U.S. EPA BASE STUDY
STANDARD OPERATING PROCEDURE
PRELIMINARY VISITS (PVs) TO BUILDINGS

Previously submitted date: April 1996

Prepared By:

Environmental Health & Engineering, Inc.
60 Wells Avenue
Newton, MA 02459-3210

EH&E Report #11663
September 2000

N:\SOP\2000\PVS.DOC

©2000 by Environmental Health & Engineering, Inc.
All rights reserved

TABLE OF CONTENTS

1.0 OBJECTIVE 1
2.0 ADVANCED PREPARATIONS 2
3.0 PRELIMINARY VISITS 3
3.1 INTRODUCTION AND OVERVIEW 3
3.2 SPECIAL CONCERNS AND SENSITIVE ISSUES 3
3.3 HVAC SYSTEM 6
3.4 STUDY AREA 6
3.5 BUILDING WALKTHROUGH 7
3.6 IADCS SURVEY INTERVIEW 7
3.7 PV CLOSURE 7
4.0 AFTER THE PRELIMINARY VISIT 9
4.1 BUILDING SELECTION 9
4.2 BUILDING CUT SHEETS 9
4.3 TRANSFER OF PV DATA TO FIELD TEAM LEADER 10

LIST OF APPENDICES

Appendix A: Inventory of items for Preliminary Visit
Appendix B: Preliminary Visit Binder

1.0 OBJECTIVE

The objective of this standard operation procedure is to give the preliminary visit (PV) field investigator a description of how to conduct a BASE PV, as well as to detail the informational requirements that are gathered as part of this investigation. The PV is intended to verify the suitability of the building for inclusion as a BASE study building. Data collected on the entire building must include information on space use, occupancy, climate, building envelope construction, and the HVAC system. Potential study areas for monitoring are to be identified and if possible one or more study areas are selected for the field study.

2.0 ADVANCED PREPARATIONS

Advanced preparations prior to EH&E's PV to the BASE city requires an organization of necessary items to successfully complete the building recruiting process. An inventory of such items are denoted in Appendix A and Appendix B. The designated EH&E investigator(s) performing the PV will finalize all details, such as calling the building contact to confirm the PV visit, verify directions to the building, and review any HVAC or occupancy questions.

3.0 PRELIMINARY VISITS

3.1 INTRODUCTION AND OVERVIEW

At the PV, an introductory overview is given to the building contact about the historical aspects of the BASE study and the logistics of the daily sampling schedules during the field week. Study objectives are stated and the building contact is advised of the options regarding data reporting. The building contact is encouraged to ask questions or discuss special concerns, which are addressed by the PV investigators. The IADCS survey is conducted with the building contact with special emphasis placed on space use, occupancy, the HVAC system, and potential study areas. A walkthrough of the building further defines logistics concerning specific field measurements for the HVAC system and potential study areas.

3.2 SPECIAL CONCERNS AND SENSITIVE ISSUES

3.2.1 Random Selection

The United States is divided into climatic regions based on climatic data and HVAC loading. Cities with over 100,000 inhabitants have been identified within these regions. The EPA defines to EH&E the regions where building studies will be conducted. From these selected regions, a city is randomly selected for the study. Businesses within the designated cities are tabulated using the ProPhone telephone database (refer to EH&E Standard Operating Procedure, *Building Recruiting*). This list is then randomized using a database application. The randomized list is used by a BASE recruiter to contact all businesses listed in the designated study city. Buildings not used for office space are eliminated and buildings meeting certain criteria and expressing interest in the BASE Study are pursued. The randomization for a building's selection is representative across many buildings.

A building that is chosen for the BASE study is subjected to a random selection to identify study areas and sampling locations.

3.2.2 Disruption to Occupants

The BASE Study is designed to collect data under “normal” workplace conditions. Equipment and sampling techniques employed are intended to be as unobtrusive as possible for field sampling within an office environment. The bioaerosols cart is the sole exception and is utilized for short periods on one day of the field week. Field team members must conduct themselves in a professional manner within a variety of office environments such as high finance, customer service, sales, support staff areas, executive suites, and government offices. All activities performed must be done without complaints or difficulty from the building occupants.

3.2.3 Final Building Selection

During the recruiting process for each city, the number of potential buildings recruited for inclusion in the BASE study will be greater than the number of buildings to be studied. For instance, if three buildings will be studied in a particular city, at least six buildings should be recruited and PVs scheduled.

The PV is intended to be a screening visit and final building selections are not made until all potential study buildings are visited within the designated city. Generally, it is found that some buildings that were thought to meet the criteria requirements based on phone contact were found not to meet the criteria requirements based on information gathered during the PV.

In some instances, the number of buildings recruited could be equal to or less than the number of buildings to be studied. The final selection process in these cases may have to be decided upon during the PV. Refer to **Section 4.1, Building Selection**, for further details on this process.

3.2.4 Data Reporting to Building Management

The building contact has the option of receiving a formal report regarding the data collected in their building. If the building contact decides to receive a written data summary, it is important to note that the summary has a limited interpretation of the data

and no extensive analytical discussion is made regarding recommendations or conclusions.

Data reporting options must also be accompanied by an explanation of the estimated time frame to process data from the field study. BASE was designed as a research project and unlike hiring a private contractor, extra time is necessary to ensure sound scientific data. Several quality assurance steps are conducted at EH&E before it is sent to EPA. EPA reviews the data and questions and comments are worked through as part of the review. It is essential that all data collected undergo a stringent quality review before it can be released. It is not uncommon for this QA/QC process to take up to one year. During this time, EH&E can provide building contacts with updates on their building but a final report cannot be submitted until the data review process is complete.

3.2.5 Questionnaire

The questionnaire was developed by EPA and the National Institute of Occupational Safety and Health for building air quality research studies. Special attention has been given to carefully and sensitively develop “non-alarmist” language in the questionnaire. Prior to BASE, the questionnaire has been administered at the “NIOSH 150 Building Study” buildings and for sick building studies at the Library of Congress and EPA’s headquarters in Washington, D.C.

The BASE questionnaire was designed and is distributed as a comparison between occupants’ perceptions of their indoor work environment and the scientific data collected. The questionnaire is confidential. Results reported as part of the final report will be done so in a statistical manner. Questionnaires are handed-out to occupants individually by an EH&E investigator. For each individual, the investigator will give a brief description of the questionnaire. Each occupant has the option not to fill out the questionnaire or to skip questions they do not feel comfortable answering.

3.3 HVAC SYSTEM

The HVAC system and the areas served is one of the main criteria used to define an acceptable BASE study building (Refer to the EPA BASE Protocol). Precise and

accurate information on the HVAC system must be verified at the PV through discussions with the building contact, as well as a visual walkthrough of the building. The field investigator must obtain from the building contact a general description of their building, the HVAC system and how it operates, occupant loading throughout the building, and special activities in the building.

3.4 STUDY AREA

Occupancy is the other criteria defining an acceptable BASE building and the location of a study area within a BASE Study building (Refer to EPA BASE Protocol). A study area is defined through conversations with the building contact and through a walkthrough of the space to confirm occupant density. A walkthrough is also useful in determining the type of HVAC system serving each potential study area. In buildings with a variety of air handlers, it is crucial to determine which HVAC systems serve each potential study area.

Each potential study area must contain 50 or more occupants and be served by no more than two HVAC systems to be eligible as a study area. Areas meeting these criteria are numbered and a random selection process is administered. This process continues until one study area and two back-up study areas are chosen.

Prior to the field week, the occupants of the chosen study area must be fully notified of the BASE Study and give their permission to allow sampling to occur in their office space during the field week. Once notification has been given and the occupants have granted their permission, a walkthrough of the study area is conducted to confirm the number of occupants in the space, to ascertain unoccupied spaces, and to determine special use areas.

3.5 BUILDING WALKTHROUGH

A building walkthrough is essential to delineate field measurement locations for the HVAC system and the study areas. It is necessary to make a reasonable assessment of how HVAC measurements can be performed. In particular, the PV investigator should focus on the identification of traverse locations, access panels, and the placement of outdoor sampling equipment. In both the study area and mechanical room walkthrough,

the PV investigator must be aware of any potential problems the field team will need to anticipate during the sampling week.

3.6 IADCS SURVEY INTERVIEW

The IADCS Survey can take place before or after the building walkthrough during the PV. A typical interview takes about an hour if the building contact is prepared as per instructions sent to him/her as part of the recruiting packet. To ensure the accuracy of information input into the IADCS survey, the second PV investigator takes handwritten notes.

Two codes are assigned to the building to identify the dataset and ensure confidentiality. The first code assignment is created as per the following example: BTXM02; B=BASE, TX=Texas (the state), M=Main Study, 02=the number assigned to the building in the order that the PV was conducted for the city. The second code identifies the date (year, month, day) of the PV. The IADCS Survey cannot start without the generation of these codes.

3.7 PV CLOSURE

At the end of the screening visit, the PV investigators provide the building contact with an overview and schedule for the field week. A handout outlining the preparation list for the sampling week is distributed to the building contact and specific issues are discussed including security access, ladders, staging area, and shipping.

Access to the study area and mechanical rooms in the building may be necessary before and after working hours due to the nature of the sampling schedule and/or repairs to sampling equipment.

A large staging area within the building is requested by the PV investigator to be used as a field work area and to store sampling media and equipment throughout the study week.

The PV investigators should get permission to ship lab media and equipment to the building contact before and during the sampling week. A description of the items to be shipped should be given to the building contact.

If no additional questions are raised by the building contact and all logistical aspects of the study have been covered, the PV investigators express their appreciation of the building contact's participation.

4.0 AFTER THE PRELIMINARY VISIT

4.1 BUILDING SELECTION

The final selection of buildings for the BASE study is performed after all PVs have been completed in the designated BASE city. Buildings that do not meet the BASE protocol are eliminated and the final selection process must be made by random selection. Eligible buildings visited during the PV week are randomly selected one by one until the number of study buildings designated by EPA for that city has been satisfied. Buildings should not be eliminated from the selection process based on HVAC complications such as difficulties in performing the measurements. For example, smaller rooftop packages will typically be more difficult to measure and require more effort than a central AHU with coils. The final selection process should not screen out an HVAC design type based on past field preferences.

Building contacts are notified of their status in the final selection process by phone the following Monday. This is followed by a formal confirmation letter sent by both FAX and mail. Building that were not selected should receive a formal rejection letter.

4.2 BUILDING CUT SHEETS

Information compiled during the PV is used to create a building “cut sheet” for the field team. The “cut sheet” gives an overview of the building and includes cautions, contact people, and specifics on the HVAC system (central and study area) and measurement locations. Other logistical information is included in the “cut sheet” such as the closest hardware store, copy center, and Federal Express location. Additionally, accommodations for the field team, rental car information, directions to the building, maps, and shipping addresses are also included. Information in the “cut sheet” is particularly important if the PV person is not going to be conducting fieldwork. “Cut sheets” will be distributed to all field team members and the PV investigators will notify EH&E office staff of field arrangements.

4.3 TRANSFER OF PV DATA TO FIELD TEAM LEADER

The PV investigators will provide the field team leader with a copy of the IADCS PV survey on disk, the PV binder, floor plans, and mechanical plans prior to the sampling week. The field team leader should have a copy of the pertinent mechanical plans and at least 5-10 copies of floor plans (8.5” x 11”, if possible) for maps of the study area (tiles, sampling locations, and occupants), radon, diffuser measurements, the questionnaire, and extra copies.

APPENDIX A

INVENTORY OF ITEMS FOR A PRELIMINARY VISIT

INVENTORY OF ITEMS FOR A PRELIMINARY VISIT

- compass (NSEW type)
- flashlight
- extension cord for computer
- tools (optional): flathead and phillips screwdrivers, hex and small crescent wrenches
- pocket knife

- computer and adapter ("cheater" for computer)
- blank diskettes
- EMBARC unit, if available

- calculator with random number function
- highlighter markers

- Misc. stationery (also, for making up additional info packets for upper management):
- stapler
- tape
- ultra fine sharpies
- manila folders
- paperclips
- letterhead & EH&E envelopes
- EH&E sticky address labels
- 1/2 x 11 envelopes
- lined paper
- engineering graph paper
- small spiral notebook for field notes during appointments

Handouts

- NY Times article
- BASE pamphlet (colored paper)
- PV Checklist

- Preparations List for Sampling Week
- Indoor Air '93 article on BASE

References

- Protocol with full appendices
- HVAC definitions sheet (from the HVAC picklist menu: SVY/BLDG DESC/ PHYS CHAR)
- Copies of any current BASE scientific publications

APPENDIX B

PRELIMINARY VISIT BINDER

PRELIMINARY VISIT BINDER

⇒ 3-ring binders (1 for selected buildings, 1 for rejected buildings)

⇒ section dividers for binders

⇒ pocket dividers (for taking new and extra handouts to the appointments)

Divide into sections for each building visited and include the following:

- **From recruiter:** all recruiting and technical forms, and letters to the building contact.
- **From PV field person:** notes taken during the PV, correspondence prior to the field week, post-PV "confirmation" or "rejection" letter to the building, and Sampling Week Schedule (will include the team members names written in).
- **Weather Station** information for the city (to be tracked down the last day and last bldg of the city)