

**WALK-THROUGH SURVEY REPORT:  
POTENTIAL OPTIONS FOR THE CONTROL OF BORDER AGENTS  
EXPOSURE TO VEHICLE EMISSIONS**

**at**

**United States Port of Entry  
Callexico, California**

**REPORT WRITTEN BY:  
Kevin Dunn, M.S.E.E.  
Kenneth R. Mead, P.E.  
William A. Heitbrink, Ph.D., C.I.H.**

**REPORT DATE:  
December, 1999**

**REPORT NO:  
ECTB 010-03a**

**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Public Health Service  
Centers for Disease Control and Prevention  
National Institute for Occupational Safety and Health  
Division of Physical Sciences and Engineering  
4676 Columbia Parkway - R5  
Cincinnati, Ohio 45226**

**STUDY SITE:** Calexico Port of Entry  
Calexico, California

**SIC CODE:** 9721

**STUDY DATES:** August 20, 1998

**STUDY CONDUCTED BY:** Kevin H. Dunn, NIOSH  
Kenneth R. Mead, NIOSH  
William A. Heitbrink, NIOSH

**EMPLOYER REPRESENTATIVES CONTACTED:** Alan Belauskas  
Immigration & Naturalization Service

Gerald Stachowitz  
United States Customs Service

Justine Jensen  
General Services Administration (GSA)

**EMPLOYEE REPRESENTATIVES CONTACTED:** Bob Barron  
Local 2805  
American Federation of Government Employees (AFGE)

**MANUSCRIPT PREPARED BY:** Diana R. Flaherty

## **DISCLAIMER**

Mention of company names or products does not constitute endorsement by the Centers for Disease Control and Prevention.

## **Introduction**

On August 20, 1998, a team of three researchers from the National Institute for Occupational Safety and Health (NIOSH) visited the United States/Mexican border crossing between Calexico, California and Mexicali, Mexico. This site visit was included in a three-day tour of border crossing stations along the United States and Mexican borders. A half-day was spent touring the facilities, taking photographs/video of operations, and reviewing facility drawings. The purpose of the visit was to review the facility operations and develop potential options for reducing border agent exposure to vehicle exhaust. Concerns about the current vehicle exhaust control strategies brought about the request for the site survey. The facility at Calexico differs from the San Ysidro in size (10 lanes versus 24 lanes), ventilation scheme, and traffic volume. There have been at least 3 recent surveys of the border agents at San Ysidro while data from the Calexico site is less recent and plentiful.

This report discusses observations and recommendations concerning the control of border agents' exposure to vehicle emissions at the Calexico Port of Entry into the United States. Please review the referenced survey report from San Ysidro Port of Entry because many of the recommendations discussed in that report are applicable to Calexico due to similarities in facility design and operations. NIOSH believes that the Calexico Port of Entry would provide a good site for the pilot scale studies recommended in this and the San Ysidro survey report.

## **Current Ventilation Systems**

There are 10 inspection booths at the Calexico border crossing station. Three of these booths are separated from the remaining seven and are under a smaller canopy or "soffit." Tempered air is supplied to each booth through a group of four supply registers at a flowrate of 3000 cubic feet per minute (cfm). Directly outside of the booth, air is supplied to the primary area where the agents perform most of their duties. The downdraft air shower consists of a register measuring 72 inches in length by 10 inches in width and provides 5400 cfm of supply air through the agent's work area. The downdraft supply registers were originally installed at a height of approximately 10 feet at all booths but were raised at all locations but one booth due to vehicle clearance problems (see figures 1 and 2). The modified downdraft supply register was placed at the top of the canopy at a height of approximately 15-20 feet above the pavement. The modifications to the downdraft air shower diminish the capability of the air shower to provide a clean air envelope around the agent due to lower supply air velocities at breathing zone height and the increased likelihood of turbulence around the work zone. Also, the NIOSH team observed higher air velocities from the downdraft supply registers in some lanes and

recommended that measurements of flow rates of each downdraft hood be performed to check on the overall balance of the system.

A pedestal supply air enclosure installed at each booth originally directed air towards the vehicle tailpipe to dilute and remove the exhaust gases. The pedestal supply air enclosures were not in operation during the site visit. A fan located in a mechanical room adjacent to the administration building provides the air for the pedestal supply with ducting running underground. Also, a series of soffit fans are installed in the canopy roof. Specific details on operating conditions for the pedestal supply and soffit fans were not reviewed due to unavailability of current facility drawings.

The U.S. Customs Service operates a continuous real time monitoring system designed to monitor carbon monoxide (CO) concentration in the primary inspection area. The system consists of a Bruel and Kjaer (B&K) model 1302 multi-gas monitor with a B&K model 1309 multi-point sampler (California Analytics, Orange CA). The CO monitoring system is designed to sequentially sample and record CO concentrations from locations within the primary inspection area. The manufacturer recommends that the B&K be calibrated on a quarterly basis with a zero point, span, and humidity interference calibration. The calibration sequence is moderately difficult and may require outside professional assistance. It is important to calibrate the instrument on a regular scheduled basis to verify that the readings are accurate. At the time of the visit, B&K operating instructions were provided in a simplified Users Manual that covered day-to-day operation of the system. In addition to the Users Manual, on-site personnel should have copies of the manufacturer's operating manuals that they can reference under unusual circumstances. During the visit, the unit was not functional and required recalibration.

## **DISCUSSION OF POTENTIAL OPTIONS**

The options discussed in the referenced report on San Ysidro are also relevant to the Calexico site. The differences in facility design at Calexico make some of the design recommendations more easily tested and implemented at this site. For instance, supply air at the vehicle exhaust system is currently in place but is not in use. Also, downdraft air showers are currently in use at Calexico. Therefore, the implementation of these options would be minimal in cost and effort. The use of supply air and downdraft will be discussed in greater detail below.

### **Supply Air at Car Exhaust**

The Calexico site has a system of supply air pedestal jets that were installed to push air away from the inspection station and to provide air for dilution of the vehicle exhaust. These pedestal supply systems were not in use during the visit. Data on the volumetric flowrates were not available from our review of the drawings. NIOSH recommends that the use of these systems be evaluated for their effectiveness. A test using tracer gas and/or smoke visualization could provide insight on the potential of this method to reduce

agent's exposure to automotive exhaust. A review of data from the B&K might also provide some historical information on the CO concentrations before the pedestal exhausts were de-activated. These systems are currently in place and could easily be evaluated for their effect on CO concentrations in the primary inspection area.

### **Downdraft Air Shower**

The use of air showers to prevent the migration of contamination into the work area of the agents is a viable option for minimizing agent exposure. The air shower is intended to provide an envelope of clean air around the agent. The ducting and air moving equipment necessary for the implementation of the air showers are currently in place with only moderate re-design necessary to improve effectiveness. System optimization would require the re-work of the existing downdraft units to move them closer to the agents' work area. Other important design changes include increasing the hood width to provide better coverage of the work area and installing laminar flow elements to minimize turbulence. Tracer gas and smoke visualization could be used to evaluate effectiveness of the downdraft hood.

## **RECOMMENDED COURSE OF ACTION**

The recommendations discussed within this report are based on the observations from the 1 day visit to Calexico. These options as well as those outlined in the attached San Ysidro report should be evaluated by each agency for operational and cost feasibility prior to going forward with any test or implementation plans. The Calexico site has in place systems that may be valuable in reducing agents exposure to vehicular exhausts. NIOSH would recommend that the INS, U.S. Customs Service and GSA consider the following options:

- Evaluate the effectiveness of the pedestal supply registers in decreasing the level of vehicle exhaust in the primary inspection lane.
- Evaluate the use of re-designed downdraft hoods to supply an envelope of clean air around the agent in the work area directly outside of the primary inspection booths.
- Consider reversing the soffit fans (if applicable) to increase airflow in the primary inspection area during stagnant atmospheric conditions.

NIOSH recommends that a pilot study be performed before making any significant changes to the existing configuration. This study should include only those options that are determined to be feasible for implementation by the GSA, INS, and Customs Service. Engineering controls for the pilot study could be manufactured and implemented on a single lane and evaluated using tracer gas and smoke visualization techniques to provide qualitative and semi-quantitative data for evaluation. The Calexico site would provide a

good test site for evaluating many of the options discussed in the San Ysidro report due to the availability of downdraft supply and pedestal exhaust air systems. Also, the decreased traffic volume may facilitate the use of a single lane for testing more readily than at the San Ysidro Port of Entry.

## REFERENCES

1. Dunn, K.H.; Mead, K.R.; Heitbrink, W.A.[1997]: ECTB 010-02a Survey Report: Potential Option for the Control of Border Agents Exposure to Vehicle Emissions San Ysidro, California. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, PHS (NIOSH).



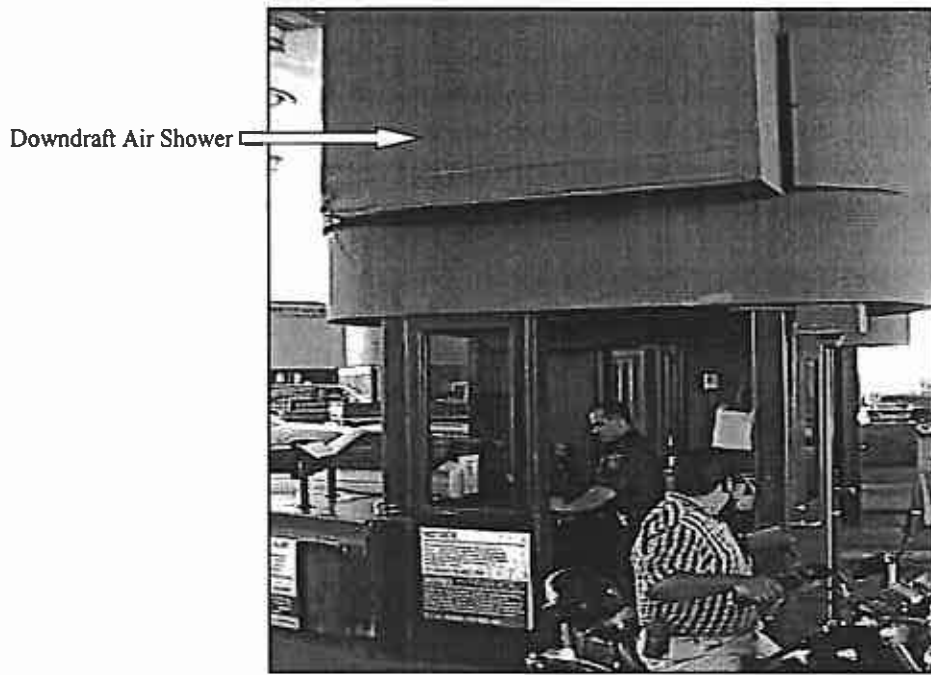


Figure 1. Original Downdraft Air Shower Configuration

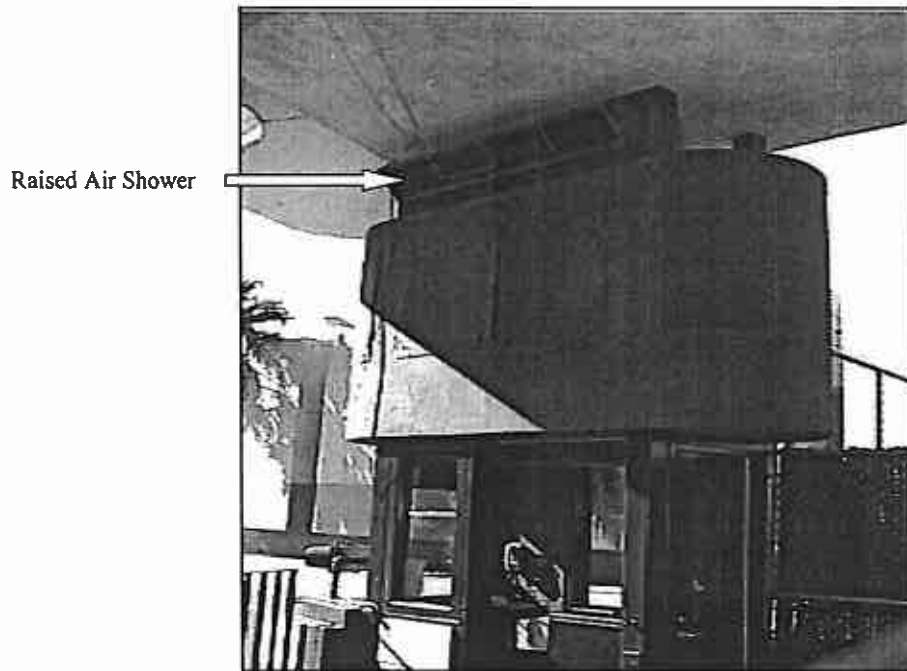


Figure 2: Raised Downdraft Air Shower Configuration