



ENVIRONMENTAL MONITORING PLAN

For Applications of MALATHION

BOLL WEEVIL ERADICATION PROGRAM
Arkansas, Louisiana, Mississippi, Missouri, and Tennessee
2007

**United States
Department of
Agriculture**

Animal and
Plant Health
Inspection
Service

Plant Protection
and Quarantine

Prepared by the
Environmental
Compliance Team

Human Health
&
Endangered and
Threatened Species

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The methods and procedures described in the 2007 Environmental Monitoring Plan are designed to ensure compliance with the National Environmental Policy Act, the Endangered Species Act, Federal Insecticide Fungicide and Rodenticide Act, and APHIS policy. Each program organizational unit (e.g. work unit, zone, region, etc.) should fully implement this plan during the 2007 boll weevil eradication season.

HUMAN HEALTH

OBJECTIVES

Monitoring for potential human exposure is designed to:

1. demonstrate the effectiveness of Boll Weevil Eradication Program (the Program) operational procedures in excluding or minimizing exposure of the public to Program-applied malathion;
2. collect data which can be used to evaluate whether the assumptions used in the Environmental Assessments are valid estimates of potential exposure of the public to Program-applied malathion by:
 - a. monitoring for aerial spray drift to investigate the overall potential for exposure;
 - b. testing crops and water bodies that might be used for human consumption to investigate the potential for exposure to malathion through ingestion;
3. ensure that quality assurance and quality control procedures were followed; and,
4. conduct additional monitoring to investigate any Program-related complaints or reports of adverse effects on public health, worker safety, environmental quality, or non-target species.

METHODS

Contact Information

Note that the APHIS Environmental Monitoring Team is now called the Environmental Compliance Team (ECT). This is only a name change as their function with the Program will not change. Should any field programs have any changes in their contact information, please notify Environmental Compliance of those changes to ensure continued communication.

Drinking Water Monitoring

Monitoring will be conducted during all treatments where surface water bodies used for human consumption lie within 500 feet of cotton fields. Make a list of the reservoirs, cisterns, or other water bodies used for human consumption that are within 500 feet of a cotton field within your program area. Before Program treatments begin, provide the ECT with a description of each site and its relation to nearby cotton fields. If there are no such sites, inform the ECT in Riverdale, MD.

Collect two water samples from each water body at least one week **before** the first Program application of malathion to any nearby field (do not combine these into a single sample). These are *pre-program* samples. Collect them whether or not treatments are expected at the nearby fields. Refer to Standard Operating Procedure (SOP) EM-03, *Collection of Water Samples*. If you do not have a copy of this or any other SOP mentioned in this monitoring plan, contact the ECT at (301) 734-7592 or 734-8247.

When a treatment is scheduled for a cotton field within 500 feet of a water body that is used for human consumption, collect two *pre-treatment* water samples from different locations at the edge of the water (do not combine these into a single sample) within 24 hours of each application to the field. These are a separate set of *pre-treatment* samples from those described in the

previous paragraph. Collect two *post-treatment* samples from different locations 2 to 4 hours after each application of malathion (do not combine these into a single sample). Monitor these water bodies with pre- and post-treatment samples during every application of malathion within 500 feet of the water body. Ship the samples as described below.

Sensitive Site Monitoring

Monitoring will be conducted where sensitive sites are within 500 feet of a Program-treated cotton field. Sensitive sites are defined as areas where people congregate such as residences, public buildings, hospitals, day care centers, inpatient clinics, nursing homes, parks, churches, and schools. For those programs that do not monitor all of the sensitive sites in their jurisdiction, monitor a minimum of three sites per work unit/district/program each week that malathion is applied to fields. Monitor these sites by using dye cards to measure potential drift.

Vegetation samples will not be required as a part of routine monitoring. However, collection of vegetation samples is recommended at sites where landowners express concern over possible contamination of vegetation. In such situations, it is recommended that pre- and post-treatment vegetation samples be collected. For details, refer to SOP EM-07, *Collection of Vegetation Samples*.

If you will only be monitoring a subset of all sensitive sites, identify the most critical sensitive sites for monitoring (for guidance, you may use SOP EM-22, *Selection of Sensitive Sites*). Give priority to sites that are the most sensitive; for example, closest to the fields, near areas occupied by children or medically compromised individuals, etc.

Sensitive Site Inventory

Each work unit, district, or program will make a list of sensitive sites that are within 500 feet of cotton fields. You may list all sensitive sites within 500 feet of cotton or list sites according to the following criteria:

1. All sensitive sites within 100 feet of cotton fields will be listed.
2. Sensitive sites 100-300 feet from cotton fields that are a priority for the Program will be listed. These sites may include locations of previous complaints, chemically sensitive individuals, organic farms, etc.
3. Sensitive sites 300-500 feet from cotton fields that are of particular interest to the Program, but not necessarily priorities, will be listed. Exposure at these sites should be negligible at best, but the Program may wish to list the sites based on public concerns.
4. All sensitive sites within 500 feet of cotton fields where children are likely to be found will be listed. These sites include schools, daycare, playgrounds, etc. This is to address a potential concern of the Environmental Protection Agency with regard to possible exposure of children to malathion on outdoor surfaces.

The sensitive site lists that are reported to the ECT need only list the type of sensitive site and the cotton field identification number associated with that site. These lists may be in an electronic form or printed out in hard copy. The additional information previously reported (distance and

direction to cotton field, etc.) is to be maintained in the local Program office (although it can be included in the site lists). For those work units that provided exhaustive lists of sensitive sites last year, only updates to that list are required for 2007 (though please specify whether your list is a complete one or only an update). If there are no additions, deletions, or changes in field numbers, please send a brief communication to the ECT noting the lack of changes. Prior to the start of malathion applications, provide the list of sensitive sites to the ECT at the following address:

Dr. Robert Baca, USDA-APHIS-PPQ, 4700 River Road, Unit 150, Room 5A-04.6,
Riverdale, MD 20737

Sensitive site lists will not be required in weevil-free areas. Since any potential treatment in these areas would be limited, sensitive sites can be easily identified on an ad hoc basis. Should a treatment be required in a weevil-free area, all sensitive sites within 500 feet of the cotton field(s) to be treated will be identified and a list provided to the ECT. This list need not be provided to the ECT prior to treatment, and may simply be submitted as part of monitoring documentation at the site. Residents within 500 feet of the cotton field(s) will be notified in advance of the treatment, and environmental monitoring with dye cards will be conducted. Additional sampling is not required but may be conducted at the discretion of the Program, in order to address particular concerns of residents or the Program.

Dye Card Sampling

Dye cards are used to monitor potential drift. Before leaving for the field to set-up dye cards, hang a clean dye card from the rear-view mirror of the Program vehicle used during sampling (SOP EM-10, *Preparation of Control Samples and Collection of Pesticide Samples*). This is a control card and should remain in place throughout the day. Send this dye card to the USDA-APHIS Analytical and Natural Products Chemistry Laboratory (ANPCL) for analysis along with an APHIS 2060 Environmental Monitoring Form for the control dye card, *whether the card is spotted or not*. If your program monitors all sensitive sites with dye cards throughout the season, send a representative sample of all control dye cards to the lab for analysis. However, the control dye card does not need to be submitted for analysis if all of the non-control cards for the day are unspotted, but document the control card on the APHIS 2060 Environmental Monitoring Form, and send it to the ECT to report the unspotted non-control dye cards.

Before treatment begins, place three dye cards between the cotton field and the sensitive site, at the edge of the *sensitive site* (not the edge of the cotton field), and with approximately 30 feet between cards (see SOP EM-01, *Collection of Dye Card Samples*). Draw a diagram (either on the 2060 form or on a separate sheet) of the card positions relative to the field and the sensitive site, indicating the distance and direction of the dye cards and sensitive site from the cotton field. Each card should be identified and labeled individually on the diagram. The location of each dye card should be selected so that surrounding vegetation does not create an obstruction that could interfere with the deposition of malathion on the dye cards. It is acceptable to place the cards under a tree or other cover if this situation is representative of the area between the treatment site and the sensitive site. Two hours after the treatment is completed, collect the dye cards. Label

each sample according to its location on the diagram. **DO NOT** write on the dye card, but rather on the plastic bag in which the dye card was shipped. Writing on the dye card will ruin it for analysis.

Check each dye card for any visible spotting.

– If **none** of the dye cards has a visible spot, then record this information on a single APHIS 2060 form, filling out all of the other information on the sheet as well. Make a note of the total number of dye cards without spots. Send the yellow copy of the form and all diagrams, maps, etc. to the ECT. Do not send these cards to the laboratory for analysis, but keep them in your files. Occasionally submit for laboratory analysis for quality control purposes, a set of unspotted dye cards (including the control dye card) used during monitoring within your work unit, district, or program area.

– If **any** of the dye cards in a set has visible spotting, then submit **all** of the cards (even those without spots and the control dye card) to ANPCL for analysis. Complete a separate APHIS 2060 form for each individual dye card (i.e. four forms and four dye cards will be submitted to ANPCL.) Fill out all of the information on each APHIS 2060 form, being sure to record if that particular dye card was spotted or not. Ship the samples as described below. Submit the yellow copy of the APHIS 2060 forms and supporting documents to the ECT.

Communication of Negative Information

Any organizational unit identified as being an active eradication program, but that does not have treatments requiring monitoring is expected to convey this information to the ECT. If pesticide applications are made to cotton fields, but there are no treatments that require monitoring in a given week, a letter or email **must** be sent to the ECT noting that treatments were conducted but were beyond the distances from sensitive sites that would have required monitoring.

Occupational Health Monitoring

Field personnel who might be exposed to malathion should be monitored for serum acetyl cholinesterase (AChE) activity. Monitoring should include pre-Program baseline blood samples collected before exposure to malathion, followed by samples collected periodically throughout the season. At termination of employment or several weeks after all malathion applications have ended, a post-Program blood sample should also be collected.

Specifics for serum AChE monitoring can be found in the *APHIS Safety and Health Manual*. The manual is available online at www.aphis.usda.gov/mrpbs/safety_health_wellness.html. Blood test results should be reviewed by a licensed health care professional and appropriate action taken should a significant inhibition of serum AChE be detected or if clinical signs and symptoms of pesticide exposure appear. At the end of the treatment season, results of the serum AChE monitoring program should be sent to the ECT in such a way that the anonymity of the employees is preserved.

Monitoring for Incidents or Complaints

Priority sampling will be conducted to investigate incidents of unknown origin involving mortality of non-target species (fish, bees, etc.) or other unintended environmental or human health impacts possibly associated with Program-applied malathion. Information about priority samples can be found in SOP EM-09, *Priority (Emergency) Sampling*. Collect priority samples as soon as possible after the complaint, request, or problem is reported. Contact the ECT at (301) 734-7592 or 734-8247 to collaborate on a sampling plan, sampling methods, and types of samples to collect in order to optimize the investigation. If the incident occurs on a weekend, commence your investigation and sampling without delay, and contact the ECT as soon as possible on Monday.

Proper documentation of the incident, investigation, and samples is extremely important. When responding to priority incidents, send to the ECT all GPS maps showing the site, location where you collected samples, the cotton field, and spray lines of recent malathion applications. Be sure to completely fill out all information on the 2060 forms with each sample. Be sure to provide an incident/complaint report to the ECT, along with any other information that you feel will be helpful in resolving the incident (i.e. photos, observations at the site, etc.).

Monitoring for Malathion Spills

Malathion spills (whether accidental, improper disposal, or aircraft crashes) may be monitored, depending on the nature of the incident, contractual arrangements, Program guidelines or local and state procedures. Call ECT personnel immediately, so that proper procedures and samples may be taken, if necessary. Sampling usually occurs as for priority incidents described above, but personnel must be aware that they may be sampling materials contaminated with nearly pure malathion, and appropriate safety measures should be taken.

Samples containing malathion from spills or accidents can contain enough malathion to ruin shipping containers and analytical equipment. Contact ANPCL for information on shipping these samples. Note on each sample and accompanying APHIS 2060 form that this is a "possible spill sample," so that ANPCL personnel may properly process the sample.

Quality Assurance and Quality Control (QA/QC) Monitoring

A QA/QC checklist can be found on pages A1-2. The checklist describes all of the QA/QC measures to be conducted by each program organizational unit to assure adherence to Program operating procedures, protection measures, and mitigations. **At the end of the treatment season**, the checklist will be signed by the State Program Manager, State EMS, or other appropriate personnel indicating that all of the QA/QC activities were followed. Record any deviations along with an explanation and any corrective actions taken. Attach this information to the checklist. After the conclusion of Program operations for the season, promptly submit the signed checklist to the ECT.

To determine purity of malathion, designated APHIS or Program personnel will collect neat (undiluted) malathion samples from the distribution warehouses, airfield or other storage areas. Collection of purity samples must be coordinated with appropriate APHIS personnel, so as not to

duplicate sampling. Program personnel may sample neat malathion that they suspect may have a problem, such as contamination, outside of regular purity sampling. Instructions for how to collect, handle, and ship the sample will be provided by ANPCL (228-863-8124), along with the necessary equipment. Further details can be found in SOP EM-10, *Preparation of Control Samples and Collection of Pesticide Samples*.

ENDANGERED AND THREATENED SPECIES

OBJECTIVES

Monitoring near endangered and threatened (E&T) species habitat is designed to provide data which can be used to evaluate the effectiveness of protection measures established for E&T species. Each year, zones, districts, or programs must reassess the presence of E&T species and their habitats. Should a species be found in the jurisdiction of a Program area that is not addressed in this document or the current Biological Assessment, the ECT must be contacted immediately at (301) 734-8247. Appropriate action will be taken to implement the proper protection measures and monitoring to assure that Program operations do not disturb the species or habitat in question. This monitoring plan lists all protected and proposed species known to occur in Arkansas, Louisiana, Mississippi, Missouri, and Tennessee as of the writing of this document and their associated protection measures on pages B1-6. Listed species and their protection measures for 2007 are the same as in 2006.

METHODS

Inventory

A complete inventory of all E&T sites near cotton fields is needed to fully evaluate the Program's ability to protect E&T species. Before the first treatments are made, each zone, district, and program staff **shall** contact the local FWS office concerning listed E&T species and the location of their habitats in all counties that **may** receive treatments during 2007 before the first treatments are made. Note that proposed species are also shown on pages B1-6 for information purposes only. No monitoring is required with these proposed species, but if they become listed as threatened or endangered, it is likely that protection measures will come into effect. If proposed species are in an area under your jurisdiction, it is strongly advised that the listed protection measures be implemented. Failure to implement these protection measures could possibly harm the species, potentially resulting in additional and highly restrictive future protection measures.

Even if you do not expect to treat any fields this year or are in a weevil-free area, it is recommended that you contact FWS for the location of protected species that may be near cotton fields. Should any fields require treatments, such treatments cannot begin until protected species locations are known. Since it can take some time for FWS to respond with the location of the protected species, it is in the Program's best interest to identify those locations ahead of time rather than potentially delay possible unexpected treatments.

Submit to the ECT a report that documents your program's annual contact with local FWS personnel and the location of E&T species and habitats near areas expected to be treated by your

Program. In your report, include the names and affiliations of those consulted, a list of E&T species in Program counties, a list of fields by field number where treatments would require protection measures for E&T species, and any other details regarding specific protection measures to be implemented. Use page B-7 (the “Endangered and Threatened Species Site Reporting Form”) to document the presence and location of each E&T species. Use additional paper if needed.

Your list should include any proposed species found near cotton and whether or not the protection measures for them will be implemented. If protected species exist beyond distances from cotton fields required to implement the protection measures, those species should also be listed on the form with a note in the comments section stating that the species are beyond the given limits requiring protection measures. Return the completed form to the ECT before treatments begin for the year. Send the completed form to:

Dr. Robert Baca, USDA-APHIS-PPQ, 4700 River Road, Unit 150, Room 5A-04.6,
Riverdale, MD 20737

Listed protection measures include buffer zones, observational monitoring, dye card monitoring, water monitoring, and run-off monitoring. If a protected species is located near cotton, the listed protection measures **must** be fully implemented. Note that many species are excluded from monitoring since it was determined that the Program will have no effect on the species. These species are listed on pages B1-6 with an “NE” (for “no effect”) under the protection measures.

Several protection measures do not require sampling. For example, the measures for the Ozark Big-eared bat state, “No aerial use within ¼ mile, no ground use within 300 feet of identified habitat.” There are no sampling requirements for this species, but the buffer zones must be implemented and documented in writing on the “Endangered and Threatened Species Site Reporting Form.”

When monitoring is required, the type of monitoring is specified in the protection measures. Descriptions of the types of monitoring are found below. The distance from a cotton field to a protected habitat that triggers required monitoring is listed in the protection measures. For example, when a protection measure states, “No use within 60 feet of identified aquatic habitat. Monitor for run-off,” any cotton field that might receive Program treatments that extends up to or within 60 feet of the habitat in question would require run-off monitoring. In this example, if **any portion** of a cotton field extended into the 60-foot no-treatment buffer area, monitoring would be required even though no malathion would be applied within the buffer area.

Monitoring for Drift

When a protection measure notes to “Monitor for drift”, dye cards are to be used. Dye cards should be placed at the edge of the habitat of the species. Do not place the dye cards next to the cotton field, but rather adjacent to the protected habitat. Placing dye cards next to the cotton field will not show that the species are being protected. Use the methods described in the Human Health section above.

Monitoring for Run-off

When a protection measure notes to “Monitor for run-off”, Automatic Runoff Sampling Equipment (ARSE) is to be used. When a cotton field is close enough to a protected habitat that it requires run-off monitoring, chances are that the cotton field will drain into that habitat at some location. Find the location where the field drains into the protected habitat. Refer to SOP EM-04, *Collection of Run-off Water Samples*. Place a cluster of 6 ARSEs in the bottom of the runoff channel just beyond the edge of the field. Be sure the ARSEs are not in a turn-row where they might be run over. This cluster of 6 ARSEs will be combined into a single sample for the “near field” sample. From the location where the ARSEs were placed at the field edge, follow the same runoff channel towards the protected aquatic habitat. At a point in the runoff channel close to the water’s edge, place another cluster of 6 ARSEs. These 6 ARSEs will be combined into a second single sample for the “away from field” sample. The goal of these 2 samples is to show that any malathion that might run off of a field will decrease in concentration down the runoff channel before it enters the aquatic habitat.

Periodically check on all the ARSEs, and replace any that have been damaged, buried, or removed. Provide a detailed description of the drainage including slope, soil type, and ground cover. Illustrate your description with an annotated map, aerial photograph, or sketch, and include photographs if available. Monitor weather and cancel treatments if rain appears imminent (within 8 hours). If it rains at 1 of the fields being monitored within 5 days after it was last treated, then collect the ARSE samples within 12 hours of when the rain begins. Each cluster of 6 ARSE samples is pooled to make 1 composite sample. So, there will be 2 samples from each site, 1 at the field edge (“near field”) and 1 near the receiving water body or drainage point (“away from field”).

Whenever run-off water samples are collected, also collect a sample of the water body receiving the runoff. Directions for collecting water samples are detailed in SOP EM-03, *Collection of Water Samples*. This sample is used to show how malathion that might be detected in the ARSEs is diluted upon entry into the water body.

Monitoring Water

A few species require water sampling as a protection measure, however these species have not been in Program treatment areas in the recent past. If one of these species is found near a treatment area this year, contact the ECT for information on the appropriate method to protect and sample the water body in question. Methods vary depending on if the water body is flowing or stationary. For reference, SOP EM-03, *Collection of Water Samples* can be reviewed, but this does not currently cover the sampling of flowing water.

Monitoring by Observation and Field Notes

Note-taking is required for most monitoring. Most often a sentence regarding general procedure is sufficient (for example: “nothing unusual noted during or after treatment”). In addition, note the time of treatment, and any wildlife activity in or around the field at E&T species sites. Refer to SOP EM-12 *Using a Field Log Book*. Submit photocopies of field log books, or make notes

directly into the “remarks” section of the APHIS 2060 form. In the case of monitoring eagle nests, see note-taking recommendations in SOP EM-18 *Observing Bald Eagles at Nest Sites*. Document your observations as required by the protection measures, and submit these notes to the ECT.

GENERAL MONITORING ISSUES

DISCRETIONARY MONITORING

At the discretion of program managers or staff, additional monitoring samples can be collected. Although the monitoring outlined in this plan should be adequate to generate the data needed to meet the objectives, additional sampling may be necessary around particular sensitive sites. Examples might include sites where there have been problems or complaints in previous years, sites that are highly visible to the public or are politically sensitive, sites where environmental monitoring might help prevent future concerns, and sites of proposed protected species.

To assure that sampling equipment is not accidentally exposed to malathion, work units or program areas may periodically submit an unused dye card, distilled/deionized water in Program containers, or gauze wipes of sampling equipment in storage for analysis of malathion. Submit an individual APHIS 2060 form with these samples, as you would with any other sample you submit for analysis.

To independently verify the analyses of ANPCL, work units or program areas may periodically follow procedures for taking, documenting, and submitting split samples for analysis. Split sampling involves taking a single sample and dividing it in half, with each half analyzed for malathion by a different laboratory. If you choose to take split samples of any type, contact the ECT at 301-734-8247 to discuss the proper procedures.

DOCUMENTATION

Draw a clear diagram of the sensitive site and where each sample is collected, either on a Geographic Information System (GIS) map, on a separate piece of paper, or on the APHIS 2060 forms associated with the samples. If you are collecting a series of samples from the same site, submit the map and diagram only once, as long as the site and each sample are clearly indicated on the map and in the appropriate sections of each APHIS 2060 form.

Complete a separate APHIS 2060 form for each sample collected. Instructions for completing the APHIS 2060 forms may be found on the back of each form. For each sample, submit the **blue** copy of the APHIS 2060 form to ANPCL with the sample, the **white** copy of the form to ANPCL in the sample shipping container but separate from the sample, and the **yellow** copy of the form (and any maps, photos, etc.) to the ECT. For any samples that are not sent to the laboratory for analysis (i.e. unspotted dye cards), send the APHIS 2060 form directly to the ECT. Keep the **pink** copy of each form you submit as a record in your local office.

Properly identify each sample as “routine” or “priority.” An incorrect identification regarding the nature of the sample creates confusion for those who must interpret the data, and delays the processing of samples that are incorrectly marked. Mark samples as “priority” only for instances where a fast turnaround of samples is required. This applies to **all** complaint investigations, spill

incidents, potential human health issues, and other samples considered to be of very high importance. Otherwise, mark the sample as “routine.”

SHIPPING OF SAMPLES

Ship all samples, including dye cards, by using some form of overnight delivery. See SOP EM-17, *Packaging and Shipping of Samples* for details. This applies to all samples, whether they are priority or routine. Do not ship samples using USPS Priority Mail or standard ground service with other carriers. Overnight delivery allows the sample to stay frozen or at least cold. Shipping any other way will take no less than 2-3 days and can ruin the sample.

With the exception of neat (pure) chemical, be sure that all samples are frozen, shipped in a cooler box (not a regular cardboard box), and kept cold during shipment. To keep samples cold, use dry ice, since it does not turn to liquid when warmed and will therefore not ruin any forms or samples. However, if *water* samples are shipped, *do not use dry ice*, since it will cause the sample containers to crack or break. Since dry ice may not be available in all areas, regular ice can be used for shipping any samples, but only if the ice is placed in a separate sealed container. Either use “blue ice” containers (the reusable plastic containers with the blue liquid/gel inside) or contained regular ice (that is, seal the ice in zip-loc bags). Unsealed ice will melt and leak during shipment, causing unnecessary concern when received at the laboratory.

SUPPLIES

As in the past, supplies for monitoring are ordered through the APHIS Analytical and Natural Products Chemistry Laboratory (ANPCL). A checklist for ordering supplies is located on pages C1-2. ANPCL prefers that supply orders be faxed to them using the numbers listed on the checklist rather than leaving a voice message for orders.

RESPONSIBILITIES

USDA-APHIS Environmental Compliance Team

In addition to preparing the Environmental Monitoring Plan, ECT personnel in Riverdale, MD, will:

1. Review and interpret field and pesticide residue data from the sample collectors and the laboratory. Contact the sample collector for clarification as soon as possible if any field data is incomplete or unclear. Notify the Program Director and Manager immediately if any residue data indicates the possibility of excessive exposure to malathion.
2. Provide training, clarification, and interpretation on how to implement the Environmental Monitoring Plan.
3. Submit a comprehensive interpretive report to the Program Director and the National Coordinator, within 60 working days of receiving all of the Program’s field data and all sampling results. Following review of the information, the ECT will provide a copy of the report to the Environmental Protection Agency and U.S. Fish & Wildlife Service.

USDA-APHIS Analytical and Natural Products Chemistry Laboratory

Personnel at the ANPCL in Gulfport, MS, will:

1. Prepare and ship sampling containers and other material required for collection, stabilization, and shipping of environmental monitoring samples.
2. Provide training on methods for collecting, handling, preserving, and shipping samples.
3. Respond to requests for additional information by field personnel when special sampling requirements occur.
4. Analyze monitoring samples according to standard operating procedures for malathion.
5. Complete analyses and report results on the following schedule:
 - a. Within 23 working days after receipt, complete analyses of all routine samples and send results to the ECT.
 - b. Within 5 working days after receipt, complete analyses of all priority/emergency samples and send results to the ECT.
 - c. Contact ECT if the projected completion schedules need to be extended due to sample load or instrument problems on site.
6. Forward copies of all environmental monitoring forms and any attached documentation to the ECT each week via overnight mail.

Program/Foundation/Organization Employees, PPQ Field Service Personnel or Cooperators, Under the Direction of the Program Director

Personnel in work unit, district, and program areas will:

1. Ensure that sufficient resources from the Program are allocated for completing the monitoring activities described in the Environmental Monitoring Plan (EMP).
2. Coordinate with Federal and local wildlife officials to identify E&T species and habitats near or within areas that may be affected by Program activities, inform the ECT of these species and locations, and implement the required protection measures.
3. Identify all sensitive sites near cotton fields as described in the EMP.
4. Select sufficient monitoring sites for the collection of samples. Follow instructions in the EMP and referenced SOPs to develop a plan for sample collection and documentation, including:
 - a. Collection of the type and number of samples recommended in the EMP.
 - b. Completion of a separate APHIS 2060 form for each sample that is collected.
 - c. Providing all the information necessary (as described above) to document the samples. Following each treatment, send all supporting documentation, including a copy of the appropriate APHIS 2060 forms to the ECT. Send all samples and appropriate APHIS 2060 forms to ANPCL. Ship all samples and supporting documentation as soon as possible after collection.
 - d. Notification of ANPCL prior to shipping any priority, spill, or unusual (i.e. other than water, dye card, soil, or vegetation) samples.

2007 OPERATIONAL PROCEDURES/MITIGATION MEASURES CHECKLIST

(Modify as needed for each work unit, district, or program area)

- _____ Retain a copy of all the pesticide certifications for Program personnel who are applying or supervising the application of pesticides. Certificates were reviewed twice per year.
- _____ Contractors' pesticide application certificates were available and recorded prior to the initial pesticide application.
- _____ Copies of all APHIS Form 2060's submitted to the USDA analytical laboratory were retained at the work unit, district, or program area as documentation of the environmental monitoring program.
- _____ A printout, or electronic file, of all trapped cotton fields, and the dates traps were checked and fields were treated, was retained as documentation for meeting all trapping and treatment criteria.
- _____ Operational Procedures and Recommended Mitigation Measures for using malathion, as defined in the National Boll Weevil Cooperative Control Program, Environmental Impact Statement, Tables 2-1 and 2-2 (attached), were reviewed with all appropriate Program personnel and copies were distributed as appropriate. (Measures for chemicals not used by the program may be ignored.)
- _____ Sensitive areas as defined in Table 2-1 in the Environmental Impact Statement (attached) were identified in each field unit. Appropriate Program supervisory personnel are familiar with all sites and have applied appropriate protective measures to avoid negative impact. Program personnel have reviewed these areas with field unit supervisors each spring prior to pesticide application, assessed the sites for environmental monitoring sampling, and provided appropriate seasonal review.
- _____ The following was issued to each employee as appropriate and serve as instructions for operational procedures:
- | | |
|----------------------------------------------|-----------------------------------|
| _____ a. Trapper Guide and Trapper Agreement | _____ d. Airplane Observer Duties |
| _____ b. Mist-Blower Operational Guide | _____ e. Airport Recorder Duties |
| _____ c. Hi-Boy Operational Guide | _____ f. BWEP Safety Manual |
- _____ Mist-blower and hi-boy operator training was conducted. Each employee signed a statement that they have received appropriate operational and safety training. This statement is retained in their personnel folder.
- _____ Each employee involved with pesticide use was tested for blood acetyl cholinesterase levels as necessary. Copies of all cholinesterase tests were retained in each employee's folder.
- _____ Global positioning systems (GPS) were required on all aerial application aircraft and generated a record of pesticide application. Two-way radio contact was maintained to allow communication between pilots and ground observers, to enhance safety and the effectiveness of each treatment.
- _____ Wind and weather conditions were recorded to document meteorological conditions during treatments.
- _____ Airplane check-in procedures certified nozzle type, size and number, spray system pressure, nozzle orientation, etc. This check-in list and subsequent seasonal inspections were retained in the work unit, district, or program area office for each aircraft used in the Program.
- _____ Correct operational and safety procedures for mist-blowers and hi-boys were monitored weekly by Program supervisory personnel and documented in the mist-blower log. Program supervisory personnel checked at least one mist-blower operator or hi-boy operator each week during the control season.

_____ A minimum of one aerial application operation was monitored by Program supervisory personnel each week for each contractor. This monitoring procedure was noted on flight records.

_____ Pesticide labels were carried in the vehicle of all persons involved with application, i.e. mist-blower operators, hi-boy operators, airplane observers, field supervisors, and Program supervisory personnel.

_____ Dye cards were labeled as to field numbers, date, and time of application. These cards were inspected by Program supervisory personnel and retained in the work unit or program area office or sent to the USDA laboratory for analysis as described in the Environmental Monitoring Plan.

_____ Initiation of Program operations was preceded by a notification to the following agencies:

- _____ a. State Department of Agriculture or similar agency;
- _____ b. State Conservation and National Resources Agency or similar agency;
- _____ c. State Forestry Commission or similar agency;
- _____ d. State Department of the Environment or similar agency; and
- _____ e. Local governmental and county agencies. (Provide listings below.)

Included in the notification letters was a request for assistance in identification of potential sensitive sites near cotton fields.

_____ A safety equipment check-off list was signed by each employee involved in pesticide application. This was retained in the employee's personnel folder.

_____ Safety procedures dealing with exposure to pesticides were inserted into the Program safety manual and made available to all employees handling pesticides.

_____ Empty pesticide containers were returned to the distributor.

_____ All complaints were documented, thoroughly investigated, and resolved. Those involving alleged pesticide misuse were referred to the appropriate state authority. Copies of complaints and actions taken were maintained on file. Copies of any state investigative reports were retained in the work unit or program area and copies submitted to the USDA-APHIS Environmental Compliance Team.

_____ Local contacts with U.S. Fish and Wildlife Service concerning endangered and threatened species habitat and mitigation measures were documented.

The above procedures and measures were performed in the _____ work unit, district, or program area during the 2007 season. Any minor deviations in such were corrected when observed. Deviations and/or pesticide incidents and corrective actions taken have been documented and are described as follows:

Signature

Date

Operational Procedures and Mitigation Measures National Boll Weevil Cooperative Control Program

These operational procedures and mitigation measures have been adopted for, and are an integral part of, the cooperative Boll Weevil Eradication Program. They were printed originally in the programmatic Environmental Impact Statement, and were revised as necessary in 2005.

Table 2-1 Operational Procedures

All Methods of Control

1. All applicable Federal, State, and local environmental laws and regulations will be followed during boll weevil control operations.
2. Sensitive areas (water bodies; parks; and occupied dwellings, such as homes, schools, churches, hospitals, and recreation areas) that may be adjacent to cotton fields will be identified. The program will be adjusted accordingly to ensure that these areas are not negatively affected.
3. Environmental monitoring of the program will be in accordance with the current environmental monitoring plan.
4. All cotton fields will be trapped. During the initial diapause year of the program, all fields will be treated from “ten percent cracked boll” until there is no hostable material remaining. In subsequent years, only hostable fields from which boll weevils have been caught will be treated.
5. All program personnel involved in chemical applications will be instructed on the safe use of malathion, the safe use of equipment, and on operational procedures. Field supervisors will train Field Technicians, mist blower operators and high-clearance sprayer operators on operational procedures, and monitor their conduct during working hours.

Aerial Applications

1. All materials will be applied in strict accordance with EPA- and State-approved label instructions.
2. Aircraft, spray equipment, and pilots that do not meet all contract requirements will not be allowed to operate.
3. All USDA, APHIS, Plant Protection and Quarantine employees who plan, supervise, recommend or perform pesticide treatments must be certified under the APHIS pesticide certification plan. They are also required to meet any additional requirements of the State where they perform duties involving pesticide use. All Foundation personnel involved in pesticide application must maintain State pesticide applicator certification as required by state law.
4. Upon notification by program personnel, growers will advise workers of the re-entry period following treatment.
5. Two-way radios or aircraft radio frequencies will be provided to program personnel who direct, coordinate, or observe pesticide applications, to facilitate communication with the pilot.
6. All APHIS field personnel will have baseline cholinesterase tests before the first application and each spring and fall thereafter. It is recommended that contract, State, and private personnel also participate in this testing program.
7. Only certified aerial applicators who have been familiarized with local conditions will be used by the program.
8. To minimize drift and volatilization, applications will not be made when any of the following conditions exist in the treatment area: wind velocity exceeds 10 miles per hour (or less if required by State law); prevailing wind is blowing toward a nearby residence or other sensitive site; rain is falling or is imminent; fog is present, or air is turbulent enough to seriously affect the normal spray pattern; or temperature inversions exist that could lead to offsite movement of applied material.
9. Nozzle types and sizes, spray system pressure, and nozzle orientation will be specified in the program’s aerial application contract or as otherwise directed by program personnel.

Ground Applications

1. Mist Blowers
 - Operators will be certified applicators, or will be in constant radio or cell phone contact with certified applicators.
 - Units will be operated from closed truck cabs with operators using re-circulated air.
2. High-Clearance Sprayers
 - Operators will be certified applicators, or will be in constant radio or cell phone contact with certified applicators.
 - Spray operations will be conducted from closed cabs using re-circulated air.

Table 2-2. Recommended Mitigation Measures

All required State and local authorities will be notified upon initiation of the program. The notification will advise State and local authorities of the need for any assistance in identifying sensitive areas in proposed treatment areas.

Protection of Workers

All program personnel will be instructed on emergency procedures to follow in the event of insecticide exposure. Equipment necessary for immediate washing procedures must be available for application personnel.

Aerial Applications

1. Pilots, loaders, and other personnel handling insecticides will be advised to wear safety equipment and protective clothing.
2. Program personnel observing applications of malathion are required to wear protective clothing or remain inside a closed vehicle with re-circulating air, depending on the circumstances of the application.
3. Application operations will be postponed in fields in which people are working. These fields will not be treated when workers are present.
4. GPS systems are required on all contract aircraft. They will be used for pilot guidance, mapping fields to be treated, and assistance in locating fields and marking swaths.

Ground Applications

1. Mist Blowers
 - Operators will be certified applicators, or will be in constant radio or cell phone contact with certified applicators.
 - Operators will wear appropriate safety equipment when loading or servicing the unit, and will be specially trained by program personnel.
 - Mist blower units will be operated from closed truck cabs with operators using re-circulated air.
2. High-Clearance Sprayers
 - Operators will be certified applicators, or will be in constant radio or cell phone contact with certified applicators.
 - Operators will wear appropriate safety equipment and protective clothing when loading or servicing the unit.
 - High-clearance sprayers will be operated from closed cabs with operators using re-circulated air.

Pesticide Handling Precautions

1. Insecticides will be delivered and stored in sealed totes (mini-bulk tanks) or drums and then pumped directly into the spraying equipment.
2. All insecticides will be stored in accordance with Federal, State, and local regulations and label instructions.

3. All loading and unloading of insecticides will be within a containment area where an accidental spill will not contaminate a stream or other body of water.
4. In the event of an accidental spill, procedures set forth in the PPQ Treatment Manual, chapter 7, pages 7-3-1 through 7-3-18, entitled, "Guidelines for Managing Pesticide Spills" will be followed.
5. All empty insecticide totes (mini-bulk tanks) and drums will be returned to the distributor for reconditioning.

Protection of the Public

1. Application aircraft shall avoid direct spraying of residences, garden plots and adjacent crops at all times.
2. Program personnel shall immediately cease spraying operations if members of the public are observed within 100 feet of a cotton field being sprayed with malathion.

Protection of Bees

Before beginning treatment with malathion, program personnel shall notify all registered apiarists in or near the treatment area of the date and approximate time of chemical treatment.

Protection of Wildlife

1. All control operations will be conducted with appropriate concern for their potential impact on endangered, threatened, and proposed species identified in this document.

APHIS has prepared a biological assessment for federally listed endangered, threatened and proposed species found within all U.S. cotton-producing counties from species information provided by the U.S. Department of the Interior, Fish and Wildlife Service (FWS) and State wildlife agencies.

Adequate protection measures are developed for federally listed endangered, threatened and proposed species through the Endangered Species Act, section 7, formal and informal consultations with FWS. Specific biological and distributional data for species is gathered in discussions between APHIS, Plant Protection and Quarantine, local FWS offices, State wildlife agencies and the Foundation before operations begin.

Species and habitats protected by State laws are addressed in site-specific assessments as needed.

2. Oil-sensitive dye cards are used to regularly monitor application efficacy. Spray deposition in the target area and droplet size are critical concerns.

**Protection Measures for Endangered, Threatened, and Proposed Species as
part of the 2007 Boll Weevil Control Program in Arkansas, Louisiana,
Mississippi, Missouri, and Tennessee**

KEY

STATUS: E=Endangered, ECH =Endangered w/Critical Habitat, T=Threatened, TCH=Threatened w/Critical Habitat, PE=Proposed Endangered, PT=Proposed Threatened, XN=Experimental Population

PROTECTION MEASURES: NE=APHIS determines that the Boll Weevil Program will have No Effect on populations of this species.

| COMMON NAME | SCIENTIFIC NAME | STATUS | PROTECTION MEASURES |
|------------------------------------|-------------------------------------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MAMMALS | | | |
| Bat, gray | <i>Myotis grisescens</i> | E | No aerial use within ¼ mile or ground use within 300 feet of a cave roost or known maternity site. No treatment within 60 feet around permanent water bodies within 10 miles of a cave roost or known maternity site. |
| Bat, Indiana | <i>Myotis sodalis</i> | E,CH | No aerial use within ¼ mile or ground use within 300 feet of a cave roost or known maternity site. No treatment within 60 feet around permanent water bodies within 10 miles of a cave roost or known maternity site. |
| Bat, Ozark big-eared | <i>Plecotus townsendii ingens</i> | E | No aerial use within ¼ mile or ground use within 300 feet of identified habitat. |
| Bear, Louisiana black | <i>Ursus americanus luteolus</i> | T | NE – Excluded by habitat |
| Manatee, West Indian | <i>Trichechus manatus</i> | E,CH | NE – Excluded by habitat |
| Panther, Florida | <i>Felis concolor coryi</i> | E | NE – Excluded by habitat |
| Puma (=cougar), eastern | <i>Felis concolor cougar</i> | E | NE – Excluded by rarity/habitat |
| Squirrel, Carolina northern flying | <i>Glaucomys sabrinus coloratus</i> | E | NE – Excluded by rarity |
| Wolf, gray, lower 48 States | <i>Canis lupus</i> | E,XN,CH | NE – Excluded by rarity |
| Wolf, red | <i>Canis rufus</i> | E,XN | NE – Excluded by rarity |
| BIRDS | | | |
| Crane, Mississippi sandhill | <i>Grus canadensis pulla</i> | E,CH | NE – Excluded by habitat |
| Crane, whooping | <i>Grus americana</i> | E,CH,XN | Trained observer at site prior to each treatment. If crane is present, postpone treatment. |
| Curlew, Eskimo | <i>Numenius borealis</i> | E | NE – Excluded by rarity |
| Eagle, bald | <i>Haliaeetus leucocephalus</i> | T | No use within 1,500 feet of occupied nest until July 1. Thereafter no use within 300 feet of occupied nest; no use within 60 feet of large water bodies (>25 feet across) within a 1-mile radius of the nest site. Eagle (adults, nestlings, or fledglings) presence or absence will be documented for each treatment by an observer at the nest site. |
| Pelican, brown | <i>Pelecanus occidentalis</i> | E | NE – Excluded by habitat |
| Plover, piping | <i>Charadrius melodus</i> | E,T,CH | NE – Migratory and excluded by habitat |
| Stork, wood | <i>Mycteria americana</i> | E | No aerial use within 1/4 mile or ground use within 300 feet of water's edge within 10 miles of rookery site. |

| COMMON NAME | SCIENTIFIC NAME | STATUS | PROTECTION MEASURES |
|-----------------------------------|----------------------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tern, least (Interior population) | <i>Sterna antillarum</i> | E | No aerial or ground use within 300 feet of a colony and no use within 60 feet of the water's edge for 2.5-mile radius around the colony. Monitor for run-off. For colonies located on or along the Mississippi River: No use within 300 feet of a colony and no use within 60 feet of the water's edge for 2.5 miles upstream and downstream of the colony site. Monitor for runoff. |
| Vireo, black-capped | <i>Vireo atricapillus</i> | E | NE – Due to location (not in LA) and habitat (if present: aerial application is prohibited within 100 feet of habitat, and ground applications are prohibited within 60 feet of habitat.) |
| Warbler, Bachman's | <i>Vermivora bachmanii</i> | E | NE – Excluded by rarity |
| Woodpecker, ivory-billed | <i>Campephilus principalis</i> | E | No aerial use within 250 feet or ground use within 60 feet of habitat edge. Use wind to avoid deposition in habitat. Monitor for drift. |
| Woodpecker, red-cockaded | <i>Picoides(=Dendrocopos) borealis</i> | E | No aerial use within 100 feet or ground use within 60 feet of habitat edge. Monitor for drift. |
| REPTILES | | | |
| Sea turtle, green | <i>Chelonia mydas</i> | E,T,CH | NE – Excluded by habitat |
| Sea turtle, hawksbill | <i>Eretmochelys imbricata</i> | E,CH | NE – Excluded by habitat |
| Sea turtle, Kemp's ridley | <i>Lepidochelys kempii</i> | E | NE – Excluded by habitat |
| Sea turtle, leatherback | <i>Dermochelys coriacea</i> | E,CH | NE – Excluded by habitat |
| Sea turtle, loggerhead | <i>Caretta caretta</i> | T | NE – Excluded by habitat |
| Snake, eastern indigo | <i>Drymarchon corais couperi</i> | T | Use least toxic organophosphate insecticide. |
| Tortoise, gopher | <i>Gopherus polyphemus</i> | T | No aerial use within 300 feet of occupied habitat. Monitor for drift. |
| Turtle, Alabama red-bellied | <i>Pseuemys alabamensis</i> | T | Avoid overflights of known habitat to prevent accidental direct spray. Pilot logs and GPS serve as documentation. |
| Turtle, ringed map | <i>Graptemys oculifera</i> | T | No use within 60 feet of identified aquatic habitat. Monitor for run-off. |
| Turtle, yellow-blotched map | <i>Graptemys flavimaculata</i> | T | No use within 60 feet of identified aquatic habitat. Monitor for run-off. |
| AMPHIBIANS | | | |
| Frog, Mississippi gopher | <i>Rana capito sevosa</i> | E | NE – Due to underground habitat |
| FISH | | | |
| Cavefish, Ozark | <i>Amblyopsis rosae</i> | T | No use within 60 feet of any drainage points within the recharge area of the cave. Monitor for run-off. |
| Chub, slender | <i>Erimystax cahni</i> | T,CH | No use within 60 feet of identified aquatic habitat. Monitor for run-off. |
| Chub, spotfin | <i>Cyprinella monacha</i> | T,CH | Same as previous species. |
| Dace, blackside | <i>Phoxinus cumberlandensis</i> | T | No use within 60 feet of identified aquatic habitat. Monitor for run-off. |
| Darter, amber | <i>Percina antesella</i> | E,CH | Same as previous species. |
| Darter, bayou | <i>Etheostoma rubrum</i> | T | Same as previous species. |
| Darter, bluemask (=jewel) | <i>Etheostoma sp.</i> | E | Same as previous species. |
| Darter, boulder (=Elk River) | <i>Etheostoma wapiti</i> | E | Same as previous species. |
| Darter, duskytail | <i>Etheostoma sp.</i> | E | Same as previous species. |
| Darter, leopard | <i>Percina pantherina</i> | T,CH | No use within 60 feet of identified aquatic habitat. Monitor for run-off. |
| Darter, Niangua | <i>Etheostoma nianguae</i> | T,CH | Same as previous species. |
| Darter, slackwater | <i>Etheostoma boschungii</i> | T,CH | Same as previous species. |
| Darter, snail | <i>Percina tanasi</i> | T | Same as previous species. |

| COMMON NAME | SCIENTIFIC NAME | STATUS | PROTECTION MEASURES |
|------------------------------------------|---------------------------------------------|-------------|---------------------------------------------------------------------------|
| Logperch, Conasauga | <i>Percina jenkinsi</i> | E,CH | Same as previous species. |
| Madtom, Neosho | <i>Noturus placidus</i> | T | Same as previous species. |
| Madtom, pygmy | <i>Noturus stanauli</i> | E | Same as previous species. |
| Madtom, smoky | <i>Noturus baileyi</i> | E,CH, XN | Same as previous species. |
| Madtom, yellowfin | <i>Noturus flavipinnis</i> | T,CH | Same as previous species. |
| Shiner, Arkansas River | <i>Notropis girardi</i> | E,CH | NE – Excluded by rarity |
| Shiner, blue | <i>Cyprinella caerulea</i> | T | No use within 60 feet of identified aquatic habitat. Monitor for run-off. |
| Shiner, Palezone | <i>Notropis sp.</i> | E | Same as previous species. |
| Shiner, Topeka | <i>Notropis topeka.</i> | E,CH | Same as previous species. |
| Sturgeon, Alabama | <i>Scaphirhynchus suttkusi</i> | E | Same as previous species. |
| Sturgeon, gulf | <i>Acipenser oxyrhynchus desotoi</i> | T,CH | Same as previous species. |
| Sturgeon, pallid | <i>Scaphirhynchus albus</i> | E | Same as previous species. |
| CLAMS | | | |
| Acornshell, southern | <i>Epioblasma othcaloogensis</i> | E,CH | No use within 60 feet of identified aquatic habitat. Monitor for run-off. |
| Bean, Cumberland (pearlymussel) | <i>Villosa trabalis</i> | E,XN | Same as previous species. |
| Bean, purple | <i>Villosa perpurpurea</i> | E,CH | Same as previous species. |
| Blossom, green (pearlymussel) | <i>Epioblasma torulosa gubernaculum</i> | E | Same as previous species. |
| Blossom, tubercled (pearlymussel) | <i>Epioblasma torulosa torulosa</i> | E,XN | Same as previous species. |
| Blossom, turgid (pearlymussel) | <i>Epioblasma turgidula</i> | E,XN | Same as previous species. |
| Blossom, yellow (pearlymussel) | <i>Epioblasma florentina florentina</i> | E,XN | Same as previous species. |
| Catspaw (=purple cat's paw pearlymussel) | <i>Epioblasma obliquata obliquata</i> | E,XN | Same as previous species. |
| Clubshell | <i>Pleurobema clava</i> | E | Same as previous species. |
| Clubshell, black | <i>Pleurobema curtum</i> | E | Same as previous species. |
| Clubshell, ovate | <i>Pleurobema perovatum</i> | E,CH | Same as previous species. |
| Clubshell, southern | <i>Pleurobema decisum</i> | E,CH | Same as previous species. |
| Combshell, Cumberlandian | <i>Epioblasma brevidens</i> | E,CH,XN | Same as previous species. |
| Combshell, southern | <i>Epioblasma penita</i> | E | Same as previous species. |
| Combshell, upland | <i>Epioblasma metastriata</i> | E,CH | Same as previous species. |
| Elktoe, Appalachian | <i>Alasmidonta raveneliana</i> | E,CH | Same as previous species. |
| Elktoe, Cumberland | <i>Alasmidonta atropurpurea</i> | E,CH | Same as previous species. |
| Fanshell | <i>Cyprogenia stegaria</i> | E | Same as previous species. |
| Fatmucket, Arkansas | <i>Lampsilis powelli</i> | T | Same as previous species. |
| Heelsplitter, Alabama (inflated) | <i>Potamilus inflatus</i> | T | Same as previous species. |
| Eye, Higgins (pearlymussel) | <i>Lampsilis higginsii</i> | E | Same as previous species. |
| Kidneyshell, triangular | <i>Ptychobranthus greenii</i> | E,CH | Same as previous species. |
| Lampmussel, Alabama | <i>Lampsilis virescens</i> | E | No use within 60 feet of identified aquatic habitat. Monitor for run-off. |
| Lilliput, pale (pearlymussel) | <i>Toxolasma(=Carunculina) cylindrellus</i> | E | Same as previous species. |
| Mapleleaf, winged (mussel) | <i>Quadrula fragosa</i> | E | Same as previous species. |
| Moccasinshell, Alabama | <i>Medionidus acutissimus</i> | T,CH | Same as previous species. |
| Moccasinshell, Coosa | <i>Medionidus parvulus</i> | E,CH | Same as previous species. |

| COMMON NAME | SCIENTIFIC NAME | STATUS | PROTECTION MEASURES |
|----------------------------------------|----------------------------------------|---------|--------------------------------------------------------------------------------------------------------|
| Monkeyface, Appalachian (pearlymussel) | <i>Quadrula sparsa</i> | E | Same as previous species. |
| Monkeyface, Cumberland (pearlymussel) | <i>Quadrula intermedia</i> | E,XN | Same as previous species. |
| Mucket, orangenacre | <i>Lampsilis perovalis</i> | T,CH | Same as previous species. |
| Mucket, pink (pearlymussel) | <i>Lampsilis abrupta</i> | E | Same as previous species. |
| Mussel, oyster | <i>Epioblasma capsaeformis</i> | E,CH,XN | Same as previous species. |
| Mussel, scaleshell | <i>Leptodea leptodon</i> | E | Same as previous species. |
| Pearlshell, Louisiana | <i>Margaritifera hembeli</i> | T | Same as previous species. |
| Pearlymussel, birdwing | <i>Conradilla caeleta</i> | E | Same as previous species. |
| Pearlymussel, cracking | <i>Hemistena lata</i> | E | Same as previous species. |
| Pearlymussel, Curtis | <i>Epioblasma florentina curtisi</i> | E | Same as previous species. |
| Pearlymussel, dromedary | <i>Dromus dromas</i> | E | Same as previous species. |
| Pearlymussel, littlewing | <i>Pegias fabula</i> | E | Same as previous species. |
| Pigtoe, Cumberland | <i>Pleurobema gibberum</i> | E | Same as previous species. |
| Pigtoe, finerayed | <i>Fusconaia cuneolus</i> | E,XN | Same as previous species. |
| Pigtoe, flat | <i>Pleurobema marshalli</i> | E | Same as previous species. |
| Pigtoe, heavy | <i>Pleurobema taitianum</i> | E | Same as previous species. |
| Pigtoe, oval | <i>Pleurobema pyriforme</i> | E | Same as previous species. |
| Pigtoe, rough | <i>Pleurobema plenum</i> | E | Same as previous species. |
| Pigtoe, shiny | <i>Fusconaia cor</i> | E,XN | Same as previous species. |
| Pigtoe, southern | <i>Pleurobema georgianum</i> | E,CH | Same as previous species. |
| Pimpleback, orangefoot (pearlymussel) | <i>Plethobasus cooperianus</i> | E | Same as previous species. |
| Pink, ring (mussel) | <i>Obovaria retusa</i> | E | Same as previous species. |
| Pocketbook, fat | <i>Potamilus capax</i> | E | Same as previous species. |
| Pocketbook, finelined | <i>Lampsilis altilis</i> | T,CH | Same as previous species. |
| Pocketbook, Ouachita rock | <i>Arkansia wheeleri</i> | E | Same as previous species. |
| Pocketbook, speckled | <i>Lampsilis streckeri</i> | E | Same as previous species. |
| Rabbitsfoot, rough | <i>Quadrula cylindrica strigillata</i> | E,CH | Same as previous species. |
| Riffleshell, tan | <i>Epioblasma walkeri</i> | E | Same as previous species. |
| Stirrupshell | <i>Quadrula stapes</i> | E | NE – Excluded due to rarity, only known populations in AL |
| Wartyback, white (pearlymussel) | <i>Plethobasus cicatricisus</i> | E | No use within 60 feet of identified aquatic habitat. Monitor for run-off. |
| SNAILS | | | |
| Cavesnail, Tumbling Creek | <i>Antrobia culveri</i> | E | NE – Excluded by habitat. |
| Marstonia, royal (snail) | <i>Pyrgulopsis ogmorphe</i> | E | No use within 60 feet of identified aquatic habitat and recharge areas of spring. Monitor for run-off. |
| Riversnail, Anthony's | <i>Athaernia anthonyi</i> | E,XN | No use within 60 feet of identified aquatic habitat. Monitor for run-off. |
| Shagreen, Magazine Mountain | <i>Mesodon magazinensis</i> | T | NE – Excluded by habitat |
| Snail, painted snake coiled forest | <i>Anguispira picta</i> | T | NE – Excluded by habitat |

| COMMON NAME | SCIENTIFIC NAME | STATUS | PROTECTION MEASURES |
|----------------------------------------------|-------------------------------------------------------------------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| INSECTS | | | |
| Beetle, American burying | <i>Nicrophorus americanus</i> | E | Avoid drift into potential habitat of beetle (=non-cultivated land) at the edge of fields in counties with species. Aerial swaths parallel to edge of beetle habitat. When possible, spray field edges near potential beetle habitat during mid morning to late afternoon from March to November. |
| Dragonfly, Hine's emerald | <i>Somatochlora hineana</i> | T | No use within 60 feet of identified habitat. Monitor for run-off. |
| ARACHNIDS | | | |
| Spider, spruce-fir moss | <i>Microhexura montivaga</i> | E,CH | NE – Excluded by habitat |
| CRUSTACEANS | | | |
| Crayfish, cave | <i>Cambarus aculabrum</i> | E | No use within 60 feet of drainage points within the recharge area for the cave. Monitor for run-off. |
| Crayfish, cave | <i>Cambarus zophonastes</i> | E | No use within 60 feet of drainage points within the recharge area for the cave. Monitor for run-off. |
| Crayfish, Nashville | <i>Orconectes shoupi</i> | E | No use within 60 feet of identified aquatic habitat. Monitor for run-off. |
| PLANTS | | | |
| Potato-bean, Price's | <i>Apios priceana</i> | T | NE – Excluded by habitat |
| Rock-cress, Braun's | <i>Arabis perstellata</i> | E,CH | NE – Excluded by habitat, pollinators unknown |
| Sandwort, Cumberland | <i>Arenaria cumberlandensis</i> | E | NE – Excluded by habitat |
| Milkweed, Mead's | <i>Asclepias meadii</i> | T | NE – Excluded by location, habitat; not insect pollinated |
| Fern, American hart's-tongue | <i>Asplenium (=Phyllitis) scolopendrium (=japomica) var. americanum</i> | T | NE – Not insect pollinated |
| Ground-plum, Pyne's (=Guthrie's) | <i>Astragalus bibillatus</i> | E | NE – Excluded by habitat |
| Aster, decurrent false | <i>Boltonia decurrens</i> | T | NE – Excluded by habitat |
| Rosemary, Cumberland | <i>Conradina verticillata</i> | T | NE – Pollinated by honeybees and bumblebees |
| Prairie-clover, leafy | <i>Dalea foliosa</i> | E | NE – Pollinated primarily by bumblebees |
| Coneflower, Tennessee purple | <i>Echinacea tennesseensis</i> | E | NE – Excluded by habitat |
| Geocarpon minimum | <i>Geocarpon minimum</i> | T | NE – Excluded by habitat |
| Avens, spreading | <i>Geum radiatum</i> | E | NE – Excluded by habitat, many insects visit, pollinators unknown |
| Lichen, rock gnome | <i>Gymnoderma lineare</i> | E | NE – Not insect pollinated |
| Bluet, Roan Mountain | <i>Hedyotis purpurea montana</i> | E | NE – Excluded by habitat, pollinators include beetles, bumblebees, flies, ants |
| Sneezeweed, Virginia | <i>Helenium virginicum</i> | T | NE – Excluded by location/habitat, pollinators include bees, wasps, butterflies, and hoverflies |
| Sunflower, Eggert's | <i>Helianthus eggertii</i> | T | NE – Excluded by location |
| Quillwort, Louisiana | <i>Isoetes louisianensis</i> | E | NE – Not insect pollinated |
| Pogonia, small whorled | <i>Isotria medeoloides</i> | T | NE – Self pollinated |
| Bladderpod, Missouri | <i>Lesquerella filiformis</i> | E | NE – Excluded by location-southwestern MO only |
| Bladderpod, Spring Creek | <i>Lesquerella perforata</i> | E | NE – Flowers early |
| Pondberry | <i>Lindera melissifolia</i> | E | NE – Pollination complete by spraying time |
| Aster, Ruth's golden | <i>Pityopsis ruthii</i> | E | NE – Vegetative reproduction in the wild |
| Orchids, prairie fringed Eastern and western | <i>Platanthera leucophaea</i> <i>Platanthera praeclara</i> | T | NE – Pollination occurs at night |
| Harperella | <i>Ptilimnium nodosum</i> | E | NE – Excluded by habitat |

| COMMON NAME | SCIENTIFIC NAME | STATUS | PROTECTION MEASURES |
|------------------------------|-------------------------------|--------|-------------------------------------------------------------------|
| Pitcher-plant, green | <i>Sarracenia oreophila</i> | T | NE – Excluded by location, only in AL & GA; not insect pollinated |
| Chaffseed, American | <i>Schwalbea americana</i> | E | NE – Excluded by habitat |
| Skullcap, large-flowered | <i>Scutellaria montana</i> | E | NE – Excluded by habitat |
| Goldenrod, Blue Ridge | <i>Solidago spithamea</i> | T | NE – Excluded by habitat, pollinators not identified |
| Spiraea, Virginia | <i>Spiraea virginiana</i> | T | NE – Vegetative reproduction |
| Clover, running buffalo | <i>Trifolium stoloniferum</i> | E | NE – Excluded by location |
| Grass, Tennessee yellow-eyed | <i>Xyris tennesseensis</i> | E | NE – Excluded by habitat |

ENVIRONMENTAL MONITORING SUPPLIES CHECKLIST

| SUPPLIES TO BRING EACH TIME YOU GO TO A SAMPLING SITE | | | | | |
|--------------------------------------------------------------|--|-----------------|---------------------------|--|----------------|
| Monitoring plan/SOP's | | Obtain from ECT | Thermometer | | |
| Field log notebook | | | Ice chest/wet or blue ice | | Obtain locally |
| Compass | | | Baby wipes | | |
| Wind gauge | | | 2060 monitoring forms | | |
| Indelible marker | | | Packing/strapping tape | | |

| A.R.S.E. (Run-off Sampling) | | | Dye Cards | | |
|------------------------------------|--|--|--------------------------------|--|--|
| Plexiglas cover | | | Oil sensitive dye cards | | |
| 8"x 8" mesh screen | | | Water sensitive dye cards | | |
| Tent pegs/nails | | | 5' bamboo poles/stakes | | |
| Funnels attached to caps | | | Paper/binder clips | | |
| 500 ml bottles | | | Tacks | | |
| 4" PVC pipe, 14" long | | | 4" x 4" plastic bags | | |
| Post hole digger | | | 12" x 12" plastic bags | | |
| Pea gravel | | | Tweezers/forceps | | |
| Large rocks/bricks | | | disposable gloves | | |
| Bamboo pole/flagging tape | | | Water Samples | | |
| collapsible cubitainer | | | Dissolved oxygen kit | | |
| Sodium sulfate (small vials) | | | collapsible cubitainer | | |
| pH paper/pH meter | | | Sodium sulfate (small vials) | | |
| Sulfuric acid (squeeze bottle) | | | pH paper/pH meter | | |
| Styrofoam "coffin" | | | Sulfuric acid (squeeze bottle) | | |

| Vegetation/Fish Samples | | | Sediment Samples | | |
|--------------------------------|--|--|----------------------------|--|--|
| Pruning sheers/scissors | | | Dredge tied to strong rope | | |
| Aluminum foil envelopes | | | 3 gallon galvanized pail | | |
| Strapping tape | | | Hand trowel | | |
| | | | 3" mesh screen | | |
| | | | Aluminum foil envelopes | | |

| Soil Samples | | | Swab/Wipe Samples | | |
|--------------------------|--|--|---------------------------------------------------------|--|----------------|
| Soil core sampler | | | 3" x 3" sterile cotton pads with resealable plastic bag | | |
| 3 gallon galvanized pail | | | Metric ruler | | |
| Hand trowel | | | Pencil | | |
| 3" mesh screen | | | Disposable gloves | | |
| Aluminum foil envelopes | | | Isopropyl alcohol | | Obtain locally |
| Baby wipes | | | | | |

| Neat (Pure) Chemical Formulations | | | Miscellaneous Supplies | | |
|-----------------------------------|--|--|---------------------------|--|----------------|
| Amber glass bottle | | | Labels | | |
| Parafilm | | | Styrofoam coolers/mailers | | |
| Small mailing tubes | | | Freezer | | Obtain locally |
| Cat litter/packing material | | | Dry ice | | Obtain locally |
| Disposable pipette | | | Resealable plastic bags: | | |
| Pipetting bulb | | | 4" x 4" | | |
| Disposable gloves | | | 6" x 6" | | |
| Protective eyewear | | | 8" x 8" | | |
| | | | 12" x 12" | | |

Program: _____

Requested by: _____

Date: _____

Phone: _____

Address: _____

To order supplies, indicate the quantity of each items needed. Fax a copy of this form to ANPCL at 228-822-3209 or 228-822-3137. If fax machines are not working, leave a message with the ANPCL supplies manager at 228-822-3106. Please realize that it may be difficult to completely fill order for large quantities of materials.

Note: This is not an exhaustive supply list...items that are not listed here may be available through ANPCL.