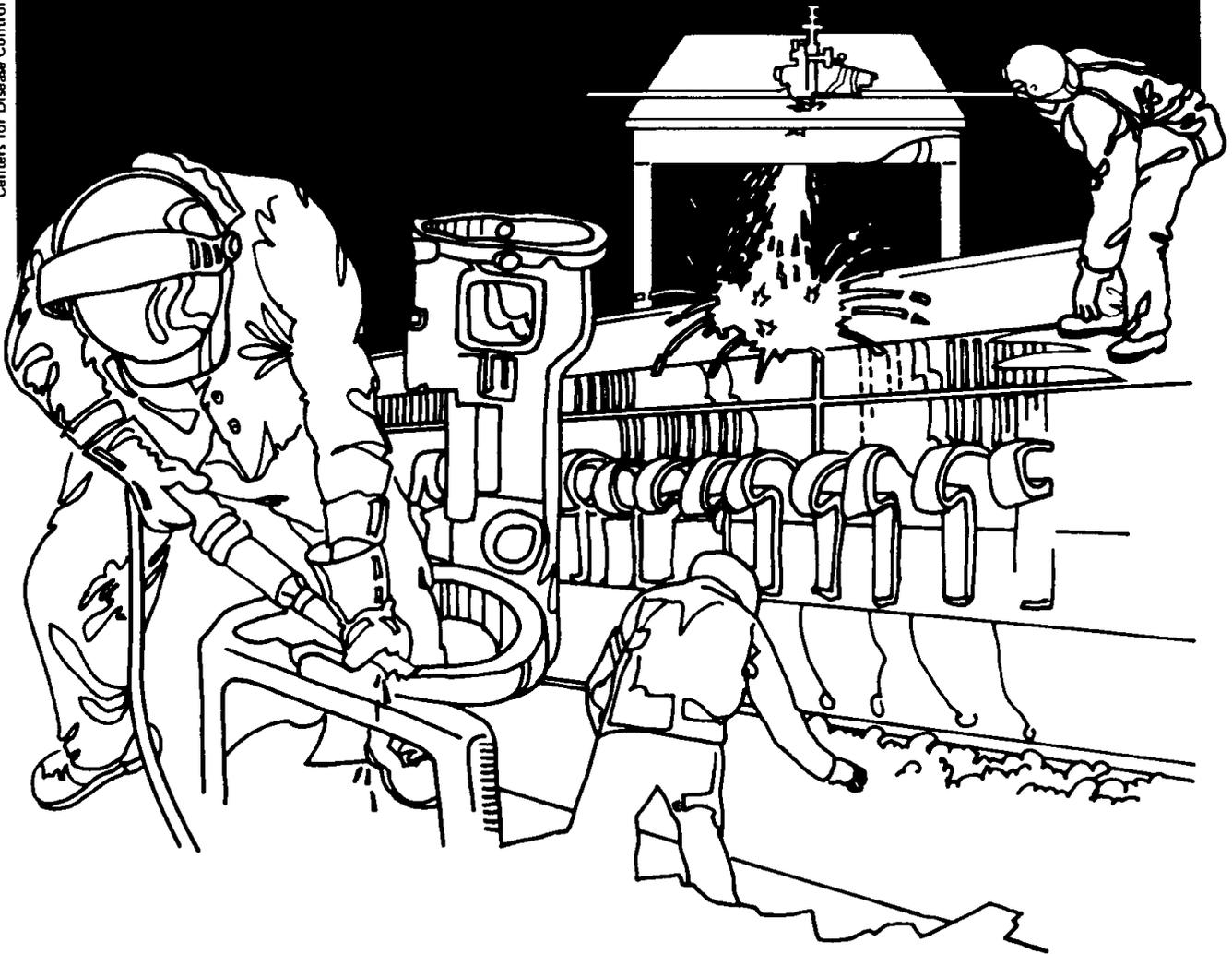


# NIOSH



## Health Hazard Evaluation Report

TA 79-027-979  
U.S. BORDER CROSSING STATIONS  
EL PASO, TEXAS

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INFORMATION SERVICE  
U.S. DEPARTMENT OF COMMERCE  
SPRINGFIELD, VA. 22161

## PREFACE

The Hazard Evaluations and Technical Assistance Branch of NIOSH conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following a written request from any employer or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

The Hazard Evaluations and Technical Assistance Branch also provides, upon request, medical, nursing, and industrial hygiene technical and consultative assistance (TA) to Federal, state, and local agencies; labor; industry and other groups or individuals to control occupational health hazards and to prevent related trauma and disease.

Mention of company names or products does not constitute endorsement by the National Institute for Occupational Safety and Health.

TA 79-027-979  
October 1981  
U.S. Border Crossing Stations  
El Paso, Texas

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## I. SUMMARY

At the request of the U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), the National Institute for Occupational Safety and Health (NIOSH) conducted industrial hygiene surveys at the U.S. Border Crossing Stations [Paso Del Norte Bridge (PDN) and Bridge of the Americas (BOTA)], El Paso, Texas, during the period August 25-26, 1979. Environmental measurements were made to determine inspectors' exposures to carbon monoxide (CO), lead (Pb), ozone (O<sub>3</sub>), benzene, sulfuric acid (H<sub>2</sub>SO<sub>4</sub>), particulate matter, sulfur dioxide (SO<sub>2</sub>) and nitrogen dioxide (NO<sub>2</sub>). A carboximeter was used to administer pre- and post-shift carboxyhemoglobin (COHb) tests to the majority of the inspectors.

On four occasions, at both PDN and BOTA, the general area hourly average CO level [PDN, 5-50 parts per million (ppm); BOTA, 2-50 ppm], as measured by ECOLYZERS/recorders, exceeded the NIOSH recommended level of 35 ppm. Time-weighted-average (TWA) personal CO exposure levels, as determined by the use of long-term detector tubes, ranged from 2-16 ppm (PDN) and 4-17 ppm (BOTA).

Tests results for COHb showed that at PDN, non-smoking inspectors' average COHb levels increased 1.8 percent from pre- to post shift, while smoking inspectors showed an increase of 1.2 percent. BOTA inspectors showed increases of 4.6 percent and 2.5 percent, respectively. However, the latter values are highly questionable, possibly reflecting equipment malfunctioning.

Results of other general area monitoring were as follows: Pb [4 samples ranging from 0.01-0.02 milligrams per cubic meter (mg/M<sup>3</sup>)]; O<sub>3</sub>/SO<sub>2</sub> [ 8 samples each, all of which showed non-detectable concentrations]; NO<sub>2</sub> [8 samples, all of which showed concentrations of 0.13 ppm]; Benzene [4 samples ranging from 0.09-0.15 mg/M<sup>3</sup>]; Particulate matter [ 4 samples ranging from 0.06-0.21 mg/M<sup>3</sup>]; and H<sub>2</sub>SO<sub>4</sub> [4 samples, all of which were below the limit of detection of the analytical method]. All of these general area measurements, including 4 for noise exposure, showed results to be below recommended exposure criteria.

Based on results obtained from this evaluation, NIOSH has determined that no health hazard to inspectors existed at the Paso Del Norte Bridge and Bridge of the Americas. Some general area carbon monoxide exposures were, however, found to be above the recommended levels, and increases in inspectors' carboxyhemoglobin levels did occur during the work shifts. Recommendations relating to this evaluation are presented in Section VII of this report.

KEYWORDS: SIC 4784 (Fixed Facilities for Handling Motor Transportation, Not Elsewhere Classified), Carbon monoxide, Carboxyhemoglobin, Lead, Ozone, Benzene, Sulfuric acid, Particulate matter, Sulfur dioxide, Nitrogen dioxide and Noise

## II. INTRODUCTION

At the request of the U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), NIOSH conducted an industrial hygiene survey at the U.S. Border Crossing Stations (Paso Del Norte Bridge and Bridge of the Americas), El Paso, Texas, during the period August 25-26, 1979. The purpose of the survey was to evaluate the exposure of APHIS; Immigration and Naturalization Service (INS, Department of Justice); and the United States Customs Service (USCS, Department of Treasury) personnel to auto exhaust/ carbon monoxide, lead, ozone, benzene, sulfuric acid, particulate matter, sulfur dioxide and nitrogen dioxide.

## III. BACKGROUND

Both bridges have primary inspection lanes [Paso Del Norte (PDN), 8 lanes; Bridge of the Americas (BOTA), 6 lanes], as well as secondary inspection areas and an administration area. The number of primary inspection lanes open to traffic during any given period depends upon the time of day, day of the week, season of the year and traffic density.

Principal employees at the bridges are, in fact, inspectors from USDA, INS, and USCS, who normally rotate on a half-hour schedule so that no one inspector is required to work in excess of four hours daily at the expected maximum exposure location -- namely, the primary lanes. The remainder of the work shift is spent in the secondary inspection areas or in the administration area. However, at BOTA, because of less pedestrian traffic, INS inspectors occasionally spend 1-1 1/2 hours on the primary inspection lanes before rotating.

## IV. EVALUATION DESIGN AND PROCEDURES

Personal/general area environmental monitoring as well as applicable analyses were accomplished as follows:

1. Carbon monoxide (CO) -- Personal sampling was conducted by use of MDA Scientific Accuhaler (Model 808) personal sampling pumps with long-term detector tubes (#CH 28121). A discoloration of the sorbent within the tube indicates the presence of CO, and the length of stain corresponds to the concentration.
2. Carbon monoxide (CO) -- Area monitoring was conducted by use of carbon monoxide ECOLYZERS equipped with recorders. The sampling probes of the monitors were positioned to sample air that corresponded to the inspectors' breathing zones.
3. Ozone (O<sub>3</sub>), sulfur dioxide (SO<sub>2</sub>) and nitrogen dioxide (NO<sub>2</sub>) -- General area evaluations were conducted by using a DRAGER Multi Gas Detector, Model 21/31 and appropriate detector tubes -- Ozone (#CH 313-01); Nitrogen dioxide (#CH 300-01); and Sulfur dioxide (#CH 317-01). Concentrations were similarly determined by sorbent discoloration/length of stain observations.

Lead, total particulate, sulfuric acid (H<sub>2</sub>SO<sub>4</sub>) and benzene were collected in a manner similar to the general area CO samples. Samples to determine lead concentrations were collected on 0.8 micron pore-size mixed cellulose ester membrane (MCEM) filters and analyzed by standard atomic absorption techniques. Total particulate was determined by gravimetric analyses using tared DM-800 filters as collection media. Samples for H<sub>2</sub>SO<sub>4</sub> determination were collected on 0.8 micron pore-size MCEM filters and analyzed by ion chromatography. Benzene evaluations were made by collecting samples on standard charcoal tubes and analyzing them by gas chromatography methods.

Inspectors' noise exposure were measured at the primary inspection lanes by using E.I. DuPont Nemours Company Permissible Audio Dosimeters, Model D-100.

Pre- and post-shift carboxyhemoglobin (COHb) levels for various inspectors were determined by use of an IADEC Ecolyzer Carboximeter, which is designed to measure the concentration of carbon monoxide in a breath sample introduced into its intake port. The carbon monoxide level is displayed on the meter as percent carboxyhemoglobin (% COHb) in the blood.

V. EVALUATION CRITERIA

A. Environmental

<u>Substance/Agent</u>	<u>*NIOSH, 8-10 hr. TWA Recommendation</u>	<u>*ACGIH, TLV Committee, 8-hr. TWA Recommendation</u>	<u>*OSHA, 8-hr. TWA Standard</u>
Carbon monoxide	35 ppm	50 ppm	50 ppm
Lead	0.05 mg/M <sup>3</sup>	0.15 mg/M <sup>3</sup>	0.05 mg/M <sup>3</sup>
Ozone	--	0.1 ppm	0.1 ppm
Benzene	3.2 mg/M <sup>3</sup>	30 mg/M <sup>3</sup>	**32 mg/M <sup>3</sup>
Sulfuric acid	1 mg/M <sup>3</sup>	1 mg/M <sup>3</sup>	10 mg/M <sup>3</sup>
Particulate matter	--	10 mg/M <sup>3</sup>	10 mg/M <sup>3</sup>
Sulfur dioxide	2 ppm	2 ppm	5 ppm
Nitrogen dioxide	**1 ppm	5 ppm	**5 ppm
Noise	85 dBA	90 dBA	90 dBA

\*ppm - Parts of vapor or gas per million parts of contaminated air, by volume, at 25°C and 760 millimeters mercury pressure.

mg/M<sup>3</sup> - Milligrams of substance per cubic meter of air sampled.

ACGIH - American Conference of Governmental Industrial Hygienists; OSHA - U.S. Department of Labor, Occupational Safety and Health Administration.

\*\*Ceiling concentration

B. Toxic Effects

Carbon Monoxide<sup>1,2</sup>

Carbon monoxide is classified as a chemical asphyxiant whose toxic effects are a direct result of hypoxia (lack of oxygen) produced by a given exposure. It is rapidly transferred in the lungs from the inhaled air to the blood, and is reversibly bound to hemoglobin in the red blood cells forming carboxyhemoglobin (COHb). Hemoglobin has 200 times more affinity for carbon monoxide than oxygen. Symptoms will vary according to the COHb saturation level, as measured in percent, and may include headache, nausea, vomiting, dizziness, drowsiness and collapse. Individuals with coronary heart disease are believed to be especially sensitive to elevated levels of COHb. Studies have also indicated that chronic exposure to carbon monoxide may result in cardiovascular alterations in persons with heart disease or underlying coronary heart problems.

NIOSH recommends that no worker be exposed to concentrations of carbon monoxide, (a) greater than 35 ppm, as determined by a time-weighted-average (TWA) exposure, or, (b) a ceiling concentration of 200 ppm. A worker continuously exposed to the recommended 35 ppm allowable concentration would not be expected to have a COHb level in excess of 5 percent. At COHb concentrations above this level, workers begin to experience impaired motor and mental function problems. It should, however, be noted that the recommended exposure levels do not take into consideration the smoking habits of workers.

Lead<sup>3,4</sup>

Prolonged absorption of lead, or its inorganic compounds, result in severe gastrointestinal disturbances and anemia; with more serious intoxication there is neuromuscular dysfunction, while the most severe lead exposure may result in encephalopathy. The onset of symptoms of lead poisoning or plumbism is often abrupt, presenting complaints such as weakness, weight loss, lassitude, insomnia, and hypotension.

Following absorption, inorganic lead is distributed in the soft tissues, the highest concentrations being in the kidneys and the liver. In the blood, nearly all circulating inorganic lead is associated with the erythrocytes. Over a period of time, the lead is redistributed, being deposited especially in bone and also in teeth and hair. Lead absorption is cumulative; elimination of lead from the body is slow requiring considerably more time than the period of storage of toxic amounts.

### Ozone<sup>5,6</sup>

Ozone is an irritant of the mucous membranes and the lungs, and its effects range from irritation of the throat to severe pulmonary edema and hemorrhage. Exposure to 0.05-0.10 ppm for 15-30 minutes causes irritation and dryness of the throat; above 0.1 ppm causes changes in visual acuity, decrease in peripheral vision, choking, cough, substernal pain and dyspnea. More severe exposure also causes headache, dizziness, and a burning sensation in the eyes.

Signs are usually minimal, or absent, except in cases of severe poisoning; in such cases, signs of pulmonary edema may appear and, a few hours following exposure, signs of broncho-pneumonia may be present; the respiratory ailment usually resolves itself within one to two weeks.

### Benzene<sup>7,8</sup>

Acute benzene exposure causes central nervous system (CNS) depression. Typical symptoms may be lightheadedness, headache, nausea, loss of appetite, and abdominal discomfort; with more severe intoxication, there may be weakness, blurring of vision, and dyspnea on exertion. Chronic exposure results in depression of the hematopoietic system and is associated with an increased incidence of leukemia. The most significant toxic effect of benzene exposure is an insidious and often irreversible injury to the bone.

### Sulfuric Acid<sup>9,10</sup>

Sulfuric acid is a severe irritant of the eyes, respiratory tract, and skin. Pulmonary edema has been reported from excessive inhalation; sequelae were pulmonary fibrosis, residual bronchitis, and pulmonary emphysema. In human subjects, concentrations of about 5 mg/M<sup>3</sup> have proven objectionable, usually causing cough, with an increase in respiratory rate, and impairment of ventilatory capacity.

### Particulate Matter<sup>11</sup>

Nuisance dusts have little adverse effects on lungs and do not produce significant organic disease or toxic effect when exposures are kept under reasonable control. The nuisance dusts have also been called biologically "inert" dusts, but the latter term is inappropriate to the extent that there is no dust which does not evoke some cellular response in the lung when inhaled in sufficient amounts. However, the lung-tissue reaction caused by inhalation of nuisance dusts has the following characteristics: the architecture of the air spaces remains intact; scar tissue is not formed to a significant extent; and the tissue reaction is potentially reversible.

Excessive concentrations of nuisance dusts in the work-room air may seriously reduce visibility, may cause unpleasant deposits in the eyes, ears, and nasal passages, or cause injury to the skin or mucous membranes by chemical or mechanical action, per se, or by the vigorous skin cleaning procedures necessary for their removal.

#### Sulfur Dioxide<sup>12,13</sup>

Sulfur dioxide (SO<sub>2</sub>) is a severe irritant of the eyes, mucous membranes, and skin. The irritant effects of SO<sub>2</sub> are caused by the rapidity with which it forms sulfuric acid on contact with moist membranes. Approximately 90 percent of all SO<sub>2</sub> inhaled is absorbed in the upper respiratory passages, where most effects occur; however, it may produce respiratory paralysis and may also cause pulmonary edema. Exposure to concentrations of 10-50 ppm for 5-15 minutes causes irritation of the eyes, nose, and throat, as well as choking and coughing.

#### Nitrogen Dioxide<sup>14</sup>

Nitrogen dioxide (NO<sub>2</sub>) is a respiratory irritant which causes pulmonary edema. Brief exposure of humans to concentrations of about 250 ppm causes cough, production of mucoid or frothy sputum, and increased labored breathing. Within 1-2 hours, the person may develop pulmonary edema and wheezes throughout the lungs.

## VI. RESULTS AND DISCUSSION

The general area hourly average carbon monoxide (CO) concentrations are shown in Tables 1 and 1A for the Paso Del Norte Bridge (PDN) and the Bridge of the Americas (BOTA), respectively. Examination of these tables show that on four occasions at both PDN and BOTA, the hourly average CO level exceeded the NIOSH recommended level of 35 ppm at Lanes 1-2. On the other hand, levels at Lanes 3-4 for both bridges as well as the PDN pedestrian traffic area, were at, or below, the recommended level. The eight-hour, time-weighted-average (TWA) levels were calculated to be: [PDN (Lanes 1-2, 40 ppm; Lanes 3-4, 26 ppm; Pedestrian traffic, < 5 ppm); and BOTA (Lanes 1-2, 39 ppm; Lanes 3-4, 27 ppm)].

Since the various inspectors generally work no more than four hours per day at the primary inspection booths, their average exposure would be expected to be less than the 8-hour TWA concentrations measured at the primary inspection booths. Results of personal monitoring of nine inspectors (Table 2) showed that assumption to be true with a measured range of 2-17 ppm. The highest recorded exposure was at the BOTA, where INS inspectors tend to spend longer periods of the work shift in the primary inspection lanes.

Table 3 shows that the August 25 average carboxyhemoglobin (COHb) levels for non-smoking Paso Del Norte Bridge inspectors increased 1.8 percent COHb from pre- to post-shift. Corresponding values for smoking inspectors showed an increase of 1.2 percent COHb.

Table 3A similarly shows that the August 26 average COHb levels for non-smoking Bridge of the Americas inspectors increased 4.6 percent COHb from pre- to post-shift. Corresponding values for smoking inspectors showed an increase of 2.5 percent COHb. Values in this table are, however, highly questionable, in that they would indicate, for many non-smokers, CO exposures far in excess of results found by personal sampling, and from general area sampling, when corrected for exposure time. This may be indicative of malfunctioning of the carboximeter.

Although results indicate that the inspectors were being exposed to variable amounts of CO while at work, it is difficult to single out and rank individual sources of CO in their order of importance. Carbon monoxide in ambient air, including that generated from cigarette smoke, is not, however, additive with regard to biological effects. Studies have shown that smoking habits of workers have a very noticeable effect on their actual daily exposure to carbon monoxide. Smokers are, in fact, less susceptible to increases in COHb because of low CO concentration exposures, since their already high COHb levels would not be increased by the additional exposure.

Measurements were also made at the inspection booths to determine the inspectors' personal noise exposures. The dosimeters used recorded actual exposure during the workday as a percentage of that permitted (90 dBA) by the OSHA standard. All four (4) measured exposures (2 - Paso Del Norte Bridge; 2 - Bridge of the Americas) indicated that the noise level did not exceed 90 dBA during the monitoring period.

Results appearing in Tables 4-5 show that airborne concentrations of four each lead/particulate matter/sulfuric acid/benzene; and eight each ozone/sulfur dioxide/nitrogen dioxide general area air samples were either non-detectable, or below: (a) applicable NIOSH, 8-10 hour TWA recommended levels; (b) ACGIH, TLV Committee, 8-hour (c) OSHA, 8-hour TWA/ceiling standards; or (d) the lower limit of detection of the specific analytical method.

## VII. RECOMMENDATIONS

1. Accelerated efforts should be made to conduct an on-going maintenance program for existing heating/air conditioning equipment at the existing stations.

2. Consider the implementation of a policy whereby vehicles awaiting inspection would be required to maintain a greater distance from the inspection booth. It is felt that this procedure will subject inspectors to lesser amounts of noxious fumes.
3. Insure compliance with the established policy of rotating inspectors at thirty-minute intervals on the primary inspection lanes. This policy cannot be overemphasized to assist in the goal of minimizing exposure to inspectors. Activities at the BOTA, where INS inspectors perform more extended duty, should be re-examined.

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IX. AUTHORSHIP AND ACKNOWLEDGEMENTS

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X. DISTRIBUTION AND AVAILABILITY OF DETERMINATION

Copies of this report are currently available upon request from NIOSH, Division of Standards Development and Technology Transfer, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days the report will be available through the National Technical Information Service (NTIS), Springfield, Virginia. Information regarding its availability through NTIS can be obtained from NIOSH, Publications Office, at the Cincinnati address.

Copies of this report have been sent to:

1. U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Washington, D.C.
2. U.S. Department of Labor, Region VI
3. NIOSH, Region VI

For the purpose of informing affected employees, a copy of this report shall be posted in a prominent place accessible to the employees for a period of 30 calendar days.

Table 1

## General Area Hourly Carbon Monoxide Concentrations

U.S. Border Crossing Station  
 Paso Del Norte Bridge  
 El Paso, Texas

August 25, 1979

Monitoring Period	*Concentration (ppm)		
	Lanes 1-2	Lanes 3-4	Pedestrian
0900-1000	35	20	< 5
1000-1100	40	25	< 5
1100-1200	35	25	5
1200-1300	50	30	5
1300-1400	50	30	5
1400-1500	45	30	5
1500-1600	35	25	< 5
1600-1700	30	25	< 5

U.S. Department of Labor, OSHA, 8-hr. TWA Standard....	50
NIOSH, 8-10 hr. TWA Recommendation.....	35
ACGIH, 8-10 hr. TWA Recommendation.....	50

\* ppm - Parts of vapor or gas per million parts of contaminated air, by volume, at 25°C and 760 millimeters mercury pressure.

Table 1A

## General Area Hourly Carbon Monoxide Concentration

U.S. Border Crossing Station  
 Bridge of the Americas  
 El Paso, Texas

August 26, 1979

<u>Monitoring Period</u>	<u>*Concentration (ppm)</u>	
	<u>Lanes 1-2</u>	<u>Lanes 3-4</u>
1000-1100	30	20
1100-1200	35	20
1200-1300	40	25
1300-1400	40	35
1400-1500	50	35
1500-1600	50	30
1600-1700	30	25

U.S. Department of Labor, OSHA, 8-hr. TWA Standard..... 50  
 NIOSH, 8-10 hr. TWA Recommendation..... 35  
 ACGIH, 8-hr. TWA Recommendation..... 50

\* ppm - Parts of vapor or gas per million parts of contaminated air, by volume, at 25°C and 760 millimeters mercury pressure.

Table 2  
Personal Breathing-Zone Long-Term Carbon Monoxide Concentrations

U.S. Border Crossing Stations  
El Paso, Texas

August 25-26, 1979

Date of Sample	(a) Location/Job	Sampling Period	*TWA Concentration (ppm)
8/25/79	Paso Del Norte Bridge, INS Inspector	0758-1545	10
8/25/79	Paso Del Norte Bridge, USCS Inspector	0801-1530	16
8/25/79	Paso Del Norte Bridge, INS Inspector	0805-1540	2
8/25/79	Paso Del Norte Bridge, USCS Inspector	0809-1542	4
8/26/79	Bridge of the Americas, USCS Inspector	0800-1558	5
8/26/79	Bridge of the Americas, USCS Inspector	0809-1534	4
8/26/79	Bridge of the Americas, INS Inspector	0808-1537	17
8/26/79	Bridge of the Americas, INS Inspector	0846-1543	(b) 8
8/26/79	Bridge of the Americas, APHIS Inspector	1200-1548	7

U.S. Department of Labor, OSHA, 8-hr. TWA Standard.....	50
NIOSH, 8-10 hr. TWA Recommendation.....	35
ACGIH, 8-hr. TWA Recommendation.....	50

\* ppm - Parts of vapor or gas per million parts of contaminated air, by volume, at 25°C and 760 millimeters mercury pressure.

(a) INS - Immigration and Naturalization Service; USCS - U.S. Customs Service;  
APHIS - Animal and Plant Inspection Service

(b) Monitoring equipment malfunction

Table 3

## Carboxyhemoglobin Levels

U.S. Border Crossing Station  
Paso Del Norte Bridge  
El Paso, Texas

August 25, 1979

(a) <u>Employee</u>	<u>Percent Carboxyhemoglobin</u>		(b) <u>Δ% COHb</u>
	<u>Pre-shift</u>	<u>Post-shift</u>	
INS (1)	1.0	4.2	+3.2
INS (2)	2.2	4.2	+2.0
INS (3)	2.4	4.8	+2.4
INS (4)	2.2	4.4	+2.2
INS (5)	3.6	5.0	+1.4
INS (6)	1.6	4.0	+2.4
INS (7)	1.8	6.4	+4.6
INS (8)	2.4	3.2	+0.8
INS (9)*	4.6	7.6	+3.0
USCS (1)*	7.8	8.0	+0.2
USCS (2)	1.8	4.0	+2.2
USCS (3)*	10.0	10.0	---
USCS (4)*	6.6	8.8	+2.2
USCS (5)*	8.4	10.0	+1.6
USCS (6)	5.4	5.2	-0.2
USCS (7)	6.2	5.6	-0.6
USCS (8)*	10.0	10.0	---
Non-smoker's average	2.8	4.6	+1.8
Smokers' average	7.9	9.1	+1.2

(a) INS - Immigration and Naturalization Service; USCS - U.S. Customs Service; APHIS, Animal and Plant Health Inspection Service

(b) Δ% COHb - Change in carboxyhemoglobin levels

\* Smoker

Table 3A

## (a) Carboxyhemoglobin Levels

U.S. Border Crossing Station  
 Bridge of the Americas  
 El Paso, Texas

August 26, 1979

(b) Employee	Percent Carboxyhemoglobin		(c) $\Delta\%$ COHb
	Pre-shift	Post-shift	
INS (1)	1.6	10.0	+8.4
INS (2)	4.0	10.0	+6.0
INS (3)*	7.0	14.0	+7.0
INS (4)	11.0	14.0	+3.0
INS (5)	7.6	5.2	-2.4
INS (6)*	7.8	10.0	+2.2
INS (7)*	10.0	12.0	+2.0
USCS (1)	1.2	8.2	+7.0
USCS (2)	1.8	7.8	+6.0
USCS (3)	1.8	7.6	+5.8
USCS (4)	1.2	5.4	+4.2
USCS (5)	2.0	7.8	+5.8
USCS (6)	3.4	7.8	+3.6
USCS (7)*	10.0	14.0	+4.0
USCS (8)*	7.6	12.0	+4.4
USCS (9)	3.2	7.2	+4.0
USCS (10)	3.2	5.8	+2.6
USCS (11)	3.2	9.0	+5.8
USCS (12)*	12.0	7.6	-4.4
Non-smokers' average	3.5	8.1	+4.6
Smokers' average	9.1	11.6	+2.5

(a) Values questionable because of possible equipment malfunction

(b) INS - Immigration and Naturalization Service; USCS - U.S. Customs Service;  
 APHIS - Animal and Plant Health Inspection Service

(c)  $\Delta\%$  COHb - Change in carboxyhemoglobin levels

\* Smoker

Table 4

General Area Lead (Pb), Total Particulate Matter, Sulfuric Acid (H<sub>2</sub>SO<sub>4</sub>) and Benzene ConcentrationsU.S. Border Crossing Stations  
El Paso, Texas

August 25-26, 1979

Date of Sample	Location	Sampling Period	*Concentration (mg/M <sup>3</sup> )			
			Pb	Particulate	H <sub>2</sub> SO <sub>4</sub>	Benzene
8/25/79	Paso Del Norte, Garita #1, Lanes 1-2	0900-1625	0.02	0.21	(a)	0.14
8/25/79	Paso Del Norte, Garita #2, Lanes 3-4	0900-1625	0.01	0.06	(a)	0.15
8/26/79	Bridge of the Americas, Garita #1, Lanes 1-2	0940-1629	0.01	0.07	(a)	0.09
8/26/79	Bridge of the Americas, Garita #2, Lanes 3-4	0940-1629	0.01	0.13	(a)	0.09
U.S. Department of Labor, OSHA, 8-hr. TWA Standard.....			0.05	10.0	1.0	30.0
U.S. Department of Labor, OSHA, Ceiling Standard.....			--	--	--	75.0
NIOSH, 8-10 hr., TWA Recommendation.....			0.05	--	1.0	3.2
ACGIH, 8-hr. TWA Recommendation.....			0.15	10.0	1.0	30.0

\* mg/M<sup>3</sup> = Milligrams of substance per cubic meter of air sampled

(a) Below the lower limit of detection of analytical method (10 micrograms per sample for the specific compound).

Table 5

General Area Ozone (O<sub>3</sub>), Sulfur Dioxide (SO<sub>2</sub>) and Nitrogen Dioxide (NO<sub>2</sub>) ConcentrationsU.S. Border Crossing Stations  
El Paso, Texas

August 25-26, 1979

Date of Sample	Location	Sampling Period	*Concentration (ppm)		
			O <sub>3</sub>	SO <sub>2</sub>	NO <sub>2</sub>
8/25/79	Paso Del Norte Bridge, Garita #1, Lanes 1-2	1130	ND	ND	0.13
8/25/79	Paso Del Norte Bridge, Garita #1, Lanes 1-2	1700	ND	ND	0.13
8/25/79	Paso Del Norte Bridge, Garita #2, Lanes 3-4	1130	ND	ND	0.13
8/25/79	Paso Del Norte Bridge, Garita #2, Lanes 3-4	1700	ND	ND	0.13
8/26/79	Bridge of the Americas, Garita #1, Lanes 1-2	1200	ND	ND	0.13
8/26/79	Bridge of the Americas, Garita #1, Lanes 1-2	1500	ND	ND	0.13
8/26/79	Bridge of the Americas, Garita #2, Lanes 3-4	1200	ND	ND	0.13
8/26/79	Bridge of the Americas, Garita #2, Lanes 3-4	1500	ND	ND	0.13
U.S. Department of Labor, OSHA, 8-hr. TWA Standard.....			0.1	5.0	5.0
NIOSH, 8-10 hr., TWA Recommendation.....			--	2.0	--
NIOSH, Ceiling Recommendation.....			--	--	1.0
ACGIH, 8-hr. TWA Recommendation.....			0.1	2.0	5.0

\* ppm - Parts of vapor or gas per million parts of contaminated air, by volume,  
at 25°C and 760 millimeters mercury pressure.

ND - None detected

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