The Arizona Border Study

An Extension of the
Arizona National Human Exposure Assessment Survey (NHEXAS)Study
Sponsored by the Environmental Health Workgroup of the Border XXI Program

Quality Systems and Implementation Plan for Human Exposure Assessment

The University of Arizona
Tucson, Arizona 85721

Cooperative Agreement CR 824719

Standard Operating Procedure **SOP-UA-F-19.1**

Title: Collection, Storage, and Shipment of Blood Samples for Selected Metals, Pesticides, and VOCs

Source: The University of Arizona

U.S. Environmental Protection Agency
Office of Research and Development
Human Exposure & Atmospheric Sciences Division
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Form TP-1

COLLECTION, STORAGE, AND SHIPMENT OF BLOOD SAMPLES FOR SELECTED METALS, PESTICIDES AND VOCs

1.0 PURPOSE AND APPLICABILITY

The procedures described in this SOP are designed to guide the collection, storage, and shipment of blood samples collected for the NHEXAS Arizona project, AZ Border Project (BORDER AZ), and other Health and Environment projects. This SOP provides a brief description of sample collection, preservation, storage, and custody procedures.

2.0 DEFINITIONS

2.1 AZ Border = The US border region is defined as 100 km north of the border. In this study, we define the border as 40 km north of the border. The Arizona Border Study or "Border AZ" is an alias for "Total Human Exposure in Arizona: A Comparison of the Border Communities and the State" conducted in Arizona by the University of Arizona / Battelle / Illinois Institute of Technology Consortium.

2.2 CDC = Centers for Disease Control in Atlanta.

2.3 FIELD COORDINATOR = The employee of the research project who supervises field data collection and operations. The Field Coordinator collates individual data into HH packets, and upon completion of all visits, sampling and QA checks, forwards the packet to the Data Coordinator.

2.4 FIELD STAFF = The Field Coordinator, the Team Leader and the Team Members.

2.5 LAB SUPERVISOR = The employee of the research project who supervises laboratory analyses.

2.6 MATERIALS TECHNICIAN (Materials Tech) = The employee of the research project who is responsible for assembling and assigning field forms, questionnaires and equipment for field use.

2.7 NHEXAS Arizona = Acronym for National Exposure Assessment Survey, a research project conducted in Arizona by the University of Arizona / Battelle / Illinois Institute of Technology Consortium.

2.8 QUALITY ASSURANCE (QA)= All those planned and systematic actions necessary for ensuring the accuracy, validity, integrity, preservation and utility of collected data.

2.9 QUALITY CONTROL (QC) = Those quality assurance actions providing a means to control and measure the characteristics of a datum, processor the adherence to established

parameters.

2.10 RESPONDENT = A person in the study population of NHEXAS Arizona project, AZ Border project, and other Health and Environment projects. Each household is assigned an HHID. All the family respondents are assigned an Individual Respondent Number (IRN). Each respondent can be uniquely identified by a combination of HHID and IRN.

2.11 SAMPLE IDENTIFICATION NUMBER = A numeric code that uniquely identifies every sample. It is generated by the NHEXAS tracking system by the Materials Technician.

2.12 TEAM LEADER = The member of the field team who is primarily responsible for respondent contact, data collection, field form and questionnaire completion, and site QC checks of all data.

2.13 TEAM MEMBER = Member of a field team responsible for assisting the team leader in the collection of data and quality control checks in the field.

2.14 TRACKING SYSTEM = A database system containing information about the custody, transfer and storage of hard copy data, electronic data, field samples, and field sample aliquots.

2.15 VISIT = A scheduled appointment with participating respondents at their place of residence (HH) for the collection of samples, questionnaires and other data.

2.16 VOC = Volatile Organic Compounds.

3.0 REFERENCES

3.1 Ashley, D. 1995. CDC Communication on Venous Blood Collection.

3.2 Lebowitz, M.D. 1993. Study Design (Revision of 31 Dec. 1993). EPA NHEXAS Cooperative Agreement.

4.0 DISCUSSION

4.1 This SOP outlines the correct procedure for the collection, storage, and transfer of blood samples at participating households according to the strategies outlined in the NHEXAS project, the AZ Border Project (BORDER AZ) and other Health and Environment projects. A local licensed and experienced medical technician (phlebotomist), nurse, or physician will collect the blood samples for project specific target metals, pesticides and VOCs.

4.2 The blood samples collected by the phlebotomist, nurse, or physician will be returned to the UA Field Staging Area by the Field Team Leader and stored in a refrigerator at 4° C. The samples will be shipped on blue-ice at approximately 4°C within 7 - 10 days of collection. The Bio-mailer or Styrofoam shipper will be appropriately labeled and will contain sufficient blue-ice packages to refrigerate, but not freeze, the samples. Samples will be shipped via overnight delivery to CDC.

4.3 Previous studies of VOCs indicate that their half-life in human blood is extremely short (ref. Ashley above). In many cases, values between 10 and 30 minutes are considered to be the best estimates for these half-lives in cases of acute exposure. Because VOCs do not reside long in the body, special sample collection considerations are necessary. The length of time after exposure for which useful samples can still be obtained will vary with the level of exposure. It is therefore suggested that samples be obtained either before removal from exposure or as quickly after removal as possible.

4.4 Vacutainer tubes obtained from commercial sources contain VOC contamination which can greatly interfere with the ability to obtain analytical results indicative of the degree of participant exposure. Tubes which were obtained commercially have been specially modified at CDC so that they no longer contain measurable levels of most VOCs. It is absolutely imperative that these tubes be used for all samples collected to insure a viable sample. CDC will supply the modified vacutainers, and they will be carried into the field by the Field Team.

4.5 The anticoagulant used in the CDC prepared tubes is a mixture of sodium oxalate and sodium fluoride. This anticoagulant is chiefly intended to stop metabolism so that VOC levels do not change appreciably during storage. This mixture's ability to prevent clotting of blood is not as great as many other anticoagulants. Thus, once samples have been collected, they must be mixed thoroughly to allow the complete distribution of the anticoagulant. If a blood mixer is available, samples should be placed on this mixer for at least 3 minutes. If a mixer is not available, the blood can be mixed by hand approximately 5 to 10 times to completely mix the anticoagulant into the blood sample.

4.6 Isopropanol (used to disinfect the venipuncture site) can interfere with analytical results when significant amounts are left on the skin during venipuncture. This can easily be prevented by swabbing the site with a sterile dry gauze bandage and allowing the site to dry for 5 to 10 seconds after wiping with isopropanol.

4.7 Since VOCs are highly volatile, care must be taken to insure that samples are kept at refrigerator temperatures (4°C) during storage and shipment. All samples will be placed into a cooler on blue-ice or a refrigerator within minutes of sample collection. In addition, samples will be shipped with enough ice or equivalent cooling material to guarantee that the samples remain cool throughout the shipment process. Samples will be shipped so they arrive at CDC on normal business days to insure proper processing upon arrival.

Blood samples must not be frozen or stored at freezer temperatures at any time during sample collection, storage, or shipment.

5.0 RESPONSIBILITIES

5.1 Field Coordinator

(a) Arrange for a local professional to meet Field Team at the sampling location for venous blood collection.
(b) 100% QC check of field forms.
(c) 10% QA Field Audits of sample collection of Field Team members.

5.2 Materials Technician

(a) Prepare HH bucket with appropriate field forms and sample collection materials as appropriate.
(b) Record the assigned kits in the NHEXAS tracking system.
(c) Store blood samples and QA reagents as appropriate.
(d) Prepare QA spikes and blanks and ship to CDC for analysis.
(e) Ship 'live' blood samples in pre-addressed Bio-mailer to CDC.

5.3 Team Leader

(a) Arrange HH visit.
(b) Transport blood collection materials into field on blue ice.
(c) Retain copy of field form and store it in the HH bucket.
(d) Maintain custody of sampling materials until transferred to the Materials Technician.

5.4 Local Phlebotomist/Professional

(a) Collect blood according to protocol.
(b) Transfer Custody of Sample to Field Team Leader in field.
(c) Record their name on the Blood Collection Data Sheet under Phlebotomist ID/Comments.

6.0 MATERIALS AND REAGENTS

1. Sterile gauze pads (100% cotton).
2. Alcohol 2 Ply prep-wipes.
3. Band-Aids (sterile, plastic lining).
4. Two 3 mL 'purple top' test tube Vacutainers (Metals).

5. Two 10 mL 'gray top' test tube Vacutainers (VOC).
6. Two 3 mL 'purple top' test tube Vacutainers (Pesticides).
7. 21g 3/4" butterfly assembly with multiple sample luer adapter (sterile)
8. 23g 3/4" butterfly assembly with multiple sample luer adapter for children and difficult 'sticks' (sterile)
9. Two 21g Vacutainer multiple sample luer needles
10. Tourniquet
11. Vacutainer needle holder
12. Vacutainer Adapter for 3 mL purple top tubes
13. Vacutainer polystyrene vial shipment containers
14. Bio-mailer with blue ice
15. Sharps Biohazard Safety Container
16. Non-sterile, non-powdered disposable latex gloves

7.0 PROCEDURE

7.1 Preparation

7.1.1 Containers

The blood vials necessary for venous blood collection will be supplied by CDC. Containers have been prepped at CDC to minimize VOC contamination by anti-coagulant. Containers are sterile upon receipt from CDC and contain a sodium oxalate and sodium fluoride mix anti-coagulant.

Sample collection kits (six blood tubes in a Styrofoam shatter-resistant package) are shipped directly from CDC. They are stored at room temperature until they are taken into the field.

7.1.2 Standards & Blanks

(a) Standard and Blank reagents are prepared at CDC and shipped on blue ice to the project field office. Spike and blank solutions are stored at controlled temperatures until used.

QA Matrix Type	Pre-Field Temp. Conditions	Holding Period
Blood Metals Blank	4°C	6 Months
Blood Metals Spike	4°C	6 Months
Blood VOCs Blank	-20°C	9 Months
Blood VOCs Spike	Not Used in our Field Projects	N/A
Blood Pesticides Blank	-20°C	9 Months
Blood Pesticides Spike	Not Used in our Field Projects	N/A

(b) QA & QC duplicate/replicate sampling will not be accomplished.

(c) Blanks and spikes are prepared at the HRP facility by the Materials Technician. Ten percent of all samples shipped for analysis will be for QC\QA checks.

7.1.3 Standard and Blank Preparation

A: Blood Metals Blank.

1. Obtain purified water ampule supplied by CDC from the Pre-Field Refrigerator. The container is labeled METALS BLANK.
2. Obtain one 3 mL purple top tube with Chain of Custody Record, one Vacutainer needle holder with 3 mL adapter, and one Vacutainer needle.
3. Assemble the Vacutainer needle holder and adapter.
4. Screw the luer lock needle securely to the inlet port of the Vacutainer assembly.
5. Tap the neck of the purified water ampule to force water from the neck and in to the main body of the ampule.
6. Cover the neck of the ampule with a gauze pad and grab both firmly.
7. Snap the neck of the ampule. The gauze pad should protect your fingers from glass slivers. Discard the glass neck of the ampule in the Sharps container, or in the broken glass container at the HRP Lab.
8. Hold the ampule upside down. Insert the tip of the needle into the purified water sample.
9. Push the 3 mL purple top tube into the rubber guard at the base of the Vacutainer and the vacuum in the 3 mL container will draw the purified water from the ampule.
10. Discard the ampule and excess purified water in the Sharps container, or in the broken glass container at the HRP Lab.
11. Label the 3 mL purple top tube with its sample-ID in indelible ink pen. Record this sample's status as a QA sample on the Chain of Custody record and in the Tracking system.
12. Return the Metals Blank to the pre-field refrigerator pending assignment to a household.

B: Blood Metals Spike.

1. Obtain Metals Spike Matrix supplied by CDC from the Pre-Field Refrigerator. The container is labeled METALS SPIKE.
2. The contents of the Metals Spike are NOT transferred from one container to another. Simply verify sample labeling and it's status as a QA spike sample in the Tracking system.

3. Ship as a Lab Blank to CDC for analysis with other 'live' samples.

C: Blood VOCs Blank.

1. Obtain the Hamilton Model 81620 airtight syringe supplied by CDC and attach a needle to the luer lock on the syringe.
2. Obtain purified water ampule supplied by CDC from the Pre-Field Freezer. The container is labeled BLOOD VOCs BLANK. Allow the ampule to sit at room temperature for 30 minutes as the solution thaws.
3. Tap the neck of the purified water ampule to force water from the neck and in to the main body of the ampule.
4. Cover the neck of the ampule with a gauze pad and grab both firmly.
5. Snap the neck of the ampule. The gauze pad should protect your fingers from glass slivers. Discard the glass neck of the ampule in the Sharps container, or in the broken glass container at the HRP Lab.
6. Hold the ampule upside down. Insert the tip of the needle into the purified water sample.
7. Pull approximately 1 mL of the purified water from the ampule and remove the needle from the water.
8. Pull the plunger on the needle down to the 10mL mark so that the 1 mL aliquot of blank water washes the inside of the syringe. Eject the water.
9. Obtain a 10 mL Blood VOCs test tube with Chain of Custody record. Pull approximately 10 mL of purified water from the vial and carefully plunge the needle into the top of the gray top container.
10. Fill the VOC test tube to within 1 cm of the top of the tube.
11. Remove the syringe from the test tube and discard the needle in a Sharps Container. Return the syringe to its storage box and discard the ampule in the broken glass disposal container at the HRP Lab.
12. Label the 10 mL gray top tube with its sample-ID in indelible ink pen. Record this sample's status as a QA sample on the Chain of Custody record and in the Tracking system.
13. Return the VOC Blank to the pre-field refrigerator pending assignment to a household.

D: Blood Pesticides Blank

1. Obtain purified water ampule supplied by CDC from the Pre-Field Freezer. The container is labeled PESTICIDES BLANK. Allow the ampule to sit at room temperature for 30 minutes as the solution thaws
2. Obtain one 3 mL purple top tube with Chain of Custody Record, one Vacutainer needle holder with 3 mL adapter, and one Vacutainer needle.
3. Assemble the Vacutainer needle holder and adapter.
4. Screw the luer lock needle securely to the inlet port of the Vacutainer

assembly.

5. Tap the neck of the purified water ampule to force water from the neck and in to the main body of the ampule.
6. Cover the neck of the ampule with a gauze pad and grab both firmly.
7. Snap the neck of the ampule. The gauze pad should protect your fingers from glass slivers. Discard the glass neck of the ampule in the Sharps container, or in the broken glass container at the HRP Lab.
8. Hold the ampule upside down. Insert the tip of the needle into the purified water sample.
9. Push the 3 mL purple top tube into the rubber guard at the base of the Vacutainer and the vacuum in the 3 mL container will draw the purified water from the ampule.
10. Discard the ampule and excess purified water in the Sharps container, or in the broken glass container at the HRP Lab.
11. Label the 3 mL purple top tube with its sample-ID in indelible ink pen. Record this sample's status as a QA sample on the Chain of Custody record and in the Tracking system.
12. Return the Pesticide Blank to the pre-field refrigerator pending assignment to a household.

7.2 Sample Collection

7.2.1 Standards and Blanks Deployed.

A: Metals Blank

1. The 3 mL test tube prepared by the Materials Technician is assigned to a Household.
2. The assignment to a household is essentially 'blind', as the Materials Technician has no knowledge of the location or identities of respondents in the study.
3. One out of every 10 blood tubes assigned for the collection of metals will be accompanied by a blank
4. Blank samples are transported to the field with non-blank blood tubes at room temperature. Once the 'live' samples are collected at the household, the blank returns with the live samples to the Field Office on blue ice.
5. The blanks sample is shipped to CDC for analysis with 'live' samples.

B: VOCs Blank

1. The 10 mL test tube prepared by the Materials Technician is assigned to a Household.

2. The assignment to a household is essentially 'blind', as the Materials Technician has no knowledge of the location or identities of respondents in the study.
3. One out of every 10 blood tubes assigned for the collection of VOCs will be accompanied by a blank
4. Blank samples are transported to the field with non-blank blood tubes at room temperature. Once the 'live' samples are collected at the household, the blank returns with the live samples to the Field Office on blue ice.
5. The blanks sample is shipped to CDC for analysis with 'live' samples.

C: Pesticides Blank

1. The 3 mL test tube prepared by the Materials Technician is assigned to a Household.
2. The assignment to a household is essentially 'blind', as the Materials Technician has no knowledge of the location or identities of respondents in the study.
3. One out of every 10 blood tubes assigned for the collection of pesticides will be accompanied by a blank
4. Blank samples are transported to the field with non-blank blood tubes at room temperature. Once the 'live' samples are collected at the household, the blank returns with the live samples to the Field Office on blue ice.
5. The blanks sample is shipped to CDC for analysis with 'live' samples.

7.2.2 Sample Collection Procedure.

The relative timing of venous blood sample collection is described in Figure 3. Samples are collected in the order that their sample-IDs are listed on the Blood Collection data Sheet (Fig. 1). The sequence is as follows:

1. Blood Metals (3 mL Purple Top)
2. Blood Metals (3 mL Purple Top)
3 Blood VOCs (10 mL Gray Top)
4. Blood VOCs (10 mL Gray Top)
5. Blood Pesticides (3 mL Purple Top)
6. Blood Pesticides (3 mL Purple Top)

(a) Locate a suitable table and chair for blood collection and lay out blood collection supplies on the table. Have respondent sit down and relax. Don a pair of non-sterile, non-powdered gloves.

(b) Apply tourniquet and locate suitable puncture site. Remove tourniquet and hold

with two fingers on one side of the alcohol wipe so that the other side touches the puncture site. Wipe the area in a circular motion with a narrow radius and moving outward so as not to cross over the area already cleaned. Repeat with a second alcohol wipe. **Allow the Isopropanol to dry** on puncture site before attempting venipuncture. If necessary, swab arm with a sterile gauze pad to quicken the drying process. It is critical that the puncture site be dry before sampling since any **alcohol residue may contaminate the blood collected.**

(c) Reapply the tourniquet and relocate the vein. Fix the vein by pressing down on the vein about 1 inch below the proposed point of entry into the skin and pull the skin taut.

(d) The two 3 mL purple top tubes for metals analysis are to be collected first. Collect the samples in the order that they are listed on the field data sheet. The 3 mL tubes will require the use of the tube adapter and Vacutainer needle holder. Insert the tube adapter into the Vacutainer needle holder.

(e) Approach the puncture site by aligning the needle parallel to the vein, pointing toward the respondents heart. Hold the Vacutainer so that it is at approximately a 15 degree angle with the respondent's arm. Push the needle, with bevel facing up, firmly and deliberately into the vein. Activate the vacuum collection (Vacutainer) tube. If the needle is in the vein, blood will flow freely into the tube. Allow the Vacutainer to fill to within 1 centimeter of the top of the tube. If no blood enters the tube, probe for the vein until entry is indicated by blood flowing into the tube.

(f) If your attempt at venipuncture is unsuccessful, ask the respondent if you may retry at another site. Repeat steps (b) through (e) with a new sterile needle. Re-attempts at blood collection are limited to a maximum of 3 punctures as long as the respondent is agreeable.

(g) Collect blood in the second 3 mL purple top tube for metals analysis. Mix each tube thoroughly with the anti-coagulant at least 5 to 10 times.

(h) Remove the Vacutainer adapter and collect the two 10 mL gray top tubes for VOCs analysis. Collect the samples in the order that they are listed on the field data sheet. Mix each tube thoroughly with the anti-coagulant at least 5 to 10 times.

(i) Now collect the two 3 mL tubes for pesticides analysis. Collect the samples in the order that they are listed on the field data sheet. The 3 mL tubes will require the use of the tube adapter and Vacutainer needle holder. Insert the tube adapter into the Vacutainer needle holder the samples and collect the samples. Mix each tube thoroughly with the anti-coagulant at least 5 to 10 times.

(j) Up to 90 mL (6 tablespoons) of blood may be collected from each participant if they are over 10 years of age. No samples will be collected from children under the age of 3 years. 5 - 20 mL (1 - 4 teaspoons) of blood will be requested from children between 3 and 10 years of age.

(k) When collecting the last tube of blood, loosen the tourniquet immediately after blood flow is established and then remove it entirely as the last tube fills to within 1 cm of the top with blood.

(l) When blood sample collection is complete, discard the needle in the Sharps container. The Vacutainer needle holder and tube adapter may be reused, however, they must be cleaned with 10% bleach solution (1 part bleach to 10 parts of water) and allowed to air dry before re-use.

(m) Press gauze firmly on the puncture site. Avoid using heavy pressure when the needle is being withdrawn as it may cause the sharp point of the needle to cut the vein. Have the respondent raise their arm over their head, but do not bend arm at the elbow while continuing to hold the gauze in place for several minutes. This will help in preventing bruising. After several minutes of continuous pressure, place a Band-Aid on the respondent's arm.

(n) The Team Leader will record any adverse reactions experienced by the respondent during the venipuncture procedure on the blood collection data sheet. The Field Team and local phlebotomist/professional will remain with the respondent for at least 20 minutes after the blood collection procedure is complete.

(o) All tubes must be labeled with their sample ID in indelible ink pen and by bar-code label. Samples must be placed in the polystyrene shipping container an Bio-mailer immediately. The phlebotomist must record their name and initials on the Blood Collection Data Sheet.

(p) If blanks are assigned, record the sampler-ID on the blood collection data sheet (Fig. 1).

(q) The samples are transported to the Field Office in a cooler on blue-ice. The samples are then logged-in to the tracking system and stored at 4°C in a refrigerator. Samples are shipped within 7-10 days of sample collection.

7.3 Sample Shipment

Materials needed per shipment:

1. 1 Styrofoam Bio-mailer

2. Blue-Ice packs (for refrigerated specimens only)
3. Strapping tape
4. Sheets of bubble-Pack packing material
5. Pre-addressed FEDERAL EXPRESS label,
6. Ziploc Freezer Bags
7. Whole blood samples (6 vials plus blanks per HH)
8. Blood Metals Lab Spikes as applicable.

7.3.1 Procedure for Packing:

(a) Place the specimens from each respondent in the shatter-resistant vial shipment container provided (white cardboard and Styrofoam freezer boxes). Place each of these boxes inside one of the zip-lock bags provided.

(b) Pack the samples in the bottom of the Bio-Mailer or shipper. If necessary, use sheets of Bubble-Pack packing material to ensure the specimens stand in the mailer with their caps / rubber plugs in a vertical position. Put one layer of Bubble-Pack on top.

(c) Fill the shipper with sufficient Blue-Ice packs to refrigerate but not freeze the samples.

(d) Place more Bubble-Pack material or Styrofoam 'peanuts' to fill-up the remaining empty space in the Bio-mailer and place the polyfoam lid on top of the shipper.

(e) Include the original copy of Field Data Sheet (Figure 1). A photocopy of the Field Data Sheet is maintained for inclusion in the HH Packet. The original copy of the Chain of Custody Record (Fig. 5) remains with the sample at all times.

(f) Record the contents of the Bio-mailer on the NHEXAS AZ (or other project) Shipment Log (Fig. 4). A photocopy of the Shipment Log is maintained by the Materials Tech for QA and QC purposes.

(g) Secure the outer cardboard lid on the shipper with filament tape.

7.3.2 Procedure for Shipping:

(a) Telephone the laboratory at CDC the day the shipment is to be mailed at (404) 488-7962 and speak with Dr. D Ashley. These samples should arrive at CDC on a normal business day (Monday through Friday 8 to 5). Verify that someone will be present to collect the samples when they arrive the next day.

(b) Obliterate or remove previous address labels on all shipping boxes.

(c) Label each Bio-Mailer with the appropriate address at CDC (see below).

(d) The samples for VOCs and metals will be shipped together overnight via Federal Express in the pre-addressed Bio-mailer with the original copies of the Chain of Custody Records and Blood Collection Field Data Sheets. Specimens should be received by CDC within 24 hours where possible.

(e) Samples will be shipped directly to:

Dr. D Ashley
Building 17 Loading Dock
Centers for Disease Control
4770 Buford Highway NE
Atlanta, GA 30341

7.4 Analysis

7.4.1 Standards/Blanks - N/A

7.4.2 Samples - N/A

7.5 Calculations - N/A

7.6 Quality Control

7.6.1 QA and QC duplicate/replicate sampling will not be performed. Blank and spike samples will be forwarded to CDC for analysis with "live" samples as a QA check.

7.6.2 Ten percent of all samples shipped for analysis will be for QC\QA purposes.

7.6.3 Tolerance Limits

(a) Temperature and lag-time between sample collection and sample analysis are critical issues in maintaining blood sample integrity. All samples must be refrigerated at 4°C after sample collection. Samples will be shipped to CDC on Blue-Ice.

7.6.4 Detection Limits

(a) 100% of all data collected is field verified for accuracy.
(b) Sample integrity must be maintained and is checked at each point of sample

transfer.

7.6.5 Corrective Actions

Apparent mis-labeling problems detected in the field may be corrected by the Team Members when appropriate and in accordance with SOP #UA-C-2.X.

8.0 RECORDS

8.1 The original copies of the Blood Collection Field Data Sheet (Figure 1) and Chain of Custody Records (Figure 5) remain with the sample at all times. A photocopy of the blood collection data sheet is maintained by the Field Team Leader in the HH bucket.

8.2 It is critical that the phlebotomist identify themselves in the appropriate section of the Blood Collection Data Sheet (Figure 1).

Figure 1. Blood Collection Field Data Sheet.

Blood Sampling Data Sheet

Project ID _____ Stage #_____.

HHID_____/_____
FS

Team Leader_____. Sampling Date _____/_____/_____.
mo. day year

Respondent's First Name: | IRN #

Sample Type	Collection Time	Sample ID	Comments
[METALS 1.]	___:___		
[METALS 2.]	___:___		
[VOC 1.]	___:___		
[VOC 2.]	___:___		
[M] or [VOC]	___:___		
[M] or [VOC]	___:___		

Phlebotomist ID / Comments:

Team Leader Comments:

[ ] 20 minute wait [ ] Sample on blue-ice after collection QC checks in field by [_____]

EACH TUBE HAS ITS OWN CHAIN OF CUSTODY RECORD(ATTACHED)

FORM = UA-F19.0 - 1.0

Attach Additional Pages as Necessary

Figure 2. Troubleshooting Guide

No field notes or troubleshooting guides are currently on record for UA-F-19.1. Additions will be appended and the SOP reviewed and updated in accordance with UA-G-1.X as appropriate.

Figure 3. **Relative Timing of Sample Collection (page 1 of 3)**

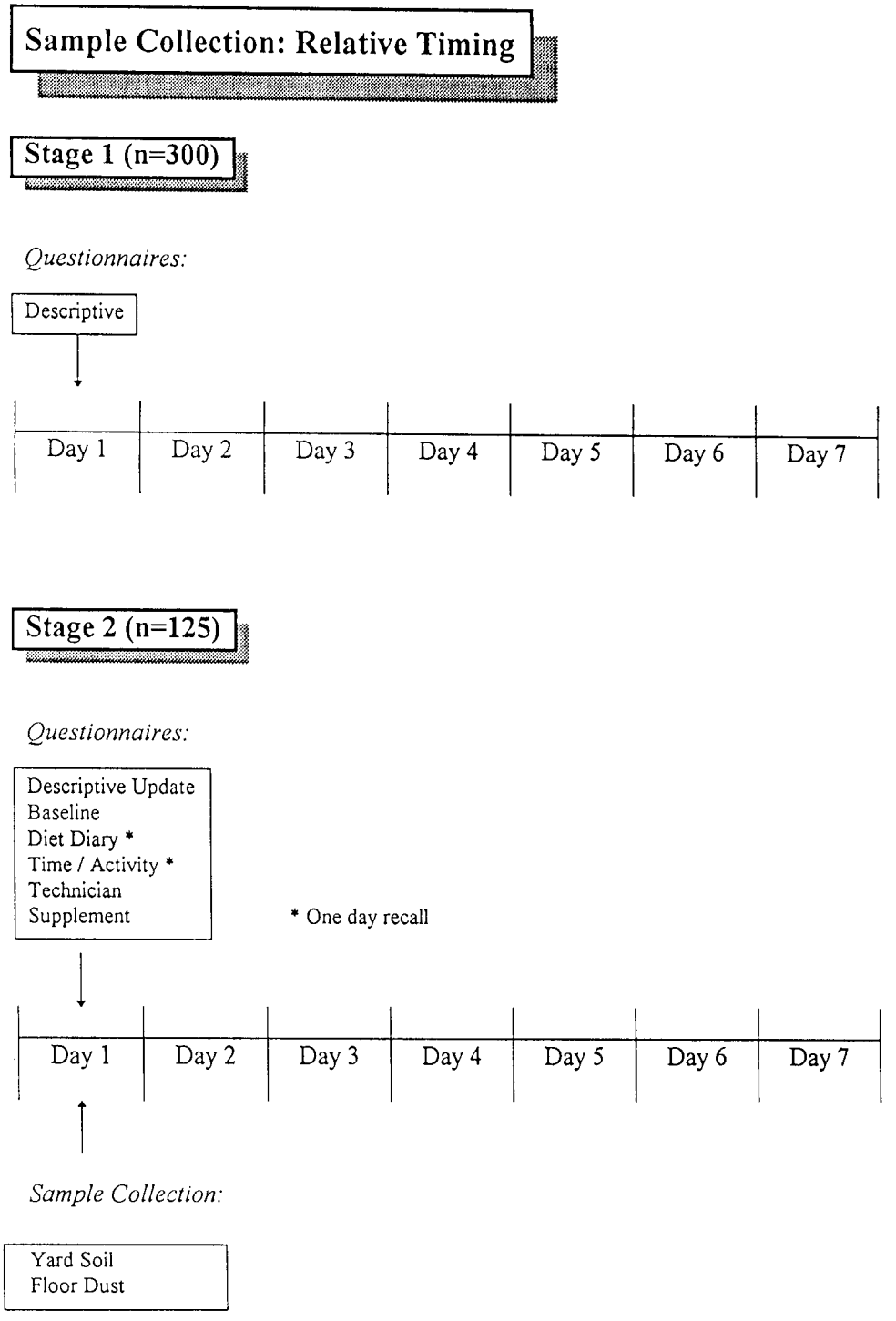
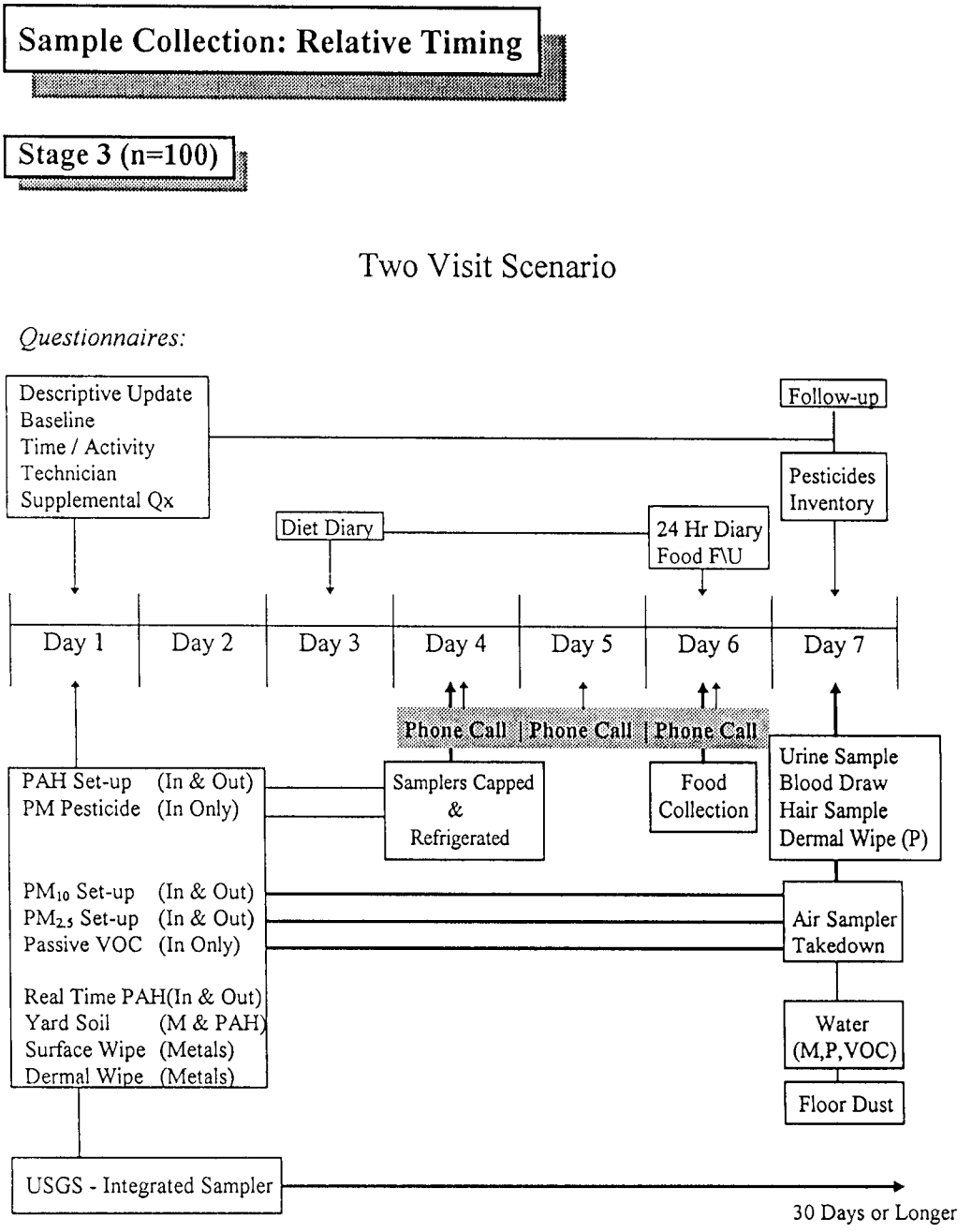
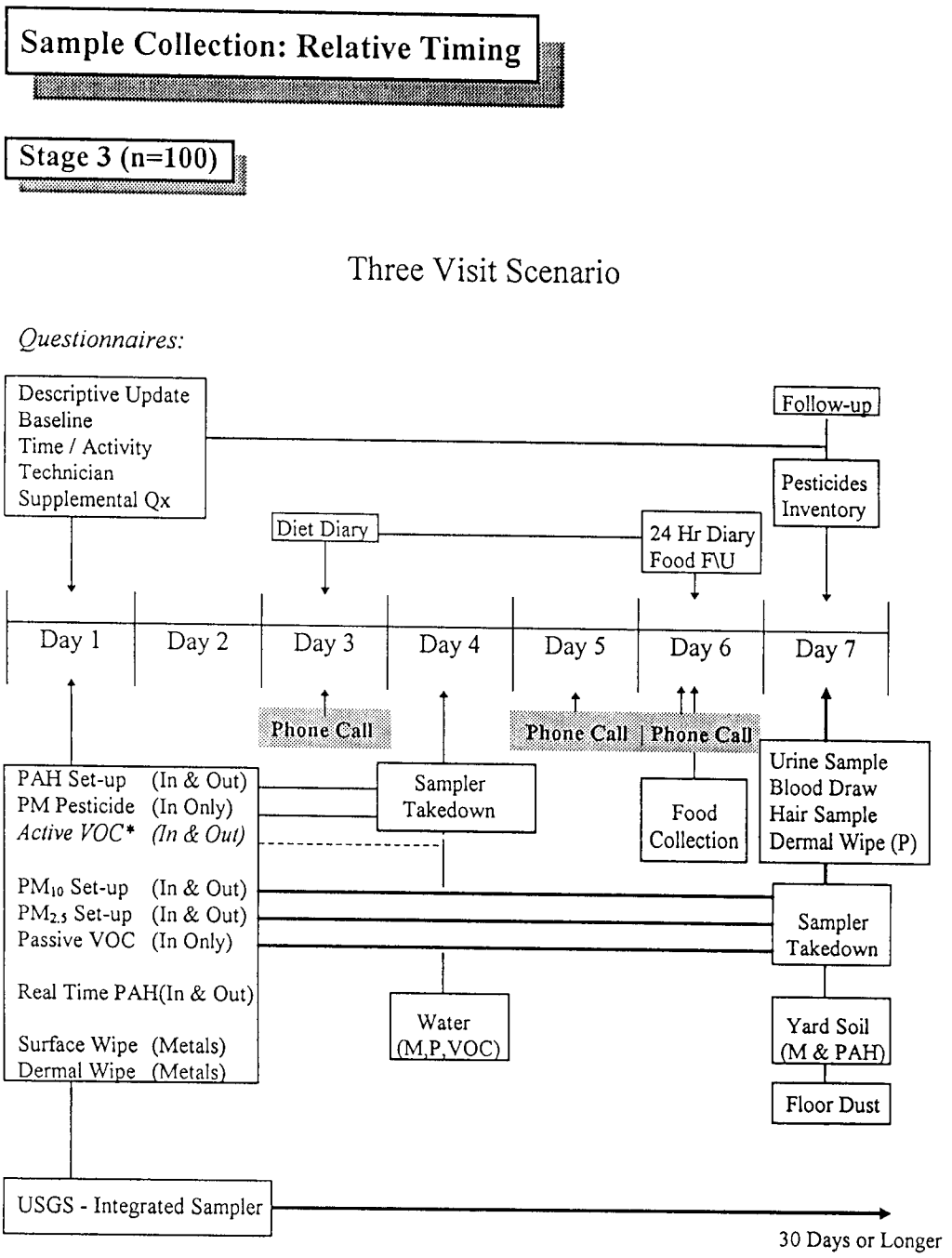


Figure 3. Relative Timing of Sample Collection (page 2 of 3)



* Active VOC is collected in a subset of 25 homes only

Figure 3. Relative Timing of Sample Collection (page 3 of 3)



* Active VOC is collected in a subset of 25 homes only

Figure 4. NHEXAS AZ Shipment Log

NHEXAS Az SHIPMENT LOG

Shipment Date____/____/____ (mo / day / yr) Destination_____ Shipment prepared by [____]

Recipient Notified of Shipment by [____] on ____/____/____ (mo / day / yr) comments_____

note: FF = field form included with shipment and CoC = chain of custody record verified and present

SAMPLE ID#	TYPE	FF	CoC	COMMENTS

FORM ID = UA-F19.1D

Figure 5. Chain of Custody Record for Blood Samples

Chain of Custody Record
NHEXAS Arizona Project (CR-821560)
Respiratory Sciences
1435 N. Fremont Ave
Tucson, AZ 85719
(520) 626 - 4226

Sample Type: HUMAN BLOOD

Generated by: _____ / _____
print name *signature*

Date Generated	Time	Sample ID	# of Containers	Remarks
__/__/__	__:__			

History of Sample Handling and Custody

Relinquished or Received	Signature	Date mo / day / yr	Time	Action
[Rel] or [Rec]		__/__/__	__:__	
[Rel] or [Rec]		__/__/__	__:__	
[Rel] or [Rec]		__/__/__	__:__	
[Rel] or [Rec]		__/__/__	__:__	
[Rel] or [Rec]		__/__/__	__:__	
[Rel] or [Rec]		__/__/__	__:__	
[Rel] or [Rec]		__/__/__	__:__	
[Rel] or [Rec]		__/__/__	__:__	
[Rel] or [Rec]		__/__/__	__:__	
[Rel] or [Rec]		__/__/__	__:__	
[Rel] or [Rec]		__/__/__	__:__	
[Rel] or [Rec]		__/__/__	__:__	
[Rel] or [Rec]		__/__/__	__:__	
[Rel] or [Rec]		__/__/__	__:__	
[Rel] or [Rec]		__/__/__	__:__	
[Rel] or [Rec]		__/__/__	__:__	

FORM = UA-F19.0 - 2.0

Attach Additional Pages as Necessary