

Immediate Environmental Concern Guidance

Version 5

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Site Remediation Program

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I. Purpose

The **Site Remediation Reform Act** enacted in May 2009 required the Department of Environmental Protection (the Department) to develop new regulations and guidance that provide clear direction for the person responsible for conducting the remediation, environmental consultants and Licensed Site Remediation Professionals on a number of issues involving the investigation and cleanup of contaminated sites.

Updated requirements for Immediate Environmental Concern (IEC) cases have been included in amendments to the Department's **Technical Requirements for Site Remediation (Technical Regulations)**, **7:26E-1.11**, as well as additional guidance to assist in the mitigation of IEC conditions. This guidance must be used to help identify IEC conditions at a site and successfully implement the **Technical Regulations** related to notification, receptor control and source remediation.

Overall, this IEC guidance is written to aid the person responsible for conducting the remediation, environmental consultants and Licensed Site Remediation Professionals when addressing the more common types of IEC conditions. The requirements for IEC cases apply to the person responsible for conducting the remediation. Environmental consultants and Licensed Site Remediation Professionals often will be the entities that provide information to the Department and communicate with an IEC case manager to ensure compliance with the appropriate **Technical Regulations** and guidance.

II. Overview

IEC cases represent one of the largest groups of priority remedial cases in the Department's Site Remediation Program that address direct threats to the residents of New Jersey. As part of IEC cases, the person responsible for conducting the remediation must act quickly and effectively to eliminate ongoing human exposures that pose a public health threat from contaminated drinking water, vapors, soil or other pathways. This guidance applies to all cases in the Site Remediation Program, primarily when an IEC condition is confirmed from a known or suspected source. Unknown sources causing IEC conditions are handled by the Department's publicly funded program in a similar manner. Overall, IEC cases differ from most remedial cases in that actual human exposure is occurring or is likely occurring, and must be stopped or prevented.

The person responsible for conducting the remediation usually will identify IEC conditions at known contaminated sites when performing receptor evaluation requirements found in the Technical Regulations at **7:26E-1.12 through 7:26E-1.16**, which includes a check for sensitive receptor populations. However, an IEC condition may be identified at any time during the remedial process and must be addressed in accordance with the **Technical Regulations, 7:26E-1.11** and this guidance.

The IEC guidance does not anticipate every scenario and, therefore, requires professional judgment for situations not directly included. The Department will assign a case manager to all IEC cases to provide guidance on any issue that may arise. Frequent communication and information sharing with the Department case manager is vital to successfully meeting the applicable IEC case requirements and protecting public health.

In the past, IEC cases primarily involved potable well contamination stemming from commercial and industrial activity or an unknown source that polluted private drinking water wells in a neighborhood or, occasionally, wells or surface water used for a public water supply. Within the last 10 years, documented IEC cases related to vapor intrusion and indoor air quality prompted SRP guidance for remedial requirements that has been extensively shared with the public. The IEC guidance compliments the vapor intrusion guidance and should be used in tandem.

Direct contact IEC cases occur infrequently and are limited to soil contamination that presents an acute threat within a short timeframe. Presently, the Department has developed acute levels for three contaminants and plans to develop acute criteria for several other contaminants in the future. In addition, certain highly acidic or basic compounds discharged onto soil also could present an acute hazard.

Furthermore, this IEC guidance includes remedial actions related to source control for IEC conditions. It reflects the importance of completing all remedial work tied to the IEC conditions:

first, requiring receptor controls to stop an ongoing exposure posing a human health threat; and, second, requiring remediation of any contaminant source associated with the IEC. Meeting established timeframes and providing early and proper notification to affected parties are critical to a successful response when IEC conditions exist.

Good communication through ample notification to residents, local officials and the Department about all remedial work involved with an IEC case is important. Timely notification that is clearly explained and documented will also assist in this effort. An **IEC Immediate Response Action Form** and **IEC Information Spreadsheet** are included as attachments that are required for use in reporting to the Department. A permit is required for potable water and vapor intrusion IEC cases to establish a Currently Known Extent of contamination exceeding applicable state standards.

In contrast to IEC actions, emergency response work addresses episodic discharges or the imminent threat of episodic discharges that require emergency action (e.g., chemical tanker spills, leaking drums of explosive hazardous substances). There may be situations where an emergency response also may develop into an IEC case, such as a chemical spill into a waterway used for potable purposes, which would be handled as part of the emergency response action. However, actions for emergency response work involve calls first to 911 to engage local emergency responders and then appropriate notification to the Department following appropriate state Spill Compensation and Control Act requirements.

IEC Receptor Protection and Source Control

There are the two critical components to remediating an IEC condition: receptor control and source control that are contained in the **Technical Regulations, 7:26E-1.11**. Both measures have specific timeframes for notification, remedial action and reporting. Receptor control and source control must be completed to close an IEC case.

If the contamination is related to a site, four major tasks must be taken by the person responsible for the conducting the remediation to address the IEC condition. Timeframes are included within the four tasks requiring actions. First, the person responsible for conducting the remediation must follow the Initial Notification and Interim Response Action procedures to report the IEC condition to the Department and address any receptors impacted by contamination from their site. The next three tasks are to be done concurrently with different completion requirements. The person responsible for the conducting the remediation must provide an Engineered System Response Action for impacted receptors, conduct a Receptor Delineation and initiate Source Control. The four tasks to be completed are explained in Section IV of the guidance for each type of IEC.

IEC Receptor Protection

The primary requirement for the person responsible for conducting the remediation is to protect human health by taking appropriate measures, both interim and long-term, to reduce exposure to acceptable levels. Actions must be taken immediately upon the identification that an IEC condition exists by notifying the Department and other parties involved.

Within 72 hours, the person responsible for conducting the remediation must act with interim response actions including: bottled water or emergency interconnections for drinking water; changes to indoor ventilation/pressurization and sealing cracks/sumps for vapor intrusion; and, site fencing, access restriction, temporary relocation or interim capping for direct contact.

A more permanent remedial action, an engineered system response, is required within 30 days to consider receptor exposure “controlled.” These actions may include but are not limited to: Point of Entry Treatment systems (POETs) or connection to a public supply for potable water; sub-slab depressurization for vapor intrusion; and, soil removal or capping for direct contact.

Implementing an engineered system response is not the solution to the IEC, but rather the receptor concern. Elimination of the source of an IEC and eliminating IEC conditions at the receptor is the solution to the problem. Reporting to the Department on this remedial work is required in 90 days from identification of the IEC condition.

IEC Source Control

In addition to receptor control, the specific source of contamination that leads to an IEC condition must begin to be addressed as part of the response to the IEC condition within six months. Until such time that the source area is delineated through a focused remedial investigation (RI) and either removed or otherwise remediated, an IEC condition remains, even if an engineered response has been implemented to address impacts to the receptor. In the case of contaminated drinking water wells and vapor intrusion the source may be dissolved contamination in ground water. In many cases it is unlikely that groundwater will be remediated in a timeframe commensurate with other IEC source control actions. However, it may be feasible to control groundwater to alleviate an IEC condition.

Material that represents a source to an IEC that can be readily removed must begin to be addressed through conducting a focused remedial investigation and initiating source control measures within the six-month timeframe. Product-saturated soil that is contaminated with gasoline or other non-aqueous phase liquid product causing a vapor problem in an adjacent structure must be removed. For material that represents a direct contact IEC, removal is often the most appropriate action to eliminate the source.

The overall goal of source control is to eliminate the cause of the IEC condition so that protection of public health does not have to rely solely on receptor controls.

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III. IEC Definitions

There are three categories of IEC conditions: Potable Water, Vapor Intrusion and Direct Contact. Definitions for these terms are included below. In addition, a Currently Known Extent definition is included that applies to both potable well and vapor intrusion IEC cases..

Potable Water IEC

A potable water IEC is a condition where there is contamination at levels at or above the **Class II Ground Water Remediation Standards, N.J.A.C. 7:26D-2.2** in wells used for potable purposes where the contamination is associated with a discharge of a hazardous substance(s). Also, when contamination above federal and state drinking water standards (**Maximum Contaminant Levels**) is found in surface waters used for public water supplies, an IEC condition exists and this guidance must be followed. Samples used for these determinations are raw water taken before any treatment.

Vapor Intrusion IEC:

A vapor intrusion IEC occurs when a discharge of a hazardous substance results in levels of contaminants in indoor air above Indoor Air Screening Levels in the Department's **Vapor Intrusion Guidance**. The **Vapor Intrusion Guidance** manual should be used to determine unacceptable risks for residential or other non-OSHA exposures. The **Vapor Intrusion Guidance's** Indoor Air Screening Levels are included as **Table 3** in this guidance and represent acceptable exposure levels for indoor vapors. The **Vapor Intrusion Guidance** is routinely updated and posted on the Department's Web site. The Department's screening levels contain both residential and non-residential exposure levels that should be used accordingly. In addition, the vapors must be attributed to a discharge of a hazardous substance.

In rare instances, other vapor intrusion conditions occur where toxic or harmful subsurface contaminants, which are found to have migrated into an occupied or confined space, produce a toxic or harmful atmosphere resulting in an unacceptable human health exposure, or produce an oxygen-deficient atmosphere, or result in demonstrated physical damage to essential underground services (i.e. phone lines carrying 911 communications). Explosive gasses are defined as levels that exceed 10 percent of the lower explosive limit for that compound requiring an emergency response and compliance with **7:26E-1.15(d)4**.

Direct Contact IEC

A direct contact IEC is a situation where contamination exists above the acute health effect levels in the upper two feet of the soil column and there is actual or a potential for human contact via dermal contact, ingestion or inhalation. Acute effect means that an adverse human health impact could result from an exposure of less than two weeks.

The Department has developed acute levels for three contaminants found in **Table 4** and plans to develop acute criteria for several other contaminants in the future. In addition, certain highly acidic or basic compounds discharged onto soil also could present an acute hazard, which normally includes pH levels 2 and under and more than 12.5.

High concentrations of certain contaminants or extremely acidic or basic compounds may present “acute” hazards in that contact/ingestion with these chemicals can result in burns or other physical effects. When these compounds are present in unsecured containers, it requires an emergency response. When these compounds are spilled onto soil as a solid or liquid, they can present a direct contact IEC condition.

Determinations of other “acute” levels may be made on a site specific basis if there is a reasonable likelihood that the concentration of the compound in soil/ sediment would cause an acute reaction through direct contact. The person responsible for conducting the remediation can rely on a variety of available toxicological references, but the determination must be made in consultation with the Department.

Currently Known Extent

A two dimensional data layer containing information about areas in the state that are specified as the Currently Known Extent of groundwater contamination and/or structures with vapor intrusion contamination attributed to a discharge of a hazardous substance. A Currently Known Extent area associated with a potable well IEC case is a geographically defined area where local groundwater exceeds **Class II Ground Water Remediation Standards, N.J.A.C. 7:26D-2.2** for specific contaminants found in potable wells and monitor wells. A Currently Known Extent area associated with a vapor intrusion IEC case is a geographically defined areas where contaminants are found above the Department’s **Vapor Intrusion Guidance** Indoor Air Screening Levels in an occupied structure. The latter reference is usually associated with groundwater contamination and geographic data known about groundwater exceeding **Class II Ground Water Remediation Standards** also must be included with a vapor intrusion Currently Known Extent area.

As described in Section IV of the guidance, the person responsible for conducting the remediation is required to obtain a permit when a Currently Known Extent area is established as part of an IEC case involving potable well or vapor intrusion contamination.

IV. IEC Guidance Procedures

A. Potable Water IEC Cases

Definition and Identification

DEP considers sites where discharges of hazardous substances have resulted in the presence of levels of contaminants at or above the **Class II Ground Water Remediation Standards (GWRS), N.J.A.C. 7:26D-2.2**, in wells used for potable purposes to be IEC cases. This guidance document and **Technical Regulations 7:26E-1.11** must be followed when a potable well is contaminated with a compound that is equal to or exceeds a Ground Water Remediation Standard. Also, when contamination above federal and state drinking water standards (**Maximum Contaminant Levels**) is found in surface waters used for public water supplies, this guidance must be followed. IEC requirements have been included in the **Technical Regulations 7:26E-1.11** and shall be followed in conjunction with this guidance. If the contamination is related to a site, four major tasks must be taken to address the IEC condition that are explained in detail below.

The potable water IEC guidance procedures primarily address the remediation of contaminated private wells used for drinking water from a known site. When contamination from a known site impacts public water supply wells or surface water intakes, the person responsible for conducting the remediation also must work with the water purveyor and the Department's Bureau of Safe Drinking Water to enact appropriate measures to protect public health.

In addition, both private wells and public supplies that are affected by unknown sources of hazardous substances require similar actions to protect human health; the Department conducts these actions with public funds.

If contamination is not related to their site, the person responsible for conducting the remediation shall report the unrelated IEC condition to the Department's Hotline. If the Department concurs with the determination that a site is not the source of contamination resulting in an IEC condition, the person responsible for conducting the remediation will not be responsible for addressing the IEC. In such a situation, the Department will pursue a responsible party, if one can be identified, for the IEC condition or the Department will conduct the remedial work itself with public funds.

Initial Notification (Immediate) and Interim Response Action (72 Hours)

When a potable water IEC is identified the person responsible for conducting the remediation must immediately report the IEC condition to the Department and must within 72 hours address any receptors impacted by contamination from their site.

The primary requirement for the person responsible for conducting the remediation is to protect human health by taking appropriate interim measures to mitigate the IEC condition to reduce exposure to acceptable levels within 72 hours. The person responsible for conducting the remediation must implement interim receptor mitigation actions that include bottled water or emergency interconnections.

In terms of notification, the person responsible for conducting the remediation must immediately call an assigned Department case manager, or if one is not available or assigned, then call the Department's Hotline (1-877-WARN DEP) and submit an **IEC Immediate Response Action Form** to the Department. If a case manager is not assigned, the Department will assign an IEC case manager. All communications with the Department then will be through an IEC case manager.

The person responsible for conducting the remediation also must immediately call any impacted property owner (and tenant, if applicable) and provide them with not only the test results and an explanation of their significance, but also information on specific future actions to be taken such as delivering bottled water as an alternate potable water source and additional sampling. When providing the test result information the person responsible for conducting the remediation must include an explanation that when a well is contaminated above Ground Water Remediation Standards it is not considered acceptable for potable purposes such as drinking or cooking.

The person responsible for conducting the remediation must within 72 hours provide written notification of the test results, their significance and future actions to be taken to any impacted property owner (and tenant, if applicable), local health department and municipal clerk. Due to the need for interaction and coordination with the public and local officials, frequent communication with the assigned case manager about all remedial actions is recommended. Sample letters for residents and local officials are provided in **Attachment 3** to assist in meeting the notification requirements and providing information about receptor control.

The person responsible for conducting the remediation also must within 72 hours submit to the Department all test results and actions to be taken on an **IEC Information Spreadsheet** for each IEC condition identified. The spreadsheet helps track all sampling results and property information. A tax map indicating the location of the remedial work also must be included with the spreadsheet along with corresponding GIS compatible coordinates. The spreadsheet must be updated on a timeframe agreed to with the Department IEC case manager, e.g., either weekly or monthly as remedial work progresses, which is dependent upon the complexity of the case.

Engineered System Response Action (30 Days)

The person responsible for conducting the remediation has 30 days from receipt of analytical results indicating IEC conditions exist to implement an engineered system response action to remediate the impacted well (s). Engineered systems include the use of a Point-of Entry Treatment (POET) system or the connection to a public water supply system. An engineered system must provide potable water to the whole house. Providing bottled water is not considered an engineered system response action.

Confirmation testing of initial analytical results is not required, but, if elected, must be completed within the same 30 day time period. No additional time is given for taking an initial confirmation sample. If a confirmation sample is taken and the result confirms that contaminant levels are equal to or exceed Ground Water Remediation Standards, an engineered system must be implemented. If the analytical results of the confirmation sample show contaminant concentrations below Ground Water Remediation Standards, the person responsible for conducting the remediation must take a second confirmation sample. If a second confirmation sample is required, the person responsible for conducting the remediation will be given an additional 30 days to conduct the second confirmation sample and to implement an engineering system if still required. If two of the three test results are equal to or exceed Ground Water Remediation Standards, an engineered system must be installed. Installation of an engineered system is not required if two of the three test results are below Ground Water Remediation Standards.

If the person responsible for conducting the remediation installs a POET system as an engineered system response action, specifications for standard POET systems provided by the Department must be used. The POET specifications are included in **Attachment 4** and show minimum design criteria and minimum monitoring frequency for POET systems. A post-installation sample is required when a POET system is installed to confirm that the system is functioning properly. Results of the post-installation sample are considered part of the installation of the system, and the sample must be taken within the 30-day timeframe for implementing an engineered system.

The person responsible for conducting the remediation must submit an IEC Engineered System Response Action Report within 90 days after the IEC is first identified. The report will detail the engineered system response actions that were implemented within the 30-day timeframe and will consist of a narrative summary of remedial work performed and receptor delineation information, which is required as outlined below and also must be included in this report. The report must include both an updated **IEC Immediate Response Action Form** and an **IEC Information Spreadsheet**, which will provide a summary of action taken to date.

If numerous receptors are found during the delineation process outlined below and are being addressed through receptor controls, the person responsible for conducting the remediation must submit an initial IEC Engineered System Response Action Report in 90 days summarizing the implemented engineered system response actions to date. As additional remedial activities for receptors are conducted the person responsible for conducting the remediation must submit every 30 days an updated IEC Engineered System Response Action Report until all impacts to receptors have been mitigated. This will eliminate the need for a report dealing with each individual receptor.

All analytical results must follow the Technical Regulations for data validation and be included in the IEC Engineered System Response Action Report.

Receptor Delineation (30 Days)

The person responsible for conducting the remediation must conduct an investigation of potential impacts to other nearby receptors within 30 days of the discovery of IEC conditions concurrently with implementation of receptor controls. This requirement is included in **N.J.A.C. 7:26E-1.14(a)3.ii.(1)-(2)**. Upon discovery of IEC conditions at a site all potable wells within 1,000 feet of the impacted well(s) must be identified and the appropriate owners offered sampling of their well water. If ground water flow direction is known, sampling may be limited to wells 250 feet up-gradient, 500 feet side-gradient and 1,000 feet down-gradient.

Within the 30 day timeframe the person responsible for conducting the remediation must collect and analyze samples from all wells initially identified within 1,000 feet of the affected well(s), or if ground water flow direction is known, within the distances noted above. If the number of properties within this range presents logistical issues due to a large number of wells requiring sampling, the person responsible for conducting the remediation must contact the assigned IEC case manager to discuss a possible extended schedule to complete the delineation.

If any samples show contaminant levels at or above Ground Water Remediation Standards, additional step-out sampling must be conducted to delineate the full extent of impacted wells. The additional sampling should be conducted using the procedures outlined above and should continue until all samples show contaminant concentrations below standards.

Details of the sampling, such as sample locations and results and well information, well owners that were contacted but refused sampling, and any other pertinent information, must be submitted to the Department as part of the IEC Engineered System Response Action Report described above. Also, the receptor delineation information must include municipal lot and block (tax) maps showing locations where testing was conducted. The person responsible for conducting the remediation must consult with the assigned case manager on scheduling the delineation sampling.

A plan for monitoring water quality in the future of nearby threatened receptors must be submitted as part of an IEC Contaminant Source Control Report. Monitoring of any wells with detected contaminant levels below GWQS found during the receptor delineation effort must be included in future sampling events.

Source Control (Six Months)

The person responsible for conducting the remediation must complete a focused remedial investigation of the IEC contaminant source and begin source control within six months after identifying an IEC condition. The goal of source control is to reduce the contaminant mass of the groundwater plume, thereby preventing further impacts to potable wells.

An IEC Contaminant Source Control Report also must be submitted by the person responsible for conducting the remediation within six months that includes results of the focused remedial investigation and source control measures initiated as well as plans for future mitigation and monitoring. The focused remedial investigation must be conducted to identify all areas of concern contributing to the IEC contaminant source. This will determine if the areas of concern contain source materials that are continuing to discharge to the environment and pose a threat to additional receptors.

As part of this effort the person responsible for conducting the remediation must obtain a permit from the Department to establish the location of the Currently Known Extent of groundwater contamination and potable well contamination above Ground Water Remediation Standards. Under the permit, the person responsible for conducting the remediation also must document actions underway to maintain controls for impacted receptors within this Currently Known Extent in accordance with specifications in the POET schematics found in **Attachment 4** and a sampling plan for potable wells and monitor wells within and outside this Currently Known Extent that includes annual sampling until the IEC condition is remediated.

This requirement is prior to full delineation of a groundwater contamination plume and submission of a Classification Exception Area that is established at the completion of a full remedial investigation for a site.

The map originally submitted as part of the IEC Contaminant Source Control Report must be updated following the focused remedial investigation with additional groundwater contamination areas and potable wells impacted included following the same format for submission outlined in the Department's GIS mapping guidance and the criteria included below.

A groundwater Currently Known Extent area map must be plotted on the most recent version of a municipal tax map. The map must have a title block with the name of the case, case number, date and name of a Licensed Site Remediation Professional if involved with the case. The map

must include a scale, north arrow, street names and lot and block numbers. All groundwater monitor well and potable well sample locations must be located and identified using symbols to represent contaminant concentrations. An open circle must be used to identify a non-detect sample for any contaminants, a circle shaded on the bottom half only will represent a result greater than non detect, but less than the applicable standard and a completely shaded circle will represent a sample greater than or equal to the applicable standard.

Once all of the sample data is plotted, a Currently Known Extent area must be drawn. When plotting a Currently Known Extent if a lot is equal to or less than three acres, the entire lot boundary must be used in the delineation. If a lot is greater than three acres, the location of the well must be used as the reference point for plotting. If the location of the well is unknown, the location of the home must be used as the reference point. Using a straight line connect the lot perimeters for all lots that exceed an applicable standard(s) to delineate a polygon area encompassing all lots exceeding the standards. When the polygon is drawn, lots around the perimeter of the polygon may be bisected. For any bisected lot that is three acres or less in size the entire lot must be encompassed in the Currently Known Extent area. If a lot is bisected and is greater than three acres the Currently Known Extent line will remain as drawn.

The most common sources of groundwater contamination are contaminated soil and non-aqueous phase liquid (NAPL), both light and dense. The preferred remedial action for sources to ground water contamination is removal. It represents the fastest and most effective way to prevent the continued discharge of contamination. In some cases, in-situ treatment, can be as effective as removal and can be used in place of removal.

However, there are situations when it is technically impracticable to remove the material or to reliably implement in-situ treatment. In these circumstances, containment of a source essentially remains the only alternative. Several viable containment technologies exist, such as reactive barriers, slurry walls and/or pumping for hydraulic control. A containment remedy for an IEC source often would be implemented in conjunction with an overall groundwater remedy for a site.

In potable water IEC cases, remediation of a dissolved plume is usually deferred to the overall remedy, provided the source is remediated. Most often, the contaminated well(s) is in a deep zone of groundwater contamination and requires extensive remedial investigation and evaluation of alternatives before determining an appropriate remedy. If the plume is limited in volume, action should not be delayed while other investigations are ongoing.

In the situation where the source was removed/treated, the residual dissolved contamination may still represent a significant source of contamination that could overwhelm the existing receptor control. A highly concentrated "slug" of contamination may still be present and migrating toward the receptor. If the receptor control is not capable for treating this slug, additional action is

necessary. Actively pumping and treating the highest concentrations may be needed to protect the receptors. Containment of the high concentration portion of the plume may be feasible. Also, there may be time to extend public water to the area, rather than rely on POETs.

In cases where it was necessary to contain the source, the design of that containment system should take into account the concentration of the contamination with respect to the location of the containment system to ensure that the portion of the plume that will continue to migrate will not compromise the receptor control. Any type of containment system that utilizes pumping should consider the effect of that pumping on the potable wells

The overall goal of source control is to eliminate the cause of the IEC condition so that protection of public health does not have to rely solely on receptor controls.

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B. Vapor Intrusion IEC Cases

Definition and Identification

DEP considers sites where discharges of hazardous substances have resulted in indoor air contaminant levels above the Indoor Air Screening Levels in the Department's **Vapor Intrusion Guidance** (Table 3 in this guidance) to be an IEC condition. This vapor intrusion IEC guidance is triggered when an exceedance of indoor air screening levels is found in an enclosed structure and is determined to be related to a vapor intrusion pathway. IEC requirements have been included in the **Technical Regulations 7:26E-1.11 and 7:26E-1.15** and should be followed in conjunction with this guidance and the established **Vapor Intrusion Guidance**. If the contamination is related to a site, four major tasks must be taken to address the IEC condition that are explained in detail below.

If contamination is not related to their site, the person responsible for conducting the remediation shall report the unrelated IEC condition to the Department's Hotline. If the Department concurs that a site is not the source of contamination resulting in an IEC condition, the person responsible for conducting the remediation will not be responsible for addressing the IEC. In such a situation, the Department will pursue a responsible party, if one can be identified, for the IEC condition or the Department will conduct the remedial work itself with public funds.

Initial Notification (Immediate) and Interim Response Action (72 Hours)

When a vapor intrusion IEC is identified the person responsible for conducting the remediation must immediately report the IEC condition to the Department and must within 72 hours address any receptors impacted by contamination from their site.

The primary requirement for the person responsible for conducting the remediation is to protect human health by taking appropriate interim measures to mitigate the IEC condition to reduce exposure to acceptable levels within 72 hours. The person responsible for conducting the remediation must implement interim receptor mitigation actions that may include ventilation/pressurization changes to an impacted structure and/or covering/sealing exposed sump pits or cracks/openings in an impacted structure. The person responsible for conducting the remediation must consult with the Department prior to implementing any Interim Response Action to determine an appropriate interim measure(s).

In terms of notification, the person responsible for conducting the remediation must immediately call an assigned Department case manager, or if one is not available or assigned, then call the Department's Hotline (1-877-WARN DEP) and submit an **IEC Immediate Response Action Form** to the Department. If a case manager is not assigned, the Department will assign an IEC case manager. All communications with the Department then will be through an IEC case manager.

The person responsible for conducting the remediation also must immediately call any impacted property owner (and tenant, if applicable) and provide them with not only with the test results and an explanation of their significance, but also information on specific future actions to be taken such as ventilation/pressurization changes and additional sampling. When providing the test result information the person responsible for conducting the remediation must include an explanation that when the Department's screening levels are exceeded it is not considered acceptable because a long-term health risk exists when breathing contaminated indoor air.

The person responsible for conducting the remediation must within 72 hours provide written notification of the test results, their significance and future actions to be taken to any impacted property owner (and tenant, if applicable), local health department and municipal clerk. Due to the need for interaction and coordination with the public and local officials, frequent communication with the assigned case manager about all remedial actions is recommended. Sample letters for residents and local officials are provided in **Attachment 3** to assist in meeting the notification requirements and providing information about receptor control.

The person responsible for conducting the remediation also must within 72 hours submit to the Department all test results and actions to be taken on an **IEC Information Spreadsheet** for each IEC condition identified. The spreadsheet helps track all sampling results and property information. A tax map indicating the location of the remedial work also must be included with the spreadsheet along with corresponding GIS compatible coordinates. The spreadsheet must be updated on a timeframe agreed to with the Department IEC case manager, e.g., either weekly or monthly as remedial work progresses, which is dependent upon the complexity of the case.

Engineered System Response Action (30 Days)

The person responsible for conducting the remediation has 30 days from the discovery of IEC conditions to implement an engineered system to remediate the vapor intrusion IEC condition in the entire structure. The Department's **Vapor Intrusion Guidance** provides procedures for implementation and monitoring of engineered systems for vapor intrusion cases.

Confirmation testing of initial analytical results is not required, but, if elected, must be completed within the same 30 day time period. No additional time is given for taking an initial confirmation sample. If a confirmation sample is taken and the result confirms that the contaminant levels are equal to or exceed the Department's screening levels in the **Vapor Intrusion Guidance**, an engineered system must be implemented. If analytical results of the confirmation sample show contaminant concentrations below the Department's screening levels, the person responsible for conducting the remediation must take a second confirmation sample. If the second confirmation sample is required, the person responsible for conducting the remediation will be given an additional 30 days to conduct the second confirmation sample and

to implement an engineered system if required. If two of the three test results are equal to or exceed the Department's screening levels, an engineered system must be installed. Installation of an engineered system is not required if two of three test results are below the screening levels.

A post-installation sample is required when an engineered system is installed to confirm that the vapor intrusion system is functioning properly. Analysis of a post-installation sample is considered part of the installation of a system, and normally is taken 30 days after installation of an engineered system, such as a sub-slab depressurization system. In addition, depending on the time of year, an additional confirmatory sample may be required at a later date during the heating season.

The person responsible for conducting the remediation must submit an IEC Engineered System Response Action Report within 90 days after the IEC is first identified. The report will consist of a narrative summary of remedial work performed and detail the engineered system(s) implemented, post-installation sample results, and both an updated **IEC Immediate Response Action Form** and an **IEC Information Spreadsheet**. Receptor delineation information, which is outlined below, also must be included in this report.

If numerous receptors are found during the delineation process outlined below and are being addressed through receptor controls, the person responsible for conducting the remediation must submit an initial IEC Engineered System Response Action Report in 90 days summarizing the implemented engineered system response actions to date. As additional remedial activities for receptors are conducted the person responsible for conducting the remediation must submit every 30 days an updated IEC Engineered System Response Action Report until all impacts to receptors have been mitigated. This will eliminate the need for a report dealing with each individual receptor.

All analytical results should follow the Technical Regulations for data validation and be included in the IEC Engineered System Response Action Report.

Receptor Delineation (30 Days)

The person responsible for conducting the remediation must delineate the extent of a vapor intrusion IEC condition in 30 days of the discovery of IEC conditions by following the Department's **Vapor Intrusion Guidance** for delineation procedures that contain specific sampling locations and distances. Requirements to evaluate vapor intrusion receptors also have been included in the Technical Regulations at **7:26E-1.15(a) through (g)**. The person responsible for conducting the remediation must provide receptor control as described above if during the sampling of additional structures indoor air screening levels are exceeded and determined to be related to the vapor intrusion pathway.

If any samples show contaminant levels at or above the Department's screening levels, additional sampling must be conducted to delineate the full extent of impacted structures. The additional sampling should be conducted using the procedures outlined above and should continue until all samples show contaminant concentrations below standards. If the number of properties within this range presents logistical issues due to a large number of indoor air samples required, then the person responsible for conducting the remediation must contact the assigned IEC case manager to discuss a possible extended schedule to complete the delineation.

After the extent of the vapor intrusion IEC case has been determined the person responsible for conducting the remediation must submit summary data detailing the delineation effort. This effort will include information such as sample locations and results, property owners that were contacted but refused sampling, and any other pertinent information, all submitted to the Department as part of the IEC Engineered System Response Action Report described above.

The receptor delineation information must include municipal lot and block (tax) maps showing locations where testing was conducted, along with a key indicating structures that were either above or below the Department's screening levels.

A plan for future vapor intrusion monitoring at nearby threatened receptors must be submitted as part of an IEC Contaminant Source Control Report outlined below. Monitoring of any properties with detected contaminant levels below the Department's screening levels found during the receptor delineation effort must be included in future sampling events.

Source Control (Six Months)

The person responsible for conducting the remediation must complete a focused remedial investigation of the IEC contaminant source and begin source control within six months after identifying an IEC condition. The goal of source control is to reduce the contaminant mass, thereby preventing further impacts to indoor receptors.

An IEC Contaminant Source Control Report also must be submitted by the person responsible for conducting the remediation within six months that includes focused remedial investigation results and source control measures initiated as well as plans for future mitigation and monitoring. The focused remedial investigation must be conducted to identify all areas of concern contributing to the IEC contaminant source. This will determine if the areas of concern contain source materials that are continuing to discharge to the environment and pose a threat to additional receptors.

As part of this effort the person responsible for conducting the remediation must obtain a permit with the Department documenting the location of the Currently Known Extent of vapor intrusion contamination above the Department's screening levels and any related ground water

contamination above Ground Water Remediation Standards. Under the permit, the person responsible for conducting the remediation also must document actions underway to maintain controls for impacted receptors within this Currently Known Extent and a sampling plan for at risk receptors to address future monitoring requirements within and outside this Currently Known Extent following requirements for such remedial activities included in the Department's Vapor Intrusion Guidance.

This requirement is prior to full delineation of a groundwater plume and submission of a Classification Exception Area that is established at the completion of a full remedial investigation for a site.

The map originally submitted as part of the IEC Contaminant Source Control Report must be updated following the focused remedial investigation with additional vapor intrusion and groundwater contamination areas included following the same format for submission outlined in the Department's GIS mapping guidance and the criteria included below.

A vapor intrusion Currently Known Extent area map must be plotted on the most recent version of a municipal tax map. The map must have a title block with the name of the case, case number, date and name of a Licensed Site Remediation Professional if involved with the case. The map must include a scale, north arrow, street names and lot and block numbers. All vapor and groundwater monitor well sample locations must be located and identified using symbols to represent contaminant concentrations. An open circle must be used to identify a sample that is non-detect for any contaminants, a circle shaded on the bottom half only must represent a result greater than non detect but less than the applicable standard and a completely shaded circle must represent a sample greater than or equal to the applicable standard.

Once all of the sample data is plotted, the Currently Known Extent area must be drawn. Using a straight line connect the building perimeters for all impacted structures or groundwater monitor wells that exceed standards as to delineate a polygon area encompassing all structures exceeding the standards. When the polygon is drawn, structures around the perimeter of the polygon maybe bisected. If any structure is bisected the entire structure must be encompassed in the Currently Known Extent area.

Sources of vapor intrusion IEC conditions can range from dissolved contaminants in ground water to saturated soils to pure product such as NAPL. Because these sources require very different response action, this guidance is not able to cover all circumstances. The guidance will focus on the more common sources and responses. If a particular site presents a contamination scenario not discussed in this guidance, the person responsible for conducting the remediation must consult with the Department to discuss appropriate remedial responses.

The most common source to vapor intrusion IEC cases is dissolved contamination in the first (water table) groundwater. In most cases, the extent of the contamination contributing to the vapor intrusion IEC condition is much smaller than the areal extent of the ground water contamination plume, and is usually relatively close to the source of the dissolved contaminants. Other sources could be a product such as NAPL, or saturated soils. Vapors can travel and enter structures through preferred pathways such as utility lines. Regardless of the type of source found, the object of source control is to prevent any further release or migration of contaminants that cause the IEC condition.

The **Technical Regulations 7:26E-1.11** require source control remedial action to be initiated within six months of the first identification of an IEC. Therefore, developing a focused RI and remedial action plan for source control should begin at the time of discovery of the IEC and run concurrent with the receptor control actions. The receptor control actions should never be sacrificed for source control, because complete receptor control could take months to fully implement.

In many cases the source of the vapor intrusion IEC is already being investigated as part of the site investigation. The person responsible for conducting the remediation will then identify the potential receptor(s) and take the appropriate samples. In this scenario, the source and pathway are known and further investigation would be limited, so that a remediation plan could be developed in a relatively short timeframe. Initiation of the plan would proceed the same as any remedial action, except at an accelerated pace to meeting the six-month timeframe. Permit identification/application requirements can become a critical factor in the schedule. The timely identification and application for the appropriate permits is expected and will be a factor in granting any extensions based on permit delays.

Sometimes the source is not known at the time of the IEC discovery. The vapor intrusion testing in an adjacent structure may be done as the result of a complaint; in these cases, further investigation is necessary. Since time is critical, field screening investigation techniques like soil vapor sampling, direct push technology, diffusion bag sampling may be preferred in place of classic investigation methods such as the use of monitor wells. The Department encourages the evaluation of these techniques for focused remedial investigations looking at IEC sources due to the accelerated time frame. Quality Assurance planning should be performed to ensure that conclusions based on field screening technologies provide a level of confidence to technically support an action

IEC conditions in confined spaces and underground utilities are often discovered by maintenance workers, and the source is unknown. After some investigation by others, the person responsible for conducting the remediation may be informed that their site is the source, and now the person responsible for conducting the remediation must continue the investigation to find the source on their site. Since these types of IECs are almost always caused by Light-NAPL (LNAPL), the

investigation should concentrate on any potential sources of LNAPL; direct push field screening techniques are well suited to this situation.

Removal through excavation and off-site disposal of the source is the preferred remedial action for the source of a vapor intrusion IEC. When viable, it provides a timely and effective response. Product-saturated soils often are easily addressed through excavation. Other means than excavation may be necessary for soils due to structural stability issues. NAPL should be removed as fast as possible to eliminate the source of the IEC and to prevent the spread of the contamination. Pumping, dual-phase extraction, and excavation of product-saturated soil are some ways to remove NAPL.

Dissolved contaminated groundwater plumes present the most common source of vapor intrusion IEC cases. Remediation of a groundwater plume can be complex. However, the objective for IEC source control is only to remediate the source of the IEC condition. Therefore, the remediation goal is not to achieve ground water remediation standards, but to prevent the IEC condition. For dissolved plumes this could be accomplished in a two-step fashion.

Using a limited action to contain a groundwater plume through active pumping or to prevent any further migration through the use of passive barriers or in-situ treatment is the first step. The plume is then basically split in two -- the portion causing the vapor intrusion IEC condition and the remainder of the dissolved plume. The second step is to remediate the source of the dissolved contaminants, but since the source is now isolated from the receptor, and source control has been initiated, this action can now proceed concurrent with the entire site remediation. There will still be an IEC component to the site, but the regulatory and mandatory timeframes for the IEC condition have been met.

The overall goal of source control is to eliminate the cause of the IEC condition so that protection of public health does not have to rely solely on receptor controls.

C. Direct Contact IEC Sites

Definition and Identification

A direct contact IEC is a situation where contamination exists above the acute health effect levels in the upper two feet of the soil column and there is actual or a potential for human contact via dermal contact, ingestion or inhalation. Acute effect means that an adverse human health impact could result from an exposure of less than two weeks. The potential for exposure is based on site specific conditions. IEC requirements have been included in the Technical Regulations at **7:26E-1.11** and should be followed in conjunction with this guidance.

DEP has developed acute levels for three contaminants found in **Table 4** and the Department plans to develop acute criteria for several other contaminants in the future. In addition, certain highly acidic or basic compounds discharged onto soil also could present an acute hazard, which normally includes pH levels 2 and under and more than 12.5.

Determinations of other “acute” levels may be made on a site specific basis if there is a reasonable likelihood that the concentration of the compound in soil/ sediment would cause an acute reaction through direct contact. The person responsible for conducting the remediation can rely on a variety of available toxicological references, but the determination must be made in consultation with the Department.

Direct Contact IEC examples could include a site where arsenical compounds, such as rat poison, spilled onto soil and impacted a receptor thus causing an acute health impact (at 1,100 parts per million). Chromic Acid, for example, is often handled in solid form. Spills of this solid could render soil highly acidic where direct contact could result in burns. High concentrations of phenol also can cause burns when a direct contact occurs.

If the contamination is related to a site, four major tasks must be taken to address the IEC condition.

Initial Notification (Immediate) and Interim Response Action (72 Hours)

When an actual direct contact IEC is identified the person responsible for conducting the remediation must immediately report the IEC condition to the Department and must within 72 hours address any receptors impacted by contamination from their site. A potential direct contact IEC is any site where the contaminant concentration exceeds the levels in Table 2 anywhere in the top two feet of the soil column. An IEC case manager will determine if an IEC condition exists based on availability of the material and land use at the location and the location of any receptors.

The primary requirement for the person responsible for conducting the remediation is to protect human health by taking appropriate interim measures to mitigate the IEC condition to reduce exposure to acceptable levels within 72 hours. The person responsible for conducting the remediation must implement interim receptor mitigation actions that may include a variety of temporary controls including a physical barrier such as a weighted tarp or cap to control contact or dust generation as well as fencing to preclude entry to an area. These controls also can be used in conjunction with each other, for example, placing a weighted tarp on the ground and then placing a fence around the tarp.

In terms of notification, the person responsible for conducting the remediation must immediately call an assigned Department case manager, or if one is not available or assigned, then call the Department's Hotline (1-877-WARN DEP) and submit an **IEC Immediate Response Action Form** to the Department. If a case manager is not assigned, the Department will assign an IEC case manager. All communications with the Department will be through an IEC case manager.

The person responsible for conducting the remediation also must immediately call any impacted property owner (and tenant, if applicable) and provide them with not only with the test results and an explanation of their significance, but also information on specific future actions to be taken such placement of a physical barrier and additional sampling. When providing the test result information the person responsible for conducting the remediation must include an explanation that when a direct contact IEC exists then acute health effects may occur if a person is exposed to the upper two feet of the soil column.

The person responsible for conducting the remediation must within 72 hours provide written notification of the test results, their significance and future actions to be taken to any impacted property owner (and tenant, if applicable), local health department and municipal clerk. Due to the need for interaction and coordination with the public and local officials, frequent communication with the assigned case manager about all remedial actions is recommended. Sample letters for residents and local officials are provided in **Attachment 1** to assist in meeting the notification requirements and providing information about receptor control.

The person responsible for conducting the remediation also must within 72 hours submit to the Department all test results and actions to be taken on an **IEC Information Spreadsheet** for each IEC condition identified. The spreadsheet helps track all sampling results and property information. A tax map indicating the location of the remedial work also must be included with the spreadsheet along with corresponding GIS compatible coordinates as defined in X (new map requirements added here). The spreadsheet must be updated on a timeframe agreed to with the Department IEC case manager – either weekly or monthly as remedial work progresses, which is dependent upon the complexity of the case.

Engineered System Response Action (30 Days)

The person responsible for conducting the remediation has 30 days from receipt of analytical results indicating IEC conditions exist to implement an engineered system to remediate a direct contact threat to any receptor.

The person responsible for conducting the remediation must submit an IEC Engineered System Response Action Report within 90 days after the IEC is first identified. The report will detail the engineering system implemented and will consist of a narrative summary of remedial work performed and both an updated **IEC Immediate Response Action Form** and an **IEC Information Spreadsheet**. Receptor delineation information, which is outlined below, also must be included in this report. If numerous receptors are being addressed during the same time period, the person responsible for conducting the remediation may submit a report every 30 days summarizing the implemented engineered systems instead of a report for each individual receptor. The additional reporting will update the initial IEC Engineered System Response Action Report.

Receptor Delineation (30 Days)

Investigation of potential impacts to other nearby receptors must be conducted concurrently with implementation of receptor controls. Within 30 days of the discovery of IEC conditions samples from all areas of concern must be collected and analyzed for direct contact threats. Details of the sampling, such as sample locations and results, property owners that were contacted but refused sampling, and any other pertinent information, must be submitted to the Department as part of the IEC Engineered System Response Action Report described above. All analytical results should follow the Technical Regulations for data validation.

Source Control (Six Months)

The person responsible for conducting the remediation has six months after identifying an IEC condition to complete a focused remedial investigation of the IEC contaminant source and begin source control. Submittal of an IEC Contaminant Source Control Report also is required within six months that includes focused remedial investigation results and source control measures taken as well as plans for future mitigation and monitoring.

A focused remedial investigation should be conducted to identify all areas of concern contributing to the IEC contaminant source. This will determine if the areas of concern contain source materials that pose a threat to additional receptors.

Whatever source control method that is used should have a preference for permanence. Some methods are treatment and or removal. The ultimate remediation used will depend on the specifics of the site. Removal of the contaminated material is the preferred remedy. Certain treatment options may be available for some contaminants, e.g., acidic soils. Capping acute

levels of soil contamination is not an acceptable source control. If excavation or treatment is technically impracticable, the person responsible for conducting the remediation should contact the Department to determine any appropriate remedy.

The overall goal of source control is to eliminate the cause of the IEC condition so that protection of public health does not have to rely solely on receptor controls.

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V. Tables

1. Class II Ground Water Remediation Standards (GWRS), N.J.A.C. 7:26D-2.2
2. Maximum Contaminant Levels (drinking water standards)
3. Indoor Air Screening Levels (Table 1 from the Department's Vapor Intrusion Guidance)
4. Acute Direct Contact Soil Levels

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VI. Attachments

1. IEC Immediate Response Action Form
2. IEC Information Spreadsheet
3. IEC notification letter examples
4. POET schematics

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VII. References

1. Site Remediation Reform Act (SRRA)
2. Technical Requirements for Site Remediation (Technical Regulations): 7:26E-1.11 (immediate environmental concern cases); 7:26E-1.12 through 7:26E-1.16 (receptor evaluation – general and reporting, land use, ground water, vapor intrusion, direct contact)
3. Department Vapor Intrusion Guidance

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