Groundwater Exemption (Closures)

Groundwater Exemption Guidance
Table of Contents

Provisional Draft
June 2014

Section:

Note: Blue font indicates information to be covered during 06/2014 Workshops.

Introduction

1.0 Introduction

Statement of Purpose:

This guidance has been drafted by the Nevada Division of Environmental Protection, Bureau of Corrective Actions. Guidance drafted by the BCA is intended to be advisory and is not enforceable by nature. Guidance provides greater detail than regulations or policies on certain methods or approaches that are acceptable to the Division but does not rule out any other method or approach that may be implemented by the regulated community. Because guidance does not contain enforceable provisions, it has not been developed through an administrative rule-making process; however, the Division always welcomes feedback from the public and the regulated community on the content of guidance.

Intent:

The Groundwater Closure Guidance is intended for use by NDEP BCA Staff, consultants, and the regulated community. Information contained in this guidance is provided to facilitate implementation of Corrective Action regulations (NAC 445A.226 through 445A.22755; *Action Levels for Contaminated Sites*) and outline the types of information necessary for NDEP to provide a No Further Action (NFA) determination for releases that have contaminated groundwater. The guidance is not intended to supplant the referenced regulations, rather it is intended to help persons involved in groundwater contaminant cases evaluate the applicability of closure (No Further Action) for individual Corrective Action cases.

Regulatory Authority:

Revisions to the referenced regulations were adopted by the Legislative Commission in August 2009 and codified in March 2012. The revised regulations provide a framework for NDEP oversight of Leaking Underground Storage Tank (UST) cases and non-Leaking UST cases (i.e., Remediation or Corrective Action cases). Individual citations that are primarily involved in the oversight through case closure of groundwater contaminant cases include:

- NAC 445A.22725 Contamination of groundwater: Order by Director for corrective action; request for exemption; exception;
- NAC 445A.22735 Contamination of groundwater: Establishment of action levels;
- NAC 445A.2273 Contamination of groundwater: Plan and schedule for completing corrective action;
- NAC 445A.22745 Contamination of groundwater: Conditions for terminating remediation of a release; monitoring;
- NAC 445A.22691 Assessment of conditions at site of facility: Division may require submission of additional information; and
- NAC 445A.22697 Factors to be considered by Director in determining acceptance of action level or approval of exemption.

It is important for all persons involved with oversight, clean-up, monitoring, and closure of groundwater contaminant cases to be familiar with these regulatory citations as they provided the basis for developing and executing a defensible case closure.

Path to Closure Process

2.0 Path to Closure Process

Pathways to Closure:

There are several possible pathways that can lead to case closure (see Figure 1). Each pathway varies dependent upon conditions at a site or how a case develops. At some sites, the hydrogeologic conditions, contaminant type and distribution, and remediation methods work together to result in groundwater quality restoration over time. In these cases, an NFA determination is provided after site conditions demonstrate that chemicals of potential concern (COPCs) in groundwater are monitored for a minimum of one year following cessation of remediation and are shown to be consistently below the action level.

At other sites, the hydrogeologic conditions, contaminant type, and contaminant distribution throughout impacted environmental media create significant challenges to site restoration. Low hydraulic conductivities, highly heterogeneous Vadose zone and saturated zone soils, the presence of large areas with limited access for remediation (major streets that overly portions of the dissolved plume), and the presence of recalcitrant contaminants can limit the ability to remove or degrade COPCs to concentrations that are below respective action levels. The revised Corrective Action regulations address these cases where some contaminants will remain un-remediated (remain in place) by requiring a demonstration that case closure under these conditions is protective of human health and the environment.

Both of the above described types of cases (those that can secure a "Clean Closure" NFA determination and those that may be provided an "exemption-based" NFA determination) share a common initial path towards closure if Corrective Action is required by NDEP (see Figure 1). Cases that are required to undergo Corrective Action follow a process that includes:

- submittal of a Corrective Action Plan (CAP);
- implementation and optimization of an approved CAP;
- monitoring to evaluate remediation progress;
- receipt of NDEP concurrence to terminate remediation; and
- implementation of additional groundwater monitoring for a minimum of one year to determine post-corrective action concentrations of COPCs throughout the impacted area.

The pathways to closure diverge based upon the results of the post-corrective action monitoring. Cases that successfully demonstrate concentrations of COPCs are below respective action levels are issued an NFA letter that cites the "Clean Closure" conditions [NAC 445A.22725(1)]. Cases that demonstrate residual COPCs are present in groundwater at concentrations of above respective action levels are considered candidates for an exemption-based NFA determination.

NDEP requests the owner/operator provide information to support an exemption from further corrective action if current site conditions suggest the release source has been adequately controlled; the contaminant extent is known; the residual groundwater contaminant plume is stable or shrinking; residual COPCs are not likely to migrate to a receptor or point of compliance at concentrations in excess of respective action levels; and groundwater contaminated by the release is not a source of drinking water. Following receipt of the requested information in sufficient detail for NDEP to concur with each element of the "exemption" [NAC 445A.22725(2)], the owner/operator submits a Request for Exemption from Corrective Action. NDEP issues an "exemption-based" NFA letter that cites "exemption" conditions [NAC 445A.22725(2)] after assuring adequate information has been submitted to support the "exemption-based" NFA determination including copies of the recorded Covenant and recordation receipt if a Covenant is required.

Figure 1 also depicts the pathways to closure for cases where no corrective action was required. These cases may result in a "Clean Closure" NFA determination or an "exemption-based" NFA determination dependent upon the results of groundwater monitoring and adequacy of additional information submitted by the owner/operator. The primary differences between these cases and those described above are that because a CAP was not required, there is no corresponding need to request termination of remediation. Additionally, monitoring of COPC concentrations in groundwater occurs as a function of NDEPs request for additional information [NAC 445A.22691].

Figure 1 additionally depicts the potential for closure through submittal of a Feasibility Study, found acceptable to NDEP, which demonstrates it is not feasible to achieve the remediation standard based upon a review of the available technologies and related prohibitive cost. As noted on the referenced figure, this type of closure is not routinely considered by NDEP and is included here for completeness (i.e., to illustrate where this type of closure would fit in comparison to other pathways to closure). NDEP considers "Clean Closure" or "exemption-based Closure" are possible at most release sites by iterating through several rounds of remediation system optimization; changing remediation methods to focus on residual "hot spots"; implementing targeted sampling and analysis to better understand the distribution of residual COPCs in source areas and throughout the contaminant groundwater plume; and/or use of other methods to better understand the fate of residual contaminants.

Corrective Action Required:

Owners/Operators of sites where groundwater is contaminated by COPCs at elevated concentrations or where other factors (e.g. proximity of receptors, high seepage velocity) cause NDEP to require Corrective Actions will be issued a letter requesting submittal of a CAP [NAC 445A.2273]. The CAP is intended to recommend a viable remediation method that is feasible for use at sites exhibiting conditions (e.g., hydrogeologic conditions, similar contaminants, etc.) similar to those found at the site in question. Additionally, the CAP is to include the following:

- A description of the source area, released COPCs, distribution of COPCs (vertically and horizontally) throughout affected media (Vadose zone soils and saturated soils [groundwater-bearing strata]), and …;
- The remedial action objectives (RAOs), remediation standards, and remediation goals applicable to the proposed remediation method at the site in question;
- A description of the proposed monitoring and data evaluation that will be used to gauge remediation progress;
- An estimated schedule for attaining the RAOs and/or remediation standards/goals; and
- A cost estimate listing the initial capital and operations & monitoring (O&M) costs and costs for each subsequent year necessary to reach the RAOs and/or remediation standards/goals.

NDEP will issue a CAP concurrence letter upon receipt of an approvable plan and any additional information that may be needed to evaluate the efficacy of the proposed Corrective Actions. The CAP is to be implemented within the timeframe outlined in the CAP concurrence letter unless NDEP provides an extension. Owners/Operators are to diligently implement the Corrective Actions as an expeditious response will help limit the contaminant extent and overall project costs.

Monitoring Groundwater and Remediation Progress:

Groundwater Monitoring:

Monitoring of groundwater is an important component of each case and typically extends from the characterization phase, through the remediation phase, and into the post-corrective action phase [NAC 445A.22691]. The frequency of groundwater monitoring, sample collection method (conventional purge, Low-flow sampling, etc.), required analysis, and level of field and laboratory quality control (QC) should be outlined in a site-specific Sampling and Analysis Plan (SAP) which is reviewed and concurred by NDEP. The SAP may take the form of a stand-alone-document or be incorporated within the CAP or other site-related submittals. The SAP should be updated and concurred upon periodically as the monitoring effort evolves to keep pace with changing site conditions and phases of the case.

The need to demonstrate applicability for requesting termination of remediation activities [NAC 445A.22745(1)] should be kept in mind each time the SAP is amended to allow for defensible data to be collected at the correct frequency (i.e., the test of asymptotic conditions requires a minimum of 12 samples collected at a monthly frequency). A demonstration that COPCs in groundwater are consistently below the action level may rely upon quarterly groundwater quality data or a more frequent sample collection and analysis schedule concurred upon by NDEP. The monitoring time frame typically spans a minimum of one year to allow for the evaluation to cover a complete hydrogeologic cycle. Groundwater levels often fluctuate within a seasonal zone that is several feet high (1 – 3 feet is typical) and contaminant mass can be stranded in Vadose Zone soils as water levels drop or be submerged in saturated soils as water levels rise. Either situation can cause the groundwater quality data to fluctuate.

Remediation System Monitoring:

Other monitoring also may be required either as part of the CAP concurrence process or during the remediation phase [NAC 445A.22691]. This monitoring is intended to track the progress of remediation and help the NDEP, Owner/Operator, and involved consultants evaluate whether remediation system optimization or additional remedial measures are needed to meet the RAOs and/or remediation standards/goals in a time and cost efficient manner. The type of remediation system monitoring proposed/required will be dependent upon the type(s) of remedial measures employed and may include influent and effluent monitoring/sampling of extracted vapors, extracted groundwater, airflow rates, system pressures and pressure drops, groundwater pumping/flow rates, temperatures, etc. Equations used for calculations to evaluate the data should be provided in each report and the necessary data (raw data and data resulting from calculations) should be summarized in tabular and graphic means to help chart the mass removal/destruction rate as a function of time.

The monitoring, sample collection methods, required analyses, and level of field and laboratory quality control (QC) should be outlined in a SAP which is reviewed and concurred by NDEP. The SAP should be updated and concurred upon periodically as the monitoring/sampling effort evolves to keep pace with changing site conditions and operational characteristics of the remediation system. A declining trend of mass removal rates should be used to either encourage remediation system optimization, remediation system replacement, or remediation system termination depending upon the results of a review of the performance data and groundwater quality data.

Conditions for Terminating Remediation:

COPCs in Groundwater are Consistently Below Action Level(s):

An owner/operator may petition the NDEP to terminate the remediation if groundwater quality results indicate that COPCs are consistently below the action level. Several consecutive sampling events demonstrating groundwater quality improvements with COPCs below respective action levels are routinely required in order to demonstrating the referenced "consistency". NDEP likely will be looking for 3 or 4 consecutive quarters of groundwater quality data demonstrating the COPCs are remediated to below action levels to understand that the contaminant has been remediated and changing water levels are not likely to cause "rebound" in contaminant concentrations. Hydrographs of the COPCs charted against water level elevations over the life of the project will be requested and reviewed to ensure that current conditions are in the range of historic conditions and expected conditions to enable an informed decision. If water levels appear to have dropped or raised significantly, other methods may be required for the owner/operator to be able to demonstrate that the contaminants have been remediated and are not left stranded in the now thicker Vadose zone or submerged beneath the raised water level.

Monitoring COPCs in Groundwater following Termination of Remediation:

NAC 445A.22745(2) requires owner/operators to monitor the groundwater at release Sites for a minimum of one year following termination of remediation. Groundwater sampling and analysis for COPCs are routinely conducted on a quarterly basis for not less than one year following cessation of remediation activities (see Figure 1). This one year minimum of groundwater monitoring is typically triggered by distribution of a written concurrence letter from the NDEP to cease remediation. The one year minimum post-corrective action monitoring is required for all cases where remediation occurred including cases where monitored natural attenuation (MNA) was the selected and agreed upon remediation method. NDEPs concurrence with the remediation method typically occurs as a written concurrence to a CAP (see prior sub-section on "Corrective Action Required") or CAP addendum although NDEP concurrence can occur for a less formalized document (e.g., A Workplan).

It should be note that NDEP has the discretion to determine the sampling and analysis frequency up to and including monthly should site conditions or project conditions warrant more frequent monitoring.

Additional/Supplemental Information to Support Closure:

The purpose of the one year minimum groundwater monitoring period to understand whether the site conditions following remediation allow for a health-protective closure in conformance with NAC 445A.22725(2); the exemption to further corrective actions designed to improve groundwater quality. The cited exemption requires a submittal of sufficient information by the owner/operator that enables NDEP to understand that:

- The release source has been adequately identified and controlled to limit further groundwater impairment and limit potential future risks to human health;
- The magnitude and extent of groundwater contamination is known;
- Sufficient data are available to permit a plume stability analysis that shows the residual groundwater contaminant plume is stable or shrinking (i.e., does not show a trend of increasing concentrations within the body of the plume;
- Natural attenuation processes will be sufficient to reduce any remaining contaminant concentrations to below respective action levels or prevent the migration of the remaining contaminants to receptors or other points established by the NDEP; and
- The groundwater contaminated by the release currently is not a source of drinking water and is not likely to become a source of drinking water in the future.

It should be recognized that additional calculations of physical or chemical processes (i.e., evidence to support the existing of biodegradation or indications of degradation based upon the presence of daughter products) or other items may be required by the NDEP or considered by the owner/operator to facilitate the closure decision [NAC 445A.22691]. Supplemental information that may be requested by the NDEP or considered by the owner/operator to support the exemption decision-making process may include covenants (use restrictions), risk assessments, soil & water management plans, Geographic Information Systems (GIS) shape files; and/or other submittals. These or other institutional controls may be necessary to demonstrate the risk to human health and the environment is reduced and that protective mechanisms are in place to permit a groundwater exemption determination.

Request for Exemption from Corrective Actions:

The owner/operator may petition the NDEP for an "exemption" either prior to taking any corrective actions (remediation) or following the cessation of remediation via NAC 445A.22745 (see Figure 1). The request (petition) must be accompanied by sufficient supporting information as required by the NDEP (see prior sub-section on Additional/Supplemental Information to Support Closure). A regulatory "Check List" is provided (Table 1) to outline the above described process and help the owner/operator budget time and resources for development, revision, and submittal of the documents necessary to support the closure decision.

Figure 2 *Groundwater Exemption Closure Process* illustrates the types of documents NDEP expects will be submitted by the owner/operator to demonstrate the applicability of an exemption from groundwater remediation or continued corrective actions and the likely timing of those submittals during the one year of post corrective action groundwater monitoring. It is important to initiate discussions w/ the assigned NDEP Case Officer early in the process (immediately before or shortly after terminating remediation with NDEP's concurrence) to help focus the level of effort NDEP expects will be needed to support the closure decision for a case. It also is helpful to budget time and resources to cull through the existing data and information and determine what data gaps exist so these can be addressed (filled) during the one year post corrective action monitoring period.

No Further Action (NFA) Determination citing the Groundwater Exemption:

Although the process remains similar from case to case, the criteria used to evaluate each exemption requests may vary some based upon:

- Site conditions;
- Proximity to receptors;
- Nature of the released contaminant(s);
- Strength of the data set used to support the closure decision;
- Magnitude of the residual contamination under consideration to be "left in place";
- Ability to control potential future human exposures or contaminant migration via durable covenant(s); and
- other factors deemed appropriate by the NDEP.

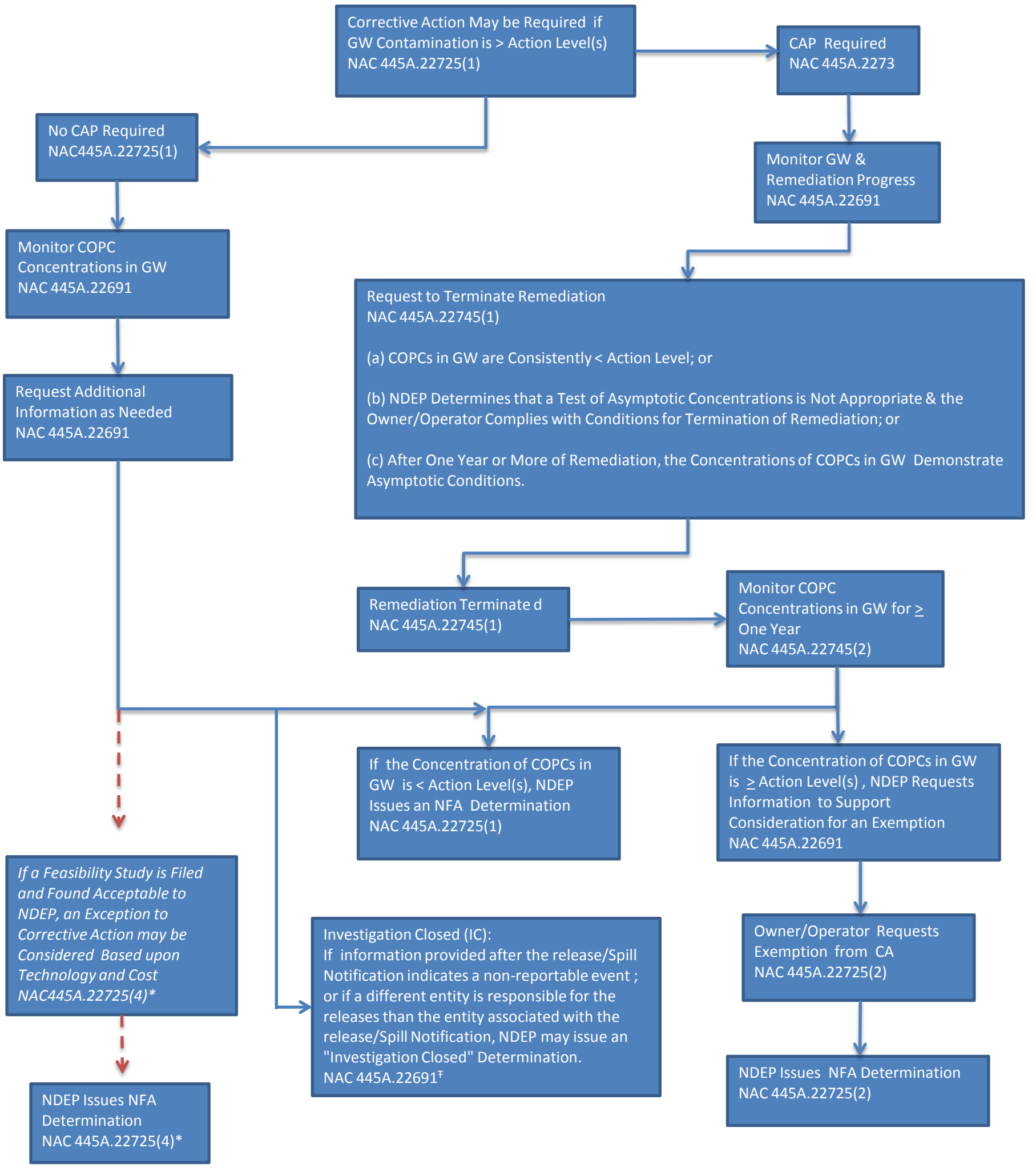
Some of these elements (covenants) require the assistance of an attorney and the Attorney General's Office while other elements (proximity to a water well) may require that additional work be performed to ensure the requested exemption is health protective. Consequently, it is helpful for the owner/operator to consider scheduling periodic project status checks with their Certified Environmental Managers (CEMs) and the NDEP Case Officer to ensure that needed information is being developed; the submittals are adequate for NDEP's needs; the necessary supplemental information is identified and scheduled for timely development and distribution to involved parties; and that the closure process is unfolding as expected. The NDEP expects the owner/operator to be very involved in each case to enable appropriate decisions throughout the characterization though remediation phases. Likewise, the involvement of the owner/operator during the groundwater exemption (closure) process is vital to keep the process on track, on schedule, and properly funded.

The NDEP may grant the exemption request if adequate information is submitted to support the groundwater exemption determination [NAC 445A.22725(2)]. The NFA determination typically follows an internal review process that involves several individuals in addition to the assigned Case Officer. The review process may rely upon the submitted and concurred upon documents, or may additionally involve a presentation of summary information. As with the criteria used to evaluate each exemption request (see above), the need for a presentation of summary information is often dictated by the complexity of the case.

The following sections of this guidance document have been structured to help the owner/operator, CEM, Case Officer, stake holders, and members of the public understand the data and analysis NDEP needs to support the groundwater exemption (closure) decision and the level of effort that owner/operators and CEMs should anticipate when considering submitting an exemption request.

Figure 1
Pathways to Closure
For BCA Cases with Groundwater Contamination

Provisional Draft
June 2014



Explanation:
CAP = Corrective Action Plan
COPC = Chemical of Potential Concern
GW = Groundwater
NAC = Nevada Administrative Code
NFA = No Further Action
IC = Investigation Closed

Ŧ Investigation Closed (IC) is reserved by the NDEP for use on cases opened by a Spill Report (release/Spill Notification) and where either:
(1) later information indicated that a Reportable Quantity (RQ) release or "Confirmed Release" could not be verified; or
(2) where the entity that called in the release is not the responsible party (i.e., not the entity that caused, contributed to, or is responsible for the release).

* Indicates this type of case closure is not routinely considered. It is include here for illustrative purposes and for completeness.

Table 1
Regulatory Check List

NAC 445A.22725 Contamination of groundwater:

- Order by Director for corrective action;
- Request for exemption; and
- Exception.

The following paragraphs focus on the "exemption" not the "exception" elements of the revised regulations (i.e. NAC 445A.22725).

1. Corrective action may be required by the NDEP if contamination is > the Action Level.

2. An exemption may be granted by the NDEP if:

   (a) The following are satisfied:

   (1) Source is identified and controlled;

   (2) Magnitude and extent is known; and

   (3) Data are available from ~ 3 years (or other time frame) and the data do not show a trend of increasing contaminant concentration in the body of the plume.

   (b) A demonstration is made which indicates that natural attenuation is sufficient to:

   (1) Reduce the concentration of contaminants to below action levels; or

   (2) Prevent migration to a receptor / point of compliance.

   (c) The contaminated groundwater is not a source of drinking water because:

   (1) It is impractical to:
   - Recover the water for drinking; or
   - Render the water fit for consumption; or

   (2) A legal restriction or institutional control is in effect concerning use of the groundwater.

3. In addition to the calculations used in the "demonstration" in 2.b above, the demonstration may also rely upon:

   (a) Evidence of biodegradation;

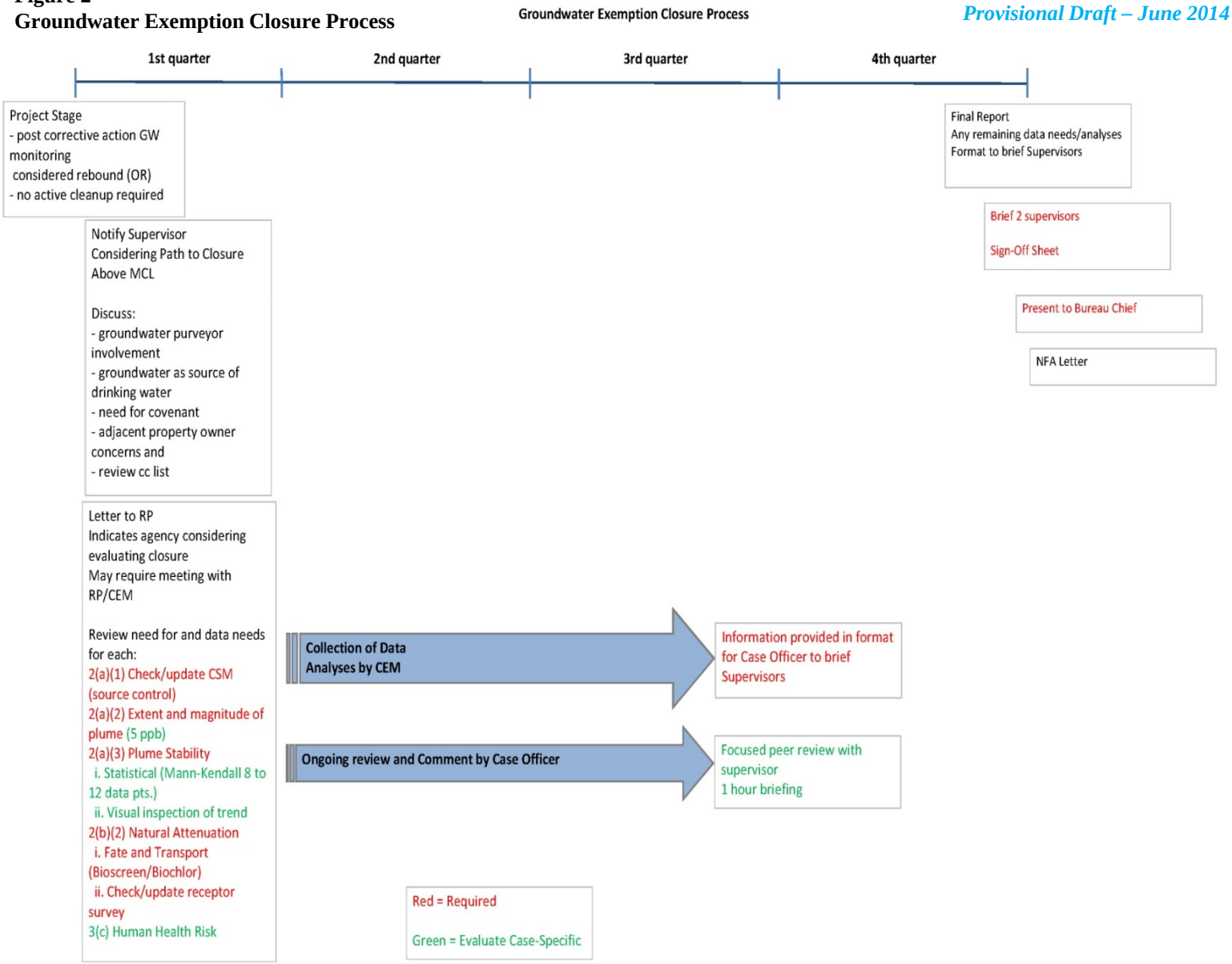
   (b) The presence of daughter products;

   (c) Any other applicable factors specified by the NDEP which are appropriate to make a decision based upon risk (e.g. a risk evaluation or risk assessment).

4. An exception* can be granted by the NDEP if the owner/operator files a study with the NDEP which demonstrates it is not "feasible" to achieve the remediation standard.

Explanation:
* It should be recognized that this type of closure (an exception) is not routinely considered by the NDEP.

Figure 2
Groundwater Exemption Closure Process



Appendix

Action Levels for Contaminated Sites

NAC 445A.226 Definitions. (NRS 445A.425) As used in NAC 445A.226 to 445A.22755, inclusive, unless the context otherwise requires, the words and terms defined in NAC 445A.22605 to 445A.2268, inclusive, have the meanings ascribed to them in those sections.
(Added to NAC by Environmental Comm'n, eff. 10-3-96; A by R189-08, 8-25-2009)

NAC 445A.22605 "Action level" defined. (NRS 445A.425) "Action level" means the level of concentration of a hazardous substance, hazardous waste or a regulated substance in soil, groundwater or surface water that is established pursuant to NAC 445A.2272, 445A.22735 and 445A.2275 and for which corrective action may be required by the Director.
(Added to NAC by Environmental Comm'n, eff. 10-3-96)

NAC 445A.2261 "Administrator" defined. (NRS 445A.425) "Administrator" means the Administrator of the Division.
(Added to NAC by Environmental Comm'n, eff. 10-3-96)

NAC 445A.22615 "Aquifer" defined. (NRS 445A.425) "Aquifer" has the meaning ascribed to it in NAC 445A.812.
(Added to NAC by Environmental Comm'n, eff. 10-3-96)

NAC 445A.2262 "Corrective action" defined. (NRS 445A.425) "Corrective action" means a permanent remedy that an owner or operator is required to take after a release of a hazardous substance, hazardous waste or a regulated substance to prevent the substance or waste from posing a threat or potential threat to public health or the environment.
(Added to NAC by Environment Comm'n, eff. 10-3-96)

NAC 445A.22625 "Director" defined. (NRS 445A.425) "Director" means the Director of the State Department of Conservation and Natural Resources.
(Added to NAC by Environmental Comm'n, eff. 10-3-96)

NAC 445A.2263 "Division" defined. (NRS 445A.425) "Division" means the Division of Environmental Protection of the State Department of Conservation and Natural Resources.
(Added to NAC by Environmental Comm'n, eff. 10-3-96)

NAC 445A.22633 "Environmental covenant" defined. (NRS 445A.425) "Environmental covenant" has the meaning ascribed to it in NRS 445D.060.
(Added to NAC by Environmental Comm'n by R189-08, eff. 8-25-2009)

NAC 445A.22635 "Groundwater" defined. (NRS 445A.425) "Groundwater" has the meaning ascribed to it in NAC 444.579.
(Added to NAC by Environmental Comm'n, eff. 10-3-96)

NAC 445A.2264 "Hazardous substance" defined. (NRS 445A.425) "Hazardous substance" has the meaning ascribed to it in NRS 459.429.
(Added to NAC by Environmental Comm'n, eff. 10-3-96)

NAC 445A.22645 "Hazardous waste" defined. (NRS 445A.425) "Hazardous waste" has the meaning ascribed to it in NAC 444.843.

(Added to NAC by Environmental Comm'n, eff. 10-3-96)

NAC 445A.2265 "Operator" defined. (NRS 445A.425**)** "Operator" means a person in control of or having responsibility for the daily operation of a site, business or other operation where a hazardous substance, hazardous waste or a regulated substance is disposed of, used or stored.
(Added to NAC by Environmental Comm'n, eff. 10-3-96)

NAC 445A.22655 "Owner" defined. (NRS 445A.425**)** "Owner" means a person who owns property where a hazardous substance, hazardous waste or a regulated substance is disposed of, used or stored.
(Added to NAC by Environmental Comm'n, eff. 10-3-96)

NAC 445A.2266 "Person" defined. (NRS 445A.425**)** "Person" has the meaning ascribed to it in NRS 445A.390.
(Added to NAC by Environmental Comm'n, eff. 10-3-96)

NAC 445A.22665 "Regulated substance" defined. (NRS 445A.425**)** "Regulated substance" has the meaning ascribed to it in NRS 459.448.
(Added to NAC by Environmental Comm'n, eff. 10-3-96)

NAC 445A.2267 "Release" defined. (NRS 445A.425**)** "Release" has the meaning ascribed to it in NAC 445A.3456.
(Added to NAC by Environmental Comm'n, eff. 10-3-96; A by R125-07, 1-30-2008)

NAC 445A.22675 "Remediation standard" defined. (NRS 445A.425**)** "Remediation standard" means the level of concentration of a hazardous substance, hazardous material or a regulated substance in soil, groundwater or surface water which corrective action is designed to achieve.
(Added to NAC by Environmental Comm'n, eff. 10-3-96)

NAC 445A.2268 "Surface water" defined. (NRS 439.200**,** 445A.425**)** "Surface water" means all water open to the atmosphere and subject to surface runoff.
(Added to NAC by Environmental Comm'n, eff. 10-3-96; A by Bd. of Health by R088-00, 8-3-2001)

NAC 445A.22685 Applicability. (NRS 445A.425**)** The provisions of NAC 445A.226 to 445A.22755, inclusive, apply to any site, business or other operation where corrective action is required, unless the corrective action is required at:
1. A facility for the treatment, storage or disposal of hazardous waste that is issued a permit pursuant to NRS 459.400 to 459.600, inclusive, and the corrective action is required for any violation of NAC 444.8632.
2. A disposal site, as defined in NRS 444.460, and the corrective action is required pursuant to NAC 444.7481 to 444.7499, inclusive.
(Added to NAC by Environmental Comm'n, eff. 10-3-96; A by R189-08, 8-25-2009)

NAC 445A.2269 Assessment of conditions at site of facility after notification of release of certain substances; exception. (NRS 445A.425**)**

1. Except as otherwise provided in this section, if the owner or operator of a facility, or his or her designated agent, is required to give notice of a release pursuant to NAC 445A.345 to 445A.348, inclusive, the Division shall require the owner or operator to conduct an assessment of the conditions at the site of the facility, including an assessment of the condition of the soil or water, or both, to determine the extent and magnitude of the contamination.
2. An assessment conducted pursuant to subsection 1 must:
(a) Characterize the relevant pathways specifically related to the site that affect public health and the environment, including, without limitation, any information concerning sources of release, pathways and rates of migration of any released substances and any possible receptors of those substances;
(b) Rely upon methods of field sampling and analytical methods used in laboratories, if any, that are acceptable to the Division; and
(c) Be approved by the Division.
3. The Division shall not require an owner or operator to conduct an assessment pursuant to subsection 1 if documentation is submitted to and approved by the Division or if any follow-up reporting is sufficient to demonstrate one or more of the following:
(a) The level of contamination of the soil no longer exceeds the action level established for that soil pursuant to NAC 445A.2272 because of any actions taken by the owner or operator of the facility pursuant to NAC 445A.22695;
(b) The release does not meet the reportable quantities set forth in NAC 445A.345 to 445A.348, inclusive, as originally reported;
(c) The release:
(1) Has not affected any environmental media that are subject to any corrective action pursuant to NAC 445A.226 to 445A.22755, inclusive; and
(2) Has been sufficiently controlled to prevent any future migration to the environmental media; or
(d) The notification was required because of a confirmed release from an underground storage tank and the conditions indicating a confirmed release have not resulted in any contamination of the soil in excess of 3 cubic yards by a regulated substance and that all appropriate actions have been taken to prevent any continued release.
4. The Division may, at any time that is reasonably required to determine if an assessment is required pursuant to subsection 1:
(a) Question the owner or operator concerning any matter relating to the release; or
(b) Require the owner or operator to provide, in writing, any records or other information relating to the release or any damage caused by the release.
(Added to NAC by Environmental Comm'n, eff. 10-3-96; A by R125-07, 1-30-2008; R189-08, 8-25-2009)

NAC 445A.22691 Assessment of conditions at site of facility: Division may require submission of additional information. (NRS 445A.425**)** The Division may require an owner or operator of a facility to submit and carry out a plan and schedule for an additional characterization of a site to collect any information that is not submitted as part of an assessment of the conditions of a site pursuant to NAC 445A.2269 if the information is required to:
1. Evaluate the efficacy of any proposed corrective action;
2. Establish any appropriate action level for soil or groundwater; or
3. Support the issuance of an exemption, waiver or determination that corrective action is not required pursuant to NAC 445A.227 or 445A.22725.

(Added to NAC by Environmental Comm'n by R189-08, eff. 8-25-2009)

NAC 445A.22693 Contamination of soil or groundwater: Management of soil or groundwater. (NRS 445A.425**)** Any soil or groundwater which is contaminated with any amount of a hazardous substance, hazardous waste or a regulated substance and which is removed through a corrective action or an assessment of conditions at a site pursuant to NAC 445A.2269 or 445A.22691 must be managed in a manner approved by the Division.
(Added to NAC by Environmental Comm'n by R189-08, eff. 8-25-2009)

NAC 445A.22695 Immediate action required under certain circumstances; Director may waive certain requirements. (NRS 445A.425**)**
1. An owner or operator shall immediately take any action necessary to mitigate and abate imminent and substantial hazards to public health or safety created by the release of a hazardous substance, hazardous waste or a regulated substance, including, without limitation:
(a) The removal of the hazardous substance, hazardous waste or regulated substance from any leaking container in an amount that is required to prevent any additional release of the hazardous substance, hazardous waste or regulated substance into the environment;
(b) Conducting a visual inspection of any aboveground release or exposed underground release of the hazardous substance, hazardous waste or regulated substance and the prevention of any additional migration of the hazardous substance, hazardous waste or regulated substance into any surrounding soil, groundwater or surface water;
(c) The reduction or elimination of any hazard that is caused or may be caused by any contaminated soil that is excavated or exposed during the confirmation of the release or investigation of the site; and
(d) Initiation of free product removal as soon as practicable and in consultation with the Division.
2. The Director may waive any provision of NAC 445A.226 to 445A.22755, inclusive, other than a provision of NAC 445A.2272, 445A.22735 or 445A.2275, and require an owner or operator to take immediate action after a release of a hazardous substance, hazardous waste or a regulated substance occurs or upon a discovery of any contaminated media specified by the Director if the release or contamination:
(a) Has an actual or imminent effect on groundwater or surface water; or
(b) Is hazardous to public health and safety.
(Added to NAC by Environmental Comm'n, eff. 10-3-96; A by R189-08, 8-25-2009)

NAC 445A.22697 Factors to be considered by Director in determining acceptance of action level or approval of exemption. (NRS 445A.425**)** In determining whether to accept an action level for soil pursuant to NAC 445A.2272 that is based on a scenario for exposure other than a standard residential exposure specified by the Director, or to approve an exemption from corrective action for soil pursuant to NAC 445A.227 or groundwater pursuant to NAC 445A.22725, the Director may consider any activity or limitation on use established by the owner or operator of the facility through an environmental covenant accepted by the Division.
(Added to NAC by Environmental Comm'n by R189-08, eff. 8-25-2009)

NAC 445A.227 Contamination of soil: Order by Director for corrective action; factors Director may consider in determining whether corrective action is required or may be terminated. (NRS 445A.425**)**

1. Except as otherwise provided in subsection 2, the Director shall require an owner or operator to take corrective action if the release of a hazardous substance, hazardous waste or a regulated substance contaminates soil and the level of contamination exceeds the action level established for the soil pursuant to NAC 445A.2272.
2. In determining whether corrective action is required or may be terminated after corrective action has been taken, the Director may consider an evaluation of the conditions at the site which indicate that any contamination remaining at the site does not cause any current or potential threat to human health or the environment. Such an evaluation must use accepted methodologies and calculations which consider, without limitation, the following factors:
(a) The depth of any groundwater;
(b) The distance to irrigation wells or wells for drinking water;
(c) The type of soil that is contaminated;
(d) The annual precipitation;
(e) The type of waste or substance that was released;
(f) The extent of the contamination;
(g) The present and potential use for the land;
(h) The preferred routes of migration;
(i) The location of structures or impediments;
(j) The potential for a hazard related to fire, vapor or an explosion; and
(k) Any other information specifically related to the site which the Director determines is appropriate.
(Added to NAC by Environmental Comm'n, eff. 10-3-96; A by R189-08, 8-25-2009)

NAC 445A.22705 Contamination of soil: Evaluation of site by owner or operator; review of evaluation by Division. (NRS 445A.425)
1. Except as otherwise provided in NAC 445A.22695, if an owner or operator is required to take corrective action pursuant to NAC 445A.227, the owner or operator may conduct an evaluation of the site, based on the risk it poses to public health and the environment, to determine the necessary remediation standards or to establish that corrective action is not necessary. Such an evaluation must be conducted using Method E1739-95, adopted by the American Society for Testing and Materials, as it exists on October 3, 1996, or an equivalent method approved by the Division.
2. The Division shall determine whether an evaluation complies with the requirements of Method E1739-95, or an equivalent method of testing approved by the Division. The Division may reject, require revisions be made to or withdraw its concurrence with the evaluation at any time after the completion of the evaluation for the following reasons:
(a) The evaluation does not comply with the applicable requirements for conducting the evaluation;
(b) Conditions at the site have changed; or
(c) New information or previously unidentified information which would alter the results of the evaluation becomes available and demonstrates that the release may have a detrimental impact on public health or the environment.
3. If the Division rejects, requires revisions be made to or withdraws its concurrence with an evaluation, it shall provide written notice of its determination and the reasons for its determination to the owner or operator. The owner or operator shall:
(a) Submit a revised evaluation to the Division; or
(b) Carry out the corrective action required by the Director.

4. Unless an evaluation is rejected by the Division or returned to the owner or operator for revision, the Director shall consider the results of the evaluation, the level of concentration of the hazardous substance, hazardous waste or regulated substance in the soil, and the points of compliance to be elements of the plan for corrective action.
5. Method E1739-95, adopted by the American Society for Testing and Materials, as it exists on October 3, 1996, is hereby adopted by reference. A copy of the method may be obtained from ASTM International, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428-2959, at a cost of $72.
(Added to NAC by Environmental Comm'n, eff. 10-3-96; A 10-29-97; R189-08, 8-25-2009)

NAC 445A.2271 Contamination of soil: Plan and schedule for completing corrective action. (NRS 445A.425**)** An owner or operator who is required to take corrective action pursuant to NAC 445A.227 shall submit to the Division a plan and schedule for completing the corrective action. Except as otherwise provided in NAC 445A.22695, the owner or operator shall not take any corrective action until the plan and schedule are approved by the Division.
(Added to NAC by Environmental Comm'n, eff. 10-3-96; A by R189-08, 8-25-2009)

NAC 445A.2272 Contamination of soil: Establishment of action levels. (NRS 445A.425**)**
1. For the purposes of NAC 445A.22695 to 445A.2271, inclusive, the action level for soil must be established at the following levels:
(a) The background concentration or volume of a hazardous substance, hazardous waste or a regulated substance set forth in:
(1) The permit issued to the owner or operator by the Division; or
(2) A study approved by the Division.
(b) The presence of a hazardous substance, hazardous waste or a regulated substance in the soil at an appropriate level of concentration that is based on the protection of the waters of the State, public health and safety for all identified routes of exposure and the environment. The appropriate level of concentration must be determined by the Division using the Integrated Risk Information System, adopted by the Environmental Protection Agency, as it existed on October 3, 1996, or any other equivalent method or peer-reviewed source of information chosen by the Division.
2. Except as otherwise provided in this subsection, if more than one action level for soil may be established using the criteria set forth in paragraph (b) of subsection 1, the most restrictive action level must be used. In no case may the action level be more restrictive than the background concentration of the hazardous substance, hazardous waste or regulated substance.
3. The State Environmental Commission hereby adopts by reference the Integrated Risk Information System, adopted by the Environmental Protection Agency, as it existed on October 3, 1996. A copy of the system is available on-line through the Internet and may be obtained from an Integrated Risk Information System Representative at (301) 496-6531, free of charge.
(Added to NAC by Environmental Comm'n, eff. 10-3-96; A by R189-08, 8-25-2009)

NAC 445A.22725 Contamination of groundwater: Order by Director for corrective action; request for exemption; exception. (NRS 445A.425**)**
1. Except as otherwise provided in this section, the Director may require an owner or operator to take corrective action if the release of a hazardous substance, hazardous waste or a regulated substance contaminates groundwater and the level of contamination exceeds the action level established for the groundwater pursuant to NAC 445A.22735.

2. An owner or operator may, before initiating corrective action or after the termination of remediation pursuant to NAC 445A.22745, submit a written request to the Director for an exemption from the provisions of subsection 1. The request must be accompanied by such supporting information as the Director may require. The Director may grant the request if:
(a) The following conditions are satisfied:
(1) Each source of the contamination of the groundwater is identified and controlled or no source of the contamination remains based upon the age and nature of the release;
(2) The magnitude and extent of the contamination of the groundwater is known; and
(3) Data are available from at least 3 years of quarterly monitoring or another period specified by the Division based upon the magnitude of the contamination of the groundwater and the data do not show a trend of increasing concentrations of the contamination in the body of the plume of the contamination;
(b) A demonstration is made which indicates that natural attenuation is sufficient to reduce any concentration of the contamination below action levels or to prevent any migration of the contaminant to a receptor or another point of demonstration established by the Division at concentrations that are greater than action levels, if the demonstration relies upon analytical or numerical models of diffusion and dispersion or any other calculations of physical or chemical processes of retardation or degradation that are approved by the Division; and
(c) The groundwater contaminated by the release is not a source of drinking water and is not likely to be a source of drinking water in the future because:
(1) It is economically or technologically impractical to recover the water for drinking because of the depth or location of the water or render the water fit for human consumption; or
(2) A legal restriction or institutional control is in effect concerning the use of the groundwater based upon the depth of the groundwater, the presence of a municipal system, the use of an environmental covenant or other controls accepted by the Division.
3. In addition to any calculations of physical or chemical processes required pursuant to paragraph (b) of subsection 2, a demonstration made pursuant to that paragraph may also rely upon:
(a) Any known mechanism of biological degradation and any evidence obtained for the site relating to metabolic activity and the presence of the appropriate redox potential which supports biological degradation of the contamination;
(b) Any indication of degradation based upon the presence of any daughter products; or
(c) Any other applicable factors specified by the Division which are appropriate for making a decision based upon risk.
4. The Director shall not require an owner or operator to take corrective action pursuant to subsection 1 to achieve the remediation standard required by the Division if the owner or operator files with the Division a study which is acceptable to the Division and which demonstrates that, based on a review of available technology and the prohibitive cost of the corrective action, it is not feasible to achieve the required remediation standard.
(Added to NAC by Environmental Comm'n, eff. 10-3-96; A by R189-08, 8-25-2009)

NAC 445A.2273 Contamination of groundwater: Plan and schedule for completing corrective action. (NRS 445A.425**)** An owner or operator who is required to take corrective action pursuant to NAC 445A.22725 shall submit to the Division a plan and schedule for completing the corrective action. The owner or operator shall not take any corrective action until the plan and schedule are approved by the Division.
(Added to NAC by Environmental Comm'n, eff. 10-3-96)

NAC 445A.22735 Contamination of groundwater: Establishment of action levels. (NRS 445A.425**)**

1. For the purposes of NAC 445A.22725, 445A.2273 and 445A.2274, the action level for groundwater must be established at the following levels:

(a) The presence of 1/2 inch or more of a petroleum substance that is free-floating on the surface of the water of an aquifer, using a measurement accuracy of .01 feet.

(b) The presence of a hazardous substance, hazardous waste or a regulated substance in groundwater at a level of concentration equal to the maximum contaminant level for that substance or waste established pursuant to the Safe Drinking Water Act, 42 U.S.C. §§ 300f et seq., and 40 C.F.R. Part 141, as those sections existed on October 3, 1996.

(c) A level of concentration equal to the background concentration of a hazardous substance, hazardous waste or a regulated substance, if that level of concentration is greater than the maximum contaminant level established pursuant to paragraph (b).

(d) If a maximum contaminant level has not been established for a hazardous substance, hazardous waste or a regulated substance, a level of concentration equal to:

(1) The background concentration of the waste or substance; or

(2) An appropriate level of concentration that is based on the protection of public health and safety and the environment. The appropriate level of concentration must be determined by the Division using the Integrated Risk Information System, adopted by reference in NAC 445A.2272, or an equivalent method approved by the Division.

2. In establishing an action level pursuant to subsection 1, the Division may consider:

(a) The presence of more than one hazardous substance, hazardous waste or regulated substance in the groundwater;

(b) Any potential threat the contamination may pose to sensitive areas of the environment; and

(c) Any other threat or potential threat to groundwater that is specifically related to the site.

3. If more than one action level for groundwater may be established using the criteria set forth in subsection 1, the most restrictive action level must be used.

4. The Safe Drinking Water Act, 42 U.S.C. §§ 300f et seq., and 40 C.F.R. Part 141, as those sections existed on October 3, 1996, are hereby adopted by reference. A copy of those sections may be obtained by mail from the Superintendent of Documents, U.S. Government Printing Office, P.O. Box 979050, St. Louis, Missouri 63197-9000, or by toll-free telephone at (866) 512-1800, at a cost of $30.

(Added to NAC by Environmental Comm'n, eff. 10-3-96)

NAC 445A.2274 Contamination of groundwater: Remediation standard. (NRS 445A.425**)**

Unless remediation of a release may be terminated pursuant to NAC 445A.22745, the remediation standard for groundwater shall be deemed to be the action level of the groundwater.

(Added to NAC by Environmental Comm'n, eff. 10-3-96)

NAC 445A.22745 Contamination of groundwater: Conditions for terminating remediation of release; monitoring. (NRS 445A.425**)**

1. After any corrective action required by NAC 445A.22725 involving the treatment of groundwater is begun, the owner or operator may terminate remediation of the release after submitting written documentation and receiving written concurrence from the Division if:

(a) An assessment of the contaminated groundwater is conducted and indicates that the level of contamination is consistently below the action level for that water established pursuant to NAC 445A.22735;

(b) A test of asymptotic concentrations specified in paragraph (c) is not appropriate, as determined by the Division based on the nature of the treatment used or the conditions at the site which limit the effectiveness of any available treatment, and the owner or operator complies with the conditions for the termination of remediation set forth in an approved plan of corrective action or an approved amendment to such a plan; or

(c) After the groundwater is treated for not less than 1 year, the concentration of dissolved constituents in the water, measured monthly, fits a curve that is substantially linear and approaches zero slope at the final portion of the curve. The curve must be established using the following equation:

$$C = Cf + Coe^{-kt}$$

Where: "C" means the concentration of the contaminant at "t" in micrograms per liter.

"Cf" means the final concentration of the contaminant in micrograms per liter which the curve approaches asymptotically.

"Co" means the difference between the final concentration of the contaminant and the concentration of the contaminant at time zero in micrograms per liter.

"e" means the base of the natural log or 2.718.

"t" means the time measured in days.

"k" means the decay constant.

2. After any remediation is terminated pursuant to subsection 1, the owner or operator shall ensure that any contaminated groundwater is monitored for not less than 1 year to determine the level of contamination in the groundwater. The Division shall determine the frequency of any monitoring required pursuant to this subsection, except that the Division shall not require monitoring more frequently than once each month.

(Added to NAC by Environmental Comm'n, eff. 10-3-96; A by R189-08, 8-25-2009)

NAC 445A.2275 Contamination of surface water. (NRS 445A.425**)**

1. The Director may require an owner or operator to take corrective action if the release of a hazardous substance, hazardous waste or a regulated substance contaminates surface water and the level of contamination exceeds the action level established for the water pursuant to subsection 2.

2. For the purposes of subsection 1, the action levels and remediation standards for surface water must conform to the standards for water quality set forth in NAC 445A.120, 445A.121, 445A.122 and 445A.1236.

3. An owner or operator who is required to take corrective action pursuant to this section shall submit to the Division a plan and schedule for completing the corrective action. The owner or operator shall not take any corrective action until the plan and schedule are approved by the Division.

(Added to NAC by Environmental Comm'n, eff. 10-3-96)

NAC 445A.22755 Public hearings regarding corrective action affecting more than one owner or operator. (NRS 445A.425**)** The Administrator may hold such hearings as he or she deems necessary to obtain public testimony regarding any corrective action required to be taken pursuant to NAC 445A.226 to 445A.2275, inclusive, which affects more than one owner or operator or members of the general public.

(Added to NAC by Environmental Comm'n, eff. 10-3-96; A by R189-08, 8-25-2009)

Notification of Release of Hazardous Substance

NAC 445A.345 Definitions. (NRS 445A.425**,** 445A.660**)** As used in NAC 445A.345 to 445A.348, inclusive, unless the context otherwise requires, the words and terms defined in NAC 445A.3451 to 445A.3459, inclusive, have the meanings ascribed to them in those sections.

(Added to NAC by Environmental Comm'n, eff. 7-22-87; A by R125-07, eff. 1-30-2008)

NAC 445A.3451 "Confirmed release from an underground storage tank" defined. (NRS 445A.425**,** 445A.660**)** "Confirmed release from an underground storage tank" means an actual or presumed underground release that is discovered by:

1. A test to determine the tightness of an underground storage tank or line that is conducted in accordance with the provisions of 40 C.F.R. § 280.43(c) or 40 C.F.R. § 280.44(b), respectively;
2. A visual or laboratory confirmation of a hazardous substance in soil surrounding the underground storage tank or in groundwater in the area of an underground storage tank which indicates that a release from the underground storage tank has occurred; or
3. Any unexplained rapid loss of a hazardous substance from an underground storage tank.

(Added to NAC by Environmental Comm'n by R125-07, eff. 1-30-2008)

NAC 445A.3452 "Facility" defined. (NRS 445A.425, 445A.660**)** "Facility" means any:

1. Building, structure, installation, equipment, pipe, including the pipe into a sanitary or storm sewer or publicly owned treatment works, pipeline, well, pit, pond, lagoon, impoundment, ditch, landfill, container for storage, tank or underground tank for storage;
2. Site or area where a hazardous substance, pollutant or contaminant has been deposited, stored, disposed of, placed or otherwise located; or
3. Motor vehicle, rolling stock or aircraft or any vessel used as a means of transportation on water.

(Added to NAC by Environmental Comm'n by R125-07, eff. 1-30-2008)

NAC 445A.3453 "Groundwater" defined. (NRS 445A.425**,** 445A.660**)** "Groundwater" means all subsurface water comprising the zone of saturation, including perched water.

(Added to NAC by Environmental Comm'n by R125-07, eff. 1-30-2008)

NAC 445A.3454 "Hazardous substance" defined. (NRS 445A.425**,** 445A.660**)** "Hazardous substance" includes, without limitation:

1. A contaminant as defined in NRS 445A.325;
2. A hazardous material as defined in NRS 459.7024;
3. A hazardous substance as defined in 40 C.F.R. Part 302;
4. A pollutant as defined in NRS 445A.400; and
5. A regulated substance as defined in NRS 459.448.

(Added to NAC by Environmental Comm'n by R125-07, eff. 1-30-2008)

NAC 445A.3455 "Other surfaces of land" defined. (NRS 445A.425**,** 445A.660**)** "Other surfaces of land" means rock, gravel, road base, compacted soil, asphalt, pavement or concrete. The term does not include a surface that is engineered to prevent a release of a hazardous substance into the environment.

(Added to NAC by Environmental Comm'n by R125-07, eff. 1-30-2008)

NAC 445A.34555 "Public water system" defined. (NRS 445A.425**,** 445A.660**)** "Public water system" has the meaning ascribed to it in NRS 445A.235.

(Added to NAC by Environmental Comm'n by R125-07, eff. 1-30-2008)

NAC 445A.3456 "Release" defined. (NRS 445A.425**,** 445A.660**)** "Release" means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injection, escaping, leaching, dumping or disposing into the environment.

(Added to NAC by Environmental Comm'n by R125-07, eff. 1-30-2008)

NAC 445A.3457 "Surface water" defined. (NRS 445A.425**,** 445A.660**)** "Surface water" means all water open to the atmosphere and subject to surface runoff.

(Added to NAC by Environmental Comm'n by R125-07, eff. 1-30-2008)

NAC 445A.3458 "Underground storage tank" defined. (NRS 445A.425**,** 445A.660**)** "Underground storage tank" means a tank or tanks which are used to contain a hazardous substance and which are at least 10 percent below the surface of the ground. The term includes any underground pipes connected to an underground storage tank.

(Added to NAC by Environmental Comm'n by R125-07, eff. 1-30-2008)

NAC 445A.3459 "Vulnerable resource" defined. (NRS 445A.425**,** 445A.660**)** "Vulnerable resource" means:

1. Any building or other structure that is used primarily to house or provide services to children, elderly persons or sick persons, including, without limitation, a school, day care center, senior citizen center and hospital;
2. An area that is located within 150 feet of a wellhead of a public water system; or
3. A storm drain.

(Added to NAC by Environmental Comm'n by R125-07, eff. 1-30-2008)

NAC 445A.346 Applicability. (NRS 445A.425**,** 445A.660**)** NAC 445A.345 to 445A.348, inclusive, do not apply to:

1. Any release resulting in exposure to an employee solely within an indoor place of employment for which the employee may assert a claim against his employer.
2. Emissions from the exhaust of the engine of a motor vehicle, the rolling stock of a railroad, an aircraft, a vessel or pipeline pumping station.
3. Release of source, by-product or special nuclear material resulting from the operation of a production or utilization facility as defined in the Atomic Energy Act of 1954, and which is subject to the regulatory authority of the Nuclear Regulatory Commission.
4. Any activity or substance which is subject to regulation pursuant to NRS 459.010 to 459.290, inclusive.
5. The normal application of fertilizers or pesticides.
6. Any release that complies with the limits or conditions of a permit issued by the State or the Federal Government.

(Added to NAC by Environmental Comm'n, eff. 7-22-87; A by R125-07, 1-30-2008)

NAC 445A.347 Notification required within 1 working day. (NRS 445A.425**,** 445A.660**,** 459.485**)** Any person who owns or operates a facility, or his designated agent, shall notify the Director not later than the first working day after he has knowledge of a release of a hazardous substance that involves the facility if the hazardous substance is:

1. Released to the soil or other surfaces of land in a quantity greater than 25 gallons or 200 pounds;
2. Discovered in at least 3 cubic yards of soil during excavation of soil, subsurface exploration or any other subsurface activity;
3. Discovered in or on the groundwater during subsurface exploration, monitoring of groundwater or any other subsurface activity; or
4. A confirmed release from an underground storage tank.

(Added to NAC by Environmental Comm'n, eff. 7-22-87; A 12-8-89; 10-29-93; 9-15-94; R021-99, 9-27-99; R126-03, 4-13-2004; R125-07, 1-30-2008)

NAC 445A.3473 Notification required as soon as practicable. (NRS 445A.425**,** 445A.660**,** 459.485**)**

1. Any person who owns or operates a facility, or his designated agent, shall notify the Director as soon as practicable after he notifies any emergency response agencies, if required, and initiates any action required to prevent or abate any imminent danger to the environment or the health or safety of persons after he has knowledge of a release of a hazardous substance that involves the facility if the release:

(a) Is in a quantity equal to or greater than that which is required to be reported to the National Response Center pursuant to 40 C.F.R. Part 302;

(b) Involves any amount of a hazardous substance that is released to surface water; or

(c) Threatens a vulnerable resource.

2. A release which is required to be reported to the Director pursuant to this section is not required to be reported to the Director pursuant to NAC 445A.347.

(Added to NAC by Environmental Comm'n by R125-07, eff. 1-30-2008)

NAC 445A.3475 Provision of notice. (NRS 445A.425**,** 445A.660**,** 459.485**)** Any notice of a release of a hazardous substance required to be provided to the Director pursuant to NAC 445A.347 or 445A.3473 must be provided by telephone at (888) 331-6337, for in-state telephone calls, or (775) 687-9485, for in-state or out-of-state telephone calls.

(Added to NAC by Environmental Comm'n by R125-07, eff. 1-30-2008)

NAC 445A.348 Use of information in criminal prosecution. (NRS 445A.425**)** Any notice received pursuant to NAC 445A.347 or 445A.3473 or any information obtained from the investigation of the release reported in the notice must not be used against the person giving the notice in any criminal prosecution, unless he is prosecuted for perjury, gross negligence or the giving of a false statement related to the reported release.

(Added to NAC by Environmental Comm'n, eff. 7-22-87; A by R125-07, 1-30-2008)

CERTIFICATION OF CERTAIN CONSULTANTS AND CONTRACTORS

CERTIFICATION OF CERTAIN CONSULTANTS AND CONTRACTORS

NAC 459.970 Definitions. (NRS 459.485**,** 459.500**)** As used in NAC 459.970 to 459.9729, inclusive, unless the context otherwise requires, the words and terms defined in NAC 459.9701 to 459.9716, inclusive, have the meanings ascribed to them in those sections.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9701 "Consultant" defined. (NRS 459.485**,** 459.500**)** "Consultant" means a person who provides information, opinion or advice for a fee or in conjunction with other services for which a fee is charged.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9702 "Division" defined. (NRS 459.485**,** 459.500**)** "Division" means the Division of Environmental Protection of the State Department of Conservation and Natural Resources.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9703 "Employee" defined. (NRS 459.485**,** 459.500**)** "Employee" includes:

1. Any officer of a corporation;
2. Any natural person whose activities are subject to a right of control by the person paying for his services; and
3. Any other natural person who would be considered an employee under any common-law definition of employee.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9704 "Environmental manager" defined. (NRS 459.485**,** 459.500**)** "Environmental manager" means a natural person who is certified by the Division pursuant to NAC 459.972 or 459.9724 to act as a consultant relating to:

1. The management of hazardous waste;
2. The investigation of a site to determine the release or potential release of a hazardous substance;
3. The sampling of air, soil, surface water or groundwater to determine the release of a hazardous substance;
4. The response to a release of a hazardous substance;
5. The cleanup of a release of a hazardous substance; or
6. The remediation of water or soil contaminated by a hazardous substance.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9705 "Handler of underground storage tanks" defined. (NRS 459.485**,** 459.500**)** "Handler of underground storage tanks" means a natural person who is certified by the Division pursuant to NAC 459.9722 or 459.9724 to install, repair, upgrade or close underground storage tanks pursuant to 40 C.F.R. Part 280, as that part existed on June 12, 1990.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9706 "Hazardous material" defined. (NRS 459.485**,** 459.500**)** "Hazardous material" has the meaning ascribed to it in NRS 459.428.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9707 "Hazardous substance" defined. (NRS 459.485**,** 459.500**)** "Hazardous substance" means:

1. Any hazardous material;
2. Any hazardous waste; or
3. Any regulated substance.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9708 "Hazardous waste" defined. (NRS 459.485, 459.500) "Hazardous waste" has the meaning ascribed to it in NRS 459.430 and NAC 444.843.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9709 "Management of hazardous waste" defined. (NRS 459.485, 459.500) "Management of hazardous waste" means services relating to the identification, sampling, handling, packaging, storage, labeling, treatment, reduction, recycling, permitting, recordkeeping, manifesting, transportation or disposal of hazardous waste.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.971 "Person" defined. (NRS 459.485, 459.500) "Person" has the meaning ascribed to it in NRS 0.039.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9711 "Regulated substance" defined. (NRS 459.485, 459.500) "Regulated substance" has the meaning ascribed to it in NRS 459.448.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9712 "Release of a hazardous substance" defined. (NRS 459.485, 459.500) "Release of a hazardous substance" means the discharge, deposit, injection, dumping, spilling, emitting, leaking, escaping, leaching, pumping, pouring, emptying, disposing or placing of a hazardous substance into the air or on land or the waters of the State. The term does not include a release of a hazardous substance:

1. Specifically allowed by a permit issued pursuant to state or federal law; or
2. For which a permit is not required by state or federal law.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9713 "Response" defined. (NRS 459.485, 459.500) "Response" means the provision of remedial services to protect the public health, safety, welfare or environment from a release of a hazardous substance, including, but not limited to, the digging, cleanup, removal, abatement, containment, control, absorbance, treatment or remediation of soil or water contaminated with a hazardous substance.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9714 "Specialist in the management of hazardous waste" defined. (NRS 459.485, 459.500) "Specialist in the management of hazardous waste" means a natural person who is certified by the Division pursuant to NAC 459.9721 or 459.9724 to act as a consultant relating to the management of hazardous waste.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9715 "Tester of underground storage tanks" defined. (NRS 459.485, 459.500) "Tester of underground storage tanks" means a natural person who is certified by the Division pursuant to NAC 459.9723 or 459.9724 to test the tightness of underground storage tanks pursuant to 40 C.F.R. Section 280.43(c), as that section existed on June 12, 1990.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9716 "Underground storage tank" defined. (NRS 459.485, 459.500) "Underground storage tank" has the meaning ascribed to it in 40 C.F.R. Section 280.12, as that section existed on June 12, 1990.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9717 Intent of provisions. (NRS 459.485, 459.500) The intent of NAC 459.970 to 459.9729, inclusive, is to carry out the provisions of NRS 459.500 to protect persons who employ consultants concerning hazardous materials and wastes.

(Added to NAC by Environmental Comm'n, eff. 3-6-91; A 5-3-96)

NAC 459.9718 Applicability of provisions. (NRS 459.485, 459.500) The provisions of NAC 459.970 to 459.9729, inclusive, do not apply to:

1. Services provided by an employee of a business or public agency relative to the hazardous waste management, release investigation or response or underground storage tank management responsibilities of his employer, exclusively, while acting in the course of that employment.

2. Services provided by an employee of a public agency with the responsibility of regulatory enforcement, emergency response, or protection of public health, welfare or the environment, while acting in the course of that employment.

3. Services provided by a person who is a transporter of hazardous waste that are:

(a) Designated as the specific responsibility of the transporter of hazardous waste under the applicable state or federal regulations; and

(b) Necessary to perform the service of transportation of hazardous waste in accordance with the applicable state or federal regulations.

4. Services provided by a person under contract at a federal facility, while acting within the scope of that contract.

5. Services provided by a person that are requested by a state agency or political subdivision of the State if fees are not charged for those services.

6. Services provided by a public utility to its customers if incidental to the services ordinarily provided by the utility.

(Added to NAC by Environmental Comm'n, eff. 3-6-91; A 10-29-93)

NAC 459.9719 Services for which certification is required. (NRS 459.485, 459.500)

1. A person shall not provide services as:

(a) An environmental manager;

(b) A specialist in the management of hazardous waste;

(c) A handler of underground storage tanks; or

(d) A tester of underground storage tanks,

➥ for a fee or in conjunction with other services for which a fee is charged, unless those services are performed under the direction and responsible control of a natural person who has obtained certification from the Division.

2. The provisions of this section do not prohibit the engagement of an apprentice or assistant if a natural person who is certified by the Division pursuant to the provisions of NAC 459.970 to 459.9729, inclusive, supervises that apprentice or assistant and maintains responsibility for the work of that apprentice or assistant.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.972 Certification as environmental manager. (NRS 459.485, 459.500) An applicant for certification as an environmental manager must:

1. Be of good character and reputation as determined by the Division upon review of the applicant's references, record of violations of environmental laws and regulations and such other considerations as the Division deems necessary and proper. Certification must be denied if such a review indicates that the applicant fails to meet the applicable standards.

2. Submit to the Division:

(a) An application on a form provided by the Division;

(b) A nonrefundable fee of $100 for the review of the application;

(c) A color photograph of the applicant which is approximately 2 inches by 2 inches;

(d) A statement signed by the applicant under penalty of perjury declaring the details of all pleas of guilty or nolo contendere in any criminal proceeding and all convictions of any crimes; and

(e) Three letters of reference from natural persons with experience in the services of that classification attesting to the applicant's moral character and competence in that classification.

3. Demonstrate to the Division that he meets one of the following qualifications:

(a) A bachelor's or advanced degree from an accredited college or university in an area relating to the environment including, but not limited to, environmental science, engineering, geology, hydrology, hydrogeology, biology, toxicology, environmental health, physics, industrial hygiene or chemistry and at least 3 years of relevant environmental experience within the 5 years immediately preceding the date of the application;

(b) A relevant professional registration or certification recognized by the Division and at least 3 years of relevant environmental experience within the 5 years immediately preceding the date of the application; or

(c) An equivalent combination of appropriate education or experience, or both, as determined by the Division.

4. Pass an examination pursuant to NAC 459.9726.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9721 Certification as specialist in the management of hazardous waste. (NRS 459.485**,** 459.500**)** An applicant for certification as a specialist in the management of hazardous waste must:

1. Be of good character and reputation as determined by the Division upon review of the applicant's references, record of violations of environmental laws and regulations and such other considerations as the Division deems necessary and proper. Certification must be denied if such a review indicates that the applicant fails to meet the applicable standards.

2. Submit to the Division:

(a) An application on a form provided by the Division;

(b) A nonrefundable fee of $100 for the review of the application;

(c) A color photograph of the applicant which is approximately 2 inches by 2 inches;

(d) A statement signed by the applicant under penalty of perjury declaring the details of all pleas of guilty or nolo contendere in any criminal proceeding and all convictions of any crimes; and

(e) Three letters of reference from natural persons with experience in the services of that classification attesting to the applicant's moral character and competence in that classification.

3. Demonstrate to the Division that he meets one of the following qualifications:

(a) A bachelor's or advanced degree from an accredited college or university in an area relating to the environment, including, but not limited to, environmental science, engineering, geology, hydrology, hydrogeology, biology, toxicology, environmental health, physics, or industrial hygiene or chemistry and at least 2 years of relevant hazardous waste experience within the 3 years immediately preceding the date of the application;

(b) A relevant professional registration or certification recognized by the Division and at least 2 years of relevant hazardous waste experience within the 3 years immediately preceding the date of the application;

(c) A high school diploma or general equivalency diploma and at least 6 years of relevant hazardous waste experience within the 8 years immediately preceding the date of the application; or

(d) An equivalent combination of appropriate education and experience as determined by the Division.

4. Pass an examination pursuant to NAC 459.9726.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9722 Certification as handler of underground storage tanks. (NRS 459.485**,** 459.500**)** An applicant for certification as a handler of underground storage tanks must:

1. Be of good character and reputation as determined by the Division upon review of the applicant's references, record of violations of environmental laws and regulations and such other considerations as the Division deems necessary and proper. Certification must be denied if such a review indicates that the applicant fails to meet the applicable standards.

2. Submit to the Division:

(a) An application on a form provided by the Division;

(b) A nonrefundable fee of $100 for the review of the application;

(c) A color photograph of the applicant which is approximately 2 inches by 2 inches;

(d) A specific record of at least 2 years' experience and the direct participation in at least 10 projects relating to the handling of underground storage tanks;

(e) A copy of an appropriate license issued by the State Contractors' Board pursuant to chapter 624 of NRS;

(f) Proof of completion of a course approved by the Division concerning the safe handling of underground storage tanks;

(g) A statement signed by the applicant under penalty of perjury declaring the details of all pleas of guilty or nolo contendere in any criminal proceeding and all convictions of any crimes; and

(h) Three letters of reference from natural persons with experience in the services of that classification attesting to the applicant's moral character and competence in that classification.

3. Pass an examination pursuant to NAC 459.9726.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9723 Certification as tester of underground storage tanks. (NRS 459.485, 459.500**)** An applicant for certification as a tester of underground storage tanks must:

1. Be of good character and reputation as determined by the Division upon review of the applicant's references, record of violations of environmental laws and regulations and such other considerations as the Division deems necessary and proper. Certification must be denied if such a review indicates that the applicant fails to meet the applicable standards.

2. Submit to the Division:

(a) An application on a form provided by the Division;

(b) A nonrefundable fee of $100 for the review of the application;

(c) A color photograph of the applicant which is approximately 2 inches by 2 inches;

(d) A specific record of direct participation in at least 50 tests of underground storage tanks;

(e) A specific record of at least 1 year of experience in the testing of underground storage tanks;

(f) Proof of training provided by the manufacturer of the equipment which is used for testing;

(g) Proof of completion of a course approved by the Division concerning the safe handling of underground storage tanks;

(h) A statement signed by the applicant under penalty of perjury declaring the details of all pleas of guilty or nolo contendere in any criminal proceeding and all convictions of any crimes; and

(i) Three letters of reference from natural persons with experience in the services of that classification attesting to the applicant's moral character and competence in that classification.

3. Pass an examination pursuant to NAC 459.9726.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9724 Certification of person certified by another state or recognized organization. (NRS 459.485, 459.500**)**

1. Except as otherwise provided in this section, a natural person who is certified as:

(a) An environmental manager;

(b) A specialist in the management of hazardous waste;

(c) A handler of underground storage tanks; or

(d) A tester of underground storage tanks,

➥ by another state or an organization recognized by the Division, may be certified by the Division if he complies with the requirements set forth in subsection 2.

2. A natural person who applies for certification pursuant to this section must submit to the Division:

(a) An application on a form provided by the Division;

(b) A nonrefundable fee of $100 for the review of the application;

(c) A color photograph of the applicant which is approximately 2 inches by 2 inches; and

(d) Proof of certification by another state or an organization recognized by the Division in the classification for which he is applying for certification in this State.

3. The Division may not issue a certificate to a natural person who is certified by another state or organization if the requirements for certification by that state or organization are not substantially equivalent to the requirements for certification in this State.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9725 Waiver of requirements for training. (NRS 459.485**,** 459.500**)** The Division may waive any requirements for training for a certificate if that training is not available.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9726 Action on applications; examinations for certification. (NRS 459.485**,** 459.500**)**

1. The Division will review each application and send each applicant written notice within 6 weeks of receipt of all required materials whether his application has been approved or rejected.
2. An applicant whose application is approved by the Division and who wishes to take the examination must submit to the Division a nonrefundable examination fee set by the Division, not to exceed $150, at least 30 days before the examination is given.
3. The Division shall determine the content of the examinations.
4. A score of 70 is a passing score on an examination for certification.
5. An examination for each classification will be given at least once each year.
6. The examinations are the property of the Division and must remain confidential.
7. An applicant who fails the examination may apply for a reexamination. The nonrefundable fee for reexamination must be set by the Division not to exceed $150.
8. Each application for certification will remain on file with the Division for 2 years after the date that all required materials are received by the Division. If the applicant does not pass an examination for certification or request reexamination within the 2-year period, the applicant must file with the Division a new application for certification.

(Added to NAC by Environmental Comm'n, eff. 3-6-91; A 1-24-92)

NAC 459.9727 Contents and duration of certificate. (NRS 459.485, 459.500**)**

1. Each certificate issued by the Division to an applicant must bear:

(a) The name of the applicant;
(b) The number of the certificate;
(c) The date of expiration of the certificate; and
(d) The specific classification of certification.

2. Each certificate is valid for 2 years after the date the Division issues the certificate.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.9728 Renewal of certificate. (NRS 459.485**,** 459.500**)** A holder of a certificate who wishes to renew his certificate must:

1. Demonstrate to the Division that he continues to meet all qualifications and performance requirements of NAC 459.970 to 459.9729, inclusive;
2. Submit an application for renewal of the certificate to the Division on a form provided by the Division;
3. Submit a nonrefundable fee set by the Division not to exceed $100; and
4. Complete an examination for renewal if the Division has determined that such a renewal examination is appropriate.

(Added to NAC by Environmental Comm'n, eff. 3-6-91)

NAC 459.97285 Contents of document relating to service for which certification is required. (NRS 459.485**,** 459.500**)** A holder of a certificate who is responsible for a service requiring certification shall ensure that each document relating to the service includes:

1. The following language:

> I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and to the best of my knowledge comply with all applicable federal, state and local statutes, regulations and ordinances.

2. A description of the services provided.

3. The signature of the holder of the certificate and the date on which the document was signed.

4. The number of the certificate.

5. The date of expiration of the certificate.

(Added to NAC by Environmental Comm'n, eff. 5-3-96)

NAC 459.9729 Standards of practice. (NRS 459.485, 459.500)

1. Each holder of a certificate issued by the Division pursuant to the provisions of NAC 459.970 to 459.9729, inclusive:

(a) Shall provide services which are ethical, meet the current standards of the profession and which comply with federal, state and local regulations concerning hazardous substances or underground storage tanks.

(b) Is responsible for the work of other persons he employs or supervises.

(c) Shall have a copy of his certificate at the location where he is supervising work. Upon the request of the Division, client or potential client, a holder of a certificate shall present his certificate for inspection.

(d) Shall make a written report to the facility owner or operator, within 24 hours, upon the discovery of a release of a hazardous substance or the existence of an unregistered underground storage tank and advise that facility owner or operator of any applicable reporting requirements.

(e) Shall report to the Division the discovery of a release of a hazardous substance which presents an imminent and substantial hazard to human health, public safety or the environment as soon as possible after he has knowledge of a release.

(f) Shall secure the services of a qualified person to perform any part of his job which requires a level of service or skill which he is not qualified to provide.

(g) Shall make complete prior disclosures to his clients or potential clients of potential conflicts of interest or other circumstances which could influence his judgment or the quality of the services he provides.

(h) Shall not falsify or misrepresent his education or experience, the degree of responsibility for prior assignments or the complexity of prior employment or business, relevant factors concerning employers, employees, associates or joint ventures or past accomplishments.

(i) Shall maintain a written record of each project requiring certification for 3 years after the project is completed. The Division may inspect those records during normal business hours and will establish requirements concerning the information which must be included in the records.

2. Certification may be suspended, revoked or denied for renewal if the Division determines that the certificate holder has not performed in accordance with these standards.

(Added to NAC by Environmental Comm'n, eff. 3-6-91; A by R021-99, 9-27-99)

STORAGE TANKS

NAC 459.9921 Definitions. (NRS 459.826) As used in NAC 459.9921 to 459.999, inclusive, unless the context otherwise requires, the words and terms defined in NAC 459.9922 to 459.9929, inclusive, have the meanings ascribed to them in those sections.

(Added to NAC by Environmental Comm'n, eff. 10-9-90; A by R083-05, 10-31-2005; R004-08 & R005-08, 4-17-2008; R189-08, 8-25-2009)

NAC 459.9922 "Assessment" defined. (NRS 459.826) "Assessment" means a test for the presence of a regulated substance.

(Added to NAC by Environmental Comm'n, eff. 10-9-90)

NAC 459.9924 "Corrective action" defined. (NRS 459.826) "Corrective action" means a permanent remedy that is taken if a regulated substance is released to prevent the substance from migrating and causing danger to the present or future health of the public or to the environment.

(Added to NAC by Environmental Comm'n, eff. 10-9-90)

NAC 459.9925 "Department" defined. (NRS 459.826) "Department" means the State Department of Conservation and Natural Resources.

(Added to NAC by Environmental Comm'n, eff. 10-9-90)

NAC 459.9927 "Division" defined. (NRS 459.826) "Division" means the Division of Environmental Protection of the Department.

(Added to NAC by Environmental Comm'n, eff. 10-9-90)

NAC 459.9928 "Groundwater" defined. (NRS 459.826) "Groundwater" has the meaning ascribed to it in NAC 444.579.

(Added to NAC by Environmental Comm'n, eff. 10-9-90; A 1-23-96)

NAC 459.99283 "Listed" defined. (NRS 459.826) "Listed" has the meaning ascribed to it in section 202 of the *International Fire Code*, 2003 edition.

(Added to NAC by Environmental Comm'n by R083-05, eff. 10-31-2005)

NAC 459.99285 "Marina storage tank" defined. (NRS 459.826) "Marina storage tank" means a petroleum storage tank used to provide fuel to water vessels, at least 90 percent of which is either above ground level or in or over water and which has a capacity of at least 110 gallons but not more than 12,000 gallons. The term includes all piping connected to the tank, except piping, valves, hoses, filters and nozzles associated with the fuel dispenser.

(Added to NAC by Environmental Comm'n by R083-05, eff. 10-31-2005)

NAC 459.99286 "Motor fuel" defined. (NRS 459.826) "Motor fuel" means petroleum or a petroleum-based substance in the form of motor gasoline, aviation gasoline, No. 1 or No. 2 diesel fuel, or any grade of gasohol that is typically used in the operation of a motor engine.

(Added to NAC by Environmental Comm'n by R005-08, eff. 4-17-2008)

NAC 459.99287 "Petroleum" defined. (NRS 459.826) "Petroleum" has the meaning ascribed to it in NRS 590.790.

(Added to NAC by Environmental Comm'n by R083-05, eff. 10-31-2005)

NAC 459.99288 "Red tag" defined. (NRS 459.826) "Red tag" means a unique identification device, tag or other mechanism of a design approved by the Division that is placed on the fill pipe of an underground storage tank to indicate that the underground storage tank is ineligible to receive a delivery of a regulated substance.

(Added to NAC by Environmental Comm'n by R004-08, eff. 4-17-2008)

NAC 459.992885 "Secondary containment system" defined. (NRS 459.826) "Secondary containment system" means a system of release prevention and detection consisting of a separate inner and outer barrier designed to contain a regulated substance together with a means of monitoring the interstitial space.

(Added to NAC by Environmental Comm'n by R005-08, eff. 4-17-2008)

NAC 459.99289 "Under-dispenser container" defined. (NRS 459.826) "Under-dispenser container" means a container that is installed under a motor fuel dispenser which is used in connection with an underground storage tank and is designed to prevent dispenser leaks from reaching soil or groundwater.

(Added to NAC by Environmental Comm'n by R005-08, eff. 4-17-2008)

NAC 459.9929 "Underground storage tank" defined. (NRS 459.826) "Underground storage tank" has the meaning ascribed to it in 40 C.F.R. § 280.12.

(Added to NAC by Environmental Comm'n, eff. 10-9-90; A by R083-05, 10-31-2005)

NAC 459.993 Federal regulations: Adoption by reference of certain provisions regarding underground storage tanks; compliance required. (NRS 459.826, 459.830)

1. The State Environmental Commission hereby adopts by reference the provisions of 40 C.F.R. §§ 280.10 to 280.116, inclusive, as they existed on July 1, 1995. A copy of the volume containing these provisions may be obtained at a cost of $50 by mail from the Superintendent of Documents, U.S. Government Printing Office, P.O. Box 979050, St. Louis, Missouri 63197-9000, or by toll-free telephone at (866) 512-1800.

2. Each owner and operator of an underground storage tank shall comply with the requirements of 40 C.F.R. §§ 280.10 to 280.116, inclusive.

3. For the purposes of this section, any reference to "implementing agency" in 40 C.F.R. §§ 280.10 to 280.116, inclusive, shall be deemed to mean the Division.

(Added to NAC by Environmental Comm'n, eff. 6-11-90; A 1-23-96; R083-05, 10-31-2005)

NAC 459.9931 Adoption by reference of certain chapters of *International Fire Code*. (NRS 459.826, 459.830) The State Environmental Commission hereby adopts by reference chapters 2, 22 and 34 of the *International Fire Code*, 2003 edition. A copy of the volume containing these provisions may be obtained at the cost of $70 from the International Code Council at the Internet address http://www.iccsafe.org.

(Added to NAC by Environmental Comm'n by R083-05, eff. 10-31-2005)

NAC 459.9933 Marina storage tanks: Registration; fee; date for compliance. (NRS 459.826)

1. On or before January 31, 2006, and each year thereafter, the owner or operator of a marina storage tank shall register each marina storage tank compartment with the Division on a prescribed form and pay a fee of $50 for each marina storage tank compartment.

2. Marina storage tanks must be in compliance with this chapter not later than September 30, 2006. The Division may require compliance before September 30, 2006, for any part of an existing system that poses a current threat to nearby property, human health or the environment.

(Added to NAC by Environmental Comm'n by R083-05, eff. 10-31-2005)

NAC 459.9934 Marina storage tanks: Construction, design, location and overfill prevention. (NRS 459.826, 459.830)

1. A marina storage tank must meet the requirements of chapters 2, 22 and 34 of the *International Fire Code*, 2003 edition, with regard to construction, design, location and overfill prevention.

2. A marina storage tank that supplies marina service stations and pumps not integral to the dispensing device must be onshore, except that a double-walled tank not exceeding a capacity of 1,100 gallons may be located on a pier of the solid-fill type if spacing, containment and piping comply with the provisions of chapters 2, 22 and 34 of the *International Fire Code*, 2003 edition.

3. Any metallic portion of a marina storage tank or its piping system that is in contact with the soil or water and is subject to corrosion must be protected from corrosion by a continuously operating cathodic protection system that is properly engineered, installed and maintained in accordance with 40 C.F.R. § 280.20(b)(2). A metal tank sitting on a concrete slab will be considered in contact with the soil unless it is insulated from the concrete by a dielectric material. Anchoring hardware is not considered part of the tank.

(Added to NAC by Environmental Comm'n by R083-05, eff. 10-31-2005)

NAC 459.9935 Marina storage tanks: Secondary containment. (NRS 459.826, 459.830)

1. A marina storage tank must have a secondary containment area for the fuel stored in the tank.

2. Multiple products stored within the same containment area must be compatible with each other.

3. If the secondary containment area is open to precipitation, it must be capable of containing 110 percent of the capacity of the largest tank plus the volume displaced by the other tanks within the containment area.

4. The secondary containment area must be made of concrete or steel and be compatible with and impermeable to the products stored in the tank.

5. Liquid discharges to the environment from the secondary containment area are prohibited if contamination of the liquid by a regulated substance is suspected or detected.

6. The secondary containment area must not include any uncapped drain that extends outside of the containment area.

7. A double-walled tank does not require additional containment if:

(a) All piping connections to the tank are made above the normal maximum liquid level;

(b) A mechanism is provided to prevent the release of liquid from the tank by siphon flow;

(c) A mechanism, accessible to a delivery operator, is provided for determining the level of liquid in the tank;

(d) A mechanism which does not restrict or interfere with the proper functioning of the normal vent or emergency vent is provided to prevent overfilling by sounding an alarm when the liquid level in the tank reaches 90 percent of capacity and by automatically stopping the delivery of liquid to the tank when the level in the tank reaches 95 percent of capacity;

(e) The interstitial space is enclosed and the space has emergency venting; and

(f) A means is provided to verify the integrity of the double wall.

(Added to NAC by Environmental Comm'n by R083-05, eff. 10-31-2005)

NAC 459.9936 Marina storage tanks: Piping and valves. (NRS 459.826, 459.830)

1. If, on a marina storage tank:

(a) A submersible pump is used, a listed emergency shutoff valve must be installed at each dispensing device.

(b) A suction pump-type dispensing device is used, a listed vacuum-actuated shutoff valve with a shear section or equivalent-type valve must be installed directly under each dispensing device.

2. Piping and valves subject to pressure extremes caused by thermal expansion of the contents must be equipped with a pressure-relieving device that has secondary containment.

3. Aboveground piping runs must be enclosed in protective containment leading to a catch basin equipped with an operating automatic leak-detection audible alarm and shutoff device.

4. Except as otherwise provided in subsection 5, any new or replacement underground piping installed after October 31, 2005, must be:

(a) Constructed of nonmetallic components;

(b) Double-walled and integral with a listed leak sensor; and

(c) Installed with a tracer locator wire installed in all buried piping trenches.

5. Existing facilities which have metallic or single-walled nonmetallic piping and which are permanently relocated to a fuel island must install dispenser sumps with leak sensors. Any additions to the metallic piping must be nonmetallic single- or double-walled piping.

6. For piping used at floating marinas:

(a) Suitable lengths of oil-, weather- and UV-resistant flexible hose, UL-approved for use at marinas, must be used between the onshore piping and the piping on the floating structure.

(b) Piping at all hinge locations must be connected with UL-approved listed flexible piping.

(c) All docks and pier installations must have double-walled piping.

(d) A listed emergency breakaway device designed to retain liquid on both sides of the breakaway point must be installed in a spill containment box monitored with a leak sensor on each line serving the dock and anchored at the onshore end of the piping.

(Added to NAC by Environmental Comm'n by R083-05, eff. 10-31-2005)

NAC 459.9937 Marina storage tanks: Dispensing equipment. (NRS 459.826**,** 459.830**)**

1. A control must be installed that will permit the fuel delivery pump to operate only when a dispensing nozzle is removed from its bracket or normal position with respect to the dispensing device and only when the switch on the dispensing device is manually actuated. The control must also stop the pump when all nozzles have been returned either to their brackets or to the normal nondispensing position.

2. Dispensers not integral with the tank must have sumps with operating leak-monitoring sensors that automatically shut off the electricity to the pumping device.

3. Dispenser hoses must be checked and a record kept on a daily basis for evidence of blistering, carcass saturation or separation, for cuts, nicks or abrasions that expose reinforced material, and for slippage, misalignment or leaks at couplings. Defective hoses must be removed from service within 48 hours after evidence of failure.

4. At least once each month, each dispenser hose must be completely extended and inspected as follows:

(a) The hose couplings and the first 12 inches of hose adjacent to the couplings must be examined.

(b) The dispenser hose must be checked for structural weakness evidenced by soft spots by pressing the hose in the area around its entire circumference. Any hose that shows evidence of soft spots must be removed from service.

5. Any dispensing nozzle used at a marina service station must be equipped with a nondrip check valve.

6. Daily and monthly inspections of dispenser hoses are not required when a marina is closed during the off-season.

(Added to NAC by Environmental Comm'n by R083-05, eff. 10-31-2005)

NAC 459.9938 Marina storage tanks: Filling equipment; monitoring; testing; daily inventory records. (NRS 459.826, 459.830)

1. Except for tanks not exceeding a capacity of 1,100 gallons or tanks not equipped to accept a tight-fill that are instead filled from a delivery nozzle on a delivery vehicle:

(a) All aboveground marina storage tanks must be filled through a liquid-tight connection enclosed in a grounded fill pipe spill-containment box that is located at least 3 feet above the ground and at least 20 feet away from a body of water and is capable of containing a minimum of 5 gallons.

(b) All marina storage tanks filled by means of remote piping must have installed in the piping at a point where connection and disconnection is made between the tank and a delivery vehicle either a check valve and shutoff valve with a quick-connect coupling or a check valve with a dry-break coupling. The check valve device must be protected from tampering and physical damage.

2. Except for double-walled, aboveground marina storage tanks which are exempt from weekly monitoring requirements and except as otherwise provided in subsection 4, aboveground marina storage tanks must be visually inspected weekly for leaks. The results of the weekly visual inspections must be dated and recorded.

3. Except as otherwise provided in subsection 4, aboveground marina storage tanks must be inspected monthly in accordance with the provisions of subsection 2 of NAC 590.740 and must be inspected for release detection in accordance with 40 C.F.R. § 280.43(a)-(d) and (g).

4. Weekly and monthly monitoring of an aboveground marina storage tank is not required when a marina is closed during the off-season if the tank contains only a de minimis quantity of fuel.

5. All underground or underwater piping that is not double-walled with interstitial leak sensors must be tightness-tested for leaks in accordance with the requirements of 40 C.F.R. § 280.41(b).

6. All electronic and mechanical equipment used for release detection, monitoring or warning must be tested for proper operation and calibration annually or pursuant to the manufacturer's recommendation, whichever is more frequent.

7. If, because of the nature of the aboveground marina storage tank or its secondary containment, visual inspections are not adequate for the purpose of determining whether a leak has occurred, an owner or operator of an aboveground storage tank shall keep daily inventory records. Daily inventory records for the most recent 3 years must be kept on the premises or made available for inspection upon 24 hours' notice. Daily inventory records are not required when a marina is closed during the off-season if the tank contains only a de minimis quantity of fuel.

(Added to NAC by Environmental Comm'n by R083-05, eff. 10-31-2005)

NAC 459.994 Underground storage tanks: Testing for tightness. (NRS 459.826, 459.830)

1. Except as otherwise provided in this section, each owner or operator of an underground storage tank shall perform or cause to be performed a test of the tank for tightness in accordance with the schedule contained in subsection (c) of 40 C.F.R. § 280.40.

2. The test must be performed by a contractor certified by the Division.

3. The owner or operator shall retain a certificate from the person performing the test showing that the test has been performed. The certificate must be made on a form approved by the Division.

4. In lieu of a test for tightness, each owner or operator may conduct any release detection methods prescribed in 40 C.F.R. §§ 280.43 and 280.44 as an acceptable means of release detection.

5. An operator of an underground storage tank that is not empty but is temporarily closed in accordance with 40 C.F.R. § 280.70 shall perform or cause to be performed a test of the storage tank for tightness in accordance with 40 C.F.R. §§ 280.40 to 280.45, inclusive.

6. Except as otherwise provided in this subsection, an abandoned storage tank must be tested for tightness in accordance with subsection (c) of 40 C.F.R. § 280.43 before it is returned to service. If a test of the abandoned storage tank will cause a threat to human health or the environment, as determined

by the Division, the Division may waive the test for tightness or require any other method of testing in accordance with the provisions of subsection (h) of 40 C.F.R. 280.43 and subsection (c) of 40 C.F.R. 280.44. The allocation of costs pursuant to NRS 590.880 or 590.890 will be applied if there is a discharge from the storage tank.

7. A test for tightness is not required before an underground storage tank is closed pursuant to subsection (b) of 40 C.F.R. § 280.71 if the Division:

(a) Has no record of the storage tank being installed, operated or closed; and

(b) Is unable to locate the owner of the storage tank.

8. As used in subsection 6, "abandoned storage tank" means an underground storage tank that:

(a) Is not maintained and whose owner or operator has not provided the Division with a written statement of his intention to close the storage tank; or

(b) Is not in service and does not comply with 40 C.F.R. § 280.70 or 280.71.

(Added to NAC by Environmental Comm'n, eff. 6-11-90; A 3-26-92; 1-23-96; R083-05, 10-31-2005)

NAC 459.9941 Underground storage tanks: Ineligibility to receive delivery of regulated substance; placement of red tag. (NRS 459.826**,** 459.830**)** An underground storage tank is ineligible to receive a delivery of a regulated substance if:

1. The Division:

(a) Determines that any required component of the underground storage tank is not installed, including, without limitation, any equipment that is designed to:

(1) Prevent a spill or overfill;

(2) Detect a leak; or

(3) Protect the underground storage tank from corrosion; or

(b) Identifies a failure in the operation of any equipment specified in paragraph (a) and the failure is not corrected:

(1) Within 30 days after the failure is discovered; or

(2) Within any other reasonable period specified by the Division; and

2. The Division places, or causes to be placed, a red tag on the fill pipe of the underground storage tank.

(Added to NAC by Environmental Comm'n by R004-08, eff. 4-17-2008)

NAC 459.9942 Underground storage tanks: Notice of determination that tank is ineligible to receive delivery of regulated substance. (NRS 459.826**,** 459.830**)** If the Division determines that an underground storage tank located at a facility specified by the Division is ineligible to receive a delivery of a regulated substance, the Division shall provide a written notice of that determination to the owner or operator or an on-site employee of the facility. The notice must include, without limitation:

1. An identification of the underground storage tank;

2. The date the Division makes the determination of ineligibility;

3. The date of placement of the red tag by the Division or the date by which the red tag must be placed on the underground storage tank, if the Division orders the red tag to be placed by the owner or operator of the facility;

4. Instructions for placing the red tag on the fill pipe of the underground storage tank, if the Division orders the red tag to be placed by the owner or operator of the facility;

5. The criteria used by the Division to make the determination of ineligibility; and

6. The specific remedial actions which the owner or operator of the facility must take in order for the Division to reclassify the underground storage facility tank as eligible to receive a delivery of a regulated substance.

(Added to NAC by Environmental Comm'n by R004-08, eff. 4-17-2008)

NAC 459.9943 Underground storage tanks: Request for or acceptance of delivery of regulated substance to tank marked with red tag prohibited; deferral of prohibition. (NRS 459.826**,** 459.830**)**

1. Except as otherwise provided in subsection 2, an owner or operator of a facility specified by the Division at which an underground storage tank is located shall not request or accept a delivery of a regulated substance to the underground storage tank if the underground storage tank is marked with a red tag in accordance with the provisions of NAC 459.9941 and 459.9942.

2. The Division may authorize a single delivery, or multiple deliveries for not more than 180 days, to an underground storage tank that is marked with a red tag by providing a deferral in writing to the owner or operator of the facility, if the owner or operator demonstrates to the satisfaction of the Division that the delivery:

(a) Is required because of an emergency;

(b) Is for the purpose of testing or calibrating the underground storage tank to reestablish eligibility to receive a delivery pursuant to NAC 459.9944; or

(c) Is required to maintain the availability of, or access to, motor vehicle fuel in any rural or remote area of this State specified by the Division.

(Added to NAC by Environmental Comm'n by R004-08, eff. 4-17-2008)

NAC 459.9944 Underground storage tanks: Reclassification of tank marked with red tag as eligible to receive delivery of regulated substance. (NRS 459.826**,** 459.830**)** If the Division determines that an underground storage tank is ineligible to receive a delivery of a regulated substance and the underground storage tank is marked with a red tag pursuant to NAC 459.9941 and 459.9942, the Division may reclassify the underground storage tank as eligible to receive such a delivery if:

1. The owner or operator of the facility at which the underground storage tank is located provides to the Division documentation setting forth the remedial actions taken to install any required equipment or to correct any operational failure of that equipment;

2. The Division reviews the documentation to determine the appropriateness of the remedial action taken:

(a) Except as otherwise provided in paragraph (b), within 7 days after the Division receives the documentation; or

(b) Within 14 days after the Division receives the documentation, if the Division determines that an inspection of the site of the underground storage tank is required; and

3. The Division removes the red tag or authorizes the owner or operator of the facility, in writing, to remove the red tag after determining that the remedial actions taken by the owner or operator are appropriate.

(Added to NAC by Environmental Comm'n by R004-08, eff. 4-17-2008)

NAC 459.9945 Underground storage tanks: Secondary containment system required on tank installed on or after July 1, 2008; exceptions. (NRS 459.826**,** 459.830**)**

1. Except as otherwise provided in subsection 2 and NAC 459.9949, a secondary containment system is required on all underground storage tanks installed on or after July 1, 2008.

2. The provisions of subsection 1 do not apply to underground storage tanks existing at a facility before July 1, 2008, which may be connected by piping or coupled through a manifold to the new underground storage tank.

(Added to NAC by Environmental Comm'n by R005-08, eff. 4-17-2008)

NAC 459.9946 Underground storage tanks: Secondary containment system required upon replacement of tank or piping; exceptions. (NRS 459.826**,** 459.830**)**

1. Except as otherwise provided in subsections 2 and 4 and NAC 459.9949, a secondary containment system is required for any existing underground storage tank which is replaced, including the

replacement of any piping that constitutes a portion of the underground storage tank regardless of whether the piping is replaced in conjunction with or separately from other portions of the underground storage tank.

2. The provisions of subsection 1 apply solely to those portions of an underground storage tank that are replaced and not to any other portion that remains in place, including any other underground storage tank that is connected to the replaced tank by piping or coupled through a manifold.

3. Piping is not considered to be replaced for purposes of this section unless the entire amount of a run of piping from one component to another component of the underground storage tank is replaced, including, without limitation, a component consisting of an individual tank, dispenser or piece of ancillary equipment.

4. The provisions of subsection 1 do not apply to any repairs not involving replacement that are intended to restore an underground storage tank to operating condition.

(Added to NAC by Environmental Comm'n by R005-08, eff. 4-17-2008)

NAC 459.9947 Underground storage tanks: Duties of owner or operator required to implement secondary containment system. (NRS 459.826**,** 459.830**)** An owner or operator of an underground storage tank who is required to implement a secondary containment system for that underground storage tank pursuant to NAC 459.9945 and 459.9946 shall:

1. Ensure that the secondary containment system:

(a) Contains regulated substances that are released from the underground storage tank until they are detected and removed;

(b) Prevents the release of regulated substances into the environment at any time during the operational life of the underground storage tank; and

(c) Operates with interstitial monitoring that meets the requirements of 40 C.F.R. § 280.43(g);

2. Check, or cause to be checked, for evidence of a release from the underground storage tank at least every 30 days and maintain records of the operation of the secondary containment system for at least 1 year;

3. Notify the Division before the installation or replacement of an underground storage tank and provide to the Division the proposed method of secondary containment planned for use;

4. Maintain records of the installation, maintenance and monitoring of the secondary containment system in accordance with the following schedule:

(a) Records of 30-day release monitoring must be maintained for not less than 1 year;

(b) All written claims of performance, including any schedules of required maintenance or calibration for the secondary containment system and its monitoring system, must be maintained for not less than 5 years after the date of installation; and

(c) All calibration, maintenance and repair of release detection equipment permanently located on-site must be maintained for not less than 1 year; and

5. Upon request, make available for review by the Division records of the installation, maintenance and monitoring of the secondary containment system.

(Added to NAC by Environmental Comm'n by R005-08, eff. 4-17-2008)

NAC 459.9948 Underground storage tanks: Under-dispenser container required for certain motor fuel dispensers. (NRS 459.826**,** 459.830**)**

1. Except as otherwise provided in NAC 459.9949, an under-dispenser container is required for all motor fuel dispensers that are installed on or after July 1, 2008, at a location where there was no previous dispenser or at a location to replace an existing dispenser and the equipment used to connect the dispenser to the underground storage tank is replaced.

2. An under-dispenser container must:

(a) Be liquid-tight on its sides, bottom and at any penetrations;

(b) Be compatible with the substance conveyed by dispenser piping;

(c) Allow for monitoring or visual inspection and access to the components in the containment system; and

(d) At all times, be made available for inspection by the Division.

(Added to NAC by Environmental Comm'n by R005-08, eff. 4-17-2008)

NAC 459.9949 Underground storage tanks: Exemption from requirements to implement secondary containment system or install under-dispenser container. (NRS 459.826**,** 459.830**)**

1. An owner or operator is not required to implement a secondary containment system pursuant to NAC 459.9945 and 459.9946 or to install an under-dispenser container pursuant to NAC 459.9948 if the owner or operator submits to the Division a study approved by the Division which demonstrates that the newly installed or replaced portions of an underground storage tank or motor fuel dispenser is not within 1,000 feet of a public water system or a well containing potable water.

2. The distance required pursuant to subsection 1 must be measured from the closest part of the new or replaced underground storage tank or new motor fuel dispenser to the closest part of the nearest public water system or the wellhead of the nearest well containing potable water.

3. As used in this section:

(a) "Public water system" has the meaning ascribed to it in NRS 445A.235.

(b) "Well containing potable water" means any hole that is dug, driven, drilled or bored that extends into the earth until it meets groundwater which:

(1) Supplies water for a noncommunity public water system; or

(2) Otherwise supplies water for household use, including, without limitation, drinking, bathing and cooking.

(Added to NAC by Environmental Comm'n by R005-08, eff. 4-17-2008)

NAC 459.995 Financial responsibility of owners and operators. (NRS 459.826**,** 459.834**)**

1. If requested by the Division, each owner and operator of a registered storage tank shall submit to the Division evidence of his financial responsibility. As used in this subsection, "registered storage tank" means a storage tank operated by a person who is:

(a) Required to demonstrate financial responsibility pursuant to 40 C.F.R. § 280.93; or

(b) Required to or who elects to register the storage tank pursuant to NRS 590.850 or 590.920.

2. An owner or operator may demonstrate his financial responsibility pursuant to the provisions of 40 C.F.R. §§ 280.94 to 280.103, inclusive.

3. An owner or operator:

(a) Who operates a storage tank containing fuel for jet or turbine-powered aircraft; and

(b) Who does not elect to obtain coverage pursuant to subsection 2 of NRS 590.920,

➥ shall comply with the requirements for financial responsibility contained in 40 C.F.R. §§ 280.90 to 280.116, inclusive.

(Added to NAC by Environmental Comm'n, eff. 6-11-90; A 3-26-92; 1-23-96)

NAC 459.996 Releases: Reporting; protection of site; inspection by Division. (NRS 459.826**)**

1. The owner or operator of a storage tank shall report any release promptly in accordance with the requirements of NAC 445A.347 and 40 C.F.R. § 280.61 if the release from the storage tank is confirmed in accordance with the provisions of 40 C.F.R. § 280.52. The owner or operator shall submit the report regardless of the amount of the release for which the report is submitted.

2. The owner or operator of a facility where a storage tank is located shall, in accordance with the reportable quantities established in NAC 445A.347 and 40 C.F.R. § 280.53, report each spill or overfill and the discovery of any soil contaminated by any previous spill or overfill.

3. The owner or operator shall take all steps for initial response and abatement prescribed in 40 C.F.R. §§ 280.60, 280.61 and 280.62 to protect the site of the release from further damage.

4. The owner or operator shall permit the Division to inspect any property or records relating to the release or damage caused by the release.

5. As used in this section, "spill or overfill" means any release of a regulated substance that occurs:

(a) Above the surface of the ground at a facility where a storage tank is located;

(b) From a dispenser for motor fuel above the sheer valve for the dispenser; or

(c) From any ancillary equipment for the tank system that:

(1) Is not included in any system for the detection of a leak; and

(2) Is accessible to visual inspection.

(Added to NAC by Environmental Comm'n, eff. 6-11-90; A 1-23-96; R189-08, 8-25-2009)

NAC 459.9972 Assessment required before closure of tank; notice of contaminated soil or groundwater; removal of tank from ground. (NRS 459.826, 459.832**)**

1. The owner or operator of a storage tank shall provide an assessment to the Division before a storage tank is permanently closed.

2. The assessment must be conducted:

(a) Using analytical test method 8015 of the Environmental Protection Agency that is modified for petroleum hydrocarbons and other constituents as required by the Division; and

(b) On two soil samples that are obtained from native soil less than 2 feet below the bottom of the excavation, from opposite sides or ends of the excavation in an area where contamination is most likely to be present.

3. The analysis must be conducted by a laboratory that is approved by the Division.

4. The owner or operator of an underground storage tank shall notify the Director in the manner prescribed in NAC 445A.347 if, during an assessment conducted pursuant to this section, any contaminated soil or groundwater is discovered in an amount that exceeds an amount of a release for which a notice is required pursuant to that section.

5. The owner or operator of an underground storage tank that is removed from the ground shall:

(a) Dispose of or reuse the tank in accordance with the provisions of NRS 459.800 to 459.856, inclusive; and

(b) Maintain a record of the disposal or reuse.

(Added to NAC by Environmental Comm'n, eff. 10-9-90; A 1-23-96; R083-05, 10-31-2005; R189-08, 8-25-2009)

NAC 459.9985 No relief of responsibility to secure approval or permit. (NRS 459.826**)** NAC 459.9972 does not relieve the owner or operator of the responsibility for securing an approval or permit from other governmental or regulatory entities.

(Added to NAC by Environmental Comm'n, eff. 10-9-90; A by R189-08, 8-25-2009)

NAC 459.9988 Corrective action concerning soil or groundwater; assessment of contaminated soil or water. (NRS 459.826, 459.834**)**

1. An owner or operator of a storage tank who submits a report pursuant to NAC 459.996 or a notice pursuant to NAC 459.9972 shall comply with the provisions of NAC 445A.226 to 445A.22755, inclusive. The Division may allow the owner or operator to use any alternative technology approved by the Division when taking any corrective action concerning soil or groundwater pursuant to those provisions.

2. If the report or notice indicates that a regulated substance has been released, the Division may require the owner or operator to assess any soil or water contaminated by the release to determine whether the presence of any hazardous waste was created by the release.

3. As used in this section, “hazardous waste” has the meaning ascribed to it in NAC 445A.826.

(Added to NAC by Environmental Comm’n by R189-08, eff. 8-25-2009)

NAC 459.999 Severability. (NRS 459.826**)** If any provision of NAC 459.9921 to 459.999, inclusive, or the application of any such provision to any person, thing or circumstance is held invalid, it is intended that the invalidity not affect the remaining provisions, or their application, that can be given effect without the invalid provision or application.

(Added to NAC by Environmental Comm’n, eff. 6-11-90; A 10-9-90; R004-08 & R005-08, 4-17-2008; R189-08, 8-25-2009)

CLEANUP OF DISCHARGED PETROLEUM

CLEANUP OF DISCHARGED PETROLEUM

NAC 590.700 Definitions. (NRS 590.830) As used in NAC 590.700 to 590.790, inclusive, unless the context otherwise requires:

1. "Board" means the Board to Review Claims.
2. "Division" means the Division of Environmental Protection of the State Department of Conservation and Natural Resources.
3. "Fund" means the Fund for Cleaning Up Discharges of Petroleum.
4. "Portable storage tank" means a storage tank with a capacity of 60 gallons or more that is used above the ground and may be moved without disassembly of the tank to more than one location for the temporary storage of petroleum.
5. "Registered storage tank" means a storage tank operated by a person who is required to or who elects to register it for coverage provided by the Fund.
6. "Storage tank" has the meaning ascribed to it in NAC 590.710.

(Added to NAC by Bd. to Review Claims, eff. 6-15-90; A 12-23-91; 1-22-96; R001-99, 11-19-99; A by Div. of Environmental Protec. by R226-05, 5-4-2006)

NAC 590.710 Interpretation of certain statutory terms. (NRS 590.830)

1. For the purposes of NRS 590.700 to 590.920, inclusive, the Board interprets:

(a) "Costs for cleaning up" to mean any expense of corrective action necessitated by a discharge from a storage tank. The term does not include:

(1) The expense of any bond posted to release a writ of attachment;

(2) Any expense incurred by an operator to investigate or defend any claim or suit, except any such expense incurred at the request of the Board;

(3) Any expense taxed against the operator as costs of suit in a suit or administrative proceeding;

(4) Any award of prejudgment interest, except for interest awarded on that part of the judgment paid by the Fund;

(5) Any expense of repairing, replacing or upgrading any storage tank or its contents;

(6) Any expense incurred by an operator during the transportation, loading or unloading of a portable storage tank; and

(7) Any loss of income or revenue of the business of an operator that is incurred by an operator during a corrective action necessitated by a discharge.

(b) "Damages" to mean any money the operator of a storage tank becomes legally obligated to pay as damages because of bodily injury or property damage to any person other than the State or the operator caused by a discharge. The term does not include:

(1) Any expense excluded from the definition contained in paragraph (a);

(2) Any obligation of the operator imposed pursuant to any statute providing benefits for workers' compensation, disability or unemployment compensation;

(3) Any bodily injury to an employee of the operator, or the spouse, parent, brother or sister of the employee, arising out of and in the course of the employee's employment by the operator. This exclusion applies whether the operator may be liable as an employer or in any other capacity, and to any obligation to share damages with or reimburse another person who must pay damages because of the injury;

(4) Any obligation of the operator imposed by a contractual assumption of liability; or

(5) Any expense incurred by an operator during the transportation, loading or unloading of a portable storage tank.

(c) “Emergency action” to mean any action that:

(1) Stops the release of petroleum;

(2) Identifies or mitigates existing or potential hazards from fire, explosion, vapor or other hazards associated with a release; or

(3) Prevents the migration of petroleum which poses a substantial imminent threat to the environment.

(d) “Marina storage tank” to mean a petroleum storage tank used to provide fuel to water vessels, at least 90 percent of which is either above ground level or in or over water and which has a capacity of at least 110 gallons but not more than 12,000 gallons. The term includes all piping connected to the tank, except piping, valves, hoses, filters and nozzles associated with the fuel dispenser.

(e) “Site” to mean the facility, whether situated on a single parcel or on multiple adjacent parcels, where the tank is located.

(f) “Small business” to mean a business which receives less than $500,000 in gross annual receipts from the site where the tank is located, based upon the average annual gross receipts for the following period:

(1) If the business has been in operation for 5 or more fiscal years on the date on which the discharge is discovered, the 5 fiscal years immediately preceding the date on which the discharge was discovered; or

(2) If the business has been in operation for less than 5 fiscal years on the date the discharge is discovered, the total number of years the business has been in operation.

(g) “Storage tank” to mean any tank, including any connected pipes, except piping above the dispenser shear valve, used to contain an accumulation of petroleum. The term does not include any tank that is:

(1) Exempted from the provisions of NRS 590.700 to 590.920, inclusive, unless the operator of the tank chooses to register it pursuant to paragraph (b) of subsection 1 of NRS 590.920;

(2) Excluded from the definition of “underground storage tank” in 40 C.F.R. § 280.12, except that a farm or residential tank having a capacity of 1,100 gallons or less and that is used for storing motor fuel for noncommercial purposes is a storage tank;

(3) Permanently closed in accordance with NAC 459.9972 and 40 C.F.R. § 280.71; or

(4) Not federally regulated which is permanently closed in accordance with a rule or an ordinance of a local governmental entity.

2. As used in this section:

(a) “Bodily injury” means any injury, sickness, disease or death suffered by a person as a proximate result of a discharge.

(b) “Property damage” means any actual injury to real or tangible personal property, loss of use of the property, or both, occurring as a proximate result of a discharge.

(c) “Suit” means any civil proceeding in which damages are sought for which the Fund is potentially liable. The term includes any arbitration proceeding in which such damages are sought, to which the operator must submit or to which he submits with the consent of the Board.

(Added to NAC by Bd. to Review Claims, eff. 6-15-90; A 12-23-91; 1-22-96; A by Div. of Environmental Protec. by R226-05, 5-4-2006)

NAC 590.714 Designation as “small business.” (NRS 590.830) To be designated as a small business as described in paragraph (f) of subsection 1 of NAC 590.710, an operator must submit the following to the Division:

1. Copies of forms reporting federal income tax which show the operator’s gross annual receipts for the following period:

(a) If the business has been in operation for 5 or more fiscal years on the date on which the discharge is discovered, the 5 fiscal years immediately preceding the date on which the discharge was discovered; or

(b) If the business has been in operation for less than 5 fiscal years on the date the discharge is discovered, the total number of years the business has been in operation.

2. Any other information requested by the Division which is necessary to determine whether the operator is a small business.

(Added to NAC by Bd. to Review Claims, eff. 1-22-96; A by Div. of Environmental Protec. by R226-05, 5-4-2006)

NAC 590.720 Adoption by reference of certain provisions of Code of Federal Regulations and *International Fire Code*. (NRS 590.830**)** The Board hereby adopts by reference:

1. The provisions of 40 C.F.R. §§ 280.12, 280.40 to 280.45, inclusive, 280.50, 280.53, 280.70 and 280.71 as they existed on July 1, 1990, and the provisions of 40 C.F.R. §§ 280.61 and 280.62 as they existed on January 1, 2006. A copy of the volume containing these provisions may be obtained at a cost of $50 from the Superintendent of Documents, United States Government Printing Office, Washington, D.C. 20401.

2. The provisions of chapters 2, 22 and 34 of the *International Fire Code*, 2003 edition. A copy of the volume containing these provisions may be obtained at a cost of $70 from the International Code Council at the Internet address http://www.iccsafe.org.

(Added to NAC by Bd. to Review Claims, eff. 6-15-90; A 12-23-91; A by Div. of Environmental Protec. by R226-05, 5-4-2006)

NAC 590.730 Annual fee and application for registration of storage tank; letter of coverage. (NRS 590.830**,** 590.850**)**

1. Except as otherwise provided in this subsection, each operator of a registered storage tank shall, on or before October 1 of each year, pay a fee in the amount of $100 for registration for coverage provided by the Fund and submit an application for registration to the Division in the form prescribed by the Board. An application for registration is not required from an operator who has filed with the Division Form 7530-1, "Notification for Underground Storage Tanks," adopted by the United States Environmental Protection Agency.

2. The Division will bill the operator for the annual registration fee not less than 30 days before the date the fee is due. The failure of an operator to receive a bill does not relieve him of his obligation to pay the fee on or before the date it is due.

3. Upon compliance by the operator with the provisions of subsection 1, the Division will issue a letter evidencing the coverage provided by NRS 590.880 or 590.890, whichever applies. The letter will:

(a) Include the name and address of the facility at which the storage tank is located, together with any other information required to identify the storage tank; and

(b) Set forth the amount of money available in the Fund, as of the date of the letter, to pay costs or damages resulting from any discharge from the storage tank which qualifies for coverage provided by NRS 590.880 or 590.890, as applicable.

4. After January 1, 1992, if a discharge from a storage tank is discovered during a period in which the annual registration fee for that storage tank is delinquent, the Division will not use money in the Fund to pay costs or damages resulting from any discharge from that storage tank.

(Added to NAC by Bd. to Review Claims, eff. 6-15-90; A 12-23-91; 10-16-95; A by Div. of Environmental Protec. by R226-05, 5-4-2006)

NAC 590.740 Testing and inspection of storage tanks. (NRS 590.830, 590.870)

1. Except as otherwise provided in this section, each operator of a registered storage tank shall perform or cause to be performed a test of the storage tank for tightness in accordance with the provisions of NAC 459.994 and the schedule contained in 40 C.F.R. § 280.40(c).

2. The operator of a registered storage tank that is above ground shall perform or cause to be performed an inspection of the storage tank at least once each month. The monthly inspection must include, without limitation:

(a) Visual inspection of the aboveground storage tank system to identify cracks or other defects in the secondary containment area and product transfer area;

(b) Visual inspection of the exterior surfaces of the tanks, piping, valves, pumps and other equipment for cracks, corrosion, releases and maintenance deficiencies and to identify malfunctioning equipment, needed maintenance and needed revisions to current operating practices;

(c) Visual inspection of the elevated tanks or tanks on concrete slabs; and

(d) Unless the secondary containment of the tank has a sound concrete floor or liner:

(1) Visual inspection of the area between the outer shell of the tank or the floor of the tank and the containment area; or

(2) Vapor monitoring of the soil directly beneath the tank bottom or perimeter and the water table.

3. A registered portable storage tank must be inspected visually by the operator immediately before and after the portable storage tank is relocated.

4. A marina storage tank must be tested and inspected in accordance with the provisions of NAC 459.9938.

5. The operator of a registered storage tank shall maintain a record of each inspection conducted pursuant to this section on a form approved by the Division for at least 3 years after the date of the inspection.

(Added to NAC by Bd. to Review Claims, eff. 6-15-90; A 12-23-91; 1-22-96; A by Div. of Environmental Protec. by R226-05, 5-4-2006)

NAC 590.750 Financial responsibility of operators. (NRS 590.830) Upon request, an operator of a regulated underground storage tank shall submit to the Division evidence of his financial responsibility. An operator may demonstrate his financial responsibility in any manner permitted by NAC 459.995.

(Added to NAC by Bd. to Review Claims, eff. 6-15-90; A 12-23-91; A by Div. of Environmental Protec. by R226-05, 5-4-2006)

NAC 590.760 Discharges: Duties of operators. (NRS 590.830, 590.870)

1. The operator of a storage tank shall report any discharge promptly in accordance with the requirements of NAC 445A.347 and 40 C.F.R. §§ 280.50 and 280.53.

2. As soon as possible after the discharge, the operator shall submit to the Division an application for coverage by the Fund for the discharge. The application for coverage must be submitted on the form prescribed by the Division and must include:

(a) A written description of how, when and where the discharge occurred;

(b) A description of any damage known to the operator to have been caused by the discharge; and

(c) If the services of a person certified as an environmental manager pursuant to NAC 459.972 or 459.9724 have been obtained, the name of that person.

3. The operator shall take all reasonable steps to protect the site of the discharge from further damage in accordance with the provisions of 40 C.F.R. §§ 280.61 and 280.62.

4. The operator shall:

(a) Prepare and maintain a record of all costs incurred by him in cleaning up the discharge.

(b) Permit the Division to inspect any property or records relating to the discharge or damage caused by the discharge.

(c) Notify the Division if the cost of:

(1) An emergency action; or

(2) The initial response actions and abatement measures prescribed by 40 C.F.R. §§ 280.61 and 280.62,

Ê will exceed $5,000.

(d) If the operator is seeking reimbursement by the Fund for the costs of cleaning up the tank or of liability for damages, unless an employee of the operator will be providing services that are exempted from the provisions of NAC 459.970 to 459.9729, inclusive, by subsection 1 of NAC 459.9718, obtain the services of a person who is certified as an environmental manager pursuant to NAC 459.972 or 459.9724.

(e) Obtain approval from the Division or secure not less than three competitive bids for a task included in a corrective action that costs more than $3,000 if:

(1) The corrective action necessitated by a discharge from a storage tank is not an emergency pursuant to paragraph (c) of subsection 1 of NAC 590.710; and

(2) The operator is seeking reimbursement by the Fund for the costs of cleaning up the tank or of liability for damages.

(Added to NAC by Bd. to Review Claims, eff. 6-15-90; A 12-23-91; 1-22-96; A by Div. of Environmental Protec. by R226-05, 5-4-2006)

NAC 590.765 Operator to notify Division of civil action for damages; submission of order of judgment or settlement agreement required for payment from Fund. (NRS 590.830)

1. An operator shall notify the Division of a civil action brought against him by another person for damages alleged to have been caused by a discharge from the storage tank of the operator. The notice must be in writing and submitted to the Division within 60 days after the date the operator is properly served with the summons and a copy of the complaint that commenced the civil action.

2. The Board may:

(a) Consider failure to notify the Division pursuant to the provisions of subsection 1 as a basis for denial of payment from the Fund.

(b) Excuse a failure to provide notice pursuant to the provisions of subsection 1 upon demonstration of good cause for the failure to comply.

3. An operator who is required to provide notice pursuant to the provisions of subsection 1 and who seeks payment from the Fund for liability for damages must submit, as a supporting document:

(a) A copy of a final judgment which has been entered with a court and which orders the operator to pay damages; or

(b) If the operator and the other party to the civil action settled the claim, a copy of the settlement agreement.

Ê The Board will not authorize payment from the Fund unless it has received the order of judgment or it has received the settlement agreement and has approved the terms of such agreement.

(Added to NAC by Bd. to Review Claims by R001-99, eff. 11-19-99)

NAC 590.770 Discharges: Authority of Administrator of Division. (NRS 590.830**)** If a discharge occurs from a storage tank, the Administrator of the Division may, at such times as are reasonably required:

1. Question the operator of the tank, under oath, about any matter relating to the discharge; and
2. Examine the books and records of the operator.

(Added to NAC by Bd. to Review Claims, eff. 6-15-90)

NAC 590.774 Factors considered in determining necessity for cleanup of discharge from certain storage tanks. (NRS 590.830**)** In determining whether cleaning up a discharge from a storage tank:

1. Which has a capacity of 1,100 gallons or less; and
2. Which is used to store heating oil for consumption on the same premises where the oil is stored,

Ê is necessary to protect the environment or the public health and safety, the Division may consider the factors listed in subsection 1 of NAC 459.9973.

(Added to NAC by Bd. to Review Claims, eff. 1-22-96)

NAC 590.780 Form of claim for reimbursement; time limitations for filing claims for reimbursement; payment to operator, vendor or contractor; payment required of operator; payment of per diem allowance and travel expenses. (NRS 590.830**)**

1. An operator, vendor or contractor who seeks to be reimbursed by the Fund for costs or liability for damages resulting from a discharge must submit to the Division a verified claim for reimbursement in the form prescribed by the Board along with any supporting documents required to substantiate his eligibility for reimbursement. An initial claim must be submitted within 12 months after the date on which the operator, vendor or contractor knew or should have known of the discharge and the final claim must be submitted within 12 months after the completion of the corrective action necessitated by the discharge. The Board will not accept a claim after either deadline unless the operator, vendor or contractor demonstrates good cause for the failure to comply with the deadline.
2. The operator shall provide any additional information required by the Board in order to determine his eligibility for payment from the Fund.
3. The Board may authorize payment from the Fund to:

(a) An operator;

(b) A vendor;

(c) A contractor; or

(d) Any combination of persons listed in paragraph (a), (b) or (c), jointly.

4. If money from the Fund is paid to an operator before the operator pays a vendor or contractor, or both, the operator shall:

(a) Pay the vendor or contractor, or both; and

(b) Not more than 30 days after receiving the money from the Fund, provide the Division with confirmation of payment to the vendor or contractor, or both, of the money paid by the Board.

5. If an operator fails to pay a vendor or contractor for costs approved and paid by the Board within 30 days, the operator shall reimburse the Board for the money paid by the Board.
6. If an operator is entitled to receive payment for his necessary expenses for the costs of cleaning up, the Board will authorize payment of the per diem allowance and travel expenses at the same rate provided for state officers and employees generally.
7. As used in this section, “claim” or “claim for reimbursement” means a request for reimbursement by the Fund of a sum of money, accompanied by the required supporting documents. The term does not include an application for coverage under the Fund.

(Added to NAC by Bd. to Review Claims, eff. 6-15-90; A 12-23-91; 11-3-92; A by Div. of Environmental Protec., 1-10-94; A by Bd. to Review Claims, 1-22-96)

NAC 590.790 Severability of provisions. (NRS 590.830) If any provision of NAC 590.700 to 590.780, inclusive, or the application of the provision to any person, thing or circumstance is held invalid, it is intended that the invalidity not affect the remaining provisions, or their application, that can be given effect without the invalid provision or application.

(Added to NAC by Bd. to Review Claims, eff. 6-15-90)

STORAGE TANKS

STORAGE TANKS

NRS 459.800 Definitions. As used in NRS 459.800 to 459.856, inclusive, unless the context otherwise requires, the words and terms defined in NRS 459.802 to 459.820, inclusive, have the meanings ascribed to them in those sections.

(Added to NRS by 1989, 769; A 1993, 208)

NRS 459.802 "Commission" defined. "Commission" means the State Environmental Commission.

(Added to NRS by 1989, 770)

NRS 459.804 "Department" defined. "Department" means the State Department of Conservation and Natural Resources.

(Added to NRS by 1989, 770)

NRS 459.806 "Director" defined. "Director" means the Director of the Department.

(Added to NRS by 1989, 770)

NRS 459.808 "Division" defined. "Division" means the Division of Environmental Protection of the Department.

(Added to NRS by 1989, 770)

NRS 459.810 "Operator" defined. "Operator" means any person in control of, or having responsibility for, the daily operation of a storage tank.

(Added to NRS by 1989, 770)

NRS 459.812 "Owner" defined. "Owner" means any person who owns:

1. An underground storage tank used to store or dispense regulated substances after November 8, 1984, or if the use of the tank was discontinued before that date, the last person to own such a tank before its use was discontinued; or
2. An aboveground storage tank used to store or dispense regulated substances after October 1, 2003, or, if the use of the tank was discontinued before that date, the last person to own such a tank before its use was discontinued.

(Added to NRS by 1989, 770; A 2003, 2116)

NRS 459.814 "Person" defined. "Person" includes an agency of the Federal Government, any state and its local governments.

(Added to NRS by 1989, 770)

NRS 459.816 "Regulated substance" defined. "Regulated substance" means:

1. Any petroleum substance or chemical regulated by the federal Resource Conservation and Recovery Act of 1976 (42 U.S.C. §§ 6901 et seq.), that is contained in a storage tank, except that the term does not include any substance subject to regulation under Subtitle C of that act as hazardous waste; and
2. Any petroleum, including crude oil or any fraction thereof that is liquid at standard condition of temperature and pressure, 60 degrees Fahrenheit and 14.7 pounds per square inch absolute. The term includes, but is not limited to, petroleum and petroleum-based substances comprised of a complex blend of hydrocarbons derived from crude oil through processes of separation, conversion, upgrading and finishing, such as motor fuels, jet fuels, distillate fuel oils, residual fuel oils, lubricants, solvents and used oils.

(Added to NRS by 1989, 770)

NRS 459.818 "Release" defined. "Release" means the spilling, leaking, emitting, discharging, escaping, leaching or disposing from a storage tank into groundwater, surface water or surface or subsurface soils.

(Added to NRS by 1989, 770)

NRS 459.820 "Storage tank" defined. "Storage tank" means any one or combination of stationary tanks, including pipes connected thereto, used to contain and accumulate regulated substances. The term includes only:

1. Underground storage tanks that are regulated pursuant to the federal Resource Conservation and Recovery Act of 1976, 42 U.S.C. §§ 6901 et seq.; and

2. Aboveground storage tanks that have a storage capacity of at least 110 gallons but not more than 30,000 gallons, including, without limitation, aboveground storage tanks located over water and used to supply fuel at a marina or other facility.

(Added to NRS by 1989, 770; A 2003, 2116)

NRS 459.822 Department designated as state agency for regulation of storage tanks. The Department is hereby designated to act as the state agency for the purpose of federal laws and regulations governing storage tanks and it may take any action necessary to secure the benefits of any federal law relating to storage tanks.

(Added to NRS by 1989, 773)

NRS 459.824 Duties of Director. The Director shall:

1. Administer the provisions of NRS 459.800 to 459.856, inclusive, in a manner that is consistent with, and not more stringent than, the applicable provisions of federal law;

2. Advise, consult and cooperate with other agencies of the State, the Federal Government, other states, interstate agencies and other persons in furthering the purposes of NRS 459.800 to 459.856, inclusive;

3. Take steps necessary to qualify for, accept and administer loans and grants from the Federal Government and other sources, public or private, for carrying out the provisions of NRS 459.800 to 459.856, inclusive;

4. Encourage, request, require the Department to participate in or conduct, studies, surveys, investigations, research, experiments, demonstrations and pilot programs by contract, grant or other means;

5. Collect and disseminate information to the public;

6. Hold hearings and issue subpoenas requiring the attendance of witnesses and the production of evidence, as the Director finds necessary to carry out the provisions of NRS 459.800 to 459.856, inclusive;

7. Exercise all powers necessary to carry out the provisions of NRS 459.800 to 459.856, inclusive; and

8. Delegate to the Division any of the Director's powers or duties set forth in NRS 459.800 to 459.856, inclusive.

(Added to NRS by 1989, 770)

NRS 459.825 Coordination of fees, regulations and forms; duties of regulatory agencies.

1. The Commission shall coordinate:

(a) The collection of fees related to storage tanks;

(b) The adoption of regulations governing storage tanks; and

(c) The standardization of forms used by the agencies of the State and local governments that regulate storage tanks for reporting information relating to such storage tanks.

2. Each agency of this State and local government that regulates storage tanks shall, in consultation with the Commission:

(a) Cooperate to eliminate any duplication, conflicts or inconsistencies in regulations adopted to govern storage tanks;

(b) Review periodically the forms for reporting information related to storage tanks to determine whether they are complete and easy to understand and, if appropriate, revise the forms accordingly;

(c) Cooperate to develop a uniform format for reporting information related to storage tanks;

(d) Cooperate to ensure that agencies of local governments that respond to emergencies involving storage tanks receive reports of those emergencies in a timely manner; and

(e) Consolidate the collection of fees related to storage tanks.

(Added to NRS by 1993, 207; A 2003, 2116)

NRS 459.826 Regulations of Commission: General requirements. The Commission shall adopt regulations to carry out the provisions of NRS 459.800 to 459.856, inclusive. Those regulations must be based upon studies, guidelines and regulations of the Federal Government and must:

1. Set forth a means for an owner or operator of a storage tank to notify the Division of the existence, size and location of and the substances contained in the storage tank;

2. Issue standards of performance for the operation and construction of a storage tank;

3. Establish requirements for the reporting of a release from a storage tank and the reporting of corrective actions taken in response to such a release;

4. Establish standards of financial responsibility for owners and operators of storage tanks;

5. Require owners or operators of facilities having storage tanks to maintain records and devices for the continuing observation of storage tanks; and

6. Establish procedures for:

(a) Inspecting and testing storage tanks;

(b) Obtaining samples from storage tanks; and

(c) Reporting to the Department on such inspections, testing and samples.

(Added to NRS by 1989, 771)

NRS 459.828 Owner or operator of storage tank to provide Department with certain information. The owner or operator of a storage tank shall notify the Department as required by regulations of the Commission, of the existence, size, location, age, type, uses and name of the owner of a storage tank.

(Added to NRS by 1989, 771)

NRS 459.830 Regulations of Commission: Standards of performance. The Commission shall adopt regulations which set forth standards of performance for:

1. Storage tanks brought into use on or after the effective date of such standards. The standards must address the:

(a) Design;

(b) Construction;

(c) Installation; and

(d) Compatibility of components,

➥ of storage tanks and systems for the detection of releases from storage tanks.

2. Maintenance and keeping records of:

(a) Systems for the detection of releases from storage tanks;

(b) Systems for the testing of storage tanks;

(c) Systems for the monitoring of inventory of storage tanks; and

(d) Other systems designed to identify releases from storage tanks.

(Added to NRS by 1989, 771)

NRS 459.832 Regulations of Commission: Closure, removal, disposal and management of storage tanks. The Commission shall adopt regulations:

1. Establishing requirements for the closure of a storage tank or the removal or disposal of a storage tank to prevent future releases of regulated substances into the environment; and

2. Setting forth a plan for the management of storage tanks in the entire State.

(Added to NRS by 1989, 771)

NRS 459.834 Regulations of Commission regarding corrective action, evidence of financial responsibility; determination of whether corrective action is required.

1. The Commission shall by regulation establish requirements for:

(a) Corrective action to be taken in response to a release from a storage tank;

(b) Ensuring that the corrective action is cost-effective; and

(c) Maintaining evidence of the financial responsibility of owners and operators of storage tanks.

2. In determining whether corrective action is required by the presence of excessive petroleum in the soil, the Division shall consider, unless waived by the Administrator of the Division:

(a) Factors peculiar to the site and to the contaminant; and

(b) The use of methods developed by the American Society for Testing and Materials to assess health and environmental risks, or equivalent procedures, to establish the need for corrective action and the required level of corrective action.

(Added to NRS by 1989, 772; A 1995, 1891)

NRS 459.836 Permits to operate storage tanks: Regulations; terms and conditions; fee.

1. The Commission may by regulation set forth a procedure for the granting, renewal, modification, suspension, revocation and denial of permits to operate storage tanks.

2. Permits may contain terms and conditions which the Commission considers necessary and which conform to law and regulations adopted by the Commission.

3. The Commission may by regulation prescribe a reasonable fee to be charged for the issuance of a permit.

(Added to NRS by 1989, 772)

NRS 459.838 Account for Management of Storage Tanks: Creation; sources; claims. All fees collected for the issuance of permits to operate storage tanks, if such permits are required, and all reimbursements and penalties recovered pursuant to NRS 459.840 to 459.856, inclusive, must be deposited with the State Treasurer for credit to the Account for the Management of Storage Tanks, which is hereby created in the State General Fund. The money in the Account must be paid as other claims against the State are paid.

(Added to NRS by 1989, 772; A 1993, 646)

NRS 459.840 Account for Management of Storage Tanks: Use; reimbursement; action by Attorney General.

1. Except as otherwise provided in subsections 2 and 3, money in the Account for the Management of Storage Tanks may only be expended for the continuing observation or other management of storage tanks.

2. If a person responsible for a release of a regulated substance from a storage tank does not act promptly to clean and decontaminate the affected area properly, and if that inaction presents an imminent and substantial hazard to human health, public safety or the environment, money from the Account may be expended to pay the costs of:

(a) Responding to a release of a regulated substance from a storage tank;

(b) Coordinating the efforts of state, local and federal agencies responding to a release from a storage tank;

(c) Managing the cleaning and decontamination of an area in which a release from a storage tank has occurred; or

(d) Removing or contracting for the removal of a regulated substance released from a storage tank which presents an imminent danger to human health, public safety or the environment.

3. The Director shall demand reimbursement of the Account for money expended pursuant to subsection 2 from any person who is responsible for the release, or who owns or controls the storage tank, or the area in which the release occurred. Payment of the reimbursement is due within 20 days after the person receives notice from the Director of the amount due. Reimbursement may include all costs actually incurred in the investigation and cleanup. The Director may impose an administrative penalty of not more than 5 percent of the amount of reimbursement for each day the amount remains unpaid after the date the payment for reimbursement is due.

4. At the request of the Director, the Attorney General shall seek recovery by legal action of the amount of any unpaid reimbursement and penalty.

(Added to NRS by 1989, 772; A 1993, 646)

NRS 459.842 Enforcement by Department; delegation of responsibility. The Department shall enforce the provisions of NRS 459.800 to 459.856, inclusive, or any regulations adopted pursuant to those sections, but may delegate responsibility for enforcing those provisions to suitably qualified agencies of the political subdivisions of this State.

(Added to NRS by 1989, 774)

NRS 459.844 Subpoenas. In carrying out the provisions of NRS 459.800 to 459.856, inclusive, the Commission, the Department and the Attorney General may by subpoena require the attendance and testimony of witnesses and the production of reports, papers, documents and other evidence which they deem necessary.

(Added to NRS by 1989, 774)

NRS 459.846 Disclosure of information obtained by Department.

1. Except as otherwise provided in this section, information which the Department obtains in the course of the performance of its duties relating to storage tanks is public information.

2. Except as otherwise provided in NRS 239.0115, any information which specifically relates to the trade secrets of any person is confidential. The following information shall be deemed a trade secret:

(a) Information concerning fuel additives. For the purposes of this paragraph, "fuel additives" are ingredients which are present in fuel compositions in amounts of less than 1 percent by weight, including detergents, dispersants, demulsifiers and dyes.

(b) Any other information considered to be a trade secret by the Director. A trade secret may include a formula, composition, process, method of operation, compilation of information or apparatus which is used in a person's business and gives that person an opportunity to obtain an advantage over competitors. In determining whether information is a trade secret, the Director shall consider whether the information is publicly available in written form and, if not, whether its disclosure would tend to affect adversely the competitive position of the owner of the information.

3. Any information which is confidential under subsection 2 may be disclosed to any officer, employee or authorized representative of this State or the United States if:

(a) He or she is engaged in carrying out the provisions of NRS 459.800 to 459.856, inclusive, or the provisions of federal law relating to storage tanks; or

(b) The information is relevant in any judicial proceeding or adversary administrative proceeding under NRS 459.800 to 459.856, inclusive, or under the provisions of federal law relating to storage tanks, and is admissible under the rules of evidence.

➥ The disclosure must be made in a manner which preserves the status of the information as a trade secret.

(Added to NRS by 1989, 773; A 2007, 2113)

NRS 459.848 Authority to enter and inspect. Any authorized representative or employee of the Commission or the Department may, for the purpose of carrying out his or her duties pursuant to NRS 459.800 to 459.856, inclusive, or to enforce a regulation adopted pursuant to those sections:

1. Enter any place where the Department has reason to believe there are storage tanks;

2. Inspect or obtain samples wherever the Department has reason to believe a release from a storage tank may have occurred;

3. Inspect and copy any records, reports, information or results of tests relating to the management of a storage tank; and

4. Inspect any system for the continuing observation of a storage tank.

(Added to NRS by 1989, 773)

NRS 459.850 Action to alleviate hazard to human health, public safety or environment. If the Department receives information that the operation of a storage tank presents an imminent and substantial hazard to human health, public safety or the environment, it may:

1. Issue an order directing the owner or operator of the storage tank to take necessary steps to prevent the act or eliminate the practice which constitutes the hazard.

2. Request that the Attorney General commence an action to enjoin the practices or acts which constitute the hazard.

3. Take any other action designed to reduce or eliminate the hazard.

(Added to NRS by 1989, 773)

NRS 459.852 Order for corrective action. Whenever the Director finds that any person is engaging or has engaged in any act or practice which violates any provision of NRS 459.800 to 459.856, inclusive, or a regulation adopted pursuant to those sections or any term or condition of a permit issued for the operation of a storage tank, the Director may issue an order:

1. Specifying the provision which is alleged to have been violated or which is about to be violated;
2. Setting forth the facts alleged to constitute the violation;
3. Prescribing any corrective action which must be taken and a reasonable time within which it must be taken; and
4. Requiring the person to whom the order is directed to appear before the Director or a hearing officer appointed by the Director to show cause why the Department should not commence an action against the person in district court for appropriate relief.

(Added to NRS by 1989, 774)

NRS 459.854 Injunctive relief.

1. The Director may seek an injunction in district court to prevent the occurrence or continuance of any act or practice which violates any provision of NRS 459.800 to 459.856, inclusive, or any regulation adopted or permit or order issued pursuant to those sections.
2. If the Director shows that a person is or has engaged in any act or practice which violates a provision of NRS 459.800 to 459.856, inclusive, or any regulation adopted or permit or order issued pursuant to those sections, the court may issue, without bond, any prohibitory or mandatory injunction which the facts warrant, including a temporary restraining order or a preliminary or permanent injunction. A temporary restraining order may be granted only if:

(a) The Director gives notice to the defendant in person, of the Director's intention to seek such an order, or mails such notice to the defendant's last known address by registered or certified mail. The notice must be given at least 10 days before the commencement of the hearing.

(b) Before and during that 10-day period, the Director affords the defendant an opportunity to correct each violation which is the subject of the hearing and the defendant fails to correct the violation or violations before the commencement of the hearing.

3. The court may require a performance bond or other security by the respondent to ensure the respondent's compliance with the order.

(Added to NRS by 1989, 774)

NRS 459.856 Civil penalties; damages.

1. Any person who violates or contributes to a violation of any provision of NRS 459.800 to 459.856, inclusive, or of any regulation adopted or permit or order issued pursuant to those sections, or who does not take action to correct a violation within the time specified in an order, is liable to the Department for a civil penalty of not more than $5,000 for each day on which the violation occurs. This penalty is in addition to any other penalty provided by NRS 459.800 to 459.856, inclusive.
2. The Department may recover, in the name of the State of Nevada, actual damages which result from a violation, in addition to the civil penalty provided in this section. The damages may include expenses incurred by the Department in removing, correcting or terminating any adverse effects which resulted from the violation and compensation for any damages incurred as a result of the violation.

(Added to NRS by 1989, 775)

CLEANUP OF DISCHARGED PETROLEUM

CLEANUP OF DISCHARGED PETROLEUM

NRS 590.700 Definitions. As used in NRS 590.700 to 590.920, inclusive, unless the context otherwise requires, the words and terms defined in NRS 590.710 to 590.800, inclusive, have the meanings ascribed to them in those sections.
(Added to NRS by 1989, 1686; A 1991, 339; 2005, 300)

NRS 590.710 "Board" defined. "Board" means the Board to Review Claims.
(Added to NRS by 1989, 1686)

NRS 590.720 "Department" defined. "Department" means the Department of Motor Vehicles.
(Added to NRS by 1989, 1686; A 1999, 1022; 2001, 2642)

NRS 590.725 "Diesel fuel of grade number 1" defined. "Diesel fuel of grade number 1" means a distillate from fuel oil which is of high volatility and used in high-speed diesel engines generally operated under variations in speed and load. The term includes diesel fuel of the type "C-B," generally used in buses and similar operations.
(Added to NRS by 1991, 338)

NRS 590.726 "Diesel fuel of grade number 2" defined. "Diesel fuel of grade number 2" means a distillate from gas oil which is of low volatility and used in high-speed diesel engines generally operated under uniform speed and load. The term includes diesel fuel of the type "R-R," generally used in railroad locomotives, and type "T-T," generally used in trucks with diesel engines.
(Added to NRS by 1991, 338)

NRS 590.730 "Discharge" defined. "Discharge" means any release, leaking or spilling from a storage tank into water or soil, unless the discharge is authorized by state or federal law.
(Added to NRS by 1989, 1686)

NRS 590.740 "Division" defined. "Division" means the Division of Environmental Protection of the State Department of Conservation and Natural Resources.
(Added to NRS by 1989, 1686)

NRS 590.750 "Fund" defined. "Fund" means the Fund for Cleaning Up Discharges of Petroleum.
(Added to NRS by 1989, 1686)

NRS 590.760 "Heating oil" defined. "Heating oil" means diesel fuel of grade number 1 or 2 or any other form of petroleum used in an oil-fired furnace or boiler for space heating.
(Added to NRS by 1989, 1686)

NRS 590.765 "Motor vehicle fuel" defined. "Motor vehicle fuel" has the meaning ascribed to it in NRS 365.060.
(Added to NRS by 1991, 338)

NRS 590.770 "Operator" defined. "Operator" means a person who owns, controls or is responsible for the operation of a storage tank.
(Added to NRS by 1989, 1686)

NRS 590.780 "Person" defined. "Person" includes the United States, this state, and any agency or political subdivision of this state.
(Added to NRS by 1989, 1686)

NRS 590.790 "Petroleum" defined. "Petroleum" means crude oil or any fraction thereof which is liquid at a temperature of 60 degrees Fahrenheit and a pressure of 14.7 pounds per square inch absolute.
(Added to NRS by 1989, 1687)

NRS 590.800 "Storage tank" defined. "Storage tank" means any tank used to store petroleum, except petroleum for use in a chemical process.

(Added to NRS by 1989, 1687)

NRS 590.810 Legislative findings. The Legislature finds that:

1. Protection of this state's environment, particularly its supplies of water, requires the prompt cleaning up of any discharge of petroleum from a storage tank.

2. Federal law and regulations require each operator of a storage tank to show financial responsibility for this purpose, but the capital of smaller operators is too little to meet these requirements and insurance to cover this liability is prohibitively costly for these smaller operators.

3. Free competitive access to the business of distributing petroleum therefore requires a system of funding this liability in which all engaged in the business must participate equitably.

4. The fee imposed by NRS 590.840 is not an excise tax but a fee for engaging in the refining or importation of motor vehicle fuel, diesel fuel of grade number 1, diesel fuel of grade number 2 and heating oil.

(Added to NRS by 1989, 1687; A 1991, 339)

NRS 590.820 Board to Review Claims: Creation; members; Chair; administrative assistance; compensation of members.

1. The Board to Review Claims is hereby created in the Division. The Board consists of:

(a) The Administrator of the Division;

(b) The Executive Director of the Department;

(c) The State Fire Marshal;

(d) A representative of refiners of petroleum;

(e) A representative of independent dealers in petroleum;

(f) A representative of independent retailers of petroleum; and

(g) A representative of the general public.

2. An officer designated as a member of the Board may designate a substitute. The Governor shall appoint the respective representatives designated as members of the Board. Each representative of a field of enterprise must be appointed from a list of three persons nominated by persons engaged in that field in this State, through their trade association if one exists.

3. The Board shall select its Chair. The Administrator of the Division shall provide administrative assistance to the Board as required.

4. Each member who is appointed by the Governor is entitled to receive a salary of not more than $80, as fixed by the Board, for each day's attendance at a meeting of the Board.

5. While engaged in the business of the Board, each member of the Board is entitled to receive the per diem allowance and travel expenses provided for state officers and employees generally.

(Added to NRS by 1989, 1687; A 1991, 491)

NRS 590.830 Fund for Cleaning Up Discharges of Petroleum: Creation; administration by Division; adoption of regulations by Board; claims; expenses and interest; resolutions adopted by Board concerning Fund.

1. The Fund for Cleaning Up Discharges of Petroleum is hereby created as a special revenue fund in the State Treasury. The Division shall administer the Fund for the purposes prescribed in NRS 590.700 to 590.920, inclusive, and the Board shall adopt appropriate regulations for the investigation and payment of claims against the Fund. The Board shall review each claim presented and authorize payment to the extent warranted by the facts of the case.

2. The expenses incurred by the Division in performing its duties pursuant to NRS 590.700 to 590.920, inclusive, are a charge against the Fund. The interest earned on money in the Fund must be credited to the Fund.

3. The Board shall transmit a copy of any resolution that the Board has adopted in carrying out its duties pursuant to this section to the Legislative Counsel within 5 working days after the adoption of the resolution for inclusion in the register of administrative regulations published pursuant to NRS 233B.0653.

(Added to NRS by 1989, 1687; A 1997, 126; 1999, 2408; 2005, 300)

NRS 590.835 Fund for Cleaning Up Discharges of Petroleum: Expenditures for certain discharges; limitations; reimbursement. Notwithstanding any provision of NRS 590.700 to 590.920, inclusive, to the contrary, and except as otherwise provided in this section:

1. The Division may expend not more than $250,000 from the Fund per year as reimbursement for necessary costs incurred by the Division in the response to and cleanup of any discharge involving petroleum, including discharges from a storage tank and discharges from a mobile tank that occur during the transportation of petroleum on roads and highways. If the discharge involving petroleum also involves the discharge of another hazardous material, the Division may expend money pursuant to this section in the cleanup of the discharge of petroleum and the other hazardous material. The Division shall not expend money from the Fund pursuant to this section to clean up discharges involving petroleum from pipelines.

2. Except as otherwise provided in this subsection, money from the Fund expended by the Division pursuant to this section must be used to augment, and must not be used to replace or supplant, any money available from other sources for the cleanup of discharges of petroleum, including, without limitation, reimbursements by operators required to be made to the Division pursuant to NRS 590.850 and 590.870. If no money is available from those other sources, the Division may expend money from the Fund pursuant to this section to reimburse the Division for any costs specified in subsection 1.

3. If the Division expends money pursuant to this section to clean up a discharge involving petroleum, the operator of the tank shall reimburse the Division for the operator's share of the costs for cleaning up the discharge. The Division shall, upon being reimbursed by the operator of the tank pursuant to this subsection, deposit that money in the Fund.

4. As used in this section:

(a) "Discharge" means any release, leaking or spilling from a tank into water or soil, unless the discharge is authorized by state or federal law.

(b) "Operator" means a person who owns, controls or is responsible for the operation of a tank.

(c) "Tank" means a storage tank or a mobile tank used to transport petroleum received for sale or use in this State.

(Added to NRS by 2005, 298)

NRS 590.840 Collection of fee for certain fuels and heating oil; exempt products; payment of expenses of Department.

1. Except as otherwise provided in subsection 2, the Department shall collect for deposit in the Fund a fee of 0.75 cent for each gallon of motor vehicle fuel, diesel fuel of grade number 1, diesel fuel of grade number 2 and heating oil imported into this State in one of those forms or refined in this State. The fee imposed by this section is in addition to the taxes imposed by chapters 365 and 366 of NRS.

2. The fee imposed by subsection 1 does not apply to motor vehicle fuel, diesel fuel of grade number 1, diesel fuel of grade number 2 or heating oil that is:

(a) Imported or refined by the United States, its unincorporated agencies and instrumentalities, or any incorporated agency or instrumentality of the United States wholly owned by the United States or by a corporation wholly owned by the United States;

(b) Exported from this State;

(c) Imported or refined by railroad companies for use in locomotive engines;

(d) Being transported through this State in interstate commerce; or

(e) Used as fuel for jet or turbine-powered aircraft.

3. The fee is payable on or before the last day of each calendar month for those products subject to the fee that are handled during the preceding calendar month. The Department shall prescribe by regulation the manner of payment of the fee and for this purpose may reasonably classify the persons liable for payment. The Department may, in collecting the fee, employ any administrative power conferred upon it by chapter 360A or 365 of NRS.

4. The expenses incurred by the Department in performing its duties under NRS 590.700 to 590.920, inclusive, are a charge against the Fund.

(Added to NRS by 1989, 1688; A 1991, 339; 1995, 2503; 1999, 1022; 2001, 2630, 2642)

NRS 590.850 Registration of storage tanks: Collection of annual fee; exempt tanks; reimbursement and other liability for noncompliance.

1. Except as otherwise provided in subsection 2, the Division shall collect for deposit in the Fund an annual fee not to exceed $100, set by the Board, for the registration of each storage tank.

2. No fee is to be collected, and no registration is required, with respect to a storage tank used to store heating oil for consumption on the same premises where the oil is stored, or a storage tank operated by a person not required to pay the fee for petroleum produced in or imported into this State.

3. The operator of a storage tank required to be registered pursuant to this section who fails to register that tank or to pay the annual fee when required shall reimburse the Division for any expense incurred by the Division in cleaning up a discharge from that storage tank and for any discharge of liability to a third person. If, in cleaning up the discharge from that storage tank, the Division expends money from the Fund in accordance with NRS 590.835, the Division shall, upon being reimbursed by the operator of the storage tank pursuant to this subsection, deposit that money in the Fund.

(Added to NRS by 1989, 1688; A 1991, 340; 1995, 2504; 2005, 301)

NRS 590.860 Transfer of portion of ending balance in Fund to account created in NRS 408.242. If the balance in the Fund for Cleaning Up Discharges of Petroleum at the end of any fiscal year is estimated at $7,500,000 or more, the Department shall transfer to the account created pursuant to NRS 408.242 the balance in the Fund for Cleaning Up Discharges of Petroleum which exceeds $7,500,000.

(Added to NRS by 1989, 1689; A 1991, 491; 2010, 26th Special Session, 48)

NRS 590.870 Report of discharge from tank required; Division to clean up discharge; exception; reimbursement; test of tank required for coverage.

1. The operator of every storage tank, and every person who for compensation puts petroleum into a storage tank, shall report to the Division every discharge from that tank of which the operator or other person is aware or has reason to believe has occurred. The Division shall undertake or contract for cleaning up the discharge unless the operator or another person is already acting properly to clean it up. If the Division cleans up the discharge, the operator shall reimburse the Division for the operator's share of the costs. If, in cleaning up the discharge, the Division expends money from the Fund in accordance with NRS 590.835, the Division shall, upon being reimbursed by the operator of the storage tank pursuant to this subsection, deposit that money in the Fund.

2. Each operator who is required or who chooses to register a tank must, unless the tank has been tested for tightness under the federal standards embodied in 40 C.F.R. § 280.43c since July 1, 1988, test the tank pursuant to those standards before it is eligible for the coverage provided by NRS 590.880 and 590.890.

(Added to NRS by 1989, 1689; A 2005, 301)

NRS 590.880 Allocation of costs resulting from discharge from certain storage tanks for heating oil. The costs resulting from a discharge from a storage tank which has a capacity of 1,100 gallons or less and is used to store heating oil for consumption on the same premises where the oil is stored must be paid as follows, to the extent applicable:

1. The first $250 for cleaning up and the first $250 of liability for damages to a person other than this state or the operator of the tank, or both amounts, by the operator.

2. If necessary to protect the environment or the public health and safety, the next $250,000 for cleaning up and the next $250,000 for damages to a person other than this state or the operator of the tank, or both amounts, from the Fund. These limits apply to any one discharge and to the total for discharges from storage tanks controlled by any one operator in any fiscal year. For the purpose of this limitation, a group of operators more than 50 percent of whose net worth is beneficially owned by the same person or persons constitutes one operator.

3. Any further cost for cleaning up or for damages, by the operator.

(Added to NRS by 1989, 1689; A 1991, 340; 1995, 2504)

NRS 590.890 Allocation of costs resulting from discharge from other storage tanks; requirement to hold public hearings under certain circumstances. If the costs resulting from a discharge from any other storage tank exceed $5,000, the costs must be paid as follows, to the extent applicable:

1. By an operator which is an agency, department, division or political subdivision of the State, 10 percent or $10,000, whichever is less, of the first $1,000,000 for cleaning up each tank and of the first $1,000,000 of liability for damages from each tank to any person other than this state or the operator of the tank, or both amounts. The balance of the first $1,000,000 for cleaning up each tank or for damages from each tank must be paid from the Fund, but the total amount paid from the Fund pursuant to this subsection in any one fiscal year for discharges from two or more storage tanks under the control of any one operator must not exceed $1,980,000 for cleaning up and $1,980,000 for damages.

2. By an operator which is a small business, 10 percent of the first $1,000,000 for cleaning up each tank and of the first $1,000,000 of liability for damages from each tank to a person other than this state or the operator of the tank, or both amounts. The total amount paid by an operator pursuant to this subsection must not exceed $50,000 for cleaning up and $50,000 for damages regardless of the number of storage tanks involved. The balance of the first $1,000,000 for cleaning up each tank or for damages from each tank must be paid from the Fund, but the total amount paid from the Fund pursuant to this subsection in any one fiscal year for discharges from two or more storage tanks under the control of any one operator must not exceed $1,900,000 for cleaning up and $1,900,000 for damages. For the purpose of this limitation, a group of operators more than 50 percent of whose net worth is beneficially owned by the same person or persons constitutes one operator.

3. By all other operators:

(a) Ten percent of the first $1,000,000 for cleaning up each tank and of the first $1,000,000 of liability for damages from each tank to a person other than this state or the operator of the tank, or both amounts.

(b) Ninety percent of the first $1,000,000 for cleaning up each tank or for damages from each tank must be paid from the Fund.

➥ The total amount paid from the Fund pursuant to paragraph (b) in any one fiscal year for discharges from two or more storage tanks under the control of any one operator must not exceed $1,800,000 for cleaning up and $1,800,000 for damages. For the purpose of this limitation, a group of operators more than 50 percent of whose net worth is beneficially owned by the same person or persons constitutes one operator.

4. Any further cost for cleaning up or for damages which is in excess of the amounts paid pursuant to subsections 1, 2 and 3 must be paid by the operator.

5. A political subdivision of the State that receives money from the Fund pursuant to subsection 1 to pay for the costs of cleaning up shall hold one public hearing upon initiation of the cleanup and one public hearing every 3 months thereafter until the cleanup is completed to ensure that the cleanup complies with any requirements of the Division concerning the cost-effectiveness of cleaning up. The costs incurred by the political subdivision for the hearing must not be attributed to the political subdivision as part of the costs paid by the political subdivision pursuant to subsection 1.

6. For the purposes of this section, a small business is a business which receives less than $500,000 in gross annual receipts from the site where the tank is located.

(Added to NRS by 1989, 1689; A 1991, 340; 1995, 2504)

NRS 590.900 Liability for costs to clean up discharge caused by willful or wanton misconduct, gross negligence or violation of statute or regulation.

1. Any person who, through willful or wanton misconduct, through gross negligence or through violation of any applicable statute or regulation, including specifically any state or federal standard pertaining to the preparation or maintenance of sites for storage tanks, proximately causes a discharge is liable to the Division for any cost in cleaning up the discharge or paying for it to be cleaned up.

2. If a discharge occurs, the site of the tank and any other premises affected by the discharge must be brought into compliance with any applicable standard as described in subsection 1.

(Added to NRS by 1989, 1690)

NRS 590.910 Pro rata reduction required if balance in Fund insufficient for full payment. If the balance in the Fund is insufficient to pay in full all amounts payable from it under NRS 590.700 to 590.920, inclusive, these amounts must be reduced pro rata and the amounts so withheld must be paid pro rata as additional money becomes available in the Fund.

(Added to NRS by 1989, 1690)

NRS 590.920 Tanks exempted from certain provisions; optional coverage of exempted tank.

1. Except as otherwise specifically provided in NRS 590.835, the provisions of NRS 590.850 to 590.910, inclusive, do not apply to any tank which:

(a) Contains petroleum being transported through this State in interstate commerce, but do apply to a tank being used to store petroleum received for sale or use in this State;

(b) Contains fuel for jet or turbine-powered aircraft, or is above ground and has a capacity of 30,000 gallons or less, unless in either case the operator complies with subsection 2; or

(c) Is above ground and has a capacity of more than 30,000 gallons.

2. The operator of a tank exempted by paragraph (b) of subsection 1 may obtain the coverage provided by NRS 590.880 and 590.890 by applying to the Board, paying the fee set pursuant to NRS 590.850 for its registration, and, if the tank is used to store fuel for jet or turbine-powered aircraft, reporting monthly the number of gallons of fuel put into the tank and paying the fee required by NRS 590.840. Coverage pursuant to this subsection begins 6 months after the tank is registered and the required fee first paid.

(Added to NRS by 1989, 1687; A 1991, 341; 2005, 301)

Source Control & Extent and Magnitude of Groundwater Contaminant Plume

NDEP CEM Work Shop: Source Control & Extent and Magnitude of Groundwater Contaminant Plume

NAC 445A.2269 Assessment of conditions at site of facility after notification of release of certain substances. (NRS 445A.425**)**

1. Except as otherwise provided in this section, if the owner or operator of a facility, or his designated agent, is required to give notice of a release pursuant to NAC 445A.345 to 445A.348, inclusive, the Division shall require the owner or operator to conduct an assessment of the conditions at the site of the facility, including an assessment of the condition of the soil or water, or both, to determine the extent and magnitude of the contamination.

NAC 445A.22725 Contamination of groundwater: Order by Director for corrective action; request for exemption; exception. (NRS 445A.425)

1. Except as otherwise provided in this section, the Director may require an owner or operator to take corrective action if the release of a hazardous substance, hazardous waste or a regulated substance contaminates groundwater and the level of contamination exceeds the action level established for the groundwater pursuant to NAC 445A.22735.

2. An owner or operator may, before initiating corrective action or after the termination of remediation pursuant to NAC 445A.22745, submit a written request to the Director for an exemption from the provisions of subsection 1. The request must be accompanied by such supporting information as the Director may require. The Director may grant the request if:

(a) The following conditions are satisfied:

(1) Each source of the contamination of the groundwater is identified and controlled or no source of the contamination remains based upon the age and nature of the release;

(2) The magnitude and extent of the contamination of the groundwater is known; and

(3) Data are available from at least 3 years of quarterly monitoring or another period specified by the Division based upon the magnitude of the contamination of the groundwater and the data do not show a trend of increasing concentrations of the contamination in the body of the plume of the contamination;

A. The Conceptual Site Model (CSM)

Overview

Conceptual Site Models (CSM) are essential elements of a systematic planning process. A CSM serves to conceptualize the relationship between contaminant sources and receptors through consideration of potential or actual migration and exposure pathways. It presents the current understanding of the site, helps to identify data gaps, and helps to focus the data collection efforts. The CSM should be maintained and updated as new information is collected throughout the life cycle of the project. Various styles of CSM are useful, from text explanations to a series of figures depicting current and assumed future site conditions in three dimensions. Some form of visualization aid (e.g., figures, graphs, charts, tables) that relates site conditions to receptors in a manner that lends itself to the explanation and use of incremental sampling methodologies (ISM) is suggested (Example 1). The sampling strategy should reflect the assumptions about the transport phenomena and exposure scenarios reflected in the CSM.

Topics

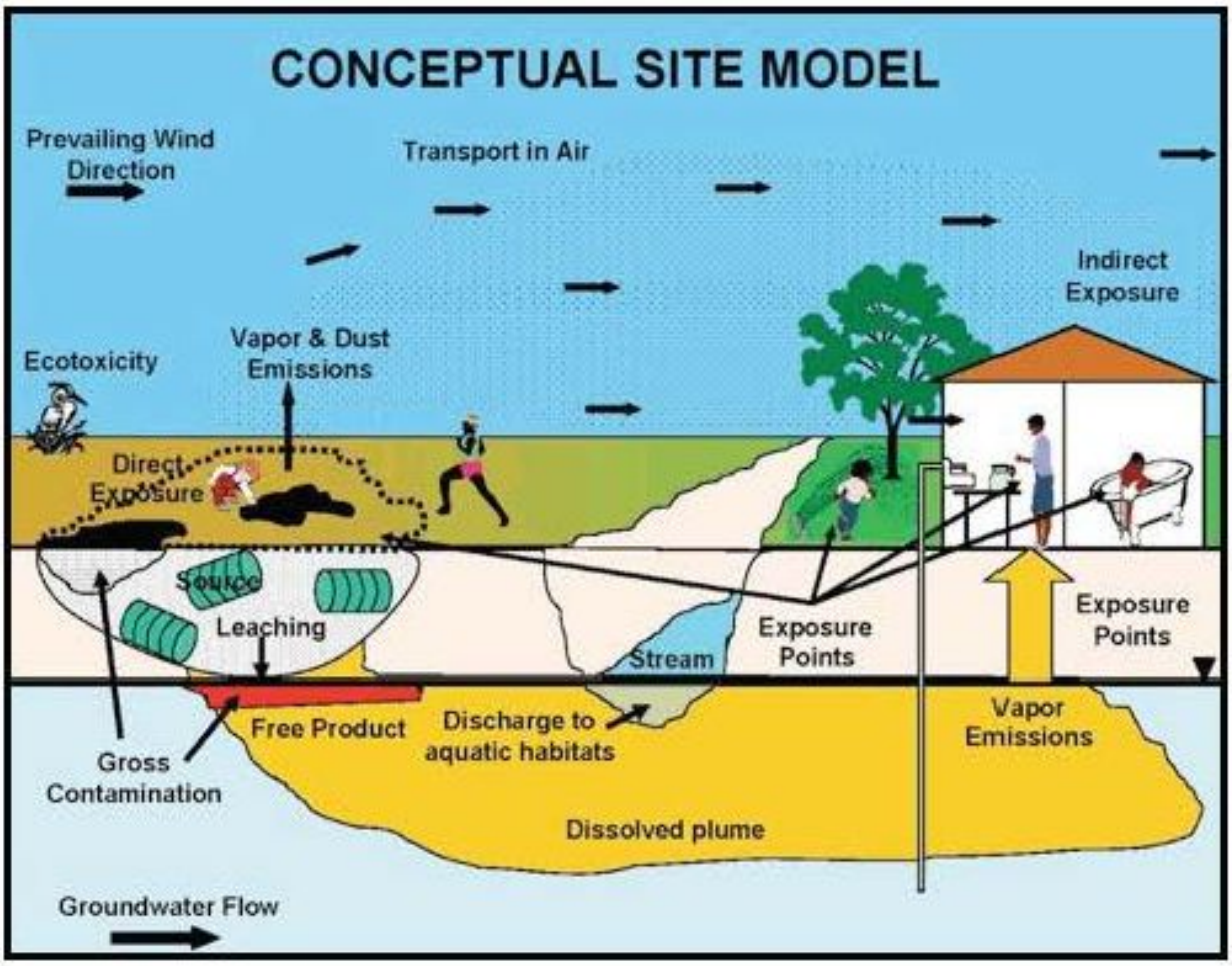
1) Definition of CSM
   a) A model is a simplification of a real system; a devise that represents an approximation of a field situation
   b) A Concept level model is presented as a narrative, schematic, tabulated data, etc. (versus analytical or numerical Mathematic models)
2) Purpose of CSM
   a) To provide a framework for assembling and organizing data
   b) To develop an understanding of a specific environment or field situation
   c) To gain insight into controlling parameters
   d) To aid in identification of data gaps and plan further data acquisition
   e) To aid in formulating ideas about system dynamics
   f) To aid in predicting a future state
   g) To facilitate selection of remedial alternatives
   h) To evaluate the effectiveness of remedial actions
3) Nature of CSM
   a) An iterative, "living document"
   b) As data gaps are identified and filled, the CSM is updated, and used again to identify data gaps, if present.
4) Activities Involved in Preparing CSM
   a) Identification of potential contaminants
   b) Identification and characterization of source(s) of contaminants
   c) Delineation of potential migration pathways through environmental media, including
      i) Groundwater
      ii) Surface water
      iii) Soils
      iv) Sediments
      v) Biota
      vi) Air
   d) Establishment of background areas of contaminants for each contaminated medium
   e) Sensitive Receptor Survey (human and ecological)

   NOTE: *The following distances are promulgated in the NDEP "Oxygenated Fuel Corrective Action Guidance" October, 1998.*

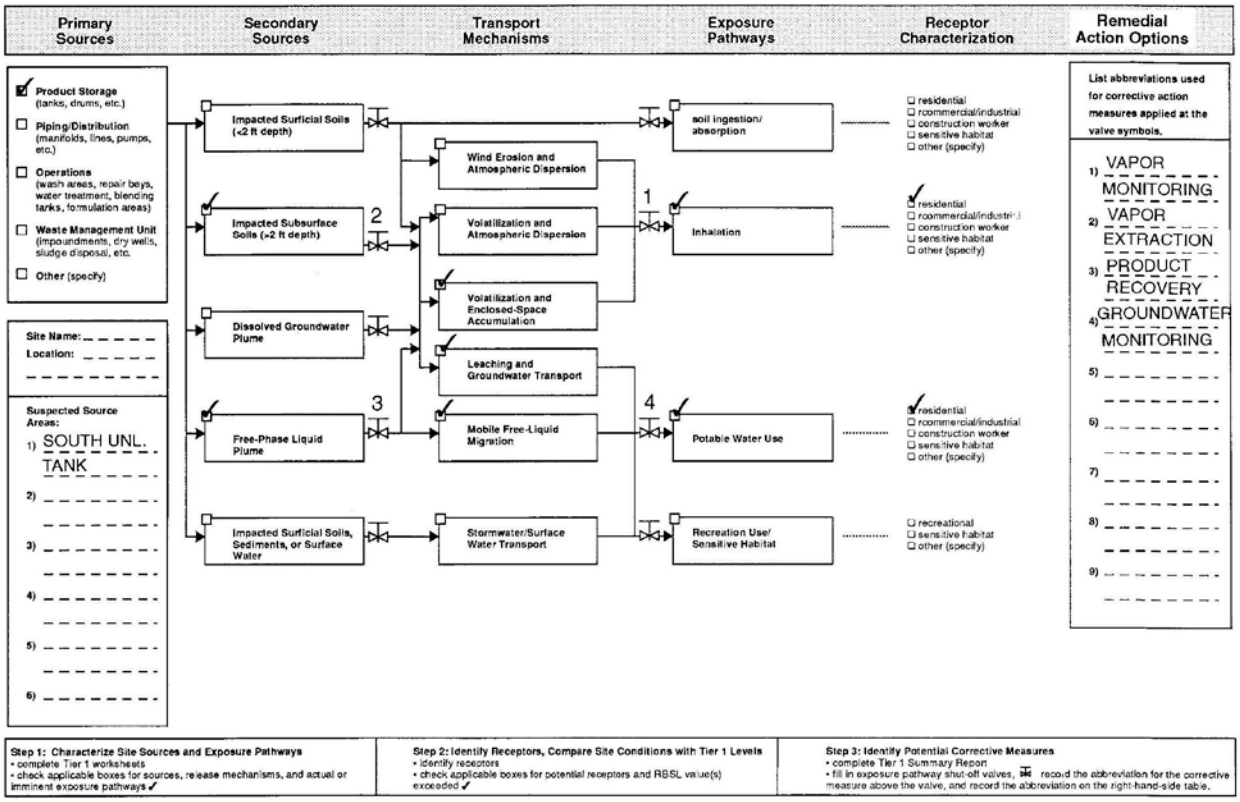
   - *water wells (receptors) are located in close proximity (within 1,000 feet) to any portion of the groundwater contaminant plume or facility boundary. As used herein, water wells are any well where water is extracted for: human consumption, bathing, swimming, or recreation; irrigation; application to crops; livestock; and/or industrial use;*
   - *surface water intakes for potable water supplies and/or other beneficial uses are located within one half mile (1/2 mile) of any portion of the groundwater contaminant plume; facility boundary; or spill location;*

   f) Determination of the limits of the study area or system boundaries
   g) Identify and emphasize uncertainties

Example 1: Pictorial or Schematic CSM



Example 2: Exposure Evaluation Flow Chart from ASTM E1739 (RBCA Applied at Petroleum Release Sites)



Example 3: Table of Contents:

TABLES

FIGURES

APPENDICES

B. Groundwater Elevation Contour Map & Plot of Historic Groundwater Flow Direction

See attached Figure

C. Analyte Isoconcentration Map

See attached Figure

D. LNAPL Isopleth Map

See attached Figure

Sources

ASTM Standard E1689-95(2014), 1995, "Standard Guide for Developing Conceptual Site Models for Contaminated Sites" ASTM International, West Conshohocken, PA, 2003, DOI: 10.1520/E1689, www.astm.org.

ASTM Standard E1739-95(2010)e1, 1995, " Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites" ASTM International, West Conshohocken, PA, 2003, DOI: 10.1520/E1689, www.astm.org.

Interstate Technology Regulatory Council (ITRC), Incremental Sampling Methodology [http://www.itrcweb.org/ism-1/]

NDEP, Oxygenated Fuel Corrective Action Guidance, October, 1998

LEGEND

UST	UNDERGROUND STORAGE TANK
MW–1	GROUNDWATER MONITORING WELL SCREENED INTERVAL
	FUEL DISPENSER
	GROUNDWATER SURFACE
famsl	FEET ABOVE MEAN SEA LEVEL
mg/Kg	MILLIGRAMS PER KILOGRAM
	LIMIT OF EXCAVATION

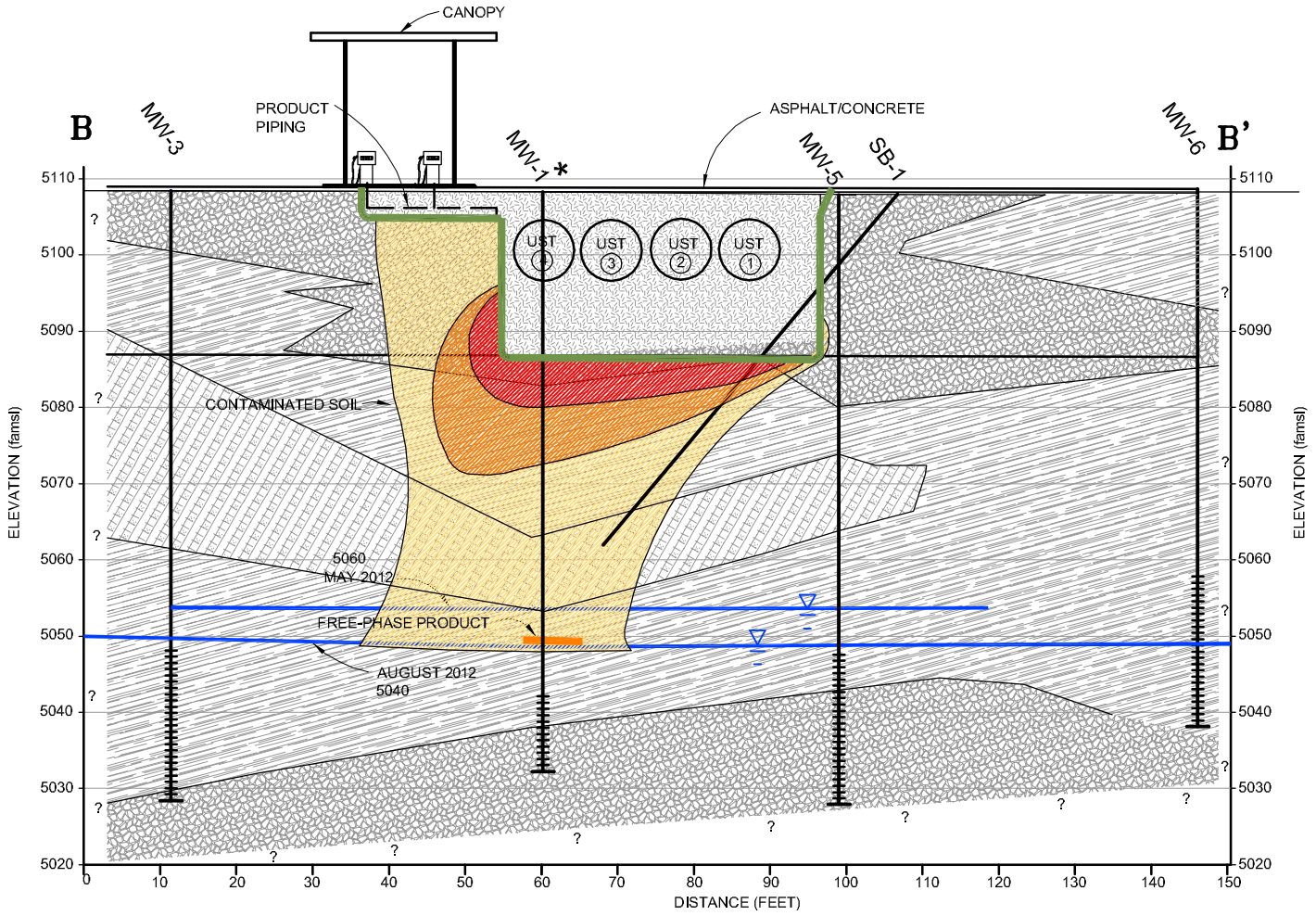
LITHOLOGIC SYMBOLS

- FILL
- CLAY/SILTY–CLAY/SANDY–CLAY (CL)
- GRAVELLY–SAND/SILT (GM)
- SILTY–SAND/SANDY–SILT (ML/SP)

TPH CONCENTRATION (mg/Kg)

- 100–1,000
- 1,000–2,000
- >2,000

* NOTE:
MW–1 ASPHALT PAVEMENT OVER WELL



0 10 20
FEET

REFERENCE			
	DESIGNED		TJ
	DRAWN		TAD
	CHECKED		
	APPROVED		
REVISIONS	No.	DESCRIPTION BY	DATE

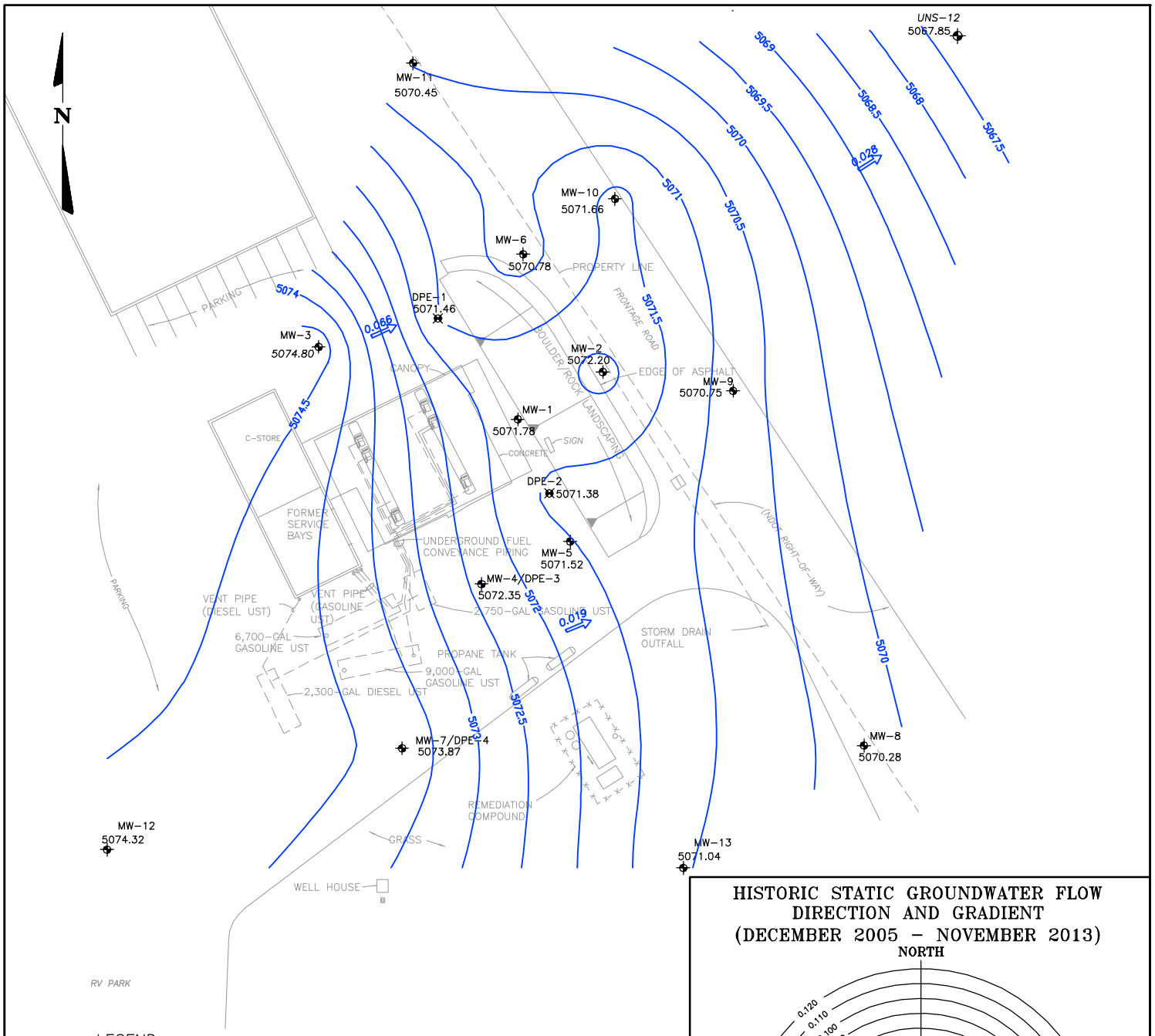
FIGURE 3

GEOLOGIC SECTION'

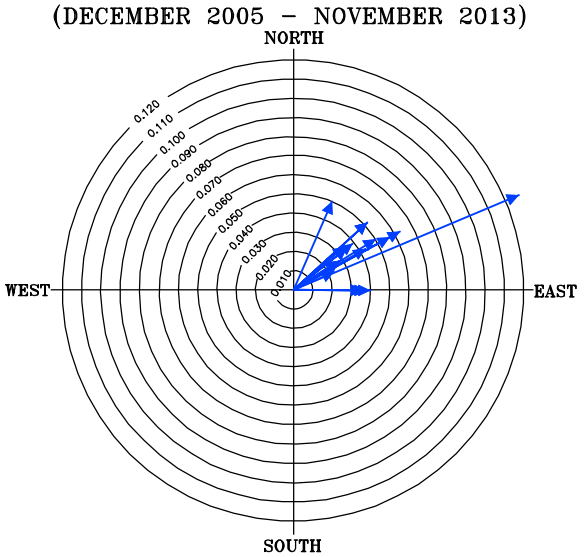
SCALE: AS SHOWN

JOB NO.

REVISION A



HISTORIC STATIC GROUNDWATER FLOW DIRECTION AND GRADIENT
(DECEMBER 2005 – NOVEMBER 2013)



LEGEND

- MW-1 5068.42 — MONITORING WELL/ GROUNDWATER ELEVATION
- DPE-1 5072.30 — FORMER DUAL-PHASE EXTRACTION WELL/ GROUNDWATER ELEVATION
- DISPENSER
- 5074 — GROUNDWATER CONTOUR
- 0.143 — APPROXIMATE HORIZONTAL HYDRAULIC GRADIENT

0 30 60
FEET

REFERENCE	DESIGNED		TJ
	DRAWN		TAD
	CHECKED		
	APPROVED		
REVISIONS	No.	DESCRIPTION BY	DATE

FIGURE 3

WATER TABLE MAP (NOVEMBER)

SCALE: AS SHOWN | REVISION
JOB NO. | A

LEGEND

UST	UNDERGROUND STORAGE TANK
MW-4 3,600	MONITORING WELL/ BENZENE CONCENTRATION (ug/L)
MW-8	DIRECTIONAL GROUNDWATER MONITORING WELL
ug/L	MICROGRAMS PER LITER

BENZENE CONCENTRATION (ug/L)

5–100	1,000–5,000
100–1,000	>5,000

0 10 20
FEET

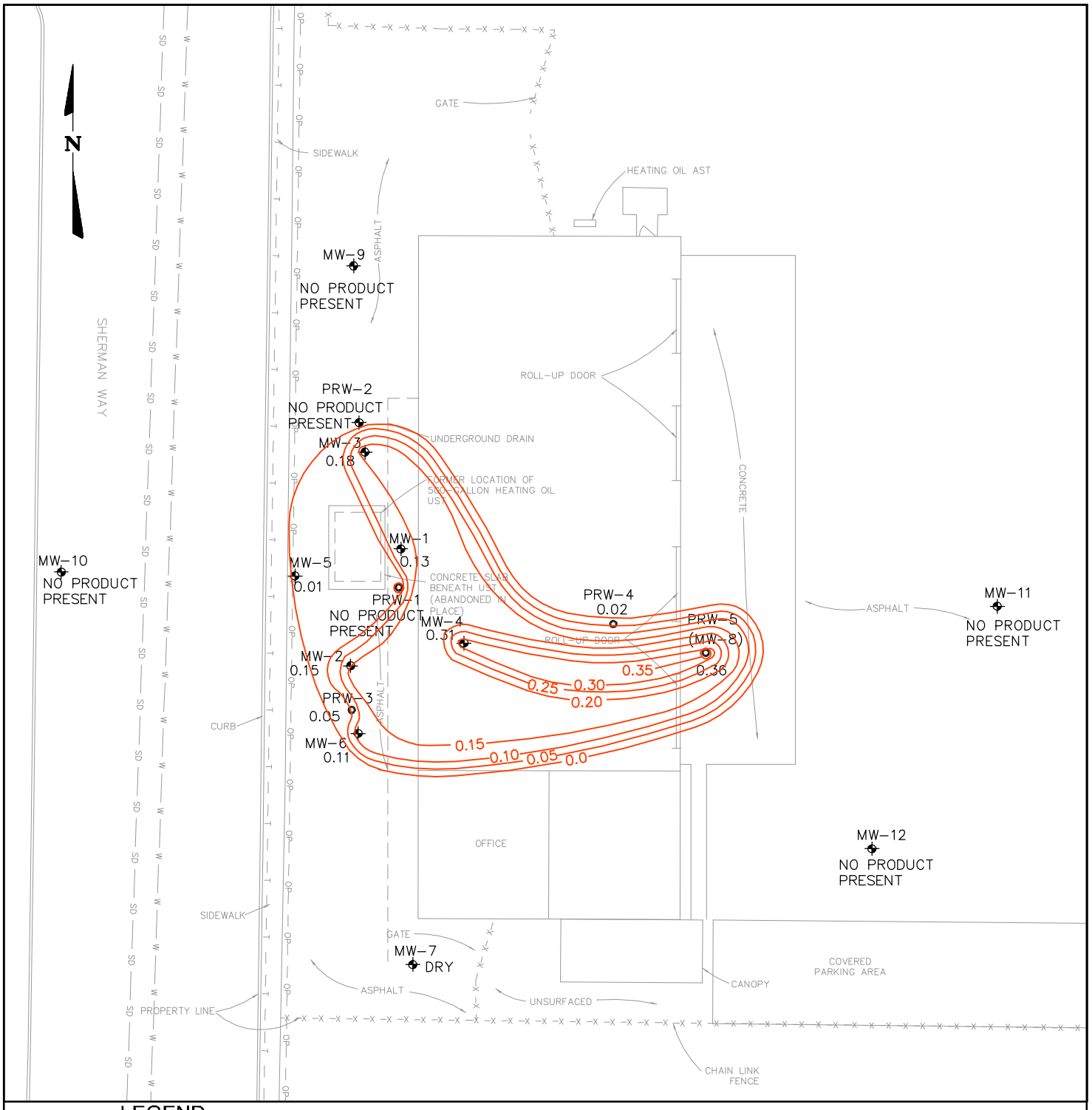
REFERENCE	
DESIGNED	
DRAWN	
CHECKED	
APPROVED	

REVISIONS	No.	DESCRIPTION	BY	DATE

FIGURE 4

ISOPLETH MAP
-SHOWING-
INFERRED LATERAL DISTRIBUTION OF BENZENE EXCEEDING ACTION LEVEL
(FEBRUARY)

SCALE: AS SHOWN
JOB NO.
REVISION A



LEGEND

MW-1 0.33	GROUNDWATER MONITORING WELL/ PRODUCT THICKNESS (FEET)	AST	ABOVEGROUND STORAGE TANK
PRW-1 0.27	PRODUCT RECOVERY WELL/ PRODUCT THICKNESS (FEET)	UST	UNDERGROUND STORAGE TANK
PRW-6	PROPOSED LOCATION OF ADDITIONAL PRODUCT RECOVERY WELL	0.25	PRODUCT CONTOUR (FEET)
		NM	NOT MEASURED

0 10 20
FEET

REFERENCE	DESIGNED		
	DRAWN		
	CHECKED		
	APPROVED		
REVISIONS	No. DESCRIPTION BY	DATE	

FIGURE 2

ISOPACH MAP -SHOWING- INFERRED EXTENT AND THICKNESS OF FREE-PHASE PRODUCT (MARCH)

SCALE: AS SHOWN | REVISION

JOB NO. | A

PNDEP CEM Work Shop: Tools for Showing Plume Stability/Trends

"It is far better to have an approximate answer to the right question than a precise answer to the wrong question…" — John Hauser

1. VISUAL ANALYSIS

Overview

Using industry standard data analysis tools (i.e., Excell), plot data (groundwater level, concentration) vs time. This allows for visual identification of trends over time. These types of plots are commonly referred to as time-series plots.

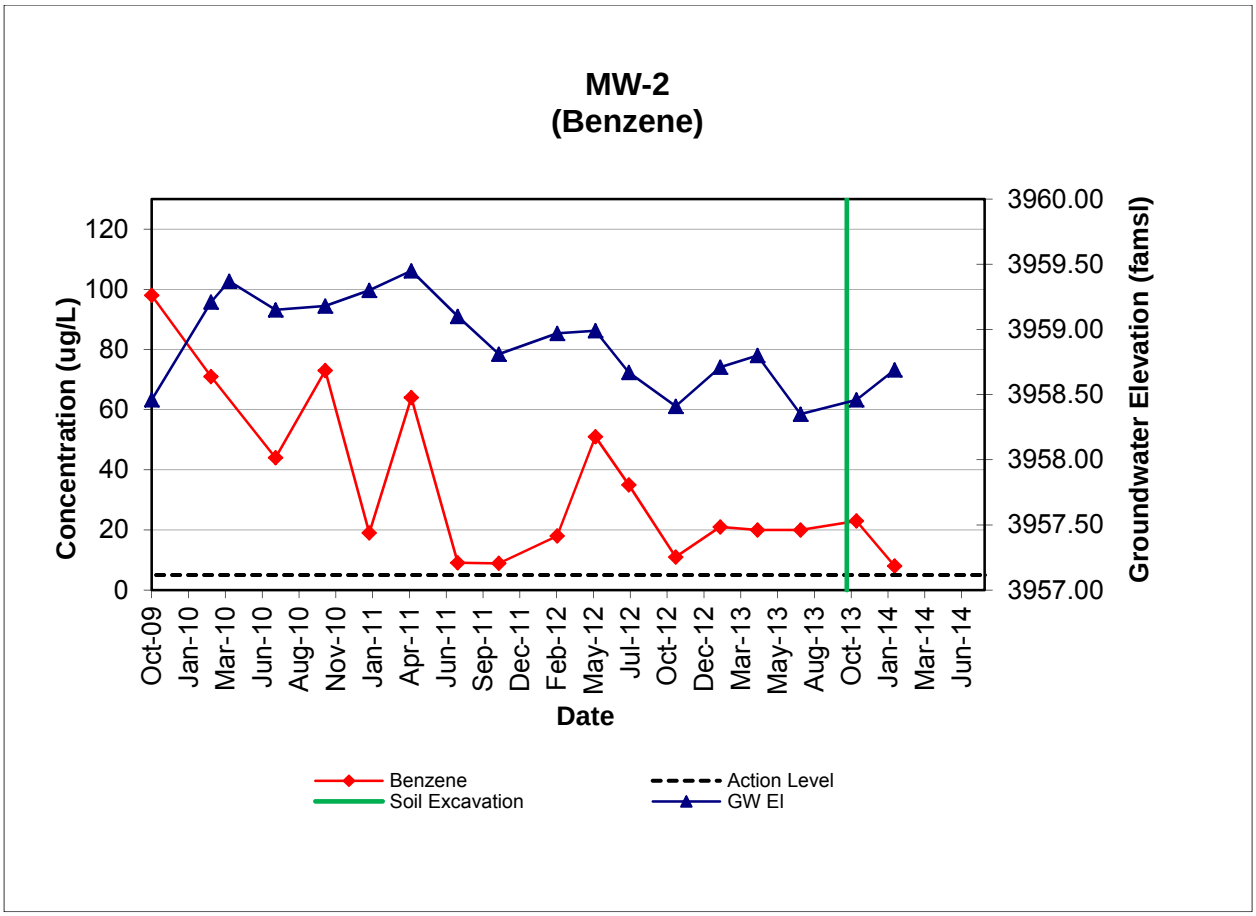
Advantages

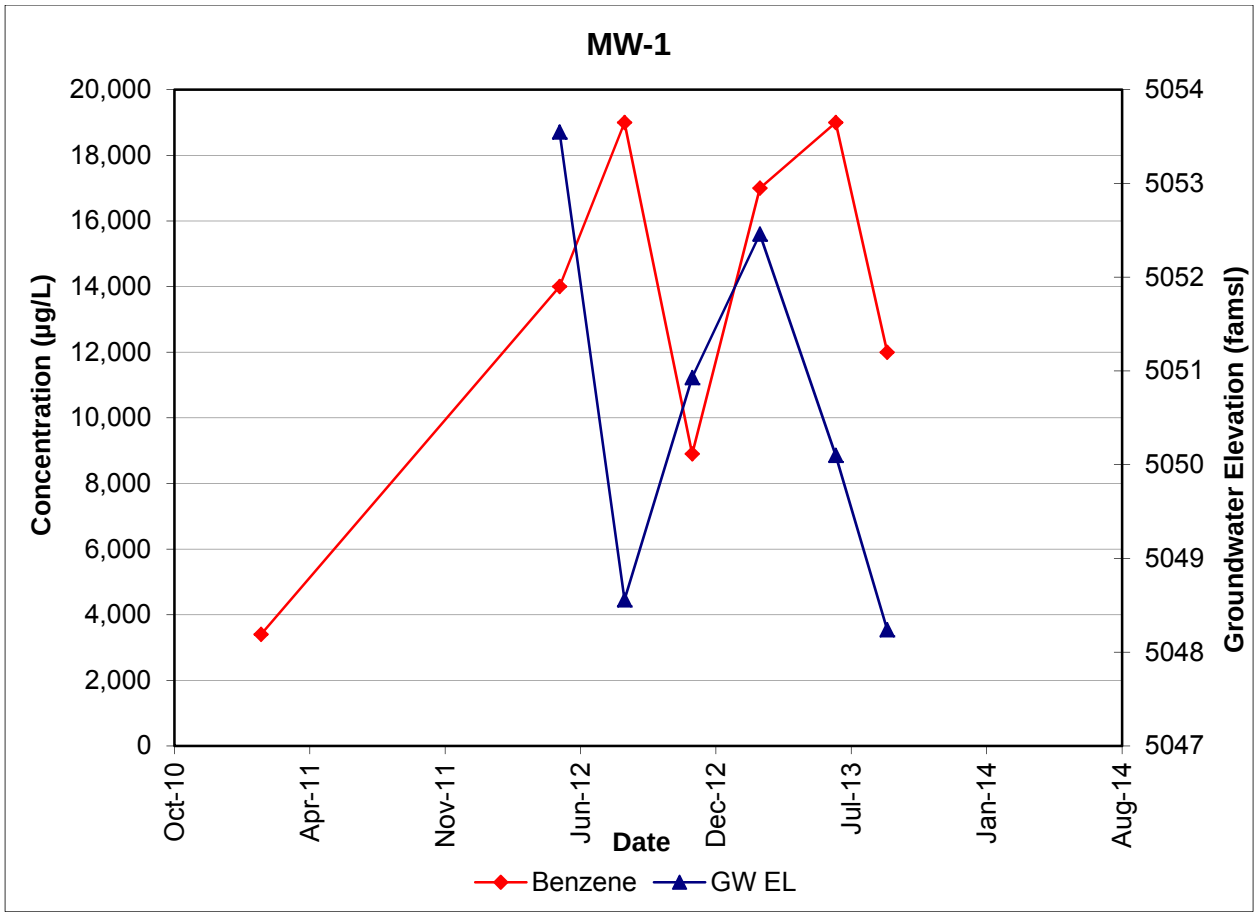
- Easily created.
- Minimal data requirements (can be as little as two data points, although more are preferred).
- Can show different components of project (VE system turned on, VE system turned off, etc.) to aid in evaluating trends.

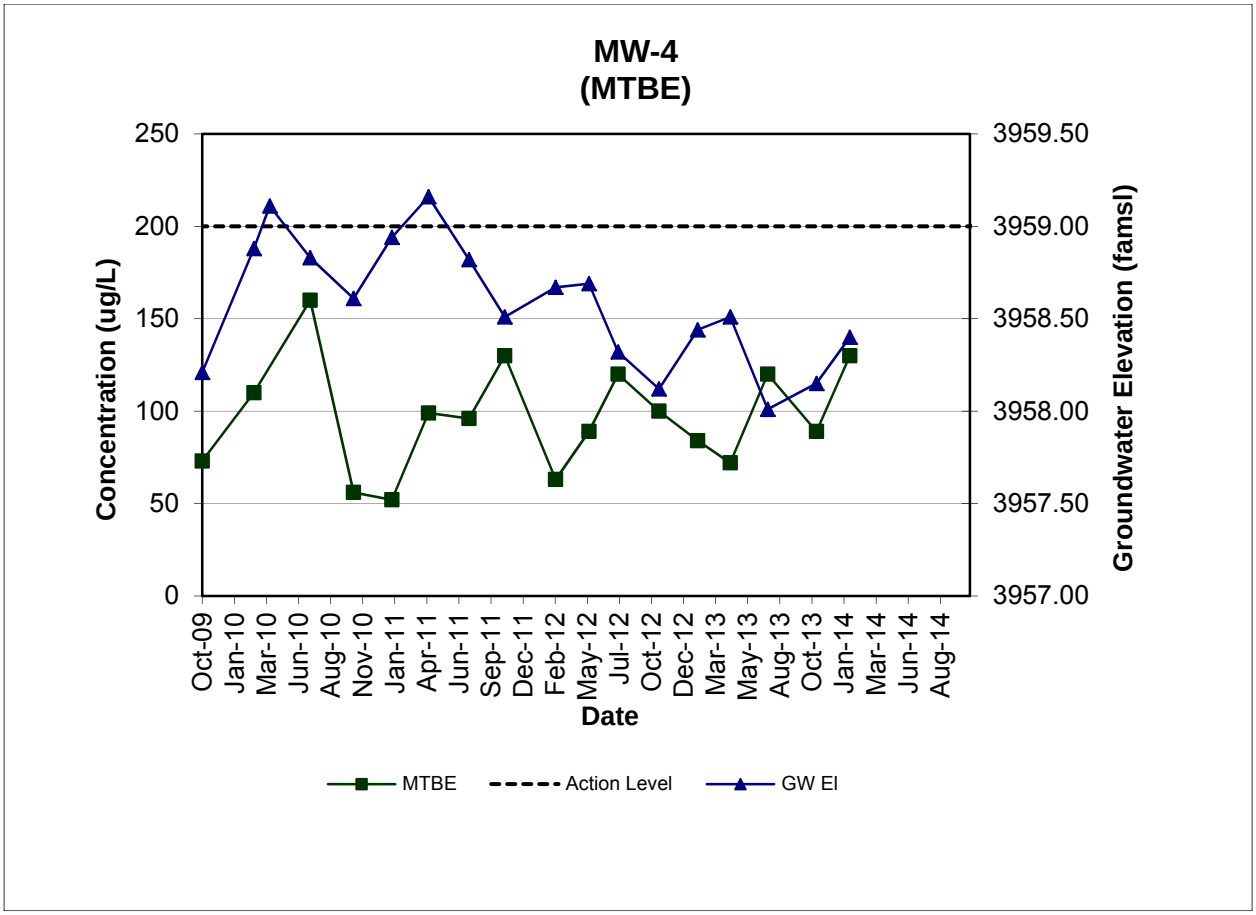
Disadvantages

- Data outliers can inadvertently influence "trend."
- Does not account for variability in seasonal groundwater fluctuations.
- Trends identified can be

Example Output


MW-2
(Benzene)
Concentration (ug/L)
Groundwater Elevation (famsl)
120
100
80
60
40
20
0
3960.00
3959.50
3959.00
3958.50
3958.00
3957.50
3957.00
Oct-09
Jan-10
Mar-10
Jun-10
Aug-10
Nov-10
Jan-11
Apr-11
Jun-11
Sep-11
Dec-11
Feb-12
May-12
Jul-12
Oct-12
Dec-12
Mar-13
May-13
Aug-13
Oct-13
Jan-14
Mar-14
Jun-14
Date
Benzene
Soil Excavation
Action Level
GW El


MW-1
Concentration (µg/L)
Groundwater Elevation (famsl)
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
5054
5053
5052
5051
5050
5049
5048
5047
Oct-10
Apr-11
Nov-11
Jun-12
Dec-12
Jul-13
Jan-14
Aug-14
Date
Benzene
GW EL



2. LINEAR REGRESSION

Overview

A parametric statistical technique used to estimate a trend via a linear relationship between multiple data points (sample analytical results). A line with a positive slope indicates an increasing trend, whereas a negative slope is indicative of a decreasing trend. Assumptions of linear regression are as follows:

1. The difference between each concentration measurement and its predicted value from the regression equation (residuals) are approximately normal in distribution.
2. Missing data and ND's are not part of data set.

The following conditions should be met prior to concluding a resulting trend:

1. The residuals (R) are approximately normal/reasonably symmetric in distribution.
2. A scatter plot of residuals vs concentrations yields a scatter cloud of generally uniform thickness.
3. A scatter plot of residuals vs time yields a scatter cloud of generally uniform thickness.
4. A minimum of eight measurements.

If the above conditions are met, the following can generally be applied with respect to trend interpretation:

- Where y=mx+b represents the trend line, and m=slope, if m is negative, the trend (slope) is decreasing.
- Conversely, if m is positive, the trend is increasing.
- A higher m value (steeper slope) indicates a more rapid rate of degradation/contamination.
- When the above items cannot be met in an approximate sense, a non-parametric trend method should be utilized (Mann-Kendall).
- A smaller R^2 value indicates a less accurate trend line (if $R^2 = 0$, then the trend line would have no linear relationship). The larger the R^2 value, the less the amount of variation/deviation in the dataset from the trend line, and the more reliable the trend line is (If $R^2=1$, the dataset is defined as linear).

Advantages

- Least squares regression is the most commonly used regression method. Calculates a best fit line for the observed data by minimizing the sum of the squares of vertical deviations from each data point to the line.
- Can be used site-wide or for individual wells, but is best suited for individual well analysis.
- Principles can be applied to site-wide plume characteristics for site wide analysis
- Relatively simple trend analysis/data requirements.

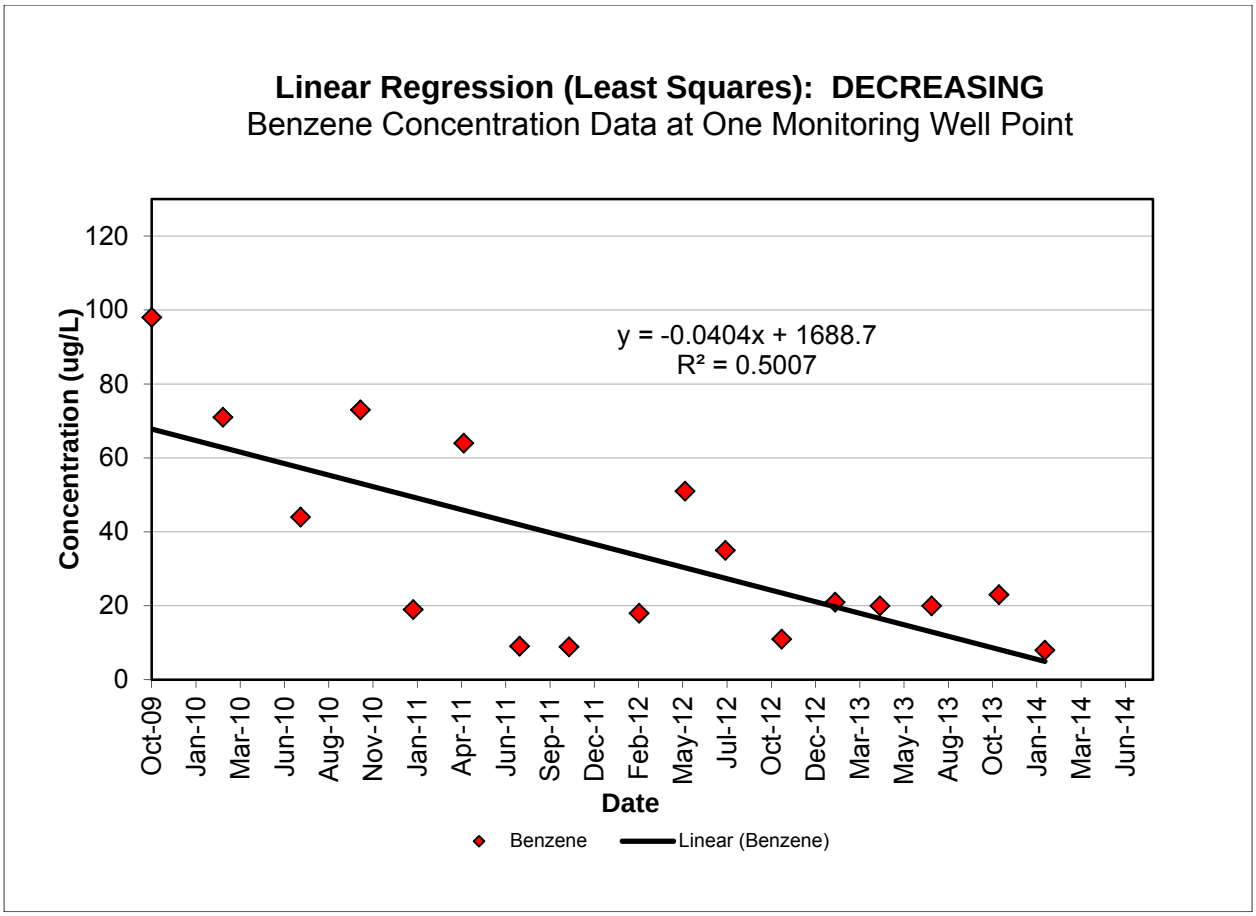
Disadvantages

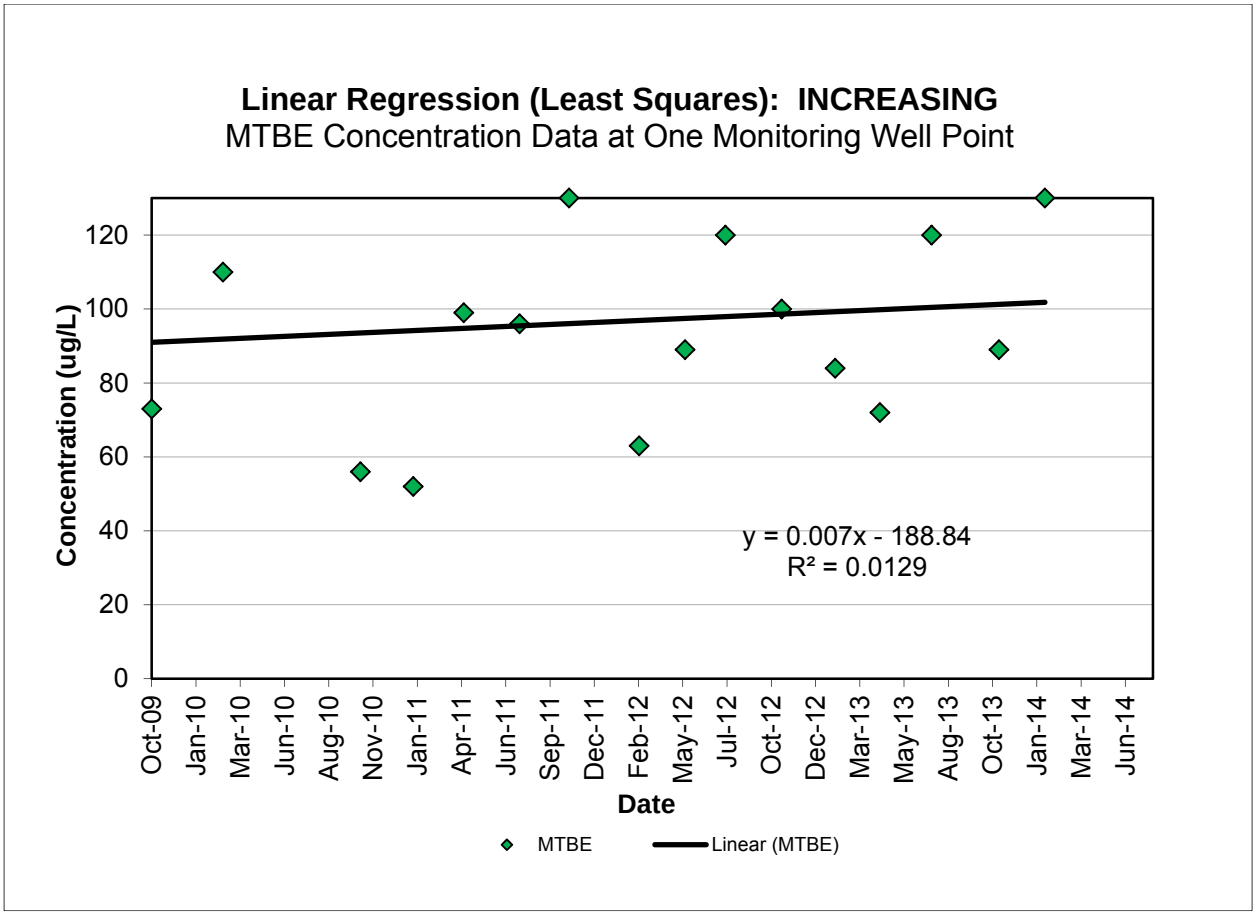
- Data outliers can inadvertently influence "trend." Data input/output must be QA/QC'd prior to determining accuracy of trend (i.e., checking the residuals and/or visual).
- Extrapolation of data is not recommended in support of project decision making, yet can be useful as a general forecasting tool.
- Trends are dependent on data quality and user interpretation.
- Does not account for ND or missing data.

Online/Free-ware availability

Regression calculators and/or freeware are readily available online. Much of the freeware discussed in the following slides are equipped with regression analysis tools. It is also easily set up using Microsoft's Excel program.

Example Output


Linear Regression (Least Squares): DECREASING
Benzene Concentration Data at One Monitoring Well Point
y = -0.0404x + 1688.7
R² = 0.5007
Concentration (ug/L)
120
100
80
60
40
20
0
Oct-09
Jan-10
Mar-10
Jun-10
Aug-10
Nov-10
Jan-11
Apr-11
Jun-11
Sep-11
Dec-11
Feb-12
May-12
Jul-12
Oct-12
Dec-12
Mar-13
May-13
Aug-13
Oct-13
Jan-14
Mar-14
Jun-14
Date
Benzene
Linear (Benzene)



Sources

Peter J. Brockwell, Richard A. Davis , *Time Series: Theory and Methods, Second Edition* Springer, 2009

Environmental Protection Agency, Office of Resource Conservation and Recovery, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance*, March, 2009

http://www.stat.yale.edu/Courses/1997-98/101/linreg.htm

3. MANN-KENDALL (M-K)

Overview

M-K analysis is a non-parametric test for identifying trends in time-series data. In short, the analysis compares relative magnitudes of sample data (not the data values themselves). If an increasing trend exists, the sample taken first from any randomly selected pair of measurements should on average, have a lower concentration than the measurement collected at a later time.

The M-K statistic (S) is given by examining all possible pairs of data points (concentrations) and scoring each pair by assigning a value (identical values = 0, earlier value > later value = -1, earlier value < later value = 1). Summing the total of the assigned values gives S. A positive S suggests an upward trend, while a negative S suggests a negative trend. The larger the value of S (+/-), the stronger the level of confidence that the trend is legitimate.

Assumptions are as follows:

1. Only relative magnitudes are required (not actual concentrations) to rank the data.
2. ND should be treated as a common value lower than any detected values.
3. At least four data points must be analyzed.

Advantages

- Relatively simple data requirements.
- User friendly.
- Quantifies confidence level in trends based on data.
- Enables quick identification of trends, historic and/or recent.

Disadvantages

- Does not account for site specific characteristics such as seepage velocity or well location.
- Analyzes only a single data point (monitoring well).
- Seasonal effects are not accounted for which can incorrectly influence trend (groundwater fluctuation through "smear zone").
- Must address ND values…they need to be the same.

Online/Free-ware availability

Mann-Kendall free-ware is available online. Two good options are:

1. GSI Mann-Kendall Toolkit
   http://www.gsi-net.com/en/software/free-software/gsi-mann-kendall-toolkit.html
2. Washington State Department of Ecology (Package A)
   http://www.ecy.wa.gov/programs/tcp/policies/pol_main.html

Mann-Kendall analysis tools are also provided in the freeware packages discussed in the following slides.

Example Output

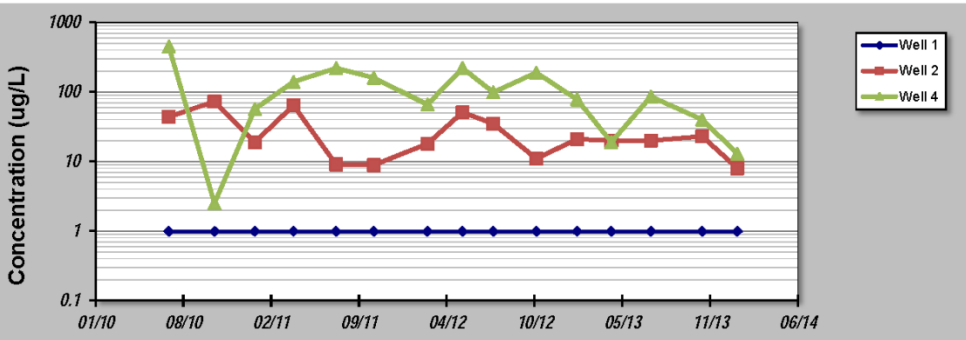
1. **(GSI)**

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 16-Jun-14
Facility Name: ABC Corporation
Conducted By: Jerry Garcia

Job ID: 9999
Constituent: Benzene
Concentration Units: ug/L

Sampling Point ID:	Well 1	Well 2	Well 4				
Sampling Event	Sampling Date	BENZENE CONCENTRATION (ug/L)						
1	2-Apr-10							
2	8-Jul-10	0.99	44	450				
3	20-Oct-10	0.99	73	2.5				
4	20-Jan-11	0.99	19	57				
5	18-Apr-11	0.99	64	140				
6	24-Jul-11	0.99	9.1	220				
7	18-Oct-11	0.99	8.9	160				
8	17-Feb-12	0.99	18	66				
9	7-May-12	0.99	51	220				
10	16-Jul-12	0.99	35	99				
11	22-Oct-12	0.99	11	190				
12	23-Jan-13	0.99	21	78				
13	11-Apr-13	0.99	20	19				
14	10-Jul-13	0.99	20	86				
15	4-Nov-13	0.99	23	40				
16	23-Jan-14	0.99	8.0	13				
17								
18								
19								
20								
Coefficient of Variation:		0.00	0.73	0.94				
Mann-Kendall Statistic (S):		0	-26	-30				
Confidence Factor:		48.0%	89.0%	92.3%				
Concentration Trend:		Stable	Stable	Prob. Decreasing				



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

2. (WSDE)

Module1: Mann-Kendall Trend Test for Plume Stability (Non-parametric Statistical Test)

Site Name:	*ABC Corporation*
Site Address:	*Reno, NV*
Additional Description:	

Well (Sampling) Location?	**Well 2**
Level of Confidence (Decision Criteria)?	**85%**

Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.

Clear all dates

		Hazardous Substances (unit is ug/L)					
Sampling Event	Date Sampled	Benzene	MTBE				
#1	2-Apr-10						
#2	8-Jul-10	44	110				
#3	20-Oct-10	73	80				
#4	20-Jan-11	19	18				
#5	18-Apr-11	64	11				
#6	24-Jul-11	9.10	5				
#7	18-Oct-11	8.90	5				
#8	17-Feb-12	18	3				
#9	7-May-12	51	3				
#10	16-Jul-12	35	2				
#11	22-Oct-12	11	2				
#12	23-Jan-13	21	1				
#13	11-Apr-13	20	2				
#14	10-Jul-13	20	2				
#15	4-Nov-13	23	2				
#16	23-Jan-14	8.0	1				

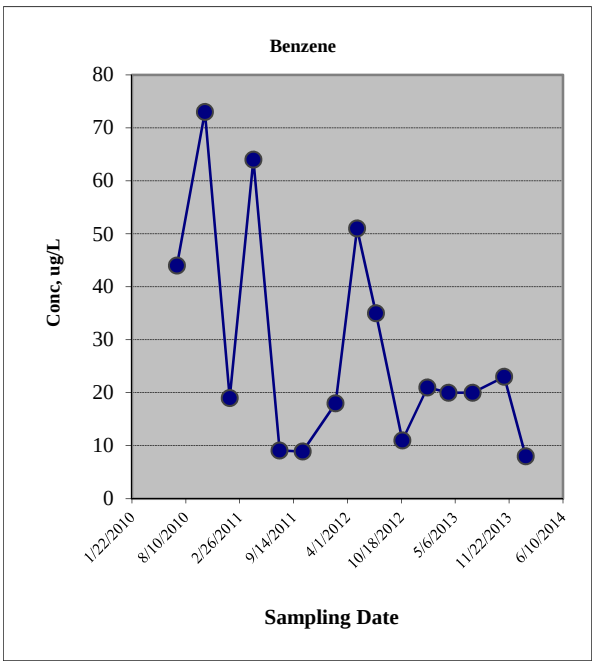
Mann-Kendall Non-parametric Statistical Test Results

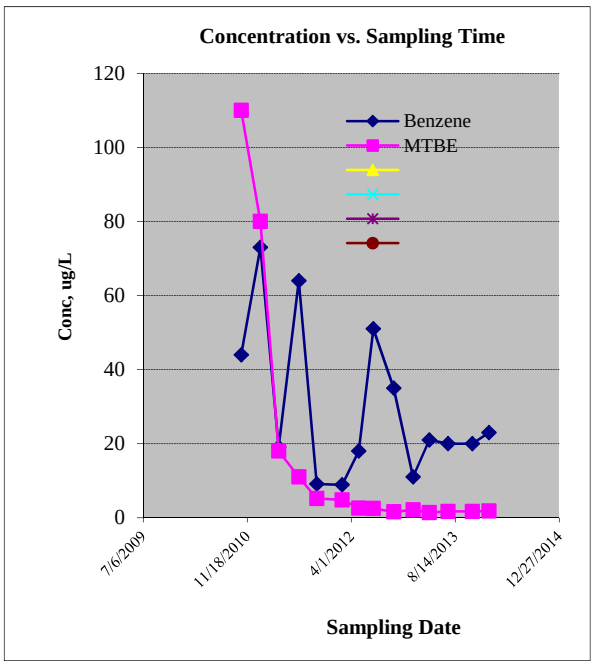
Hazardous Substance?	**Benzene**	**MTBE**				
Confidence Level Calculated?	88.00%	100.00%	NA	NA	NA	
Plume Stability?	Shrinking	Shrinking	NA	NA	NA	
Coefficient of Variation?			n<4	n<4	n<4	
Mann-Kendall Statistic "S" value?	-26	-86	0	0	0	
Number of Sampling Rounds?	15	15	0	0	0	
Average Concentration?	28.33	16.36	NA	NA	NA	
Standard Deviation?	20.61	32.75	NA	NA	NA	
Coefficient of Variation?	0.73	2.00	NA	NA	NA	
Blank if No Errors found			n<4	n<4	n<4	

Temporal Trend: Plot of Concentration vs. Sampling Time

Hazardous substance? **Benzene**

Plume Stability? **Shrinking**





Sources

Environmental Protection Agency, Office of Resource Conservation and Recovery, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance*, March, 2009

GSI Environmental, Inc., *GSI Mann-Kendall Toolkit for Constituent Trend Analysis, User's Manual, Version 1.0*, November, 2012

Washington State Department of Ecology, *User's Manual: Natural Attenuation Analysis Tool Package for Petroleum-Contaminated Ground Water*, July, 2005

4. WASHINGTON STATE DEPARTMENT OF ECOLOGY: NATURAL ATTENUATION ANALYSIS TOOL PACKAGE FOR PETROLEUM-CONTAMINATED GROUND WATER

Overview

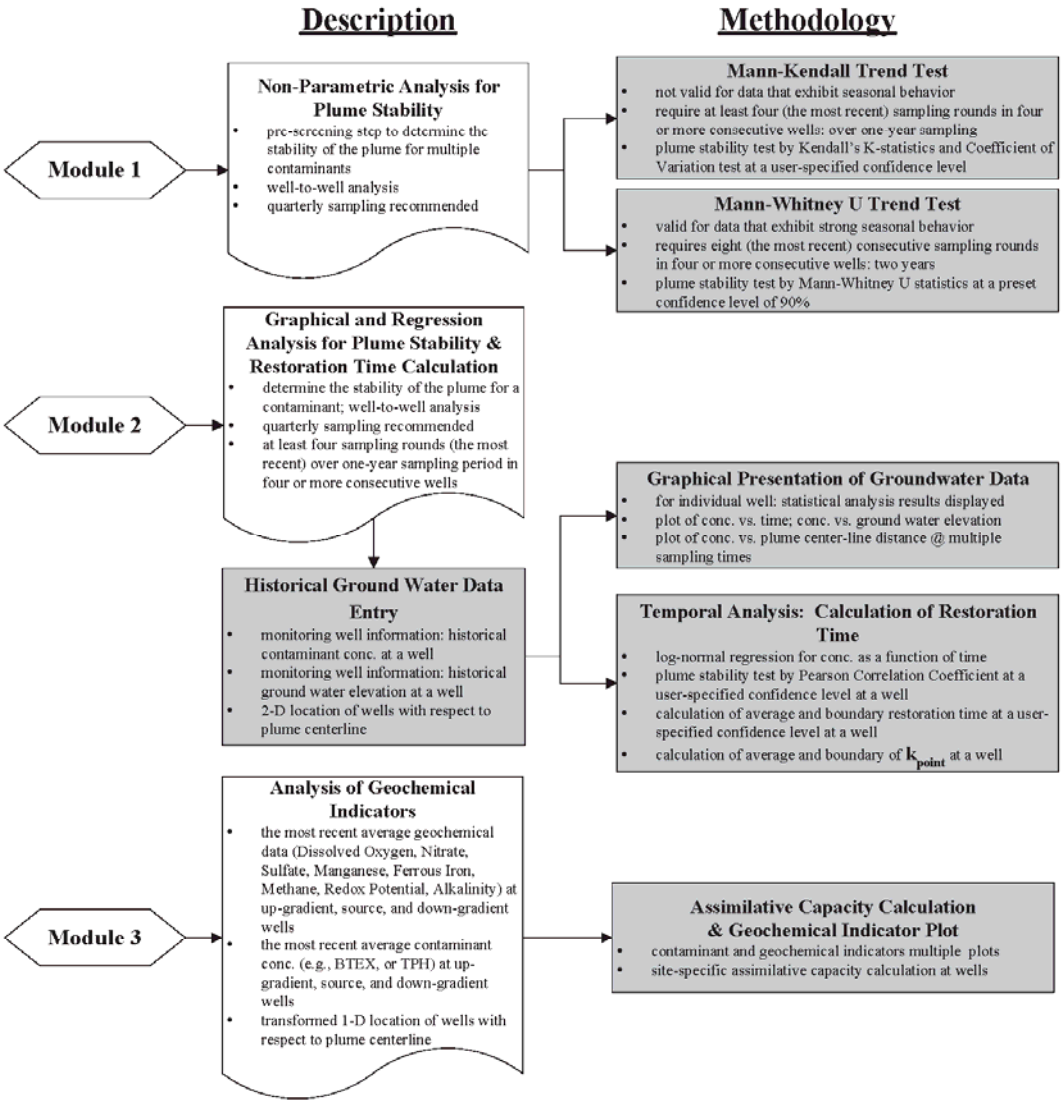
Comprehensive site evaluation tool based on statistical methods applied to site-specific data that accounts for historical and current data as well as hydrogeologic factors (e.g., wells, seepage velocity), and potential receptors. Analyzes individual wells, plume with respect to temporal/spatial indicators and stability. Using statistical trend analysis, helps identify temporal trends, plume characteristics (shrinking/expanding), time until target concentrations are met, influence of groundwater, evaluation of geochemical indicators, and graphical presentation of historical groundwater data. The program is divided into two packages, A and B.

Package A (Modules 1, 2, and 3) analysis tool will conduct the following:

- Non-parametric statistical tests for plume stability at each well.
    - Mann-Kendall test (previously discussed)
    - Mann-Whitney U-test
- Graphical presentation of historical ground water data.
    - Plot of temporal ground water analytical and elevation data vs. time to assess the plume status and the impact of ground water elevation fluctuation on contaminant concentrations at each well
    - Plot of spatial ground water analytical data vs. distance (for multiple wells) to assess the overall plume status
- Evaluation of geochemical indicators.
    - Estimate of expressed assimilative capacity at multiple wells
    - Simultaneous plot of concentrations of contaminant and geochemical indicators vs. distance (at multiple wells) to demonstrate biodegradation clearly
- Temporal trend (regression) analysis at each well.
    - Estimate of an average and a range of (kpoint) point decay rate (1st-order) constant for both the best-fit and a given one-tailed confidence level at each well
    - Temporal prediction at each well location under a given confidence level
    - Estimate of an average and a range (under a given confidence level) of restoration time to reach the cleanup goal at each well
    - Calculation of the correlation coefficient and confidence level (with the Pearson's correlation coefficient) of log-linear regression analysis (for a plot of concentration vs. time at each well)

Figure A.1. Calculation Module for Natural Attenuation Analysis Package A

Note: Modules are not linked each other.



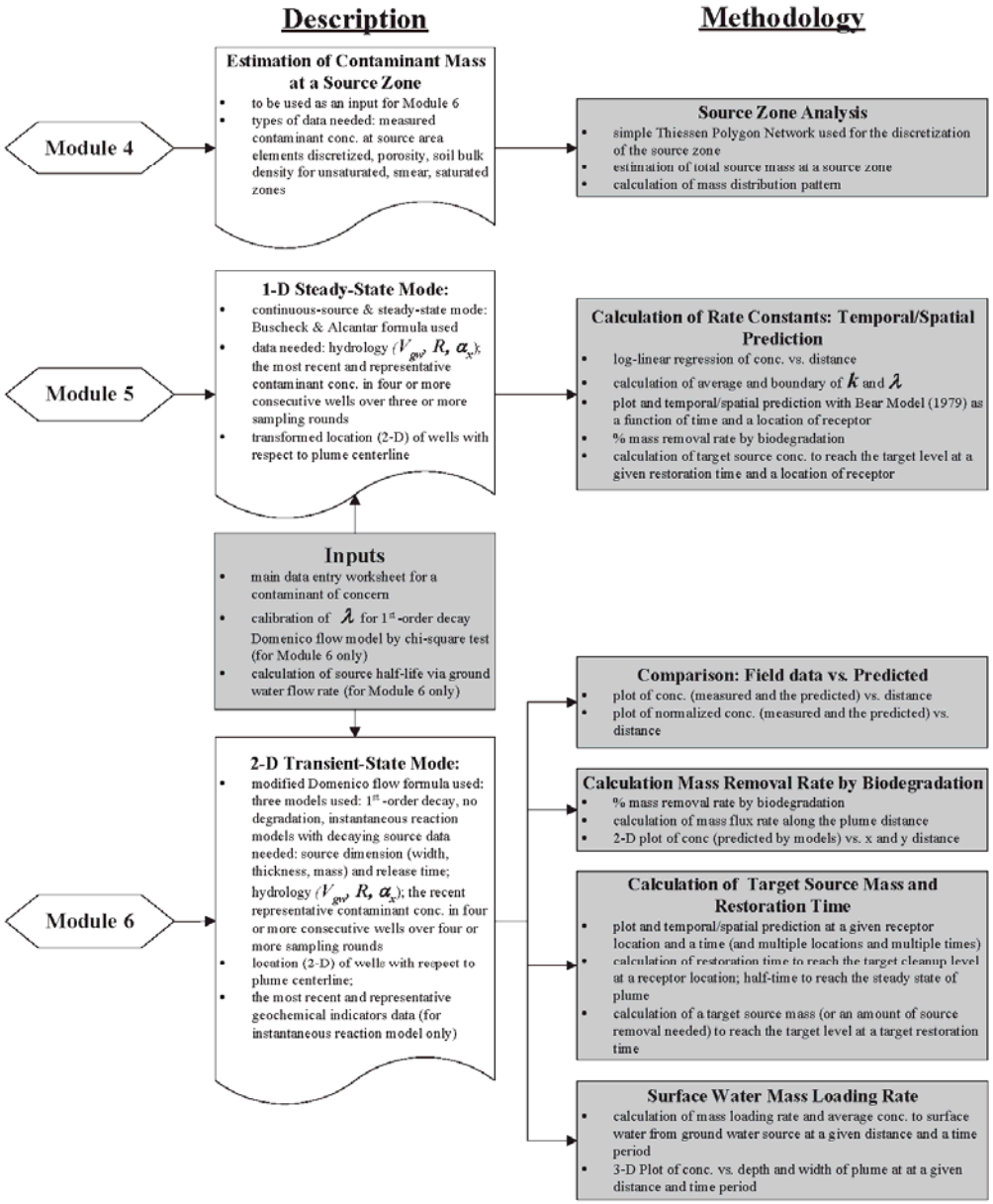
Package B (Modules 4, 5, and 6) analysis tool will conduct the following calculations:

- Estimate of source mass from sampling data: for unsaturated, smear, and dissolved zones.
- Under 1-D (transformed from 2-D): steady state/continuous source assumption for only stable.
    - plume (with Buscheck and Alcantar model: see footnote on page 33 of this User's Manual)

    - Plot of the concentration vs. distance
    - Estimate of an average and a range of (λ) biodegradation rate constant
    - Estimate of an average and a range of (k) bulk attenuation rate (1st-order) constant under steady state (stable plume)
    - Estimate of a percent mass removal rate by biodegradation alone
    - Temporal and spatial prediction as a function of time and well location
    - Estimate of a target source concentration in order to reach a target level at a receptor location under given restoration time
- Under 2-D; transient state (with modified Domenico model) for shrinking and stable (or any type) plumes:

    - Estimate of a biodegradation rate constant (λ) by calibration via chi-square statistics for best-fit to the normalized concentration of consecutive multiple wells by 1st-order decay model
    - Estimate of a percent mass removal rate by biodegradation alone with 1st-order decay model and instantaneous reaction model (via the calculation of mass flux)
    - Estimate of a temporal/spatial prediction at a receptor location by 1st-order decay model and instantaneous reaction model
    - Estimate of a plume stabilization time (half time to reach the steady state) at a receptor location
    - Estimate of a restoration time to reach a target level at a receptor location by 1st-order decay model and instantaneous reaction model
    - Estimate of a target source mass amount (amount of mass that should be removed from the current source zone) in order to reach a target level at a receptor location under a given restoration time by 1st-order decay model and instantaneous reaction model
    - Estimate of a contaminant mass loading rate (as a function of x-distance and time) to the adjacent surface water body by 1st-order decay model

Figure A.2. Calculation Module for Natural Attenuation Analysis Package B



7/2005: Version 1.0; User's Manual: Natural Attenuation Analysis Tool Package for Petroleum-Contaminated Ground Water

Advantages

- User friendly
- Quantifies confidence level in trends based on data
- Enables quick identification of trends, historic and/or recent
- Comprehensive site analysis
- Incorporates hydrogeologic site data and potential receptors in analysis
- Geochemical/Biodegradation assessment/modeling capability
- 2-D Modeling capability

Disadvantages

- Complex data requirements (depending on module)
- Time intensive (depending on module)
- Does not use real world coordinates in 2-D modeling components
- Does not provide site optimization recommendations

Online/Freeware availability

Free-ware is available online:

http://www.ecy.wa.gov/programs/tcp/policies/pol_main.html

Example Output

Module 5: Calculation of Rate Constants: Temporal/Spatial Prediction
by 1-D (transformed) Steady State/Continuous Source Assumption

Site Name: Dummy XYZ site
Site Address: 1234, Olympia, WA 98501

Main | Print View | End

1. Input data used for this module

Hazardous Substance:	Benzene
Seepage Velocity (Average), v_{gw}, ft/yr	113.8
Longitudinal Dispersivity, α_x, ft	13.45
Retardation Factor, R	2.05
Current Continuous Source Concentration, ug/L	6500

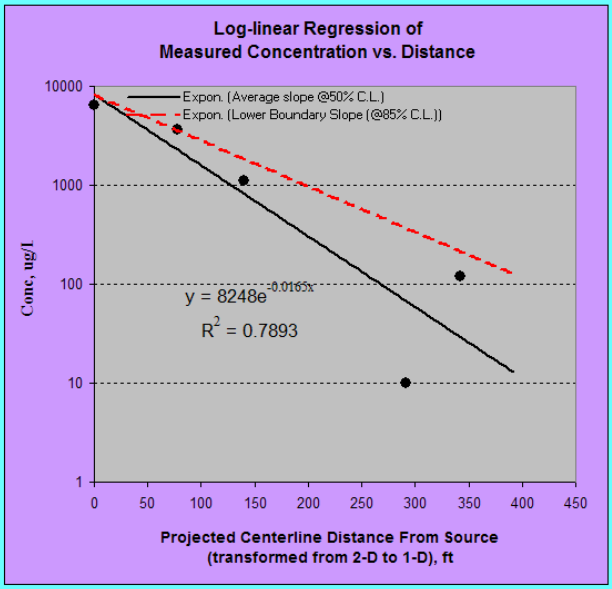
2. Enter Decision Criteria

Level of Confidence (Decision Criteria used) 85%

3. 1-D Steady-state analytical result for estimating contaminant degradation rates: Buscheck and Alcantar (1995)

Log-Linear Regression Results:

Average Slope	ft^{-1}	1.65E-02
Lower Boundary Slope (@85% C.L.)	ft^{-1}	1.06E-02
Intercept	ug/L	8248.0
Coefficient of Determination, r^2		0.789
Correlation Coefficient, r		-0.888
Number of Data Point, n		5
t-statistics		3.35
Level of Significance calculated for the slope		95.6%



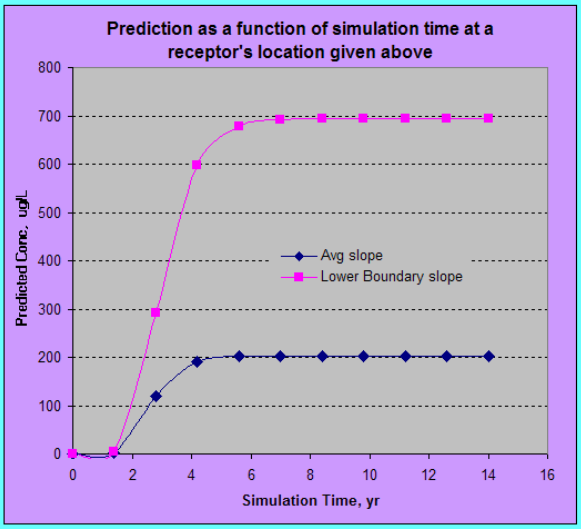
Rates Calculated:

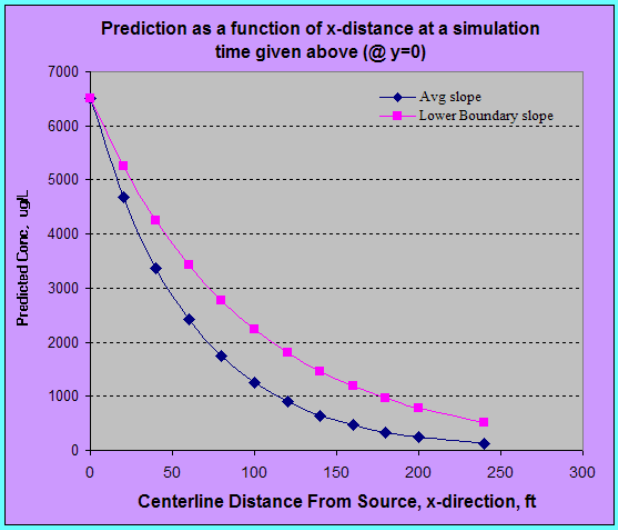
	unit	@ Avg Slope	@Lower Boundary Slope (85% C.L.)
Bulk Attenuation Rate Constant, k	yr^{-1}	1.88	1.21
Half Life of k	yr	0.37	0.57
Biodegradation Rate Constant, λ	yr^{-1}	1.12	0.67
Half-Life of λ	yr	0.62	1.03
Ratio of λ/k	%	59%	56%

4. 1-D Temporal/Spatial Prediction with Bear Equation (1979): Transient Plug-flow model with a longitudinal dispersion

Temporal/Spatial Prediction		Predicted Concentration, ug/L		Calculation of Target Source Concentration	
Location of a Receptor		@ Avg Slope	@Lower Boundary Slope (85% C.L.)	Target Groundwater Level at a receptor, ug/L @Avg slope	10
x-direction, ft	200	202.8	694.2		
y-direction, ft	15				
Simulation Time, yr	14				

Calculate Target Source concentration





Module 6: Calculation of Mass Removal Rate by Biodegradation

Main | Print View | End

Site Name: Dummy XYZ site
Site Address: 1234, Olympia, WA 98501
Hazardous Substance: Benzene

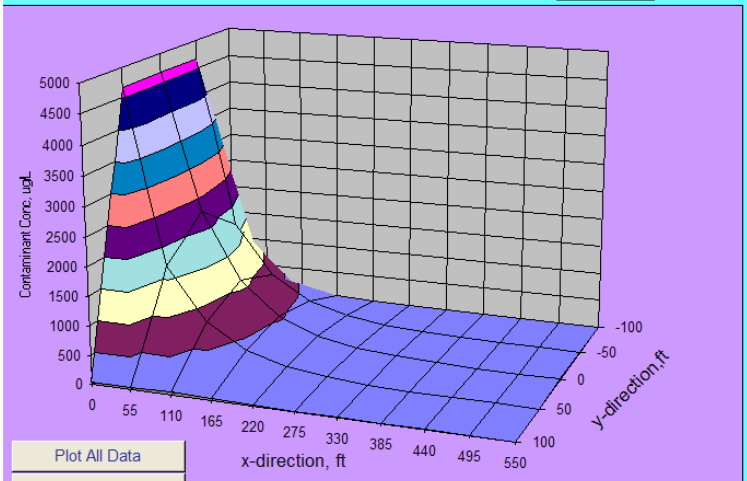
Ground water Concentrations in Plume (ug/L at z=0)

Transverse Distance, y-direction (ft) ↓ \ Distance from Source, x-direction (ft) →	0.0	55.0	110.0	165.0	220.0	275.0	330.0	385.0	440.0	495.0	550.0
100.0	36.3	39.6	48.8	37.2	23.9	14.1	8.0	4.3	2.3	1.2	0.6
50.0	4669.0	1681.7	789.4	372.3	176.8	84.3	40.4	19.4	9.3	4.5	2.1
0.0	4669.0	2272.0	1103.6	533.2	256.3	122.8	58.7	28.1	13.4	6.4	3.0
-50.0	4669.0	1681.7	789.4	372.3	176.8	84.3	40.4	19.4	9.3	4.5	2.1
-100.0	36.3	39.6	48.8	37.2	23.9	14.1	8.0	4.3	2.3	1.2	0.6
MASS FLUX (mg/day)	3.00E+4	7.56E+3	3.68E+3	1.79E+3	8.71E+2	4.23E+2	2.06E+2	9.99E+1	4.85E+1	2.35E+1	1.14E+1

Choose a Model below to Display:

- No Degradation Model
- 1st Order Decay Model
- Instantaneous Reaction Model

Target Ground water Conc, ug/L: 5.0
Modeled Area Length (L), ft: 550.0
Modeled Area Width (W), ft: 200.0



Enter Simulation Time, yr: 12

**Displayed Model is 1st-order Decay.*

Plume and Source Masses (Order-of-Magnitude Accuracy)

Plume Mass if No Biodegradation:	96.2	*kg*
- Actual Plume Mass:	5.3	*kg*
= Plume Mass Removed by Biodegradation:	**90.9**	*kg* (94 %)

Change in Electron Acceptor/Byproduct Mass, kg:

Oxygen	Nitrate	Ferrous Iron	Sulfate	Methane	Manganese
na	na	na	na	na	na

Contam. Mass in Source (t=0 years):	200.0	*kg*
Contam. Mass in Source Now (t=12 years):	103.8	*kg*
Current Volume of Groundwater in Plume:	10.4	*ac-ft*
Flowrate of Water Through Source Zone:	1.960	*ac-ft/yr*

Module 5: Calculation of Rate Constants: Temporal/Spatial Prediction
by 1-D (transformed) Steady State/Continuous Source Assumption

Site Name: Dummy XYZ site
Site Address: 1234, Olympia, WA 98501

1. Input data used for this module

Main | Print View | End

Hazardous Substance:	Benzene
Seepage Velocity (Average), v_{gw}, ft/yr	113.8
Longitudinal Dispersivity, α_x, ft	13.45
Retardation Factor, R	2.05
Current Continuous Source Concentration, ug/L	6500

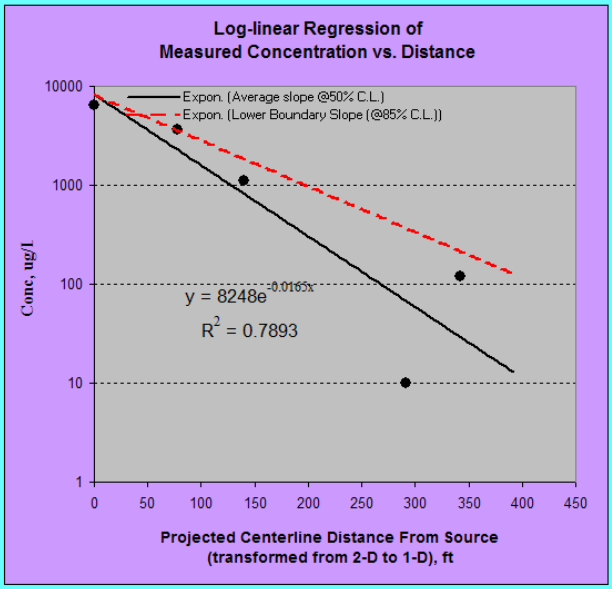
2. Enter Decision Criteria

Level of Confidence (Decision Criteria used) 85%

3. 1-D Steady-state analytical result for estimating contaminant degradation rates: Buscheck and Alcantar (1995)

Log-Linear Regression Results:

Average Slope	ft^{-1}	1.65E-02
Lower Boundary Slope (@85% C.L.)	ft^{-1}	1.06E-02
Intercept	ug/L	8248.0
Coefficient of Determination, r^2		0.789
Correlation Coefficient, r		-0.888
Number of Data Point, n		5
t-statistics		3.35
Level of Significance calculated for the slope		95.6%



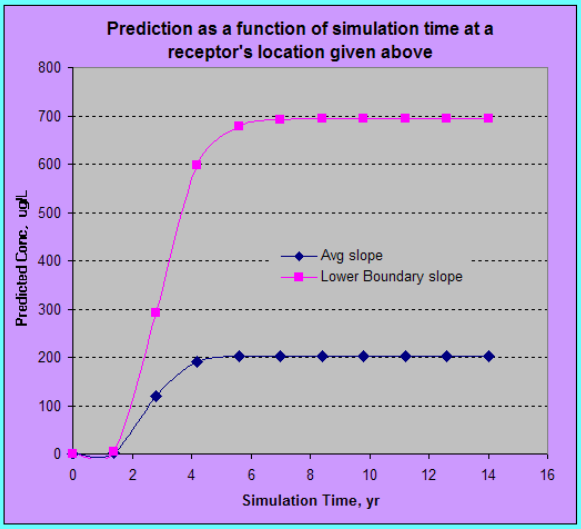
Rates Calculated:

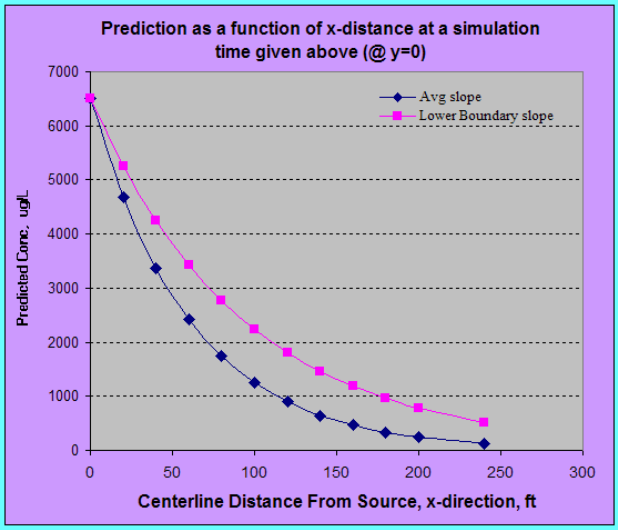
	unit	@ Avg Slope	@Lower Boundary Slope (85% C.L.)
Bulk Attenuation Rate Constant, k	yr^{-1}	1.88	1.21
Half Life of k	yr	0.37	0.57
Biodegradation Rate Constant, λ	yr^{-1}	1.12	0.67
Half-Life of λ	yr	0.62	1.03
Ratio of λ/k	%	59%	56%

4. 1-D Temporal/Spatial Prediction with Bear Equation (1979): Transient Plug-flow model with a longitudinal dispersion

Temporal/Spatial Prediction		Predicted Concentration, ug/L		Calculation of Target Source Concentration	
Location of a Receptor		@ Avg Slope	@Lower Boundary Slope (85% C.L.)	Target Groundwater Level at a receptor, ug/L @Avg slope	10
x-direction, ft	200	202.8	694.2		
y-direction, ft	15				
Simulation Time, yr	14				

Calculate Target Source concentration





Module 6: Calculation of Target Source Mass and Restoration

Site Name: Dummy XYZ site
Site Address: 1234, Olympia, WA 98501

1. Input data used for this Module

Hazardous Substance:	Benzene
Current Source Mass, kg	100
Source Release time, yr	3
Seepage Velocity, V_{gw}, ft/yr	113.81
Longitudinal Dispersivity, α_x, ft	13.45
Transverse Dispersivity, α_y, ft	1.35
Retardation Factor, R	2.054
Biodegradation Rate Constant, λ, yr^{-1}	0.627

Main | Print View | End

2. Enter Decision Criteria

Simulation Start time, yr	0.001
Simulation End time, yr	30
Target Level at receptors, ug/L	100

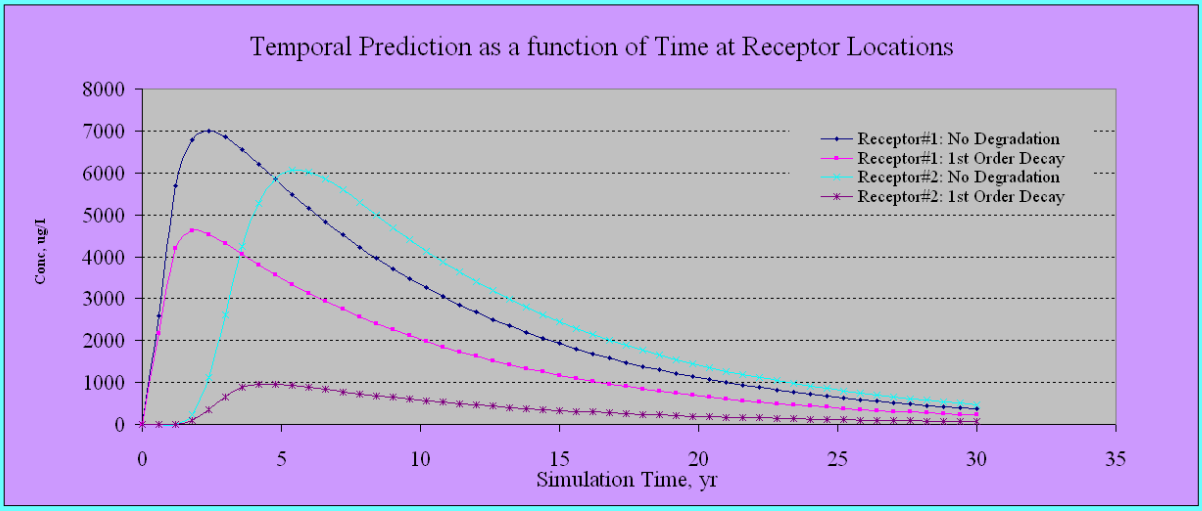
Calculate Restoration Time

Calculate Target Source Mass

3. Temporal Prediction at a Receptor (at z=0)

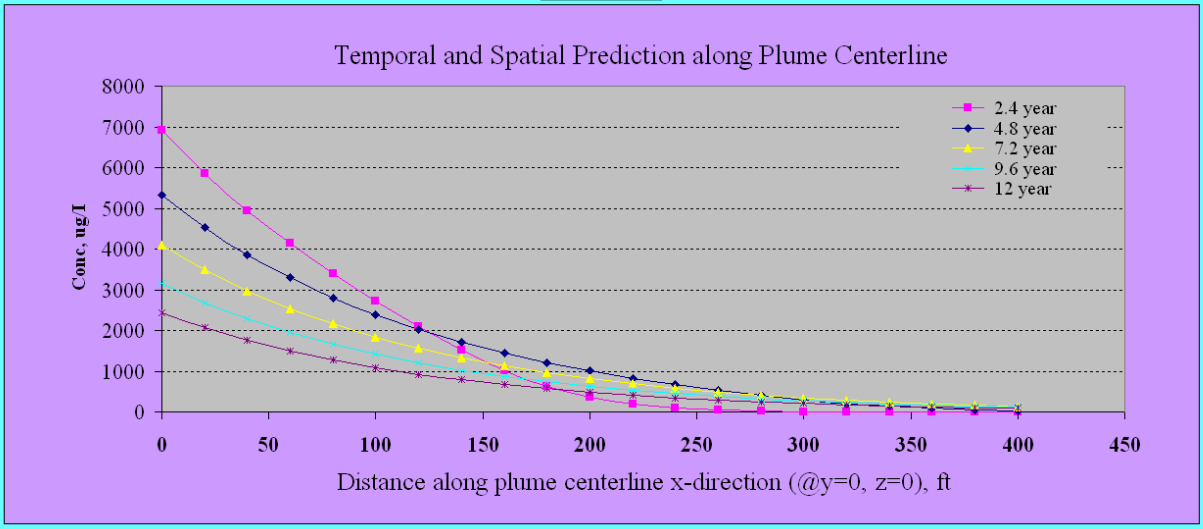
Location of Receptors		Type of Model Used	Half-Time to reach the steady-state, yr	Predicted Concentration, ug/L @Simulation Time, yr		Time to reach the Target level without source Removal, yr	Target Source information to reach target level (@100ug/L) and at Simulation End Time (@30yr)	
				15.0	30.0		Target mass	Removal needed
Receptor #1								
x-direction, ft	50	No degradation	1.2	1925.2	373.2	42.0	70.7	29.3
y-direction, ft	10	1st Order Decay	1.0	1169.4	226.7	37.5	79.5	20.5
		Inst. Reaction	NA	0.0	0.0	NA	NA	NA
Receptor #2								
x-direction, ft	200	No degradation	3.9	2449.2	474.8	44.2	65.0	35.0
y-direction, ft	20	1st Order Decay	3.1	333.4	64.6	26.0	NA	NA
		Inst. Reaction	NA	0.0	0.0	NA	NA	NA

Location of Receptor #1 is 50ft x-direction & 10ft y-direction; Location of Receptor #2 is 200ft x-direction & 20ft y-direction



4. Temporal/Spatial Prediction along Plume Centerline (@ y & z = 0) with 1st-order Decay Model

Modeled Overall Plume Centerline Distance to evaluate, ft	400
Modeled Overall Simulation Time to evaluate, year	12



Sources

Washington State Department of Ecology, User's Manual: Natural Attenuation Analysis Tool Package for Petroleum-Contaminated Ground Water, July, 2005

5. MONITORING AND REMEDIATION OPTIMIZATION SYSTEM (MAROS)

Overview

Developed by GSI for the Air Force Center for Environmental Excellence (AFCEE), in accordance with the AFCEE Long Term Monitoring Optimization Guide.

Comprehensive site evaluation tool based on statistical methods applied to site-specific data that accounts for historical and current data as well as hydrogeologic factors (e.g., wells, seepage velocity), and potential receptors. Analyzes individual wells, plume with respect to spatial indicators and stability, and site optimization. Using database trend analysis, helps identify constituents of concern (CoC), significance of temporal trends, redundancy of data points (monitoring wells), adequate sampling frequency, and data gaps.

MAROS will conduct the following calculations:

- Summary Statistics for Individual Wells
  - Calculates the detection frequency, date range of data, maximum concentration, range of concentrations, and date of maximum result for up to 5 COCs for all wells
  - Summary Statistics using Kaplan-Meier Method: Mean, median standard deviation and percentiles for individual well data are calculated using the Kaplan-Meier method to account for datasets with a higher percentage of non-detect (ND) data
  - Outliers for Individual Wells: uses Dixon's method to identify high or low outliers in a dataset
  - Data Distribution: MAROS Uses the Shapiro-Wilk method to identify individual well datasets that do not have Normal or Log-normal data distributions

- Trend Analysis for Individual Wells
  - Mann Kendall
  - Linear Regression

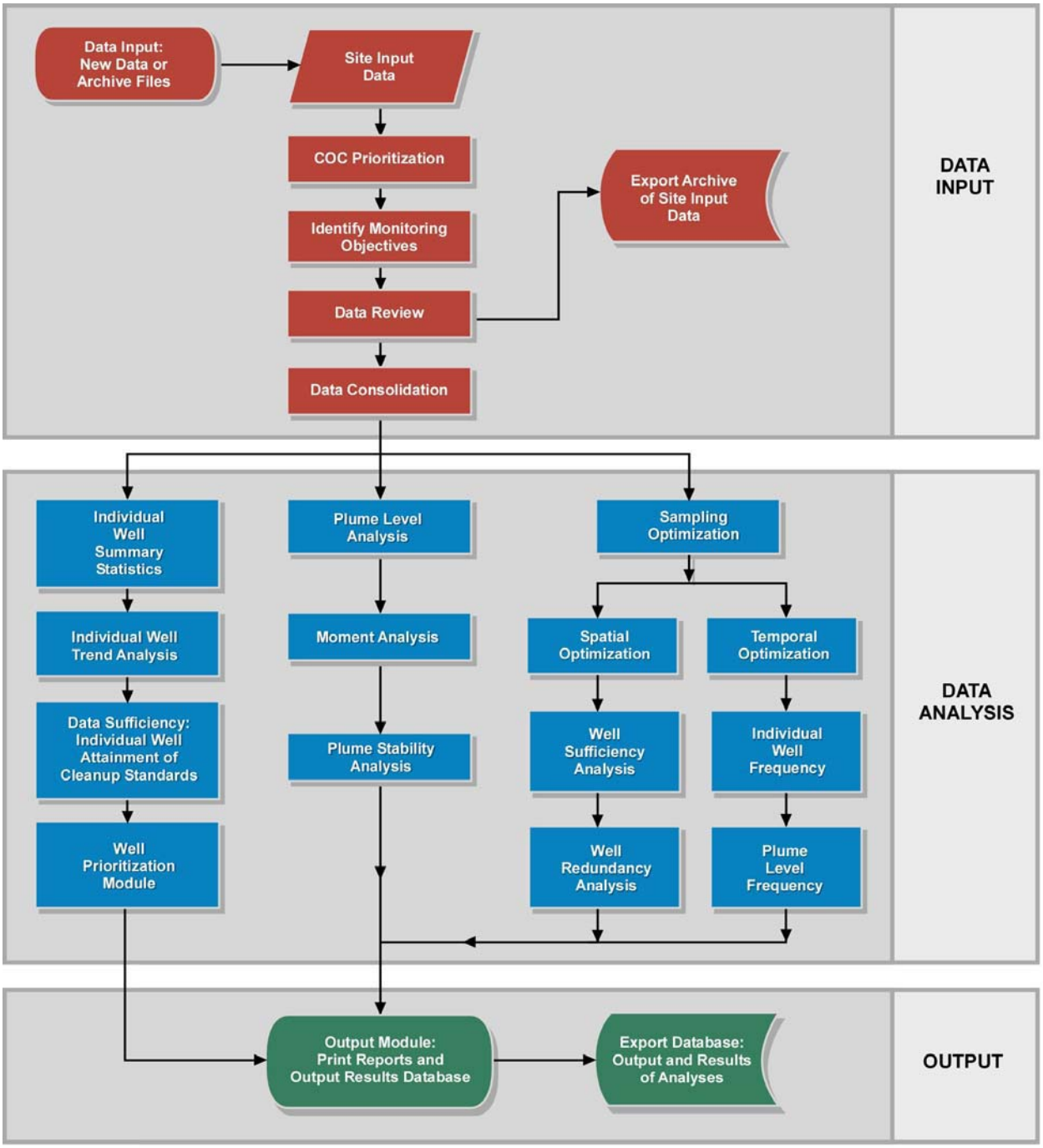
- Data Sufficiency for Individual Wells
  - Cleanup Status: Sequential T-Test and Student's T-Test are used to determine if concentrations are statistically below the cleanup goal
  - Power Analysis: Estimates how many more samples may be required to demonstrate location is statistically below the cleanup level
  - Prioritizes well importance using a qualitative method based on individual well statistics and well monitoring objectives

- Moment Analysis

- Uses the full dataset to estimate moments and the Mann-Kendall trends of each metric.
- Total dissolved mass in the plume
- Center of mass: Coordinates of the center of mass
- Spread of mass about the center of the plume

- Evaluation of aggregate concentration trends for source area, tail and User-defined well groups

- Spatial/Temporal Optimization
  - Provides several qualitative and quantitative metrics for identifying redundant monitoring locations and for identifying areas of high uncertainty that may require more monitoring locations
  - Provides several qualitative and quantitative metrics for assessing appropriate sampling frequency for well networks


Data Input: New Data or Archive Files
Site Input Data
COC Prioritization
Identify Monitoring Objectives
Data Review
Data Consolidation
Export Archive of Site Input Data
DATA INPUT
Individual Well Summary Statistics
Individual Well Trend Analysis
Data Sufficiency: Individual Well Attainment of Cleanup Standards
Well Prioritization Module
Plume Level Analysis
Moment Analysis
Plume Stability Analysis
Sampling Optimization
Spatial Optimization
Temporal Optimization
Well Sufficiency Analysis
Well Redundancy Analysis
Individual Well Frequency
Plume Level Frequency
DATA ANALYSIS
Output Module: Print Reports and Output Results Database
Export Database: Output and Results of Analyses
OUTPUT

Advantages

- Comprehensive site analysis
- Incorporates hydrogeologic site data and potential receptors in analysis
- Recommendations for sampling optimization (potential for cost reduction)
- Recommendations for potential well locations (data gaps)
- EPA accepted data analysis tool for project decision support
- Uses real world coordinates in 2-D modeling components

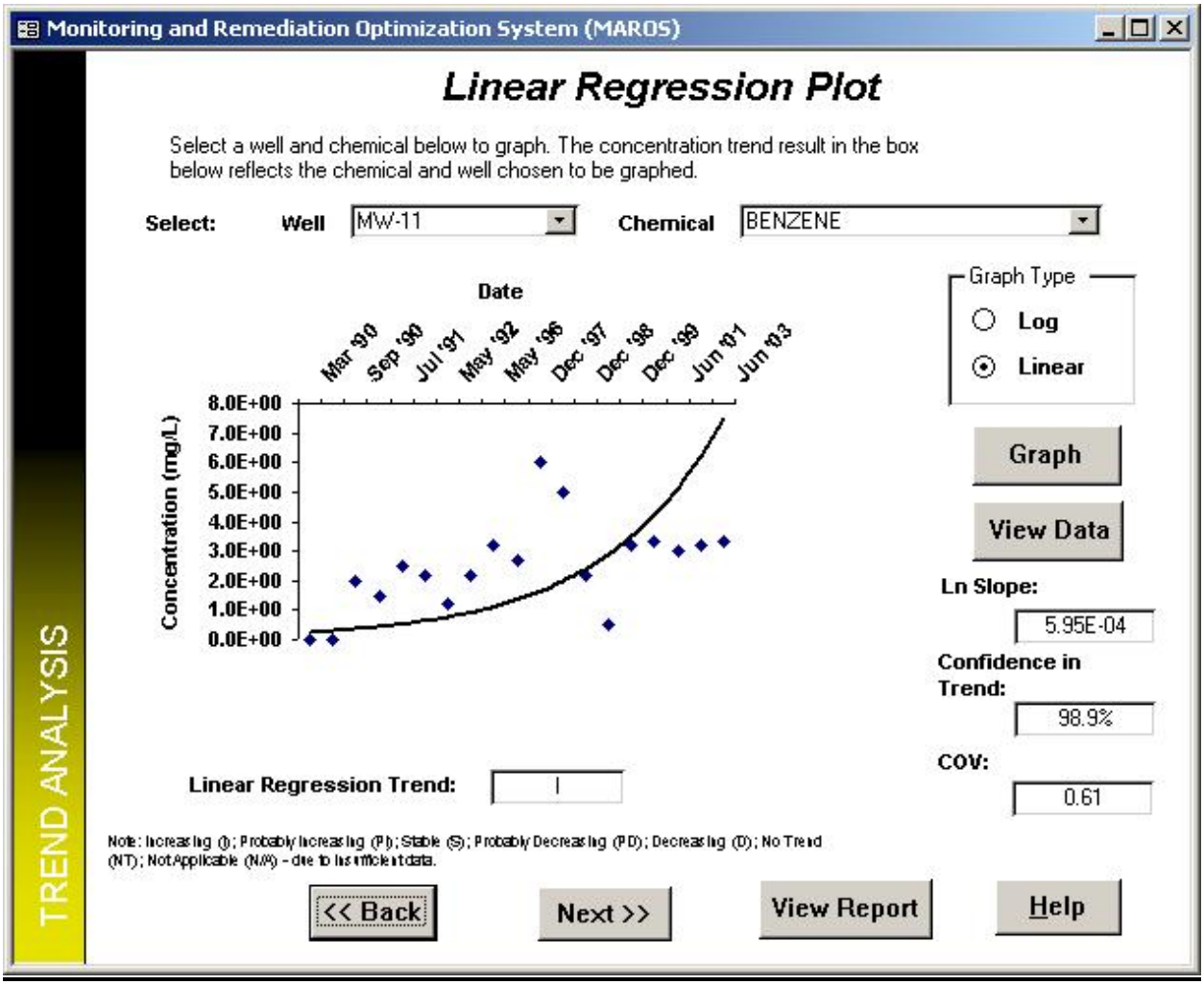
Disadvantages

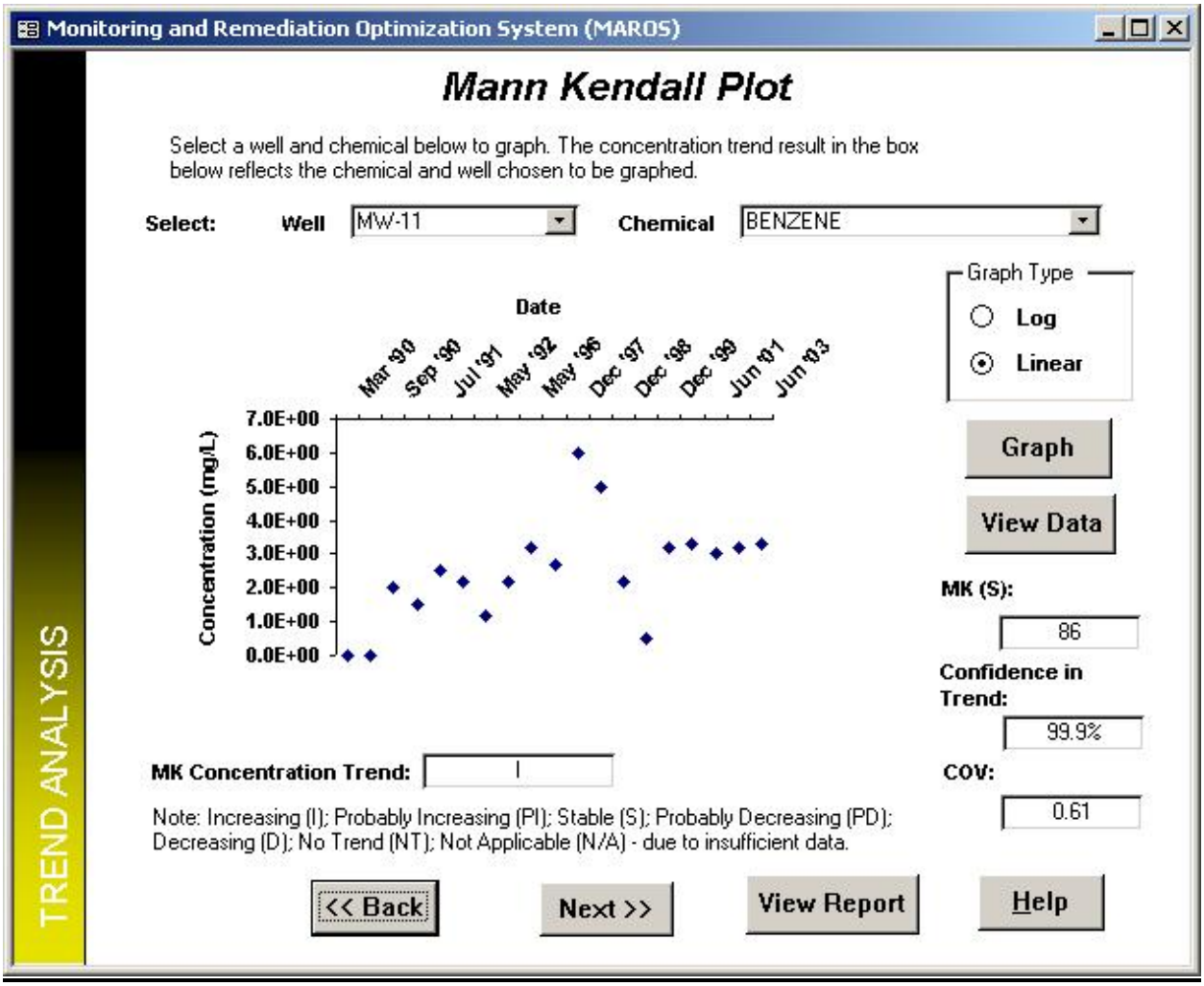
- Complex data requirements
- Time intensive
- Does not analyze geochemical/biodegradation components (work-around required)

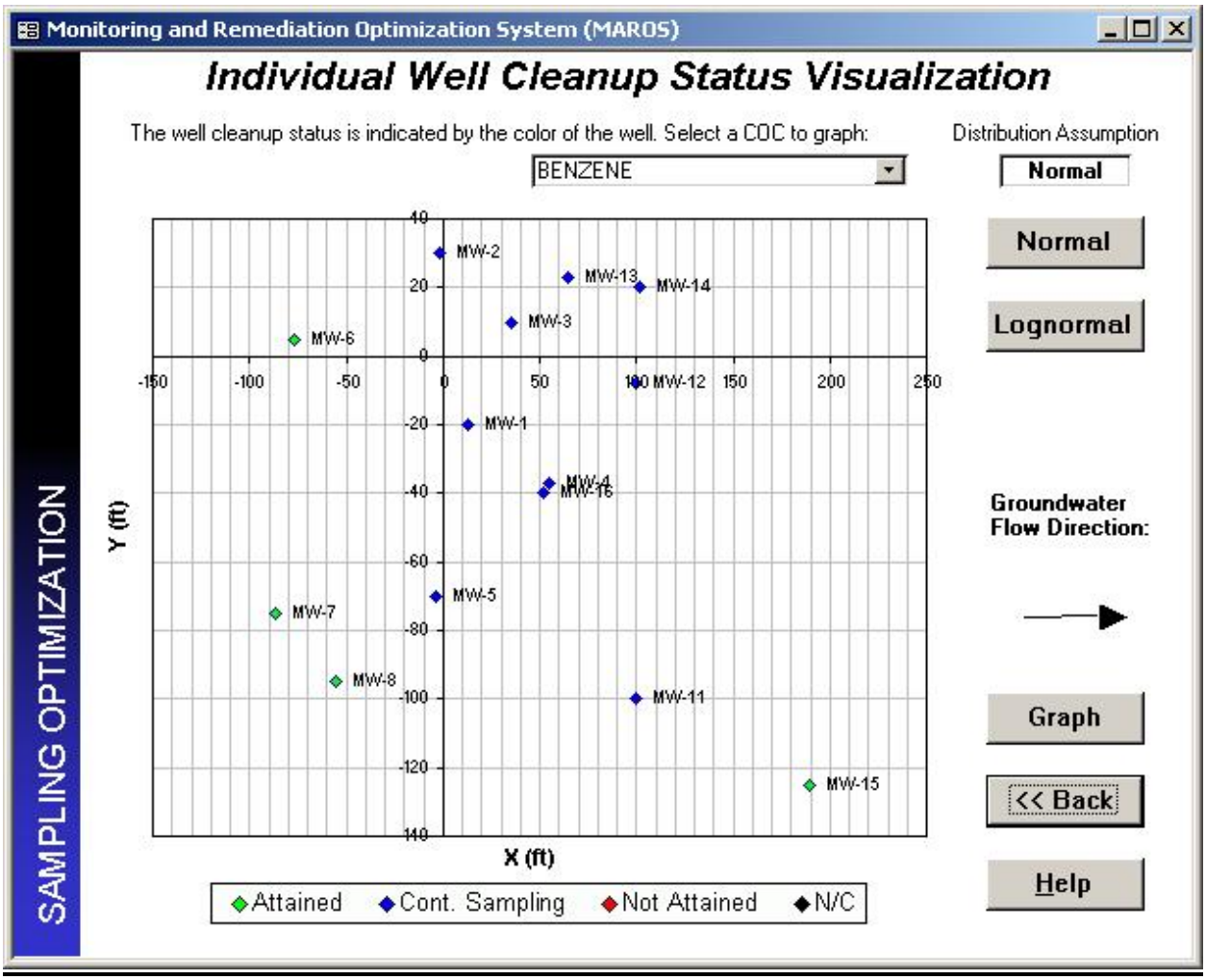
Online/Freeware availability

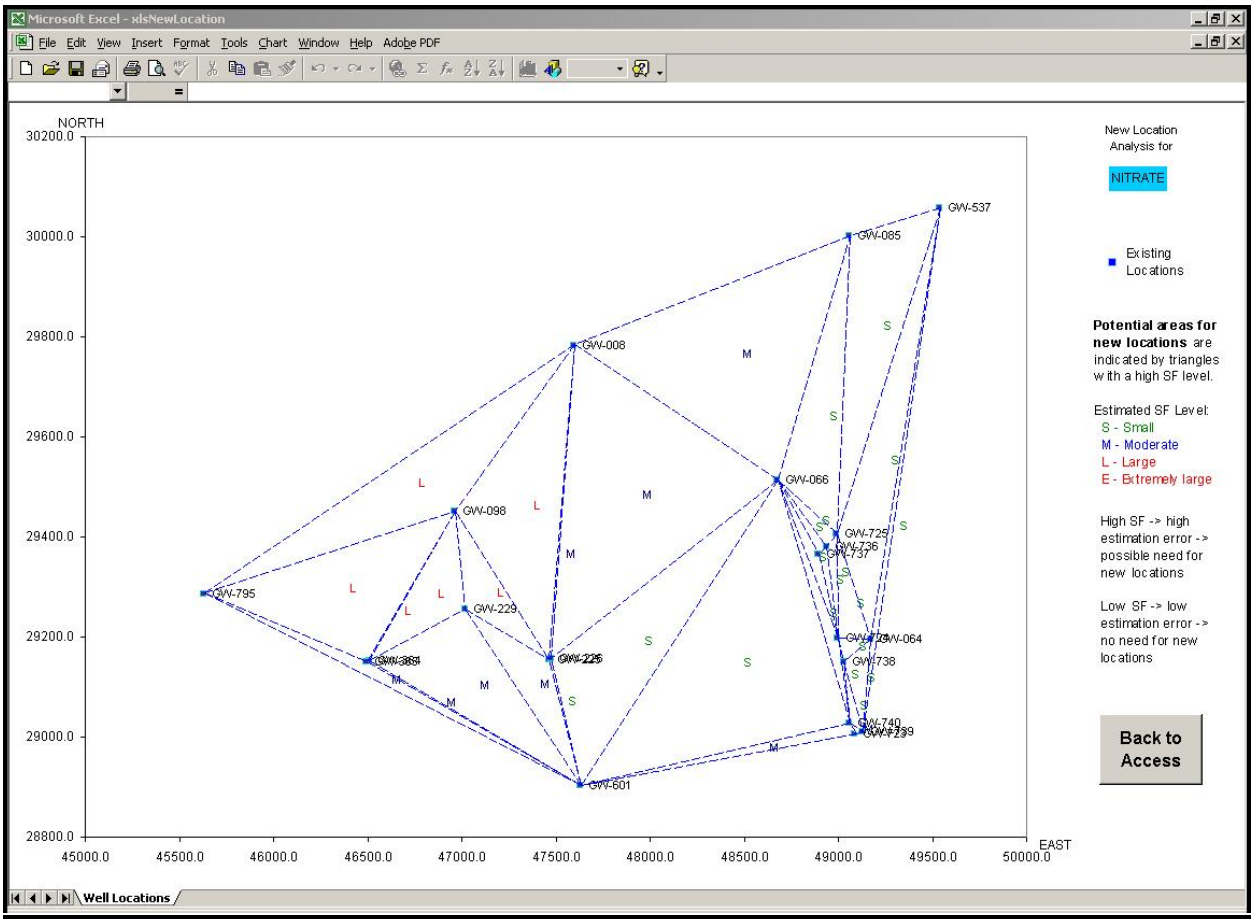
http://www.gsi-net.com/en/software/free-software/maros.html

Example Output




Monitoring and Remediation Optimization System (MAROS)
Mann Kendall Plot
Select a well and chemical below to graph. The concentration trend result in the box below reflects the chemical and well chosen to be graphed.
Select:
Well
MW-11
Chemical
BENZENE
Graph Type
Log
Linear
Date
Mar '90
Sep '90
Jul '91
May '92
May '96
Dec '97
Dec '98
Dec '99
Jun '01
Jun '03
Concentration (mg/L)
7.0E+00
6.0E+00
5.0E+00
4.0E+00
3.0E+00
2.0E+00
1.0E+00
0.0E+00
Graph
View Data
MK (S):
86
Confidence in Trend:
99.9%
MK Concentration Trend:
I
COV:
0.61
Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A) - due to insufficient data.
<< Back
Next >>
View Report
Help
TREND ANALYSIS


Monitoring and Remediation Optimization System (MAROS)
Individual Well Cleanup Status Visualization
SAMPLING OPTIMIZATION
The well cleanup status is indicated by the color of the well. Select a COC to graph:
BENZENE
Distribution Assumption
Normal
Normal
Lognormal
Groundwater Flow Direction:
Graph
<< Back
Help
Y (ft)
X (ft)
MW-2
MW-13
MW-14
MW-3
MW-6
MW-12
MW-1
MW-4
MW-16
MW-5
MW-7
MW-8
MW-11
MW-15
Attained
Cont. Sampling
Not Attained
N/C



Sources

GSI Environmental, Inc., Air Force Center for Engineering and the Environment, Monitoring and Remediations System (MAROS), User's Guide and Technical Manual, September, 2012

Natural Attenuation

BIOSCREEN Natural Attenuation Decision Support System – Version 1.4

BIOSCREEN is a screening level model developed by the U.S. Environmental Protection Agency and the U.S. Air Force. The model simulates remediation through natural attenuation of dissolved petroleum hydrocarbons. The model is an analytical solution, and therefore, the geology must be homogeneous (may be anisotropic) and the flow of groundwater must be constant in magnitude and direction. The model is programmed in Microsoft® Excel spreadsheet environment. The model approximates a solution using the Domenico solute transport model in a three-dimensional porous media for a single chemical. BIOSCREEN has the ability to simulate advection, dispersion, adsorption, and first order decay (aerobic and anaerobic).

BIOSCREEN includes three different model types:

1) Solute transport without decay (conventional approach).
2) Solute transport with biodegradation modeled as first order decay process (simple, lumped-parameter approach). The solute degradation rate is proportional to the solute concentration.
3) Solute transport with biodegradation modeled as an "instantaneous" biodegradation reaction (approach used by BIOPLUME models).

1st order decay - rate of loss of mass at any given time is directly proportional to the mass present at that time. Use of the first order decay coefficient is modified to fit the representative field data for calibration. Uncertainties in parameters (e.g., dispersion, sorption, biodegradation) are "lumped" together in a "single" calibration parameter.

Suggested uses for BIOSCREEN:

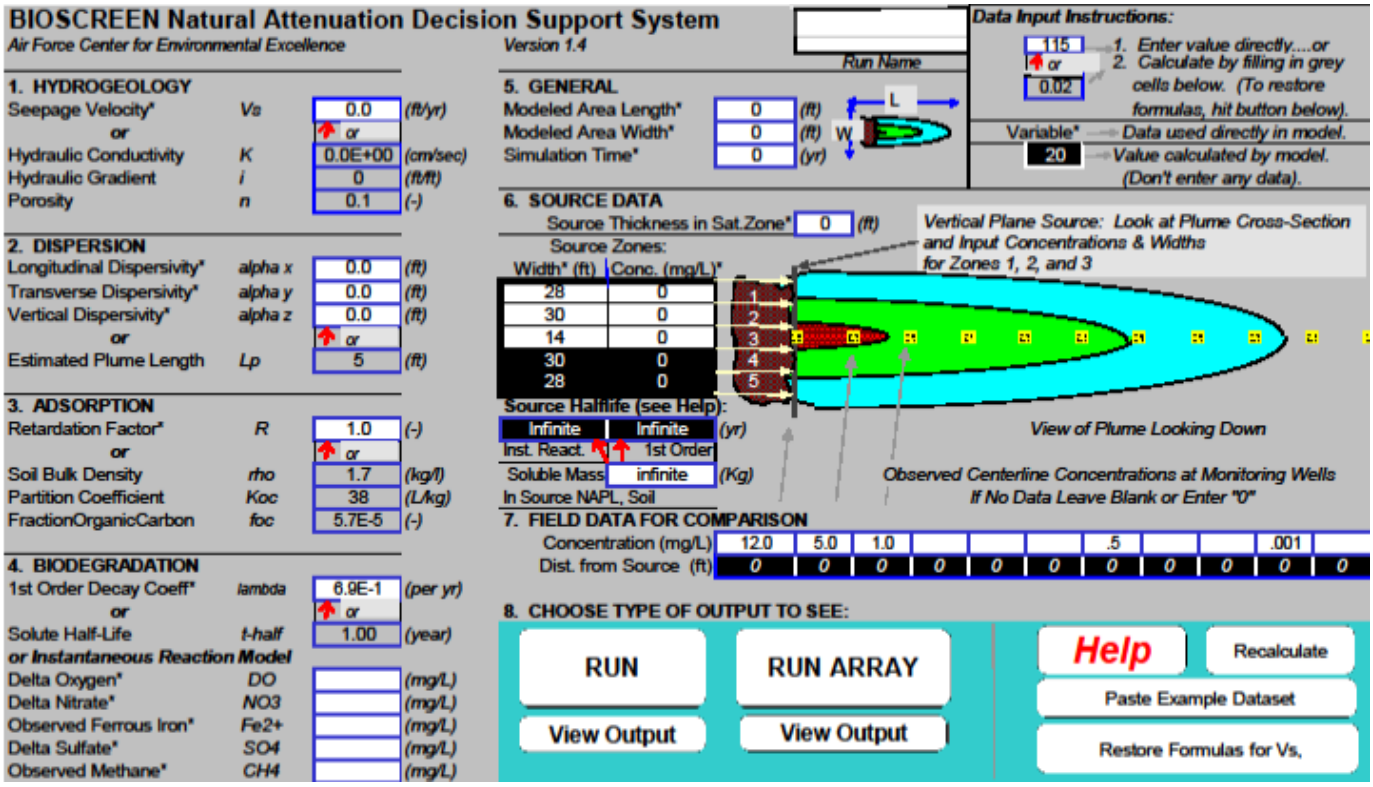
1) How far will the dissolved contaminate plume extend if no engineered controls or further source zone reduction measures are implemented?
2) How long will the plume persist until natural attenuation processes cause it to dissipate?

The following limitations are present in the model:

1) BIOSCREEN assumes simple groundwater flow conditions as an analytical model.
   a) Do not use in pumping systems
   b) Do not use where vertical gradients affect contaminant transport
2) BIOSCREEN as a screening tool only approximates more complicated processes that occur in the field
   a) Should not be used where detailed results are required. Requires the use of more complicated modeling efforts.

BIOSCREEN data input:

Input Parameters – the inputs are inter-related to each other. Need to begin evaluating collection of site parameters early in the site characterization phases. The better the input parameter data the more "accurate" the model.



1. Hydrogeology

   Seepage velocity – $V_s = Ki/\phi$ (ft/yr)

   Actual interstitial groundwater velocity, equaling Darcy velocity divided by effective porosity. The Domenico model and BIOSCREEN are not formatted to simulate the effects of chemical diffusion. Therefore, care should be utilized when applying to contaminant transport in low-flow hydrogeologic regimes.

   or

   Hydraulic conductivity – K (cm/sec) - **HORIZONTAL**
   Hydraulic gradient – i (ft/ft)
   Effective porosity – ϕ (unitless) – measured (best) or estimated.

Sources: Field data (Best); Freeze and Cherry, Driscoll, Fetter, Todd, etc.

Please verify all input parameters – DO THEY MAKE SENSE

2. Dispersion
   Refers to the process whereby a plume will spread out in longitudinal, horizontal, and vertically (x, y, z). Due to the difficulty in measuring actual values, selection of dispersivity is a difficult process.

   Longitudinal – alpha x (ft)
   Transverse – alpha y (ft)
   Vertical - alpha z (ft) or

   Plume length (ft)

Estimated length of the existing or hypothetical groundwater plume being modeled. Plume length is a key parameter as it is used to estimate dispersivity terms.

If modeler choses to use Xu and Eckstein (1995) formula for estimating/calculating the longitudinal dispersion, modeler must be cautioned to use consistent units. The formula given in this paper is in meters. BIOSCREEN manual contains the appropriate conversion.

$3.28 \times 0.83[\log_{10} (L_p)/3.28)]^{2.414}$

3. Adsorption

   Retardation Factor - R (unitless) – Retardation is the rate at which dissolved contaminants migrating through a water-bearing zone can be reduced by sorption to the sediment matrix.

   or

   Soil Bulk Density - rho (kg/l)
   Partition Coefficient – K_{oc} (L/kg) – chemical specific
   Fraction of Organic Carbon – f_{oc} (unitless) – Fraction of the soil matrix comprised of natural organic carbon. Greater content of carbon equates to greater adsorption capacity of matrix. Default value of 0.001 is often used.

Retardation will also represent the slow diffusion of contaminants from lower permeability matrix back into the higher permeability matrix – Concentration gradient

4. Biodegradation

   1st Order Decay – lambda (per year) – BIOSCREEN assumes the rate of biodegradation depends only on the concentration of the constituents and the rate coefficient.

   or

   Solute half-life – t-half (year) – Time for dissolved constituents concentrations to decay by one-half as contaminants migrate.

   Instantaneous Reaction Model

   Delta Oxygen – DO (mg/L), Delta Nitrate – NO_3 (mg/L), Observed Ferrous Iron Fe^{+2} (mg/L), Delta Sulfate – SO_4 (mg/L), Observed Methane – CH_4 (mg/L)

5. General Parameters

   Modeled Area Length (ft) – sets up distances in the field data entry.
   Modeled Area Width (ft)
   Simulation Time (yr)

6. Source Data

   Source Thickness (ft) – Equates to the smear zone or source zone created from the historical maximum and minimum of groundwater fluctuations.
   Source Zone
   Mass – reduce during current and future conditions iterations

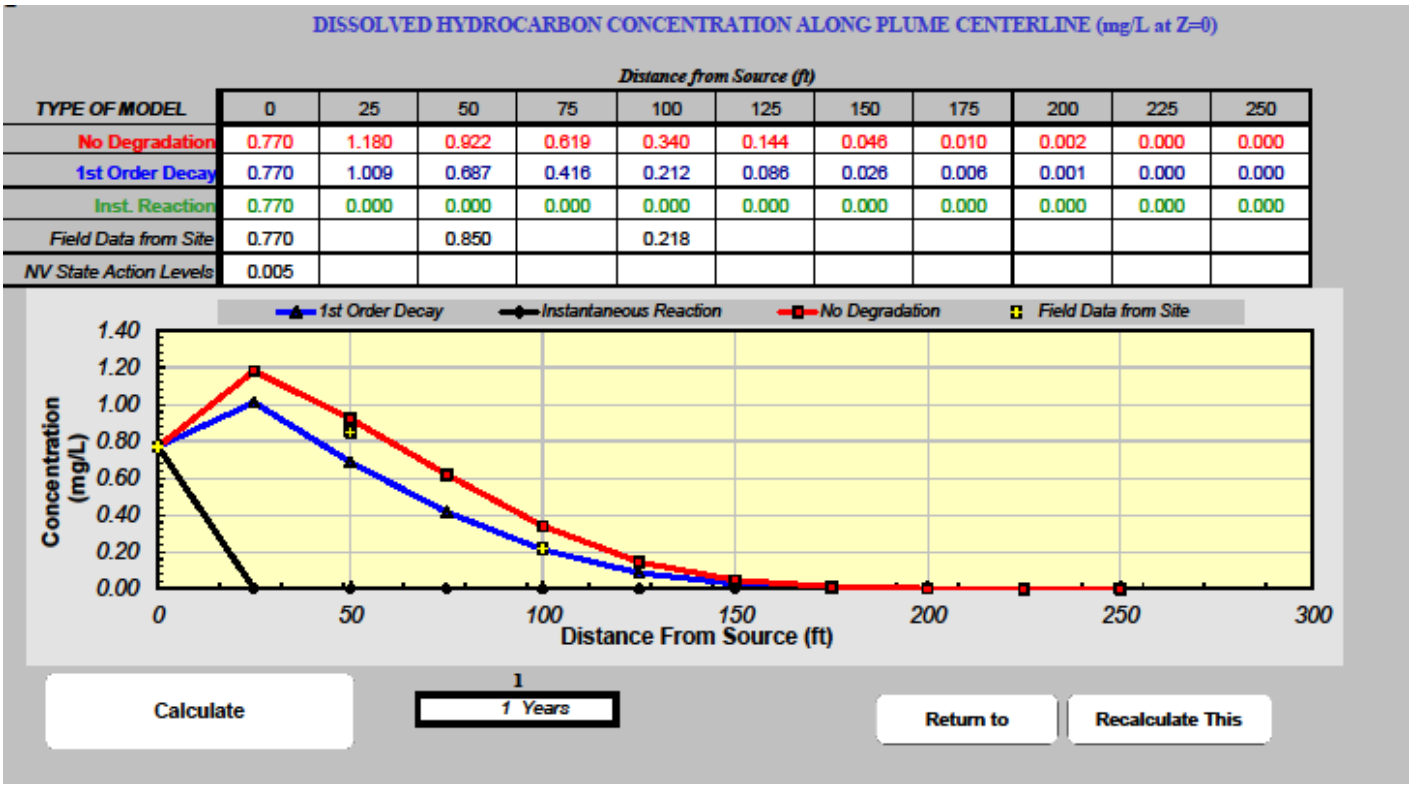
7. Field Data

   Actual field data – this is what you are calibrating to (i.e., calibration, current conditions).

Important to calibrate the model to field conditions that are present prior to any remediation being conducted at the site. This removes any potential variation any data.

Run Center Line – (Many times). Modifications to input parameters including time will need to be adjusted in order to approximate the field data. It is recommended to change only one parameter at a time, so that the modeler can inherently observe the results of that parameter on the model (positive or negative effect – next parameter). Once calibrated, the modeler can then use the model to simulate flow conditions for length of the dissolved plume, time to a given receptor, etc.

Change to current conditions (category 7) and continue iterations using input parameters categories 5 and 6 only.

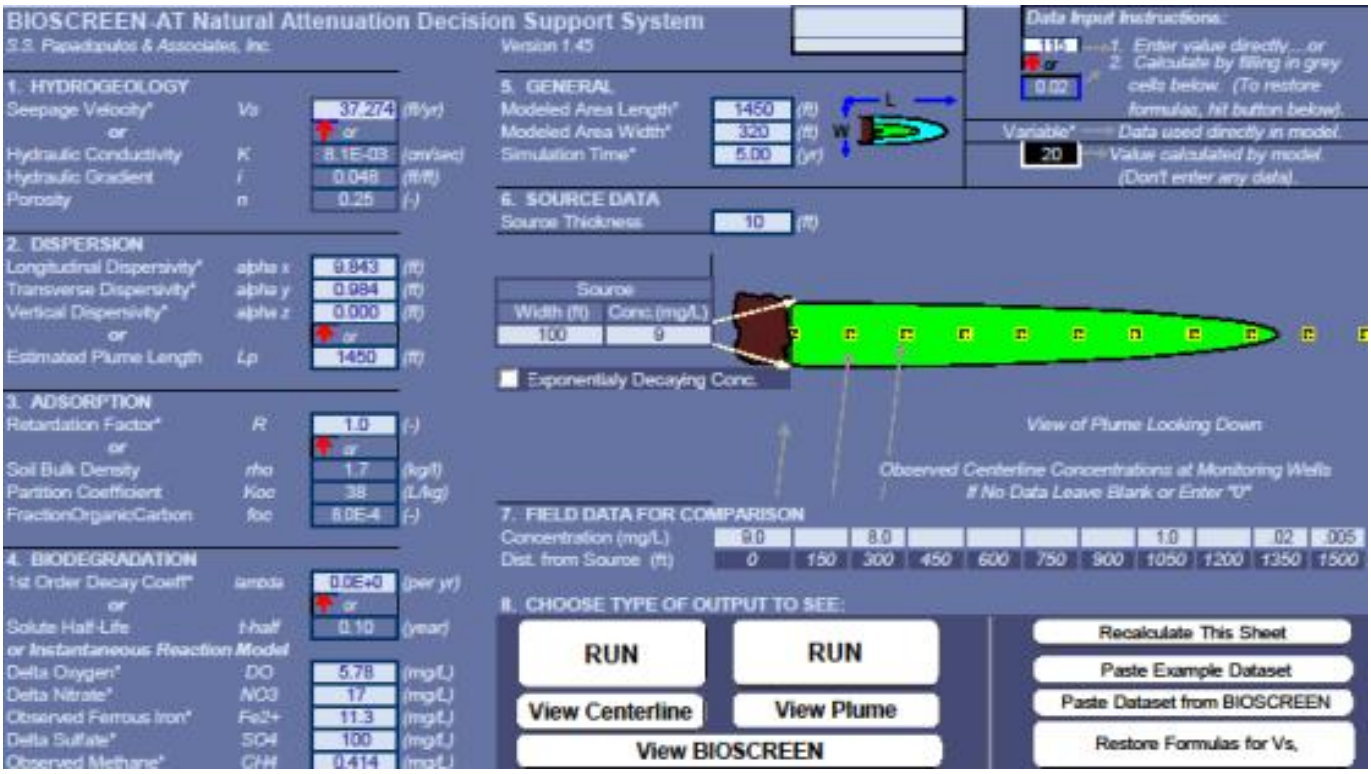


Note that the "calibrated" model curves should fit the field data relatively well.

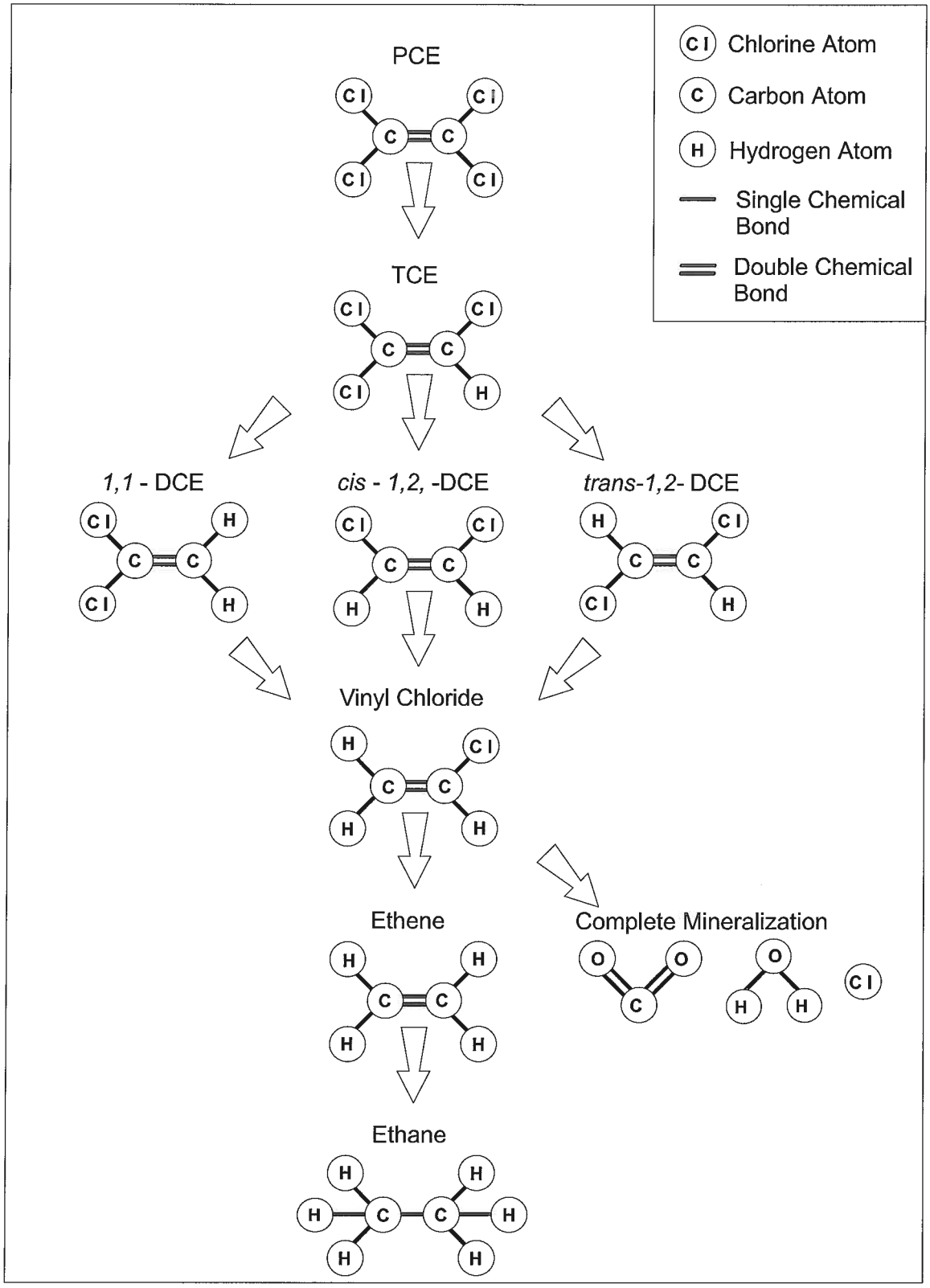
BIOSCREEN - AT

- BIOSCREEN left out an integral which only approximates the solution
- BIOSCREEN - AT uses the complete integral and therefore, provides a more exact solution.
- For low flow environment, such as Las Vegas, BIOSCREEN is sufficient.

EPA has acknowledge the error in the BIOSCREEN model. However, at this time, EPA has not modified the use of BIOSCREEN. Using BIOSCREEN – AT, the modeler can quickly see a comparison between the two model version results.


BIOSCREEN-AT Natural Attenuation Decision Support System
S.S. Papadopulos & Associates, Inc.
Version 1.45
1. HYDROGEOLOGY
Seepage Velocity*
Vs
37.274
(ft/yr)
or
Hydraulic Conductivity
K
8.1E-03
(cm/sec)
Hydraulic Gradient
i
0.048
(ft/ft)
Porosity
n
0.25
(-)
2. DISPERSION
Longitudinal Dispersivity*
alpha x
9.843
(ft)
Transverse Dispersivity*
alpha y
0.984
(ft)
Vertical Dispersivity*
alpha z
0.000
(ft)
or
Estimated Plume Length
Lp
1450
(ft)
3. ADSORPTION
Retardation Factor*
R
1.0
(-)
or
Soil Bulk Density
rho
1.7
(kg/l)
Partition Coefficient
Koc
38
(L/kg)
FractionOrganicCarbon
foc
6.0E-4
(-)
4. BIODEGRADATION
1st Order Decay Coeff*
lambda
0.0E+0
(per yr)
or
Solute Half-Life
t-half
0.10
(year)
or Instantaneous Reaction Model
Delta Oxygen*
DO
5.78
(mg/L)
Delta Nitrate*
NO3
17
(mg/L)
Observed Ferrous Iron*
Fe2+
11.3
(mg/L)
Delta Sulfate*
SO4
100
(mg/L)
Observed Methane*
CH4
0.414
(mg/L)
5. GENERAL
Modeled Area Length*
1450
(ft)
Modeled Area Width*
320
(ft)
Simulation Time*
5.00
(yr)
L
W
Data Input Instructions:
1. Enter value directly ... or
2. Calculate by filling in grey cells below. (To restore formulas, hit button below).
0.02
Variable* ---- Data used directly in model.
20 ---- Value calculated by model. (Don't enter any data).
6. SOURCE DATA
Source Thickness
10
(ft)
Source
Width (ft)
Conc.(mg/L)
100
9
Exponentialy Decaying Conc.
View of Plume Looking Down
Observed Centerline Concentrations at Monitoring Wells
No Data Leave Blank or Enter "0"
7. FIELD DATA FOR COMPARISON
Concentration (mg/L)
9.0
8.0
1.0
02
.005
Dist. from Source (ft)
0
150
300
450
600
750
900
1050
1200
1350
1500
II. CHOOSE TYPE OF OUTPUT TO SEE:
RUN
RUN
View Centerline
View Plume
View BIOSCREEN
Recalculate This Sheet
Paste Example Dataset
Paste Dataset from BIOSCREEN
Restore Formulas for Vs,

BIOCHLOR


Cl Chlorine Atom
C Carbon Atom
H Hydrogen Atom
Single Chemical Bond
Double Chemical Bond
PCE
TCE
1,1 - DCE
cis - 1,2, -DCE
trans-1,2- DCE
Vinyl Chloride
Ethene
Ethane
Complete Mineralization
O
O
C
O
H
H
Cl

Institutional Controls