Georgia Department of Natural Resources

Environmental Protection Division
Land Protection Branch
Underground Storage Tank Management Program
4244 International Parkway, Suite 100
Atlanta, Georgia 30354
Phone (404) 362-2687
FAX (404) 362-2654

CORRECTIVE ACTION PLAN
PART B

Facility Name: _____

Street Address: _____

City: _____ County: _____

Facility ID: _____

Submitted by UST Owner/Operator:

Name: _____

Company: _____

Address: _____

_____

City: _____ State: _____

Zip Code: _____

Prepared by:

Name: _____

Company: _____

Address: _____

_____

City: _____ State: _____

Zip Code: _____

I. PLAN CERTIFICATION:

A. UST Owner/Operator:

I hereby certify that the information contained in this plan and in all the attachments is true, accurate, and complete, and the plan satisfies all criteria and requirements of Rule 391-3-15-.09 of the Georgia Rules for Underground Storage Tank Management.

Name: _____

Signature: _____ Date: _____

B. Professional Engineer or Professional Geologist (same person listed under "Prepared by", above:

Name: _____

Signature: _____

Date: _____

_____

Georgia Stamp or Seal

Check all boxes below that apply. Attach supporting documentation, i.e., narrative, figures, tables, maps, boring/well logs, etc., for all items checked. Supporting documentation should be three-hole punched and prepared in conformity with the guidance document "Underground Storage Tank (UST) Release: Corrective Action Plan - Part B (CAP-B) Content", GUST-7B.

II. SITE INVESTIGATION REPORT:

A. Local and Site Hydrogeology:

G Documentation of Local Groundwater Conditions

G Stratigraphic Boring Logs

G Stratigraphic Cross Sections

G Referenced or Documented Calculations of Relevant Aquifer Parameters

G Direction of Groundwater Flow:

G Table of Monitoring Well Data

G Potentiometric Map

G Flow Net Superimposed on a Base map

B. Extent of Contamination:

G Soil **G** Groundwater **G** Free product **G** Surface water

III. REMEDIAL ACTION PLAN:

A. Corrective Action Completed or In-Progress:

G Recovery/Removal of Free Product (Non-aqueous Phase Hydrocarbons)

G Remediation/Treatment of Contaminated Backfill Material & Native Soils

G Other (specify) _____

_____

B. Objectives of Corrective Action:

G Remove Free Product That Exceeds One-Eighth Inch

G Remediate Groundwater Contamination That Exceeds:

G Maximum Contaminant Levels (MCLs)

OR

B. Objectives of Corrective Action (continued):

G In-stream Water Quality Standards

G Remediate Soil Contamination That Exceeds:

G Threshold Values Listed In Table A

OR

G Threshold Values Listed In Table B

OR

G Alternate Threshold Levels (ATLs) (Reference CAP A App. I)

G Provide Risk-Based Corrective Action (Reference CAP B App. I)

G Remediate Soil and/or Groundwater Contamination That Exceeds Alternate Concentration Limits (ACLs) and Monitor Residual Contaminants

OR

G Monitor Soil and/or Groundwater Contamination That Exceeds Levels In Rule -.09(3) But Is Less Than ACLs

C. Design and Operation of Corrective Action Systems:

G Soil **G** Groundwater **G** Free Product **G** Surface Water

D. Implementation:

Includes, as a minimum, the following:

< Milestone schedule for site remediation

< Inspection and preventive maintenance schedule for all specialized remediation equipment

< Monitoring/sampling and reporting plan for measuring interim progress and project completion

< Plan to decommission equipment/wells and close site

IV. PUBLIC NOTICE:

G Certified Letters to Adjacent, and Potentially Affected Property

Owners and Local Officials

G Legal Notice in Newspaper, as approved by EPD

G Other EPD-approved Method (specify) _____

V. CLAIM FOR REIMBURSEMENT (For GUST Trust Fund sites only)

G GUST Trust Fund Application (GUST-36), must be attached if applicable

G Cost Proposal

G Non-Reimbursable Costs

OR

G Reimbursable Costs

G Total Project Costs

G Costs incurred to date, per GUST-92

G Estimated costs to complete corrective action, per GUST-92

G Invoices and Proofs-of-Payment For Costs Incurred To Date

G Proposed Schedule For Reimbursement

G Lump Sum Payment Upon Completion Of Corrective Action

OR

G Interim Payments With Final Payment Upon Completion

Georgia Department of Natural Resources

205 Butler Street, S.E., Floyd Towers East, Atlanta, Georgia 30334
Joe D. Tanner, Commissioner
Harold F. Reheis, Director
Environmental Protection Division

GUIDANCE DOCUMENT

UNDERGROUND STORAGE TANK RELEASE: CORRECTIVE ACTION PLAN (CAP) PART B

GENERAL: A Corrective Action Plan-Part B (CAP Part-B) is required if petroleum contaminants present in the soil and/or groundwater exceed one or more of the thresholds as established in GUST Rule 391-3-15.09(3). For sites requiring corrective action, i.e., soil and/or groundwater cleanup, the complexity of the Corrective Action Plan-Part B depends upon the corrective action objectives, per GUST Rule 391-3-15.09(4). CAP-Part B must be submitted to EPD no later than the date projected in CAP-Part A.

ORGANIZATION: All attachments to CAP-Part B must be organized and contain the information described in this guidance document. CAP-Part B should be submitted with pages three-hole punched. Tables, figures, data summaries, etc., should be separated from the general text for clarity. If applicable, submit the Cost Proposal, GUST Trust Fund Application, claim for reimbursement and any additional information required for the claim for reimbursement, if applicable, simultaneously with CAP-Part B, as a separate volume. Reference should be made to CAP-Part A by section and page number, as necessary.

I. PLAN CERTIFICATION:

A. UST Owner/Operator: The Corrective Action Plan-Part B must include the following certification (verbatim) signed by the owner or operator.

Corrective Action Plan (CAP) Certification - Part B

I hereby certify that the information, contained in this plan and all attachments, is true, accurate, and complete, and the plan satisfies all the criteria and requirements of Rule 391-3-15-.09 of the Rules for Underground Storage Tank Management.

_____ _____

Printed Name (Owner/Operator) *Signature (Owner/Operator)*

B. Professional Engineer or Professional Geologist. The Corrective Action Plan-Part B must bear the stamp or seal of a Professional Geologist or a Professional Engineer registered in Georgia, who directed the development of the plan.

II. SITE INVESTIGATION REPORT:

A. Local and Site Hydrogeology: This section serves to record local and site-specific groundwater and geologic characteristics, as determined by the implementation of the approved Site Investigation Plan (SIP) from CAP-Part A.

1. Documentation of Local Groundwater Conditions: Information pertaining to local groundwater conditions must be provided, including usage (i.e., public, industrial, private domestic, irrigation, etc.) and identification of the supplying aquifer(s), recharge area(s), and potential discharge to surface waters.

2. Stratigraphic Boring Logs: Stratigraphic logs of all boreholes must be provided using a standard classification system and/or any other borehole geophysical methods.

3. Stratigraphic Cross Sections: A minimum of two stratigraphic cross sections per contaminant plume must be provided and identified on a base map. Preferred orientation of a cross section pair is hydraulically down-gradient and perpendicular to the hydraulic gradient. Boreholes completed as monitoring wells are preferred so as to identify static water table conditions on each cross section.

4. Referenced or Documented Calculations: Utilizing documented references and/or aquifer tests, evaluate and calculate all relevant aquifer parameters, including but not limited to: hydraulic conductivity, hydraulic gradient, and effective porosity. All supporting data, measurement locations and calculations must be submitted with the reported results (refer to Guidance Document, CAP-Part A, Section III.B).

5. Direction of Groundwater Flow:

   (a) Document in a tabular format, pertinent information for each monitoring or observation well, including but not limited to: date and static water level measurement collected, depth of screened interval, top of casing and land surface elevation, resulting groundwater elevation, free product thickness, and corrected groundwater elevation, as needed, to compensate for free product thickness.

   (b) Provide a separate potentiometric map* for each hydraulic unit and sampling event, dated and referenced to a common datum. Provide additional potentiometric maps, as needed, to include new wells in the monitoring network and/or to demonstrate

seasonal variations identified with periodic sampling events.

(c) Provide a flow net superimposed on a base map, showing contours of equipotential lines** and selected flowlines which exhibit the direction(s) of groundwater flow. Static water level measurements used in flow net construction must be indicated on the potentiometric map.

*Potentiometric map: a groundwater elevation map which is a graphical representation of a groundwater flow gradient and can be prepared by plotting groundwater elevation measurements on a base map and then drawing contours

**Equipotential lines: lines drawn between locations of equal groundwater elevation or equal pressure to identify groundwater elevation trends based on site-specific measurements

B. Extent of Contamination: This section serves to record the results of the site investigation, as proposed in CAP-Part A, and to illustrate the full extent of soil and groundwater contamination from the release **up to and including non-detect laboratory results**. If additional sampling occurs subsequent to the Site Investigation Plan review meeting new sample locations must be identified on a site map, which must be included as part of CAP-Part B.

1. Delineation of Soil Contamination: Horizontal and vertical extent of soil contamination must be identified for each BTEX and PAH constituent until laboratory test results indicate contaminant concentrations are non-detectable, including soil samples at and below the groundwater table. Horizontal and vertical components of subsurface soil contamination must be displayed on site maps and cross sections. All analytical data must be summarized in a tabular format in units of mg/kg. All supporting laboratory data must be provided.

   (a) The maximum soil contaminant concentrations for each sampling location must be depicted on a site map and cross sections with a reference to the sample's depth. Multiple soil contamination maps may be necessary.

   (b) Field screening devices should be utilized to determine which samples should be submitted to the laboratory.

2. Delineation of Groundwater Contamination: Horizontal and vertical extent of groundwater contamination must be identified for each BTEX and PAH constituent until laboratory test results indicate contaminant concentrations are non-detectable. The horizontal and vertical components of groundwater contamination must be displayed on site maps and cross sections. All analytical data must be summarized in a tabular format in units of µg/l. All supporting laboratory data must be provided.

(a) The horizontal extent of groundwater contamination must be identified for each BTEX/PAH constituent. Isoconcentration contours of each constituent (BTEX/PAH) must be noted for each sampling location and plotted on a site map. Provide a separate concentration map for each sampling event.

(b) The vertical extent of groundwater contamination must be identified with individual BTEX/PAH concentrations referenced to cross sections as described in Section II.A.3.

3. Delineation of Free Product Plume:

(a) The horizontal extent of free product must be superimposed on a site map within the areal dissolved plume as described above in Section II.B.2.(a). Free product thickness (including a sheen) in contact with the groundwater table must also be plotted on site maps.

(b) The vertical extent of free product must also be depicted on cross sections as described in Section II.A.3.

4. Delineation of Surface Water Contamination: Water sample analysis of BTEX/PAHs must be provided for any surface water body that intersects the dissolved contaminant plume. Surface water sample analysis must be included in the laboratory data tables. The sampling location(s) and concentration(s) must be plotted on a site map. The surface water concentration map may be combined with a groundwater concentration map if the surface water sampling date coincides with the groundwater sampling date.

NOTE: All determinations of petroleum contaminants in soil or water must be performed in conformity with Test Methods for Evaluating Solid Waste (United States Environmental Protection Agency, Office of Solid Waste and Emergency Response, SW-846, Third Edition, as revised) or with an alternate method, as approved by EPD.

III. REMEDIAL ACTION PLAN:

A. Corrective Action Completed or In Progress: The purpose of this section is to describe self-initiated cleanup measures begun or already completed, subsequent to CAP-Part A submittal, to minimize environmental contamination and/or to promote more effective cleanup. This section is limited to a discussion of the actions taken in an effort to remove the source of contamination **after the release has been confirmed**.

1. Recovery/Removal of Free Product: Free product recovery activities must be described in this section. Report actions taken to recover the maximum amount of free product, and those taken to minimize the spread of contamination into previously uncontaminated areas. Provide a site map and tabulated history of free product recovery, including, but not limited to: the location, thickness, groundwater elevation and corrected elevation for free product, dates of measurement and removal (with manifests of disposal). In addition, propose a plan for continued free product recovery which includes the method and frequency of removal. The method of continual removal must be appropriate for the site's hydrogeologic conditions and must be in compliance with all applicable local, state, and federal regulations. If manual bailing and/or passive skimming have been used, an explanation and determination of the efficiency of such a removal system may be required for prolonged use. If free product is identified at any point of the site investigation or corrective action, record measurements in inches and begin immediate removal of free product exceeding one-eighth inch in thickness.

2. Remediation/Treatment of Contaminated Backfill Material and Native Soils: Excavation or other form of remediation of contaminated material must be described in this section, including, but not limited to: remediation methods, the volume of material remediated, and destination of remediated/excavated soils. Accomplish off-site treatment/disposal of soils in accordance with the Disposal of Petroleum Contaminated Soils at Landfills Guidance Document, GUST #39-A. Manifests for soil disposition must be submitted. To document satisfactory remediation of contaminated soil by over-excavation submit the laboratory analytical results of confirmatory sampling (one composite sample per approximately 100 square feet of surface area) in the sides and bottom of the excavation(s). To document proper disposition of contaminated soils, collect and analyze one composite sample per approximately 100 cubic yards of excavated soil and submit the laboratory analytical results. Depict the area of remediated soil on a base map and show the location and concentrations of confirmatory samples.

B. Objectives of Corrective Action: This section states the goals and expected results of corrective action, including target concentrations for soil and/or groundwater as described in Rule 391-3-15-.09(4). The proposed objectives of corrective action must explain clearly and concisely how they will satisfy EPD corrective action objectives or how the proposed Alternate Concentration Limits (ACLs) will be protective of human health and the environment. One or more of the following corrective action objectives for contaminated soil and groundwater must be proposed and become effective upon EPD approval:

1. Remove Free Product That Exceeds One-Eighth Inch:

The presence of free product, including a sheen, must be reported. Free product recovery must begin immediately and continue until all free product exceeding 1/8 inch in thickness has been removed.

2. Remediate Groundwater Contamination That Exceeds:

   (a) Maximum Contaminant Limits (MCLs)

   (b) In-stream Water Quality Standards

3. Remediate Soil Contamination That Exceeds:

   (a) Threshold Values Listed in Table A

   (b) Threshold Values Listed in Table B

   (c) Alternate Threshold Levels (ATLs) as approved in CAP-Part A

4. Provide Risk-based Corrective Action : To assess the risk that soil and/or groundwater contamination may pose to potential receptors, document and explain the calculations used to determine ACLs in accordance with Rule 391-3-15.09(4)(d). The use of proposed ACLs is subject to EPD approval.

   (a) Potential Receptor Survey: All potential receptors must be identified, such as points of withdrawal for water supply, downgradient surface water bodies, underground utilities (including sanitary and storm sewers), basements, etc. A surrounding land-use map must be provided depicting the land usage in the area of the site. The location of all potential receptors must be depicted on the base map, surrounding land use map, and/or a topographic map, as appropriate. All maps must be to scale and include a scale line and north arrow.

   (b) Fate and Transport Model: Fate and transport modeling must be utilized to estimate the predicted impact to each receptor from the soil and/or groundwater contaminant plume(s). The fate and transport modeling must be performed in accordance with the guidelines provided in Appendix I.

   (c) Conclusions and Recommendations: A concluding summary must be provided to document the activities completed and data collected to substantiate a recommendation to either:

      (i) Meet EPD corrective action objectives in order to protect human health and the environment, including drinking

water MCLs, in-stream water quality standards, and/or threshold levels for soil contamination as indicated on Table A or Table B (see Rule 391-3-15-.09 (3)).

OR

(ii) Remediate soil and/or groundwater contamination that exceeds ACLs and monitor residual contaminants.

OR

(iii) Monitor soil and/or groundwater contamination that exceeds levels in Rule 391-3-15-.09(3) but is less than ACLs.

C. Design and Operation of Corrective Action System(s): The purpose of this section is to present the **planned design and operation** of the corrective action system(s) proposed to remediate contaminated soil and/or groundwater. It is a narrative supported by flowsheets, figures, specifications, etc.

1. EPD will review this section and make a determination of whether the proposed system is likely to achieve the stated objectives. Provide actual data to support the determination that a particular remediation system will be effective. However, this section should **not** include plans or specifications in the degree of detail required for shop fabrication or field construction. A system's effectiveness is based on its ability to meet the stated corrective action objectives within a reasonable time frame; such as, six to twelve months for soils only remediation and eighteen to twenty-four months for groundwater remediation.

   (a) Include a narrative describing the theory behind the selection of the corrective action system. The narrative should include an evaluation of the feasibility of the corrective action in relation to the contaminant to be remediated, depth of contamination and groundwater, geologic site conditions and limitations, etc. Include all results and documentation of pilot tests conducted to evaluate the feasibility of the remediation system, as set forth in the guidelines for CAP-Part A.

   (b) Superimpose on all figures the radius of influence for all applicable remedial systems, i.e., vapor extraction and groundwater recovery, in relation to the respective contaminant plumes. This should account for the effects any existing preferential pathways would have on the zones of influence.

2. Approval for any discharges to the air, surface water, or groundwater that are created by operation of the corrective action system should be

coordinated by the Underground Storage Tank Management Program. Contact EPD prior to selecting corrective action alternatives in order to determine if emission controls are required and to facilitate the timely issuance of consent agreements and permits, as appropriate.

NOTE: For corrective action systems requiring Injection Well Operating Permits, or other required EPD permits, a completed permit application must be submitted as part of CAP-Part B for processing by EPD. Approval for any wastewater discharges to public sewers must be coordinated by local wastewater treatment authorities.

D. Implementation: Include the following items in each CAP-Part B in this section or in an appendix:

1. A milestone schedule listing the major events and a timetable to initiate and/or complete corrective action.

2. The proposed format of quarterly (or other EPD approved time frame) progress reports to be submitted to EPD as a part of CAP-Part B. Progress reports include, but are not limited to, an evaluation of the effectiveness of the corrective action, any proposal for changes to the remediation system to obtain optimal operating conditions, a progress summary and conclusions.

3. The proposed format, content, and due date for the completion report to be submitted to EPD after corrective action objectives are satisfied. A final completion report is required within 30 days of completing all corrective action specified in the CAP-Part B. This completion report must include the following certification (verbatim) completed and signed by the owner or operator.

Certificate of Completion

I hereby certify that the Corrective Action Plan-Part B, dated_____, 19__, for (facility name)_____, Facility ID#:_____, including any and all certified amendments thereto, has been implemented in accordance with the schedules, specifications, sampling programs, and conditions contained therein, and that the plan's stated objectives have been met.

_____

Signature (Owner/Operator)

4. A scheduled inspection and preventive maintenance program for all specialized remediation equipment, installed or portable, to verify

correct operation and to minimize down time.

5. A specific plan for periodic monitoring to detect changes in groundwater movement, plume geometry, and characteristics; and to assess site response to drawdown, effluent reinjection, etc.

6. A specific method to periodically evaluate the effectiveness of each corrective action system (e.g., free product removal, groundwater remediation, in-situ soil cleanup, etc.) in meeting its objectives.

7. A confirmatory sampling plan, if applicable, to verify that complete remediation of contaminated soils has occurred for excavated and in-situ remediation. Show the location and ID number of specific sampling points in the sides and bottom of the excavation(s) on a figure to confirm in-situ remediation. Include at least one (1) sample taken in the areas of highest contamination.

8. A specific protocol for sampling and testing stockpiled bulk soils to classify them for treatment, disposal or reuse as fill material, if applicable.

9. In the case of "monitor only" corrective action for contaminated groundwater, a scenario outlining documentable conditions when EPD will be requested to approve termination of monitoring and how EPD will be notified if proposed criteria trigger a requirement to initiate cleanup.

10. A list of steps that will be taken to remove and dispose of on-site equipment and to properly close monitoring wells, sumps, recovery wells, etc., upon completion of corrective action activities.

NOTE: Where laboratory testing is required to satisfy one of the items listed above, the test method(s) should be specified as well.

E. **Public Notice:** Public notification must be by certified mail (return receipt requested) unless another form of notice, which satisfactorily demonstrates compliance with the intent of public participation, such as a newspaper announcement, **is approved by EPD**.

1. Complete public notice no sooner than 60 days and no later than 30 days prior to forwarding a properly certified CAP-Part B to EPD for review.

2. Notify the following members of the public by certified mail that a CAP-Part B is being prepared:

   (a) The property owner of the UST site, if not the CAP-Part B proponent.

(b) All owners of property contiguous to the UST site, including local, county or state officials responsible for public rights-of-ways.

(c) Other property owners whose property is potentially affected by the release and/or the proposed CAP-Part B.

(d) The elected head of the municipal or county government where the UST site is located.

3. Send the notice to each property owner to the owner of record for tax purposes as shown in the local property tax records.

4. Prepare the information content of the notice to conform with the attached sample notice. Additional information may be included at the discretion of the CAP-Part B proponent.

5. Provide the following supporting documentation in this section of the CAP-Part B:

(a) A property tax map keyed to identify the UST site and the ownership of each parcel included in the public notification.

(b) A copy of each notification letter; attach a copy (both sides) of the return receipt.

V. CLAIM FOR REIMBURSEMENT (CAP Part-B): GEORGIA UNDERGROUND STORAGE TANK (GUST) TRUST FUND: The claim for reimbursement section is included as a separate volume to CAP-Part B if the UST owner or operator is filing a claim for reimbursement of reasonable and eligible cleanup costs. This section may contain the GUST Trust Fund Application and Cost Proposal.

A. GUST Trust Fund Application: A completed application (GUST-36) must be submitted with CAP-Part B, **unless previously submitted with CAP-Part-A.** Eligibility for GUST Trust Fund coverage is based on payments of Environmental Assurance Fees (EAFs) and satisfactory compliance evaluations of the USTs with the GUST Rules, as set forth in CAP-Part A. The UST owner or operator **must** state in the CAP-Part B transmittal letter if submission of the CAP-Part B also constitutes a claim for reimbursement in accordance with paragraph 391-3-15-.13 (1)(e)2. of the GUST Rules.

B. Cost Proposal: The information listed below must be included in this section, or volume to support the claim. Furnish this information to EPD with pages three-hole punched:

1. Non-Reimbursable Costs: Costs incurred prior to release confirmation are not eligible for reimbursement and can not be applied towards the $10,000 deductible. Costs not related to corrective action tasks are

also not covered by the GUST Trust Fund. Non-reimbursable costs are outlined in the GUST-59 guidance document for GUST Trust Fund reimbursable and non-reimbursable costs.

2. Reimbursable Costs: Costs reimbursable from the GUST Trust Fund are for tasks directly associated with release response and corrective action related to a confirmed release. Tasks completed and anticipated must be outlined individually showing the costs incurred to date as well as those estimated. Reimbursable costs are outlined in the GUST-59 guidance document for GUST Trust Fund reimbursable and non-reimbursable costs.

   (a) Copies of paid invoices, or other documentation acceptable to EPD, to demonstrate that the Environmental Assurance Fee was paid on each gallon of petroleum product purchased after July 1, 1988, for storage at the location where the leak occurred, **unless previously submitted in CAP-Part A**.

   (b) Copies of paid invoices, or other records acceptable to EPD, with adequate proof-of-payment documentation on the GUST-92 form (or in the GUST 92 format), to certify expenses incurred by the UST owner or operator, **since** CAP-Part A, that qualify as reasonable and eligible corrective action costs for reimbursement, excluding the initial $10,000 deductible and costs covered in CAP-Part A. Invoice amounts and associated corrective action tasks must be summarized on such forms as provided by EPD (GUST-92).

   (c) An estimate of the **total projected costs** of corrective action for completion of CAP-Part B. The estimated costs must be subdivided into these descriptive headings, as applicable: corrective action plan; soil remediation; free product removal; remediation of dissolved contaminants in groundwater; long term operating costs associated with remediation; and decommissioning of equipment.

   Where total project costs exceed $100,000, present a comparison of costs with at least two alternative remediation technologies as alternatives to over-excavation and landfilling, or as alternatives to standard pump-and-treat systems. Include a narrative justifying the selection of the remedial design/system chosen, based on considerations balancing overall environmental protection and economic effectiveness.

   (d) Payment for approved and eligible reimbursements will be made after receipt of a property certified Application For Reimbursement, GUST-4A, has been received.

C. Proposed Schedule For Reimbursement: A schedule must be submitted of planned reimbursement application submittals, including the total number of interim applications for reimbursement, if interim reimbursements are desired. This schedule should not propose reimbursements for long-term operation and maintenance costs or monitoring costs more frequently than quarterly. If this schedule is not proposed, only one final lump sum reimbursement will be processed at the end of the cleanup project.

SAMPLE

Public Notification Letter

I. M. Tankowner Company Letterhead

Date

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

U. R. Landowner
123 Main Street
Anywhere, Georgia 09876

SUBJECT: Notification of Corrective Action Plan-Part B
Underground Storage Tank Release:
I. M. Tankowner Store No. 3
135 Main Street
Anywhere, GA; Some County
Facility ID:

Dear Ms. Landowner:

This is to inform you that the Georgia Environmental Protection Division has required the I. M. Tankowner Company to prepare a plan to remediate contamination of soil and/or groundwater caused by a release from underground storage tanks at the subject location. This plan will be submitted to the Georgia Environmental Protection Division for review on or before _____, 199__.

The Georgia Rules for Underground Storage Tank Management require that we notify members of the public most directly affected by our plans. As the owner of property near the release site, you may be one of these persons.

If you want a **copy** of the plan to examine, please contact **[*personal contact for corrective action plan proponent*]** at **[*telephone number with area code for contact*]**; a copy will be mailed promptly at a nominal fee. Or you may review the public display copy at **[*name of local public facility(e.g., library, city hall), address and phone number].***

If you desire to make **comments** on our plan, or to examine the Georgia Environmental Protection Division's files, you should contact the Corrective Action Unit, Underground Storage Tank Management Program, Environmental Protection Division, at (404)362-2687. The Underground Storage Tank Management Program will accept comments on this plan until [*specific date at least 30 days after corrective action plan submittal].* Their mailing address is:

Underground Storage Tank Management Program
4244 International Parkway
Suite 100
Atlanta, Georgia 30354.

Should you have questions of I. M. Tankowner Company, please contact the undersigned at (XXX) XXX-XXXX.

Sincerely,

I. M. Tankowner
President

IMT:
cc: Georgia EPD, USTMP

APPENDIX I

CAP PART B

RISK OF EXPOSURE ASSESSMENT GUIDELINES

I. POTENTIAL RECEPTOR SURVEY

Since the primary points of human exposure to petroleum contaminants from underground storage tanks include contact with contaminated drinking water, surface water, inhalation of vapors, or direct dermal contact with free-phase petroleum product, the potential receptor survey must consider all possible pathways to these potential points of exposure. In addition to considering human exposure, the potential receptor survey must include possible points of exposure to domestic animal and wildlife. In order to accomplish this goal, the following guidelines are to be followed:

A. Conduct a thorough search for private water-supply wells in addition to gathering published information regarding private water supply well locations. Drive throughout the radii of concern for non-public water supplies and look for well houses, spigots detached from buildings, and an absence of water meters or fire hydrants. However, the presence of water meters in an area does not preclude the presence of private water-supply wells.

B. Search for surface water bodies where United States Geologic Survey (USGS) topographic quadrangle contours suggest a possible drainage pathway. Many existing streams are not depicted on these maps. Drainage paths should be field-verified.

C. Gather field data and information from the public utilities regarding the location and depth of utilities. Of particular concern, due to their depth, are storm and sanitary sewers which may serve as preferential pathways for contaminant migration inside the surrounding trench gravels or within the sewers themselves.

D. Examine all adjacent buildings for basements which may become impacted by vapors from the contaminant plume. Be aware that some fast-food restaurants utilize basements for inexpensive storage space in areas where basements are atypical.

E. Inquire about the planned future use of the subject site. Should excavation be planned during future construction, human exposure to contaminants during construction must be considered.

F. Show the surrounding land use and potential points of exposure on a scaled map including all surface water bodies within a half-mile radius and points of withdrawal within the radii of concern for non-public water supplies.

II. GROUND-WATER TRANSPORT OF DISSOLVED CONSTITUENTS

CONSIDERATIONS FOR RISK-OF-EXPOSURE ASSESSMENTS & COMPUTER MODELING GUIDELINES

A. Model Selection for Transport of Dissolved Constituents

1. One-dimensional (1-D) groundwater transport models should be used only when the potential receptor is approximately downgradient of the source.

2. Two-dimensional (2-D) transport models can be used to predict the effects of transverse dispersion of the contaminant plume (spreading). Because the 2-D models include predictions of plume spreading, they are not as conservative by design as 1-D models. 2-D models should also be used to predict potential impacts due to transverse dispersion, provided that transverse dispersivity is calibrated to the distribution of groundwater contamination at the site. Additionally, 2-D models are appropriate where the contaminant source may lie within or near the radius of influence of a continuously pumping well.

3. 2-D numerical models should not be applied to situations in which heterogeneities of the site, including contaminant distribution, are largely unknown. Should use of a 2-D model become necessary, sufficient data should be gathered regarding heterogeneity, anisotropy, and contaminant distribution in order to obtain meaningful results.

4. 3-D numerical models should only be used if extensive data is available regarding vertical and horizontal heterogeneity, anisotropy, and any vertical gradients.

5. Deterministic models (both 1-D and 2-D) should use reasonable "worst case" conditions for the input parameters. "Worst case" conditions are those input parameter values (gathered from measured and published data) which result in the fastest rate of transport of the highest contaminant concentrations to the potential receptor. Should "worst case" conditions indicate that a potential receptor may be impacted, the type of model used should be changed, or the model be calibrated to historical site data Field-measured values should not be altered during calibration to the extent that they fall outside reasonable ranges for that parameter or expected field-measurement error.

6. One-dimensional models often cannot be calibrated to match historical data. However, the parameter values can be selected so that the contaminant transport rate predicted by the model exceeds the actual observed rate of contaminant transport. This demonstration, combined with verification through monitoring, may be used to show that the predictions of the model are conservative.

7. Probablistic models can be used to re-assess the risk if the results of the deterministic model indicate that the potential receptor will be impacted. Probablistic models use a range of values for each parameter and an assumed statistical distribution of each parameter. The highest input value of each parameter's range should equal the "worst case" input value for that parameter. The lowest value for each parameter should not fall outside the reasonable range indicated by field measurements and/or published, peer-reviewed references.

B. Modeling Guidelines for Dissolved Transport

1. Gather enough field data to adequately model contaminant transport at the site. This data should include at a minimum:

   a. Hydraulic Conductivity through slug or pumping tests (for modeling horizontal transport).

   b. Direction of ground-water flow from measured water-table elevations referenced to a permanent datum.

   c. BTEX/PAHs concentrations in several monitor wells at more than one point in time.

   d. Total Organic Carbon content of the soil at the site from three **uncontaminated** samples. The Total Organic Carbon analytical results must be used to calculate retardation. These samples must also be analyzed for BTEX/PAHs to verify that they are not contaminated.

   e. The invert elevation, referenced to the water-table elevation datum, of any storm or sanitary sewer that traverses or borders the site, or lies downgradient and is likely to be intersected by the contaminant plume.

   f. Aquifer thickness from site-specific borings if a 2-D model with a pumping well or a 3-D model is used.

   g. Any existing boundary conditions, if using a 2-D or 3-D model.

2. Gather enough published data to provide reasonable assumed values for:

   a. Effective Porosity (may also be estimated by measuring the specific yield of the surficial aquifer using a pumping test)

   b. Partitioning coefficients of each contaminant modeled

   c. Equilibrium concentration of each contaminant constituent modeled.

These are dependent on the petroleum contaminant spilled.

3. Use the "one-tenth" rule to estimate longitudinal dispersivity: Dx = one tenth of the transport distance, as recommended by the USEPA.

4. If using a probablistic model, use uniform distributions for probablistic input parameters unless enough information is available to justify an alternate distribution for that parameter.

5. The most mobile constituent of contamination (e.g., benzene), which exceeds the applicable standards (drinking water MCLs or in-stream water quality standards) may be modeled as an indicator of the behavior of the other less mobile constituents which exceed applicable standards. In selecting an indicator constituent, consideration should also be given to the concentration of the contaminant in groundwater in relation to its applicable standard.

6. Start the model simulation at the time the spill occurred. Use the equilibrium concentration of each constituent modeled as the initial concentration, and then calibrate through time to the present concentration distribution. It is preferred that the current contaminant distribution not be used as the initial concentration prior to calibration. It is helpful to check the reasonableness of the model by correlating the initial time of the release calibrated by the model with the known age of the UST system, release history, and other known site data. However, it may not be possible to calibrate one-dimensional models using this method (See II.A.6. above).

7. Calibrate the model using historical concentration data from site monitor wells before extending the simulation time into the future. Use at least two monitor wells downgradient of the spill in the calibrations.

8. Assume a continuous source of contaminant, or assume that a contaminant slug was released over the life of the tank system until the tank was repaired or removed. A shorter release time may be utilized if supported by model calibration results. A non-continuous source may be used to predict contaminant transport if the source (contaminated soil and/or free product) have been removed.

9. If benzene is modeled as the indicator constituent, the transport model must use a biodegradation half-life of benzene greater than one year. If no free product has been observed in the soil or on the water table, and if dissolved concentrations do not indicate probable anaerobic groundwater conditions, a biodegradation half-life of less than two years may be used. However, if free product has been observed in the subsurface at the site, or dissolved concentrations indicate probable anaerobic conditions, a biodegradation half-life of benzene of two years or more must be used. Properly measured dissolved oxygen concentrations in the groundwater across the plume may

be used as an indicator of the biodegradation conditions at the site. The predicted biodegradation rate may be altered during model calibration to match historical data, but must remain within a reasonable range as indicated by peer-reviewed, published research.

10. Identify a downgradient location for groundwater monitoring for model verification by modeling the predicted increased contaminant concentrations at a downgradient point in one to two years. This predicted increase in contaminant concentration at the downgradient monitoring point should be high enough to be observable through laboratory analysis of groundwater samples collected under variable water table conditions.

11. Model and identify the predicted extent of contaminant transport at the point in time that the contaminant plume stabilizes and migration ceases. Identify the time required for plume stabilization.

12. Model and identify the predicted contamination concentrations in the groundwater at each potential receptor at the time of plume stabilization.

13. If the risk assessment concludes that the potential receptors will be impacted above the applicable standards, remediation to prevent such impact must be proposed. Alternate cleanup standards may be proposed if the risk assessment indicates that the potential receptors will not be impacted above applicable cleanup standards if the alternate cleanup standards are achieved. Acceptable methods of achieving alternate cleanup standards may include active remediation and/or intrinsic remediation, depending on the findings of the risk assessment.

C. Model Report Guidelines

1. Provide documentation for all assumed values from published references.

2. Provide documentation for all measured and calculated values; e.g., slug test data analysis, laboratory data, and ground-water levels and elevations.

3. Show all calculations.

4. Show calibration results.

5. Provide model results for several simulations through time.

6. State whether or not the modeled plume reached steady state. If the model results reached steady state, provide the results for that time period.

7. Provide a narrative describing the modeling procedure, including data collection, calibration, and final model runs.

D. Monitoring

1. The contaminant plume must be monitored in order to validate the findings of the risk assessment. This monitoring should be conducted for the period of time required to show that a downgradient monitoring point which was predicted to contain increased contaminant concentrations does not exhibit concentrations greater than those predicted by the model. The proposed period of monitoring must not be less than one year (in order to observe seasonal variations). If the proposed period of monitoring is greater than three years, justification must be provided.

2. Monitoring parameters must include BTEX if the contaminant was gasoline, and BTEX and PAHs if the contaminant was a heavier petroleum distillate (e.g., diesel, kerosene, jet fuel, waste oil). Other parameters, for example, dissolved oxygen, must be monitored to support any claims of aerobic degradation of the contaminant plume.

3. The entire contaminant plume must be monitored to observe changes in the plume geometry, biodegradation effects, and contaminant migration.

Note: The EPD is currently evaluating groundwater transport models and modeling parameters. Upon completion of this study, the guidelines for dissolved contaminant transport modeling may be revised.

II. VADOSE-ZONE TRANSPORT OF PETROLEUM CONSTITUENTS

CONSIDERATIONS FOR RISK-OF-EXPOSURE ASSESSMENTS & COMPUTER MODELING GUIDELINES

A. Model Selection for Transport of Petroleum Constituents in the Vadose Zone

1. One-dimensional models can be used to approximate the predicted impact to the groundwater from contaminated soils. A series of one-dimensional analytical equations is provided in Appendix I of CAP Part A, with the "worst-case" assumptions used by the EPD to calculate the soil threshold values. If the conditions at the subject site differ from the EPD assumptions (e.g., depth to groundwater) the site-specific values may be used in the equations to calculate alternate cleanup standards. This may be attempted before using the more complex and data-intensive models described below. If the modeling results indicate that the soil may provide a source of groundwater contamination above the applicable groundwater standards, one of the models below may be used to account for dispersion and other effects.

2. Two-dimensional (2-D) transport models can be used to predict the effects of transverse dispersion of the contaminant plume (spreading). Because the 2-D models include predictions of plume spreading, they are not as intrinsically conservative as 1-D models.

3. 2-D numerical models should not be applied to situations in which heterogeneities of the site, including contaminant distribution, are largely unknown. Should use of a 2-D model become necessary, enough data should be gathered regarding heterogeneity and contaminant distribution.

4. 3-D numerical models should only be used if extensive data is available regarding vertical and horizontal heterogeneity and contaminant distribution.

5. Deterministic models (both 1-D and 2-D) should use reasonable "worst case" conditions for the input parameters. "Worst case" conditions are those input parameter values (gathered from measured and published data) which result in the fastest rate of transport of the highest contaminant concentrations to the potential receptor. Should "worst case" conditions indicate that groundwater may be impacted above the applicable standards, the type of model used should be changed, or the model be calibrated to historical site data. Field-measured values should not be altered during calibration to the extent that they fall outside reasonable ranges for that parameter or expected field-measurement error.

6. One-dimensional models often cannot be calibrated to match historical data.

7. If the risk assessment concludes that the potential receptors will be impacted

above the applicable standards, remediation to prevent such impact must be proposed. Alternate cleanup standards may be proposed if the risk assessment indicates that the potential receptors will not be impacted above applicable standards if the alternate cleanup standards are achieved. Acceptable methods of achieving alternate cleanup standards may include active remediation and/or intrinsic remediation, depending on the findings of the risk assessment.

B. Model Report Guidelines

1. Provide documentation for all assumed values from published references.

2. Provide documentation for all measured and calculated values; e.g., seive analyses, laboratory data, and infiltration rate data, etc.

3. Show all calculations.

4. Show calibration results.

5. Provide model results for several simulations through time.

6. State whether or not the modeled plume reached steady state. If the model results reached steady state, provide the results for that time period.

7. Provide a narrative describing the modeling procedure, including data collection, calibration, and final model runs.

Note: The EPD is currently evaluating soil/vadose transport models and modeling parameters. Upon completion of this study, the guidelines for modeling contaminant transport through soil may be revised.