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Environmental Quality

AIR PATHWAY ANALYSIS FOR THE DESIGN OF REMEDIAL ACTION PROJECTS

ENGINEER PAMPHLET

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DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
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AIR PATHWAY ANALYSIS FOR THE DESIGN OF
REMEDIAL ACTION PROJECTS

1. Purpose.

a. This Engineer Pamphlet describes Air Pathway Analysis (APA) procedures. These procedures provide guidance for emission rate and dispersion modeling used to determine public health impacts of air emissions from remedial action projects. Using APA results in the design process for remedial actions helps to justify need and design requirements for perimeter air monitoring systems. It also aids in the design of air pollution control equipment and procedures.

b. The foundation of Corps of Engineers environmental work is the Environmental Operating Principles as specified in ER 200-1-5. These seven tenets serve as guides and must be applied in all Corps business lines as we strive to achieve a sustainable environment.

2. Applicability. This pamphlet applies to all USACE commands responsible for the design of remedial action projects that will be funded from USACE appropriations. This EP does not apply to remedial action projects designed for the cleanup of radioactive isotopes or projects designed to address contamination identified in buildings, including abatement of lead or asbestos hazards.

3. Distribution Statement. Approved for public release; distribution is unlimited.

4. References.

a. Executive Order 12580, 23 January 1987, as amended.

b. ER 200-1-5, Policy for Implementation and Integrated Application of the U.S. Army Corps of Engineers Environmental Operating Principles and Doctrine

c. EM 200-l-4, Risk Assessment Handbook, Human Health Evaluation.

This pamphlet supersedes EP 200-1-24, dated 31 January 2012.

d. EPA Publication EPA-450/l-89-001a, Air/Superfund National Technical Guidance Study Series, Volume I-Overview of Air Pathway Assessments for Superfund Sites (revised).

e. EPA Publication EPA-450/1-89-03, Air/Superfund National Technical Guidance Study Series, Volume III-Estimation of Air Emissions from Cleanup Activities at Superfund Sites.

f. EPA Publication EPA-450/l -9 l-001, Air/Superfund National Technical Guidance Study Series-Emission Factors for Superfund Remediation Technologies (revised).

g. EPA Publication EPA-45l/R-93-001, Air/Superfund National Technical Guidance Study Series-Models for Estimating Air Emission Rates From Superfund Remedial Actions.

h. EPA Publication EPA 45l/R-96-006, Air Superfund National Technical Guidance Study Series-Air/Superfund Guide to Pollutant Toxicity.

i. EPA Publication EPA-454/R-95-003, Air/Superfund National Technical Guidance Study Series, Volume V-Procedures for Air Dispersion Modeling at Superfund Sites.

j. EPA Publication EPA/625/R-92/0 12, Control of Air Emissions from Superfund Sites.

k. EPA Publication 9234.2-22FS, ARARS Fact Sheet, Compliance with the Clean Air Act and Associated Air Quality Requirements.

5. Discussion.

a. Air quality requirements for remedial action projects are dictated primarily by the air quality control region (AQCR) in the state where the project is located. Designers must speak with District Office of Counsel before both Counsel and the Designer contact the AQCR for requirements for emission rate action levels, emission controls, and receptor point action levels before starting a project-specific APA.

b. APA is a multi-disciplinary effort, requiring involvement of dispersion modelers, regulatory specialists, counsel and, risk assessors. Solicit input from geotechnical engineers when estimating emission rates from soil handling operations and from treatment process engineers when calculating emission rates from treatment processes.

c. This EP is to be used to guide the development of in-house APAs and scopes of work for Architect-Engineer (A-E) developed APAs.

d. Concepts and procedures found in references d through k are critical for the development of APAs. Reference c is available at the Corps of Engineers Publications webpage http://www.publications.usace.army.mil/. References d through k can be obtained from http://www.epa.gov/nscep/.

6. Definitions.

a. Emission Rate. The rate at which contaminants are emitted to the air from point sources (grams/second) and area sources (grams/second-square meter).

b. Dispersion Modeling. The process of using an air dispersion model and an emission rate to calculate the concentration of contaminants in the air at a receptor point.

c. Emission Rate Action Level. The regulation or regulatory guideline emission rate for point source emissions.

d. Receptor Point Action Level. The airborne concentration of a contaminant at the receptor, which is considered (by regulation, regulatory guideline, or risk assessment practice) unacceptable for public exposure.

e. Perimeter Air Monitoring Action Level. The airborne concentration of a contaminant to be monitored at the site perimeter that has been demonstrated through dispersion modeling to be in compliance with the receptor point action level.

FOR THE COMMANDER:

D. PETER HELMLINGER
COL, EN
Chief of Staff

2 Appendices
A. Air Pathway Analysis Procedure
B. Perimeter Air Monitoring Action Level Development

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APPENDIX A

Air Pathway Analysis Procedure

A-l. Emission Rate Calculations/Estimations. Develop an emission rate estimate using project-specific models given in references d, e, f, and g. The emission rate estimate is used to determine necessary emission control equipment for point sources. It is also used in dispersion modeling for both point sources and area sources to determine if site emissions comply with receptor point action levels. EPA's Office of Air Quality Planning and Standards Technology Transfer Network (OAQPS-TTN) provides valuable information for estimating and measuring emissions to the public at http://www.epa.gov/ttn/chief/.

a. Point Sources. These are stacks and vents on HTRW treatment process equipment. Contaminants of concern include those present in the environmental medium undergoing treatment, as well as chemicals used in the treatment process, or by-products of the treatment process, which may be released to the air. Consult process engineering staff and references e, f, and g, to calculate emission rates from HTRW treatment process point sources. Be sure to account for emission control technology if it is included in the design. Pilot-scale treatability studies and existing full-scale treatment processes, where the processes and contaminants are similar to the project under design, are valuable sources of information for estimating point source emission rates.

b. Area Sources. These are ground level releases to the air over a specified surface area. Examples of this type of a release on HTRW sites include excavations and associated material handling activities, stockpiles, landfills, and lagoons. Emissions are calculated using models specified in references e, f, and g. Emission rate modeling results can be made more realistic by substituting site-specific data (e.g., moisture content, bulk density, particle size distribution, and chemical and physical properties of the contaminants) for the default values specified in the models.

A-2. Dispersion Modeling Procedure. Apply a two-tiered approach when performing dispersion modeling for point sources. Do screening level modeling first, followed by refined dispersion modeling if the results from the first model exceed receptor point action levels. Dispersion modeling for area sources needs only to be done with screening level models.

a. Screening Models. TSCREEN or SCREEN3 are good screening level dispersion models that can be applied to most HTRW remedial action scenarios for both point sources and area sources. Both models are available to the public at no cost from the EPA's Support Center for Regulatory Air Models (SCRAM) web site at http://epa.gov/ttn/scram.

b. Refined Models. Seek professional dispersion modeling support when doing refined dispersion modeling for point sources when screening level modeling results exceed receptor point action levels. Professional help is critical for selecting the model,

A-4. Emission Control Requirements.

a. Point Sources. Point source emissions can be controlled. Emission control equipment should be applied to point sources if required by state regulations or if emission rate action levels or receptor point action levels are exceeded.

b. Area Sources. Area source emissions are very difficult to control. The most effective way to control area source emissions is to control the rate of contaminated material handling. The remedial action project designer should specify handling rate restrictions if screening level dispersion modeling results for area source emissions exceed receptor point action levels. Designers may develop other methods to control area source emissions from HTRW sites, but all methods chosen should be supported by screening level dispersion modeling results exceeding receptor point action levels.

A-5. Air Emission Monitoring Requirements.

a. Monitor emissions from point sources at the stack to assure that air pollution control equipment (if used) is working properly or to assure that emission rate modeling assumptions are correct. Do not attempt to characterize point source emissions using ambient air sampling methods at the site perimeter or at off-site sampling locations. Daily variability in wind speed and direction is too great and makes it impossible to characterize point sources at these locations.

b. The Emissions Measuring Center (EMC) at the EPA Office of Air and Radiation Technology Transfer Network http://www.epa.gov/ttn/emc/ provides access to many emission monitoring/sampling methods and procedures that can be modified to evaluate toxic air emissions from stacks and vents on cleanup project treatment processes.

c. Monitor emissions from area sources when screening level dispersion modeling results exceed receptor point action levels. Use ambient air monitoring techniques at the site perimeter to check the effectiveness of controls and procedures for limiting emissions to the air from the area source. Specify use of appropriate sampling equipment and analytical methods. See the Appendix B of this document to develop perimeter air monitoring action levels.

d. The Ambient Monitoring Technology Information Center (AMTIC) at the EPA Office of Air and Radiation Technology Transfer Network http://www.epa.gov/ttn/amtic/ provides access to air monitoring and sampling and analysis methods and procedures that can be set up at optimum locations on cleanup projects to monitor emissions to the air from area sources.

e. With support from a chemist or industrial hygienist with ambient air or vent and stack emission monitoring experience, most emission monitoring or perimeter air sampling methods can be modified to fit project specific requirements Consult with project stakeholders to assure that method modifications meet their needs for decision making and data quality.

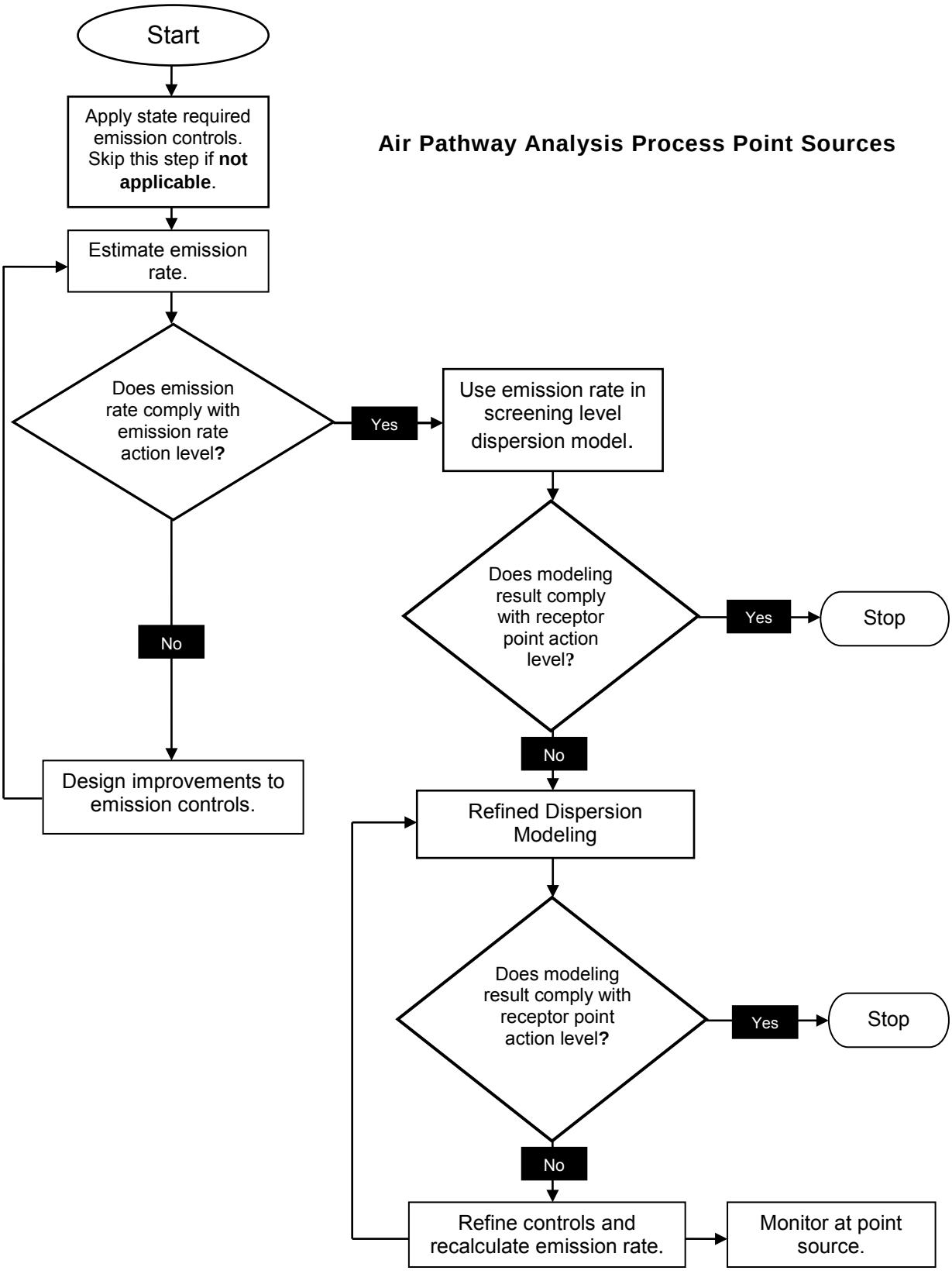

Figure A-1. Point Source APA Summary Flow

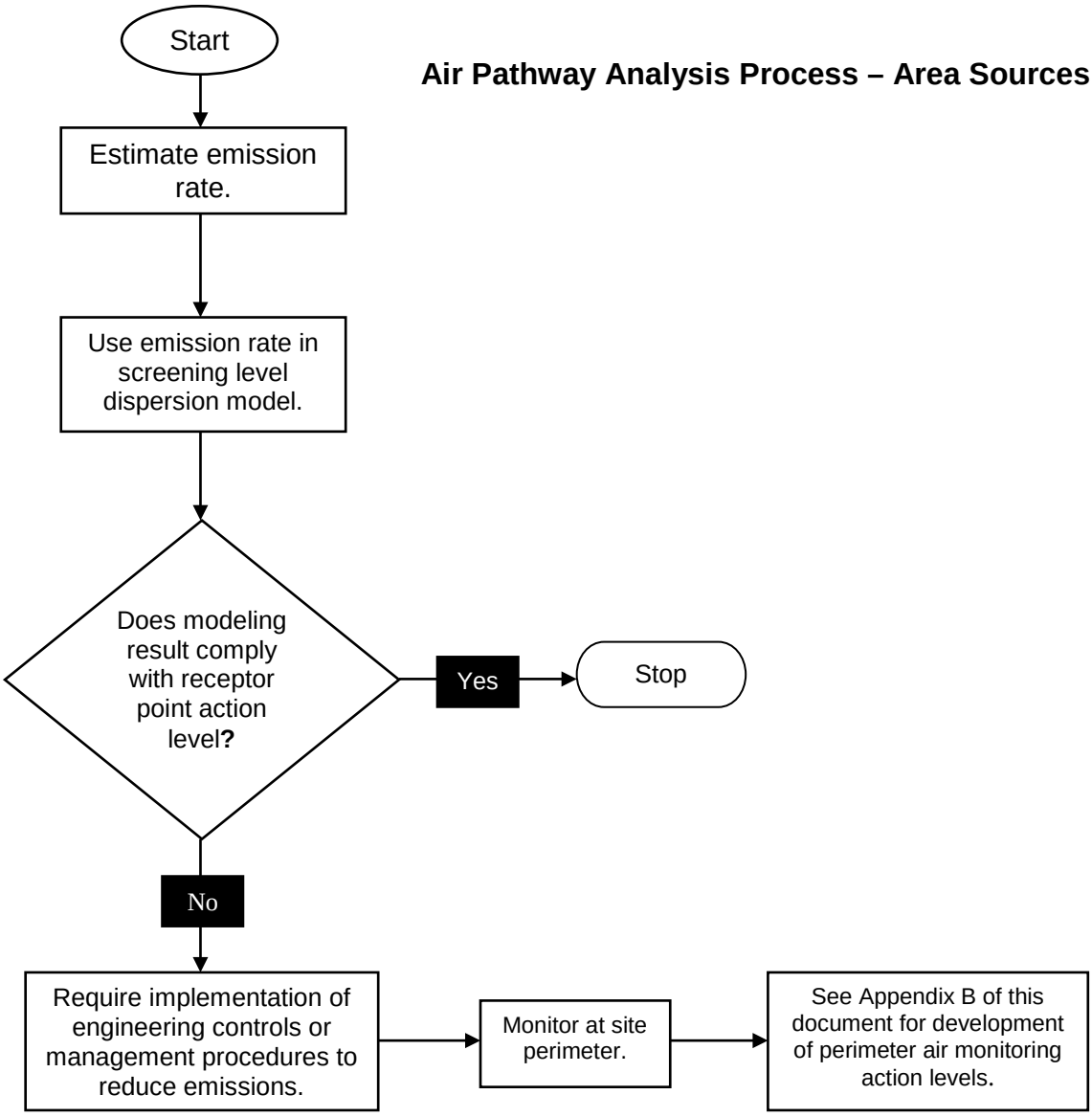

Figure A-2. Area Source Flow Chart

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APPENDIX B

Perimeter Air Monitoring Action Level Development

B-l. Area Sources. Develop perimeter air monitoring action levels when perimeter air monitoring is included as part of a remedial action design. The procedure for developing perimeter air monitoring action levels applies to area sources only. Follow the step by step procedure described below to calculate these action levels.

a. Use SCREEN 3 to calculate a dilution factor between the site perimeter and the receptor point location.

b. Multiply the receptor point action level by the SCREEN3 dilution factor to derive the perimeter air monitoring action level.

c. Monitor for and enforce the perimeter air monitoring action level at the site perimeter.

B-2. Point Sources. The procedures for developing perimeter air monitoring action levels do not apply to point sources. Monitor point sources at the stack using emission rate monitoring techniques to determine compliance with emission rate action levels.

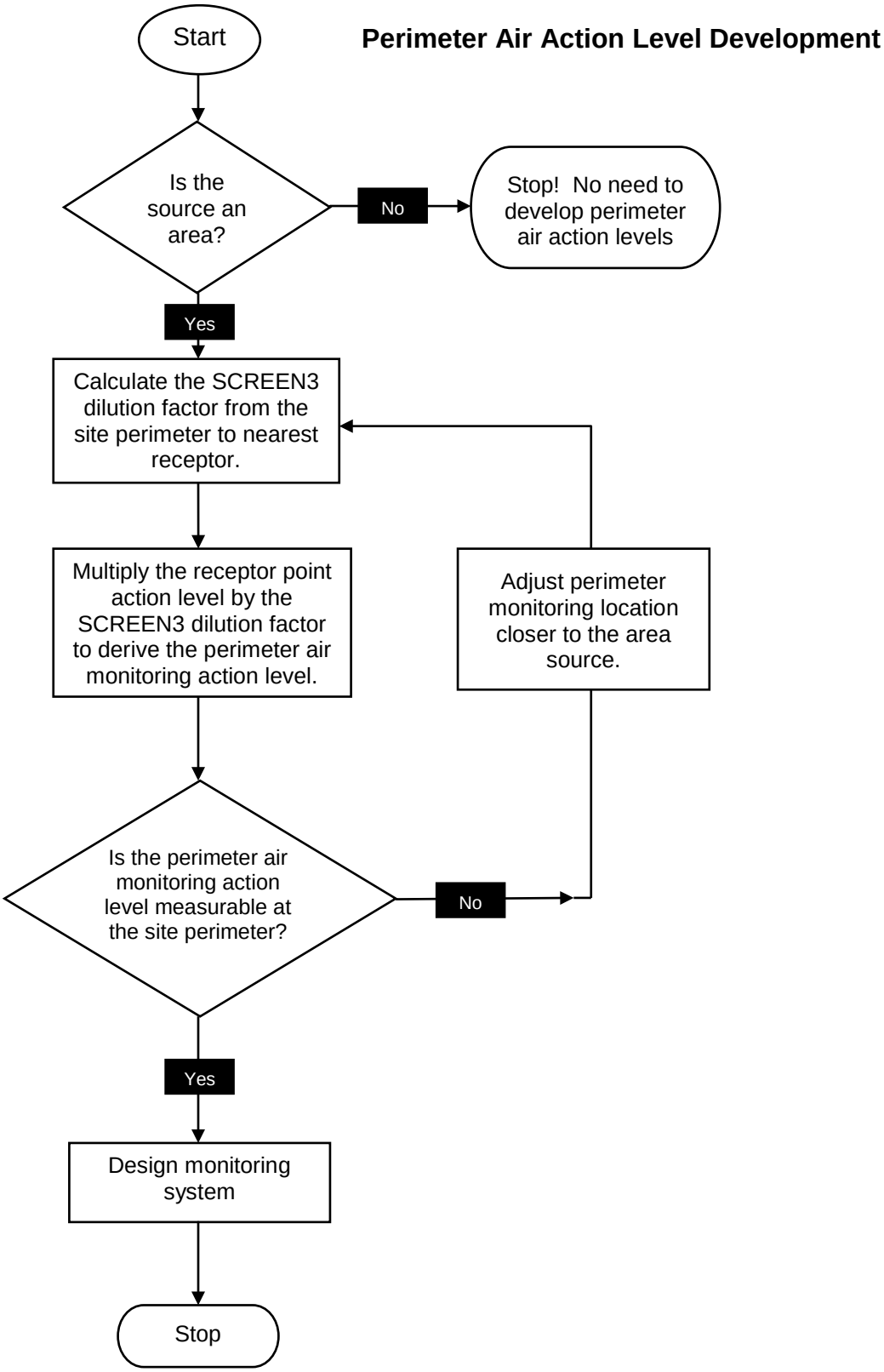

Figure B-1. Action Level Development Flow Chart