Group Poll

- What experience, if any, have you had with determining Environmental Indicators at your federal facility site?
In this course, we will discuss performance measures and targets, how those measures relate to the role of environmental indicators (EIs) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (also referred to as Superfund), how EIs may affect other CERCLA components, and review guidance and tools that are helpful in making EI determinations.
In this section we will discuss the role of the Government Performance and Results Act (GPRA), the GPRA Modernization Act of 2010, and how these acts help shape Superfund planning targets and measures.

GPRA is a Congressional Action (law) that addresses all federal agencies. It was enacted in 1993 during era of government reinvention to promote improved government performance and greater public confidence in government through better planning and reporting on results. GPRA requires federal agencies to develop results-oriented and outcome-related goals. These goals are meant to align annual plans and budgets to long-term outcomes through multi-year agency-specific strategic plans. A key component of the Act is to reform program performance by “setting program goals, measuring program performance against those goals, and reporting publicly on their progress.” Other goals of GPRA include helping Federal managers improve service delivery, and to improve congressional decision-making by providing more objective information on achieving statutory objectives, and on the relative effectiveness and efficiency of
Performance Measures and Environmental Indicators
Federal Facilities Academy

federal programs and spending. GPRA was envisioned as a performance-based management system and has 3 elements: 1) five-year strategic plans that set the general direction of efforts; 2) annual performance plans; and 3) annual reports of agency successes and failures in meeting targeted performance goals.

GPRA was updated in 2010 by the Government Performance and Results Modernization Act of 2010 (GPRAMA). GPRAMA directs EPA to consult with Congress and requires that the Agency solicit and consider the views and suggestions of those entities potentially affected by or interested in a strategic plan. GPRMA also requires that progress be tracked via annual performance measures which are presented in EPA’s Annual Performance Plans and Budgets. EPA reports out performance against these annual measures in the Annual Performance Reports. This information is used to establish priorities, develop future budget submissions, and manage programs. Each federal agency is responsible for meeting the GPRA and GPRAMA requirements.

The GPRA provides a general framework for government accountability through the use of strategic planning. Under this framework, EPA develops strategic plans, annual performance goals and other measures, and national program offices develop planning and tracking mechanisms as well as conduct program evaluations to ensure the Agency meets its goals effectively and efficiently.

EPA`s strategic plan is published every 4 years and describes the Agency`s long-term direction/results and strategies to achieve them. The Strategic Plan is used by senior leadership as a management tool and is a basis for annual planning, budgeting and accountability. It sets quantifiable goals and cross-agency strategies.
The Superfund Remedial Program tracks six performance measures which are then reported to Congress. GPRA measures are important because they are linked to budget requests to Congress. One factor in formulating budget requests is the amount of money needed to complete anticipated work, which are determined by these targets and measures.

These measures may be referred to by other names. EPA regions may also focus on Superfund Comprehensive Accomplishments Plan (SCAP) due dates, which are important since they are used to track regional financial planning. SCAP dates may not necessarily represent GPRA measures, but both are important as planning tools.

### Superfund Performance Measures

- **Remedial Site Assessments Completed**: When there is an approved Preliminary Assessment Report.
- **Human Exposures Under Control (HEUC)**: When there are no unacceptable complete exposure pathways sitewide. May be controlled with engineered barriers and/or institutional controls.
- **Sitewide Ready for Anticipated Use (SWRAU)**: When all cleanup goals have been achieved so that there are no unacceptable risks.
- **Remedial Action Project Completion**: When construction activities and final inspection are complete, and a Remedial Action Completion Report is approved.
- **Groundwater Migration Under Control (GMUC)**: When all groundwater plumes have been delineated with ongoing monitoring, migration of contaminated groundwater is stable, and there are no unacceptable discharges to surface water.
- **Construction Completion (CC)**: When all remedies sitewide documented in site decision documents have completed physical construction, have had a pre-final inspection and a Preliminary Close Out Report.
The Superfund remedial program has six performance measures that it employs to accomplish specific environmental results. This slide presents the annual commitments that are reported to Congress, with a brief description of each performance measure. The descriptions below include more detail on the criteria used to establish achievement of the performance measures.

- **Remedial Site Assessments Completed**: A site assessment is considered complete when EPA approves the Preliminary Assessment Report.
- **Human Exposures Under Control (HEUC)**: Current human exposure is considered to be under control when assessments for human exposure indicate there are no unacceptable complete exposure pathways sitewide. Exposure pathways may be controlled with engineered barriers and/or institutional controls.
- **Sitewide Ready for Anticipated Use (SWRAU)**: This is achieved when all cleanup goals in the Record(s) of Decision or other remedy decision document(s) have been achieved for media that may affect current and reasonably anticipated future land uses of the site, so that there are no unacceptable risks.
- **Remedial Action Project Completion**: Remedial Action (RA) project is complete when the construction activities and final inspection are complete, and a RA Completion Report is approved.
- **Groundwater Migration Under Control (GMUC)**: Contaminated Groundwater Migration is considered to be under control when all groundwater plumes have been delineated with ongoing monitoring, migration of contaminated groundwater is stable, and there are no unacceptable discharges to surface water.
- **Construction Completion (CC)**: A Construction Completion (CC) is achieved when all remedies sitewide documented in site decision documents have completed physical construction, have had a pre-final inspection, and a Preliminary Close Out Report has been approved by EPA.

Note that two of these performance measures are environmental indicators (highlighted in blue) which we will discuss in more detail on the following slides. The Superfund program tracks EI’s nationally, specifically how many sites will achieve an “under control” EI status annually. More information available at [https://www.epa.gov/superfund/superfund-remedial-performance-measures](https://www.epa.gov/superfund/superfund-remedial-performance-measures).
Tracking Measures and Targets

- EPA planning information and targets are tracked in the Superfund Enterprise Management System (SEMS)
  - Source of Superfund site activity data, records and support documentation for the agency
  - Program staff and managers plan and track program activities and resource planning information
  - Regional and Headquarters staff monitor progress each region is making towards achieving annual performance goals described in the Strategic Plan

One EPA Superfund-specific data base and management system is the Superfund Enterprise Management System (SEMS). EPA uses this system for maintaining and reporting Superfund documentation. SEMS serves as the official source of primary Superfund site activity data, records, and support documentation for internal and external stakeholders. It is an internal management tool used by EPA program staff and managers to plan and track program activities and resource use. Various SEMS reports are used by senior Superfund managers and the regions to monitor the progress in each region towards achieving annual performance goals described in the Strategic Plan as well as help the program project future program performance. Since SEMS is used for tracking Superfund activity, planning activities and reporting on the achievement of annual performance goals, it is critical that data be entered into SEMS in a timely and accurate manner.

Section IX.B (Federal Facilities Targets and Measures) of the 2019 SPIM provides definitions of Federal Facilities targets and measures, as well as the internal and external reporting hierarchy for the Federal Facilities activities (available at https://www.epa.gov/superfund/superfund-program-implementation-manual)
In May 2017, the EPA Administrator established the Superfund Task Force and requested that the Superfund program develop recommendations to expedite cleanup and remediation, among other goals. On July 25, 2017, EPA released the Superfund Task Force Report, which identified Recommendation 1, “Target NPL Sites That Are Not Showing Sufficient Progress Towards Site Cleanup and Completion,” and directed the program to specifically “determine any site where human exposure is not under control and prioritize effecting control.” Based on these recommendations, more attention has been focused on those sites that do not have human exposures under control and on identifying a path forward to achieve a human exposure under control status.

In response to the EPA SFTF recommendation, the publicly accessible EI Human Exposure Dashboard was launched in January 2018. The website provides background information on the human exposure environmental indicator, a national overview of human exposure EI status, and site-specific data reports. The Superfund Human Exposure Dashboard is available at [https://www.epa.gov/superfund/superfund-human-exposure-dashboard](https://www.epa.gov/superfund/superfund-human-exposure-dashboard).
The EI Dashboard shows current Human Exposure status and a brief description of the statues for those sites designated as “Not Under Control” or “Insufficient Data”. EPA remedial project managers (RPMs) work with their regional teams to update this information on at least an annual basis. EI determinations are uploaded into SEMS for tracking purposes.
Environmental Indicators (EIs)

- Designed to communicate the tangible progress made in protecting human health and the environment
- Focus on bringing human exposure and contaminated groundwater migration under control
- Both EIs are sitewide measures
  - All operable units in a site are considered

Why environmental indicators? Environmental indicators are simple measures that tell us what is happening in the environment. Since the environment is very complex, indicators provide a more practical and economical way to track the state of the environment than if we attempted to record every possible variable in the environment.

Superfund’s Environmental Indicators are designed to communicate the tangible progress EPA has made in protecting human health and the environment through site cleanup activities. Reporting on EIs is included on EPA’s website as a way to communicate EPA’s progress, as well as in reports to Congress. EIs are reflective of what Superfund should be doing under the CERCLA and the National Contingency Plan (NCP), and are therefore consistent with EPA’s mission to protect human health.

The focus of the human exposure and contaminated groundwater migration indicators is to communicate the progress EPA has made in protecting human health and the environment. The EIs are not intended to change the ultimate goal of the remedial process - to provide remedies that are protective of human health and the environment, maintain protection over time, and minimize untreated waste. Thus, EIs do not substitute for meeting final Superfund remedy requirements.

EIs are measured and reported through an evaluation of the potential for human exposures to contamination and assessment of whether contaminated groundwater migration is being controlled.
Els Under RCRA Corrective Action

- Track progress.
- Evaluating current environmental conditions.
- Opportunity to show meaningful progress.
- Els are interim milestones and not final remedy or site closure goals.

National Corrective Action Prioritization System

- 1991: EPA developed a screening tool to rank facilities subject to RCRA Corrective Action as high, medium, or low priority.
- Relative ranking of each site was based on an evaluation of four pathways for actual or potential contamination: groundwater, surface water, air and soil.
2018 Program Accomplishments

- RCRA Corrective Action Program achieved the following for the 3,779 2020 Baseline facilities:
  - 95 percent met Human Exposures Under Control
  - 89 percent met Migration of Contaminated Groundwater Under Control
  - 70 percent met Final Remedy Construction and
  - 36 percent met Performance Standards Attained.

RCRA EI Guidance

- The RCRA program is using two EIs to measure program performance for GPRA purposes:
  - Current Human Exposures Under Control (CA725), and
  - Migration of Contaminated Groundwater Under Control (CA750).
- The 1999 Guidance on Documentation of Environmental Indicator Determination provides detailed information

This document gives guidance on how to determine if a facility has met the RCRA Corrective Action EIs.
ENVIRONMENTAL INDICATORS
HUMAN EXPOSURE DETERMINATIONS

Human Exposure Determinations

- Current Human Exposure is under control (HEUC) when:
  - Sufficient information exists to make a determination
  - There are currently no unacceptable complete exposure pathways

- Consideration of new information
  - New information on exposure pathways or contaminant sources may change a status from “under control” to “not under control”

For HEUC, note that a sufficient amount of information needs to be available in order to make a determination of whether human exposure is under control. However, it should also be noted that there is a certain level of uncertainty in making HEUC decisions; for example, the level of certainty would not be the same as an RI/FS with a human health risk assessment. EPA RPMs and Regions need to assess the data available when making HEUC decisions. Keep in mind, the assessment of whether human exposure is under control is based on current land use and human exposures.

The human exposure determination is intended to be a realistic, risk-based evaluation based on actual current land and groundwater use. The determination should not consider hypothetical human exposures, but rather exposure that would be expected under current use. Similarly, current land and ground water use should be considered, but exposures that would occur under reasonably anticipated future land or ground water use are not considered for this indicator.
In performing the evaluation, EPA will assign the site into one of five HE categories (listed on slide). The indicator applies to proposed, final, and deleted NPL sites and Superfund Alternative Approach (SAA) sites. In the evaluation of the HEUC environmental indicator, the assessor needs to evaluate the current status of institutional and engineering controls. This is critical in determining a HE category for the site.

A **Human Exposure Insufficient Data (HEID)** determination indicates the site lacks sufficient information to make such a determination on whether there are completed pathways or whether a completed pathway poses an unacceptable risk.

The **Human Exposure Not Under Control (HENC)** determination indicates a site where: 1) there are currently completed human exposure pathways and 2) that those exposure pathways pose an unacceptable risk to humans based on the magnitude, frequency, duration and route(s) of exposure relative to the exposure concentrations and chemical intakes.

The **Human Exposure Under Control (HEUC)** environmental indicator documents human health protection on a sitewide basis by measuring the progress achieved in controlling unacceptable human exposures to contamination at a site.

There are three categories which constitute a “human exposures under control” determination. For these sites, a determination has been made that there are not currently completed human exposure pathways or that exposure(s) that may be occurring do not pose an unacceptable risk to humans based on the magnitude, frequency, duration and route(s) of exposure relative to the exposure concentrations and chemical intakes. Please note that a determination of “**human exposures under control and protective remedy or remedies in place**” (HEPR) or “**human exposures under control and long-term human health protection achieved**” (HHPA) are needed in order to be eligible for a sitewide ready for anticipated use (SWRAU) status. See Table 4-1 of the 2008 EI Guidance (EI Guidance Human Exposure Revisions) which provides descriptions and general site types associated with each level of human health protection.

![](Table_4-1_of_EI_Guidance_Human_Exposure_Revisions.png)
Insufficient Data to Determine Human Exposure (HEID) describes sites where EPA lacks enough information to determine whether people have the potential to be exposed to contamination. At these sites, EPA needs to investigate what contamination exists, where it is located, and how it could adversely affect public health. Typically, sites with insufficient data are those where EPA has not yet identified all potential exposure pathways, or those that are at the beginning of the assessment and cleanup process after being placed on the National Priorities List (NPL). Once sufficient data is collected, it may be apparent that human exposures are not under control. The data may show that there are existing pathways that need to be addressed. All pathways must be investigated and sufficient information collected in order to determine if exposure pathways exist.

Where a region lacks sufficient information to make such a determination on whether there are completed pathways or whether a completed pathway poses an unacceptable risk, a site should be classified as "insufficient data to determine human exposure control status". One good example is fully investigating vapor intrusion pathways or when the investigation is in its early phases of data collection.
Based on the scenario described in this slide, what is your initial human exposure status determination?

A. Current Human Exposure Not Under Control (HENC)
B. Insufficient Data to Determine Human Exposure Control Status (HEID)
C. Current Human Exposure Under Control (HEUC)
D. Current Human Exposure Under Control and Protective Remedy or Remedies in Place (HHPR)
E. Current Human Exposure Under Control and Long-Term Human Health Protection Achieved (HHPA)

What about after considering the more recent data?
Human Exposure Not Under Control (HENC) describes sites that have not had pathways to human exposure to contamination completely controlled, mitigated or eliminated. This category includes sites where response actions are under way but are not yet complete.

Specifically, these are sites where:
• An unsafe level of contamination has been detected somewhere on site; and
• Contamination has not yet been fully treated, stabilized or contained across the entire site to prevent current human exposure; and
• Though there may not be any actual exposures occurring, there is potential for individuals to be exposed to the contamination somewhere within the site’s boundaries.

There should be a connection between SCAP dates/site schedule and the date for getting human exposures under control. For example, the date for completion of a remedial investigation and feasibility study (RI/FS) should match with an anticipated date for having sufficient information to make EI determination. Keep in mind, human exposures could be determined to be under control before a Record of Decision is signed. It depends on the specific conditions of the site.
Superfund Site Y was determined to have unacceptable levels of groundwater contamination. In response, bottled water is being provided to all impacted residents. No other exposure pathways have been identified.

A groundwater remedy has not yet been implemented.

- Is Human Exposure Under Control?

Based on the scenario described in this slide, what is your human exposure status determination?

A. Current Human Exposure Not Under Control (HENC)
B. Insufficient Data to Determine Human Exposure Control Status (HEID)
C. Current Human Exposure Under Control (HEUC)
D. Current Human Exposure Under Control and Protective Remedy or Remedies in Place (HHPR)
E. Current Human Exposure Under Control and Long-Term Human Health Protection Achieved (HHPA)
Human Exposure Under Control (HEUC) describes sites where EPA assessments indicate there are currently no unacceptable human exposure pathways anywhere on site. This is generally because either the entire site has been cleaned up to levels that do not adversely affect public health, or controls have been implemented that prevent human exposure to contamination. For example, a site may be considered HEUC if the groundwater is contaminated yet no human exposure pathways exist, and the soil above the plume has been investigated to ensure it is safe for human exposure.

Current Human Exposure Under Control and All Protective Remedy(ies) in Place (HEPR) sites are assigned to this category when assessments for human exposures indicate there are no unacceptable human exposure pathways and when EPA has determined the site is under control for current conditions site-wide. In addition, all physical construction is complete, systems are operating as intended, and institutional controls are in place and effective.
operating as intended, and institutional controls are in place and effective. However, one or more of the human exposure-related cleanup goals for the site have yet to be met.

This category includes Construction Completion sites where long-term remedial actions (LTRAs) or O&M activities (only) are underway to achieve cleanup levels and **all institutional controls required to prevent unacceptable human exposures are in place.** In addition to LTRAs, this category includes Construction Completion sites:

- requiring O&M after the LTRA period,
- involving a groundwater or surface water remedy with the primary purpose to provide drinking water supply, or
- involving in-situ SVE or bioremediation where cleanup levels have yet to be met.

**Current Human Exposure Under Control and Long-term Human Health Protection Achieved (HHPA)**

- Data indicate that there are no unacceptable complete human exposure pathways and site is under control sitewide
- All physical construction is complete and institutional controls are in place and effective.
- There are no on-going soil, groundwater or surface water restoration remedies and the site has achieved soil, groundwater and surface water restoration levels.

**Current Human Exposure Under Control and Long-Term Human Health Protection Achieved (HHPA) sites** are assigned to this category when assessments for human exposures indicate there are no unacceptable human exposure pathways and EPA has determined the site is under control for current conditions site-wide. In addition, all physical construction is complete, systems are operating as intended, and institutional controls are in place and effective. Finally, all human exposure-related cleanup goals for the site have been achieved.

This category would typically include:

- Construction Completion sites that do not involve long-term soil, groundwater or surface water restoration remedies and all institutional controls are in place,
- Construction Completion sites that have achieved long-term soil, groundwater and surface water restoration cleanup levels and all institutional controls are in place,
- sites that have attained Site Completion status, and
- Deleted NPL sites.
Human Exposure Worksheet Summary

1. Is there sufficient information to make an evaluation of human exposure at the site?
   - No: Insufficient Data to Determine Human Exposure
   - Yes: Current Human Exposures Under Control and Long-Term Protection Achieved

2. Have all long-term human exposure-related cleanup goals been met for the entire site?
   - No: Insufficient Data to Determine Human Exposure
   - Yes: Current Human Exposures Under Control and Long-Term Protection Achieved

3. Are there complete human exposure pathways between contaminated groundwater, soil, surface water, and air media and human receptors such that human exposures can reasonably be expected?
   - No: Go to Step 5
   - Yes: Go to Step 4

4. Are there actual or reasonably anticipated human exposures associated with the complete pathways identified in Step 3 within acceptable limits under current conditions?
   - No: Human Exposures Not Under Control
   - Yes: Current Human Exposures Under Control

5. Is the site Construction Complete, is the remedy operating as intended, and are engineering and institutional controls (if required), in place and effective?
   - If one or more of Step 5 criteria are not met: Human Exposures Not Under Control
   - If all Step 5 criteria are met: Current Human Exposures Under Control

This graphic is adapted from the Human Exposure Worksheet in the EPA 2008 Human Exposure Environmental Indicator Guidance.
Emerging Contaminant Exercise: Group Poll
Which of the following emerging contaminant situations have you dealt with at a site?
A. Situation is unknown as the emerging contaminant has never been included in sampling.
B. The emerging contaminant is in monitoring wells but not sure if it has reached surface water or drinking water
C. The emerging contaminant is in drinking water wells or reaching surface water
D. None of the above

Exercise: Emerging Contaminants
- A remedial action to address soil and groundwater contamination at Superfund Site A has been implemented.
  - COCs: include hexavalent chromium and TCE
  - Remedy: soil removal, pump-and-treat of groundwater plumes contaminated over risk-based levels
  - Last EI determination was Human Exposures Under Control
- It was recently determined that there was historical use of fire-fighting foam
  - Monitoring wells were sampled for emerging contaminants
  - Data has not yet returned
  - Uncertain if emerging contaminants have migrated to drinking water sources

Exercise: Emerging Contaminants
- Monitoring Well
- Public Drinking Water Supply Well
- Private Drinking Water Well

Site A
Existing Contaminant Plumes
Groundwater Flow
What Human Exposure EI Determination applies in this example?

A. Keep HEUC (under control) status until data is collected  
B. Select HEID (Insufficient data)  
C. Select HENC (human exposure not under control)

Exercise: Emerging Contaminants Continued

- One year later, you are making your annual EI determination.  
- Sampling data that shows emerging contaminants are above risk-screening level (RSL) in some monitoring wells  
- Still no data for public and private drinking water wells, but will be collected over the next year
Exercise: Emerging Contaminants

Site A

Existing Contaminant Plumes

Groundwater Flow

- Monitoring Well
- Monitoring Wells with EC
- Public Drinking Water Supply Well
- Private Drinking Water Well

What Human Exposure EI Determination applies in this example?

A. Keep HEUC (under control) status until data is collected
B. Select HEID (Insufficient data)
C. Select HENC (human exposure not under control)

Exercise: Emerging Contaminants Continued

- One more year later, you are making your annual EI determination.
- Sampling data that shows emerging contaminants above the RSL in some public drinking water supply wells
- No sampling has been conducted to date at the private well
Exercise: Emerging Contaminants

Site A

Existing Contaminant Plumes

Groundwater Flow

Drinking Water Wells with EC above RSL

Monitoring Well

Monitoring Wells with EC

Public Drinking Water Supply Well

Private Drinking Water Well

Drinking Water Wells with EC above RSL

What EI Determination Applies in this example?

A. Keep HEUC (under control) status until data is collected
B. Select HEID (Insufficient data)
C. Select HENC (human exposure not under control)
Example of EI Statue Change: Dover AFB - HEID

- As of May 2019, there is insufficient information to determine the Human Exposure status at the Dover Air Force Base (DAFB) Superfund Site. PFAS were detected on-base.
- Nearby public water supply wells were sampled and do not contain PFAS, however, off-base sampling indicated one private well had unacceptable levels of PFAS and a filtration system was installed.
- Limited 2016 sampling indicated the potential for off-base PFAS migration. Nearby off-base properties that could be affected will be sampled in 2019.

Example of EI Status Change: Aberdeen Proving Ground (Michaelsville Landfill) - HEID

- As of May 2019, there is insufficient data to determine the Human Exposure status at the Aberdeen Proving Ground (Michaelsville Landfill) Superfund site because the facility is undergoing a PA/SI to determine if PFAS is present in current drinking water sources.
- Once additional data from the study becomes available, EPA will make a human exposure determination for this site and assure that any appropriate cleanup actions are taken.
ENVIRONMENTAL INDICATORS
GROUNDWATER MIGRATION DETERMINATIONS

Migration of Contaminated Ground Water Under Control
Environmental Indicator

- Typically documents whether ground water contamination is below protective, risk-based levels, or, if not, whether the migration of contaminated ground water is stabilized and there is no unacceptable discharge to surface water and monitoring will be conducted to confirm that affected ground water remains in the original area of contamination.

The Contaminated Groundwater Migration Under Control (GMUC) EI describes whether contamination is below protective, risk-based levels or, if not, whether the following conditions are met:

- migration of contaminated ground water is stabilized;
- there is no unacceptable discharge to surface water; and
- monitoring will be conducted to confirm that affected groundwater remains in the original area of contamination.

This requires understanding the full (horizontal and vertical) extent of the plume to determine if it is stable. The determination is based on the existing plume boundary (not property boundary or projected exposure point).
The determination must be made with "reasonable certainty" (i.e., based on the most current data for the site). Documents such as RODs, Action Memoranda, Five-year Reviews, periodic ground water and surface water monitoring reports, and Close Out Reports are good sources of data and often provide the information necessary in making a determination with reasonable certainty. As new data become available, the determination can be revised.

Apply Your Understanding

- **Superfund Site Z** has contaminated groundwater above acceptable risk levels. A pump-and-treat remedy has been selected and treatment is ongoing.
- Institutional controls are in place and effective. Recent data confirms no surface discharge to impacted water bodies is occurring.
  - Is Groundwater Migration Under Control?

Groundwater Migration Determination Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
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<tbody>
<tr>
<td>GMNA</td>
<td>Site currently does not have contaminated groundwater or site conditions did not warrant investigation or remediation of groundwater contamination in the past</td>
</tr>
<tr>
<td>GMID</td>
<td>Insufficient Data to determine contaminated groundwater migration control status</td>
</tr>
<tr>
<td>GMNC</td>
<td>Contaminated Groundwater Migration Not Under Control</td>
</tr>
<tr>
<td>GMUC</td>
<td>Contaminated Groundwater Migration Under Control</td>
</tr>
</tbody>
</table>

The **Contaminated Groundwater Migration Not Applicable (GMNA)** determination refers to sites that do not have contaminated groundwater or where site conditions did not warrant investigation or remediation of groundwater contamination in the past. Sites with past or present groundwater contamination should be evaluated. Data for sites where groundwater was previously contaminated but has been cleaned up should be evaluated to ensure that the indicator accurately records program progress.
The **Contaminated Groundwater Migration Insufficient Data (GMID)** determination refers to sites where there is insufficient data to determine the groundwater migration control status. Each site is unique, so there is no common definition of "sufficiency." For example, if you have limited data on which to judge stability of the plume, you can identify the site as having "insufficient data".

The **Contaminated Groundwater Migration Not Under Control (GMNC)** determination refers to sites contaminated groundwater is above a protective, risk-based level, or the migration of contaminated groundwater is unstable (such that it is expected to migrate outside of an existing area of contaminated groundwater), or that there is an unacceptable discharge into surface water.

The **Contaminated Groundwater Migration Under Control (GMUC)** environmental indicator documents whether contamination is below protective, risk-based levels or, if not, whether the migration of contaminated groundwater is stabilized and there is no unacceptable discharge to surface water.

A conclusion of “migration of contaminated ground water under control” (GMUC) generally indicates that all information on known and reasonably expected groundwater contamination has been reviewed and the necessary conditions are met.
In evaluating the potential for contaminated groundwater migration, the evaluation should be conducted on a sitewide basis, with evaluation of distinct plumes. The plumes should be evaluated based on the boundaries of the plume areas, not on facility boundaries. Monitored Natural Attenuation (MNA) monitoring may be used to verify that contaminated groundwater migration is under control. Limited migration is permissible if it is part of a formal natural attenuation remedy. The evaluation of the GMUC environmental indicator includes an evaluation of groundwater discharge to surface water.

The Superfund Migration of Contaminated Groundwater Under Control Worksheet is found in the Superfund Environmental Indicators Guidance Human Exposure Revisions, 2008. The following slides break out the steps in more detail.
Superfund Migration of Contaminated Ground Water Under Control Worksheet

Definition: Is the migration of contaminated ground water being controlled through engineered or natural processes?

Step 1. Does the site currently have contaminated ground water or does the site conditions warrant EPA’s investigation or remediation of ground water contamination in the past?
- Yes
- No
  Stop, you do not need to complete the GMU.

Step 2. Based on the most current data on the site, has all available relevant/significant information on known and reasonably suspected releases to ground water been considered in this evaluation?
- Yes
- No

Step 3. Is ground water known or reasonably suspected to be “contaminated” above appropriately protective risk-based “levels” (applicable promulgated standards, as well as other appropriate standards, guidelines, or criteria) as a result of a release from the site?
- Yes
- No

Step 4. Is the migration of contaminated ground water stabilized (such that contaminated ground water is expected to remain within “existing area of contaminated ground water”) as defined by the monitoring locations designated at the time of this evaluation?
- Yes
- No

Step 5. Does “contaminated” ground water discharge into surface water bodies?
- Yes
- No

Step 6. Can the discharge of “contaminated” ground water into surface water be shown to be “currently acceptable” as defined (i.e., not cause unacceptable impacts to surface water, sediments, or ecosystems that should not be allowed to continue until a final remedy decision can be made and implemented)?
- Yes
- No

Insufficient Data

Insufficient Data to Determine Contaminated Ground Water Migration Under Control Status

Contaminated Ground Water Migration Under Control

Contaminated Ground Water Migration Not Under Control
Q. Does the site currently have contaminated groundwater or did site conditions warrant investigation or remediation in the past?

Step 1. Based on the most current data, has all available information on known and reasonably suspected releases to groundwater been considered?

Step 2. Is groundwater known or reasonably suspected to be contaminated above risk-based levels as a result of a release from the site?

Step 3. Is the migration of contaminated groundwater stabilized (expected to remain in existing area of contaminated groundwater) as defined by monitoring locations?

Step 4. Does contaminated groundwater discharge into surface water bodies?

Step 5. Can the discharge of contaminated groundwater into surface water be shown to be “currently acceptable” (not cause unacceptable impacts)?

Step 6. Will groundwater monitoring be collected to verify that contaminated groundwater has remained within the existing area of contaminated groundwater?

This graphic is adapted from the Superfund Migration of Contaminated Groundwater Under Control Worksheet in the EPA 2008 Human Exposure Environmental Indicator Guidance.
**EI Best Management Practices**
- Periodic Management Focus on EIs
- Consideration of Human Exposure Status in the Prioritization of Site Work
- Regular Review and Management Attention to the HENC/HEID Paragraphs
- Increased Information Sharing & Coordination Via Tools, Educational Resources, & Training
- Increased Situational Awareness of Linkages between EI, SWRAU, & FYR Protectiveness Determinations
- Continued Focus on Quality EI Data in SEMS

**OTHER CERCLA COMPONENTS**
A change in an EI status, especially from under control to not under control, can impact other CERCLA determinations.

Many of the activities required to make a five-year review protectiveness evaluation (e.g., addressing newly promulgated standards, confirming current and expected land use, identifying new contamination or contaminant sources) are useful in confirming the human exposure status. Upon completion of any five-year review, you should confirm that the information evaluated in the review is consistent with the current site-wide human exposure evaluation. If necessary, revise human exposure evaluations to be consistent with the information evaluated during the five-year review. Note that human exposure evaluations describe risks to human health under current conditions, and do not address potential/future human health risks or ecological risks.
Five-year reviews do not always address the entire site, may consider potential/future risks, and may also address ecological risks. Because of this, five-year review protectiveness statements and human exposure evaluations are not direct corollaries. For assuring consistency between five-year reviews and human exposure evaluations, the information used to develop protectiveness statements is generally more useful than the protectiveness category itself.

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The Sitewide Ready for Anticipated Reuse (SWRAU) measure was developed to comply with the EPA’s responsibility to report long-term outcome-based accomplishments under the Government Performance and Results Act (GPRA). This performance measure refers to the number of final and deleted construction complete National Priorities List (NPL) sites where, for the entire site:

1. All cleanup goals in the Record(s) of Decision or other remedy decision document(s) have been achieved for media that may affect current and reasonably anticipated future land uses of the site, so that there are no unacceptable risks; and
2. All institutional or other controls required in the Record(s) of Decision or other remedy decision document(s) have been put in place.

The Human Exposure determination for sites that qualify for the Sitewide Ready-for-Reuse measure should either be:

- "Current Human Exposure Controlled and Protective Remedy in Place“ (HHPR); or
- "Long-Term Human Health Protection Achieved“ (HHPA).

Human exposure site determinations that are not one of the two categories above are inconsistent with the requirements that must be met for the Sitewide Ready-for-Reuse measure. SEMS misleadingly will let you say a site is SWRAU if it meets “Current human exposure under control”. As stated in this slide, HEPR or HHPA status must be met. More information is available at [https://www.epa.gov/superfund-redevelopment-initiative/sitewide-ready-anticipated-use-swrau-superfund-sites](https://www.epa.gov/superfund-redevelopment-initiative/sitewide-ready-anticipated-use-swrau-superfund-sites).
The determination that a site is SWRAU is based on the information available at the time the determination is made. That determination may revert if site conditions change, or if new or additional information is discovered regarding the contamination at the site. If after a site has been designated as SWRAU, EPA becomes aware that any of the requirements are no longer met, then the site will cease to be designated as SWRAU. The site can be re-designated only when the appropriate requirements are met.

EIs are not intended to measure risk in the way baseline risk assessments are used to determine a need for action under CERCLA. Also, even if a remedy is not yet construction complete for the entire site, it is possible that human exposure pathways and/or groundwater migration are under control, depending on the specifics of a site. EIs are designed to communicate the tangible progress made in protecting human health and the environment, not measure risk. Additionally, the HE EI does not look at ecological risk.
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**EI Guidance and Tools**

- [2004 Superfund Environmental Indicators Guidance Manual](#)
- [2008 Superfund Environmental Indicators Guidance Human Exposure Revisions](#)
- [Superfund Program Implementation Manual](#) (Chapter VIII: Remedial Program, Part V on Environmental Indicators)
- [Human Exposure Dashboard (Public)](#)

**Summary**

- EIs are designed to communicate the tangible progress made in protecting human health and the environment
- The Human Exposure and Groundwater Migration EIs are reported to Congress
- Use the tools and resources available when determining EIs for your sites and work with your project teams and EI coordinator
- Remember that a change in EI status can impact other program measures (e.g., SWRAU) and that other program components may impact EIs (FYRs)
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Questions

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