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SURVEY REPORT: MERCURY VAPOR LEVELS IN DENTAL TREATMENT ROOMS. (U)
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IN DENTAL TREATMENT ROOMS
AUGUST 1982

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Commander

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) → Three dental treatment rooms (DTRs) at Brooks AFB TX were surveyed for mercury vapor levels. These DTRs are being used by the Dental Investigation Service, USAFSAM/NGD, in a protocol to determine the relationship between the use of precapsulated dental amalgam, type of floor covering and mercury vapor levels. This preliminary survey shows mercury vapor levels in each room to be below the lowest detectable level (.001 mg/m³). These results will serve as a baseline for the semiannual surveys to be taken over the next two years. ↙		

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USAF OCCUPATIONAL AND ENVIRONMENTAL

HEALTH LABORATORY

Brooks AFB, Texas 78235

Survey Report: Mercury Vapor Levels

in Dental Treatment Rooms

August 1982

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I. INTRODUCTION

On 25 March 1982 Col Almquist of the USAF Dental Investigation Service, USAFSAM/NGD, requested that the USAF Occupational and Environmental Health Laboratory (USAF OEHL) perform a series of mercury surveys in three dental treatment rooms in Building 125, Brooks AFB TX. The effort was to consist of an initial survey, serving as a baseline, with semiannual followups for two years to determine the relationship between the use of precapsulated dental amalgam, type of dental treatment room floor covering and mercury vapor levels.

II. BACKGROUND

The current OSHA standard is 0.1 milligram of mercury per cubic meter of air (mg/m^3). NIOSH has recommended 0.05 mg/m^3 be the permissible exposure limit over an eight-hour work shift.¹

Elemental mercury is used extensively in dental treatment rooms during routine dental procedures of tooth restoration. The principal route of exposure for dental professionals is vapor inhalation. Adverse health effects have been associated with chronic exposure to mercury vapors.

Impaired motor behavior, such as hand tremors, is often the first effect to occur. Other possible effects of chronic mercury exposure are skin rash, headache, swollen gums, loose teeth, personality change, irritability, and intellectual deterioration.¹

There is some controversy concerning the floor covering's contribution to personnel exposure.^(2,3) Carpet is aesthetically pleasing, provides a softer walking surface and aids in noise reduction. At the same time, carpet is more difficult to decontaminate after mercury spills. Routine vacuuming operations have led to exposures above the Short Term Exposure Limit (STEL) for custodial personnel.⁴

Mercury for use in dental labs is now available as precapsulated dental amalgam alloy. This eliminates the need for mercury in bulk containers and decreases the handling required.

The three dental treatment rooms of concern in Building 125 were renovated. No mercury was used in any room prior to this survey. Therefore, these results may serve as a baseline for future sampling.

III. METHODS

On 26 May 1982, the investigative protocol guidelines provided by the Dental Investigation Service were followed.⁵

The dental treatment rooms to be sampled were set up as follows:

<u>Rooms</u>	<u>Floor Covering</u>	<u>Mercury used in the Room</u>
214 A	Seamless vinyl	Precapsulated dental amalgam
214 B	Antron III hospital grade carpet	Precapsulated dental amalgam
216	Antron III hospital grade carpet	None

Five DuPont P-200 pumps equipped with Jerome dosimeters were placed in each room. The flow rate was approximately 50 cc/min for a 6 to 7 hour period. Three were area samples 1 to 2 inches from the floor. The other two were placed in the dental professionals' breathing zone. The sample sites are noted in attachments 1 through 3.

The Jerome Instrument Corporation Model 401 Gold Film Mercury Vapor Analyzer was used to determine the amount of mercury collected on the dosimeter coils. The dosimeter coil consists of a gold-plated wire coiled within a nylon holder. Mercury from the sampled air adsorbs onto the wire. The model 401 analyzer heats the coil and draws in airborne mercury. There the mercury alters the resistance of its gold-plated wire and causes an imbalance in the bridge network.⁶

IV. RESULTS AND DISCUSSION

As seen in Table 1 no mercury was detected. The mercury levels at all (15) sample sites were less than the lowest detectable level (0.001 mg/m³). This is well below the existing workplace standards.

Attachment 4 summarizes the mercury vapor survey as suggested in the USAF Dental Service Mercury Hygiene Report, Calendar Year 1980.⁷

TABLE 1. RESULTS

<u>Sample Number</u>	<u>Room Number</u>	<u>Sample Type</u>	<u>Dosimeter Coil</u>	<u>DuPont Pump #</u>	<u>Air Volume Sampled (l)</u>	<u>Mercury Concentration (mg/m³)</u>
1	214 A	BZ	D 741	9858	21.14	<.001
2	214 A	BZ	D 698	8803	19.75	<.001
3	214 A	Floor	D 725	8904	21.04	<.001
4	214 A	Floor	D 724	7678	20.25	<.001
5	214 A	Floor	D 726	8487	18.75	<.001
6	214 B	BZ	D 665	9461	21.6	<.001
7	214 B	BZ	D 691	8997	21.4	<.001
8	214 B	Floor	D 688	7672	19.09	<.001
9	214 B	Floor	D 730	7677	20.80	<.001
10	214 B	Floor	D 736	8894	17.90	<.001
11	216	BZ	D 664	9029	19.12	<.001
12	216	BZ	D 733	9016	18.59	<.001
13	216	Floor	D 742	8885	20.17	<.001
14	216	Floor	D 735	8899	20.18	<.001
15	216	Floor	D 692	8806	18.99	<.001

BZ = Breathing Zone

Floor = 1-2 inches off the floor

V. RECOMMENDATION

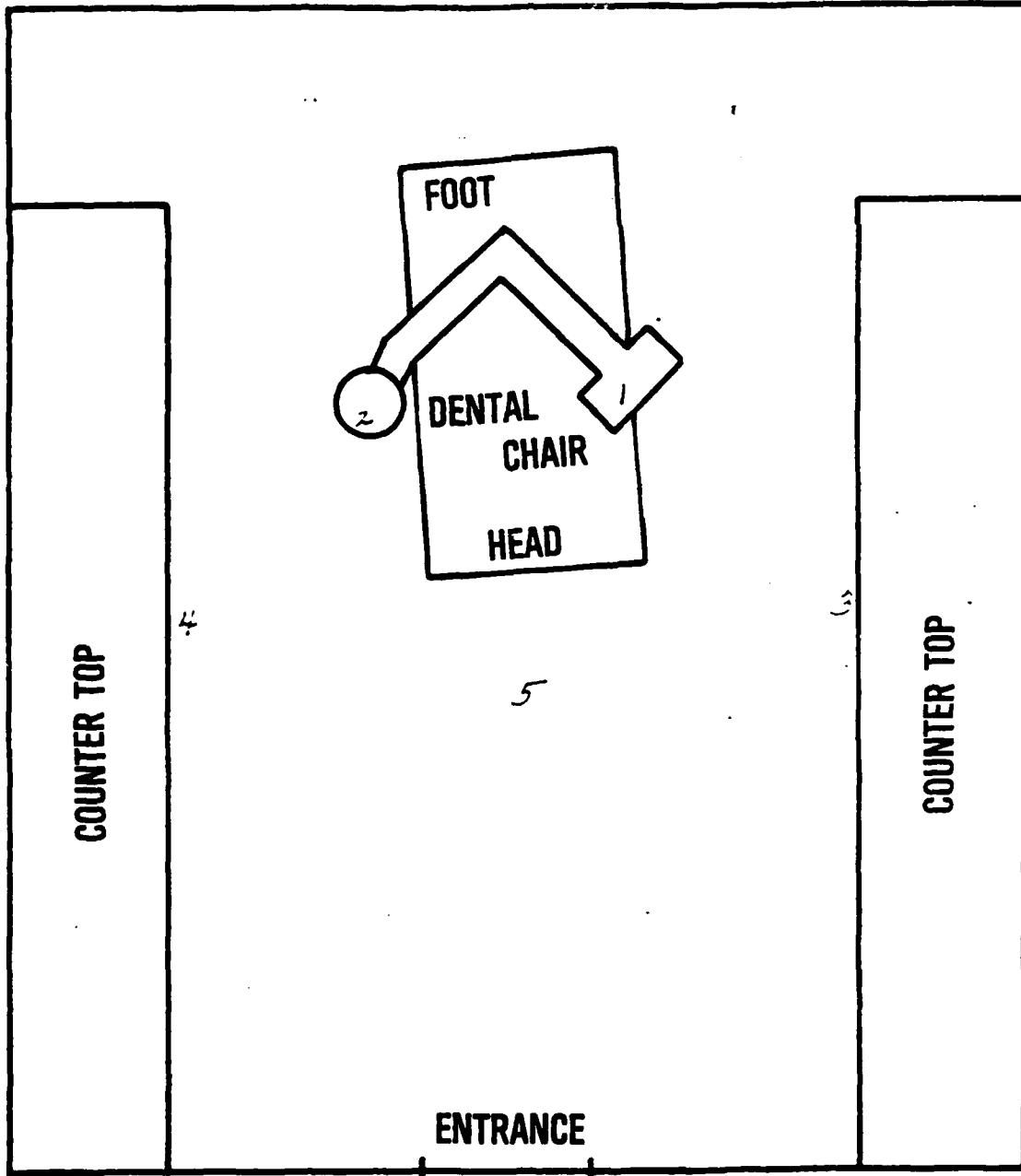
The procedure will be repeated in six months as requested by the Dental Investigation Service protocol. The purpose of the surveys is to monitor any mercury escaping from the precapsulated amalgam alloy into the treatment room. Samples will be taken again in November 1982.

VI. REFERENCES

1. NIOSH/OSHA Occupational Health Guidelines for Chemical Hazards. DHHS (NIOSH) Publication No. 81-123. January 1981.
2. Kantor, Mel L., and R.C. Woodcock. "Mercury Vapor Exposure in the Dental Office-Does Carpeting Make a Difference?" Journal of the American Dental Association, Vol. 103 September 1981, 402-407.
3. Lowe, Jere M. "Mercury Vapor Exposure in the Dental Office." Dental Hygiene, March 1980, 118-120.
4. Study of Airborne Mercury Concentrations in the USAF Hospital Bergstrom AFB Dental Clinic. Dick T. Jordon, Jr, Bergstrom AFB: May 1979.
5. Investigative Protocol-USA Hospital Columbus. Theodore C. Almquist, USAF Dental Investigation Service Brooks AFB: February 23, 1981.
6. Jerome Instrument's Model 401 Mercury Vapor Analyzer Operational Test and Evaluation. OEHL #81-21. April 1981.
7. USAF Dental Service Mercury Hygiene Report, Calendar Year 1980. Aero-medical Review 6-81. Theodore C. Almquist, et al. Brooks AFB: 1981.

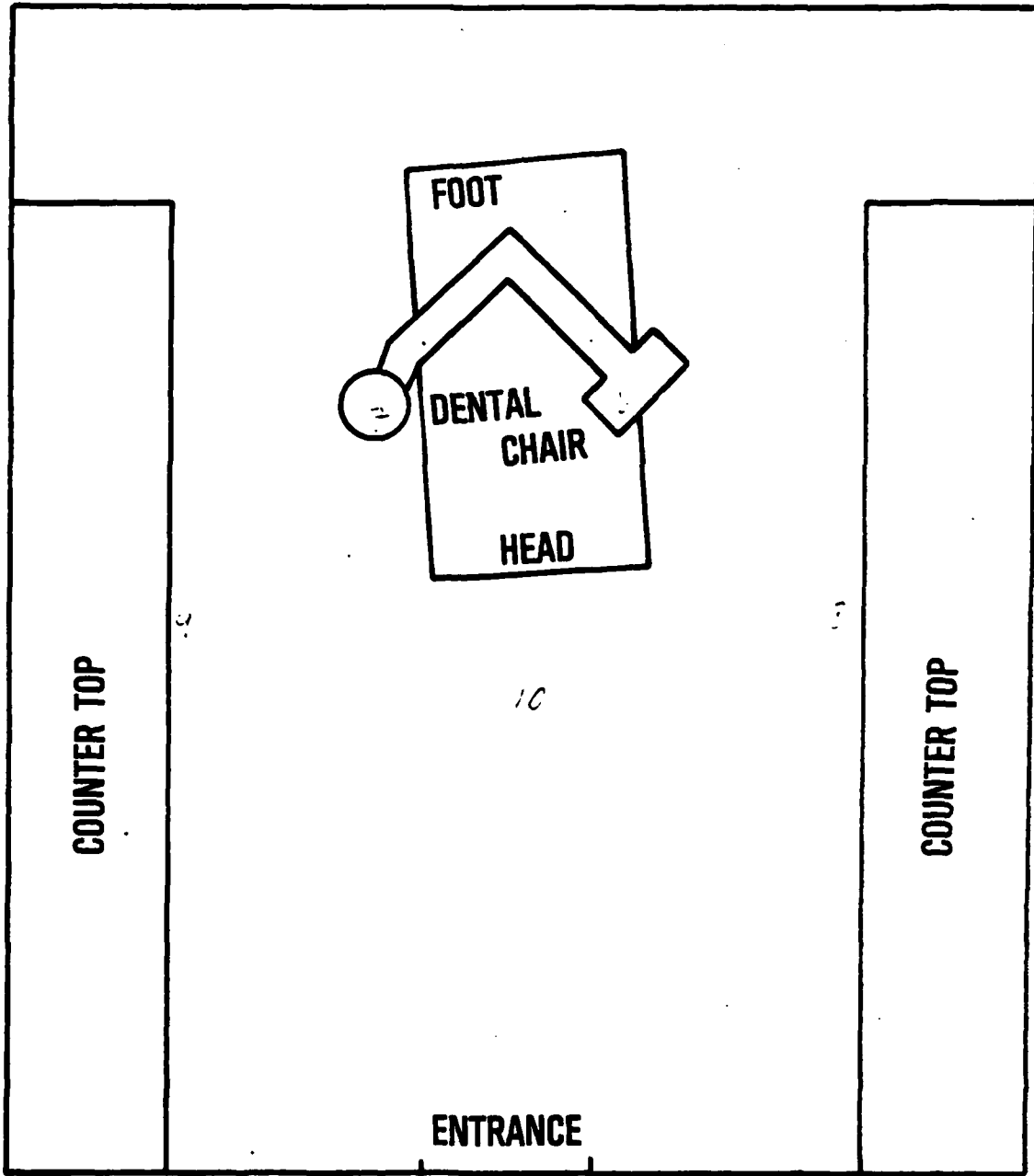
ATTACHMENT 1

BROOKS AFB
BUILDING 125
ROOM 214 A



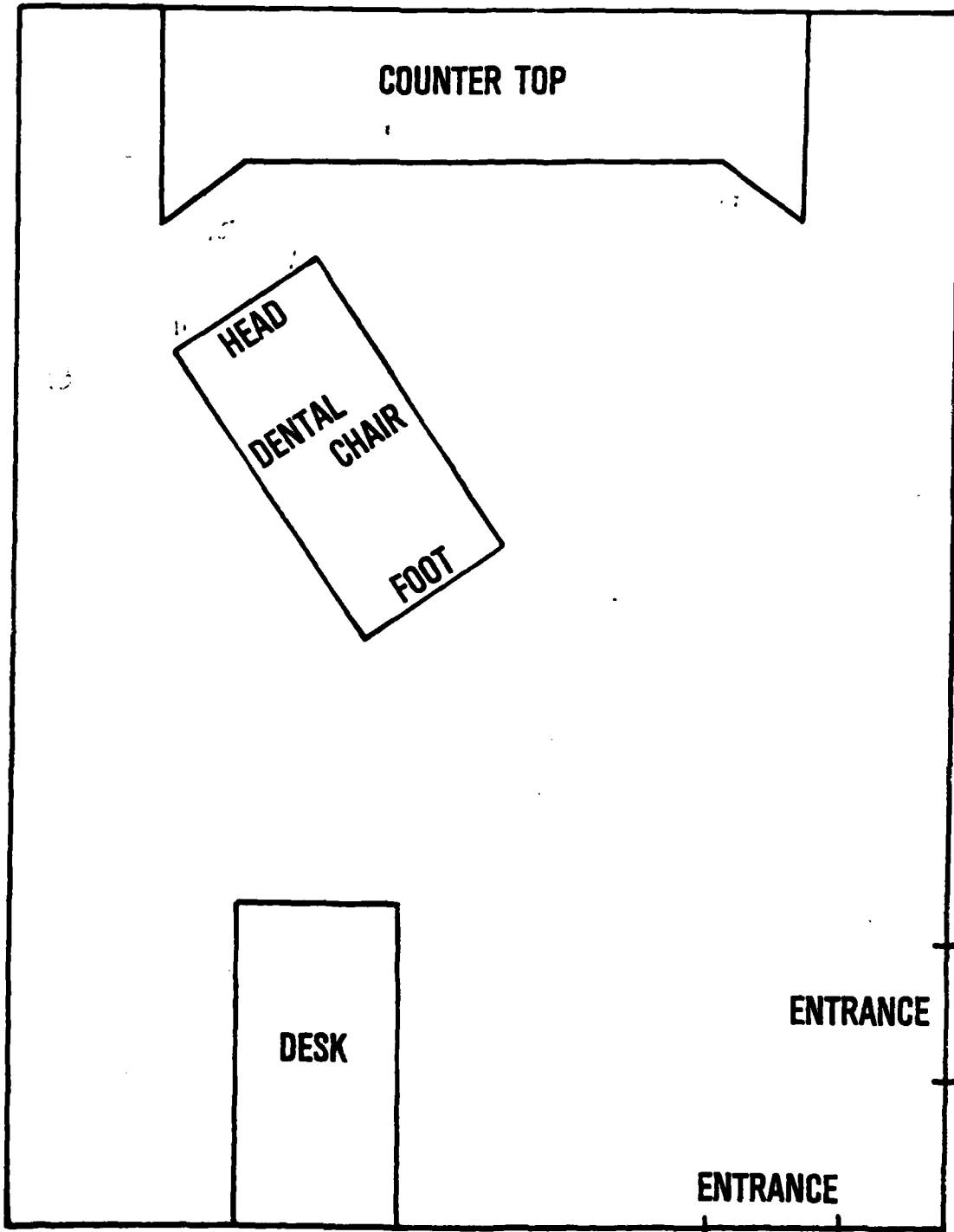
ATTACHMENT 2

BROOKS AFB
BUILDING 125
ROOM 214 B



ATTACHMENT 3

BROOKS AFB
BUILDING 125
ROOM 216



MERCURY VAPOR SURVEY REPORT FORM

I. Introduction

A. Clinic: USAF Dental Investigation Service

Building No.: 125

Base: Brooks AFB

B. Date: 25 March 1982

C. Type Survey: Preliminary

D. Background: Remodeled rooms, no spills

E. Instrumentation:

1. Analyzer: Gold Film Mercury Analyzer, Model 401 and Mercury Dosimeter by Jerome Instrument Corp.

2. Name of operators: Capt Bennett
Lt Vaughn

3. Sample time: Mean time; 6 hr. 21 min.

II. Findings:

A. Area surveyed: Dental treatment rooms

B. Floor covering: Carpet, and seamless vinyl

C. Breathing zone mercury vapor values: All samples <0.001 mg/m³

D. Sources of contamination: None

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