



**U.S. Department of Energy**  
Office of Legacy Management

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**RADIONUCLIDE AIR EMISSION ANNUAL REPORT  
CALENDAR YEAR 2006**

for the

**LABORATORY FOR ENERGY-RELATED HEALTH RESEARCH  
UNIVERSITY OF CALIFORNIA, DAVIS**

*prepared for:*

**SM Stoller Corporation**  
2597 B <sup>3</sup>/<sub>4</sub> Road  
Grand Junction, Colorado 81503

*prepared by:*

**Weiss Associates**  
5801 Christie Avenue, Suite 600  
Emeryville, California 94608-1827

June 29, 2007  
Rev. 0

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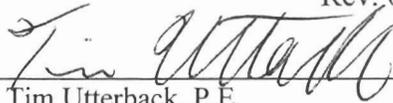
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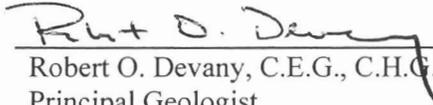


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## CONTENTS

|  |     |
|--|-----|
| 1. Facility Information                  | 1-1 |
| 1.1 Site Description                     | 1-1 |
| 1.2 Source Description                   | 1-3 |
| 1.2.1 Point Sources                      | 1-3 |
| 1.2.2 Diffuse Sources                    | 1-3 |
| 1.2.3 Western and Eastern Dog Pens Areas | 1-3 |
| 2. Air Emission Data                     | 2-1 |
| 2.1 Point Sources                        | 2-1 |
| 2.2 Diffuse Sources                      | 2-1 |
| 2.3 Particulate Matter-10                | 2-3 |
| 3. Dose Assessments                      | 3-1 |
| 3.1 Description of Dose Model            | 3-1 |
| 3.2 Summary of Input Parameters          | 3-2 |
| 4. Compliance Assessment                 | 4-1 |
| 4.1 Certification                        | 4-1 |
| 5. Additional Information                | 5-1 |
| 6. Supplemental DOE Information          | 6-1 |
| 7. References                            | 7-1 |

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## TABLES

|           |   |
|-----------|---|
| Table 1.  | Results of National Emissions Standards for Hazardous Air Pollutants Reports for the Past Six Years   |
| Table 2.  | Summary of Potential Diffuse-Area Radionuclide Sources  |
| Table 3.  | Maximum Surface-Soil Concentrations for Radionuclides Exceeding Background and PM <sub>10</sub> Emission Rates, LEHR Western Dog Pens Area                        |
| Table 4.  | Maximum Surface-Soil Concentrations for Radionuclides Exceeding Background and PM <sub>10</sub> Emission Rates, LEHR Eastern Dog Pens Area                        |
| Table 5.  | Maximum Soil Concentrations for Radionuclides Exceeding Background and PM <sub>10</sub> Emission Rates, LEHR Southwest Trenches Overburden                        |
| Table 6.  | On-Site Effective Dose Equivalent to Maximally Exposed Individual Resulting from Radionuclide Emissions from Each Potential Fugitive-Dust-Emission Diffuse Source |
| Table 7.  | Estimated Collective Population Dose Resulting from Radionuclide Emissions from Diffuse Sources   |
| Table 8.  | CAP88-PC Input for the Western Dog Pens Area  |
| Table 9.  | CAP88-PC Input for the Eastern Dog Pens Area  |
| Table 10. | CAP88-PC Input for the Western Dog Pens Area during Scarification   |
| Table 11. | CAP88-PC Input for the Western Dog Pens during Placement of the Southwest Trenches Overburden   |

## FIGURES

|           |  |
|-----------|--|
| Figure 1. | LEHR Facility Location Map, UC Davis, California                                     |
| Figure 2. | LEHR Facility DOE Diffuse-Source Areas and Location of Maximally Exposed Individuals |

## **APPENDIX**

### Appendix A. CAP88-PC Output Results

## ACRONYMS AND ABBREVIATIONS

|                      |  |
|----------------------|--|
| °C                   | degree(s) Celsius  |
| Ac-228               | actinium-228   |
| Bi-212               | bismuth-212  |
| Bi-214               | bismuth-214  |
| CAP88-PC             | atmospheric dispersion/radiation dose calculation computer code (US EPA) |
| C-14                 | carbon-14  |
| CERCLA               | Comprehensive Environmental Response, Compensation and Liability Act     |
| CFR                  | Code of Federal Regulations  |
| Ci/yr                | curies per year  |
| cm                   | centimeter(s)  |
| cm/s                 | centimeter(s) per second   |
| cm/yr                | centimeter(s) per year   |
| Co-60                | cobalt-60  |
| Cs-137               | cesium-137   |
| DOE                  | United States Department of Energy                                       |
| E                    | east   |
| EDE                  | effective dose equivalent  |
| EDPs                 | Eastern Dog Pens   |
| Eq.                  | equation   |
| g/m <sup>2</sup> -hr | gram(s) per square meter-hour(s)   |
| H-3                  | tritium  |

---

|                  |  |
|------------------|--|
| K-40             | potassium-40   |
| km               | kilometer(s)   |
| km <sup>2</sup>  | square kilometer(s)  |
| LEHR             | Laboratory for Energy-Related Health Research  |
| m                | meter(s)   |
| m/s              | meter(s) per second  |
| m <sup>2</sup>   | square meter(s)  |
| Max.             | maximum  |
| MEI              | maximally exposed individual   |
| mrem/yr          | millirem(s) per year   |
| mSv/yr           | millisievert(s) per year   |
| N                | north  |
| NESHAPs          | National Emissions Standards for Hazardous Air Pollutants                            |
| NNE              | north-northeast  |
| No.              | number   |
| NW               | northwest  |
| Pb-210           | lead-210   |
| Pb-212           | lead-212   |
| Pb-214           | lead-214   |
| pCi/g            | picocurie(s) per gram  |
| person-rem/yr    | person – roentgen(s) equivalent man per year   |
| PM <sub>10</sub> | particulate matter with an aerodynamic diameter less than or equal to 10 micrometers |
| RA               | removal action   |

|          |   |
|----------|---|
| Ra-226   | radium-226                                    |
| S        | south   |
| Sr-90    | strontium-90                                  |
| SWTs     | Southwest Trenches                            |
| Th-228   | thorium-228                                   |
| Th-232   | thorium-232                                   |
| Th-234   | thorium-234                                   |
| Tl-208   | thallium-208                                  |
| U-235    | uranium-235                                   |
| U-238    | uranium-238                                   |
| UC Davis | University of California, Davis               |
| US EPA   | United States Environmental Protection Agency |
| W        | west  |
| WDPs     | Western Dog Pens                              |
| µm       | micrometer(s)                                 |

**US Department of Energy**  
**Radionuclide Air Emission Annual Report**  
**(Subpart H of 40 CFR 61)**  
**Calendar Year 2006**

**Site Name:** Laboratory for Energy-Related Health Research (LEHR)

**Field Office Information**

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## 1. FACILITY INFORMATION

This Radionuclide Air Emission Annual Report documents that, in 2006, the United States Department of Energy (DOE) facilities at the Laboratory for Energy-Related Health Research (LEHR) complied with the requirements of Title 40 Code of Federal Regulations (CFR) Part 61 Subpart H - National Emissions Standards for Hazardous Air Pollutants (NESHAPs) for Emissions of Radionuclides. The NESHAPs regulations require that radionuclide emissions not exceed levels that would result in an effective dose equivalent (EDE) to a member of the public of 10 millirems per year (mrem/yr).

LEHR is located on the campus of the University of California, Davis (UC Davis). This report, however, applies to only the DOE areas at LEHR. The DOE areas will be referred to as “the Site,” whereas the entire 15-acre property where both DOE and UC Davis conduct activities will be referred to as “LEHR.” There are currently no point sources of radionuclide emissions at the Site, but there are potential diffuse sources (i.e., surface soil) of radionuclide emissions. These emissions were modeled using the United States Environmental Protection Agency (US EPA) atmospheric dispersion/radiation dose calculation computer code, CAP88-PC, Version 1.0. Based on the results from this model, the total contribution to the maximum EDE to a member of the public from diffuse-source emissions for reporting year 2006 is estimated to be 5.2E-2 mrem/yr (about 0.5% of the 10 mrem/yr standard). This result is between one and two orders of magnitude greater than the results of the previous seven years (Table 1); this higher result is due to emissions from a short-term grading event<sup>1</sup> conducted at the Site in September 2006.

### 1.1 Site Description

The LEHR facility is located in Solano County, California, in the southeast quadrant of Section 21, Township 8 North, Range 2 East, Mount Diablo Base and Meridian. It is approximately 1.5 miles south of the town of Davis (Figure 1) and occupies about 15 acres on the southeast portion of the UC Davis campus. The LEHR facility is bounded by UC Davis research facilities, private farmland, and the South Fork of Putah Creek. The southern boundary of the LEHR facility is the northern levee of the South Fork of Putah Creek (Figure 2).

The local climate is Mediterranean with mild winters and dry summers. Precipitation and temperature data specific to 2006 were obtained from the Davis WSW weather station located approximately one mile northwest of the LEHR facility (Western Regional Climate Center, 2007).

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<sup>1</sup> Included soil scarification, filling, compacting and grading operations.

The average temperature for 2006 was approximately 16.3 degrees Celsius (°C) (61.3 degrees Fahrenheit), and the total precipitation for 2006 was approximately 18.5 inches (47.0 cm). These values are based on the reported monthly average temperatures and precipitation totals. The sun shines approximately 95% of the time during daylight hours in the summer and about 45% of the time during daylight hours in the winter.

The prevailing wind direction is from the south, due to frequent incursions of marine air through the Carquinez Strait into the Sacramento Valley. Changes in wind direction, however, are common, with winds from the northwest occurring diurnally. Several times a year, strong winds blow from the north, generally following the passage of Pacific storm systems (DOE, 1994a). The Davis WSW weather station does not report wind speed; therefore, wind data from the Sacramento Executive Airport is used instead to represent wind conditions at LEHR. The Sacramento Executive Airport is located approximately 15 miles east of LEHR. The average wind speed for the Sacramento Executive Airport in 2006 was 2.7 meters per second (6.0 miles per hour) (NCDC, 2007).

The land within a one-mile radius of the LEHR facility is owned privately or by UC Davis, and is mainly used for animal research, agriculture and recreation. Immediately to the north, east and west of the LEHR facility are UC Davis research facilities. The privately owned lands within one mile to the south and east of the LEHR facility include rural residences and crop land. Approximately 75% of the surrounding land in the general vicinity of the LEHR facility is used for agriculture. Major crops include fruits, nuts and grains. Approximately 40% of the agricultural land in the vicinity is irrigated and some of the nearby lands are used for cattle grazing (DOE, 1988).

The LEHR facility contains laboratory buildings and former animal-handling facilities (Figure 2). Approximately 45% of the Site is paved or covered by structures. Approximately 45% is unpaved and relatively free of vegetation, and 5% is covered by large, deep-rooted vegetation. Former outdoor dog pens consisting of asphalt, concrete, gravel and soil occupy the remaining 5% of the Site. The Regents of the University of California own the land and the buildings on the Site.

In the early 1950s, the Atomic Energy Commission (now DOE) began conducting radiological studies at UC Davis on laboratory animals, particularly beagles. Initial studies were carried out on the main campus, north of LEHR, and involved irradiation of beagles. DOE began operating at LEHR in 1958 when full-scale experimental use of radioactive materials began. Research at the Site through the mid-1980s focused on the health effects from chronic exposure to radionuclides, primarily strontium-90 (Sr-90) and radium-226 (Ra-226). In the early 1970s, a cobalt-60 irradiator facility was constructed at the Site to study the effects of chronic exposure to gamma rays on bone-marrow cells of beagles. In 1975, DOE initiated a program at the Site to study the potential health effects of combustion products from fossil fuel power plants. In 1983, the Toxic Pollutant Health Research Laboratory was established at the Site. In 1989, DOE-funded research ended at LEHR. The LEHR Site was listed on the US EPA National Priority list in May 1994. The LEHR facility is presently occupied by the UC Davis Center for Health and the Environment. Current DOE activities at the Site are limited to environmental restoration under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

## 1.2 Source Description

Applicable sources of radionuclide air emissions at LEHR, along with lists of the radioactive materials at the facility, are discussed below.

### 1.2.1 Point Sources

No potential point sources of radionuclide emissions existed at the Site in 2006.

### 1.2.2 Diffuse Sources

Diffuse radionuclide emission sources in 2006 consisted of dust from the Western Dog Pens (WDPs) and Eastern Dog Pens (EDPs) areas (Figure 2, Table 2). These are “fugitive” emissions, by definition, because they were not released through an actively ventilated air stream (US EPA, 2004). The dust was primarily entrained by wind. During two weeks in September, the WDPs were backfilled with soil and graded. Dust monitoring data was collected during this activity and evaluated in this report (see Section 2.3). At the EDPs, no ground-disturbing or development activities have been conducted since 2002. No other activities were conducted at the Site in 2006 that would have generated radionuclide air emissions.

Compared to emissions in previous years, emissions in 2006 are expected to be similar; any differences would potentially be due to three factors: the grading activities at the WDPs, covering of the WDPs, and meteorological conditions.

### 1.2.3 Western and Eastern Dog Pens Areas

The WDPs and EDPs areas, located near the center of the LEHR facility (Figure 2), are the two potential diffuse sources of radiological emissions from fugitive dust. Historically, these areas contained outdoor pens that were used to house dogs involved in the former Ra-226 and Sr-90 research activities at the Site. The pens were constructed of concrete curbs and chain-link fencing. The floor of each pen was partly covered by asphalt and partly covered by gravel. In the areas covered by gravel, there was no impermeable barrier between the gravel and the underlying soil. Each pen included above-grade structures, which have been removed.

The WDPs area originally contained 320 pens. In 1975, 64 of these pens were removed from the northern side of the WDPs to construct the Cellular Biology Laboratory (Building H-294, Figure 2). In 1996, the above-grade structures and interior chain-link fencing from the remaining 256 pens were removed, properly packaged and shipped to the DOE Hanford site for disposal. In 2001, the remaining materials from the 256 pens were removed during the WDPs removal action (RA) conducted under CERCLA (WA, 2002b). These materials, which were removed by an excavator, included concrete curbing, gravel, metal grating, fence posts and asphalt. These materials were

transported to a temporary on-site stockpile, and removed entirely from the Site in 2003 and 2004. Following the 2001 WDPs CERCLA RA, the southern portion of the WDPs was backfilled to grade with clean imported fill (Figure 2). Therefore, the portion of the WDPs that was a potential source of airborne radionuclide emissions in 2006 was the central portion, between the clean imported fill (in the south) and the Cellular Biology Laboratory (in the north). The central area was a potential source because the soil that was originally underneath the dog pens there was exposed from January 1 through September 18. From September 18, 2006 through September 28, 2006, this central area was backfilled with two layers of soil, one that originated as overburden from the Southwest Trenches (SWTs), and a final “capping” layer of imported soil. Since September 28, the cover of imported soil has prevented any radionuclide releases from the WDPs.

The EDPs area, which overlies UC Davis Landfill Number (No.) 2, contained 96 pens. In 1996, the above-grade structures and interior chain-link fencing were removed, as they were at the WDPs, and properly packaged and shipped to the DOE Hanford site for disposal. Currently, the EDPs area is covered by the concrete curbing, asphalt and gravel. The EDPs area is a potential source of airborne radionuclide emissions because soil is exposed in some of the pens and in areas where asphalt is degraded and broken.

The radionuclides emitted from the WDPs and EDPs, as assumed for this report, are listed in Tables 3 through 5. Low levels of Sr-90 and Ra-226 are known to have been released at the WDPs and EDPs in excreta from the dogs, and these radionuclides are now potentially contained in soil and fugitive-dust emissions associated with these areas. It is assumed that all radionuclides detected in soil at the WDPs and EDPs at concentrations greater than background are also present in fugitive dust. (The term “concentration,” where applied to radionuclides, refers to the radioactive activity measured in a unit mass of soil, in units of picocuries per gram [pCi/g]). Furthermore, the assumed concentrations of radionuclides in dust particulates are conservatively based on the highest detected concentrations in soil at each area. Although part of the total concentrations can be attributed to background in most cases, background concentrations were not subtracted. Additionally, all soil samples that form the concentration basis for the dust particulates were collected prior to 2002 and no corrections were made to account for attenuation due to radioactive decay. These factors ultimately result in a conservative estimate of the radionuclide air emissions at LEHR. The concentrations of radionuclides in soil at the WDPs area are based on samples collected from the upper two feet of soil (Table 3). The emissions are assumed to be generated only from the central portion of the WDPs (Figure 2), because the southern portion of the WDPs area was covered with clean imported fill and the northern pens were removed in 1975 to construct the Cellular Biology Building. The concentrations of radionuclides in soil at the EDPs area are based on soil samples collected during the 1999 EDPs investigation (WA, 1999), which is the only CERCLA investigation in this area (Table 4).

The grading operations at the WDPs resulted in potential radionuclide dust emissions from two distinct sources. Initially, the area was scarified to remove vegetation, which potentially disturbed the top six inches of the WDPs soil. Following this, stockpiled soil that had originated as overburden at the SWTs was placed within the central portion of the WDPs area. This SWT overburden soil was characterized (WA, 2001b), and had been covered with plastic sheeting until it

was installed as backfill at the WDPs. All radionuclides in this soil that were statistically shown to be at concentrations greater than background concentrations were included in the calculations of dose due to airborne radionuclides. These radionuclides are reported in Table 5.

## 2. AIR EMISSION DATA

### 2.1 Point Sources

As discussed in Section 1, there were no point sources of radionuclide emissions at the Site in 2006.

### 2.2 Diffuse Sources

There were two diffuse sources of radionuclide emissions present at the Site in 2006, the WDPs and EDPs. For most of the year, emissions from these two areas were due only to wind erosion of surface soil. To estimate the emissions from wind erosion of radionuclides as respirable particles, defined as those particles 10 micrometers (PM<sub>10</sub>) in diameter or smaller, a two-step process was used. First, a general emission rate for respirable particles was calculated for each area (Equation [Eq.] 1). The equation used for this calculation assumes that the source areas are “unlimited reservoirs” of erodible soil, and is a function of percent of vegetation, soil conditions and meteorological conditions. Secondly, specific emission rates for each radionuclide at each source area was calculated (Eq. 3).

The general-emission equation is found in the US EPA’s guidance document *Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination Sites* (Cowherd et al., 1985):

$$E_{10} = 0.036 \times (1 - V) \times \left( \frac{[u]}{u_t} \right)^3 \times F(x) \quad (\text{Eq. 1})$$

where,

- $E_{10}$  = annual average PM<sub>10</sub> emission rate per unit contaminated surface, grams per square meter-hour [g/(m<sup>2</sup>-hr)];
- $V$  = fraction of contaminated surface vegetative cover (assumed zero for worst-case bare soil);
- $[u]$  = mean annual wind speed (= 2.7 m/s at Sacramento Executive Airport);
- $u_t$  = threshold value of wind speed at height of wind instrument (= 715 cm/s);
- $F(x)$  = function plotted in Figure 4-3 (= 1.16E-1) of Cowherd et al., 1985; and
- $x$  =  $0.866 u_t/[u]$  = dimensionless ratio (= 2.29).

The fraction of contaminated surface vegetative cover was conservatively assumed to be zero (i.e., bare soil) to calculate a worst-case value. The mean annual wind speed is taken from the Sacramento Executive Airport (NCDC, 2007), which is the nearest meteorological station to LEHR with wind sensors.

The threshold value of wind speed at the height of the wind instrument is calculated by Eq. 2:

$$u_t = u_{friction} \times \left( \frac{1}{0.4} \right) \times \left( \ln \frac{z}{z_0} \right) \quad (\text{Eq. 2})$$

where,

- $u_t$  = threshold value of wind speed at height of wind instrument;
- $u_{friction}$  = threshold friction velocity (= 50 cm per second [cm/s]);
- $z$  = height of wind instrument (20 feet = 610 cm); and
- $z_0$  = emission source-area roughness height (= 2 centimeters [cm]).

Cowherd et al. recommend a procedure for determining the threshold friction velocity based upon surface-soil sieve-analysis data. Because no surface-soil sieve-analysis data were available for the Site, a conservative threshold friction velocity of 50 cm/s was selected, following the example in Cowherd et al. (1985) for a rural emergency response application (Application No. 1). This velocity is based on a particle-size mode of 500  $\mu\text{m}$ . The two-cm roughness height represents a value between the ranges for a plowed field and grasslands (Cowherd et al., 1985). The resulting value of  $u_t$  is 715 cm/s.

The result of Eq. 1, using the site- and 2006-specific data, is  $2.25 \times 10^{-4}$  g/m<sup>2</sup>-hr.

To determine the specific emission rate for each radionuclide, the emission rate is multiplied by the area over which the radionuclide-bearing soil is exposed, the time during which the soil is exposed, and the concentration of the radionuclide in the soil:

$$E_{area} = E_{10} \times A_{area} \times \left( \frac{24 \text{ hr/day}}{365 \text{ days/year}} \right) \times C_{rad} \times (10^{-12} \text{ curies/picocurie}) \quad (\text{Eq. 3})$$

where,

- $E_{area}$  = annual average PM<sub>10</sub> emission rate for the potential radionuclide-emission diffuse source, curies per year (Ci/yr);
- $E_{10}$  = annual average PM<sub>10</sub> emission rate per unit contaminated surface, g/(m<sup>2</sup>-hr);
- $A_{area}$  = surface area of potential radionuclide-emission diffuse source, m<sup>2</sup>; and
- $C_{Rad}$  = maximum value of the measured surface-soil radionuclide concentrations, pCi/g.

The surface area of each source area was determined using a scaled map of the Site (Figure 2). Table 2 reports the surface areas of the WDPs and EDPs. The exposure time for the WDPs was 260 days because the grading operations began on September 18. On this date, the dominant

dust-entrainment mechanism became the grading operations rather than wind. The highest measured (non-decay-corrected) concentrations are conservatively assumed to be uniformly distributed across each area. The concentration in the fugitive dust is assumed to be equal to the concentration measured in soil. Tables 3 and 4 report the concentrations of radionuclides in the soils and the resulting emission rates for each radionuclide as determined by Eq. 3.

During the grading of the WDPs, entrainment of soil particulates into the air was also potentially caused by mechanical disturbance by earth-moving equipment. The US EPA guidance for estimating radionuclide emissions from diffuse sources (US EPA, 2004) recommends a method for estimating emissions from soil grading and shaping. This method uses the following equation to calculate the annual emissions:

$$E = (5.8E - 2) \times M \times a \div (2.2E - 3) \quad (\text{Eq. 4})$$

where,

- $E$  = annual emissions (pCi/yr);
- $5.8E-2$  = emission factor (pounds of particulate matter per ton);
- $M$  = mass of soil graded or shaped (tons per year);
- $a$  = activity concentration of soil (pCi/g); and
- $2.2E-3$  = conversion factor (pounds per gram).

The mass of soil disturbed during the initial scarification of the WDPs was calculated to be 1,503 tons. This assumes disturbance to a six-inch depth over the whole area (5,263 m<sup>2</sup>), and a conservative bulk density of 1.7 grams per cm<sup>3</sup>. The mass of SWT overburden soil was calculated to be 623 tons. This is based on a reported volume of 435 cubic yards (WA, 2001b) and also assumes a conservative bulk density of 1.7 grams per cm<sup>3</sup>. The resulting emissions for each radionuclide are reported in Tables 3 and 5.

### 2.3 Particulate Matter-10

During the grading at the WDPs, a dust monitor was deployed to measure PM<sub>10</sub> generated by the activities there. The instrument used was a personal DataRAM (pDR) mounted on a tripod near the breathing zone and in a down-wind location. To maintain this downwind position, the pDR was moved as needed during the day. The pDR logged dust concentrations every minute during grading activities. The average dust concentration over the entire work period was 0.079 mg/m<sup>3</sup>.

The direct emissions of airborne radionuclides was not measured. The dust-concentration data cannot be easily converted into the flux value that is necessary for calculating emissions using the Cap-88 model. Therefore, the preferred method specified in the EPA guidance (US EPA, 2004) was used to estimate emissions during the grading operations (see above). An independent estimate

of the dose was calculated using the model RESRAD (ANL, 2005), which could incorporate Site dust concentration data. That dose estimate is described in Section 3.

No excavation or other ground-disturbing activities were conducted at the EDPs or any other DOE areas during calendar year 2006.

## 3. DOSE ASSESSMENTS

### 3.1 Description of Dose Model

Compliance with the NESHAPs radiation-dose limits for diffuse-source emissions was assessed using the US EPA computer code CAP88-PC, Version 1.0. CAP88-PC calculates radiation dose from atmospheric diffusion, and was used to calculate dose from radionuclides in wind-emitted dust. In addition, RESRAD was used to evaluate the results from CAP88-PC for the on-site worker at the WDPs during the grading activities. The RESRAD code calculates radiation dose from residual radioactive materials. It was not used to determine compliance status with respect to the NESHAPs regulations, but is used to help confirm that the emission rate assumption during grading and the related results from CAP88-PC are conservative.

CAP88-PC was used to calculate the EDE to individual receptors at various distances from the WDPs and EDPs, which are the two potential site radionuclide-emission diffuse sources. A total of four "individual receptor" CAP88-PC runs were executed to model the fugitive-dust emission sources described in Section 2: one for each source area during the normal course of the year, one for the disturbance of the WDPs soil during the initial scarifying operations, and one for the covering of the WDPs with the SWT overburden soil. For each of the four potential radionuclide-emission sources, a human receptor was identified in each of the north, south, east and west quadrants relative to the potential source. Additionally, a short-term dose was calculated for a construction-worker receptor located in the center of the WDPs during the short-term grading operation.

The area-source algorithm employed by CAP88-PC, Version 1.0, assumes the distance from an area source to a receptor is measured as the distance from the centroid of the area source to the receptor (US EPA, 1992). For the site CAP88-PC modeling, the distance from an area source to a receptor is measured as the approximate distance from the centroid of the area source to the outdoor individual or building assumed to house the indoor receptor (Table 6). The construction worker during the grading operations at the WDPs was assumed to be located one meter from the center of the WDPs.

The reported EDE to an MEI at the LEHR facility includes contributions from the four potential site radionuclide-emission diffuse sources based on the CAP88-PC model output. Based on the combined diffuse-source exposures, the MEI at the LEHR facility is the construction worker located at the WDPs (Figure 2, Table 6). RESRAD was also used to calculate the dose to an individual receptor at the center of the WDPs during the two weeks of grading activities there. This was based on the average concentration of dust ( $0.079 \text{ mg/m}^3$ ) and the radionuclides present in WDP soil. The radionuclides present in the SWT overburden soil were not included in the RESRAD

calculation. Although the RESRAD result is not acceptable for determining NESHAPs compliance, it is useful to indicate whether the emission assumption during grading, and the resulting dose calculated by CAP88-PC, is conservative. The result from CAP88-PC was 5.2E-02 mrem/yr to the worker at the WDPs during the two weeks of grading; the result from RESRAD for this same worker was 3.1E-03 mrem/yr. RESRAD may be more accurate for this application, because it uses known dust concentrations. The CAP88-PC result is likely an overestimate of the actual public dose.

The collective population dose is calculated as the average radiation dose to an individual in a specified area, multiplied by the number of individuals in that area. Four "population" CAP88-PC runs were executed to model the fugitive dust emission diffuse sources:

- The EDPs during the normal course of the year;
- The central WDPs before grading;
- Disturbance of the WDPs soil during the scarifying operations; and
- Covering the WDPs with the SWT overburden soil.

The CAP88-PC model output for each run is included in Appendix A. For each of the four potential radionuclide-emission diffuse sources, the CAP88-PC model was run with an updated population data file calculated from the United States Census Bureau 2006 population estimates for counties (US Census Bureau, 2007).

The population file includes receptors within a distance of 80 kilometers (km) from the Site, as specified by DOE guidance. Using geographical information system software, the area within 80 km of the Site was split into 128 sectors by dividing the area into eight 10-km-wide rings and sixteen compass directions. The population of each sector was calculated from the population density of the county or counties occupied by that sector. The populations of the counties were obtained from the 2006 Annual Population Estimates Program of the United States Census Bureau (US Census Bureau, 2007). The results of the CAP88-PC population runs based upon the combined source exposures are presented in Table 7 and Appendix A.

Supplemental information required by DOE (DOE, 1994b) is included in Section 6.

### 3.2 Summary of Input Parameters

The input parameters for the CAP88-PC runs are summarized for the WDPs and EDPs areas in Tables 8 through 11. As noted above, each diffuse source was conservatively calculated assuming that the maximum concentrations (not corrected for background) of the observed radiological surface- and shallow-soil contamination for the WDPs and EDPs areas were present across the entire potential radionuclide emission diffuse source area. The US EPA-recommended particulate-resuspension rate model was used to calculate the fugitive dust emission rates.

The Sacramento area wind file included with the CAP88-PC computer code was used for the modeling. The average annual wind speeds recorded at Sacramento Executive Airport were used to calculate particle-emission rates, as described above. Use of the Sacramento wind data is appropriate because the Site is near Sacramento (approximately 15 miles), the geography is similar, there are no intervening geographical anomalies, and a compatible meteorological data file from a closer air station is not available.

The input parameters for the RESRAD modeling for the grading activities at the WDPs were 1) radionuclide concentrations listed in Table 3, with additional parent and daughter decay chain equilibrium assumptions; 2) average dust concentration during grading activities of 0.079 mg/m<sup>3</sup>; 3) exposure for eight work days of ten hours each (actual grading activities occurred during eight days in September); 4) inhalation as the only exposure pathway; and 5) a receptor location at the center of the WDPs. The RESRAD modifications to the list of radionuclides include larger parts of whole decay chains. The additional radionuclides that were incorporated in the RESRAD calculation resulted in a conservative calculation of the dose. The receptor location at the center of the WDPs is appropriate for the equipment operators who were performing the grading operations. The RESRAD dose calculation result was 3.1E-3 mrem/yr.

## 4. COMPLIANCE ASSESSMENT

Point-Source Effective Dose Equivalent: None

Diffuse-Source Maximum Effective Dose Equivalent:  $5.2 \times 10^{-2}$  millirem per year [mrem/yr]  
 $(5.2 \times 10^{-4}$  millisieverts [mSv] per yr) (about  
0.5% of the 10 mrem/yr standard).

Location of On-Site Maximally Exposed Individual: Center of WDPs area

### 4.1 Certification

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment (See 18 U. S. C. 1001).

Signature: Robert D. Devany Date: 6-29-07  
Robert Devany  
Principal Geologist

Signature: V. J. Kothari Date: \_\_\_\_\_  
Digitally signed by VJ Kothari  
Date: 2007.06.28 13:07:02  
-04'00'  
Vijendra Kothari  
DOE-LEHR Project Manager

## 5. ADDITIONAL INFORMATION

In 2006, grading and backfilling operations occurred at the WDPs; no other construction or modifications were completed at the LEHR facility.

As required in the memorandum of understanding for facilities that were exempt from having to submit an application to the US EPA for construction or modifications, the following information is provided for the Site:

- **Provide a brief description of the construction or modification project and an estimate of potential doses to the public.**

Grading operations at the WDPs involved scarification, filling, compaction, and grading to cover that area with clean soil. This occurred during two weeks in September. There were no other construction or modification projects completed at the LEHR Site in 2006.

- **Identify any unplanned releases of radionuclides to the atmosphere.**

There were no unplanned releases of radionuclides to the atmosphere during 2006.

- **Results of the dose assessment associated with the diffuse-source emissions from the facility.**

As noted in Sections 1 and 2, there are currently no point sources of radionuclide emissions at the Site. The only potential sources of radionuclide emissions remaining at the Site are diffuse sources of fugitive dust. The results of the dose assessment associated with the diffuse-source emissions from the Site are presented in Section 3 and Table 6. Table 6 presents the results of CAP88-PC modeling; the total EDE to the on-site MEI from diffuse-source emissions was estimated to be  $5.2 \times 10^{-2}$  mrem/yr ( $5.2 \times 10^{-4}$  mSv/yr), far below the 10 mrem/yr standard.

## 6. SUPPLEMENTAL DOE INFORMATION

- **Provide an estimate of collective dose equivalent for 2006 releases.**
  - The collective population dose for calendar year 2006 emissions to the population within an 80-km distance of the facility is estimated to be 3.2E-4 person-rem/yr.
- **Provide information on the status of compliance with Subparts Q and T of 40 CFR Part 61.**
  - LEHR is in compliance with Subparts Q and T of 40 CFR part 61, based on a radon study conducted at the LEHR Facility by DOE (DOE, 1990).
- **Provide information on radon-220 emissions from sources containing uranium-232 and thorium-232, where emissions potentially can exceed 0.1 mrem/yr to the public or 10% of the non-radon dose to the public.**
  - There are no unencapsulated uranium-232 or thorium-232 sources stored at the facility. The emissions from radon-220 from encapsulated sources would not result in a dose to a member of the public in excess of 0.1 mrem/yr or exceed 10% of the non-radon dose to the public from the Site.
- **Provide information on radon-222 emissions from non-disposal/non-storage sources where emissions potentially can exceed 0.1 mrem/yr to the public or 10% of the non-radon dose to the public.**
  - There are no non-disposal or non-storage sources of radon-222 located at the facility.
- **Give the number of emission points subject to the continuous monitoring requirements of Section 61.93(b) of 40 CFR, the number of these emission points that do not comply with Section 61.93(b) requirements and the cost of upgrades. Describe site periodic confirmatory measurement plans. Indicate the status of the quality assurance program described by Appendix B, Method 114.**
  - There are no point-source emissions that require continuous monitoring according to Subpart H of 40 CFR.

## 7. REFERENCES

- Argonne National Laboratory (ANL), 2005, RESRAD for Windows Version 6.3, August 25.
- Cowherd, Chatten, Jr., Gregory E. Muleski, Phillip J. Englehart, and Dale A. Gillette, 1985, *Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination Sites*, U.S. Environmental Protection Agency, Washington, D.C. (USEPA/600/8-85/002).
- United States Department of Energy (DOE), 1988, *Environmental Survey Preliminary Report*, Laboratory for Energy-Related Health Research, Davis, California, Environment, Safety and Health Office of Environmental Audit.
- DOE, 1990, *Results of the U.S. Department of Energy Indoor Radon Study*, August 1990.
- DOE, 1994a, *Water Monitoring Plan*, LEHR Environmental Restoration, UC Davis, California.
- DOE, 1994b, *Memorandum—Calendar Year 1993 Radionuclide Air Emissions Annual Reports for DOE Sites*, March.
- National Climate Data Center (NCDC), 2007, <http://lwf.ncdc.noaa.gov/oa/mppsearch.html>.
- United States Census Bureau, Fact Finder web page (US Census Bureau), 2007, [http://factfinder.census.gov/home/saff/main.html?\\_lang=en](http://factfinder.census.gov/home/saff/main.html?_lang=en)
- United States Environmental Protection Agency (US EPA), 1992, *User's Guide for CAP88-PC Version 1*, U.S. Environmental Protection Agency, (402-3-92-001, March 1992).
- US EPA, 2004, *Methods for Estimating Fugitive Air Emissions of Radionuclides from Diffuse Sources at DOE Facilities Final Report*, U.S. Environmental Protection Agency, (September 2004).
- Weiss Associates (WA), 1999, *Technical Memorandum: Investigative Results for the Former Eastern Dog Pens at the Laboratory for Energy-Related Health Research (LEHR), University of California at Davis, California*, September, Rev. 0.
- WA, 2000, *Final Radionuclide Air Emission Annual Report (Subpart H of 40 CFR 61) Calendar Year 1999 for the Laboratory for Energy-Related Health Research, University of California, Davis*, May, Rev. 0.

- WA, 2001a, *Final Radionuclide Air Emission Annual Report (Subpart H of 40 CFR 61) Calendar Year 2000 for the Laboratory for Energy-Related Health Research, University of California, Davis, May, Rev. 0.*
- WA, 2001b, *Evaluation of 2001 Southwest Trenches Overburden Soil Data, DOE LEHR Site, Davis, California, September 24.*
- WA, 2002a, *Final Radionuclide Air Emission Annual Report (Subpart H of 40 CFR 61) Calendar Year 2001 for the Laboratory for Energy-Related Health Research, University of California, Davis, May, Rev. 0.*
- WA, 2002b, *Final Western Dog Pens Area Removal Action Confirmation Report for the U.S. Department of Energy Areas at the Laboratory for Energy-Related Health Research, University of California at Davis, California, October, Rev. 0.*
- WA, 2003, *Final Radionuclide Air Emission Annual Report (Subpart H of 40 CFR 61) Calendar Year 2002 for the Laboratory for Energy-Related Health Research, University of California, Davis, April, Rev. 0.*
- WA, 2004, *Final Radionuclide Air Emission Annual Report (Subpart H of 40 CFR 61) Calendar Year 2003 for the Laboratory for Energy-Related Health Research, University of California, Davis, April, Rev. 0.*
- WA, 2005, *Final Radionuclide Air Emission Annual Report (Subpart H of 40 CFR 61) Calendar Year 2004 for the Laboratory for Energy-Related Health Research, University of California, Davis, June, Rev. 0.*
- WA, 2006, *Final Radionuclide Air Emission Annual Report (Subpart H of 40 CFR 61) Calendar Year 2005 for the Laboratory for Energy-Related Health Research, University of California, Davis, June, Rev. 0.*
- Western Regional Climate Center, 2006, <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?cadavi+nca>.

## **TABLES**

Table 1. Results of National Emissions Standards for Hazardous Air Pollutants Reports for the Past Six Years

| Calendar Year | Effective Dose Equivalent to Maximally Exposed Individual (mrem/yr) | Reference     |
|---------------|---|---------------|
| 1999          | 1.35E-3   | WA, 2000      |
| 2000          | 7.52E-4   | WA, 2001a     |
| 2001          | 1.0E-3  | WA, 2002a     |
| 2002          | 3.8E-4  | WA, 2003      |
| 2003          | 1.4E-3  | WA, 2004      |
| 2004          | 1.6E-3  | WA, 2005      |
| 2005          | 5.9E-4  | WA, 2006      |
| 2006          | 5.2E-2  | This document |

**Abbreviation**

mrem/yr millirem(s) per year

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Table 2. Summary of Potential Diffuse-Area Radionuclide Sources

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| Potential Source      | Description  | Surface Area (m <sup>2</sup> ) |
|-----------------------|--|--------------------------------|
| Western Dog Pens Area | Former outdoor dog pens with potential radioactive surface releases. | 5,263                          |
| Eastern Dog Pens Area | Former outdoor dog pens with potential radioactive surface releases. | 3,900                          |

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**Abbreviation**

m<sup>2</sup> square meters

Table 3. Maximum Surface-Soil Concentrations for Radionuclides Exceeding Background and PM<sub>10</sub> Emission Rates, LEHR Western Dog Pens Area

| Radionuclide | Maximum Concentration <sup>1</sup><br>(pCi/g) | Maximum PM <sub>10</sub> Emission<br>Rate from Wind Erosion<br>(Ci/yr) | Maximum PM <sub>10</sub> Emission<br>Rate from Mechanical<br>Entrainment during Grading<br>(Ci/yr) |
|--------------|---|--|--|
| Actinium-228 | 0.719   | 5.31E-09   | 2.85E-08   |
| Bismuth-212  | 0.628   | 4.64E-09   | 2.49E-08   |
| Bismuth-214  | 1.09  | 8.05E-09   | 4.32E-08   |
| Carbon-14    | 11.3  | 8.34E-08   | 4.48E-07   |
| Cesium-137   | 0.115   | 8.49E-10   | 4.56E-09   |
| Cobalt-60    | 0.028   | 2.07E-10   | 1.11E-09   |
| Lead-210     | 4.96  | 3.66E-08   | 1.97E-07   |
| Lead-212     | 0.744   | 5.49E-09   | 2.95E-08   |
| Lead-214     | 1.41  | 1.04E-08   | 5.59E-08   |
| Potassium-40 | 14.3  | 1.06E-07   | 5.67E-07   |
| Radium-226   | 1.9   | 1.40E-08   | 7.53E-08   |
| Strontium-90 | 0.675   | 4.98E-09   | 2.67E-08   |
| Thallium-208 | 0.272   | 2.01E-09   | 1.08E-08   |
| Thorium-234  | 1.62  | 1.20E-08   | 6.42E-08   |
| Uranium-235  | 0.232   | 1.71E-09   | 9.19E-09   |
| Uranium-238  | 1.62  | 1.20E-08   | 6.42E-08   |

**Note**

<sup>1</sup>Not corrected for background or decay.

**Abbreviations**

Ci/yr            curies per year  
pCi/g            picocuries per gram  
PM<sub>10</sub>            particulate matter with an aerodynamic diameter less than or equal to 10 micrometers

Table 4. Maximum Surface-Soil Concentrations for Radionuclides Exceeding Background and PM<sub>10</sub> Emission Rates, LEHR Eastern Dog Pens Area

| Radionuclide | Maximum Concentration <sup>1</sup><br>(pCi/g) | Maximum PM <sub>10</sub> Emission Rate<br>(Ci/yr) |
|--------------|---|---|
| Bismuth-212  | 0.415   | 3.19E-09  |
| Bismuth-214  | 0.572   | 4.39E-09  |
| Cesium-137   | 0.191   | 1.47E-09  |
| Lead-214     | 0.607   | 4.66E-09  |
| Strontium-90 | 0.164   | 1.26E-09  |
| Thallium-208 | 0.219   | 1.68E-09  |
| Thorium-228  | 1.54  | 1.18E-08  |
| Thorium-232  | 1.26  | 9.68E-09  |
| Thorium-234  | 0.89  | 6.84E-09  |
| Tritium      | 1.21  | 9.29E-09  |
| Uranium-235  | 0.383   | 2.94E-10  |

**Note**

<sup>1</sup>Not corrected for background or decay.

**Abbreviations**

Ci/yr            curies per year  
 pCi/g           picocuries per gram  
 PM<sub>10</sub>           particulate matter with an aerodynamic diameter less than or equal to 10 micrometers

Table 5. Maximum Soil Concentrations for Radionuclides Exceeding Background and PM<sub>10</sub> Emission Rates, Installation of LEHR Southwest Trenches Overburden

| Radionuclide | Maximum Concentration <sup>1</sup><br>(pCi/g) | Maximum PM <sub>10</sub> Emission Rate<br>(Ci/yr) |
|--------------|---|---|
| Lead-210     | 9.77  | 1.61E-07  |
| Lead-214     | 0.722   | 1.19E-08  |
| Strontium-90 | 0.423   | 6.95E-09  |
| Thorium-228  | 0.652   | 1.07E-08  |

**Note**

<sup>1</sup>Not corrected for background or decay.

**Abbreviations**

Ci/yr curies per year  
pCi/g picocuries per gram  
PM<sub>10</sub> particulate matter with an aerodynamic diameter less than or equal to 10 micrometers

Table 6. On-Site Effective Dose Equivalent to Maximally Exposed Individual Resulting from Radionuclide Emissions from Each Potential Fugitive-Dust-Emission Diffuse Source

| Receptor Location                                      | Western Dog Pens Area <sup>1</sup> |                       | Eastern Dog Pens Area  |                       | Total Dose to MEI<br>(mrem/yr) <sup>4</sup> |
|--|------------------------------------|-----------------------|------------------------|-----------------------|---|
|  | (mrem/yr) <sup>2</sup>             | Location <sup>3</sup> | (mrem/yr) <sup>2</sup> | Location <sup>3</sup> |   |
| Equipment Operator (center of Western Dog Pens area)   | 5.2E-02                            | 1 m <sup>5</sup>      | 1.9E-05                | 100 m NW              | <b>5.2E-02</b>                              |
| Specimen Storage Building (Building H-216)             | 1.5E-02                            | 48 m W                | 3.4E-04                | 132 m W               | 1.6E-02                                     |
| UC Davis Building E of LEHR Site                       | 2.1E-03                            | 300 m E               | 5.2E-05                | 180 m E               | 2.2E-03                                     |
| Off-Site Receptor S of Putah Creek                     | 2.0E-03                            | 1,200 m S             | 5.1E-06                | 1,000 m S             | 2.0E-03                                     |
| Off-Site Receptor W of LEHR Site                       | 2.2E-03                            | 400 m W               | 2.5E-05                | 500 m W               | 2.3E-03                                     |
| Animal Hospital Building No. 1 (Building H-219)        | 9.3E-03                            | 65 m W                | 2.2E-04                | 165 m W               | 9.5E-03                                     |
| Inter-Regional Project No. 4 Building (Building H-217) | 1.3E-02                            | 52 m W                | 2.9E-04                | 143 m W               | 1.3E-02                                     |
| Animal Hospital Building No. 2 (Building H-218)        | 9.3E-03                            | 65 m W                | 2.2E-04                | 165 m W               | 9.5E-03                                     |
| Cellular Biology Laboratory (Building H-294)           | 1.2E-02                            | 65 m N                | 3.9E-04                | 150 m NNE             | 1.2E-02                                     |
| Clinical Pathology (H-215)                             | 5.3E-03                            | 99 m W                | 2.6E-04                | 150 m W               | 5.5E-03                                     |
| Main Office (H-213)                                    | 1.2E-02                            | 65 m NW               | 2.2E-04                | 187 m NW              | 1.2E-02                                     |

**Notes**

<sup>1</sup>The dose for the Western Dog Pens area is the sum of the dose from wind-entrained particulates before grading, the mechanically entrained particulates during the scarification of the Western Dog Pens soil and the grading of the Southwest Trenches Overburden soil.

<sup>2</sup>The effective dose equivalent to the maximally exposed individual is taken as the maximum modeled dose within a 45° sector in the direction and at the distance indicated in the "Location" column. For example, the dose 65 m north of the Western Dog Pens area would be the maximum modeled dose within the sector bounded by 65 m NNE and 65 m NNW.

<sup>3</sup>The distance from an area source to a receptor is defined by CAP88-PC as the distance from the centroid of the area source to the receptor (US EPA, 1992). For the LEHR facility CAP88-PC modeling, the distance from an area diffuse source to a receptor is measured as the approximate distance from the centroid of the diffuse source to the centroid of the building assumed to house the receptor.

<sup>4</sup>The total dose is the sum of the EDEs modeled for each MEI receptor from the two potential radionuclide fugitive-dust-emission diffuse sources. Value in **bold face** is the maximum total dose to the MEI.

<sup>5</sup>One m is the shortest distance available in CAP88-PC.

**Abbreviations**

|         |                              |          |                                 |
|---------|------------------------------|----------|---------------------------------|
| E       | east                         | EDE      | effective dose equivalent       |
| NW      | northwest                    | m        | meters                          |
| MEI     | maximally exposed individual | No.      | number                          |
| mrem/yr | millirem(s) per year         | S        | south                           |
| N       | north                        | UC Davis | University of California, Davis |
| NNE     | north by northeast           | W        | west                            |

Table 7. Estimated Collective Population Dose Resulting from Radionuclide Emissions from Diffuse Sources

| Potential Source   | Off-Site Maximally Exposed Individual |               | Collective Population Dose <sup>1</sup><br>(person-rem/yr) |
|--|---------------------------------------|---------------|--|
|  | (mrem/yr)                             | Location      |  |
| Western Dog Pens Area before Grading Operations                                    | 4.39E-07                              | 5,000 m north | 3.07E-05   |
| Eastern Dog Pens Area  | 6.90E-07                              | 5,000 m north | 3.47E-05   |
| Western Dog Pens Area Soil, during Grading Operations                              | 2.36E-06                              | 5,000 m north | 1.65E-04   |
| Western Dog Pens Area during Southwest Trenches Overburden Soil Grading Operations | 1.13E-06                              | 5,000 m north | 8.50E-05   |
| <b>Total LEHR Site</b>   | <b>4.6E-06</b>                        |               | <b>3.2E-04</b>   |

**Notes**

Source of data: CAP88-PC, Version 1.0 modeling output files.

<sup>1</sup>The collective population dose is for receptors within a 80-km radius.

**Abbreviations**

km                    kilometer(s)  
 LEHR                Laboratory for Energy-Related Health Research  
 m                     meter(s)  
 mrem/yr            millirem per year  
 person-rem/yr    person-roentgen equivalent man per year

Table 8. CAP88-PC Input for the Western Dog Pens Area

|  |  |   |                       |                        |                    |
|--|--|---|-----------------------|------------------------|--------------------|
| <b>Run type</b>  | Individual   | Receptor distances (m): 1, 48, 52, 65, 99, 300, 400, 1200 |                       |                        |                    |
| <b>Run type</b>  | Population   | Population file to use: 06LEHR.POP                        |                       |                        |                    |
| <b>Modeling Options</b>                                | Generate genetic effects?                                      | Yes   |                       |                        |                    |
|  | Create Dose and Risk Factor file?                              | Yes   |                       |                        |                    |
|  | Create Concentration Table file?                               | Yes   |                       |                        |                    |
|  | Create Chi/Q Table file?                                       | Yes   |                       |                        |                    |
| <b>Meteorological Data</b>                             |  |   |                       |                        |                    |
| Wind file to use:                                      | SAC0320.WND (CAP88-PC supplied wind file)                      |   |                       |                        |                    |
| Annual precipitation (cm/yr):                          | 47.0 (2006 Davis total)  |   |                       |                        |                    |
| Annual ambient temperature (°C):                       | 16.3 (2006 Davis average)                                      |   |                       |                        |                    |
| Height of lid (m):                                     | 1,000 (CAP88-PC default)                                       |   |                       |                        |                    |
| <b>Source Data</b>                                     |  |   |                       |                        |                    |
| Source type:   | AREA   |   |                       |                        |                    |
| Number of source:                                      | 1  |   |                       |                        |                    |
| Height (m):  | 0  |   |                       |                        |                    |
| Area (m <sup>2</sup> ):                                | 5,263  |   |                       |                        |                    |
| Plume rise:  | Zero (Plume rise is zero for each Pasquill stability category) |   |                       |                        |                    |
| <b>Agricultural Data</b>                               |  |   |                       |                        |                    |
| Source: Rural (CAP88-PC defaults)                      |  |   |                       |                        |                    |
|  | Vegetable  | Milk  | Beef                  |                        |                    |
| Fraction home produced:                                | 0.7  | 0.399   | 0.442                 |                        |                    |
| Fraction from assessment area:                         | 0.3  | 0.601   | 0.558                 |                        |                    |
| Fraction imported:                                     | 0  | 0   | 0                     |                        |                    |
| Beef cattle density (No./km <sup>2</sup> ):            | 8.81E-02 (CAP88-PC default)                                    |   |                       |                        |                    |
| Milk cattle density (No./km <sup>2</sup> ):            | 2.85E-02 (CAP88-PC default)                                    |   |                       |                        |                    |
| Land fraction cultivated for vegetable crops:          | 0.25 (Site-specific parameter per 1995 NESHAPs)                |   |                       |                        |                    |
| <b>Radionuclide Release Data</b>                       |  |   |                       |                        |                    |
| PM <sub>10</sub> emission rate (g/m <sup>2</sup> -hr): | 5.32E-05 (Using Cowherd, 1985, unlimited erosion potential)    |   |                       |                        |                    |
|  | Nuclide  | Max. Soil (pCi/g)   | Emission Rate (Ci/yr) | Size <sup>1</sup> (µm) | Class <sup>1</sup> |
|  | Ac-228   | 0.719   | 5.31E-09              | 1                      | Y                  |
|  | Bi-212   | 0.628   | 4.64E-09              | 1                      | W                  |
|  | Bi-214   | 1.09  | 8.05E-09              | 1                      | W                  |
|  | C-14   | 11.3  | 8.34E-08              | 0                      | G                  |
|  | Cs-137   | 0.115   | 8.49E-10              | 1                      | D                  |
|  | Co-60  | 0.028   | 2.07E-10              | 1                      | Y                  |
|  | Pb-210   | 4.96  | 3.66E-08              | 1                      | D                  |
|  | Pb-212   | 0.744   | 5.49E-09              | 1                      | D                  |
|  | Pb-214   | 1.41  | 1.04E-08              | 1                      | D                  |
|  | K-40   | 14.3  | 1.06E-07              | 1                      | D                  |
|  | Ra-226   | 1.9   | 1.40E-08              | 1                      | W                  |
|  | Sr-90  | 0.675   | 4.98E-09              | 1                      | D                  |
|  | Tl-208   | 0.272   | 2.01E-09              | 1                      | D                  |
|  | Th-234   | 1.62  | 1.20E-08              | 1                      | Y                  |
|  | U-235  | 0.232   | 1.71E-09              | 1                      | Y                  |
|  | U-238  | 1.62  | 1.20E-08              | 1                      | Y                  |

Table 8. CAP88-PC Input for the Western Dog Pens Area (continued)

**Note**

<sup>1</sup>CAP88-PC default particle size and lung retention class (D = day, G = gas, W = week, Y = year).

**Abbreviations**

|                      |  |
|----------------------|--|
| µm                   | micrometer   |
| km <sup>2</sup>      | square kilometer   |
| °C                   | degrees Celsius  |
| Ac-228               | actinium-228   |
| Bi-212               | bismuth-212  |
| Bi-214               | bismuth-214  |
| C-14                 | carbon-14  |
| Ci/yr                | curies per year  |
| cm/yr                | centimeter(s) per year   |
| Co-60                | cobalt-60  |
| Cs-137               | cesium-137   |
| g/m <sup>2</sup> -hr | grams per square meter-hour(s)   |
| K-40                 | potassium-40   |
| m                    | meters   |
| m <sup>2</sup>       | square meter(s)  |
| Max.                 | maximum (concentration)  |
| NESHAPs              | National Emissions Standards for Hazardous Air Pollutants                            |
| No.                  | number   |
| Pb-210               | lead-210   |
| Pb-212               | lead-212   |
| Pb-214               | lead-214   |
| pCi/g                | picocurie per gram   |
| PM <sub>10</sub>     | particulate matter with an aerodynamic diameter less than or equal to 10 micrometers |
| Ra-226               | radium-226   |
| Sr-90                | strontium-90   |
| Th-234               | thorium-234  |
| Tl-208               | thallium-208   |
| U-235                | uranium-235  |
| U-238                | uranium-238  |

Table 9. CAP88-PC Input for the Eastern Dog Pens Area

|  |  |  |                       |                        |                    |
|--|--|--|-----------------------|------------------------|--------------------|
| <b>Run type</b>  | Individual   | Receptor distances (m): 1, 132, 143, 150, 165, 180, 187, 500, 1000 |                       |                        |                    |
| <b>Run type</b>  | Population   | Population file to use: 06LEHR.POP                                 |                       |                        |                    |
| <b>Modeling Options</b>                                | Generate genetic effects?                                      | Yes  |                       |                        |                    |
|  | Create Dose and Risk Factor file?                              | Yes  |                       |                        |                    |
|  | Create Concentration Table file?                               | Yes  |                       |                        |                    |
|  | Create Chi/Q Table file?                                       | Yes  |                       |                        |                    |
| <b>Meteorological Data</b>                             |  |  |                       |                        |                    |
| Wind file to use:                                      | SAC0320.WND (CAP88-PC supplied wind file)                      |  |                       |                        |                    |
| Annual precipitation (cm/yr):                          | 47.0 (2006 Davis total)  |  |                       |                        |                    |
| Annual ambient temperature (°C):                       | 16.3 (2006 Davis average)                                      |  |                       |                        |                    |
| Height of lid (m):                                     | 1,000 (CAP88-PC default)                                       |  |                       |                        |                    |
| <b>Source Data</b>                                     |  |  |                       |                        |                    |
| Source type:   | AREA   |  |                       |                        |                    |
| Number of source:                                      | 1  |  |                       |                        |                    |
| Height (m):  | 0  |  |                       |                        |                    |
| Area (m <sup>2</sup> ):                                | 3,900  |  |                       |                        |                    |
| Plume rise:  | Zero (Plume rise is zero for each Pasquill stability category) |  |                       |                        |                    |
| <b>Agricultural Data</b>                               |  |  |                       |                        |                    |
|  | Source: Rural (CAP88-PC defaults)                              |  |                       |                        |                    |
|  | Vegetable  | Milk   | Beef                  |                        |                    |
| Fraction home produced:                                | 0.7  | 0.399  | 0.442                 |                        |                    |
| Fraction from assessment area:                         | 0.3  | 0.601  | 0.558                 |                        |                    |
| Fraction imported:                                     | 0  | 0  | 0                     |                        |                    |
| Beef cattle density (No./km <sup>2</sup> ):            | 8.81E-02 (CAP88-PC default)                                    |  |                       |                        |                    |
| Milk cattle density (No./km <sup>2</sup> ):            | 2.85E-02 (CAP88-PC default)                                    |  |                       |                        |                    |
| Land fraction cultivated for vegetable crops:          | 0.25 (Site specific parameter per 1995 NESHAPs)                |  |                       |                        |                    |
| <b>Radionuclide Release Data</b>                       |  |  |                       |                        |                    |
| PM <sub>10</sub> emission Rate (g/m <sup>2</sup> -hr): | 5.32E-05 (Using Cowherd, 1985, unlimited erosion potential)    |  |                       |                        |                    |
|  | Nuclide  | Max. Soil (pCi/g)  | Emission Rate (Ci/yr) | Size <sup>1</sup> (µm) | Class <sup>1</sup> |
|  | Bi-212   | 0.415  | 3.19E-09              | 1                      | W                  |
|  | Bi-214   | 0.572  | 4.39E-09              | 1                      | W                  |
|  | Cs-137   | 0.191  | 1.47E-09              | 1                      | D                  |
|  | Pb-214   | 0.607  | 4.66E-09              | 1                      | D                  |
|  | Sr-90  | 0.164  | 1.26E-09              | 1                      | D                  |
|  | Tl-208   | 0.219  | 1.68E-09              | 1                      | D                  |
|  | Th-228   | 1.54   | 1.18E-08              | 1                      | Y                  |
|  | Th-232   | 1.26   | 9.68E-09              | 1                      | Y                  |
|  | Th-234   | 0.89   | 6.84E-09              | 1                      | Y                  |
|  | H-3  | 1.21   | 9.29E-09              | 0                      | G                  |
|  | U-235  | 0.0383   | 2.94E-10              | 1                      | Y                  |

**Note**

<sup>1</sup>CAP88-PC default particle size and lung retention class (D = day, G = gas, W = week, Y = year).

**Abbreviations**

µm                      micrometer  
°C                        degrees Celsius

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Table 9. CAP88-PC Input for the Eastern Dog Pens Area (continued)

---

|                      |  |
|----------------------|--|
| Bi-212               | bismuth-212  |
| Bi-214               | bismuth-214  |
| Ci/yr                | curies per year  |
| cm/yr                | centimeter(s) per year   |
| Cs-137               | cesium-137   |
| g/m <sup>2</sup> -hr | grams per square meter-hour(s)   |
| H-3                  | tritium  |
| km <sup>2</sup>      | square kilometer   |
| m                    | meter(s)   |
| m <sup>2</sup>       | square meter(s)  |
| Max.                 | maximum (concentration)  |
| NESHAPs              | National Emissions Standards for Hazardous Air Pollutants                            |
| No.                  | number   |
| Pb-214               | lead-214   |
| pCi/g                | picocurie per gram   |
| PM <sub>10</sub>     | particulate matter with an aerodynamic diameter less than or equal to 10 micrometers |
| Sr-90                | strontium-90   |
| Th-228               | thorium-228  |
| Th-232               | thorium-232  |
| Th-234               | thorium-234  |
| Tl-208               | thallium-208   |
| U-235                | uranium-235  |

Table 10. CAP88-PC Input for the Western Dog Pens Area during Scarification

|   |  |   |                       |                        |                    |
|---|--|---|-----------------------|------------------------|--------------------|
| <b>Run type</b>                               | Individual   | Receptor distances (m): 1, 48, 52, 65, 99, 300, 400, 1200 |                       |                        |                    |
| <b>Run type</b>                               | Population   | Population file to use: 06LEHR.POP                        |                       |                        |                    |
| <b>Modeling Options</b>                       | Generate genetic effects?                                      | Yes   |                       |                        |                    |
|   | Create Dose and Risk Factor file?                              | Yes   |                       |                        |                    |
|   | Create Concentration Table file?                               | Yes   |                       |                        |                    |
|   | Create Chi/Q Table file?                                       | Yes   |                       |                        |                    |
| <b>Meteorological Data</b>                    |  |   |                       |                        |                    |
| Wind file to use:                             | SAC0320.WND (CAP88-PC supplied wind file)                      |   |                       |                        |                    |
| Annual precipitation (cm/yr):                 | 47.0 (2006 Davis total)  |   |                       |                        |                    |
| Annual ambient temperature (°C):              | 16.3 (2006 Davis average)                                      |   |                       |                        |                    |
| Height of lid (m):                            | 1,000 (CAP88-PC default)                                       |   |                       |                        |                    |
| <b>Source Data</b>                            |  |   |                       |                        |                    |
| Source type:                                  | AREA   |   |                       |                        |                    |
| Number of source:                             | 1  |   |                       |                        |                    |
| Height (m):                                   | 0  |   |                       |                        |                    |
| Area (m <sup>2</sup> ):                       | 5,263  |   |                       |                        |                    |
| Plume rise:                                   | Zero (Plume rise is zero for each Pasquill stability category) |   |                       |                        |                    |
| <b>Agricultural Data</b>                      |  |   |                       |                        |                    |
| Source: Rural (CAP88-PC defaults)             |  |   |                       |                        |                    |
|   | Vegetable  | Milk  | Beef                  |                        |                    |
| Fraction home produced:                       | 0.7  | 0.399   | 0.442                 |                        |                    |
| Fraction from assessment area:                | 0.3  | 0.601   | 0.558                 |                        |                    |
| Fraction imported:                            | 0  | 0   | 0                     |                        |                    |
| Beef cattle density (No./km <sup>2</sup> ):   | 8.81E-02 (CAP88-PC default)                                    |   |                       |                        |                    |
| Milk cattle density (No./km <sup>2</sup> ):   | 2.85E-02 (CAP88-PC default)                                    |   |                       |                        |                    |
| Land fraction cultivated for vegetable crops: | 0.25 (Site-specific parameter per 1995 NESHAPs)                |   |                       |                        |                    |
| <b>Radionuclide Release Data</b>              |  |   |                       |                        |                    |
| PM <sub>10</sub> emission rate (g/yr):        | 3.96E-08 (Using US EPA, 2004, Equation 7-6)                    |   |                       |                        |                    |
|   | Nuclide  | Max. Soil (pCi/g)   | Emission Rate (Ci/yr) | Size <sup>1</sup> (µm) | Class <sup>1</sup> |
|   | Ac-228   | 0.719   | 2.85E-08              | 1                      | Y                  |
|   | Bi-212   | 0.628   | 2.49E-08              | 1                      | W                  |
|   | Bi-214   | 1.09  | 4.32E-08              | 1                      | W                  |
|   | C-14   | 11.3  | 4.48E-07              | 0                      | G                  |
|   | Cs-137   | 0.115   | 4.56E-09              | 1                      | D                  |
|   | Co-60  | 0.028   | 1.11E-09              | 1                      | Y                  |
|   | Pb-210   | 4.96  | 1.97E-07              | 1                      | D                  |
|   | Pb-212   | 0.744   | 2.95E-08              | 1                      | D                  |
|   | Pb-214   | 1.41  | 5.59E-08              | 1                      | D                  |
|   | K-40   | 14.3  | 5.67E-07              | 1                      | D                  |
|   | Ra-226   | 1.9   | 7.53E-08              | 1                      | W                  |
|   | Sr-90  | 0.675   | 2.67E-08              | 1                      | D                  |
|   | Tl-208   | 0.272   | 1.08E-08              | 1                      | D                  |
|   | Th-234   | 1.62  | 6.42E-08              | 1                      | Y                  |
|   | U-235  | 0.232   | 9.19E-09              | 1                      | Y                  |
|   | U-238  | 1.62  | 6.42E-08              | 1                      | Y                  |

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Table 10. CAP88-PC Input for the Western Dog Pens Area during Scarification (continued)

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**Note**

<sup>1</sup>CAP88-PC default particle size and lung retention class (D = day, G = gas, W = week, Y = year).

**Abbreviations**

|                      |  |
|----------------------|--|
| µm                   | micrometer   |
| km <sup>2</sup>      | square kilometer   |
| °C                   | degrees Celsius  |
| Ac-228               | actinium-228   |
| Bi-212               | bismuth-212  |
| Bi-214               | bismuth-214  |
| C-14                 | carbon-14  |
| Ci/yr                | curies per year  |
| cm/yr                | centimeter(s) per year   |
| Co-60                | cobalt-60  |
| Cs-137               | cesium-137   |
| g/m <sup>2</sup> -hr | grams per square meter-hour(s)   |
| K-40                 | potassium-40   |
| m                    | meters   |
| m <sup>2</sup>       | square meter(s)  |
| Max.                 | maximum (concentration)  |
| NESHAPs              | National Emissions Standards for Hazardous Air Pollutants                            |
| No.                  | number   |
| Pb-210               | lead-210   |
| Pb-212               | lead-212   |
| Pb-214               | lead-214   |
| pCi/g                | picocurie per gram   |
| PM <sub>10</sub>     | particulate matter with an aerodynamic diameter less than or equal to 10 micrometers |
| Ra-226               | radium-226   |
| Sr-90                | strontium-90   |
| Th-234               | thorium-234  |
| Tl-208               | thallium-208   |
| U-235                | uranium-235  |
| U-238                | uranium-238  |

Table 11. CAP88-PC Input for the Western Dog Pens during Installation of the Southwest Trenches Overburden

|                                  |   |  |                   |                       |                        |                    |
|----------------------------------|---|--|-------------------|-----------------------|------------------------|--------------------|
| <b>Run type</b>                  | Individual                                    | Receptor distances (m): 1, 48, 52, 65, 99, 300, 400, 1200      |                   |                       |                        |                    |
| <b>Run type</b>                  | Population                                    | Population file to use: 06LEHR.POP                             |                   |                       |                        |                    |
| <b>Modeling Options</b>          | Generate genetic effects?                     | Yes  |                   |                       |                        |                    |
|                                  | Create Dose and Risk Factor file?             | Yes  |                   |                       |                        |                    |
|                                  | Create Concentration Table file?              | Yes  |                   |                       |                        |                    |
|                                  | Create Chi/Q Table file?                      | Yes  |                   |                       |                        |                    |
| <b>Meteorological Data</b>       |   |  |                   |                       |                        |                    |
|                                  | Wind file to use:                             | SAC0320.WND (CAP88-PC supplied wind file)                      |                   |                       |                        |                    |
|                                  | Annual precipitation (cm/yr):                 | 47.0 (2006 Davis total)  |                   |                       |                        |                    |
|                                  | Annual ambient temperature (°C):              | 16.3 (2006 Davis average)                                      |                   |                       |                        |                    |
|                                  | Height of lid (m):                            | 1,000 (CAP88-PC default)                                       |                   |                       |                        |                    |
| <b>Source Data</b>               |   |  |                   |                       |                        |                    |
|                                  | Source type:                                  | AREA   |                   |                       |                        |                    |
|                                  | Number of source:                             | 1  |                   |                       |                        |                    |
|                                  | Height (m):                                   | 0  |                   |                       |                        |                    |
|                                  | Area (m <sup>2</sup> ):                       | 5,263  |                   |                       |                        |                    |
|                                  | Plume rise:                                   | Zero (Plume rise is zero for each Pasquill stability category) |                   |                       |                        |                    |
| <b>Agricultural Data</b>         |   |  |                   |                       |                        |                    |
|                                  | Source:                                       | Rural (CAP88-PC defaults)                                      |                   |                       |                        |                    |
|                                  |   | Vegetable  | Milk              | Beef                  |                        |                    |
|                                  | Fraction home produced:                       | 0.7  | 0.399             | 0.442                 |                        |                    |
|                                  | Fraction from assessment area:                | 0.3  | 0.601             | 0.558                 |                        |                    |
|                                  | Fraction imported:                            | 0  | 0                 | 0                     |                        |                    |
|                                  | Beef cattle density (No./km <sup>2</sup> ):   | 8.81E-02 (CAP88-PC default)                                    |                   |                       |                        |                    |
|                                  | Milk cattle density (No./km <sup>2</sup> ):   | 2.85E-02 (CAP88-PC default)                                    |                   |                       |                        |                    |
|                                  | Land fraction cultivated for vegetable crops: | 0.25 (Site specific parameter per 1995 NESHAPs)                |                   |                       |                        |                    |
| <b>Radionuclide Release Data</b> |   |  |                   |                       |                        |                    |
|                                  | PM <sub>10</sub> emission Rate (g/yr):        | 1.64E-08 (Using US EPA, 2004, Equation 7-6)                    |                   |                       |                        |                    |
|                                  |   | Nuclide  | Max. Soil (pCi/g) | Emission Rate (Ci/yr) | Size <sup>1</sup> (µm) | Class <sup>1</sup> |
|                                  |   | Pb-210   | 9.77              | 1.61E-07              | 1                      | D                  |
|                                  |   | Pb-214   | 0.722             | 1.19E-08              | 1                      | D                  |
|                                  |   | Sr-90  | 0.423             | 6.95E-09              | 1                      | D                  |
|                                  |   | Th-228   | 0.652             | 1.07E-08              | 1                      | Y                  |

**Note**

<sup>1</sup>CAP88-PC default particle size and lung retention class (D = day, G = gas, W = week, Y = year).

**Abbreviations**

|                      |   |
|----------------------|---|
| µm                   | micrometer  |
| °C                   | degrees Celsius   |
| Ci/yr                | curies per year   |
| cm/yr                | centimeter(s) per year                                    |
| g/m <sup>2</sup> -hr | grams per square meter-hour(s)                            |
| km <sup>2</sup>      | square kilometer  |
| m                    | meter(s)  |
| m <sup>2</sup>       | square meter(s)   |
| Max.                 | maximum (concentration)                                   |
| NESHAPs              | National Emissions Standards for Hazardous Air Pollutants |

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Table 11. CAP88-PC Input for the Western Dog Pens during Installation of the Southwest Trenches Overburden (continued)

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|                  |  |
|------------------|--|
| No.              | number   |
| Pb-210           | lead-210   |
| Pb-214           | lead-214   |
| pCi/g            | picocurie per gram   |
| PM <sub>10</sub> | particulate matter with an aerodynamic diameter less than or equal to 10 micrometers |
| Sr-90            | strontium-90   |
| Th-228           | thorium-228  |

## **FIGURES**

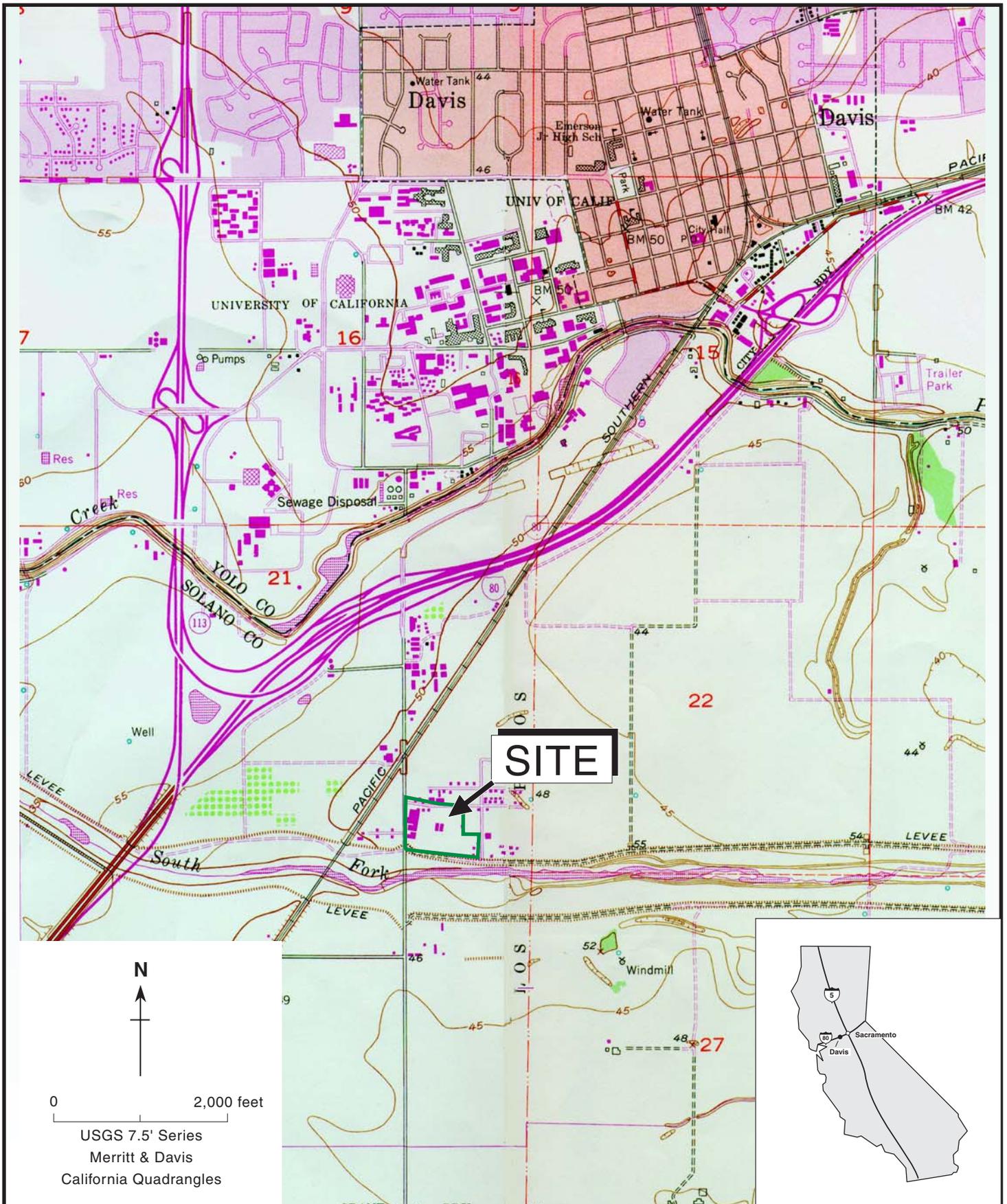


Figure 1. LEHR Facility Location Map, University of California, Davis

Weiss Associates

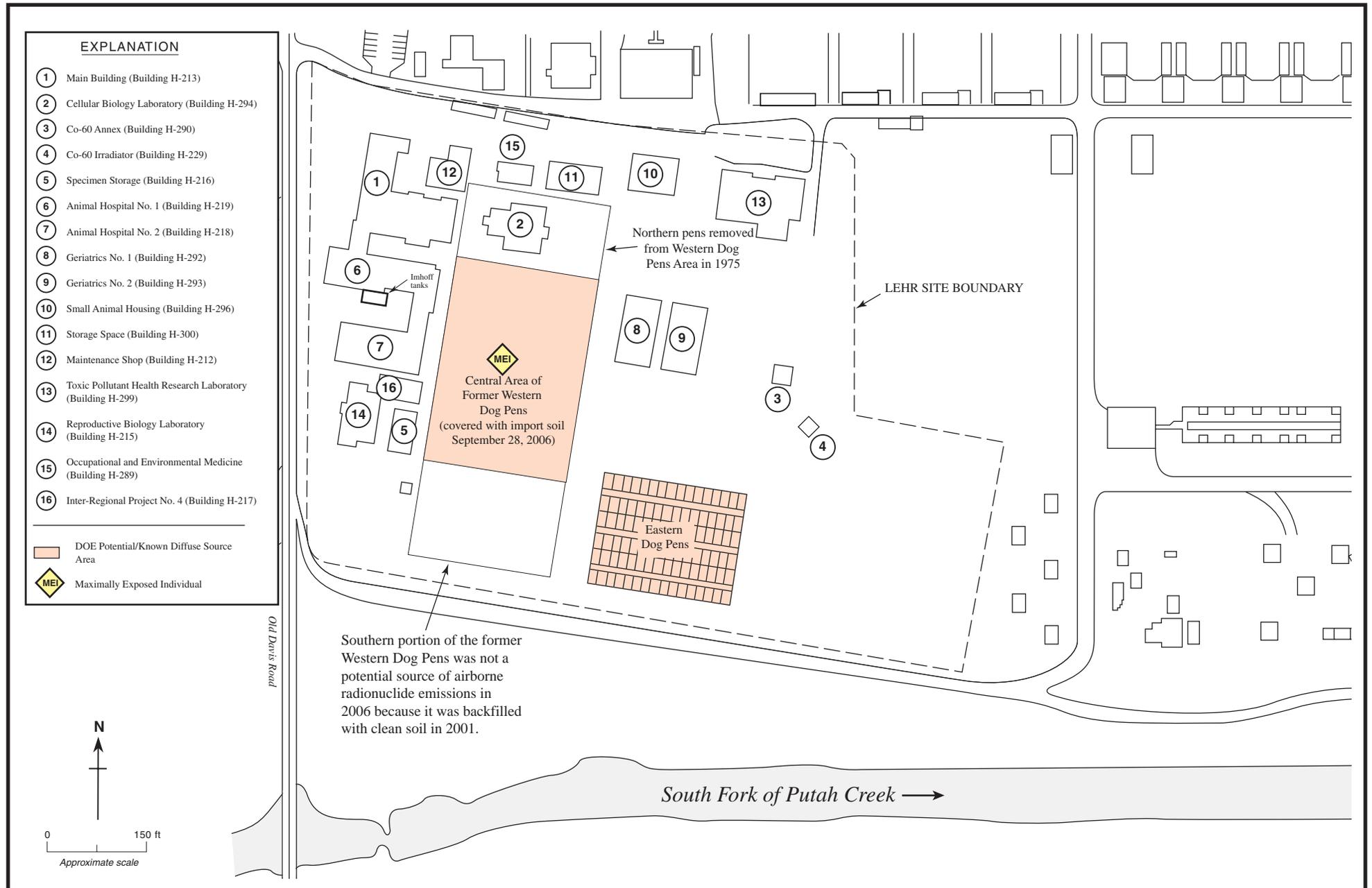


Figure 2. LEHR Facility DOE Diffuse-Source Areas and Location of Maximally Exposed Individual

## **APPENDIX A**

### **CAP88-PC OUTPUT RESULTS**

B

C A P 8 8 - P C

Versi on 1. 00

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  
May 31, 2007 9:49 am

Facility: LEHR  
Address: Old Davis Road  
City: Davis  
State: CA                      Zip: 95616

Source Category: diffuse  
Source Type: Area  
Emission Year: 2006

Comments: Western Dog Pens area, individual run

Dataset Name: WDPind06  
Dataset Date: May 31, 2007 9:08 am  
Wind File: WNDFILES\SAC0320.WND

May 31, 2007 9:49 am

SUMMARY  
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

| Organ   | Selected Individual (mrem/y) |
|---------|------------------------------|
| GONADS  | 1.04E-03                     |
| BREAST  | 9.97E-04                     |
| R MAR   | 4.16E-03                     |
| LUNGS   | 2.38E-02                     |
| THYROID | 1.01E-03                     |
| ENDOST  | 4.80E-02                     |
| RMNDR   | 4.41E-03                     |

EFFEC B 6.56E-03

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

| Pathway        | Selected Individual (mrem/y) |
|----------------|------------------------------|
| INGESTION      | 2.59E-03                     |
| INHALATION     | 3.61E-03                     |
| AIR IMMERSION  | 4.77E-08                     |
| GROUND SURFACE | 3.66E-04                     |
| INTERNAL       | 6.19E-03                     |
| EXTERNAL       | 3.66E-04                     |
| TOTAL          | 6.56E-03                     |

May 31, 2007 9:49 am

SUMMARY  
Page 2

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

| Nuclide | Selected Individual (mrem/y) |
|---------|------------------------------|
| AC-228  | 7.45E-07                     |
| BI-212  | 2.56E-07                     |
| BI-214  | 1.85E-08                     |
| C-14    | 4.67E-06                     |
| CS-137  | 1.19E-06                     |
| CO-60   | 1.93E-06                     |
| PB-210  | 2.77E-03                     |
| PB-212  | 1.50E-06                     |
| PB-214  | 1.85E-08                     |
| K-40    | 6.45E-04                     |
| RA-226  | 3.79E-04                     |
| SR-90   | 2.32E-05                     |
| TL-208  | 7.59E-09                     |
| TH-234  | 1.40E-06                     |
| U-235   | 3.59E-04                     |
| U-238   | 2.37E-03                     |
| TOTAL   | 6.56E-03                     |

May 31, 2007 9:49 am

SUMMARY  
Page 3

CANCER RISK SUMMARY

Cancer Selected Individual Total Lifetime Fatal Cancer Risk  
Page 2

## B

|          |          |
|----------|----------|
| LEUKEMIA | 6.07E-09 |
| BONE     | 2.66E-09 |
| THYROID  | 3.63E-10 |
| BREAST   | 3.05E-09 |
| LUNG     | 4.26E-08 |
| STOMACH  | 1.92E-09 |
| BOWEL    | 1.02E-09 |
| LIVER    | 1.33E-08 |
| PANCREAS | 1.61E-09 |
| URINARY  | 3.06E-09 |
| OTHER    | 1.97E-09 |
| TOTAL    | 7.77E-08 |

## PATHWAY RISK SUMMARY

| Pathway        | Selected Individual |                            |
|----------------|---------------------|----------------------------|
|                | Fatal               | Total Lifetime Cancer Risk |
| INGESTION      |                     | 2.36E-08                   |
| INHALATION     |                     | 4.52E-08                   |
| AIR IMMERSION  |                     | 1.15E-12                   |
| GROUND SURFACE |                     | 8.86E-09                   |
| INTERNAL       |                     | 6.88E-08                   |
| EXTERNAL       |                     | 8.86E-09                   |
| TOTAL          |                     | 7.77E-08                   |

May 31, 2007 9:49 am

SUMMARY  
Page 4

## NUCLIDE RISK SUMMARY

| Nuclide | Selected Individual |                            |
|---------|---------------------|----------------------------|
|         | Fatal               | Total Lifetime Cancer Risk |
| AC-228  |                     | 1.50E-11                   |
| BI-212  |                     | 3.29E-12                   |
| BI-214  |                     | 2.14E-12                   |
| C-14    |                     | 1.14E-10                   |
| CS-137  |                     | 3.12E-11                   |
| CO-60   |                     | 4.85E-11                   |
| PB-210  |                     | 1.98E-08                   |
| PB-212  |                     | 2.56E-11                   |
| PB-214  |                     | 3.17E-12                   |
| K-40    |                     | 1.62E-08                   |
| RA-226  |                     | 5.40E-09                   |
| SR-90   |                     | 3.92E-10                   |
| TL-208  |                     | 1.86E-13                   |
| TH-234  |                     | 4.81E-11                   |
| U-235   |                     | 4.73E-09                   |
| U-238   |                     | 3.09E-08                   |

B

TOTAL

7.77E-08

May 31, 2007 9:49 am

SUMMARY  
Page 5

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

---

|           |         | Distance (m) |         |         |         |         |         |     |
|-----------|---------|--------------|---------|---------|---------|---------|---------|-----|
| Direction |         | 1            | 48      | 52      | 65      | 99      | 300     | 400 |
| N         | 6.6E-03 | 2.0E-03      | 1.7E-03 | 1.2E-03 | 6.7E-04 | 2.7E-04 | 2.5E-04 |     |
| NNW       | 6.6E-03 | 2.2E-03      | 1.9E-03 | 1.3E-03 | 6.6E-04 | 2.6E-04 | 2.4E-04 |     |
| NW        | 6.6E-03 | 2.0E-03      | 1.7E-03 | 1.2E-03 | 6.4E-04 | 2.6E-04 | 2.4E-04 |     |
| WNW       | 6.6E-03 | 1.7E-03      | 1.5E-03 | 1.0E-03 | 5.7E-04 | 2.5E-04 | 2.3E-04 |     |
| W         | 6.6E-03 | 1.3E-03      | 1.1E-03 | 7.6E-04 | 4.5E-04 | 2.4E-04 | 2.3E-04 |     |
| WSW       | 6.6E-03 | 9.0E-04      | 7.7E-04 | 5.3E-04 | 3.4E-04 | 2.2E-04 | 2.2E-04 |     |
| SW        | 6.6E-03 | 7.0E-04      | 5.9E-04 | 4.0E-04 | 2.9E-04 | 2.2E-04 | 2.1E-04 |     |
| SSW       | 6.6E-03 | 7.5E-04      | 6.5E-04 | 4.6E-04 | 3.1E-04 | 2.2E-04 | 2.2E-04 |     |
| S         | 6.6E-03 | 8.9E-04      | 8.0E-04 | 6.0E-04 | 3.8E-04 | 2.3E-04 | 2.2E-04 |     |
| SSE       | 6.6E-03 | 9.5E-04      | 8.6E-04 | 6.6E-04 | 4.2E-04 | 2.4E-04 | 2.3E-04 |     |
| SE        | 6.6E-03 | 8.9E-04      | 7.9E-04 | 5.8E-04 | 3.7E-04 | 2.3E-04 | 2.2E-04 |     |
| ESE       | 6.6E-03 | 7.5E-04      | 6.5E-04 | 4.6E-04 | 3.1E-04 | 2.2E-04 | 2.2E-04 |     |
| E         | 6.6E-03 | 7.4E-04      | 6.2E-04 | 4.3E-04 | 3.0E-04 | 2.2E-04 | 2.2E-04 |     |
| ENE       | 6.6E-03 | 9.6E-04      | 8.2E-04 | 5.7E-04 | 3.5E-04 | 2.2E-04 | 2.2E-04 |     |
| NE        | 6.6E-03 | 1.3E-03      | 1.1E-03 | 7.6E-04 | 4.6E-04 | 2.4E-04 | 2.3E-04 |     |
| NNE       | 6.6E-03 | 1.8E-03      | 1.6E-03 | 1.1E-03 | 5.8E-04 | 2.5E-04 | 2.3E-04 |     |

---

|           |         | Distance (m) |
|-----------|---------|--------------|
| Direction |         | 1200         |
| N         | 2.2E-04 |              |
| NNW       | 2.1E-04 |              |
| NW        | 2.1E-04 |              |
| WNW       | 2.1E-04 |              |
| W         | 2.1E-04 |              |
| WSW       | 2.1E-04 |              |
| SW        | 2.1E-04 |              |
| SSW       | 2.1E-04 |              |
| S         | 2.1E-04 |              |
| SSE       | 2.1E-04 |              |
| SE        | 2.1E-04 |              |
| ESE       | 2.1E-04 |              |
| E         | 2.1E-04 |              |
| ENE       | 2.1E-04 |              |
| NE        | 2.1E-04 |              |
| NNE       | 2.1E-04 |              |

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May 31, 2007 9:49 am

SUMMARY  
Page 6

## B

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

| Direction | Distance (m) |         |         |         |         |         |         |
|-----------|--------------|---------|---------|---------|---------|---------|---------|
|           | 1            | 48      | 52      | 65      | 99      | 300     | 400     |
| N         | 7.8E-08      | 2.4E-08 | 2.0E-08 | 1.4E-08 | 7.6E-09 | 2.9E-09 | 2.6E-09 |
| NNW       | 7.8E-08      | 2.5E-08 | 2.2E-08 | 1.5E-08 | 7.5E-09 | 2.7E-09 | 2.5E-09 |
| NW        | 7.8E-08      | 2.3E-08 | 2.0E-08 | 1.3E-08 | 7.2E-09 | 2.8E-09 | 2.5E-09 |
| WNW       | 7.8E-08      | 2.0E-08 | 1.7E-08 | 1.2E-08 | 6.4E-09 | 2.6E-09 | 2.4E-09 |
| W         | 7.8E-08      | 1.5E-08 | 1.3E-08 | 8.7E-09 | 5.0E-09 | 2.5E-09 | 2.3E-09 |
| WSW       | 7.8E-08      | 1.0E-08 | 8.8E-09 | 6.0E-09 | 3.7E-09 | 2.3E-09 | 2.2E-09 |
| SW        | 7.8E-08      | 8.0E-09 | 6.6E-09 | 4.4E-09 | 3.1E-09 | 2.2E-09 | 2.2E-09 |
| SSW       | 7.8E-08      | 8.6E-09 | 7.4E-09 | 5.1E-09 | 3.3E-09 | 2.3E-09 | 2.2E-09 |
| S         | 7.8E-08      | 1.0E-08 | 9.2E-09 | 6.8E-09 | 4.2E-09 | 2.4E-09 | 2.3E-09 |
| SSE       | 7.8E-08      | 1.1E-08 | 9.9E-09 | 7.5E-09 | 4.7E-09 | 2.5E-09 | 2.4E-09 |
| SE        | 7.8E-08      | 1.0E-08 | 9.0E-09 | 6.5E-09 | 4.0E-09 | 2.4E-09 | 2.3E-09 |
| ESE       | 7.8E-08      | 8.6E-09 | 7.4E-09 | 5.1E-09 | 3.3E-09 | 2.3E-09 | 2.2E-09 |
| E         | 7.8E-08      | 8.4E-09 | 7.1E-09 | 4.7E-09 | 3.3E-09 | 2.3E-09 | 2.2E-09 |
| ENE       | 7.8E-08      | 1.1E-08 | 9.5E-09 | 6.5E-09 | 3.8E-09 | 2.3E-09 | 2.2E-09 |
| NE        | 7.8E-08      | 1.6E-08 | 1.3E-08 | 8.7E-09 | 5.1E-09 | 2.5E-09 | 2.4E-09 |
| NNE       | 7.8E-08      | 2.1E-08 | 1.8E-08 | 1.3E-08 | 6.5E-09 | 2.6E-09 | 2.4E-09 |

| Direction | Distance (m) |
|-----------|--------------|
|           | 1200         |
| N         | 2.2E-09      |
| NNW       | 2.2E-09      |
| NW        | 2.2E-09      |
| WNW       | 2.2E-09      |
| W         | 2.2E-09      |
| WSW       | 2.2E-09      |
| SW        | 2.2E-09      |
| SSW       | 2.2E-09      |
| S         | 2.2E-09      |
| SSE       | 2.2E-09      |
| SE        | 2.2E-09      |
| ESE       | 2.2E-09      |
| E         | 2.2E-09      |
| ENE       | 2.2E-09      |
| NE        | 2.2E-09      |
| NNE       | 2.2E-09      |

A

C A P 8 8 - P C

Versi on 1.00

Clean Air Act Assessment Package - 1988

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

Non-Radon Popul ati on Assessment  
May 31, 2007 9:49 am

Facility: LEHR  
Address: Old Davis Road  
City: Davis  
State: CA Zip: 95616

Effecti ve Dose Equi val ent  
(mrem/year)

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4.39E-07

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At Thi s Locati on: 5000 Meters North  
Source Category: di ffuse  
Source Type: Area  
Emi ssi on Year: 2006

Comments: Western Dog Pens area, popul ati on run

Dataset Name: WDPpop06  
Dataset Date: May 31, 2007 9:20 am  
Wind File: WNDFILES\SAC0320.WND  
Popul ati on File: POPFILES\06LEHR.POP

May 31, 2007 9:49 am

SYNOPSIS  
Page 1

MAXI MALLY EXPOSED I NDI VI DUAL

Locati on Of The Indi vi dual : 5000 Meters North  
Li feti me Fatal Cancer Ri sk: 5.13E-12  
Page 1

A

ORGAN DOSE EQUIVALENT SUMMARY

| Organ   | Selected Individual (mrem/y) | Collective Population (person-rem/y) |
|---------|------------------------------|--------------------------------------|
| GONADS  | 6.91E-08                     | 5.39E-06                             |
| BREAST  | 6.61E-08                     | 5.21E-06                             |
| R MAR   | 2.84E-07                     | 2.39E-05                             |
| LUNGS   | 1.56E-06                     | 7.97E-05                             |
| THYROID | 6.70E-08                     | 5.25E-06                             |
| ENDOST  | 3.31E-06                     | 2.81E-04                             |
| RMNDR   | 3.01E-07                     | 2.51E-05                             |
| EFFEC   | 4.39E-07                     | 3.07E-05                             |

FREQUENCY DISTRIBUTION OF LIFETIME FATAL CANCER RISKS

| Risk Range         | Number of People | Number of People In This Risk Range Or Higher | Deaths/Year In This Risk Range | Deaths/Year In This Risk 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 | 0                | 0   | 0.00E+00                       | 0.00E+00                                 |
| 1.0E-04 TO 1.0E-05 | 0                | 0   | 0.00E+00                       | 0.00E+00                                 |
| 1.0E-05 TO 1.0E-06 | 0                | 0   | 0.00E+00                       | 0.00E+00                                 |
| LESS THAN 1.0E-06  | 3617073          | 3617073                                       | 4.79E-09                       | 4.79E-09                                 |

May 31, 2007 9:49 am

SYNOPSIS  
Page 2

RADIONUCLIDE EMISSIONS DURING THE YEAR 2006

| Nuclide | Class | Size | Source #1 Ci/y | TOTAL Ci/y |
|---------|-------|------|----------------|------------|
| AC-228  | Y     | 1.00 | 5.3E-09        | 5.3E-09    |
| BI-212  | W     | 1.00 | 4.6E-09        | 4.6E-09    |
| BI-214  | W     | 1.00 | 8.0E-09        | 8.0E-09    |
| C-14    | *     | 0.00 | 8.3E-08        | 8.3E-08    |
| CS-137  | D     | 1.00 | 8.5E-10        | 8.5E-10    |
| CO-60   | Y     | 1.00 | 2.1E-10        | 2.1E-10    |
| PB-210  | D     | 1.00 | 3.7E-08        | 3.7E-08    |
| PB-212  | D     | 1.00 | 5.5E-09        | 5.5E-09    |
| PB-214  | D     | 1.00 | 1.0E-08        | 1.0E-08    |
| K-40    | D     | 1.00 | 1.1E-07        | 1.1E-07    |
| RA-226  | W     | 1.00 | 1.4E-08        | 1.4E-08    |
| SR-90   | D     | 1.00 | 5.0E-09        | 5.0E-09    |
| TL-208  | D     | 1.00 | 2.0E-09        | 2.0E-09    |
| TH-234  | Y     | 1.00 | 1.2E-08        | 1.2E-08    |

U-235      Y      1.00      1.7E-09      1.7E-09      A  
 U-238      Y      1.00      1.2E-08      1.2E-08

SITE INFORMATION

Temperature:      16 degrees C  
 Precipitation:      47 cm/y  
 Mixing Height:      1000 m

May 31, 2007      9:49 am

SYNOPSIS  
 Page 3

SOURCE INFORMATION

Source Number:      1

Source Height (m):      0.00  
 Area (sq m):      5.26E+03

| Plume Rise<br>Pasquill Cat: | A    | B    | C    | D    | E    | F    | G    |
|-----------------------------|------|------|------|------|------|------|------|
| Zero:                       | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

AGRICULTURAL DATA

|                                | Vegetable | Milk  | Meat  |
|--------------------------------|-----------|-------|-------|
| Fraction Home Produced:        | 0.700     | 0.399 | 0.442 |
| Fraction From Assessment Area: | 0.300     | 0.601 | 0.558 |
| Fraction Imported:             | 0.000     | 0.000 | 0.000 |

Beef Cattle Density:      8.81E-02  
 Milk Cattle Density:      2.85E-02  
 Land Fraction Cultivated  
 for Vegetable Crops:      2.50E-01

May 31, 2007      9:49 am

SYNOPSIS  
 Page 4

POPULATION DATA

| Direction | Distance (m) |       |       |       |       |       |       |
|-----------|--------------|-------|-------|-------|-------|-------|-------|
|           | 5000         | 15000 | 25000 | 35000 | 45000 | 55000 | 65000 |
| N         | 1425         | 4174  | 6956  | 9086  | 9991  | 10076 | 14265 |
| NNW       | 1419         | 4169  | 6947  | 9726  | 10775 | 2509  | 1957  |

|     |      |       |       |       |       |        |        |
|-----|------|-------|-------|-------|-------|--------|--------|
|     |      |       |       | A     |       |        |        |
| NW  | 1457 | 4169  | 6946  | 9725  | 12511 | 13769  | 8933   |
| WNW | 1638 | 4181  | 6946  | 9553  | 11833 | 14105  | 11556  |
| W   | 3637 | 8869  | 10779 | 9753  | 11533 | 14089  | 18992  |
| WSW | 3666 | 10998 | 18324 | 13776 | 12587 | 14089  | 26338  |
| SW  | 3666 | 10998 | 18325 | 23893 | 32250 | 29355  | 42546  |
| SSW | 3666 | 10998 | 18327 | 25659 | 31392 | 49174  | 125607 |
| S   | 3671 | 11012 | 18352 | 25867 | 49021 | 112038 | 134355 |
| SSE | 3664 | 7229  | 16759 | 53346 | 67202 | 57206  | 60249  |
| SE  | 2802 | 4169  | 25916 | 70685 | 60180 | 41224  | 46193  |
| ESE | 2141 | 4750  | 40348 | 73070 | 94019 | 109850 | 72747  |
| E   | 2028 | 8143  | 50743 | 73067 | 94022 | 114860 | 42923  |
| ENE | 1840 | 4201  | 46227 | 73069 | 82395 | 70063  | 12487  |
| NE  | 1576 | 4224  | 49764 | 36544 | 15159 | 18083  | 21366  |
| NNE | 1444 | 4169  | 13214 | 8028  | 10448 | 12146  | 12438  |

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Distance (m)

---

Direction      75000

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|     |        |
|-----|--------|
| N   | 16630  |
| NNW | 2609   |
| NW  | 3834   |
| WNW | 7664   |
| W   | 29501  |
| WSW | 33507  |
| SW  | 55196  |
| SSW | 154811 |
| S   | 155029 |
| SSE | 63171  |
| SE  | 53296  |
| ESE | 22177  |
| E   | 9028   |
| ENE | 11529  |
| NE  | 19852  |
| NNE | 12420  |

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C

C A P 8 8 - P C

Versi on 1. 00

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  
May 31, 2007 11:28 am

Facility: LEHR  
Address: Old Davis Road  
City: Davis  
State: CA                      Zip: 95616

Source Category: diffuse  
Source Type: Area  
Emission Year: 2006

Comments: Eastern Dog Pens area, individual run

Dataset Name: EDPind06  
Dataset Date: May 31, 2007 11:27 am  
Wind File: WNDFILES\SAC0320.WND

May 31, 2007 11:28 am

SUMMARY  
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

| Organ   | Selected<br>Individual<br>(mrem/y) |
|---------|------------------------------------|
| GONADS  | 2.81E-06                           |
| BREAST  | 2.89E-06                           |
| R MAR   | 3.33E-04                           |
| LUNGS   | 5.04E-03                           |
| THYROID | 2.82E-06                           |
| ENDOST  | 4.12E-03                           |
| RMNDR   | 8.23E-06                           |

EFFEC C 7.72E-04

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

| Pathway        | Selected Individual (mrem/y) |
|----------------|------------------------------|
| INGESTION      | 5.32E-06                     |
| INHALATION     | 7.67E-04                     |
| AIR IMMERSION  | 1.01E-09                     |
| GROUND SURFACE | 1.04E-07                     |
| INTERNAL       | 7.72E-04                     |
| EXTERNAL       | 1.05E-07                     |
| TOTAL          | 7.72E-04                     |

May 31, 2007 11:28 am

SUMMARY  
Page 2

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

| Nuclide | Selected Individual (mrem/y) |
|---------|------------------------------|
| BI-212  | 1.28E-08                     |
| BI-214  | 7.14E-10                     |
| CS-137  | 1.54E-07                     |
| PB-214  | 5.94E-10                     |
| SR-90   | 4.36E-07                     |
| TL-208  | 3.82E-10                     |
| TH-228  | 3.53E-04                     |
| TH-232  | 4.14E-04                     |
| TH-234  | 5.88E-08                     |
| H-3     | 7.32E-10                     |
| U-235   | 4.52E-06                     |
| TOTAL   | 7.72E-04                     |

May 31, 2007 11:28 am

SUMMARY  
Page 3

CANCER RISK SUMMARY

| Cancer   | Selected Individual Total Lifetime Fatal Cancer Risk |
|----------|--|
| LEUKEMIA | 3.00E-10   |
| BONE     | 1.94E-10   |
| THYROID  | 5.38E-13   |

|          |   |           |
|----------|---|-----------|
|          | C |           |
| BREAST   |   | 4. 64E-12 |
| LUNG     |   | 8. 96E-09 |
| STOMACH  |   | 3. 86E-12 |
| BOWEL    |   | 5. 84E-12 |
| LIVER    |   | 1. 64E-11 |
| PANCREAS |   | 2. 67E-12 |
| URINARY  |   | 2. 40E-12 |
| OTHER    |   | 3. 27E-12 |
| TOTAL    |   | 9. 49E-09 |

PATHWAY RISK SUMMARY

| Pathway        | Selected Individual<br>Total Lifetime<br>Fatal Cancer Risk |
|----------------|--|
| INGESTION      | 2. 86E-11  |
| INHALATION     | 9. 46E-09  |
| AIR IMMERSION  | 2. 45E-14  |
| GROUND SURFACE | 2. 40E-12  |
| INTERNAL       | 9. 49E-09  |
| EXTERNAL       | 2. 42E-12  |
| TOTAL          | 9. 49E-09  |

May 31, 2007 11:28 am

SUMMARY  
Page 4

NUCLIDE RISK SUMMARY

| Nuclide | Selected Individual<br>Total Lifetime<br>Fatal Cancer Risk |
|---------|--|
| BI -212 | 1. 64E-13  |
| BI -214 | 8. 28E-14  |
| CS-137  | 4. 02E-12  |
| PB-214  | 1. 02E-13  |
| SR-90   | 7. 35E-12  |
| TL-208  | 9. 35E-15  |
| TH-228  | 7. 08E-09  |
| TH-232  | 2. 33E-09  |
| TH-234  | 2. 01E-12  |
| H-3     | 1. 98E-14  |
| U-235   | 5. 95E-11  |
| TOTAL   | 9. 49E-09  |

May 31, 2007 11:28 am

SUMMARY  
Page 5

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

C

Distance (m)

| Di recti on | 100      | 132      | 143      | 150      | 165      | 180      | 187      |
|-------------|----------|----------|----------|----------|----------|----------|----------|
| N           | 7. 7E-04 | 4. 8E-04 | 4. 3E-04 | 3. 9E-04 | 3. 3E-04 | 2. 8E-04 | 2. 6E-04 |
| NNW         | 7. 0E-04 | 3. 9E-04 | 3. 3E-04 | 2. 9E-04 | 2. 4E-04 | 2. 0E-04 | 1. 9E-04 |
| NW          | 7. 0E-04 | 4. 3E-04 | 3. 7E-04 | 3. 4E-04 | 2. 9E-04 | 2. 4E-04 | 2. 2E-04 |
| WNW         | 5. 8E-04 | 3. 4E-04 | 2. 9E-04 | 2. 6E-04 | 2. 2E-04 | 1. 8E-04 | 1. 7E-04 |
| W           | 3. 9E-04 | 2. 3E-04 | 2. 0E-04 | 1. 8E-04 | 1. 5E-04 | 1. 3E-04 | 1. 2E-04 |
| WSW         | 2. 0E-04 | 1. 0E-04 | 8. 6E-05 | 7. 7E-05 | 6. 2E-05 | 5. 2E-05 | 4. 8E-05 |
| SW          | 1. 2E-04 | 6. 6E-05 | 5. 5E-05 | 5. 0E-05 | 4. 1E-05 | 3. 4E-05 | 3. 2E-05 |
| SSW         | 1. 5E-04 | 7. 4E-05 | 6. 0E-05 | 5. 3E-05 | 4. 2E-05 | 3. 5E-05 | 3. 3E-05 |
| S           | 2. 9E-04 | 1. 7E-04 | 1. 5E-04 | 1. 4E-04 | 1. 1E-04 | 9. 5E-05 | 8. 9E-05 |
| SSE         | 3. 5E-04 | 2. 2E-04 | 2. 0E-04 | 1. 8E-04 | 1. 5E-04 | 1. 3E-04 | 1. 2E-04 |
| SE          | 2. 5E-04 | 1. 4E-04 | 1. 2E-04 | 1. 1E-04 | 8. 8E-05 | 7. 4E-05 | 6. 9E-05 |
| ESE         | 1. 6E-04 | 8. 3E-05 | 6. 9E-05 | 6. 2E-05 | 5. 0E-05 | 4. 2E-05 | 3. 9E-05 |
| E           | 1. 5E-04 | 8. 7E-05 | 7. 5E-05 | 6. 8E-05 | 5. 7E-05 | 4. 8E-05 | 4. 4E-05 |
| ENE         | 2. 1E-04 | 1. 1E-04 | 8. 8E-05 | 7. 8E-05 | 6. 2E-05 | 5. 2E-05 | 4. 8E-05 |
| NE          | 4. 1E-04 | 2. 5E-04 | 2. 2E-04 | 2. 0E-04 | 1. 7E-04 | 1. 4E-04 | 1. 3E-04 |
| NNE         | 5. 8E-04 | 3. 2E-04 | 2. 7E-04 | 2. 5E-04 | 2. 0E-04 | 1. 7E-04 | 1. 6E-04 |

Distance (m)

| Di recti on | 500      | 1000     |
|-------------|----------|----------|
| N           | 3. 9E-05 | 1. 1E-05 |
| NNW         | 2. 8E-05 | 7. 7E-06 |
| NW          | 3. 3E-05 | 9. 0E-06 |
| WNW         | 2. 5E-05 | 6. 7E-06 |
| W           | 1. 7E-05 | 4. 7E-06 |
| WSW         | 7. 3E-06 | 2. 2E-06 |
| SW          | 5. 0E-06 | 1. 6E-06 |
| SSW         | 5. 1E-06 | 1. 6E-06 |
| S           | 1. 3E-05 | 3. 8E-06 |
| SSE         | 1. 8E-05 | 5. 1E-06 |
| SE          | 1. 1E-05 | 3. 1E-06 |
| ESE         | 6. 1E-06 | 1. 9E-06 |
| E           | 6. 8E-06 | 2. 1E-06 |
| ENE         | 7. 5E-06 | 2. 3E-06 |
| NE          | 2. 0E-05 | 5. 7E-06 |
| NNE         | 2. 4E-05 | 6. 7E-06 |

May 31, 2007 11:28 am

SUMMARY  
Page 6

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

Distance (m)

| Di recti on | 100 | 132 | 143 | 150 | 165 | 180 | 187 |
|-------------|-----|-----|-----|-----|-----|-----|-----|
|-------------|-----|-----|-----|-----|-----|-----|-----|

## C

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|     |         |         |         |         |         |         |         |
|-----|---------|---------|---------|---------|---------|---------|---------|
| N   | 9.5E-09 | 6.0E-09 | 5.2E-09 | 4.8E-09 | 4.1E-09 | 3.4E-09 | 3.2E-09 |
| NNW | 8.7E-09 | 4.8E-09 | 4.0E-09 | 3.6E-09 | 3.0E-09 | 2.5E-09 | 2.3E-09 |
| NW  | 8.6E-09 | 5.2E-09 | 4.5E-09 | 4.2E-09 | 3.5E-09 | 3.0E-09 | 2.7E-09 |
| WNW | 7.1E-09 | 4.1E-09 | 3.5E-09 | 3.2E-09 | 2.7E-09 | 2.2E-09 | 2.1E-09 |
| W   | 4.8E-09 | 2.8E-09 | 2.4E-09 | 2.2E-09 | 1.8E-09 | 1.5E-09 | 1.4E-09 |
| WSW | 2.4E-09 | 1.3E-09 | 1.1E-09 | 9.4E-10 | 7.6E-10 | 6.3E-10 | 5.9E-10 |
| SW  | 1.5E-09 | 8.1E-10 | 6.8E-10 | 6.1E-10 | 5.0E-10 | 4.2E-10 | 3.9E-10 |
| SSW | 1.8E-09 | 9.1E-10 | 7.4E-10 | 6.5E-10 | 5.1E-10 | 4.3E-10 | 4.0E-10 |
| S   | 3.5E-09 | 2.1E-09 | 1.8E-09 | 1.7E-09 | 1.4E-09 | 1.2E-09 | 1.1E-09 |
| SSE | 4.3E-09 | 2.7E-09 | 2.4E-09 | 2.2E-09 | 1.9E-09 | 1.6E-09 | 1.5E-09 |
| SE  | 3.0E-09 | 1.7E-09 | 1.5E-09 | 1.3E-09 | 1.1E-09 | 9.1E-10 | 8.5E-10 |
| ESE | 1.9E-09 | 1.0E-09 | 8.5E-10 | 7.6E-10 | 6.2E-10 | 5.2E-10 | 4.8E-10 |
| E   | 1.8E-09 | 1.1E-09 | 9.2E-10 | 8.4E-10 | 6.9E-10 | 5.8E-10 | 5.4E-10 |
| ENE | 2.6E-09 | 1.3E-09 | 1.1E-09 | 9.5E-10 | 7.6E-10 | 6.4E-10 | 5.9E-10 |
| NE  | 5.1E-09 | 3.1E-09 | 2.7E-09 | 2.5E-09 | 2.1E-09 | 1.8E-09 | 1.6E-09 |
| NNE | 7.2E-09 | 4.0E-09 | 3.4E-09 | 3.0E-09 | 2.5E-09 | 2.1E-09 | 1.9E-09 |

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## Distance (m)

---

| Di recti on | 500     | 1000    |
|-------------|---------|---------|
| N           | 4.8E-10 | 1.3E-10 |
| NNW         | 3.4E-10 | 9.2E-11 |
| NW          | 4.1E-10 | 1.1E-10 |
| WNW         | 3.1E-10 | 8.0E-11 |
| W           | 2.1E-10 | 5.5E-11 |
| WSW         | 8.7E-11 | 2.4E-11 |
| SW          | 5.9E-11 | 1.7E-11 |
| SSW         | 6.0E-11 | 1.7E-11 |
| S           | 1.6E-10 | 4.4E-11 |
| SSE         | 2.2E-10 | 6.1E-11 |
| SE          | 1.3E-10 | 3.5E-11 |
| ESE         | 7.3E-11 | 2.1E-11 |
| E           | 8.1E-11 | 2.3E-11 |
| ENE         | 9.0E-11 | 2.5E-11 |
| NE          | 2.5E-10 | 6.7E-11 |
| NNE         | 3.0E-10 | 8.0E-11 |

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D

C A P 8 8 - P C

Versi on 1.00

Clean Air Act Assessment Package - 1988

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

Non-Radon Popul ati on Assessment  
May 31, 2007 9: 48 am

Facility: LEHR  
Address: Old Davis Road  
City: Davis  
State: CA Zip: 95616

Effecti ve Dose Equi val ent  
(mrem/year)

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6.90E-07

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At Thi s Locati on: 5000 Meters North  
Source Category: di ffuse  
Source Type: Area  
Emi ssi on Year: 2006

Comments: Eastern Dog Pens area, popul ati on run

Dataset Name: EDPpop06  
Dataset Date: May 26, 2007 5: 03 pm  
Wi nd Fi le: WNDFILES\SAC0320.WND  
Popul ati on Fi le: POPFILES\06LEHR.POP

May 31, 2007 9: 48 am

SYNOPSIS  
Page 1

MAXI MALLY EXPOSED I NDI VI DUAL

Locati on Of The Indi vi dual : 5000 Meters North  
Li feti me Fatal Cancer Ri sk: 8.47E-12  
Page 1

D

ORGAN DOSE EQUIVALENT SUMMARY

| Organ   | Selected Individual (mrem/y) | Collective Population (person-rem/y) |
|---------|------------------------------|--------------------------------------|
| GONADS  | 2.47E-09                     | 1.35E-07                             |
| BREAST  | 2.55E-09                     | 1.39E-07                             |
| R MAR   | 2.98E-07                     | 1.54E-05                             |
| LUNGS   | 4.50E-06                     | 2.25E-04                             |
| THYROID | 2.48E-09                     | 1.35E-07                             |
| ENDOST  | 3.68E-06                     | 1.89E-04                             |
| RMNDR   | 7.42E-09                     | 4.57E-07                             |
| EFFEC   | 6.90E-07                     | 3.47E-05                             |

FREQUENCY DISTRIBUTION OF LIFETIME FATAL CANCER RISKS

| Risk Range         | Number of People | Number of People In This Risk Range Or Higher | Deaths/Year In This Risk Range | Deaths/Year In This Risk 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 | 0                | 0   | 0.00E+00                       | 0.00E+00                                 |
| 1.0E-04 TO 1.0E-05 | 0                | 0   | 0.00E+00                       | 0.00E+00                                 |
| 1.0E-05 TO 1.0E-06 | 0                | 0   | 0.00E+00                       | 0.00E+00                                 |
| LESS THAN 1.0E-06  | 3617073          | 3617073                                       | 6.01E-09                       | 6.01E-09                                 |

May 31, 2007 9:48 am

SYNOPSIS  
Page 2

RADIONUCLIDE EMISSIONS DURING THE YEAR 2006

| Nuclide | Class | Size | Source #1 Ci/y | TOTAL Ci/y |
|---------|-------|------|----------------|------------|
| BI-212  | W     | 1.00 | 3.2E-09        | 3.2E-09    |
| BI-214  | W     | 1.00 | 4.4E-09        | 4.4E-09    |
| CS-137  | D     | 1.00 | 1.5E-09        | 1.5E-09    |
| PB-214  | D     | 1.00 | 4.7E-09        | 4.7E-09    |
| SR-90   | D     | 1.00 | 1.3E-09        | 1.3E-09    |
| TL-208  | D     | 1.00 | 1.7E-09        | 1.7E-09    |
| TH-228  | Y     | 1.00 | 1.2E-08        | 1.2E-08    |
| TH-232  | Y     | 1.00 | 9.7E-09        | 9.7E-09    |
| TH-234  | Y     | 1.00 | 6.8E-09        | 6.8E-09    |
| H-3     | *     | 0.00 | 9.3E-09        | 9.3E-09    |
| U-235   | Y     | 1.00 | 2.9E-10        | 2.9E-10    |

D  
SITE INFORMATION

Temperature: 16 degrees C  
Precipitation: 47 cm/y  
Mixing Height: 1000 m

May 31, 2007 9:48 am

SYNOPSIS  
Page 3

SOURCE INFORMATION

Source Number: 1

Source Height (m): 0.00  
Area (sq m): 3.90E+03

| Plume Rise<br>Pasquill Cat: | <u>A</u> | <u>B</u> | <u>C</u> | <u>D</u> | <u>E</u> | <u>F</u> | <u>G</u> |
|-----------------------------|----------|----------|----------|----------|----------|----------|----------|
| Zero:                       | 0.00     | 0.00     | 0.00     | 0.00     | 0.00     | 0.00     | 0.00     |

AGRICULTURAL DATA

|                                 | <u>Vegetable</u> | <u>Milk</u> | <u>Meat</u> |
|---------------------------------|------------------|-------------|-------------|
| Fracti on Home Produced:        | 0.700            | 0.399       | 0.442       |
| Fracti on From Assessment Area: | 0.300            | 0.601       | 0.558       |
| Fracti on Imported:             | 0.000            | 0.000       | 0.000       |

Beef Cattle Density: 8.81E-02  
Milk Cattle Density: 2.85E-02  
Land Fracti on Cultivated  
for Vegetable Crops: 2.50E-01

May 31, 2007 9:48 am

SYNOPSIS  
Page 4

POPULATION DATA

|                    | <u>Distance (m)</u> |       |       |       |       |       |       |
|--------------------|---------------------|-------|-------|-------|-------|-------|-------|
| <u>Di recti on</u> | 5000                | 15000 | 25000 | 35000 | 45000 | 55000 | 65000 |
| N                  | 1425                | 4174  | 6956  | 9086  | 9991  | 10076 | 14265 |
| NNW                | 1419                | 4169  | 6947  | 9726  | 10775 | 2509  | 1957  |
| NW                 | 1457                | 4169  | 6946  | 9725  | 12511 | 13769 | 8933  |
| WNW                | 1638                | 4181  | 6946  | 9553  | 11833 | 14105 | 11556 |
| W                  | 3637                | 8869  | 10779 | 9753  | 11533 | 14089 | 18992 |
| WSW                | 3666                | 10998 | 18324 | 13776 | 12587 | 14089 | 26338 |
| SW                 | 3666                | 10998 | 18325 | 23893 | 32250 | 29355 | 42546 |

|     |      |       |       |       |       |        |        |  |
|-----|------|-------|-------|-------|-------|--------|--------|--|
|     |      |       |       | D     |       |        |        |  |
| SSW | 3666 | 10998 | 18327 | 25659 | 31392 | 49174  | 125607 |  |
| S   | 3671 | 11012 | 18352 | 25867 | 49021 | 112038 | 134355 |  |
| SSE | 3664 | 7229  | 16759 | 53346 | 67202 | 57206  | 60249  |  |
| SE  | 2802 | 4169  | 25916 | 70685 | 60180 | 41224  | 46193  |  |
| ESE | 2141 | 4750  | 40348 | 73070 | 94019 | 109850 | 72747  |  |
| E   | 2028 | 8143  | 50743 | 73067 | 94022 | 114860 | 42923  |  |
| ENE | 1840 | 4201  | 46227 | 73069 | 82395 | 70063  | 12487  |  |
| NE  | 1576 | 4224  | 49764 | 36544 | 15159 | 18083  | 21366  |  |
| NNE | 1444 | 4169  | 13214 | 8028  | 10448 | 12146  | 12438  |  |

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Di stance (m)

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Di recti on      75000

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|     |        |
|-----|--------|
| N   | 16630  |
| NNW | 2609   |
| NW  | 3834   |
| WNW | 7664   |
| W   | 29501  |
| WSW | 33507  |
| SW  | 55196  |
| SSW | 154811 |
| S   | 155029 |
| SSE | 63171  |
| SE  | 53296  |
| ESE | 22177  |
| E   | 9028   |
| ENE | 11529  |
| NE  | 19852  |
| NNE | 12420  |

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E

C A P 8 8 - P C

Versi on 1. 00

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  
May 31, 2007 8:05 pm

Facility: LEHR  
Address: Old Davis Road  
City: Davis  
State: CA                      Zip: 95616

Source Category: diffuse  
Source Type: Area  
Emission Year: 2006

Comments: WDPs, graded WDP soil, individual run

Dataset Name: WDPindGrade06  
Dataset Date: May 31, 2007 8:04 pm  
Wind File: WNDFILES\SAC0320.WND

May 31, 2007 8:05 pm

SUMMARY  
Page 1

ORGAN DOSE EQUIVALENT SUMMARY

| Organ   | Selected<br>Individual<br>(mrem/y) |
|---------|------------------------------------|
| GONADS  | 5.55E-03                           |
| BREAST  | 5.34E-03                           |
| R MAR   | 2.24E-02                           |
| LUNGS   | 1.28E-01                           |
| THYROID | 5.40E-03                           |
| ENDOST  | 2.58E-01                           |
| RMNDR   | 2.37E-02                           |

EFFEC E 3.52E-02

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

| Pathway        | Selected Individual (mrem/y) |
|----------------|------------------------------|
| INGESTION      | 1.39E-02                     |
| INHALATION     | 1.93E-02                     |
| AIR IMMERSION  | 2.56E-07                     |
| GROUND SURFACE | 1.96E-03                     |
| INTERNAL       | 3.32E-02                     |
| EXTERNAL       | 1.96E-03                     |
| TOTAL          | 3.52E-02                     |

May 31, 2007 8:05 pm

SUMMARY  
Page 2

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

| Nuclide | Selected Individual (mrem/y) |
|---------|------------------------------|
| AC-228  | 4.00E-06                     |
| BI-212  | 1.37E-06                     |
| BI-214  | 9.90E-08                     |
| C-14    | 2.51E-05                     |
| CS-137  | 6.40E-06                     |
| CO-60   | 1.04E-05                     |
| PB-210  | 1.49E-02                     |
| PB-212  | 8.05E-06                     |
| PB-214  | 9.96E-08                     |
| K-40    | 3.45E-03                     |
| RA-226  | 2.04E-03                     |
| SR-90   | 1.25E-04                     |
| TL-208  | 4.08E-08                     |
| TH-234  | 7.49E-06                     |
| U-235   | 1.93E-03                     |
| U-238   | 1.27E-02                     |
| TOTAL   | 3.52E-02                     |

May 31, 2007 8:05 pm

SUMMARY  
Page 3

CANCER RISK SUMMARY

Cancer Selected Individual Total Lifetime Fatal Cancer Risk  
Page 2

## E

|          |          |
|----------|----------|
| LEUKEMIA | 3.26E-08 |
| BONE     | 1.43E-08 |
| THYROID  | 1.94E-09 |
| BREAST   | 1.63E-08 |
| LUNG     | 2.28E-07 |
| STOMACH  | 1.03E-08 |
| BOWEL    | 5.47E-09 |
| LIVER    | 7.17E-08 |
| PANCREAS | 8.64E-09 |
| URINARY  | 1.64E-08 |
| OTHER    | 1.06E-08 |
| TOTAL    | 4.16E-07 |

## PATHWAY RISK SUMMARY

| Pathway        | Selected Individual |                            |
|----------------|---------------------|----------------------------|
|                | Fatal               | Total Lifetime Cancer Risk |
| INGESTION      | 1.27E-07            |                            |
| INHALATION     | 2.42E-07            |                            |
| AIR IMMERSION  | 6.18E-12            |                            |
| GROUND SURFACE | 4.74E-08            |                            |
| INTERNAL       | 3.69E-07            |                            |
| EXTERNAL       | 4.74E-08            |                            |
| TOTAL          | 4.16E-07            |                            |

May 31, 2007 8:05 pm

SUMMARY  
Page 4

## NUCLIDE RISK SUMMARY

| Nuclide | Selected Individual |                            |
|---------|---------------------|----------------------------|
|         | Fatal               | Total Lifetime Cancer Risk |
| AC-228  | 8.06E-11            |                            |
| BI-212  | 1.77E-11            |                            |
| BI-214  | 1.15E-11            |                            |
| C-14    | 6.12E-10            |                            |
| CS-137  | 1.67E-10            |                            |
| CO-60   | 2.60E-10            |                            |
| PB-210  | 1.06E-07            |                            |
| PB-212  | 1.38E-10            |                            |
| PB-214  | 1.70E-11            |                            |
| K-40    | 8.65E-08            |                            |
| RA-226  | 2.90E-08            |                            |
| SR-90   | 2.10E-09            |                            |
| TL-208  | 9.98E-13            |                            |
| TH-234  | 2.57E-10            |                            |
| U-235   | 2.54E-08            |                            |
| U-238   | 1.65E-07            |                            |

E

TOTAL

4.16E-07

May 31, 2007 8:05 pm

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

| Direction | Distance (m) |         |         |         |         |         |         |
|-----------|--------------|---------|---------|---------|---------|---------|---------|
|           | 1            | 48      | 52      | 65      | 99      | 300     | 400     |
| N         | 3.5E-02      | 1.1E-02 | 9.4E-03 | 6.4E-03 | 3.6E-03 | 1.5E-03 | 1.3E-03 |
| NNW       | 3.5E-02      | 1.2E-02 | 1.0E-02 | 7.0E-03 | 3.5E-03 | 1.4E-03 | 1.3E-03 |
| NW        | 3.5E-02      | 1.1E-02 | 9.2E-03 | 6.2E-03 | 3.4E-03 | 1.4E-03 | 1.3E-03 |
| WNW       | 3.5E-02      | 9.1E-03 | 7.9E-03 | 5.6E-03 | 3.1E-03 | 1.3E-03 | 1.3E-03 |
| W         | 3.5E-02      | 6.9E-03 | 5.9E-03 | 4.1E-03 | 2.4E-03 | 1.3E-03 | 1.2E-03 |
| WSW       | 3.5E-02      | 4.8E-03 | 4.2E-03 | 2.9E-03 | 1.8E-03 | 1.2E-03 | 1.2E-03 |
| SW        | 3.5E-02      | 3.8E-03 | 3.2E-03 | 2.1E-03 | 1.5E-03 | 1.2E-03 | 1.2E-03 |
| SSW       | 3.5E-02      | 4.1E-03 | 3.5E-03 | 2.5E-03 | 1.6E-03 | 1.2E-03 | 1.2E-03 |
| S         | 3.5E-02      | 4.8E-03 | 4.3E-03 | 3.2E-03 | 2.1E-03 | 1.2E-03 | 1.2E-03 |
| SSE       | 3.5E-02      | 5.1E-03 | 4.6E-03 | 3.6E-03 | 2.3E-03 | 1.3E-03 | 1.2E-03 |
| SE        | 3.5E-02      | 4.8E-03 | 4.2E-03 | 3.1E-03 | 2.0E-03 | 1.2E-03 | 1.2E-03 |
| ESE       | 3.5E-02      | 4.0E-03 | 3.5E-03 | 2.5E-03 | 1.7E-03 | 1.2E-03 | 1.2E-03 |
| E         | 3.5E-02      | 4.0E-03 | 3.3E-03 | 2.3E-03 | 1.6E-03 | 1.2E-03 | 1.2E-03 |
| ENE       | 3.5E-02      | 5.1E-03 | 4.4E-03 | 3.1E-03 | 1.9E-03 | 1.2E-03 | 1.2E-03 |
| NE        | 3.5E-02      | 7.2E-03 | 6.1E-03 | 4.1E-03 | 2.5E-03 | 1.3E-03 | 1.2E-03 |
| NNE       | 3.5E-02      | 9.5E-03 | 8.3E-03 | 5.9E-03 | 3.1E-03 | 1.3E-03 | 1.3E-03 |

| Direction | Distance (m) |
|-----------|--------------|
|           | 1200         |
| N         | 1.2E-03      |
| NNW       | 1.1E-03      |
| NW        | 1.2E-03      |
| WNW       | 1.1E-03      |
| W         | 1.1E-03      |
| WSW       | 1.1E-03      |
| SW        | 1.1E-03      |
| SSW       | 1.1E-03      |
| S         | 1.1E-03      |
| SSE       | 1.1E-03      |
| SE        | 1.1E-03      |
| ESE       | 1.1E-03      |
| E         | 1.1E-03      |
| ENE       | 1.1E-03      |
| NE        | 1.1E-03      |
| NNE       | 1.1E-03      |

May 31, 2007 8:05 pm

SUMMARY  
Page 6

E

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

|           |         | Distance (m) |         |         |         |         |         |     |
|-----------|---------|--------------|---------|---------|---------|---------|---------|-----|
| Direction |         | 1            | 48      | 52      | 65      | 99      | 300     | 400 |
| N         | 4.2E-07 | 1.3E-07      | 1.1E-07 | 7.5E-08 | 4.1E-08 | 1.6E-08 | 1.4E-08 |     |
| NNW       | 4.2E-07 | 1.4E-07      | 1.2E-07 | 8.1E-08 | 4.0E-08 | 1.4E-08 | 1.3E-08 |     |
| NW        | 4.2E-07 | 1.3E-07      | 1.1E-07 | 7.2E-08 | 3.9E-08 | 1.5E-08 | 1.4E-08 |     |
| WNW       | 4.2E-07 | 1.1E-07      | 9.2E-08 | 6.5E-08 | 3.4E-08 | 1.4E-08 | 1.3E-08 |     |
| W         | 4.2E-07 | 8.0E-08      | 6.9E-08 | 4.7E-08 | 2.7E-08 | 1.3E-08 | 1.3E-08 |     |
| WSW       | 4.2E-07 | 5.6E-08      | 4.7E-08 | 3.2E-08 | 2.0E-08 | 1.2E-08 | 1.2E-08 |     |
| SW        | 4.2E-07 | 4.3E-08      | 3.6E-08 | 2.3E-08 | 1.6E-08 | 1.2E-08 | 1.2E-08 |     |
| SSW       | 4.2E-07 | 4.6E-08      | 4.0E-08 | 2.7E-08 | 1.8E-08 | 1.2E-08 | 1.2E-08 |     |
| S         | 4.2E-07 | 5.5E-08      | 4.9E-08 | 3.7E-08 | 2.3E-08 | 1.3E-08 | 1.2E-08 |     |
| SSE       | 4.2E-07 | 5.9E-08      | 5.3E-08 | 4.0E-08 | 2.5E-08 | 1.3E-08 | 1.3E-08 |     |
| SE        | 4.2E-07 | 5.5E-08      | 4.8E-08 | 3.5E-08 | 2.1E-08 | 1.3E-08 | 1.2E-08 |     |
| ESE       | 4.2E-07 | 4.6E-08      | 3.9E-08 | 2.7E-08 | 1.8E-08 | 1.2E-08 | 1.2E-08 |     |
| E         | 4.2E-07 | 4.5E-08      | 3.8E-08 | 2.5E-08 | 1.8E-08 | 1.2E-08 | 1.2E-08 |     |
| ENE       | 4.2E-07 | 5.9E-08      | 5.1E-08 | 3.5E-08 | 2.1E-08 | 1.2E-08 | 1.2E-08 |     |
| NE        | 4.2E-07 | 8.3E-08      | 7.0E-08 | 4.7E-08 | 2.8E-08 | 1.4E-08 | 1.3E-08 |     |
| NNE       | 4.2E-07 | 1.1E-07      | 9.7E-08 | 6.8E-08 | 3.5E-08 | 1.4E-08 | 1.3E-08 |     |

|           |         | Distance (m) |
|-----------|---------|--------------|
| Direction |         | 1200         |
| N         | 1.2E-08 |              |
| NNW       | 1.2E-08 |              |
| NW        | 1.2E-08 |              |
| WNW       | 1.2E-08 |              |
| W         | 1.2E-08 |              |
| WSW       | 1.2E-08 |              |
| SW        | 1.2E-08 |              |
| SSW       | 1.2E-08 |              |
| S         | 1.2E-08 |              |
| SSE       | 1.2E-08 |              |
| SE        | 1.2E-08 |              |
| ESE       | 1.2E-08 |              |
| E         | 1.2E-08 |              |
| ENE       | 1.2E-08 |              |
| NE        | 1.2E-08 |              |
| NNE       | 1.2E-08 |              |

F

C A P 8 8 - P C

Versi on 1. 00

Clean Air Act Assessment Package - 1988

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

Non-Radon Popul ati on Assessment  
May 31, 2007 8: 05 pm

Faci l i ty: LEHR  
Address: Ol d Davi s Road  
Ci ty: Davi s  
State: CA Zi p: 95616

Effecti ve Dose Equi val ent  
(mrem/year)

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2. 36E-06

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At Thi s Locati on: 5000 Meters North  
Source Category: di ffuse  
Source Type: Area  
Emi ssi on Year: 2006

Comments: WDPs, graded WDP soi l , popul ati on run

Dataset Name: WDPpopGrade06  
Dataset Date: May 31, 2007 8: 05 pm  
Wi nd Fi le: WNDFI LES\SAC0320. WND  
Popul ati on Fi le: POPFI LES\06LEHR. POP

May 31, 2007 8: 05 pm

SYNOPSIS  
Page 1

MAXI MALLY EXPOSED I NDI VI DUAL

Locati on Of The Indi vi dual : 5000 Meters North  
Li feti me Fatal Cancer Ri sk: 2. 75E-11  
Page 1

F

ORGAN DOSE EQUIVALENT SUMMARY

| Organ   | Selected Individual (mrem/y) | Collective Population (person-rem/y) |
|---------|------------------------------|--------------------------------------|
| GONADS  | 3.70E-07                     | 2.89E-05                             |
| BREAST  | 3.54E-07                     | 2.79E-05                             |
| R MAR   | 1.52E-06                     | 1.29E-04                             |
| LUNGS   | 8.33E-06                     | 4.27E-04                             |
| THYROID | 3.59E-07                     | 2.82E-05                             |
| ENDOST  | 1.78E-05                     | 1.51E-03                             |
| RMNDR   | 1.62E-06                     | 1.35E-04                             |
| EFFEC   | 2.36E-06                     | 1.65E-04                             |

FREQUENCY DISTRIBUTION OF LIFETIME FATAL CANCER RISKS

| Risk Range         | Number of People | Number of People In This Risk Range Or Higher | Deaths/Year In This Risk Range | Deaths/Year In This Risk 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 | 0                | 0   | 0.00E+00                       | 0.00E+00                                 |
| 1.0E-04 TO 1.0E-05 | 0                | 0   | 0.00E+00                       | 0.00E+00                                 |
| 1.0E-05 TO 1.0E-06 | 0                | 0   | 0.00E+00                       | 0.00E+00                                 |
| LESS THAN 1.0E-06  | 3617073          | 3617073                                       | 2.57E-08                       | 2.57E-08                                 |

May 31, 2007 8:05 pm

SYNOPSIS  
Page 2

RADIONUCLIDE EMISSIONS DURING THE YEAR 2006

| Nuclide | Class | Size | Source #1 Ci/y | TOTAL Ci/y |
|---------|-------|------|----------------|------------|
| AC-228  | Y     | 1.00 | 2.9E-08        | 2.9E-08    |
| BI-212  | W     | 1.00 | 2.5E-08        | 2.5E-08    |
| BI-214  | W     | 1.00 | 4.3E-08        | 4.3E-08    |
| C-14    | *     | 0.00 | 4.5E-07        | 4.5E-07    |
| CS-137  | D     | 1.00 | 4.6E-09        | 4.6E-09    |
| CO-60   | Y     | 1.00 | 1.1E-09        | 1.1E-09    |
| PB-210  | D     | 1.00 | 2.0E-07        | 2.0E-07    |
| PB-212  | D     | 1.00 | 3.0E-08        | 3.0E-08    |
| PB-214  | D     | 1.00 | 5.6E-08        | 5.6E-08    |
| K-40    | D     | 1.00 | 5.7E-07        | 5.7E-07    |
| RA-226  | W     | 1.00 | 7.5E-08        | 7.5E-08    |
| SR-90   | D     | 1.00 | 2.7E-08        | 2.7E-08    |
| TL-208  | D     | 1.00 | 1.1E-08        | 1.1E-08    |
| TH-234  | Y     | 1.00 | 6.4E-08        | 6.4E-08    |

U-235      Y      1.00      9.2E-09      9.2E-09      F  
 U-238      Y      1.00      6.4E-08      6.4E-08

SITE INFORMATION

Temperature:      16 degrees C  
 Precipitation:      47 cm/y  
 Mixing Height:      1000 m

May 31, 2007      8:05 pm

SYNOPSIS  
 Page 3

SOURCE INFORMATION

Source Number:      1

Source Height (m):      0.00  
 Area (sq m):      5.26E+03

| Plume Rise<br>Pasquill Cat: | A    | B    | C    | D    | E    | F    | G    |
|-----------------------------|------|------|------|------|------|------|------|
| Zero:                       | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

AGRICULTURAL DATA

|                                | Vegetable | Milk  | Meat  |
|--------------------------------|-----------|-------|-------|
| Fraction Home Produced:        | 0.700     | 0.399 | 0.442 |
| Fraction From Assessment Area: | 0.300     | 0.601 | 0.558 |
| Fraction Imported:             | 0.000     | 0.000 | 0.000 |

Beef Cattle Density:      8.81E-02  
 Milk Cattle Density:      2.85E-02  
 Land Fraction Cultivated  
 for Vegetable Crops:      2.50E-01

May 31, 2007      8:05 pm

SYNOPSIS  
 Page 4

POPULATION DATA

| Direction | Distance (m) |       |       |       |       |       |       |
|-----------|--------------|-------|-------|-------|-------|-------|-------|
|           | 5000         | 15000 | 25000 | 35000 | 45000 | 55000 | 65000 |
| N         | 1425         | 4174  | 6956  | 9086  | 9991  | 10076 | 14265 |
| NNW       | 1419         | 4169  | 6947  | 9726  | 10775 | 2509  | 1957  |

|     | F    |       |       |       |       |        |        |
|-----|------|-------|-------|-------|-------|--------|--------|
| NW  | 1457 | 4169  | 6946  | 9725  | 12511 | 13769  | 8933   |
| WNW | 1638 | 4181  | 6946  | 9553  | 11833 | 14105  | 11556  |
| W   | 3637 | 8869  | 10779 | 9753  | 11533 | 14089  | 18992  |
| WSW | 3666 | 10998 | 18324 | 13776 | 12587 | 14089  | 26338  |
| SW  | 3666 | 10998 | 18325 | 23893 | 32250 | 29355  | 42546  |
| SSW | 3666 | 10998 | 18327 | 25659 | 31392 | 49174  | 125607 |
| S   | 3671 | 11012 | 18352 | 25867 | 49021 | 112038 | 134355 |
| SSE | 3664 | 7229  | 16759 | 53346 | 67202 | 57206  | 60249  |
| SE  | 2802 | 4169  | 25916 | 70685 | 60180 | 41224  | 46193  |
| ESE | 2141 | 4750  | 40348 | 73070 | 94019 | 109850 | 72747  |
| E   | 2028 | 8143  | 50743 | 73067 | 94022 | 114860 | 42923  |
| ENE | 1840 | 4201  | 46227 | 73069 | 82395 | 70063  | 12487  |
| NE  | 1576 | 4224  | 49764 | 36544 | 15159 | 18083  | 21366  |
| NNE | 1444 | 4169  | 13214 | 8028  | 10448 | 12146  | 12438  |

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Distance (m)

---

Direction      75000

---

|     |        |
|-----|--------|
| N   | 16630  |
| NNW | 2609   |
| NW  | 3834   |
| WNW | 7664   |
| W   | 29501  |
| WSW | 33507  |
| SW  | 55196  |
| SSW | 154811 |
| S   | 155029 |
| SSE | 63171  |
| SE  | 53296  |
| ESE | 22177  |
| E   | 9028   |
| ENE | 11529  |
| NE  | 19852  |
| NNE | 12420  |

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## C A P 8 8 - P C

Version 1.00

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 27, 2007 4:33 pm

Facility: LEHR  
 Address: Old Davis Road  
 City: Davis  
 State: CA                      Zip: 95616

Source Category: diffuse  
 Source Type: Area  
 Emission Year: 2006

Comments: WDPs, SWT overburden, individual run

Dataset Name: SWTx0BIndGrade06  
 Dataset Date: Jun 27, 2007 4:33 pm  
 Wind File: WNDFILES\SAC0320.WND

Jun 27, 2007 4:33 pm

SUMMARY  
 Page 1

## ORGAN DOSE EQUIVALENT SUMMARY

| Organ   | Selected<br>Individual<br>(mrem/y) |
|---------|------------------------------------|
| GONADS  | 1.10E-03                           |
| BREAST  | 1.11E-03                           |
| R MAR   | 1.35E-02                           |
| LUNGS   | 3.52E-02                           |
| THYROID | 1.10E-03                           |
| ENDOST  | 1.87E-01                           |
| RMNDR   | 1.55E-02                           |

EFFEC G 1.66E-02

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

| Pathway        | Selected Individual (mrem/y) |
|----------------|------------------------------|
| INGESTION      | 8.67E-03                     |
| INHALATION     | 7.93E-03                     |
| AIR IMMERSION  | 3.12E-09                     |
| GROUND SURFACE | 5.21E-06                     |
| INTERNAL       | 1.66E-02                     |
| EXTERNAL       | 5.21E-06                     |
| TOTAL          | 1.66E-02                     |

Jun 27, 2007 4:33 pm

SUMMARY Page 2

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

| Nuclide | Selected Individual (mrem/y) |
|---------|------------------------------|
| PB-210  | 1.22E-02                     |
| PB-214  | 2.12E-08                     |
| SR-90   | 3.24E-05                     |
| TH-228  | 4.38E-03                     |
| TOTAL   | 1.66E-02                     |

Jun 27, 2007 4:33 pm

SUMMARY Page 3

CANCER RISK SUMMARY

| Cancer   | Selected Individual Total Lifetime Fatal Cancer Risk |
|----------|--|
| LEUKEMIA | 1.52E-08   |
| BONE     | 1.01E-08   |
| THYROID  | 1.57E-10   |
| BREAST   | 1.26E-09   |
| LUNG     | 8.80E-08   |
| STOMACH  | 9.93E-10   |
| BOWEL    | 5.68E-10   |
| LIVER    | 4.91E-08   |
| PANCREAS | 7.51E-10   |
| URINARY  | 8.16E-09   |

G

|       |          |
|-------|----------|
| OTHER | 9.19E-10 |
| TOTAL | 1.75E-07 |

PATHWAY RISK SUMMARY

| Pathway        | Selected Individual<br>Total Lifetime<br>Fatal Cancer Risk |
|----------------|--|
| INGESTION      | 6.20E-08   |
| INHALATION     | 1.13E-07   |
| AIR IMMERSION  | 7.30E-14   |
| GROUND SURFACE | 1.07E-10   |
| INTERNAL       | 1.75E-07   |
| EXTERNAL       | 1.07E-10   |
| TOTAL          | 1.75E-07   |

Jun 27, 2007 4:33 pm

SUMMARY  
Page 4

NUCLIDE RISK SUMMARY

| Nuclide | Selected Individual<br>Total Lifetime<br>Fatal Cancer Risk |
|---------|--|
| PB-210  | 8.70E-08   |
| PB-214  | 3.63E-12   |
| SR-90   | 5.47E-10   |
| TH-228  | 8.78E-08   |
| TOTAL   | 1.75E-07   |

Jun 27, 2007 4:33 pm

SUMMARY  
Page 5

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

| Direction | Distance (m) |         |         |         |         |         |         |
|-----------|--------------|---------|---------|---------|---------|---------|---------|
|           | 1            | 48      | 52      | 65      | 99      | 300     | 400     |
| N         | 1.7E-02      | 5.2E-03 | 4.5E-03 | 3.1E-03 | 1.8E-03 | 8.2E-04 | 7.5E-04 |
| NNW       | 1.7E-02      | 5.5E-03 | 4.8E-03 | 3.4E-03 | 1.8E-03 | 7.7E-04 | 7.2E-04 |
| NW        | 1.7E-02      | 5.1E-03 | 4.4E-03 | 3.0E-03 | 1.7E-03 | 7.9E-04 | 7.3E-04 |
| WNW       | 1.7E-02      | 4.4E-03 | 3.8E-03 | 2.7E-03 | 1.6E-03 | 7.6E-04 | 7.1E-04 |
| W         | 1.7E-02      | 3.4E-03 | 2.9E-03 | 2.0E-03 | 1.3E-03 | 7.3E-04 | 7.0E-04 |
| WSW       | 1.7E-02      | 2.4E-03 | 2.1E-03 | 1.5E-03 | 9.8E-04 | 6.9E-04 | 6.7E-04 |
| SW        | 1.7E-02      | 1.9E-03 | 1.6E-03 | 1.1E-03 | 8.5E-04 | 6.8E-04 | 6.7E-04 |

|     | G        |          |          |          |          |          |          |
|-----|----------|----------|----------|----------|----------|----------|----------|
| SSW | 1. 7E-02 | 2. 0E-03 | 1. 8E-03 | 1. 3E-03 | 9. 0E-04 | 6. 8E-04 | 6. 7E-04 |
| S   | 1. 7E-02 | 2. 4E-03 | 2. 1E-03 | 1. 6E-03 | 1. 1E-03 | 7. 1E-04 | 6. 9E-04 |
| SSE | 1. 7E-02 | 2. 5E-03 | 2. 3E-03 | 1. 8E-03 | 1. 2E-03 | 7. 3E-04 | 7. 0E-04 |
| SE  | 1. 7E-02 | 2. 4E-03 | 2. 1E-03 | 1. 6E-03 | 1. 0E-03 | 7. 0E-04 | 6. 8E-04 |
| ESE | 1. 7E-02 | 2. 0E-03 | 1. 8E-03 | 1. 3E-03 | 9. 1E-04 | 6. 8E-04 | 6. 7E-04 |
| E   | 1. 7E-02 | 2. 0E-03 | 1. 7E-03 | 1. 2E-03 | 8. 9E-04 | 6. 8E-04 | 6. 7E-04 |
| ENE | 1. 7E-02 | 2. 5E-03 | 2. 2E-03 | 1. 6E-03 | 1. 0E-03 | 6. 9E-04 | 6. 7E-04 |
| NE  | 1. 7E-02 | 3. 5E-03 | 3. 0E-03 | 2. 0E-03 | 1. 3E-03 | 7. 4E-04 | 7. 0E-04 |
| NNE | 1. 7E-02 | 4. 6E-03 | 4. 0E-03 | 2. 9E-03 | 1. 6E-03 | 7. 5E-04 | 7. 1E-04 |

---

Distance (m)

---

Di recti on      1200

---

|     |          |
|-----|----------|
| N   | 6. 7E-04 |
| NNW | 6. 6E-04 |
| NW  | 6. 7E-04 |
| WNW | 6. 6E-04 |
| W   | 6. 6E-04 |
| WSW | 6. 6E-04 |
| SW  | 6. 6E-04 |
| SSW | 6. 6E-04 |
| S   | 6. 6E-04 |
| SSE | 6. 6E-04 |
| SE  | 6. 6E-04 |
| ESE | 6. 6E-04 |
| E   | 6. 6E-04 |
| ENE | 6. 6E-04 |
| NE  | 6. 6E-04 |
| NNE | 6. 6E-04 |

Jun 27, 2007    4: 33 pm

SUMMARY  
Page 6

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

---

Distance (m)

---

| Di recti on | 1 | 48 | 52 | 65 | 99 | 300 | 400 |
|-------------|---|----|----|----|----|-----|-----|
|-------------|---|----|----|----|----|-----|-----|

---

|     |          |          |          |          |          |          |          |
|-----|----------|----------|----------|----------|----------|----------|----------|
| N   | 1. 8E-07 | 5. 3E-08 | 4. 6E-08 | 3. 1E-08 | 1. 7E-08 | 6. 4E-09 | 5. 7E-09 |
| NNW | 1. 8E-07 | 5. 7E-08 | 4. 9E-08 | 3. 4E-08 | 1. 7E-08 | 5. 9E-09 | 5. 4E-09 |
| NW  | 1. 8E-07 | 5. 3E-08 | 4. 5E-08 | 3. 0E-08 | 1. 6E-08 | 6. 2E-09 | 5. 5E-09 |
| WNW | 1. 8E-07 | 4. 4E-08 | 3. 9E-08 | 2. 7E-08 | 1. 4E-08 | 5. 8E-09 | 5. 3E-09 |
| W   | 1. 8E-07 | 3. 4E-08 | 2. 9E-08 | 1. 9E-08 | 1. 1E-08 | 5. 5E-09 | 5. 1E-09 |
| WSW | 1. 8E-07 | 2. 3E-08 | 2. 0E-08 | 1. 3E-08 | 8. 1E-09 | 5. 0E-09 | 4. 9E-09 |
| SW  | 1. 8E-07 | 1. 8E-08 | 1. 5E-08 | 9. 7E-09 | 6. 7E-09 | 4. 9E-09 | 4. 8E-09 |
| SSW | 1. 8E-07 | 1. 9E-08 | 1. 7E-08 | 1. 1E-08 | 7. 3E-09 | 4. 9E-09 | 4. 8E-09 |
| S   | 1. 8E-07 | 2. 3E-08 | 2. 0E-08 | 1. 5E-08 | 9. 4E-09 | 5. 3E-09 | 5. 0E-09 |
| SSE | 1. 8E-07 | 2. 5E-08 | 2. 2E-08 | 1. 7E-08 | 1. 0E-08 | 5. 5E-09 | 5. 2E-09 |
| SE  | 1. 8E-07 | 2. 3E-08 | 2. 0E-08 | 1. 5E-08 | 8. 9E-09 | 5. 2E-09 | 5. 0E-09 |
| ESE | 1. 8E-07 | 1. 9E-08 | 1. 6E-08 | 1. 1E-08 | 7. 4E-09 | 5. 0E-09 | 4. 8E-09 |

|     |          |          |          |          |          |          |          |
|-----|----------|----------|----------|----------|----------|----------|----------|
|     |          |          |          | G        |          |          |          |
| E   | 1. 8E-07 | 1. 9E-08 | 1. 6E-08 | 1. 0E-08 | 7. 2E-09 | 5. 0E-09 | 4. 9E-09 |
| ENE | 1. 8E-07 | 2. 5E-08 | 2. 1E-08 | 1. 4E-08 | 8. 5E-09 | 5. 0E-09 | 4. 9E-09 |
| NE  | 1. 8E-07 | 3. 5E-08 | 2. 9E-08 | 2. 0E-08 | 1. 1E-08 | 5. 6E-09 | 5. 2E-09 |
| NNE | 1. 8E-07 | 4. 7E-08 | 4. 1E-08 | 2. 9E-08 | 1. 5E-08 | 5. 7E-09 | 5. 3E-09 |

---

Di stance (m)

---

Di recti on      1200

---

|     |          |
|-----|----------|
| N   | 4. 8E-09 |
| NNW | 4. 8E-09 |
| NW  | 4. 8E-09 |
| WNW | 4. 8E-09 |
| W   | 4. 8E-09 |
| WSW | 4. 7E-09 |
| SW  | 4. 7E-09 |
| SSW | 4. 7E-09 |
| S   | 4. 7E-09 |
| SSE | 4. 8E-09 |
| SE  | 4. 7E-09 |
| ESE | 4. 7E-09 |
| E   | 4. 7E-09 |
| ENE | 4. 7E-09 |
| NE  | 4. 8E-09 |
| NNE | 4. 8E-09 |

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H

C A P 8 8 - P C

Versi on 1. 00

Clean Air Act Assessment Package - 1988

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

Non-Radon Popul ati on Assessment  
Jun 27, 2007 4: 59 pm

Fac i l i t y: LEHR  
Address: Ol d Davi s Road  
Ci t y: Davi s  
State: CA Zi p: 95616

Effecti ve Dose Equi val ent  
(mrem/year)

---

1. 13E-06

---

At Thi s Locati on: 5000 Meters North  
Source Category: di ffuse  
Source Type: Area  
Emi ssi on Year: 2006

Comments: WDPs, SWT overburden, popul ati on run

Dataset Name: SWTx0BpopGrade06  
Dataset Date: Jun 27, 2007 4: 59 pm  
Wi nd Fi le: WNDFI LES\SAC0320. WND  
Popul ati on Fi le: POPFI LES\06LEHR. POP

Jun 27, 2007 4: 59 pm

SYNOPSIS  
Page 1

MAXI MALLY EXPOSED I NDI VI DUAL

Locati on Of The Indi vi dual : 5000 Meters North  
Li feti me Fatal Cancer Ri sk: 1. 18E-11  
Page 1

H

ORGAN DOSE EQUIVALENT SUMMARY

| Organ   | Selected Individual (mrem/y) | Collective Population (person-rem/y) |
|---------|------------------------------|--------------------------------------|
| GONADS  | 7.59E-08                     | 6.32E-06                             |
| BREAST  | 7.67E-08                     | 6.36E-06                             |
| R MAR   | 9.30E-07                     | 7.70E-05                             |
| LUNGS   | 2.31E-06                     | 1.18E-04                             |
| THYROID | 7.58E-08                     | 6.31E-06                             |
| ENDOST  | 1.29E-05                     | 1.07E-03                             |
| RMNDR   | 1.07E-06                     | 8.95E-05                             |
| EFFEC   | 1.13E-06                     | 8.50E-05                             |

FREQUENCY DISTRIBUTION OF LIFETIME FATAL CANCER RISKS

| Risk Range         | Number of People | Number of People In This Risk Range Or Higher | Deaths/Year In This Risk Range | Deaths/Year In This Risk 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 | 0                | 0   | 0.00E+00                       | 0.00E+00                                 |
| 1.0E-04 TO 1.0E-05 | 0                | 0   | 0.00E+00                       | 0.00E+00                                 |
| 1.0E-05 TO 1.0E-06 | 0                | 0   | 0.00E+00                       | 0.00E+00                                 |
| LESS THAN 1.0E-06  | 3617073          | 3617073                                       | 1.12E-08                       | 1.12E-08                                 |

Jun 27, 2007 4:59 pm

SYNOPSIS  
Page 2

RADIONUCLIDE EMISSIONS DURING THE YEAR 2006

| Nuclide | Class | Size | Source #1 Ci/y | TOTAL Ci/y |
|---------|-------|------|----------------|------------|
| PB-210  | D     | 1.00 | 1.6E-07        | 1.6E-07    |
| PB-214  | D     | 1.00 | 1.2E-08        | 1.2E-08    |
| SR-90   | D     | 1.00 | 7.0E-09        | 7.0E-09    |
| TH-228  | Y     | 1.00 | 1.1E-08        | 1.1E-08    |

SITE INFORMATION

Temperature: 16 degrees C  
Precipitation: 47 cm/y  
Mixing Height: 1000 m

Jun 27, 2007 4:59 pm

Page 2

SYNOPSIS

## SOURCE INFORMATION

|                             |          |      |      |      |      |      |      |
|-----------------------------|----------|------|------|------|------|------|------|
| Source Number:              | 1        |      |      |      |      |      |      |
| Source Height (m):          | 0.00     |      |      |      |      |      |      |
| Area (sq m):                | 5.26E+03 |      |      |      |      |      |      |
| Plume Rise<br>Pasquill Cat: | A        | B    | C    | D    | E    | F    | G    |
| Zero:                       | 0.00     | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## AGRICULTURAL DATA

|  | Vegetable | Milk  | Meat  |
|--|-----------|-------|-------|
| Fraction Home Produced:                          | 0.700     | 0.399 | 0.442 |
| Fraction From Assessment Area:                   | 0.300     | 0.601 | 0.558 |
| Fraction Imported:                               | 0.000     | 0.000 | 0.000 |
| Beef Cattle Density:                             | 8.81E-02  |       |       |
| Milk Cattle Density:                             | 2.85E-02  |       |       |
| Land Fraction Cultivated<br>for Vegetable Crops: | 2.50E-01  |       |       |

Jun 27, 2007 4:59 pm

SYNOPSIS  
Page 4

## POPULATION DATA

| Direction | Distance (m) |       |       |       |       |        |        |
|-----------|--------------|-------|-------|-------|-------|--------|--------|
|           | 5000         | 15000 | 25000 | 35000 | 45000 | 55000  | 65000  |
| N         | 1425         | 4174  | 6956  | 9086  | 9991  | 10076  | 14265  |
| NNW       | 1419         | 4169  | 6947  | 9726  | 10775 | 2509   | 1957   |
| NW        | 1457         | 4169  | 6946  | 9725  | 12511 | 13769  | 8933   |
| WNW       | 1638         | 4181  | 6946  | 9553  | 11833 | 14105  | 11556  |
| W         | 3637         | 8869  | 10779 | 9753  | 11533 | 14089  | 18992  |
| WSW       | 3666         | 10998 | 18324 | 13776 | 12587 | 14089  | 26338  |
| SW        | 3666         | 10998 | 18325 | 23893 | 32250 | 29355  | 42546  |
| SSW       | 3666         | 10998 | 18327 | 25659 | 31392 | 49174  | 125607 |
| S         | 3671         | 11012 | 18352 | 25867 | 49021 | 112038 | 134355 |
| SSE       | 3664         | 7229  | 16759 | 53346 | 67202 | 57206  | 60249  |
| SE        | 2802         | 4169  | 25916 | 70685 | 60180 | 41224  | 46193  |
| ESE       | 2141         | 4750  | 40348 | 73070 | 94019 | 109850 | 72747  |
| E         | 2028         | 8143  | 50743 | 73067 | 94022 | 114860 | 42923  |
| ENE       | 1840         | 4201  | 46227 | 73069 | 82395 | 70063  | 12487  |

|     |      |      |       |   |       |       |       |       |
|-----|------|------|-------|---|-------|-------|-------|-------|
| NE  | 1576 | 4224 | 49764 | H | 36544 | 15159 | 18083 | 21366 |
| NNE | 1444 | 4169 | 13214 |   | 8028  | 10448 | 12146 | 12438 |

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Distance (m)

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Direction      75000

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|     |        |
|-----|--------|
| N   | 16630  |
| NNW | 2609   |
| NW  | 3834   |
| WNW | 7664   |
| W   | 29501  |
| WSW | 33507  |
| SW  | 55196  |
| SSW | 154811 |
| S   | 155029 |
| SSE | 63171  |
| SE  | 53296  |
| ESE | 22177  |
| E   | 9028   |
| ENE | 11529  |
| NE  | 19852  |
| NNE | 12420  |

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