000	1.3E-07	2.0E-11	5.8E-08	9.2E-14	05:38
80.000	1.2E-07	1.9E-11	5.5E-08	8.8E-14	05:55

Hotspot User Mixture Database

User Mixture Name : DS UserMix Sourceterm Co max.mix

Mixture Scale Factor : 1.0000E+00

Nuclide [01] : Am-241 S 432.2y
Half-life (Years) : 4.3220E+02
Inhalation 50-yr CEDE (Sv/Bq) : 1.6000E-05
Submersion (Sv-m3)/(Bq-sec) : 6.7400E-16
Ground Shine (Sv-m2)/(Bq-sec) : 2.3300E-17
Total Activity Released (Ci) : 5.7E-05
Airborne Fraction : 1.0000E+00
Respirable Fraction : 1.0000E+00
Respirable Deposition Velocity (cm/sec) : 3.0000E-01
Non-resp. Deposition Velocity (cm/sec) : 8.0000E+00

Nuclide [02] : Co-60 S 5.271y
Half-life (Years) : 5.2710E+00
Inhalation 50-yr CEDE (Sv/Bq) : 3.0700E-08
Submersion (Sv-m3)/(Bq-sec) : 1.1900E-13
Ground Shine (Sv-m2)/(Bq-sec) : 2.3000E-15
Total Activity Released (Ci) : 7.35E-5
Airborne Fraction : 1.0000E+00
Respirable Fraction : 1.0000E+00
Respirable Deposition Velocity (cm/sec) : 3.0000E-01
Non-resp. Deposition Velocity (cm/sec) : 8.0000E+00

Nuclide [03] : Cs-137 S 30.0y
Half-life (Years) : 3.0000E+01
Inhalation 50-yr CEDE (Sv/Bq) : 3.9200E-08
Submersion (Sv-m3)/(Bq-sec) : 2.5400E-14
Ground Shine (Sv-m2)/(Bq-sec) : 5.4800E-16
Total Activity Released (Ci) : 2.4E-04
Airborne Fraction : 1.0000E+00
Respirable Fraction : 1.0000E+00
Respirable Deposition Velocity (cm/sec) : 3.0000E-01
Non-resp. Deposition Velocity (cm/sec) : 8.0000E+00

Nuclide [04] : Ba-135m S 28.7h
Half-life (Years) : 3.2763E-03

Appendix C

Inhalation	50-yr CEDE	(Sv/Bq)	: 3.6000E-10
Submersion		(Sv-m3)/(Bq-sec)	: 2.1600E-15
Ground Shine		(Sv-m2)/(Bq-sec)	: 5.3800E-17
Total Activity Released		(Ci)	: 2.4E-04
Airborne Fraction			: 1.0000E+00
Respirable Fraction			: 1.0000E+00
Respirable Deposition Velocity		(cm/sec)	: 3.0000E-01
Non-resp. Deposition Velocity		(cm/sec)	: 8.0000E+00

Nuclide [05] : Pu-238 S 87.74y

Half-life		(Years)	: 8.7740E+01
Inhalation	50-yr CEDE	(Sv/Bq)	: 1.6100E-05
Submersion		(Sv-m3)/(Bq-sec)	: 3.5000E-18
Ground Shine		(Sv-m2)/(Bq-sec)	: 6.2600E-19
Total Activity Released		(Ci)	: 1.1E-04
Airborne Fraction			: 1.0000E+00
Respirable Fraction			: 1.0000E+00
Respirable Deposition Velocity		(cm/sec)	: 3.0000E-01
Non-resp. Deposition Velocity		(cm/sec)	: 8.0000E+00

Nuclide [06] : Pu-239 S 24065y

Half-life		(Years)	: 2.4065E+04
Inhalation	50-yr CEDE	(Sv/Bq)	: 1.6000E-05
Submersion		(Sv-m3)/(Bq-sec)	: 3.4800E-18
Ground Shine		(Sv-m2)/(Bq-sec)	: 2.8400E-19
Total Activity Released		(Ci)	: 2.8E-04
Airborne Fraction			: 1.0000E+00
Respirable Fraction			: 1.0000E+00
Respirable Deposition Velocity		(cm/sec)	: 3.0000E-01
Non-resp. Deposition Velocity		(cm/sec)	: 8.0000E+00

Nuclide [07] : Sr-90 S 29.12y

Half-life		(Years)	: 2.9120E+01
Inhalation	50-yr CEDE	(Sv/Bq)	: 1.5700E-07
Submersion		(Sv-m3)/(Bq-sec)	: 8.9000E-16
Ground Shine		(Sv-m2)/(Bq-sec)	: 1.1200E-16
Total Activity Released		(Ci)	: 3.6E-04
Airborne Fraction			: 1.0000E+00
Respirable Fraction			: 1.0000E+00
Respirable Deposition Velocity		(cm/sec)	: 3.0000E-01
Non-resp. Deposition Velocity		(cm/sec)	: 8.0000E+00

Nuclide [08] : Y-90 S 64.0h
Halflife (Years) : 7.3059E-03
Inhalation 50-yr CEDE (Sv/Bq) : 1.5000E-09
Submersion (Sv-m3)/(Bq-sec) : 7.9200E-16
Ground Shine (Sv-m2)/(Bq-sec) : 1.1000E-16
Total Activity Released (Ci) : 3.6E-04
Airborne Fraction : 1.0000E+00
Respirable Fraction : 1.0000E+00
Respirable Deposition Velocity (cm/sec) : 3.0000E-01
Non-resp. Deposition Velocity (cm/sec) : 8.0000E+00

Nuclide [09] : K-40 S 1.28E9y
Halflife (Years) : 1.2800E+09
Inhalation 50-yr CEDE (Sv/Bq) : 8.4800E-08
Submersion (Sv-m3)/(Bq-sec) : 7.9200E-15
Ground Shine (Sv-m2)/(Bq-sec) : 2.0400E-16
Total Activity Released (Ci) : 3.2E-04
Airborne Fraction : 1.0000E+00
Respirable Fraction : 1.0000E+00
Respirable Deposition Velocity (cm/sec) : 3.0000E-01
Non-resp. Deposition Velocity (cm/sec) : 8.0000E+00

Nuclide [10] : Th-232 S1.405E10y
Halflife (Years) : 1.4050E+10
Inhalation 50-yr CEDE (Sv/Bq) : 2.4800E-05
Submersion (Sv-m3)/(Bq-sec) : 7.2400E-18
Ground Shine (Sv-m2)/(Bq-sec) : 4.5500E-19
Total Activity Released (Ci) : 5.400E-05
Airborne Fraction : 1.0000E+00
Respirable Fraction : 1.0000E+00
Respirable Deposition Velocity (cm/sec) : 3.0000E-01
Non-resp. Deposition Velocity (cm/sec) : 8.0000E+00

Nuclide [11] : Ra-228 S 5.75y
Halflife (Years) : 5.7500E+00
Inhalation 50-yr CEDE (Sv/Bq) : 1.6000E-05
Submersion (Sv-m3)/(Bq-sec) : 0.0000E+00
Ground Shine (Sv-m2)/(Bq-sec) : 0.0000E+00
Total Activity Released (Ci) : 5.4000E-05

Appendix C

Airborne Fraction : 1.0000E+00
Respirable Fraction : 1.0000E+00
Respirable Deposition Velocity (cm/sec) : 3.0000E-01
Non-resp. Deposition Velocity (cm/sec) : 8.0000E+00

Nuclide [12] : Ac-228 S 6.13h
Half-life (Years) : 6.9977E-04
Inhalation 50-yr CEDE (Sv/Bq) : 1.4600E-08
Submersion (Sv-m3)/(Bq-sec) : 4.4900E-14
Ground Shine (Sv-m2)/(Bq-sec) : 9.3900E-16
Total Activity Released (Ci) : 5.4000E-05
Airborne Fraction : 1.0000E+00
Respirable Fraction : 1.0000E+00
Respirable Deposition Velocity (cm/sec) : 3.0000E-01
Non-resp. Deposition Velocity (cm/sec) : 8.0000E+00

Nuclide [13] : Th-228 S 1.9131y
Half-life (Years) : 1.9131E+00
Inhalation 50-yr CEDE (Sv/Bq) : 3.9700E-05
Submersion (Sv-m3)/(Bq-sec) : 8.1000E-17
Ground Shine (Sv-m2)/(Bq-sec) : 2.1300E-18
Total Activity Released (Ci) : 5.4000E-05
Airborne Fraction : 1.0000E+00
Respirable Fraction : 1.0000E+00
Respirable Deposition Velocity (cm/sec) : 3.0000E-01
Non-resp. Deposition Velocity (cm/sec) : 8.0000E+00

Nuclide [14] : Ra-224 S 3.66d
Half-life (Years) : 1.0027E-02
Inhalation 50-yr CEDE (Sv/Bq) : 3.3600E-06
Submersion (Sv-m3)/(Bq-sec) : 4.2900E-16
Ground Shine (Sv-m2)/(Bq-sec) : 9.1500E-18
Total Activity Released (Ci) : 5.4000E-05
Airborne Fraction : 1.0000E+00
Respirable Fraction : 1.0000E+00
Respirable Deposition Velocity (cm/sec) : 3.0000E-01
Non-resp. Deposition Velocity (cm/sec) : 8.0000E+00

Nuclide [15] : Po-216 0.15s
Half-life (Years) : 4.7532E-09

Inhalation	50-yr CEDE	(Sv/Bq)	: 0.0000E+00
Submersion		(Sv-m3)/(Bq-sec)	: 7.7500E-19
Ground Shine		(Sv-m2)/(Bq-sec)	: 1.6100E-20
Total Activity Released		(Ci)	: 5.4000E-05
Airborne Fraction			: 1.0000E+00
Respirable Fraction			: 1.0000E+00
Respirable Deposition Velocity		(cm/sec)	: 3.0000E-01
Non-resp. Deposition Velocity		(cm/sec)	: 8.0000E+00

Nuclide [16] : Pb-212 S 10.64h

Half-life		(Years)	: 1.2146E-03
Inhalation	50-yr CEDE	(Sv/Bq)	: 1.9000E-07
Submersion		(Sv-m3)/(Bq-sec)	: 6.2400E-15
Ground Shine		(Sv-m2)/(Bq-sec)	: 1.3500E-16
Total Activity Released		(Ci)	: 5.4000E-05
Airborne Fraction			: 1.0000E+00
Respirable Fraction			: 1.0000E+00
Respirable Deposition Velocity		(cm/sec)	: 3.0000E-01
Non-resp. Deposition Velocity		(cm/sec)	: 8.0000E+00

Nuclide [17] : Bi-212 S 60.55m

Half-life		(Years)	: 1.1520E-04
Inhalation	50-yr CEDE	(Sv/Bq)	: 3.3200E-08
Submersion		(Sv-m3)/(Bq-sec)	: 8.9500E-15
Ground Shine		(Sv-m2)/(Bq-sec)	: 2.2500E-16
Total Activity Released		(Ci)	: 5.4000E-05
Airborne Fraction			: 1.0000E+00
Respirable Fraction			: 1.0000E+00
Respirable Deposition Velocity		(cm/sec)	: 3.0000E-01
Non-resp. Deposition Velocity		(cm/sec)	: 8.0000E+00

Nuclide [18] : Po-212 0.305u

Half-life		(Years)	: 3.0500E-01
Inhalation	50-yr CEDE	(Sv/Bq)	: 0.0000E+00
Submersion		(Sv-m3)/(Bq-sec)	: 0.0000E+00
Ground Shine		(Sv-m2)/(Bq-sec)	: 0.0000E+00
Total Activity Released		(Ci)	: 3.5000E-05
Airborne Fraction			: 1.0000E+00
Respirable Fraction			: 1.0000E+00
Respirable Deposition Velocity		(cm/sec)	: 3.0000E-01
Non-resp. Deposition Velocity		(cm/sec)	: 8.0000E+00

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Nuclide [19] : Tl-208 3.07m

Halflife	(Years)	:	5.8409E-06
Inhalation	50-yr CEDE (Sv/Bq)	:	0.0000E+00
Submersion	(Sv-m3)/(Bq-sec)	:	1.6900E-13
Ground Shine	(Sv-m2)/(Bq-sec)	:	2.9700E-15
Total Activity Released	(Ci)	:	1.9000E-05
Airborne Fraction		:	1.0000E+00
Respirable Fraction		:	1.0000E+00
Respirable Deposition Velocity	(cm/sec)	:	3.0000E-01
Non-resp. Deposition Velocity	(cm/sec)	:	8.0000E+00

Nuclide [20] : U-235 S 703.8E6y

Halflife	(Years)	:	7.0380E+08
Inhalation	50-yr CEDE (Sv/Bq)	:	8.4700E-06
Submersion	(Sv-m3)/(Bq-sec)	:	6.4600E-15
Ground Shine	(Sv-m2)/(Bq-sec)	:	1.4000E-16
Total Activity Released	(Ci)	:	4.8000E-07
Airborne Fraction		:	1.0000E+00
Respirable Fraction		:	1.0000E+00
Respirable Deposition Velocity	(cm/sec)	:	3.0000E-01
Non-resp. Deposition Velocity	(cm/sec)	:	8.0000E+00

Nuclide [22] : Pa-231 M 3.276E4y

Halflife	(Years)	:	3.2760E+04
Inhalation	50-yr CEDE (Sv/Bq)	:	9.3500E-05
Submersion	(Sv-m3)/(Bq-sec)	:	1.5700E-15
Ground Shine	(Sv-m2)/(Bq-sec)	:	3.7800E-17
Total Activity Released	(Ci)	:	4.8000E-07
Airborne Fraction		:	1.0000E+00
Respirable Fraction		:	1.0000E+00
Respirable Deposition Velocity	(cm/sec)	:	3.0000E-01
Non-resp. Deposition Velocity	(cm/sec)	:	8.0000E+00

Nuclide [23] : Ac-227 S 21.773y

Halflife	(Years)	:	2.1773E+01
Inhalation	50-yr CEDE (Sv/Bq)	:	5.5300E-05
Submersion	(Sv-m3)/(Bq-sec)	:	5.1200E-18
Ground Shine	(Sv-m2)/(Bq-sec)	:	1.4100E-19
Total Activity Released	(Ci)	:	4.8000E-07

Airborne Fraction	:	1.0000E+00
Respirable Fraction	:	1.0000E+00
Respirable Deposition Velocity (cm/sec)	:	3.0000E-01
Non-resp. Deposition Velocity (cm/sec)	:	8.0000E+00

Nuclide [24] : Th-227 S 18.718d		
Half-life	(Years)	: 5.1282E-02
Inhalation	50-yr CEDE (Sv/Bq)	: 1.0400E-05
Submersion	(Sv-m3)/(Bq-sec)	: 4.4300E-15
Ground Shine	(Sv-m2)/(Bq-sec)	: 9.8100E-17
Total Activity Released	(Ci)	: 4.8000E-07
Airborne Fraction	:	1.0000E+00
Respirable Fraction	:	1.0000E+00
Respirable Deposition Velocity (cm/sec)	:	3.0000E-01
Non-resp. Deposition Velocity (cm/sec)	:	8.0000E+00

Nuclide [25] : Fr-223 S 21.8m		
Half-life	(Years)	: 4.1476E-05
Inhalation	50-yr CEDE (Sv/Bq)	: 1.2100E-08
Submersion	(Sv-m3)/(Bq-sec)	: 2.2000E-15
Ground Shine	(Sv-m2)/(Bq-sec)	: 7.7600E-17
Total Activity Released	(Ci)	: 6.7000E-09
Airborne Fraction	:	1.0000E+00
Respirable Fraction	:	1.0000E+00
Respirable Deposition Velocity (cm/sec)	:	3.0000E-01
Non-resp. Deposition Velocity (cm/sec)	:	8.0000E+00

Nuclide [26] : Ra-223 S 11.434d		
Half-life	(Years)	: 3.1326E-02
Inhalation	50-yr CEDE (Sv/Bq)	: 8.6800E-06
Submersion	(Sv-m3)/(Bq-sec)	: 5.4700E-15
Ground Shine	(Sv-m2)/(Bq-sec)	: 1.2100E-16
Total Activity Released	(Ci)	: 4.8000E-07
Airborne Fraction	:	1.0000E+00
Respirable Fraction	:	1.0000E+00
Respirable Deposition Velocity (cm/sec)	:	3.0000E-01
Non-resp. Deposition Velocity (cm/sec)	:	8.0000E+00

Nuclide [27] : Rn-219 3.96s		
Half-life	(Years)	: 1.2548E-07

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Inhalation	50-yr CEDE	(Sv/Bq)	: 0.0000E+00
Submersion		(Sv-m3)/(Bq-sec)	: 2.4600E-15
Ground Shine		(Sv-m2)/(Bq-sec)	: 5.2800E-17
Total Activity Released		(Ci)	: 4.8000E-07
Airborne Fraction			: 1.0000E+00
Respirable Fraction			: 1.0000E+00
Respirable Deposition Velocity		(cm/sec)	: 0.0000E+00
Non-resp. Deposition Velocity		(cm/sec)	: 0.0000E+00

Nuclide [28] : Po-215 0.001780s

Half-life		(Years)	: 5.6405E-11
Inhalation	50-yr CEDE	(Sv/Bq)	: 0.0000E+00
Submersion		(Sv-m3)/(Bq-sec)	: 7.7900E-18
Ground Shine		(Sv-m2)/(Bq-sec)	: 1.6800E-19
Total Activity Released		(Ci)	: 4.8000E-07
Airborne Fraction			: 1.0000E+00
Respirable Fraction			: 1.0000E+00
Respirable Deposition Velocity		(cm/sec)	: 3.0000E-01
Non-resp. Deposition Velocity		(cm/sec)	: 8.0000E+00

Nuclide [29] : Pb-211 S 36.1m

Half-life		(Years)	: 6.8683E-05
Inhalation	50-yr CEDE	(Sv/Bq)	: 1.2000E-08
Submersion		(Sv-m3)/(Bq-sec)	: 2.5900E-15
Ground Shine		(Sv-m2)/(Bq-sec)	: 9.5000E-17
Total Activity Released		(Ci)	: 4.8000E-07
Airborne Fraction			: 1.0000E+00
Respirable Fraction			: 1.0000E+00
Respirable Deposition Velocity		(cm/sec)	: 3.0000E-01
Non-resp. Deposition Velocity		(cm/sec)	: 8.0000E+00

Nuclide [30] : Bi-211 2.14m

Half-life		(Years)	: 4.0715E-06
Inhalation	50-yr CEDE	(Sv/Bq)	: 0.0000E+00
Submersion		(Sv-m3)/(Bq-sec)	: 2.0400E-15
Ground Shine		(Sv-m2)/(Bq-sec)	: 4.4000E-17
Total Activity Released		(Ci)	: 4.8000E-07
Airborne Fraction			: 1.0000E+00
Respirable Fraction			: 1.0000E+00
Respirable Deposition Velocity		(cm/sec)	: 3.0000E-01
Non-resp. Deposition Velocity		(cm/sec)	: 8.0000E+00

Nuclide [31] : Tl-207 4.77m

Halflife	(Years)	:	9.0753E-06
Inhalation	50-yr CEDE (Sv/Bq)	:	0.0000E+00
Submersion	(Sv-m3)/(Bq-sec)	:	4.5300E-16
Ground Shine	(Sv-m2)/(Bq-sec)	:	5.5600E-17
Total Activity Released	(Ci)	:	4.8000E-07
Airborne Fraction		:	1.0000E+00
Respirable Fraction		:	1.0000E+00
Respirable Deposition Velocity	(cm/sec)	:	3.0000E-01
Non-resp. Deposition Velocity	(cm/sec)	:	8.0000E+00

Nuclide [32] : Po-211 0.516s

Halflife	(Years)	:	1.6351E-08
Inhalation	50-yr CEDE (Sv/Bq)	:	0.0000E+00
Submersion	(Sv-m3)/(Bq-sec)	:	3.5600E-16
Ground Shine	(Sv-m2)/(Bq-sec)	:	7.4200E-18
Total Activity Released	(Ci)	:	1.3000E-09
Airborne Fraction		:	1.0000E+00
Respirable Fraction		:	1.0000E+00
Respirable Deposition Velocity	(cm/sec)	:	3.0000E-01
Non-resp. Deposition Velocity	(cm/sec)	:	8.0000E+00

Nuclide [33] : U-238 S 4.468E9y

Halflife	(Years)	:	4.4680E+09
Inhalation	50-yr CEDE (Sv/Bq)	:	8.0400E-06
Submersion	(Sv-m3)/(Bq-sec)	:	2.5000E-18
Ground Shine	(Sv-m2)/(Bq-sec)	:	4.2300E-19
Total Activity Released	(Ci)	:	6.1000E-05
Airborne Fraction		:	1.0000E+00
Respirable Fraction		:	1.0000E+00
Respirable Deposition Velocity	(cm/sec)	:	3.0000E-01
Non-resp. Deposition Velocity	(cm/sec)	:	8.0000E+00

Nuclide [34] : Th-234 S 24.10d

Halflife	(Years)	:	6.6027E-02
Inhalation	50-yr CEDE (Sv/Bq)	:	7.6900E-09
Submersion	(Sv-m3)/(Bq-sec)	:	2.9400E-16
Ground Shine	(Sv-m2)/(Bq-sec)	:	7.4900E-18
Total Activity Released	(Ci)	:	6.1000E-05

Appendix C

Airborne Fraction : 1.0000E+00
Respirable Fraction : 1.0000E+00
Respirable Deposition Velocity (cm/sec) : 3.0000E-01
Non-resp. Deposition Velocity (cm/sec) : 8.0000E+00

Nuclide [35] : Pa-234m 1.17m
Halflife (Years) : 2.2260E-06
Inhalation 50-yr CEDE (Sv/Bq) : 0.0000E+00
Submersion (Sv-m3)/(Bq-sec) : 1.2100E-15
Ground Shine (Sv-m2)/(Bq-sec) : 1.0800E-16
Total Activity Released (Ci) : 6.1000E-05
Airborne Fraction : 1.0000E+00
Respirable Fraction : 1.0000E+00
Respirable Deposition Velocity (cm/sec) : 3.0000E-01
Non-resp. Deposition Velocity (cm/sec) : 8.0000E+00

Nuclide [36] : Pa-234 S 6.70h
Halflife (Years) : 7.6484E-04
Inhalation 50-yr CEDE (Sv/Bq) : 4.1600E-10
Submersion (Sv-m3)/(Bq-sec) : 8.7200E-14
Ground Shine (Sv-m2)/(Bq-sec) : 1.8000E-15
Total Activity Released (Ci) : 7.9000E-08
Airborne Fraction : 1.0000E+00
Respirable Fraction : 1.0000E+00
Respirable Deposition Velocity (cm/sec) : 3.0000E-01
Non-resp. Deposition Velocity (cm/sec) : 8.0000E+00

Nuclide [37] : U-234 S 2.445E5y
Halflife (Years) : 2.4450E+05
Inhalation 50-yr CEDE (Sv/Bq) : 9.4000E-06
Submersion (Sv-m3)/(Bq-sec) : 6.1100E-18
Ground Shine (Sv-m2)/(Bq-sec) : 5.8600E-19
Total Activity Released (Ci) : 6.1000E-05
Airborne Fraction : 1.0000E+00
Respirable Fraction : 1.0000E+00
Respirable Deposition Velocity (cm/sec) : 3.0000E-01
Non-resp. Deposition Velocity (cm/sec) : 8.0000E+00

Nuclide [38] : Th-230 S 7.7E4y
Halflife (Years) : 7.7000E+04

Inhalation	50-yr CEDE	(Sv/Bq)	: 1.4000E-05
Submersion		(Sv-m3)/(Bq-sec)	: 1.4800E-17
Ground Shine		(Sv-m2)/(Bq-sec)	: 6.3700E-19
Total Activity Released		(Ci)	: 6.1000E-05
Airborne Fraction			: 1.0000E+00
Respirable Fraction			: 1.0000E+00
Respirable Deposition Velocity		(cm/sec)	: 3.0000E-01
Non-resp. Deposition Velocity		(cm/sec)	: 8.0000E+00

Nuclide [39] : Ra-226 S 1600y			
Half-life		(Years)	: 1.6000E+03
Inhalation	50-yr CEDE	(Sv/Bq)	: 9.5100E-06
Submersion		(Sv-m3)/(Bq-sec)	: 2.8400E-16
Ground Shine		(Sv-m2)/(Bq-sec)	: 6.1100E-18
Total Activity Released		(Ci)	: 6.1000E-05
Airborne Fraction			: 1.0000E+00
Respirable Fraction			: 1.0000E+00
Respirable Deposition Velocity		(cm/sec)	: 3.0000E-01
Non-resp. Deposition Velocity		(cm/sec)	: 8.0000E+00

Nuclide [40] : Rn-222 3.8235d			
Half-life		(Years)	: 1.0475E-02
Inhalation	50-yr CEDE	(Sv/Bq)	: 0.0000E+00
Submersion		(Sv-m3)/(Bq-sec)	: 1.7700E-17
Ground Shine		(Sv-m2)/(Bq-sec)	: 3.8200E-19
Total Activity Released		(Ci)	: 6.1000E-05
Airborne Fraction			: 1.0000E+00
Respirable Fraction			: 1.0000E+00
Respirable Deposition Velocity		(cm/sec)	: 0.0000E+00
Non-resp. Deposition Velocity		(cm/sec)	: 0.0000E+00

Nuclide [41] : Po-218 3.05m			
Half-life		(Years)	: 5.8029E-06
Inhalation	50-yr CEDE	(Sv/Bq)	: 0.0000E+00
Submersion		(Sv-m3)/(Bq-sec)	: 4.2100E-19
Ground Shine		(Sv-m2)/(Bq-sec)	: 8.6600E-21
Total Activity Released		(Ci)	: 6.1000E-05
Airborne Fraction			: 1.0000E+00
Respirable Fraction			: 1.0000E+00
Respirable Deposition Velocity		(cm/sec)	: 3.0000E-01
Non-resp. Deposition Velocity		(cm/sec)	: 8.0000E+00

Appendix C

Nuclide [42] : Pb-214 S 26.8m
Halflife (Years) : 5.0989E-05
Inhalation 50-yr CEDE (Sv/Bq) : 1.4700E-08
Submersion (Sv-m3)/(Bq-sec) : 1.0900E-14
Ground Shine (Sv-m2)/(Bq-sec) : 2.4000E-16
Total Activity Released (Ci) : 6.1000E-05
Airborne Fraction : 1.0000E+00
Respirable Fraction : 1.0000E+00
Respirable Deposition Velocity (cm/sec) : 3.0000E-01
Non-resp. Deposition Velocity (cm/sec) : 8.0000E+00

Nuclide [43] : At-218 2s
Halflife (Years) : 6.3376E-08
Inhalation 50-yr CEDE (Sv/Bq) : 0.0000E+00
Submersion (Sv-m3)/(Bq-sec) : 9.7100E-17
Ground Shine (Sv-m2)/(Bq-sec) : 3.6400E-18
Total Activity Released (Ci) : 1.2000E-08
Airborne Fraction : 1.0000E+00
Respirable Fraction : 1.0000E+00
Respirable Deposition Velocity (cm/sec) : 3.0000E-01
Non-resp. Deposition Velocity (cm/sec) : 8.0000E+00

Nuclide [44] : Bi-214 S 19.9m
Halflife (Years) : 3.7861E-05
Inhalation 50-yr CEDE (Sv/Bq) : 1.5400E-08
Submersion (Sv-m3)/(Bq-sec) : 7.2500E-14
Ground Shine (Sv-m2)/(Bq-sec) : 1.4400E-15
Total Activity Released (Ci) : 6.1000E-05
Airborne Fraction : 1.0000E+00
Respirable Fraction : 1.0000E+00
Respirable Deposition Velocity (cm/sec) : 3.0000E-01
Non-resp. Deposition Velocity (cm/sec) : 8.0000E+00

Nuclide [44] : Rn-220 55.6s
Halflife (Years) : 1.7619E-06
Inhalation 50-yr CEDE (Sv/Bq) : 0.0000E+00
Submersion (Sv-m3)/(Bq-sec) : 1.7200E-17
Ground Shine (Sv-m2)/(Bq-sec) : 3.6900E-19
Total Activity Released (Ci) : 5.4000E-05

Airborne Fraction	:	1.0000E+00
Respirable Fraction	:	1.0000E+00
Respirable Deposition Velocity (cm/sec)	:	0.0000E+00
Non-resp. Deposition Velocity (cm/sec)	:	0.0000E+00

Nuclide [45] : Po-214	164.3u		
Half-life	(Years)	:	1.6430E+02
Inhalation	50-yr CEDE (Sv/Bq)	:	0.0000E+00
Submersion	(Sv-m3)/(Bq-sec)	:	3.8100E-18
Ground Shine	(Sv-m2)/(Bq-sec)	:	7.9300E-20
Total Activity Released	(Ci)	:	6.1000E-05
Airborne Fraction		:	1.0000E+00
Respirable Fraction		:	1.0000E+00
Respirable Deposition Velocity (cm/sec)		:	3.0000E-01
Non-resp. Deposition Velocity (cm/sec)		:	8.0000E+00

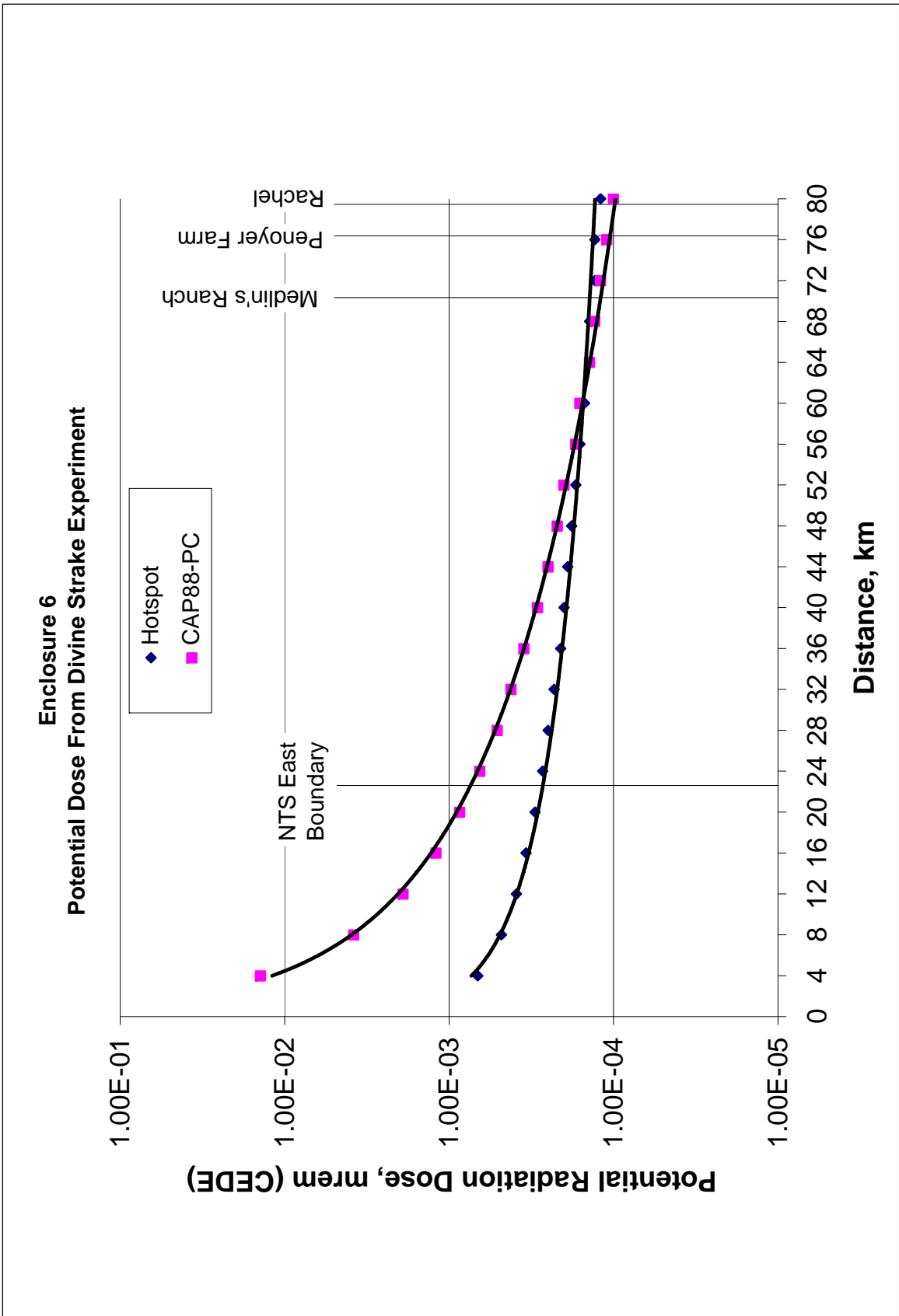
Nuclide [46] : Pb-210	S	22.3y	
Half-life	(Years)	:	2.2300E+01
Inhalation	50-yr CEDE (Sv/Bq)	:	5.6100E-06
Submersion	(Sv-m3)/(Bq-sec)	:	4.4800E-17
Ground Shine	(Sv-m2)/(Bq-sec)	:	2.1300E-18
Total Activity Released	(Ci)	:	6.1000E-05
Airborne Fraction		:	1.0000E+00
Respirable Fraction		:	1.0000E+00
Respirable Deposition Velocity (cm/sec)		:	3.0000E-01
Non-resp. Deposition Velocity (cm/sec)		:	8.0000E+00

Nuclide [47] : Bi-210	S	5.012d	
Half-life	(Years)	:	1.3732E-02
Inhalation	50-yr CEDE (Sv/Bq)	:	1.3300E-07
Submersion	(Sv-m3)/(Bq-sec)	:	2.5800E-16
Ground Shine	(Sv-m2)/(Bq-sec)	:	3.5100E-17
Total Activity Released	(Ci)	:	6.1000E-05
Airborne Fraction		:	1.0000E+00
Respirable Fraction		:	1.0000E+00
Respirable Deposition Velocity (cm/sec)		:	3.0000E-01
Non-resp. Deposition Velocity (cm/sec)		:	8.0000E+00

Nuclide [48] : Po-210	S	138.38d	
Half-life	(Years)	:	3.7912E-01

Appendix C

Inhalation	50-yr CEDE	(Sv/Bq)	:	4.2700E-06
Submersion		(Sv-m ³)/(Bq-sec)	:	3.8900E-19
Ground Shine		(Sv-m ²)/(Bq-sec)	:	8.0900E-21
Total Activity Released		(Ci)	:	6.1000E-05
Airborne Fraction			:	1.0000E+00
Respirable Fraction			:	1.0000E+00
Respirable Deposition Velocity		(cm/sec)	:	3.0000E-01
Non-resp. Deposition Velocity		(cm/sec)	:	8.0000E+00



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Appendix D

Output from CAP88-PC Version 3.0 Modtest Sample Case Run October 2006

Prior to modeling potential dose from the Divine Strake experiment the Modtest sample case, described in the CAP88-PC Version 3.0 Users Guide, was run on the same computer and software installation as was used for dose estimations from the Divine Strake experiment. Results of this test were identical to those from the published example (Shroff, 2006). The *Synopsis* and *Dose and Risk Equivalent Summary* Reports from our run of Modtest are provided in this Appendix for comparison with those given in Appendix G of the CAP88-PC Version 3.0 Users Guide (Shroff, 2006).

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Version 3.0

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Population Assessment
Oct 12, 2006 09:29 am

Facility: CAP88-PC Version 3
Address: 1111 Simulation Dr
City: Portsmouth
State: OH Zip: 45111

Source Category: Stack
Source Type: Stack
Emission Year: 2006

Comments: Modtest problem
for Version 3 User Manual

Effective Dose Equivalent
(mrem/year)

5.19E+02

At This Location: 805 Meters East Northeast

Dataset Name: ModelTest Oct16
Dataset Date: 10/12/2006 8:48:00 AM
Wind File: C:\Program Files\CAP88-PC30\WindLib\PORTS30.
Population File: C:\Program Files\CAP88-PC30\Poplib\PORTS.POP

Oct 12, 2006 09:29 am

SYNOPSIS

Page 1

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 805 Meters East Northeast
 Lifetime Fatal Cancer Risk: 4.13E-04

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)	Collective Population (person-rem/y)
Adrenals	1.70E+01	2.99E+01
B Surfac	1.82E+01	3.21E+01
Breasts	8.43E+01	1.47E+02
St Wall	1.75E+01	3.08E+01
ULI Wall	2.28E+01	4.02E+01
Kidneys	1.56E+01	2.76E+01
Lungs	1.82E+01	3.22E+01
Ovaries	1.71E+01	3.03E+01
R Marrow	1.79E+01	3.19E+01
Spleen	1.85E+01	3.34E+01
Thymus	3.19E+01	5.54E+01
Uterus	2.24E+01	3.93E+01
Bld Wall	2.03E+02	2.57E+02
Brain	2.18E+01	3.85E+01
Esophagu	1.71E+01	3.02E+01
SI Wall	1.65E+01	2.92E+01
LLI Wall	2.17E+01	3.82E+01
Liver	7.69E+02	1.36E+03
Muscle	1.83E+01	3.24E+01
Pancreas	2.26E+01	3.99E+01
Skin	1.77E+01	3.12E+01
Testes	1.97E+01	3.47E+01
Thyroid	1.72E+01	3.03E+01
EFFEC	5.19E+02	6.68E+02

FREQUENCY DISTRIBUTION OF LIFETIME FATAL CANCER RISKS

Risk Range	# of People	# of People	Deaths/Year	Deaths/Year
	# of People	in This Risk	in This	in This Risk
	Range or Higher	Range or Higher	Range or Higher	Range or Higher
1.0E+00 TO 1.0E-01	0	0	0.00E+00	0.00E+00
1.0E-01 TO 1.0E-02	0	0	0.00E+00	0.00E+00
1.0E-02 TO 1.0E-03	0	0	0.00E+00	0.00E+00
1.0E-03 TO 1.0E-04	194	194	6.08E-04	6.08E-04
1.0E-04 TO 1.0E-05	4566	4760	1.31E-03	1.92E-03
1.0E-05 TO 1.0E-06	121146	125906	3.02E-03	4.94E-03
LESS THAN 1.0E-06	536315	662221	1.73E-03	6.67E-03

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SYNOPSIS
Page 2

RADIONUCLIDE EMISSIONS DURING THE YEAR 2006

Nuclide	Type	Size	Source	
			#1 Ci/y	TOTAL Ci/y
U-238	M	1	1.0E+01	1.0E+01
U-235	M	1	1.0E+01	1.0E+01
U-234	M	1	8.0E+00	8.0E+00

SITE INFORMATION

Temperature: 10 degrees C
Precipitation: 100 cm/y
Humidity: 8 g/cu m
Mixing Height: 1000 m

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SYNOPSIS
Page 3

SOURCE INFORMATION

Source Number: 1

Stack Height (m): 10.00
Diameter (m): 1.00

Plume Rise
Buoyant (cal/s): 1.00
(Heat Release Rate)

AGRICULTURAL DATA

	Vegetable	Milk	Meat
	_____	_____	_____
Fraction Home Produced:	0.700	0.400	0.440
Fraction From Assessment Area:	0.300	0.600	0.560
Fraction Imported:	0.000	0.000	0.000
Beef Cattle Density:	2.03E-01		
Milk Cattle Density:	4.56E-02		
Land Fraction Cultivated for Vegetable Crops:	1.70E-02		

POPULATION DATA

Direction	Distance (m)						
	805	2415	4025	5635	7245	12075	24150
N	0	0	19	443	803	3785	0
NNW	0	9	14	10	34	1069	3248
NW	0	121	0	371	141	1106	2284
WNW	0	0	0	0	33	922	1600
W	30	0	40	57	46	876	1348
WSW	57	6	9	16	20	569	1674
SW	46	7	57	224	20	707	1375
SSW	38	0	173	40	71	1631	3183
S	7	18	207	144	36	3518	30593
SSE	0	104	18	35	170	1656	13613
SE	7	39	10	3	75	986	4587
ESE	2	12	5	57	63	878	1980
E	6	54	40	2	96	1102	5808
ENE	1	65	37	93	95	1023	2435
NE	0	12	20	63	225	359	2329
NNE	0	10	82	79	567	2780	2266

Direction	Distance (m)		
	40250	56350	72200
N	42304	7518	26978
NNW	4628	4028	21176
NW	4111	12150	7605
WNW	6021	13838	9880
W	5591	7376	18285
WSW	2464	11058	17205
SW	1923	2702	5657
SSW	3732	6222	4633
S	4489	3037	14068
SSE	14145	43111	76266
SE	4108	4698	14064
ESE	6106	5645	25178
E	7400	4997	8015
ENE	11823	5583	9245
NE	2653	3232	16780
NNE	3879	7594	12216

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Version 3.0

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Population Assessment

Oct 12, 2006 09:29 am

Facility: CAP88-PC Version 3
Address: 1111 Simulation Dr
City: Portsmouth
State: OH Zip: 45111

Source Category: Stack
Source Type: Stack
Emission Year: 2006

Comments: Modtest problem
for Version 3 User Manual

Dataset Name: ModelTest Oct16
Dataset Date: 10/12/2006 8:48:00 AM
Wind File: C:\Program Files\CAP88-PC30\WindLib\PORTS30.WND
Population File: C:\Program Files\CAP88-PC30\Poplib\PORTS.POP

Oct 12, 2006 09:29 am

SUMMARY
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)	Collective Population (person-rem/y)
Adrenals	1.70E+01	2.99E+01
B Surfac	1.82E+01	3.21E+01
Breasts	8.43E+01	1.47E+02
St Wall	1.75E+01	3.08E+01
ULI Wall	2.28E+01	4.02E+01
Kidneys	1.56E+01	2.76E+01
Lungs	1.82E+01	3.22E+01
Ovaries	1.71E+01	3.03E+01
R Marrow	1.79E+01	3.19E+01
Spleen	1.85E+01	3.34E+01
Thymus	3.19E+01	5.54E+01
Uterus	2.24E+01	3.93E+01
Bld Wall	2.03E+02	2.57E+02
Brain	2.18E+01	3.85E+01
Esophagu	1.71E+01	3.02E+01
SI Wall	1.65E+01	2.92E+01
LLI Wall	2.17E+01	3.82E+01
Liver	7.69E+02	1.36E+03
Muscle	1.83E+01	3.24E+01
Pancreas	2.26E+01	3.99E+01
Skin	1.77E+01	3.12E+01
Testes	1.97E+01	3.47E+01
Thyroid	1.72E+01	3.03E+01
EFFEC	5.19E+02	6.68E+02

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)	Collective Population (person-rem/y)
INGESTION	1.74E+01	4.73E+01
INHALATION	4.75E+02	5.75E+02
AIR IMMERSION	1.39E-03	1.68E-03
GROUND SURFACE	2.58E+01	4.58E+01
INTERNAL	4.93E+02	6.23E+02
EXTERNAL	2.58E+01	4.58E+01
TOTAL	5.19E+02	6.68E+02

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SUMMARY
Page 2

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclides	Selected Individual (mrem/y)	Collective Population (person-rem/y)
U-238	1.62E+02	2.04E+02
Th-234	7.34E-01	1.42E+00
Pa-234m	8.45E+00	1.50E+01
Pa-234	4.64E-01	8.21E-01
U-234	1.57E+02	1.98E+02
Th-230	3.99E-05	1.03E-04
Ra-226	7.76E-27	2.13E-26
Rn-222	0.00E+00	0.00E+00
Po-218	7.96E-32	1.41E-31
Pb-214	2.21E-27	3.91E-27
Bi-214	1.33E-26	2.35E-26
Po-214	7.28E-31	1.29E-30
Pb-210	2.85E-27	7.67E-27
Bi-210	1.10E-28	1.98E-28
Po-210	9.35E-28	2.73E-27
At-218	0.00E+00	0.00E+00
U-235	1.89E+02	2.46E+02
Th-231	1.62E+00	2.86E+00
Pa-231	3.55E-04	9.03E-04
Ac-227	6.35E-07	1.64E-06
Th-227	1.08E-07	1.94E-07
Ra-223	1.65E-07	3.55E-07
Rn-219	0.00E+00	0.00E+00
Po-215	1.26E-10	2.22E-10
Pb-211	7.09E-08	1.26E-07
Bi-211	3.29E-08	5.82E-08
Tl-207	4.14E-08	7.34E-08
Po-211	4.55E-29	8.06E-29
Fr-223	2.62E-27	4.64E-27
TOTAL	5.19E+02	6.68E+02

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk (Deaths/y)
Esophagu	3.73E-07	8.48E-06
Stomach	1.21E-06	2.81E-05
Colon	5.18E-06	1.45E-04
Liver	1.69E-06	3.84E-05
LUNG	3.93E-04	6.18E-03
Bone	9.52E-07	2.16E-05
Skin	7.81E-07	1.79E-05
Breast	1.31E-06	3.01E-05
Ovary	4.71E-07	1.07E-05
Bladder	9.05E-07	2.07E-05
Kidneys	1.73E-06	3.93E-05
Thyroid	9.86E-08	2.26E-06
Leukemia	1.32E-06	3.00E-05
Residual	4.30E-06	9.89E-05
Total	4.13E-04	6.67E-03

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk (Deaths/y)
INGESTION	6.09E-06	2.14E-04
INHALATION	3.96E-04	6.21E-03
AIR IMMERSION	7.38E-10	1.16E-08
GROUND SURFACE	1.06E-05	2.44E-04
INTERNAL	4.02E-04	6.42E-03
EXTERNAL	1.06E-05	2.44E-04
TOTAL	4.13E-04	6.67E-03

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NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk	Total Collective Population Fatal Cancer Risk (Deaths/y)
U-238	1.32E-04	2.10E-03
Th-234	5.20E-07	1.42E-05
Pa-234m	1.35E-06	3.10E-05
Pa-234	2.53E-07	5.80E-06
U-234	1.28E-04	2.04E-03
Th-230	4.10E-12	1.37E-10
Ra-226	2.66E-33	9.48E-32
Rn-222	0.00E+00	0.00E+00
Po-218	4.36E-38	1.00E-36
Pb-214	1.18E-33	2.70E-32
Bi-214	7.04E-33	1.62E-31
Po-214	4.00E-37	9.17E-36
Pb-210	9.45E-34	3.30E-32
Bi-210	1.58E-35	4.07E-34
Po-210	3.58E-34	1.35E-32
At-218	0.00E+00	0.00E+00
U-235	1.50E-04	2.45E-03
Th-231	7.30E-07	1.67E-05
Pa-231	3.95E-11	1.22E-09
Ac-227	1.05E-13	3.52E-12
Th-227	6.09E-14	1.45E-12
Ra-223	8.93E-14	2.49E-12
Rn-219	0.00E+00	0.00E+00
Po-215	6.88E-17	1.58E-15
Pb-211	2.35E-14	5.40E-13
Bi-211	1.80E-14	4.13E-13
Tl-207	5.29E-15	1.21E-13
Po-211	2.49E-35	5.72E-34
Fr-223	9.93E-34	2.28E-32
TOTAL	4.13E-04	6.67E-03

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

Distance (m)

Direction	805	2415	4025	5635	7245	12075	24150
N	0.0E+00	0.0E+00	5.5E+01	3.3E+01	2.2E+01	9.8E+00	0.0E+00
NNW	0.0E+00	8.3E+01	3.6E+01	2.2E+01	1.4E+01	6.2E+00	1.9E+00
NW	0.0E+00	7.1E+01	0.0E+00	1.8E+01	1.2E+01	5.2E+00	1.5E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E+01	4.7E+00	1.4E+00
W	2.8E+02	0.0E+00	2.3E+01	1.3E+01	8.7E+00	3.8E+00	1.1E+00
WSW	2.5E+02	4.7E+01	2.1E+01	1.2E+01	8.0E+00	3.6E+00	1.1E+00
SW	3.0E+02	5.6E+01	2.5E+01	1.5E+01	9.6E+00	4.3E+00	1.4E+00
SSW	4.0E+02	0.0E+00	3.3E+01	2.0E+01	1.3E+01	5.9E+00	1.9E+00
S	3.2E+02	5.9E+01	2.6E+01	1.6E+01	1.0E+01	4.7E+00	1.5E+00
SSE	0.0E+00	4.5E+01	2.0E+01	1.2E+01	7.9E+00	3.6E+00	1.2E+00
SE	2.6E+02	4.7E+01	2.1E+01	1.2E+01	8.3E+00	3.8E+00	1.2E+00
ESE	2.8E+02	5.1E+01	2.3E+01	1.3E+01	8.8E+00	4.0E+00	1.2E+00
E	3.6E+02	6.7E+01	3.0E+01	1.8E+01	1.1E+01	5.1E+00	1.5E+00
ENE	5.2E+02	9.6E+01	4.2E+01	2.5E+01	1.6E+01	7.3E+00	2.2E+00
NE	0.0E+00	1.2E+02	5.3E+01	3.1E+01	2.0E+01	9.1E+00	2.8E+00
NNE	0.0E+00	1.2E+02	5.5E+01	3.3E+01	2.1E+01	9.6E+00	2.9E+00

Distance (m)

Direction	40250	56350	72200
N	1.3E+00	6.6E-01	3.3E-01
NNW	7.6E-01	3.6E-01	1.7E-01
NW	6.1E-01	2.9E-01	1.3E-01
WNW	5.6E-01	2.7E-01	1.3E-01
W	4.7E-01	2.2E-01	1.1E-01
WSW	4.5E-01	2.2E-01	1.1E-01
SW	5.8E-01	2.9E-01	1.5E-01
SSW	8.2E-01	4.2E-01	2.2E-01
S	6.4E-01	3.3E-01	1.8E-01
SSE	5.0E-01	2.6E-01	1.4E-01
SE	5.2E-01	2.7E-01	1.5E-01
ESE	5.2E-01	2.7E-01	1.4E-01
E	6.5E-01	3.2E-01	1.6E-01
ENE	9.2E-01	4.5E-01	2.2E-01
NE	1.2E+00	5.6E-01	2.8E-01
NNE	1.2E+00	5.9E-01	2.9E-01

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COLLECTIVE EFFECTIVE DOSE EQUIVALENT (person rem/y)
(All Radionuclides and Pathways)

Distance (m)

Direction	805	2415	4025	5635	7245	12075	24150
N	0.0E+00	0.0E+00	1.0E+00	1.4E+01	1.7E+01	3.7E+01	0.0E+00
NNW	0.0E+00	7.5E-01	5.1E-01	2.2E-01	4.8E-01	6.7E+00	6.0E+00
NW	0.0E+00	8.6E+00	0.0E+00	6.8E+00	1.7E+00	5.8E+00	3.4E+00
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.5E-01	4.4E+00	2.2E+00
W	8.3E+00	0.0E+00	9.0E-01	7.6E-01	4.0E-01	3.4E+00	1.5E+00
WSW	1.4E+01	2.8E-01	1.9E-01	2.0E-01	1.6E-01	2.0E+00	1.8E+00
SW	1.4E+01	3.9E-01	1.4E+00	3.3E+00	1.9E-01	3.1E+00	1.9E+00
SSW	1.5E+01	0.0E+00	5.7E+00	7.8E-01	9.2E-01	9.6E+00	6.0E+00
S	2.3E+00	1.1E+00	5.4E+00	2.3E+00	3.7E-01	1.7E+01	4.5E+01
SSE	0.0E+00	4.7E+00	3.6E-01	4.2E-01	1.3E+00	6.0E+00	1.6E+01
SE	1.8E+00	1.8E+00	2.1E-01	3.7E-02	6.2E-01	3.7E+00	5.5E+00
ESE	5.6E-01	6.2E-01	1.1E-01	7.7E-01	5.6E-01	3.5E+00	2.4E+00
E	2.2E+00	3.6E+00	1.2E+00	3.5E-02	1.1E+00	5.6E+00	9.0E+00
ENE	5.2E-01	6.2E+00	1.6E+00	2.3E+00	1.6E+00	7.5E+00	5.4E+00
NE	0.0E+00	1.4E+00	1.1E+00	2.0E+00	4.6E+00	3.3E+00	6.5E+00
NNE	0.0E+00	1.2E+00	4.5E+00	2.6E+00	1.2E+01	2.7E+01	6.6E+00

Distance (m)

Direction	40250	56350	72200
N	5.6E+01	5.0E+00	9.0E+00
NNW	3.5E+00	1.5E+00	3.6E+00
NW	2.5E+00	3.5E+00	1.0E+00
WNW	3.4E+00	3.7E+00	1.2E+00
W	2.6E+00	1.7E+00	2.0E+00
WSW	1.1E+00	2.5E+00	2.0E+00
SW	1.1E+00	7.9E-01	8.6E-01
SSW	3.1E+00	2.6E+00	1.0E+00
S	2.9E+00	1.0E+00	2.5E+00
SSE	7.1E+00	1.1E+01	1.1E+01
SE	2.1E+00	1.3E+00	2.1E+00
ESE	3.2E+00	1.5E+00	3.5E+00
E	4.8E+00	1.6E+00	1.3E+00
ENE	1.1E+01	2.5E+00	2.1E+00
NE	3.1E+00	1.8E+00	4.6E+00
NNE	4.7E+00	4.5E+00	3.5E+00

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Distance (m)

Direction	805	2415	4025	5635	7245	12075	24150
N	0.0E+00	0.0E+00	4.3E-05	2.6E-05	1.7E-05	7.7E-06	0.0E+00
NNW	0.0E+00	6.6E-05	2.9E-05	1.7E-05	1.1E-05	4.9E-06	1.4E-06
NW	0.0E+00	5.6E-05	0.0E+00	1.4E-05	9.4E-06	4.1E-06	1.2E-06
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.5E-06	3.7E-06	1.1E-06
W	2.2E-04	0.0E+00	1.8E-05	1.1E-05	6.8E-06	3.0E-06	8.7E-07
WSW	2.0E-04	3.7E-05	1.6E-05	9.6E-06	6.3E-06	2.8E-06	8.2E-07
SW	2.4E-04	4.4E-05	1.9E-05	1.2E-05	7.6E-06	3.4E-06	1.0E-06
SSW	3.2E-04	0.0E+00	2.6E-05	1.5E-05	1.0E-05	4.6E-06	1.5E-06
S	2.6E-04	4.7E-05	2.1E-05	1.2E-05	8.1E-06	3.7E-06	1.1E-06
SSE	0.0E+00	3.6E-05	1.6E-05	9.4E-06	6.2E-06	2.8E-06	8.8E-07
SE	2.1E-04	3.7E-05	1.6E-05	9.8E-06	6.5E-06	2.9E-06	9.2E-07
ESE	2.2E-04	4.1E-05	1.8E-05	1.1E-05	6.9E-06	3.1E-06	9.4E-07
E	2.9E-04	5.3E-05	2.3E-05	1.4E-05	9.0E-06	4.0E-06	1.2E-06
ENE	4.1E-04	7.6E-05	3.3E-05	2.0E-05	1.3E-05	5.7E-06	1.7E-06
NE	0.0E+00	9.5E-05	4.2E-05	2.5E-05	1.6E-05	7.1E-06	2.1E-06
NNE	0.0E+00	9.9E-05	4.3E-05	2.6E-05	1.7E-05	7.5E-06	2.3E-06

Distance (m)

Direction	40250	56350	72200
N	1.0E-06	5.0E-07	2.4E-07
NNW	5.8E-07	2.7E-07	1.2E-07
NW	4.6E-07	2.1E-07	8.9E-08
WNW	4.3E-07	2.0E-07	8.5E-08
W	3.5E-07	1.6E-07	7.3E-08
WSW	3.4E-07	1.6E-07	7.7E-08
SW	4.4E-07	2.1E-07	1.0E-07
SSW	6.3E-07	3.1E-07	1.6E-07
S	4.8E-07	2.4E-07	1.2E-07
SSE	3.8E-07	1.9E-07	9.8E-08
SE	3.9E-07	2.0E-07	1.0E-07
ESE	3.9E-07	1.9E-07	9.5E-08
E	4.9E-07	2.3E-07	1.1E-07
ENE	7.0E-07	3.3E-07	1.6E-07
NE	8.8E-07	4.2E-07	2.0E-07
NNE	9.3E-07	4.4E-07	2.1E-07

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COLLECTIVE FATAL CANCER RATE (deaths/y)
(All Radionuclides and Pathways)

Distance (m)

Direction	805	2415	4025	5635	7245	12075	24150
N	0.0E+00	0.0E+00	1.1E-05	1.5E-04	1.8E-04	3.8E-04	0.0E+00
NNW	0.0E+00	7.7E-06	5.2E-06	2.2E-06	4.9E-06	6.8E-05	6.0E-05
NW	0.0E+00	8.8E-05	0.0E+00	6.9E-05	1.7E-05	5.9E-05	3.5E-05
WNW	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.6E-06	4.4E-05	2.2E-05
W	8.6E-05	0.0E+00	9.2E-06	7.8E-06	4.1E-06	3.4E-05	1.5E-05
WSW	1.5E-04	2.9E-06	1.9E-06	2.0E-06	1.6E-06	2.0E-05	1.8E-05
SW	1.4E-04	4.0E-06	1.4E-05	3.3E-05	2.0E-06	3.1E-05	1.9E-05
SSW	1.6E-04	0.0E+00	5.8E-05	8.0E-06	9.4E-06	9.8E-05	6.1E-05
S	2.3E-05	1.1E-05	5.5E-05	2.3E-05	3.8E-06	1.7E-04	4.5E-04
SSE	0.0E+00	4.8E-05	3.7E-06	4.3E-06	1.4E-05	6.0E-05	1.6E-04
SE	1.9E-05	1.9E-05	2.1E-06	3.8E-07	6.3E-06	3.7E-05	5.5E-05
ESE	5.7E-06	6.3E-06	1.2E-06	7.8E-06	5.7E-06	3.5E-05	2.4E-05
E	2.3E-05	3.7E-05	1.2E-05	3.6E-07	1.1E-05	5.7E-05	9.0E-05
ENE	5.3E-06	6.4E-05	1.6E-05	2.4E-05	1.6E-05	7.6E-05	5.4E-05
NE	0.0E+00	1.5E-05	1.1E-05	2.0E-05	4.7E-05	3.3E-05	6.5E-05
NNE	0.0E+00	1.3E-05	4.6E-05	2.6E-05	1.2E-04	2.7E-04	6.7E-05

Distance (m)

Direction	40250	56350	72200
N	5.6E-04	4.8E-05	8.6E-05
NNW	3.5E-05	1.4E-05	3.2E-05
NW	2.5E-05	3.3E-05	8.8E-06
WNW	3.3E-05	3.5E-05	1.1E-05
W	2.5E-05	1.6E-05	1.7E-05
WSW	1.1E-05	2.3E-05	1.7E-05
SW	1.1E-05	7.5E-06	7.7E-06
SSW	3.0E-05	2.5E-05	9.5E-06
S	2.8E-05	9.5E-06	2.2E-05
SSE	6.9E-05	1.1E-04	9.7E-05
SE	2.1E-05	1.2E-05	1.9E-05
ESE	3.1E-05	1.4E-05	3.1E-05
E	4.7E-05	1.5E-05	1.2E-05
ENE	1.1E-04	2.4E-05	1.9E-05
NE	3.0E-05	1.8E-05	4.3E-05
NNE	4.7E-05	4.4E-05	3.3E-05

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