APPENDIX R

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Screening Health Risk Assessment for a Gasoline Fueling Facility at Knighton Road and Interstate 5, Shasta County, California

Prepared for:

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Air Pollution Meteorology ● Dispersion Modeling ●Climatological Analysis

Introduction

This report provides a conservative screening health risk analysis for a gasoline fueling facility proposed to be constructed within a commercial development north of Knighton Road and just east of the I-5 freeway. Two sites are analyzed, one at the southeast corner of the commercial center and one more centrally located at the northern end of the site. The two proposed sites are shown in the site plan in Appendix 1.

Gasoline fueling facilities are a source of gasoline vapors that would include Toxic Air Contaminants (TACs), primarily benzene. Gasoline vapors are released during the filling of both the stationary underground storage tanks and the transfer from those underground tanks to individual vehicles.

Small amounts of gasoline vapor (a reactive organic gas) escape to the atmosphere at filling stations due to loading losses, breathing losses, refueling losses and spillage. The rate of emission, for stations with CARB Phase I and Phase II emission controls and vent valves (as required by Shasta County AQMD permit requirements) is 1.269 pounds per thousand gallons.[1]

The Shasta County Air Quality Management District has stringent requirements for the control of gasoline vapor emissions from gasoline dispensing facilities that require all new facilities to install and maintain CARB Certified Vapor Recovery Systems. Primary applicable Shasta County AQMD regulations are Rule 3:3, "Gasoline Loading, Transfer and Dispensing" and Rule 2:1, New Source Review". As a source of TACs, a gasoline filling station is subject to the Shasta County AQMD's toxic risk screening and risk management procedures.

Previous Studies

The project site was the subject of a health risk assessment in 2000. A Flying J Travel Plaza project was proposed for the project site. The study addressed the cumulative health risk effects of the proposed Flying J project together with the effects of the existing TA Travel Center facility located on the opposite (south) side of the Knighton Road from the project site and diesel truck traffic on I-5.[2]

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[1] California Air Pollution Control Officers Association (CAPCOA), *Gasoline Service Station Industry-wide Risk Assessment Guidelines*, December 1997.

[2] Kleinfelder, Inc., *Human Health Risk Assessment Cumulative Effects of Proposed Flying J Travel Plaza Project and Existing Sources, Shasta County, California*, February 15, 2000.

The Flying J health risk assessment estimated that the cancer risk from the TA Travel Center and I-5 truck traffic would be as much as 220 in one million for the nearest residence (this is the same residence for which maximum risk from the southern gasoline state site has been estimated below). The existing risk at the Pacheco School was estimated as 19 in one million for the nearest off-site worker and 2.1 in one million for students. Almost all (99%) this risk was due to diesel exhaust, with the remaining 1% due to gasoline emissions from the TA Travel Center.

Based on the Flying J health risk assessment, it is estimated that the cancer risk from the TA Travel Center and I-5 truck traffic at the closest receptor to the northern gasoline station site would be about 271 in one million (1 in one million from the T/A Travel Center and 270 in one million from I-5 diesel trucks).

The above estimates of risk were based on year 2000 emission factors, and do not reflect any of the State of California's efforts to reduce risk associated with diesel exhaust that have occurred since 2000.

The proposed project is quite different from the earlier Flying J proposal for the site. The proposed project would not generate much diesel truck traffic, which was responsible for 99% of the calculated risk for the Flying J Travel Plaza.

Methodology

A screening risk assessment was conducted utilizing the procedures and emission factors defined in California Air Pollution Control Officers' *Air Toxics "Hot Spots" Program Gasoline Service Station Industry-wide Risk Assessment Guidelines*.[3] Using the project site plan and aerial photographs of the project environs, the distance between the centers of the two proposed gasoline facility sites and the nearest sensitive receptors were estimated.

The CAPCOA procedures provide a very conservative estimate of cancer risk per million gallons of gasoline pumped based on distance from the facility using results of the ISCST-3 dispersion model and hypothetical worst-case meteorological conditions.

[3] California Air Pollution Control Officers Association (CAPCOA), *Gasoline Service Station Industry-wide Risk Assessment Guidelines*, December 1997.

The only inputs required for the CAPCOA risk calculation is the distance from the gasoline facility to the receptor, identification of the type of emission control equipment that will be utilized, and a determination as to whether the surrounding neighborhood would be considered urban or rural. With these inputs, a conservative estimate of benzene concentration and the resulting risk can be obtained from tables and graphs. The risk is expressed as excess cancer risk per million gallons throughput. Since concentration is directly proportional to throughput, risks for any throughput can be estimated by multiplying the risk per million gallons by the desired throughput.

The estimated risk from the CAPCOA risk calculation is based on a continuous 24-hour a day exposure over a 70-year lifetime, typically termed the exposure of the Maximum Exposed Individual (MEI). The CAPCOA document recommends that adjustments to this risk calculation be made for other types of exposure.

The project site is near Pacheco Elementary School, which is located just east of the Knighton Road/Churn Creek intersection on the south side of Churn Creek Road. Exposures at this school have been estimated for employees and students. The correction factor for school employees is based on being on the site 8 hours per day, 180 days per year for 46 years. The correction factor for students is based on being on the site 8 hours per day, 180 days per year for 5 years. These adjustments to exposure are the same as those utilized for the health risk assessment for the Flying J Travel Plaza project in the year 2000.

Maximum residential exposure was also estimated for both analyzed sites. The closest existing residence to the southern gas station site is located on the east side of Churn Creek Road south of Knighton Road. The closest existing residence to the northern gas station is to the northwest where the boundary of the site forms a corner.

Estimated Cancer and Non-Cancer Risk

The distance to receptors was determined using the site plan and aerial photographs. Cancer risks were found by interpolating within a table of cancer risks for gas stations as calculated using the ISCST-3 model with the default SCREEN-3 meteorological data. The table of cancer risk versus distance is included in Appendix 2.

Table 1 shows the calculation of cancer risk at the maximally exposed school and residential receptors for an annual throughput of 1 million gallons of gasoline. At this emission rate, locating the gasoline station at the analyzed southern site will result in an

Table 1: Calculated Excess Carcinogenic Risk for 1 Million Gallon Annual Throughput

Southern Site					
Receptor	Maximum Annual Concentration (ug/m^3)	Distance (Meters)	Risk for MEI	Adjustment Factor	Adjusted Risk
Student Exposure	0.822	148	$1.90x10^{-6}$	0.012	$0.023x10^{-6}$
Teacher Exposure	0.822	148	$1.90x\ 10^{-6}$	0.108	$0.205x10^{-6}$
Resident Exposure	0.34	300	$0.79x10^{-6}$	1.0	$0.79x10^{-6}$

Northern Site					
Receptor	Maximum Annual Concentration (ug/m^3)	Distance (Meters)	Risk for MEI	Adjustment Factor	Adjusted Risk
Student Exposure	0.10	700	$0.23x10^{-6}$	0.012	$0.002x10^{-6}$
Teacher Exposure	0.10	700	$0.23x\ 10^{-6}$	0.108	$0.02x10^{-6}$
Resident Exposure	1.56	76	$3.62x10^{-6}$	1.0	$3.62x10^{-6}$

incremental individual cancer risk of 0.023 per million for a student at Pacheco Elementary School, and a cancer risk of 0.205 per million for a teacher. The southern analyzed site will result in an incremental individual cancer risk of 0.79 per million at the point of maximum residential exposure. These risks are to be compared to the Shasta County AQMD's significant risk threshold of 10 in one million established in the *Policy Establishing Guidelines for Toxics Health Risk Assessment*.

Locating a gasoline station at the northern analyzed site will result in an incremental individual cancer risk of 0.002 per million for a student at Pacheco Elementary School, and a cancer risk of 0.02 per million for a teacher. The northern analyzed gas station site would result in an incremental individual cancer risk of 3.62 per million at the point of maximum residential exposure. These risks are to be compared to the Shasta County AQMD's significant risk threshold of 10 in one million established in the *Policy Establishing Guidelines for Toxics Health Risk Assessment.*

The potential for non-cancer health effects is evaluated by comparing the long-term exposure level to a Reference Exposure Level (REL). A REL is a concentration level at or below which no adverse health effects are anticipated. RELs are designed to protect sensitive individuals within the population. Comparisons to RELs are made by determining the Hazard Index, which the ratio of the estimated exposure to the REL. The REL for benzene is 71 ug/m^3.

For the southern analyzed gasoline station site, the resulting Hazard Index is 0.0115 for the maximally exposed student and teacher, and 0.005 for the maximally exposed resident. These values are to be compared to the Shasta County AQMD's significant risk threshold of 1.0 established in the *Policy Establishing Guidelines for Toxics Health Risk Assessment*.

For the northern analyzed gasoline station site, the resulting Hazard Index is 0.0015 for the maximally exposed student and teacher, and 0.022 for the maximally exposed resident. These values are to be compared to the Shasta County AQMD's significant risk threshold of 1.0 established in the *Policy Establishing Guidelines for Toxics Health Risk Assessment*.

Project Incremental Risk

The actual risk resulting from the proposed gasoline facilities will be directly proportionally to the actual throughput, which is not known at this time. Throughput could be limited by Shasta County AQMD permit requirements and the results of the health risk assessment that the District would perform as part of the permitting process.

Based on the results in Table 1, a fueling facility at the southern analyzed site would not exceed the significant risk thresholds unless the annual throughput exceeded 12.65 million gallons. A similar calculation for the northern analyzed site yields a maximum throughput of 2.65 million gallons before the significant risk thresholds are reached.

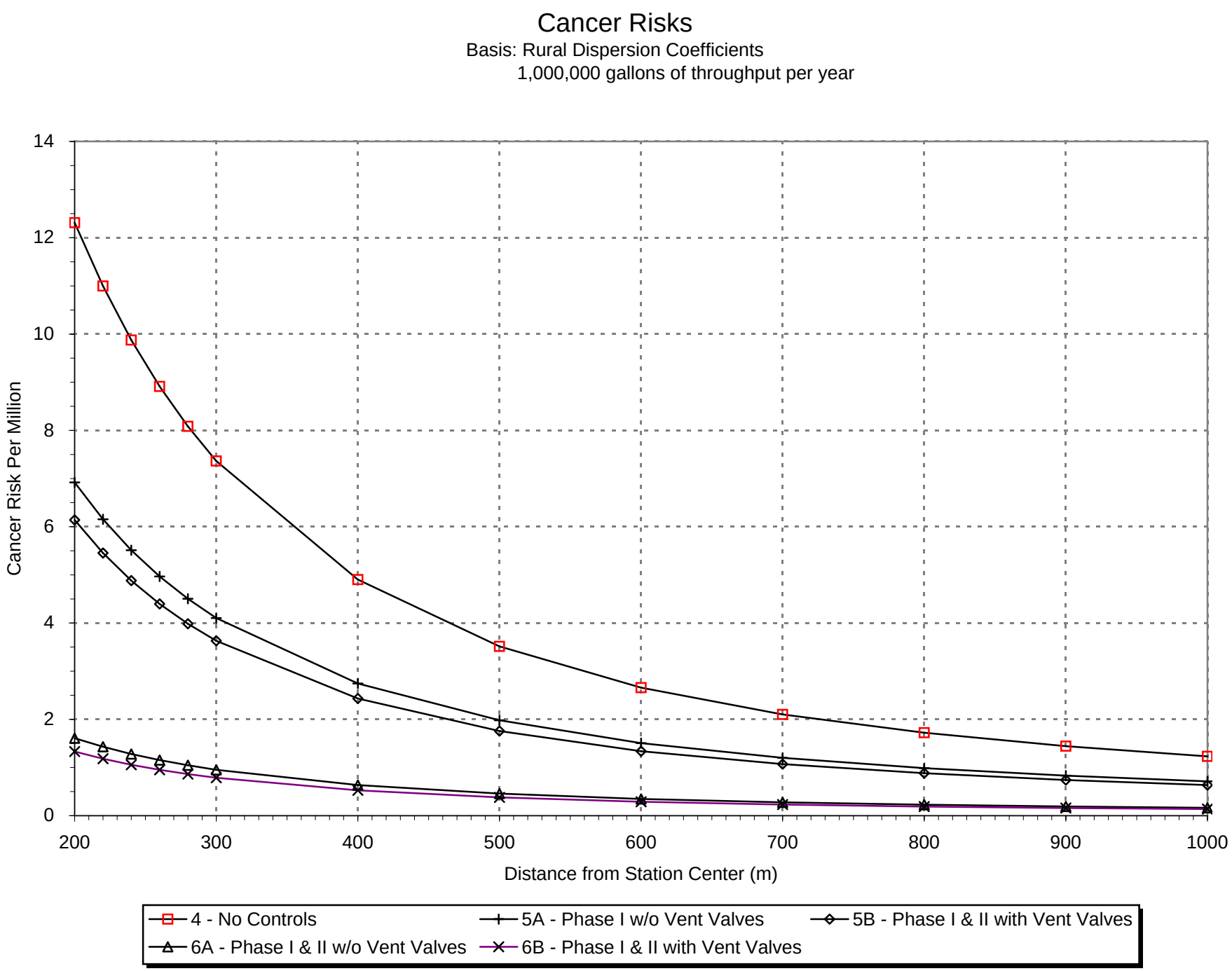
If a throughput of more than 12.65 million gallons is requested at the southern analyzed site, the allowable throughput can be increased by moving the gasoline station site further to the north and west towards the center of the site. Alternatively, it is very likely that a more sophisticated method of calculating risks, using actual meteorology and an air dispersion model, would provide a less conservative, more realistic estimate of risk, which would provide for a higher level of annual throughput.

If a throughput of more than 2.76 million gallons is requested at the northern analyzed site, the allowable throughput can be increased by moving the gasoline station site further to the south and east towards the center of the site. Alternatively, it is very likely that a more sophisticated method of calculating risks, using actual meteorology and an air dispersion model, would provide a less conservative, more realistic estimate of risk, which would provide for a higher level of annual throughput.

APPENDIX 1: SITE PLAN

SP-FC	FUEL STATION LOCATIONS	KNIGHTON RD & INTERSTATE 5 REDDING, CALIFORNIA	HAWKINS COMPANIES COMMERCIAL DEVELOPERS
Drawn By: KN / Revision: 04-29-08			

APPENDIX 2: CAPCOA RISK ESTIMATES


Cancer Risks
Basis: Rural Dispersion Coefficients
1,000,000 gallons of throughput per year
Cancer Risk Per Million
0
2
4
6
8
10
12
14
200
300
400
500
600
700
800
900
1000
Distance from Station Center (m)
4 - No Controls
5A - Phase I w/o Vent Valves
5B - Phase I & II with Vent Valves
6A - Phase I & II w/o Vent Valves
6B - Phase I & II with Vent Valves