Performance Measures and Environmental Indicators

Federal Facilities Restoration and Reuse Office
Environmental Protection Agency
August 8, 2024

Group Poll

What type of performance measures are important to your agency at your federal facility site?

Overview

- ❑ Performance Measures
- ❑ Environmental Indicators
  - Human Exposure (HE)
  - Migration of Contaminated Groundwater (GM)
- ❑ Other Superfund Components

Click here for the Updated 2022 EI Guidance!

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In this course, we will discuss performance measures and targets, and 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 Superfund components, and review guidance and tools that are helpful in making EI determinations.

PERFORMANCE MEASURES

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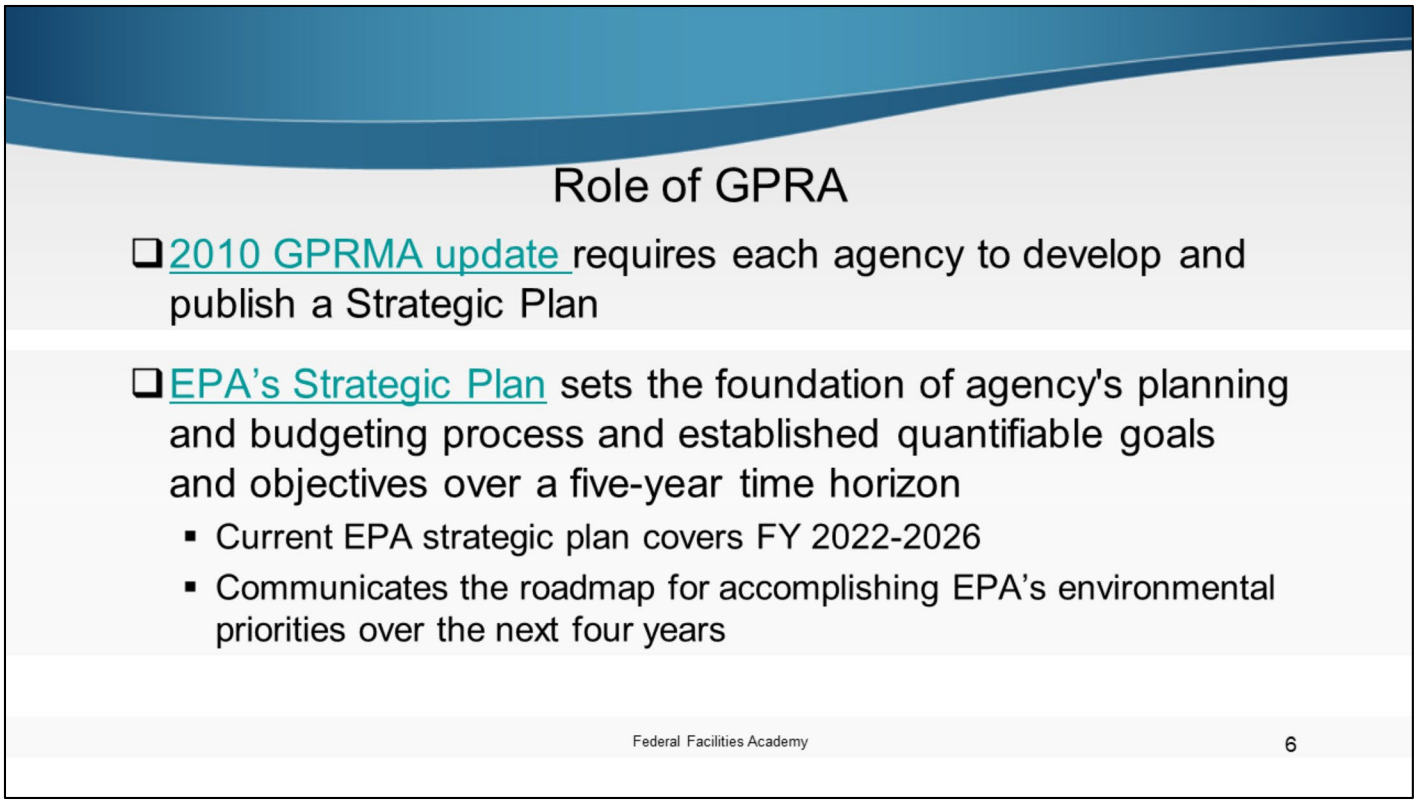
GPRA is a Congressional Action (law) that addresses all federal agencies. It was enacted in 1993 during an era of government reinvention to promote improved government performance and greater public confidence in government through better planning and reporting on results. GPRA requires federal agencies 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 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.

2010 GPRA Update: https://www.govinfo.gov/content/pkg/PLAW-111publ352/pdf/PLAW-111publ352.pdf

EPA strategic plan: https://www.epa.gov/planandbudget/fy-2018-2022-epa- strategic-plan

Superfund Performance Measures

- The Superfund Remedial program tracks six performance measures to demonstrate progress in accomplishing specific environmental results
- In EPA's annual Congressional Justification, the Superfund program commits to accomplishing certain targets for these three measures:
  - Site Wide Ready for Anticipated Use (SWRAU)
  - Human Exposure Under Control (HEUC)
  - Remedial Action (RA) Project Completion

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The Superfund Remedial Program tracks six performance measures and reports three 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.

Completion of Superfund Performance Measures

Remedial Site Assessments Completed (RSAC)	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 (RAPC)	When construction activities and final inspection are complete, and a Remedial Action Completion Report is approved.
Migration of Contaminated Groundwater 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.

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The Superfund remedial program has six performance measures that it employs to accomplish specific environmental results. The descriptions below include more detail on the criteria used to establish achievement of the performance measures.

- **Remedial Site Assessments Completed (RSAC)**: A site assessment is considered complete when EPA approves the Preliminary Assessment Report.
- **Human Exposures Under Control (HEUC)**: Sites are assigned to this category when there are currently no completed or reasonably anticipated human exposure pathways that are unacceptable based on site-specific risk criteria.
- **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):** Sites are assigned to this category when the contamination of groundwater is below protective, risk- based levels or, if not, when the migration of contaminated groundwater is stabilized AND there is no unacceptable discharge into 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.
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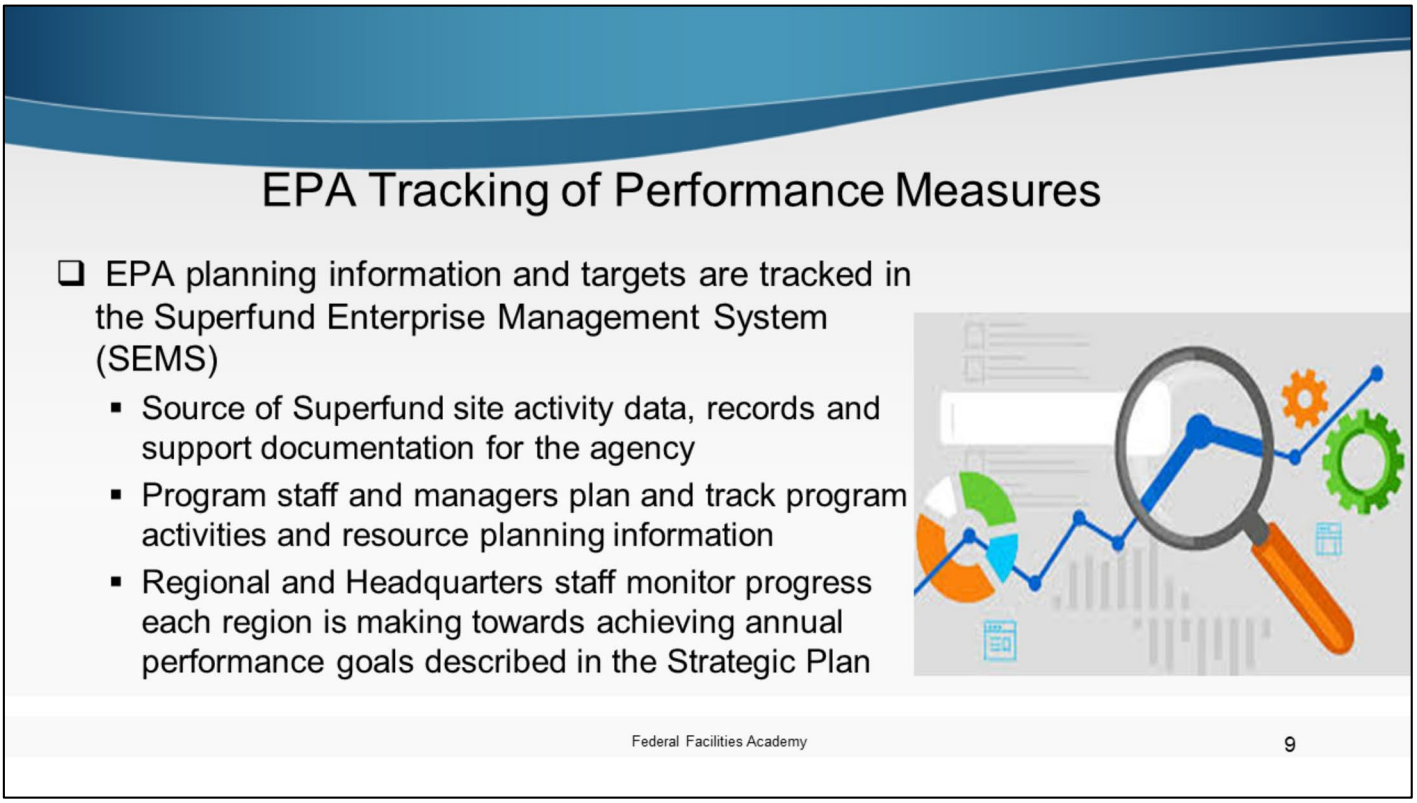
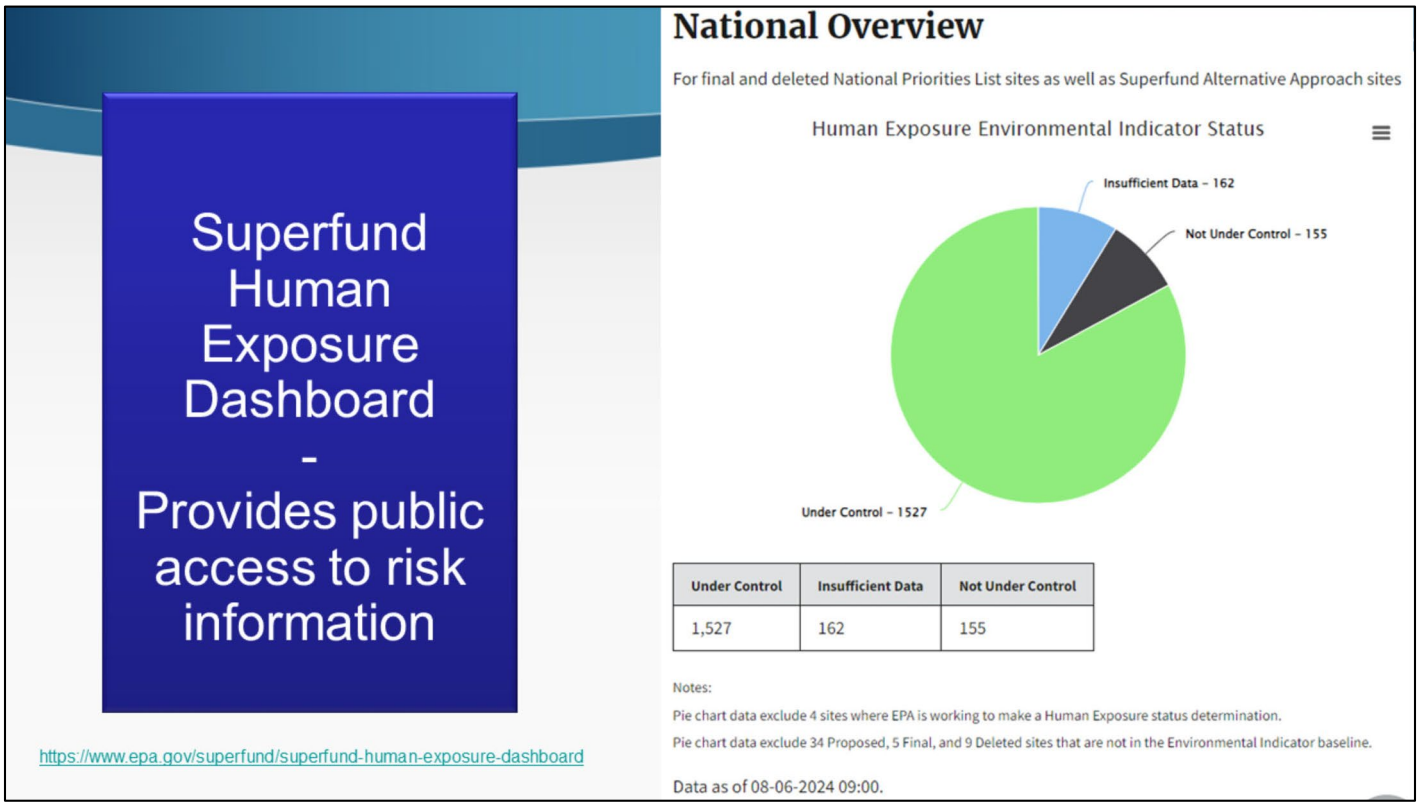
Note that two of these performance measures, HEUC and GMUC, are environmental indicators which we will discuss in more detail on the following slides. The Superfund program tracks EI's nationally, specifically how many sites will achieve an "under control" EI status annually. More information available at https://www.epa.gov/superfund/superfund-remedial-performance-measures.

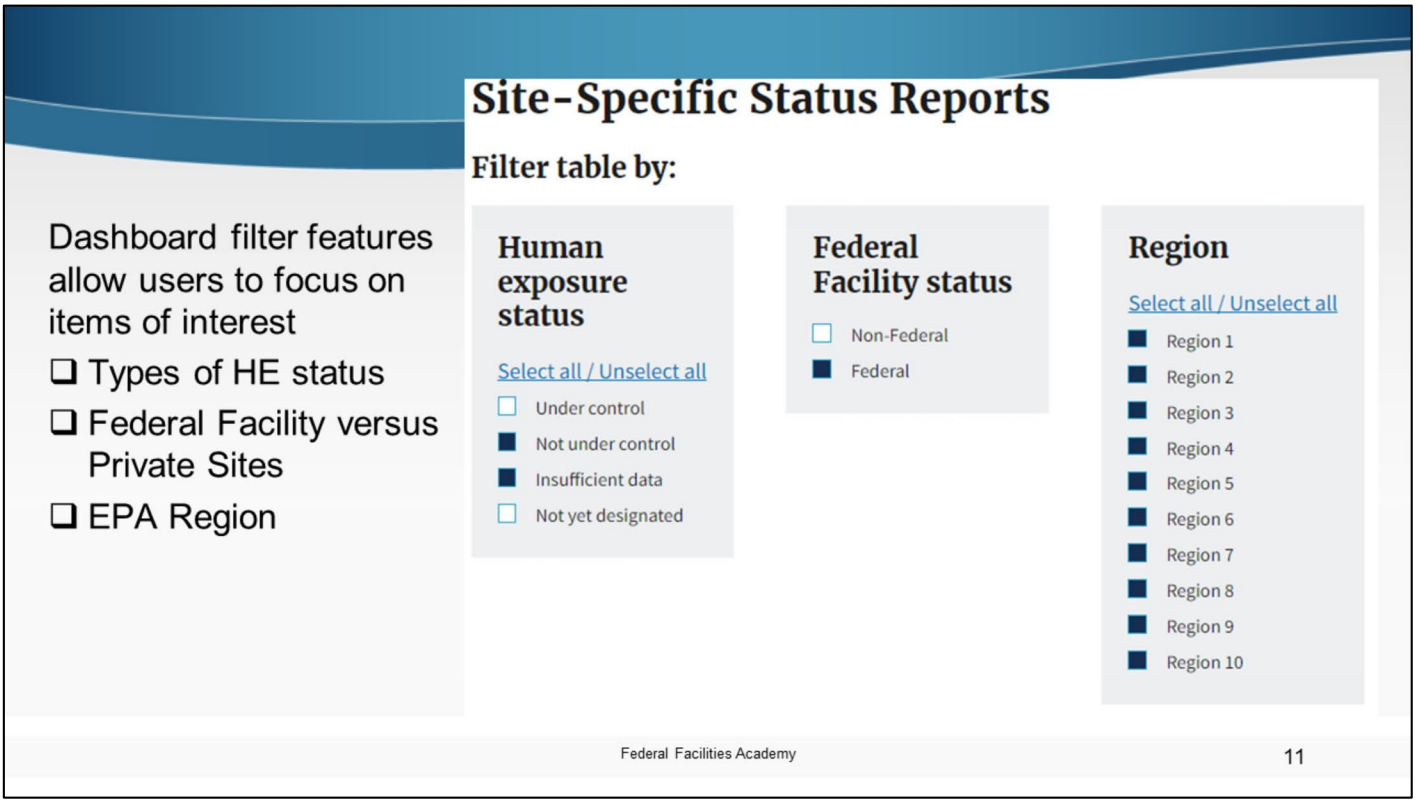


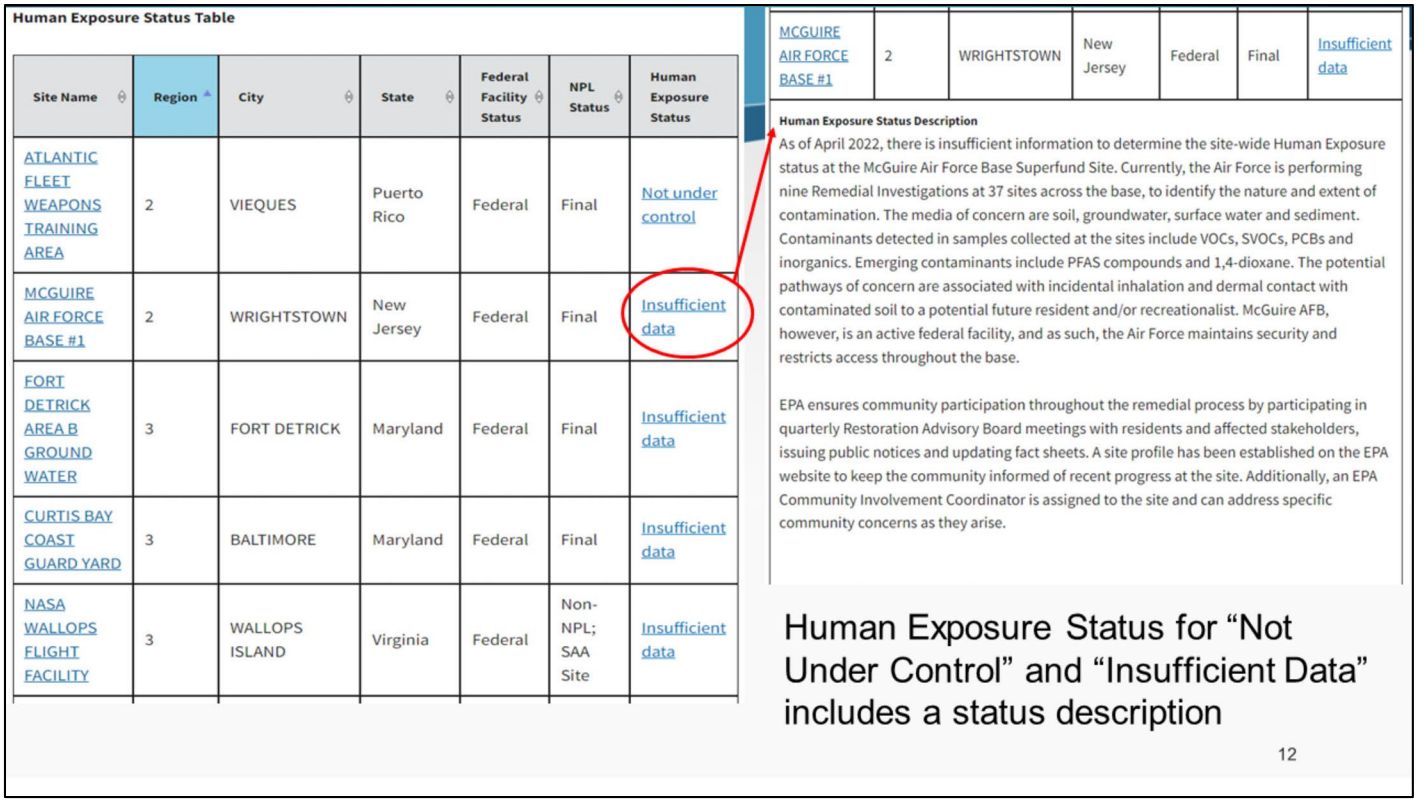
One EPA Superfund-specific data base and management system is the Superfund Enterprise Management System (SEMS). EPA uses this system for maintaining and reporting Superfund documentation. SEMS serves as the official source of primary Superfund site activity data, records, and support documentation for 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.



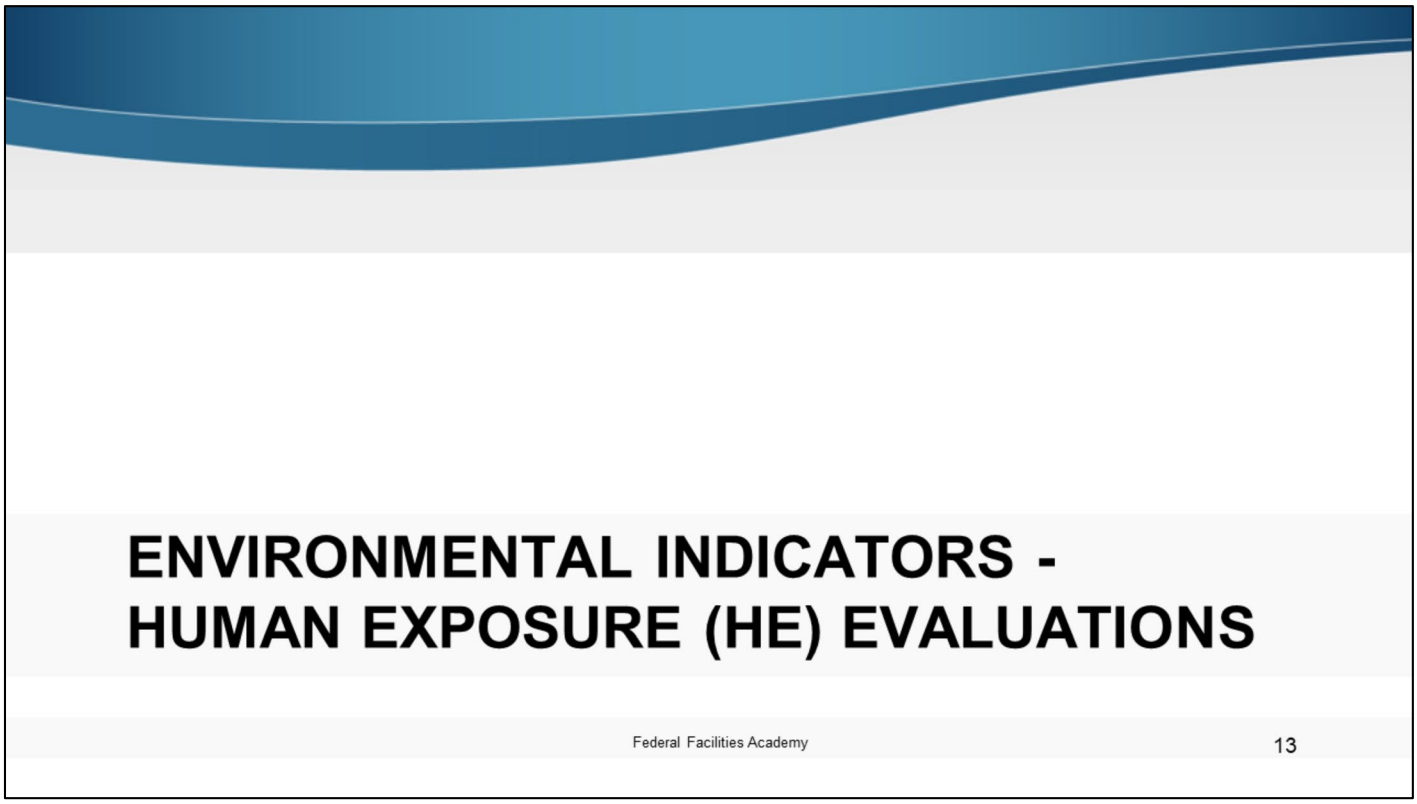
In January 2018, EPA launched a public Human Exposure Dashboard to improve public access to HE data and information. The dashboard provides live SEMS data on HE for Superfund sites in a single, easily accessible webpage. HE evaluations are made for all Final and Deleted NPL sites and sites with SAA agreements in place. This is one way EPA communicates risk to the public. The dashboard includes a national overview of the cumulative number of sites with each status. Further down the page, site-specific status reports can be populated in a data table. Filter panes for HE status, FF status, and Region allow the user to query the SEMS HE data for specific criteria. Detailed exposure pathway descriptions are available for all HEID and HENC sites and can be accessed by clicking on the hyperlinks under the "Human Exposure Status" column of the data table.

Note that for the purposes of public communication or reporting EPA's GPRA accomplishments, the three categories of HEUC, HEPR, and HHPA are combined into a single category reported as "Human Exposure Under Control" (HEUC). HEPR and HHPA are internal-EPA statuses used for site planning. The Human Exposure Web Dashboard can be accessed at https://www.epa.gov/superfund/superfund-human- exposure-dashboard

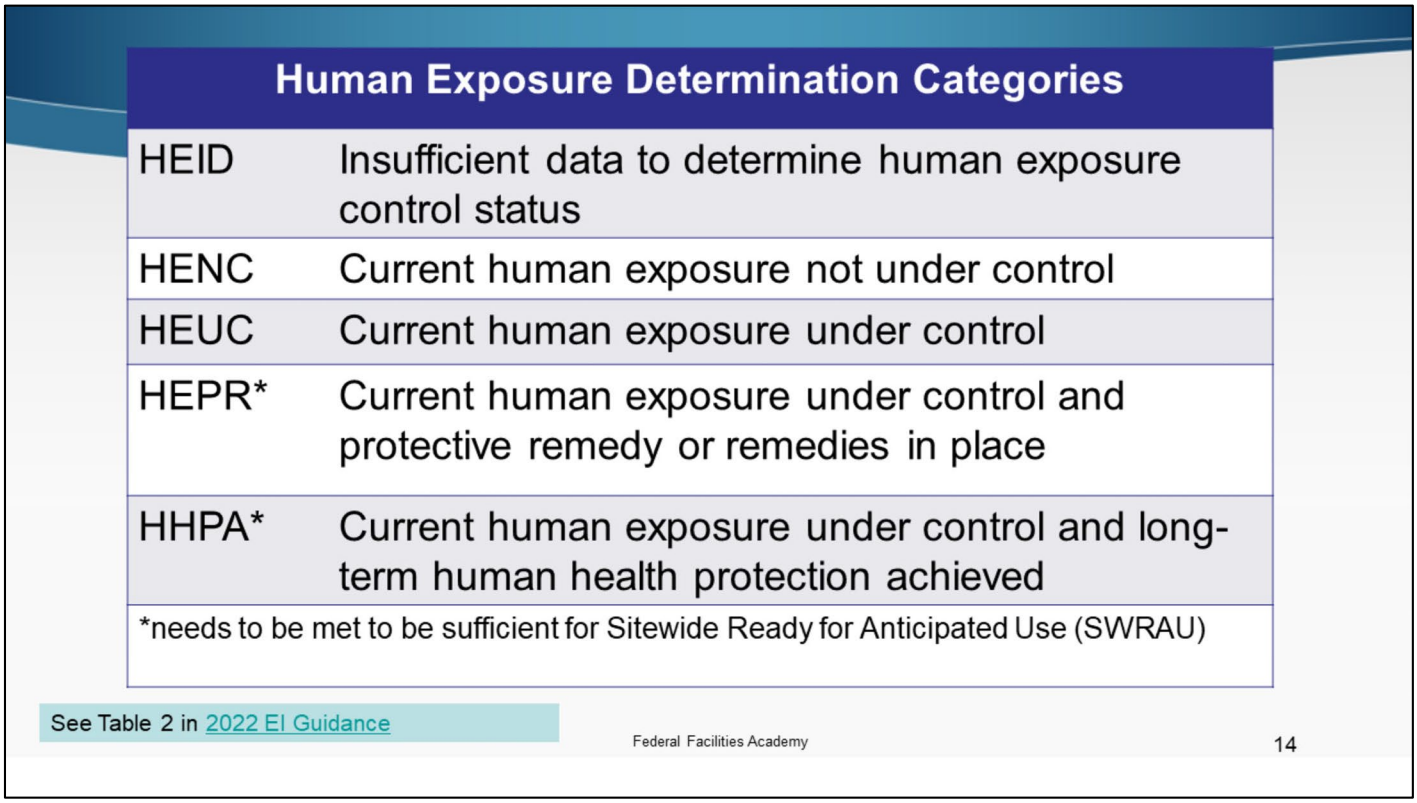




The EI Dashboard shows current Human Exposure status and a brief description of the statues for those sites designated as "Not Under Control" or "Insufficient Data". EPA remedial project managers (RPMs) work with their regional teams to update this information on at least an annual basis. EI determinations are uploaded into SEMS for tracking purposes.



The Human Exposure (HE) environmental indicator is designed to evaluate and categorize incremental human health protection by measuring EPA's and/or relevant PRPs' ability to control complete, unacceptable human exposure pathways at a Superfund site. These evaluations currently apply to final and deleted Superfund NPL sites and SAA Sites. The Human Exposure indicator is measured on a site-wide basis, meaning that one, unacceptable human exposure pathway at a single operable unit (OU) can determine the status of the entire site, and is intended to document current conditions. Evaluation of Long-Term Human Health Protection Achieved (HHPA) however, considers both current and future conditions. 2022 Environmental Indicators Guidance is available at https://semspub.epa.gov/work/HQ/100003069.pdf

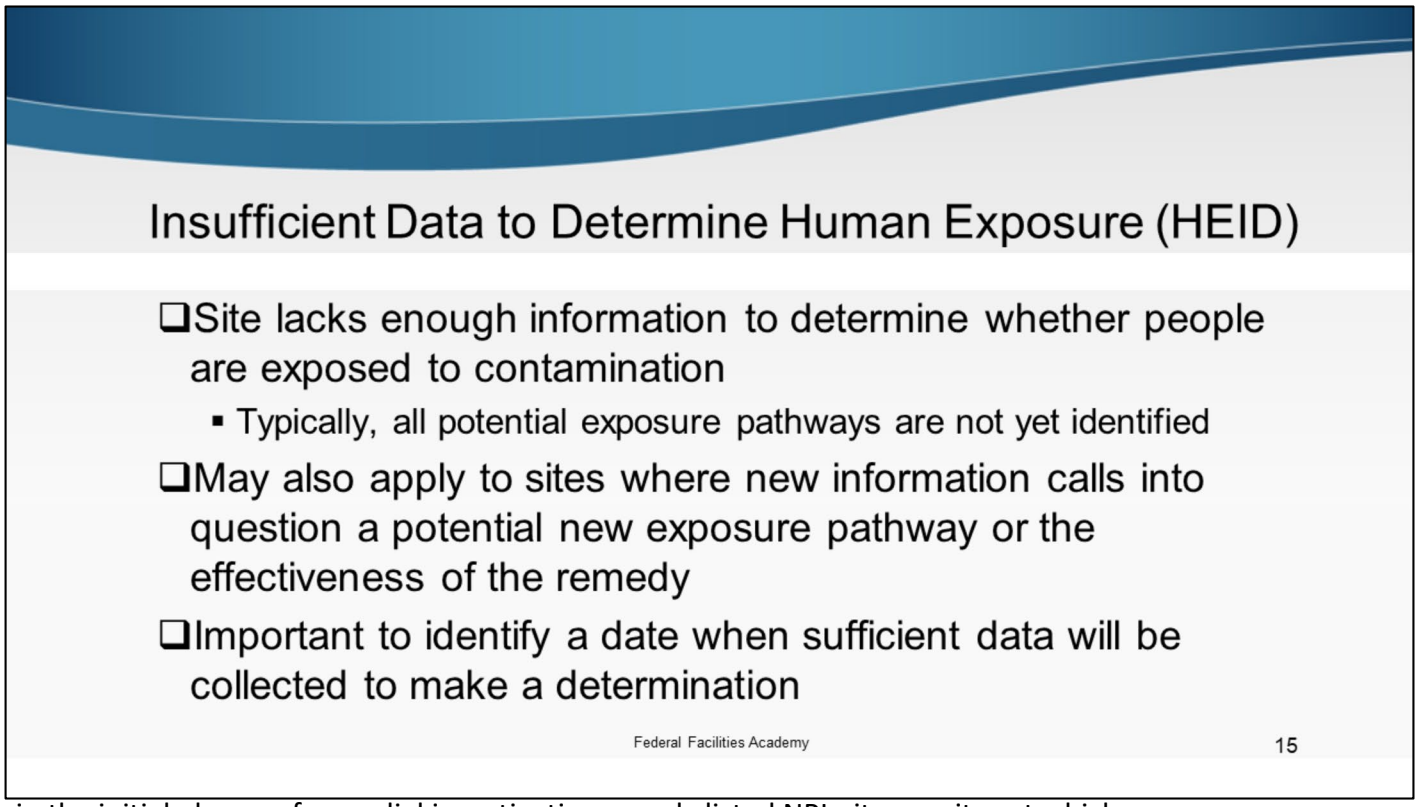


In performing the evaluation, EPA will assign the site into one of five HE categories (listed on slide). The indicator applies to Final, and Deleted NPL sites and Superfund Alternative Approach (SAA) sites. In the evaluation of the HEUC environmental indicator, the assessor needs to evaluate the current status of institutional and engineering controls. This is critical in determining a HE category for the site.

- A **Human Exposure Insufficient Data (HEID)** status indicates that there is not sufficient information/data to fully evaluate whether there are any current, complete unacceptable human exposure pathways at the site.
- The **Human Exposure Not Under Control (HENC)** status indicates that sufficient data/information are available to support the evaluation that current, completed, or reasonably anticipated human exposure pathways exist and that they are unacceptable based on site-specific risk criteria.
- The **Human Exposure Under Control (HEUC)** status means that sufficient data/information are available to support the evaluation that there are currently no completed or reasonably anticipated human exposure pathways that are unacceptable based on site-specific risk criteria.

However, there may be additional physical construction work required and/or institutional controls need to be implemented to address long-term human health exposure, where all human exposure-related cleanup goals have yet to be met.

There are two, elevated categories which constitute a “human exposures under control" determination. Sites evaluated as **HEPR** have achieved the Construction Completion (CC) status, remedies to human exposures are operating as intended, and engineering and/or 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. In addition to these elements, sites evaluated as **HHPA** have achieved all human exposure-related cleanup goal. Please note that a human exposure status of **HEPR** or **HHPA** are the only statuses sufficient for a site to use the **SWRAU** designation (see following slides). These two statuses are used internally and are publicly reported simply as **“HEUC”.** There are templates for RPMs to use when writing your determinations.



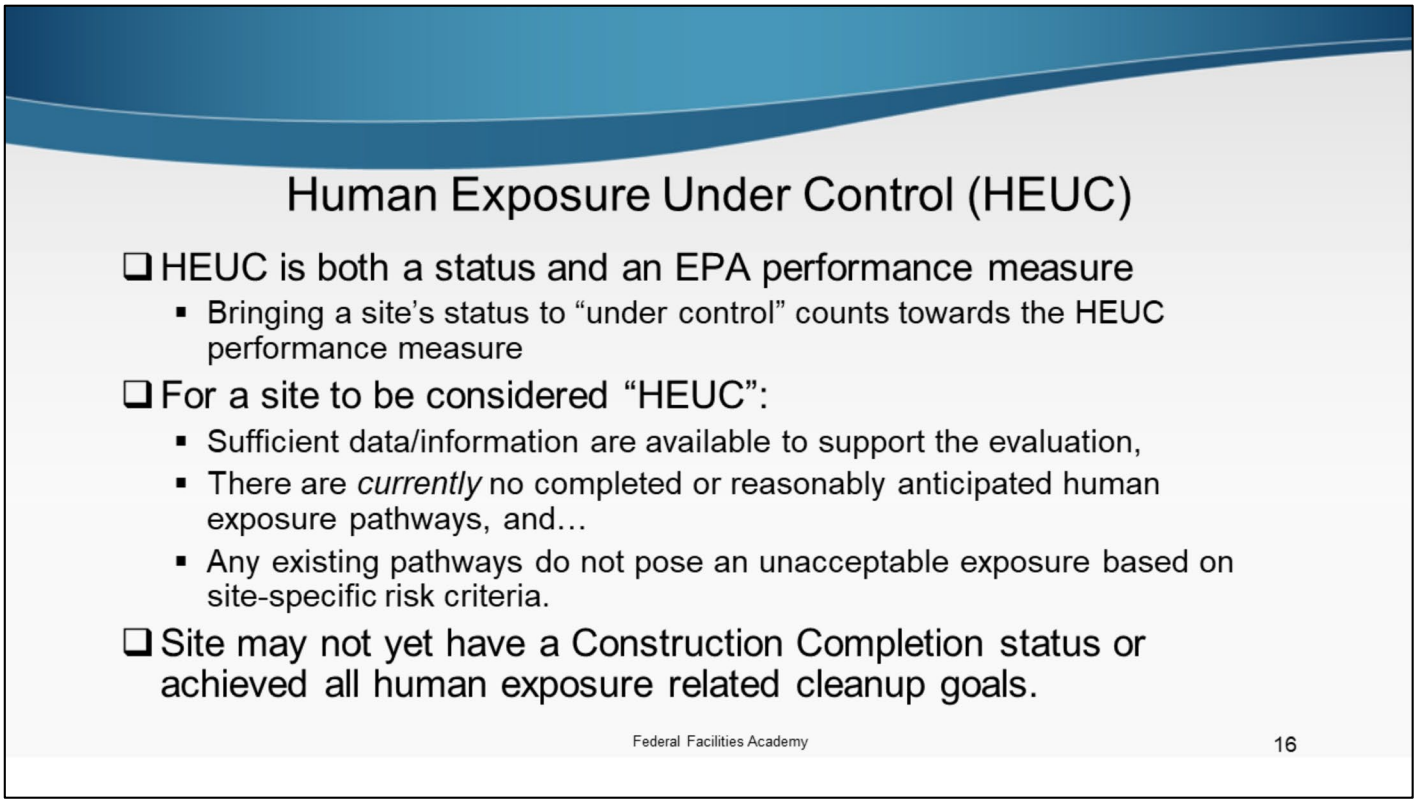
in the initial phases of remedial investigation newly listed NPL sites or sites at which an investigation is underway to assess a new exposure pathway (e.g., vapor intrusion, emerging contaminants, etc.). In order to effectively evaluate for HE, Regions should have sufficient data, knowledge & information regarding:

1. A site’s physical setting and how that contributes to human exposure.
2. Exposed populations.
3. Exposure pathways.
4. Estimates of exposure concentrations.
5. Estimates of chemical intakes.

Before a Region can fully evaluate a site for the human exposure indicator, they should have sufficient data on the five items listed above to determine both the degree of risk to exposure and the control of the exposure itself. The primary source of information and data for HE evaluations is the Baseline Human Health Risk Assessment (HHRA), which will identify exposure pathways and their associated risk levels. Keep in mind, human exposures evaluations can be made before a Record of Decision is signed, depending on the specific conditions of the site.

There are limited situations where a completed risk assessment is not needed for a site's status to progress beyond HEID. For example, in the early stages of the Remedial Assessment (RI), it may be abundantly clear that there is sufficient data to make an evaluation of HENC. In these cases, regions should work with a risk assessor to determine how best to interpret limited information and make such an evaluation for public awareness.

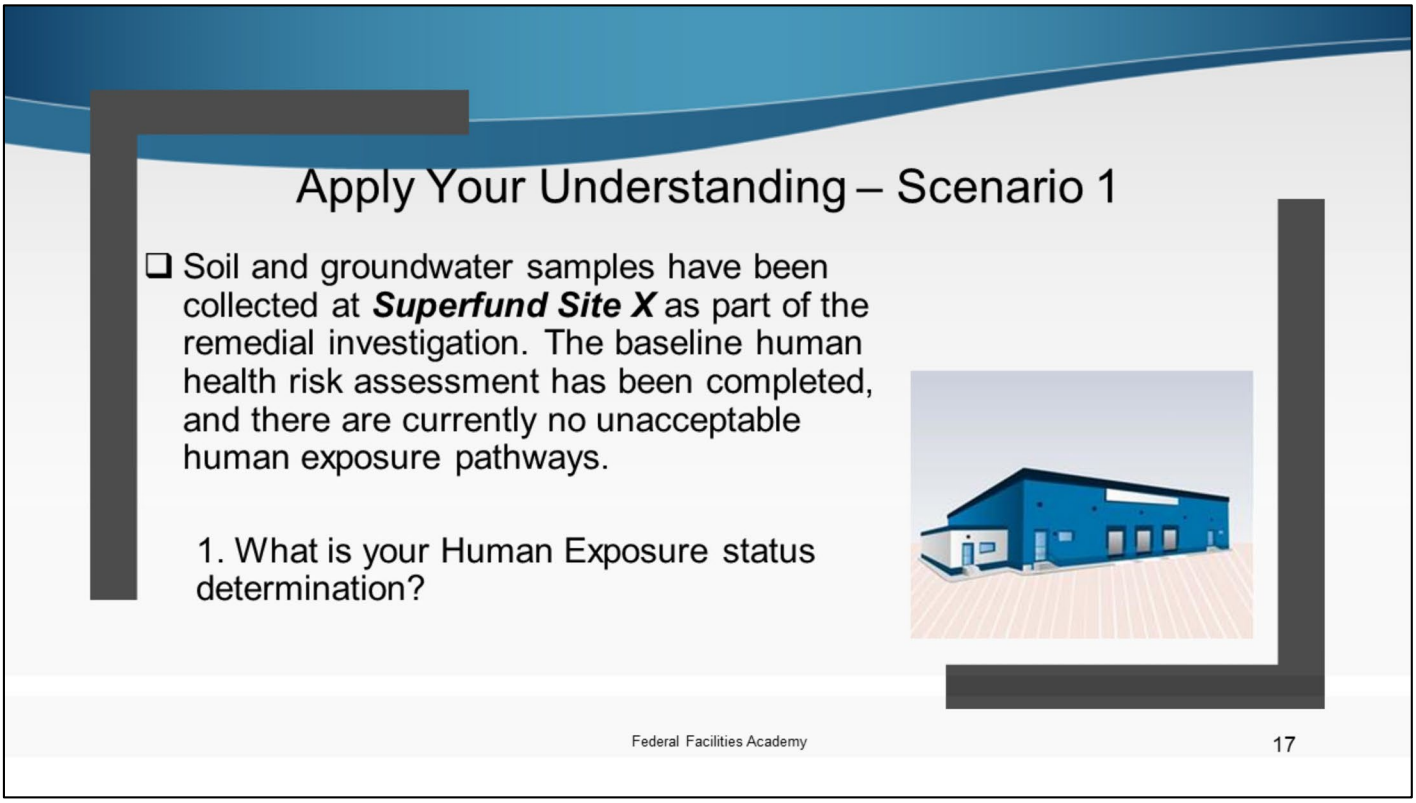
Evaluations should be made whenever site conditions or information changes in such a way that calls into question the status of human exposure under current conditions. The evaluations should be made with reasonable certainty and based on the most current, available data/information for a site. Complete certainty, however, is not a necessary condition to make a human exposure evaluation at a site. The evaluation is intended to be a realistic, risk-based evaluation based on actual and reasonably anticipated current land, surface water and groundwater use. All response actions across all media should be considered when making these evaluations and should be revised as new information becomes available.

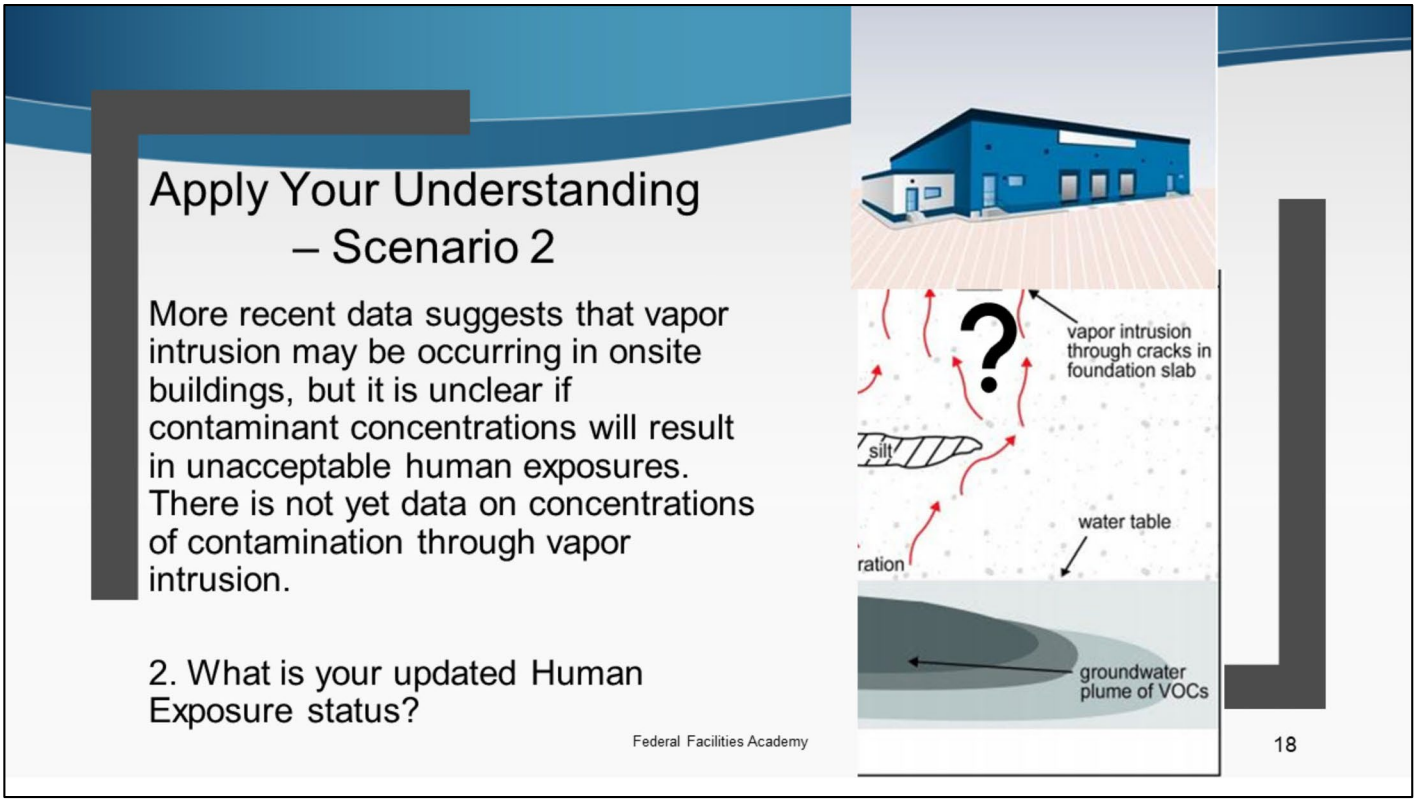


Human exposures generally can be controlled in one of five ways:

1. Collecting sufficient data to determine that there are no unacceptable exposure pathways anywhere on site.
2. Reducing contamination below risk-based levels.
3. Eliminating exposure pathways to human receptors.
4. Preventing human receptors from contacting contaminants in place.
5. Influencing harmful, human receptor activity patterns (e.g., by reducing the frequency or duration of exposure).

Most Superfund remedies include a combination of components that control or mitigate exposure pathways (e.g., engineering or institutional controls designed to control contact with waste left in place) and components that altogether eliminate human exposures to contamination (e.g., excavation and treatment remedies). Where EPA determines that a situation may present a release or substantial threat of a release of a hazardous substance, or where a pollutant or contaminant presents an imminent and substantial endangerment to human health or the environment, the Agency has broad response (removal and remedial) and enforcement authority to take appropriate action.





Based on each scenario described, what is your human exposure status determination?

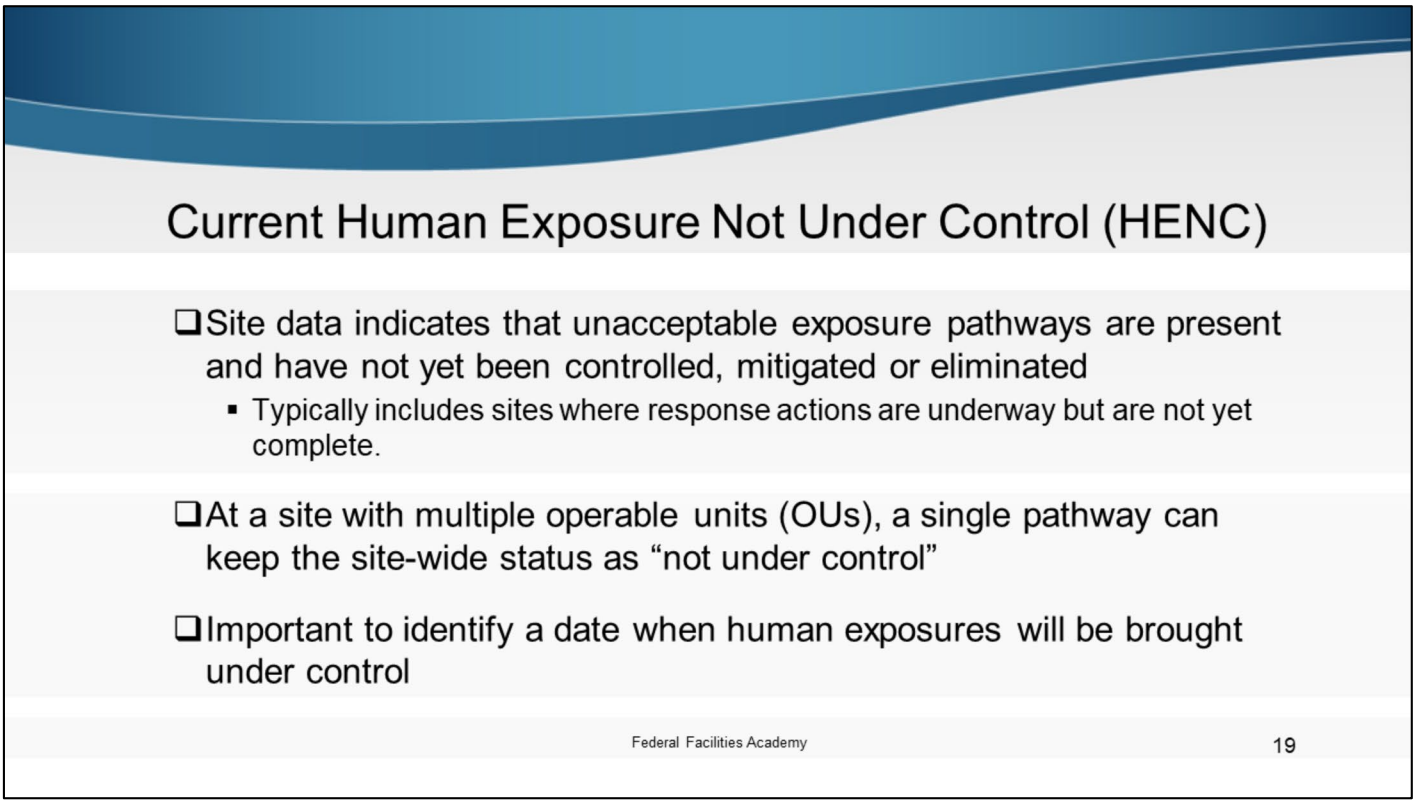
A. Current Human Exposure Not Under Control (HENC)

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)

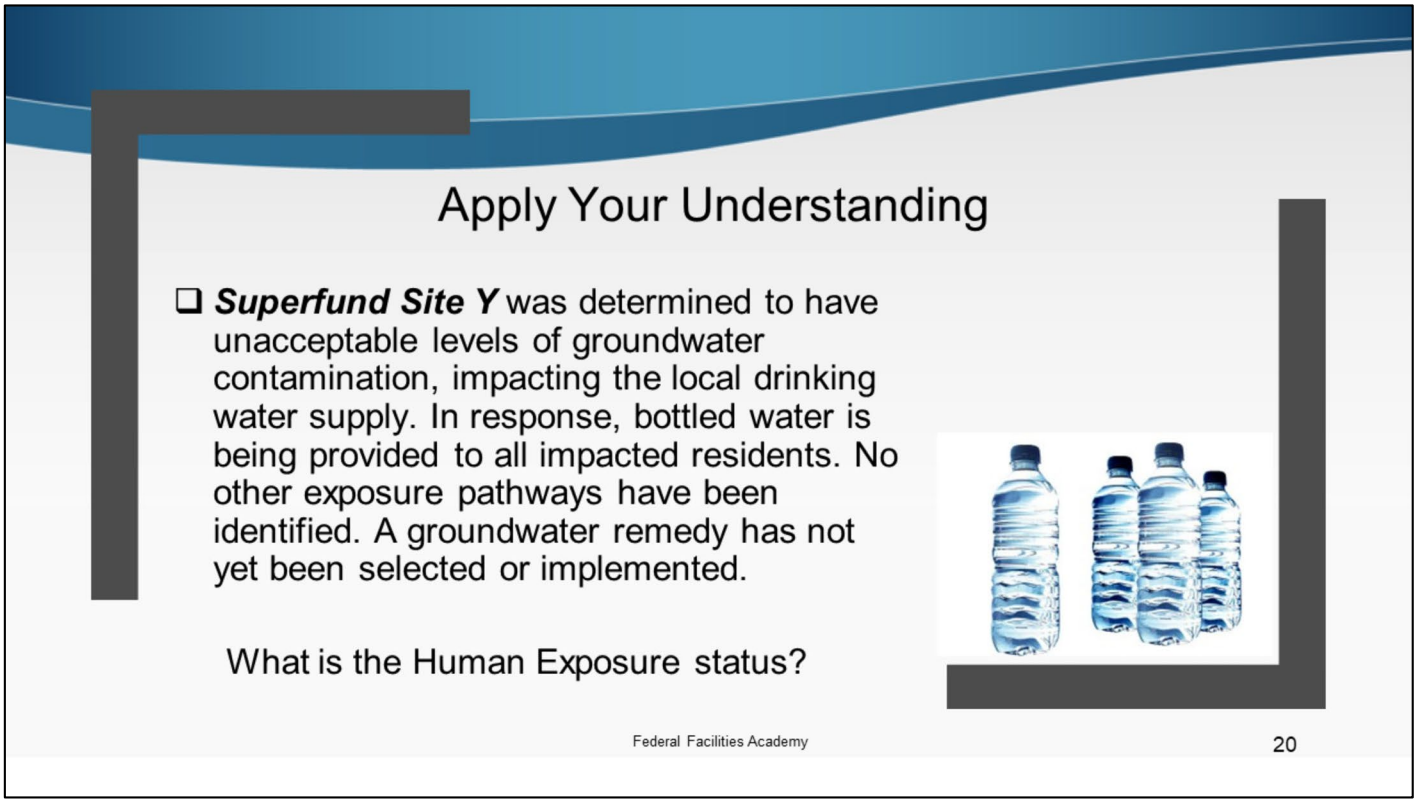
E. Current Human Exposure Under Control and Long-Term Human Health Protection Achieved (HHPA)



Human Exposure Not Under Control (HENC) describes sites where sufficient data/information are available to support the evaluation that current, completed, or reasonably anticipated human exposure pathways exist and that they are unacceptable based on site- specific risk criteria. Reasonably anticipated exposures should be evidence-based and prompt Regions to take mitigating actions, whereas not every exposure possibility will warrant action. Of course, this judgment will have to be made by individual Regions to the best of their abilities and in consideration of unique site conditions. Specifically, these are sites where:

1. An unsafe level of contamination has been detected **somewhere** on site; and
2. Contamination has not yet been fully treated, stabilized or contained across the entire site to prevent current human exposure; and
3. Though there may not be any actual exposures occurring, it can be reasonably anticipated that individuals would be exposed to unsafe levels of contamination somewhere within the site's boundaries.

There should be a connection between 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) may be used as the anticipated date for having sufficient information to make EI determination, or an RA completion date might be used for when the site will become HEUC if that remedial action would eliminate human exposure pathways.



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

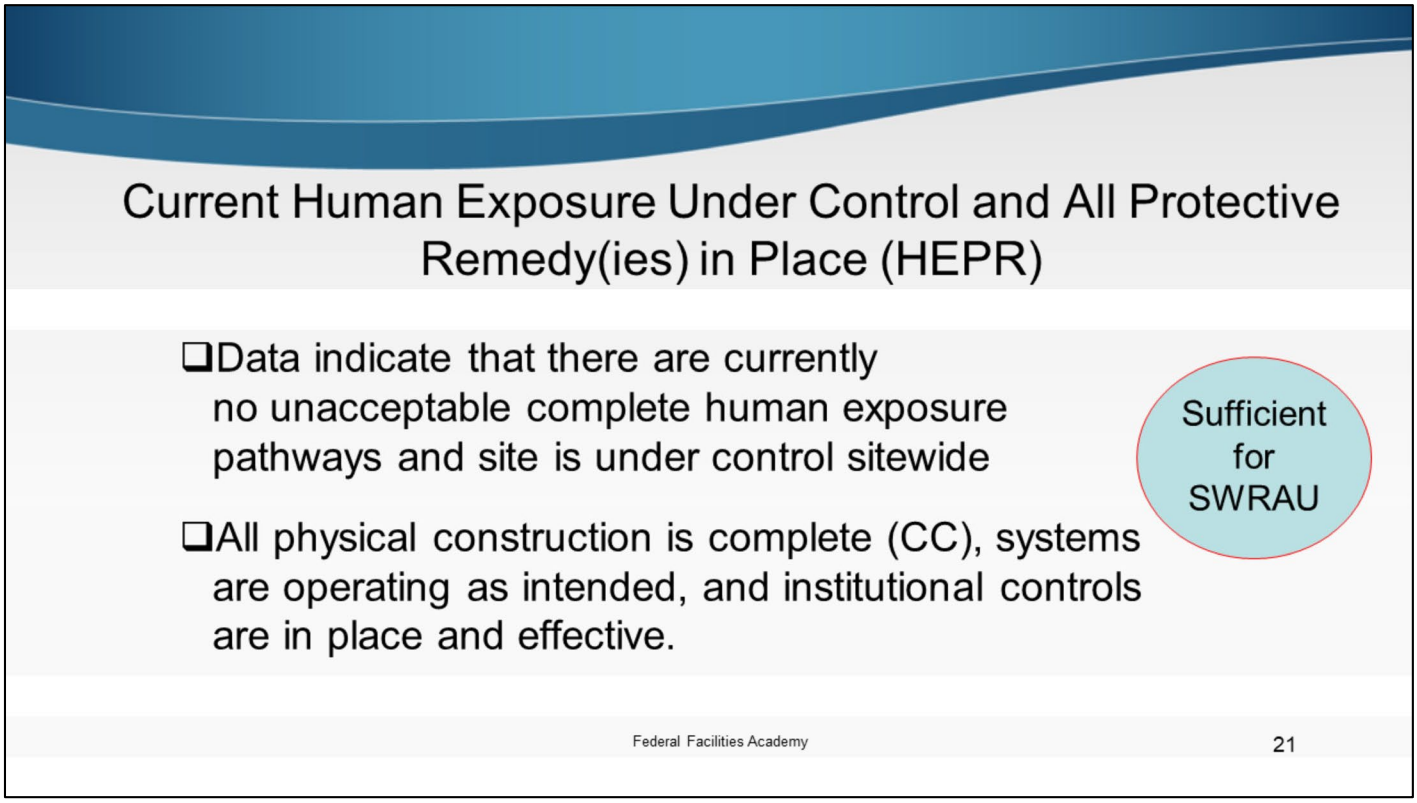
A. Current Human Exposure Not Under Control (HENC)

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)

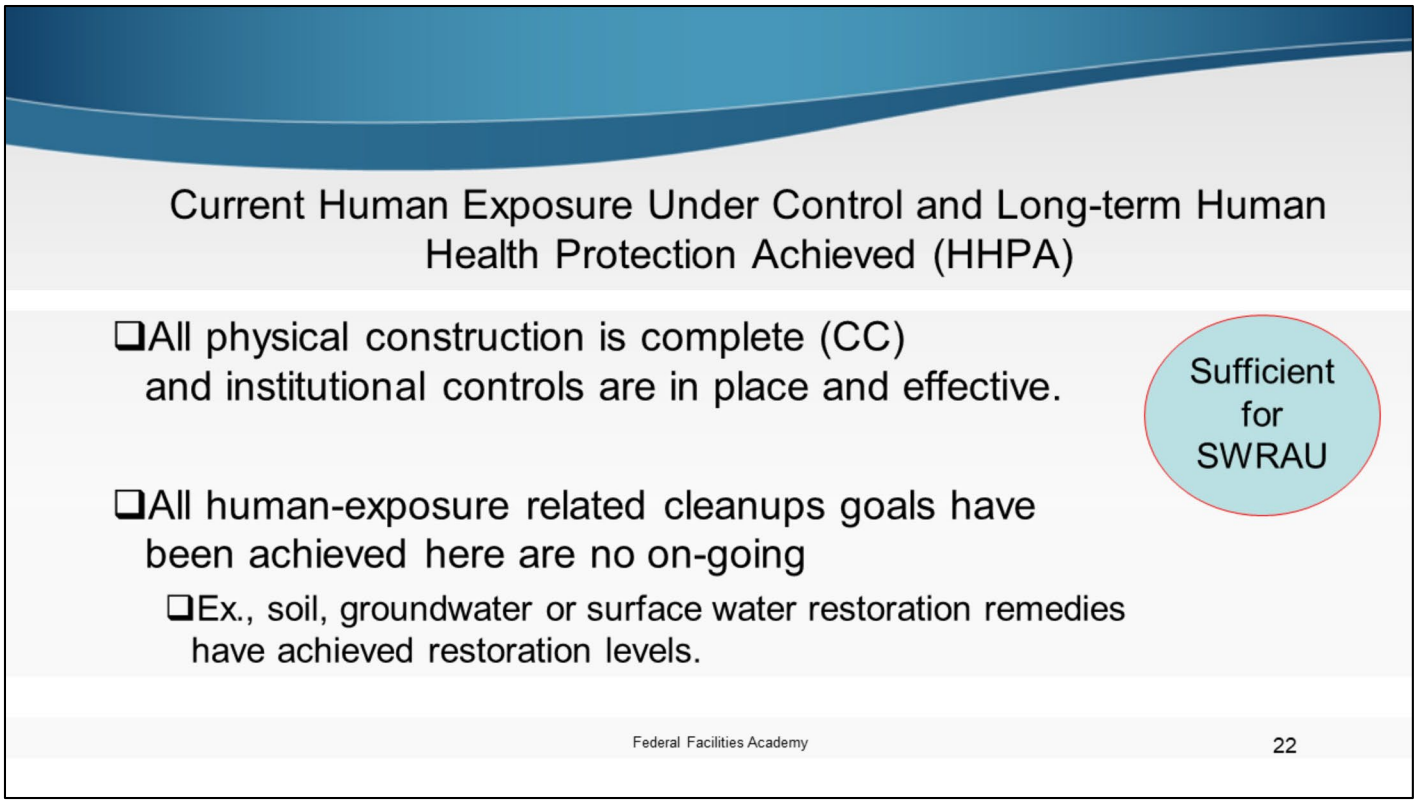
E. Current Human Exposure Under Control and Long-Term Human Health Protection Achieved (HHPA)



Current Human Exposure Under Control and All Protective Remedy(ies) in Place (HEPR) sites are considered "under control". In addition…

1. these sites have achieved the Construction Completion status,
2. remedies to human exposures are operating as intended, and
3. engineering and/or 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 are underway to achieve cleanup levels and **all institutional controls required to prevent unacceptable human exposures are in place**. If the remedies, engineering controls, or institutional controls are not operating as intended, but such that the protectiveness of human health is unlikely to be impacted, it may be appropriate to change the site status back to HEUC and develop a plan to make them fully operational again. This status change would simply designate a remedy failure and not necessarily a completion of an unacceptable exposure pathway. Of course, if the remedy failures result in a reasonably anticipated or actual, unacceptable exposure pathway, the site status should change to HENC.



Current Human Exposure Under Control and Long-Term Human Health Protection Achieved (HHPA) sites are considered "under control". In addition, the site has achieved the Construction Completion status, remedies to human exposures are operating as intended, and engineering or institutional controls are in place and effective. Finally, all human exposure-related cleanup goals for the site have been achieved.

Whereas other categories depict current conditions, this category also reflects reasonably anticipated future, conditions. This category typically includes CC sites that do not involve long-term soil, groundwater or surface water restoration remedies and all institutional controls are in place and effective. Often this status is used for sites with the Site Completion status or are Deleted NPL sites.

Examples of Each Human Exposure Status

HEUC

Supply drinking water to people impacted by contaminated groundwater

HHPR

Construct an effective drinking water treatment system

HHPA

All contaminated groundwater restoration levels met

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This slide presents a simple example of incremental human health protection, measured by the ability to control complete, unacceptable human exposure pathways at a Superfund site. It shows the distinctions of the three human exposure site statuses that are represent when human exposures are under control.

Superfund Human Exposure Under Control Worksheet

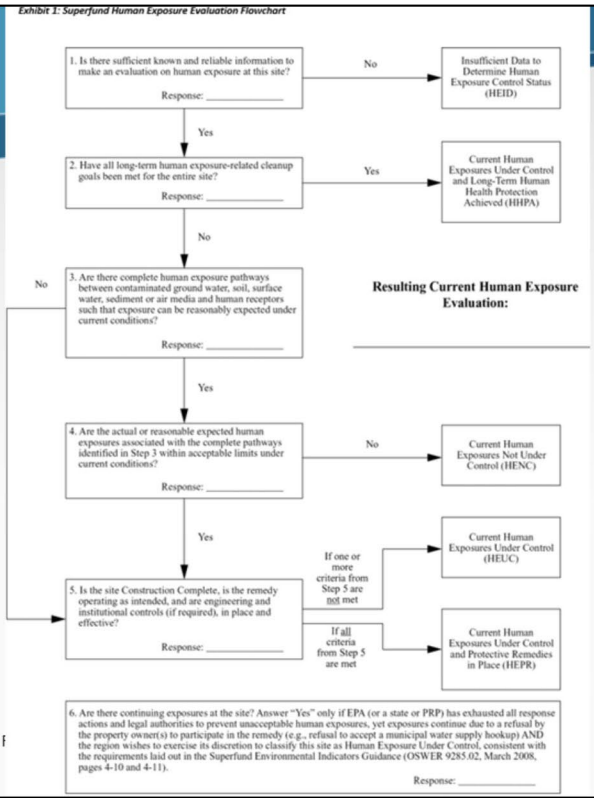

Exhibit 1: Superfund Human Exposure Evaluation Flowchart

1. Is there sufficient known and reliable information to make an evaluation on human exposure at this site? Response: _____ — No → Insufficient Data to Determine Human Exposure Control Status (HEID)

Yes ↓

2. Have all long-term human exposure-related cleanup goals been met for the entire site? Response: _____ — Yes → Current Human Exposures Under Control and Long-Term Human Health Protection Achieved (HHPA)

No ↓

3. Are there complete human exposure pathways between contaminated ground water, soil, surface water, sediment or air media and human receptors such that exposure can be reasonably expected under current conditions? Response: _____ — No → **Resulting Current Human Exposure Evaluation:** _____

Yes ↓

4. Are the actual or reasonable expected human exposures associated with the complete pathways identified in Step 3 within acceptable limits under current conditions? Response: _____ — No → Current Human Exposures Not Under Control (HENC)

Yes ↓

5. Is the site Construction Complete, is the remedy operating as intended, and are engineering and institutional controls (if required), in place and effective? Response: _____

- If one or more criteria from Step 5 are not met → Current Human Exposures Under Control (HEUC)
- If all criteria from Step 5 are met → Current Human Exposures Under Control and Protective Remedies in Place (HEPR)

6. Are there continuing exposures at the site? Answer "Yes" only if EPA (or a state or PRP) has exhausted all response actions and legal authorities to prevent unacceptable human exposures, yet exposures continue due to a refusal by the property owner(s) to participate in the remedy (e.g., refusal to accept a municipal water supply hookup) AND the region wishes to exercise its discretion to classify this site as Human Exposure Under Control, consistent with the requirements laid out in the Superfund Environmental Indicators Guidance (OSWER 9285.02, March 2008, pages 4-10 and 4-11). Response: _____

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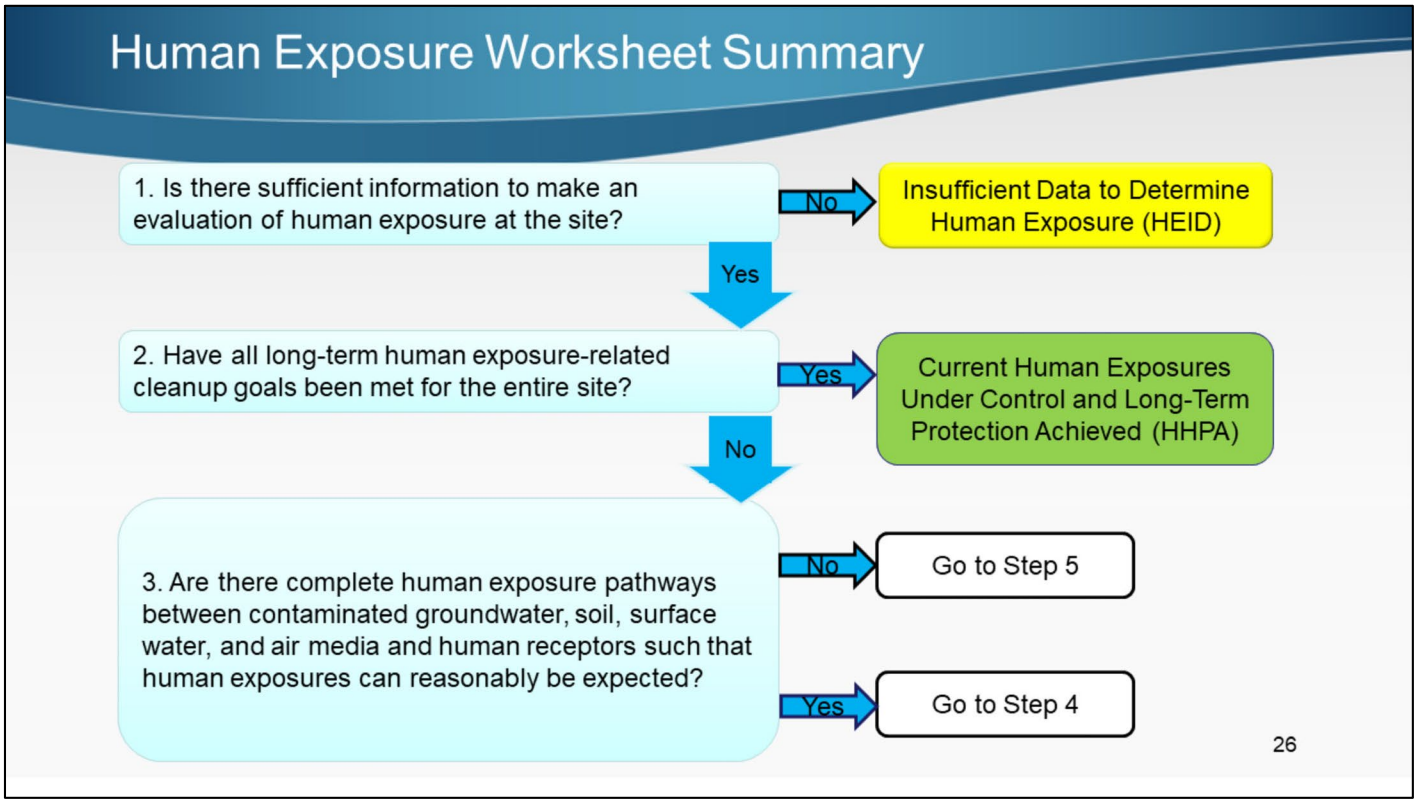
The Superfund Human Exposure Under Control Worksheet is taken from the 2022 Superfund Environmental Indicators Guidance. For national consistency, EPA Regions should use this step-by- step process to make a human exposure evaluation. These steps were developed in cooperation with representatives from all ten Regional Superfund programs and are designed to assist Remedial Project Managers (RPMs) in making accurate HE evaluations.

Human Exposure Documentation List

Table 3: Appropriate Data/Information Sources from 2022 EI Guidance

Question	Documentation
Is there sufficient data?	• Human Health Risk Assessment(s) • RI/FS reports • Removal Action Memoranda • Site Assessment Reports • Site Investigation reports (Federal Facility (FF) sites) • Expanded Site Investigations (FF sites)
All long-term goals met?	• Final Close-Out Reports (FCORs) Decision documents: o Records of Decision (RODs) o ROD Amendments o Explanation of Significant Differences (ESDs) o Early RODs o Interim RODs o Removal Action Memoranda • RA Reports • Ground/surface water monitoring reports • Deletion Notices • Five-Year Reviews (FYRs)
Are there completed pathways?	• Human Health Risk Assessment(s) o Conceptual Site Model (CSM) • RI/FS reports
Are exposures acceptable?	• Human Health Risk Assessment(s) • POLREPS • RA Project Reports
Is the site CC, etc.?	• Close-out reports (preliminary or final) • Five-Year Reviews (FYRs)

The six-step HE evaluation process outlines the various considerations for HE decision-making, and each step has different documentation sources that may prove helpful. Human exposure evaluations should be evidence-based and supported with documentation, which can be identified in SEMS.



This graphic is adapted from the Human Exposure Worksheet in the 2022 Superfund Environmental Indicators Guidance.

Step 1: Is there sufficient known and reliable information to make an evaluation on human exposure at this site?

The purpose of this step generally is to identify and screen for sites where information (i.e., human exposure and risk data) is insufficient to make a sufficient data determination (SDD) for Human Exposure. "Sufficient data" is defined here as reliable data and information on

1. A site's physical setting and how that contributes to human exposure,
2. Exposed populations,
3. Exposure pathways,
4. Estimates of exposure concentrations, and
5. Estimates of chemical intakes.

The primary source of information to answer this question is the Baseline Human Health Risk Assessment (HHRA). Keep in mind that the Human Exposure measure is a site-wide measure; not every risk assessment for every operable unit necessarily needs to be completed before the EPA Region could answer "yes" to this question, so long as one unacceptable, completed exposure pathway (see steps 3 and 4) has been identified. There are limited situations where a completed risk assessment is not needed at all to answer "yes" to this question. For example, in the early stages of the Remedial Assessment (RI), it may be abundantly clear that there is

sufficient data to make an evaluation of HENC. In these cases, Regions should work with a risk assessor to determine how best to interpret limited information and make such an evaluation for public awareness.

Step 2: Have all long-term human exposure-related cleanup goals been met for the entire site?

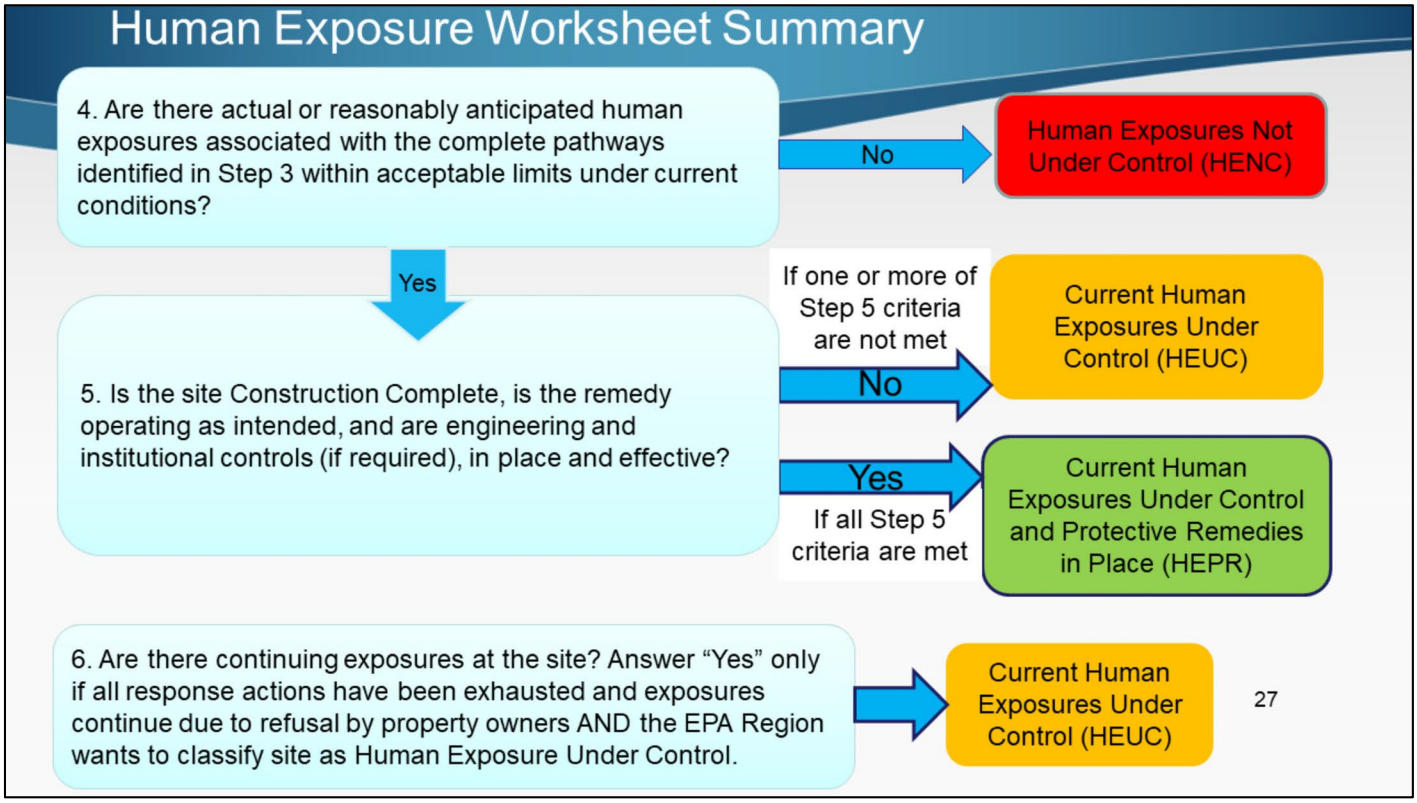
The purpose of this step is to identify those sites where *all* human exposure-related cleanup goals at all operable units (OUs) for the site have been met and long-term human health protection has been achieved. This would include attainment of contaminant-specific cleanup levels and implementation of engineering and institutional controls related to human exposures that are operating as intended.
Sites that meet these criteria are typically in the very final stages of the remedial cleanup process. Cleanup goals are identified in Records of Decision (RODs), and are designed to provide a general description of what the cleanup will accomplish, form the basis for design of remedies that will be protective of human health and the environment, and may include (but are not limited to) contaminant-specific numeric cleanup goals, as well as current and reasonably anticipated land use.

This measure documents the status of human exposure and does not consider ecological risk, even though cleanup goals for any given site may include those related to protection of the environment as well as human health.

Step 3: Are there complete human exposure pathways between contaminated ground water, soil, surface water, sediment, or air media and human receptors such that exposures can be reasonably anticipated under current conditions?

The purpose of this step is to identify whether there are any complete human exposure pathways between human receptors and contaminated media under current land and ground water use conditions.

The primary source of information on human exposure pathways should be the Conceptual Site Model (CSM) and the Baseline Human Health Risk Assessment. For sites with a ROD that pertains to the exposure pathway, Regions should consider Contaminants of Concern and risk-based levels documented in the ROD; however, if the exposures driving the remedy as outlined in the ROD are based on future use only, and future use conditions are different than current conditions, then data from the baseline risk assessment should be used to evaluate exposure pathways rather than those detailed in the ROD.



Step 4: Are the actual or reasonably anticipated human exposures associated with the complete pathways identified in step 3 within acceptable limits under current conditions?

For human exposure, "acceptable limits" are generally defined as when cumulative carcinogenic site risk to an individual is less than 10^{-4} Reasonable Maximum Exposure (RME) and when the non-carcinogenic hazard index is less than 1. The primary source of information regarding acceptable, risk- based limits should be derived from the baseline risk assessment, and/or acceptable protectiveness standards identified in the applicable RODs, if available.

If future use conditions are different than current conditions, then to ensure that the HE evaluation reflects current conditions, data from the baseline risk assessment for current exposures should be used to evaluate acceptable current exposure risk rather than the future protectiveness standards outlined in the ROD. A positive evaluation ("yes") could be made for this step if the frequency and/or duration of exposure associated with complete pathways is such that the risk is acceptable and/or the only cleanup goals that have yet to be met (see Step 2) address future reuse purposes.

Step 5: Is the Site Construction Complete, is the remedy operating as intended, and are engineering and institutional controls (if required) in place and effective?

The purpose of this step is to categorize sites where not only are current human exposures are under control, but that also have more permanent mitigation remedies AND where long-term human health protection has yet to be attained. If at least one of these criteria is *not met,* the answer should be "no" and the site should be assigned the category of "current human exposures

under control" (HEUC). This step is intended to distinguish between sites where current human exposures are under control and sites where there is also a protective remedy in place, and from sites where all long- term human exposure-related cleanup goals have yet to be met (the criteria for the HHPA determination – see step 2).

If the remedies, engineering controls, or institutional controls are not operating as intended, but such that the protectiveness of human health is unlikely to be impacted, it may be appropriate to change the site status back to HEUC and develop a plan to make them fully operational again. This status change would simply designate a remedy failure and not necessarily a completion of an unacceptable exposure pathway.

Step 6: Are there continuing exposures at this site?

This is an optional step occasionally used to document where EPA and/or a state agency, a PRP or another Federal Agency may have exhausted all response actions, including all relevant enforcement actions, to prevent human exposures, yet some exposures may continue based on a decision by a property owner to either not participate in the remedy or allow access. In these cases, the EPA Region has determined that it would not be appropriate to compel access, and the Region has the discretion to categorize a site as HEUC in situations where the negative impacts of property owners' decisions are limited to the owner and/or their property. In contrast, a site would not be eligible to be categorized as HEUC where an owner does not allow access to remediate his/her property, and contamination from that owner's property also contaminates adjoining properties above risk-based levels. Further, Regions should not exercise this discretion in the case of rental properties, where tenants may not have the power to make such decisions. Document in the site files all steps taken to inform property owner and occupants of the contamination and the exposure risk that may result from their decision to refuse access or assistance. The property owner/resident's response should be included in such documentation.

CASE STUDY – PART 1

Emerging Contaminant Exercise: Group Poll

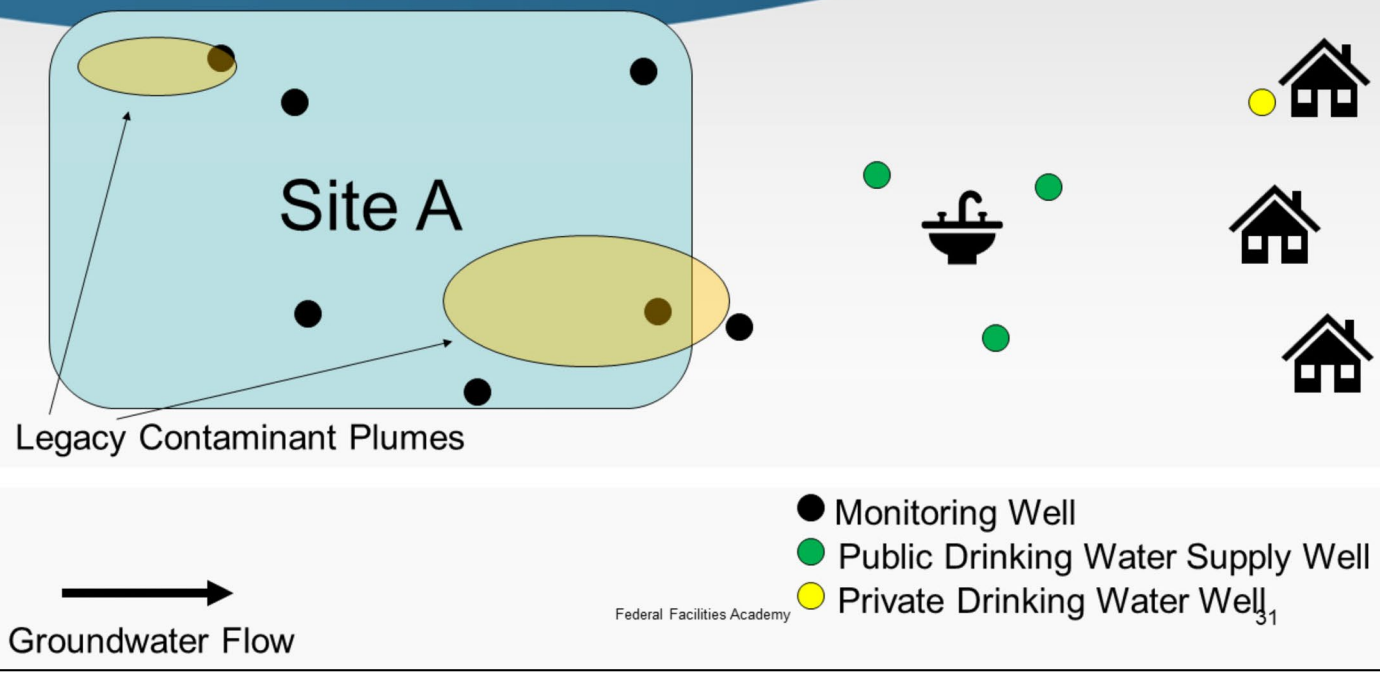
Which of the following emerging contaminant situations have you dealt with at a site?

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 (air stripping) 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 PFAS in metal plating at the site
  - Monitoring wells were sampled and PFAS was detected
  - Public water system was sampled and PFAS was not detected

Exercise: Emerging Contaminants

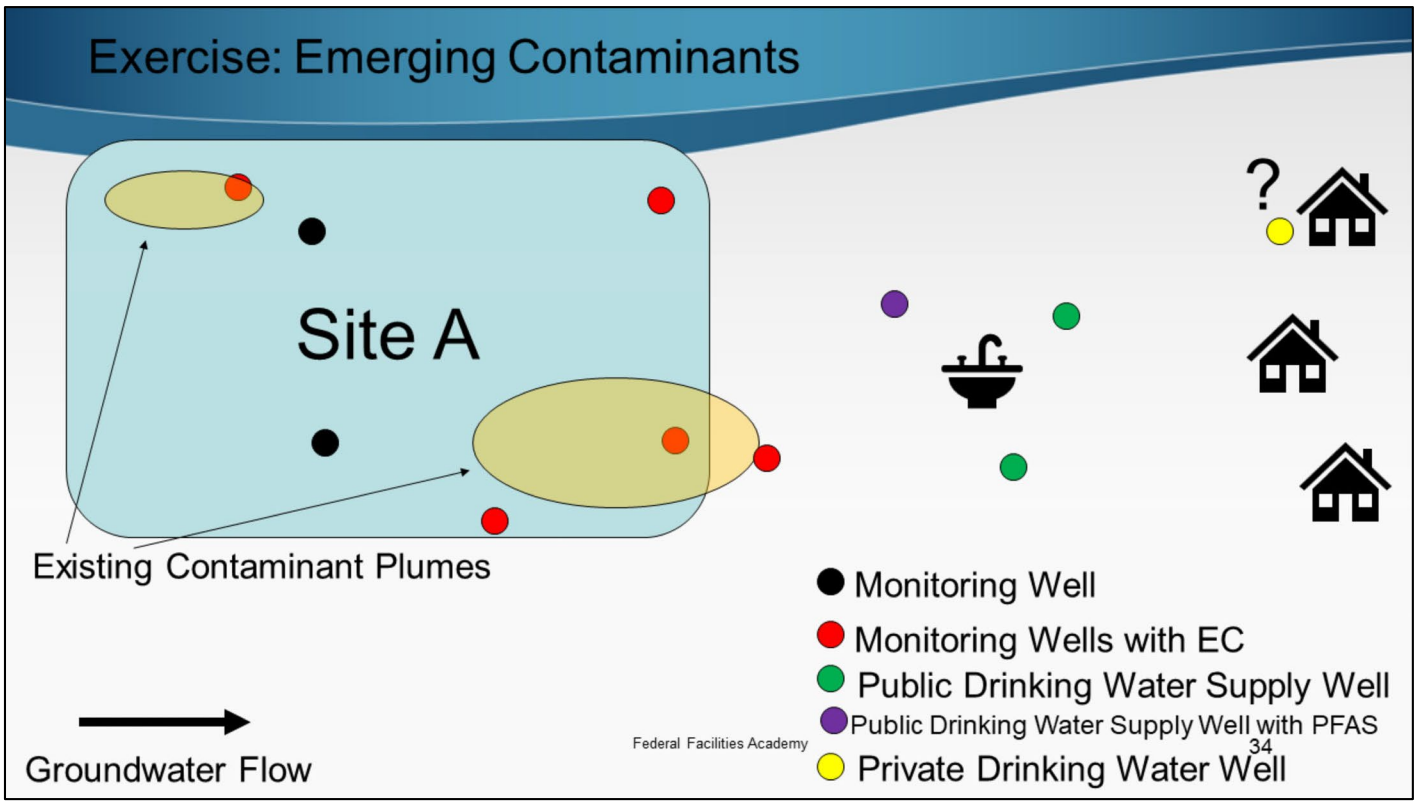


What Human Exposure EI Determination applies in this example?

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 shows PFAS levels are increasing in some monitoring wells
- ❑ One public well has detected PFAS, but it PFAS has not been detected in the public water supply
- ❑ No data yet from private drinking water wells



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

- ❑ Another year later, you are making your annual EI determination.
- ❑ Sampling data shows emerging contaminants above the maximum contaminant level (MCL) in some public drinking water supply wells
- ❑ No sampling has been conducted to date at the private well
- ❑ It seems there is likely an unacceptable risk for human exposures based on the contaminants present

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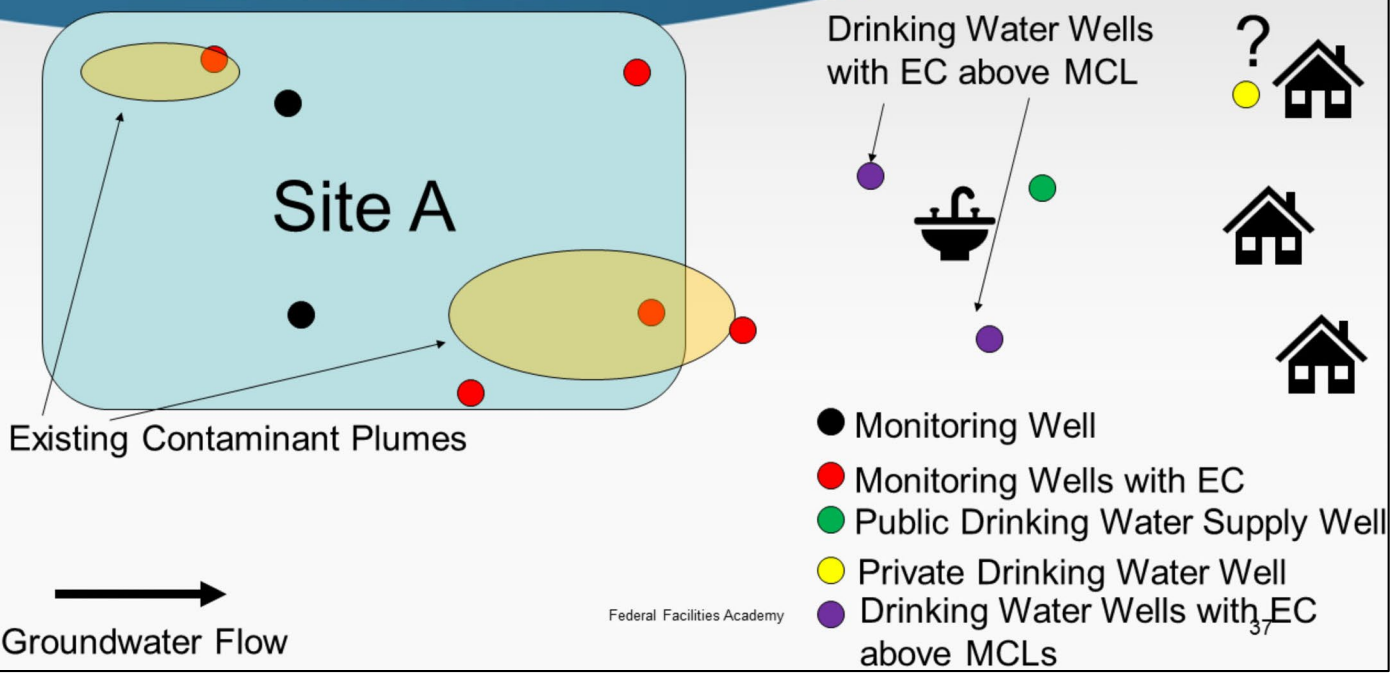
Exercise: Emerging Contaminants



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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)

CASE STUDY – PART 2

ENVIRONMENTAL INDICATORS GROUNDWATER MIGRATION DETERMINATIONS

Migration of Contaminated Ground Water Under Control Environmental Indicator

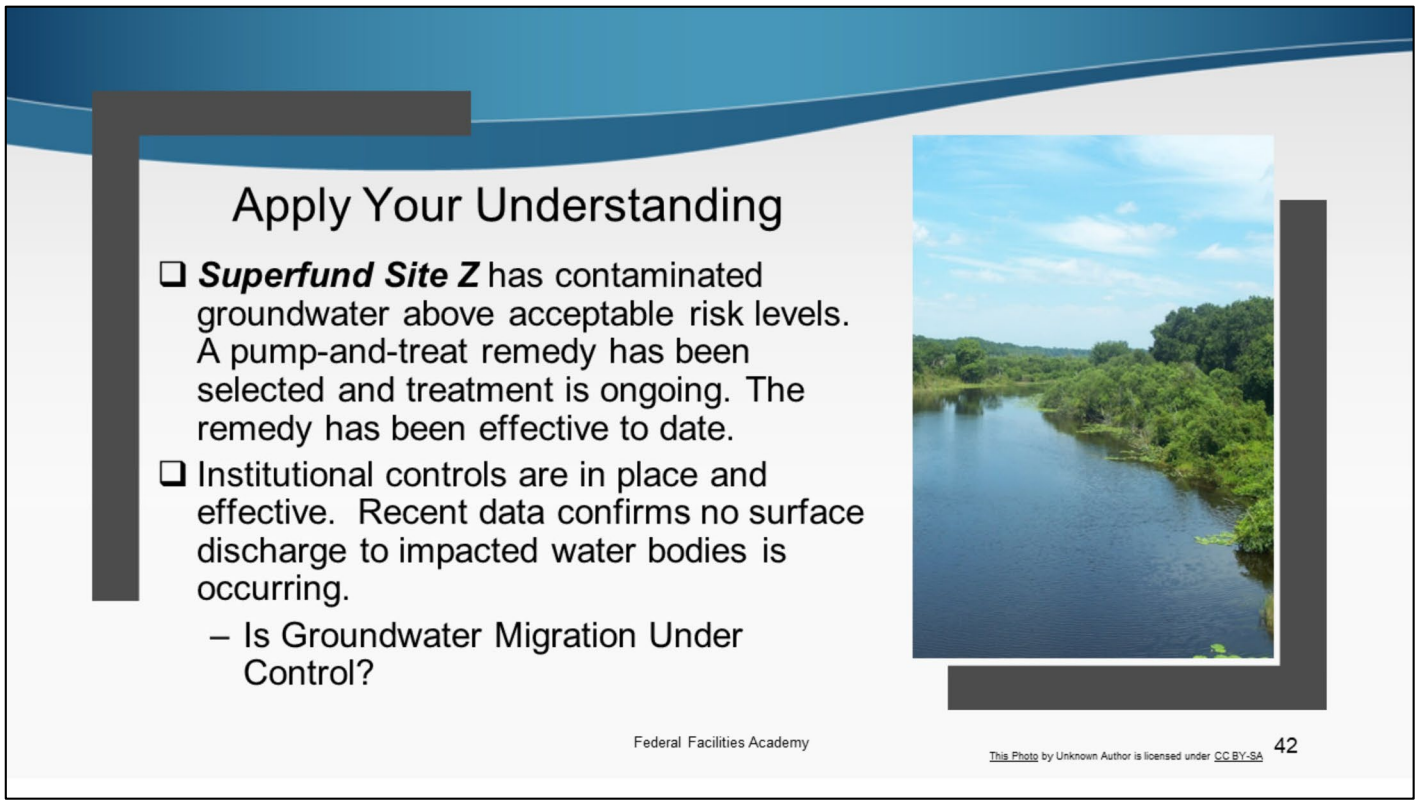
- Typically documents whether ground water contamination is below protective, risk-based levels, or, if not, whether the migration of contaminated ground water is **stabilized** and there is **no unacceptable discharge to surface water** and monitoring will be conducted to confirm that affected ground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

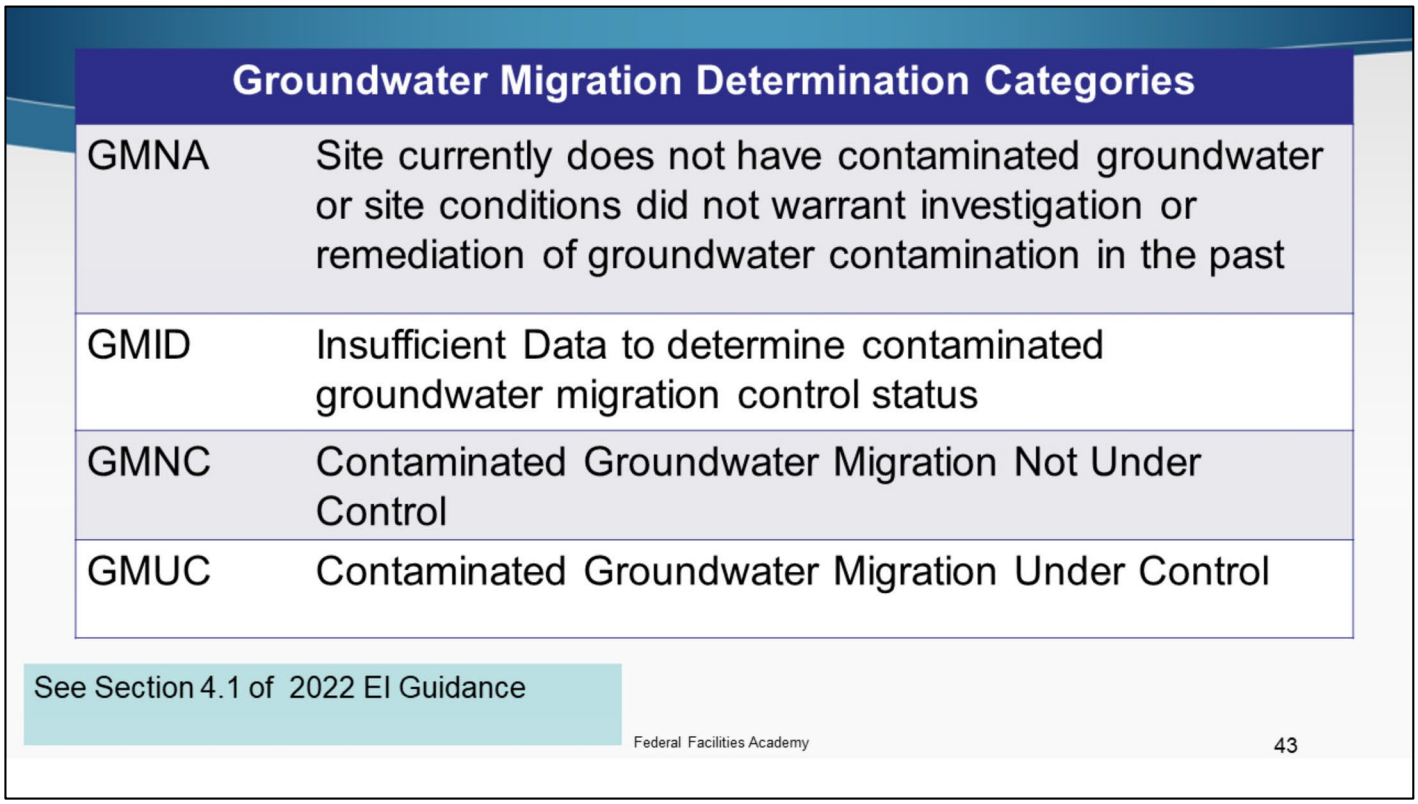
The **Contaminated Groundwater Migration Under Control (GMUC) EI** describes whether contamination is below protective, risk-based levels or, if not, whether the following conditions are met:

- 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.





Contaminated Groundwater Migration Not Applicable (GMNA): sites are assigned to this category when assessments for GM indicate that either the groundwater is not contaminated, or site conditions do not warrant investigation or remediation of groundwater. Sites with past or present groundwater contamination should be evaluated.

Contaminated Groundwater Migration Insufficient Data (GMID): sites are assigned to this category when evaluations for GM lack sufficient data or information to determine whether groundwater is contaminated above risk- based levels or is stabilized.

Contaminated Groundwater Migration Not Under Control (GMNC): sites are assigned to this category when contaminated groundwater is above a protective, risk-based level, and the migration of contaminated groundwater is unstable such that it can be reasonably anticipated to migrate outside of existing areas of contamination, or there is unacceptable discharge into surface water. The **Contaminated Groundwater Migration Under Control (GMUC):** sites are assigned to this category when the contamination of groundwater is below protective, risk-based levels or, if not, when the migration of contaminated groundwater is stabilized AND there is no unacceptable discharge into surface water.

Groundwater Migration Under Control

- ❑ Sufficient information exists to make a determination (all plumes are delineated)
- ❑ Plumes are not expanding
- ❑ There are no unacceptable groundwater discharges to surface water

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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.

Groundwater Migration Evaluation

- ❑ Evaluate sitewide, looking at distinct plumes
- ❑ Based on existing plume boundaries, not facility boundaries
- ❑ Monitored Natural Attenuation may be used to verify that contaminated groundwater migration is under control
- ❑ Evaluate groundwater discharge to surface water

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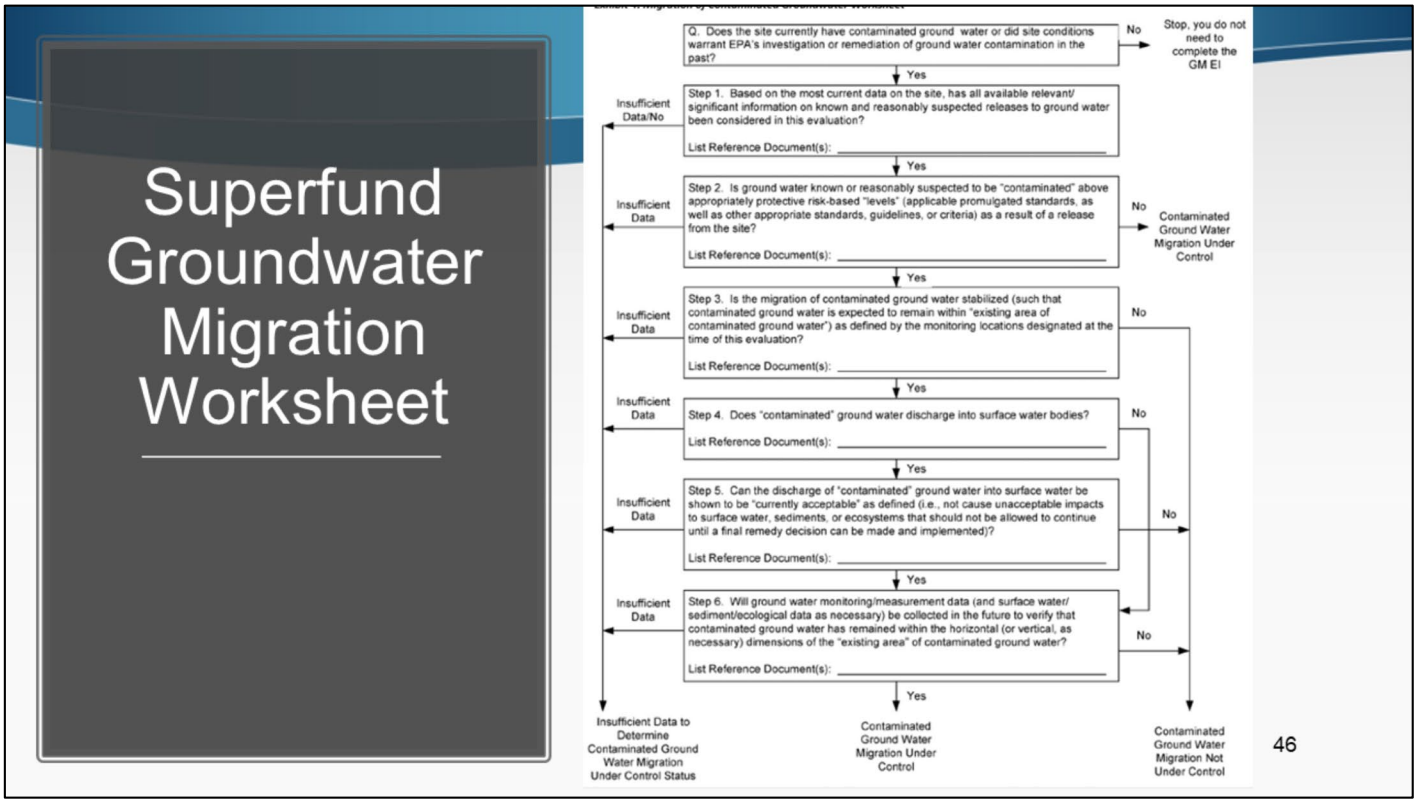
In evaluating the potential for contaminated groundwater migration, the evaluation should be conducted on a sitewide basis, with evaluation of distinct plumes. The plumes should be evaluated based on the boundaries of the plume areas, not on facility boundaries. Monitored Natural Attenuation (MNA) monitoring 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 2022 Superfund Environmental Indicators Guidance

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OTHER SUPERFUND COMPONENTS

Other Superfund Components

- A change in an EI status can impact other determinations and vice versa as they are interrelated
  - Five-Year Reviews (FYRs)
  - Risks to Human Health
  - Sitewide Ready for Anticipated Use (SWRAU)

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

Five-Year Reviews

- New information can be discovered during the five-year review process
  - New exposure pathway(s)
  - New source(s) of contamination
  - Emerging contaminant(s)
  - Evidence (or uncertainty) of groundwater plume migration
- This can affect whether the remedy is functioning as intended and any protectiveness determinations

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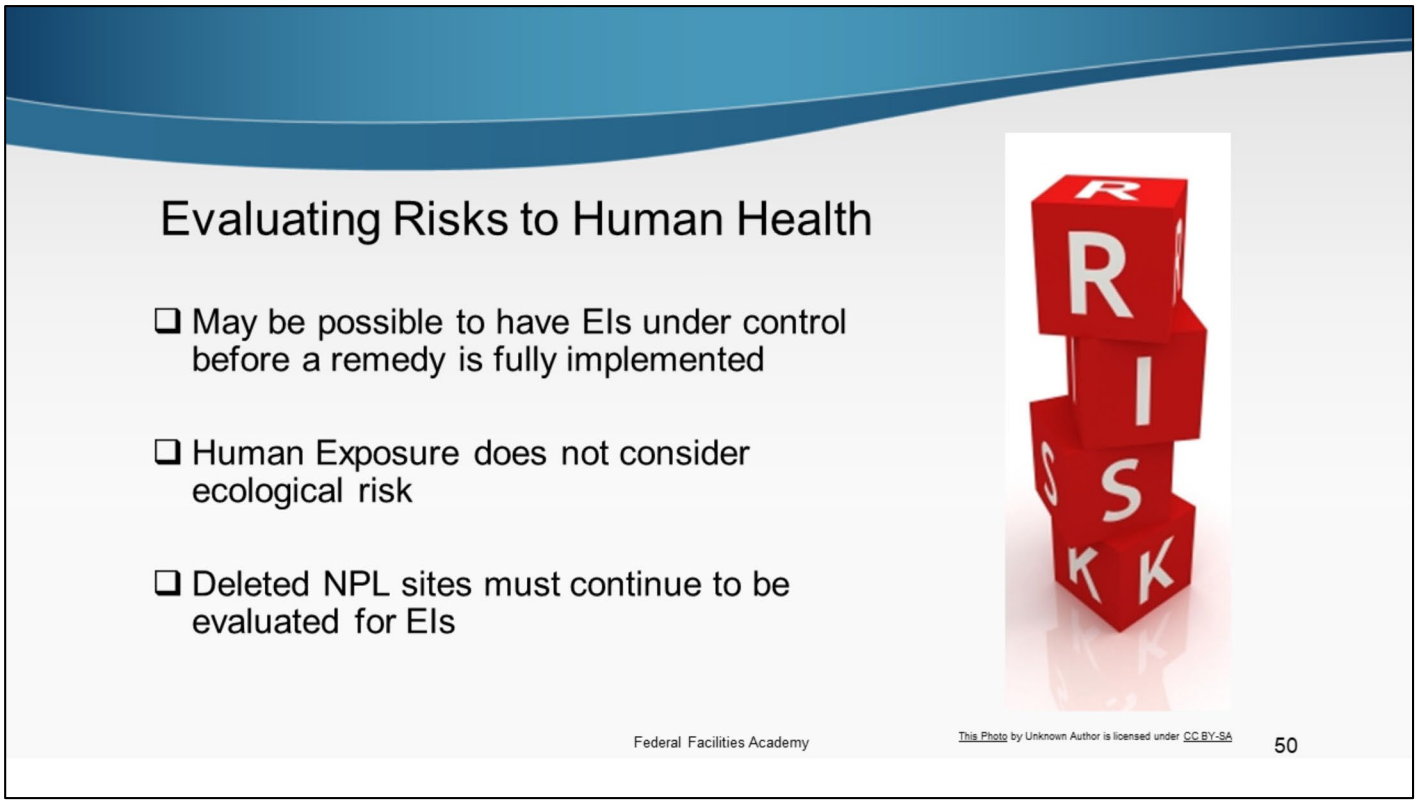
Many of the activities required to make a five-year review protectiveness evaluation (e.g., addressing newly promulgated standards, confirming current and expected land use, identifying new contamination or contaminant sources) are useful in confirming the human exposure status. Upon completion of any 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.



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.

Deleted sites need to continue to be evaluated for Human Exposure and Groundwater Migration, as they are still included in the EI baseline. Deleted sites will almost always be categorized as HHPA but may still be assessed for exposure risks during a FYR, during which time new pathways or changed site conditions (ex. toxicity levels) are sometimes identified.

SITE-WIDE READY FOR ANTICIPATED USE (SWRAU) Requirements

SWRAU sites are final and deleted NPL sites and SAA sites where the **entire site** meets these conditions:

- Site is **Construction Complete** (CC)
- **All institutional or other engineering controls** required in the ROD or other remedy decision document(s) have been put **in place**
- **Human Exposure Under Control Environmental Indicators** of Current Human Exposures Controlled and Protective Remedy in Place (**HEPR**) **or** Long-Term Human Health Protection Achieved (**HHPA**)

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SWRAU is an internal EPA performance measure to track the Superfund program's progress achieving key milestones. Achievement of the SWRAU measure means EPA has deemed the entire site to be protective of human health and the environment based on reasonably anticipated future land uses that were envisioned when the site's cleanup standards were decided. At this time, EPA has designated approximately 950 Superfund sites as having achieved SWRAU.

Human Exposure Status Sufficient for SWRAU

- SWRAU must meet one of the following conditions:
  - Current human exposure under control and protective remedy or remedies in place (HEPR)
  - Current human exposure under control and long-term human health protection achieved (HHPA)

Human Exposure Status Required to Achieve SWRAU	
HEID HENC HEUC	Not sufficient for SWRAU
HEPR HHPA	Sufficient for SWRAU

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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" (HEPR); 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

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Retraction of SWRAU Status

- A SWRAU designation may be retracted if site conditions change, or if new or additional information is discovered regarding the contamination or the protectiveness of the remedy at the site.
  - For example, a Five-Year Review finds a new complete exposure pathway which changes the site's EI status from HEUC to HENC, also impacting it's SWRAU determination.

SWRAU is not a measure of risk. SWRAU retractions do not necessarily mean people are being exposed to contamination from the site. In almost all cases, the site can continue to be used or redeveloped even if its SWRAU status is retracted. As EPA continues to monitor each site following the initial cleanup, SWRAU status may be retracted for several reasons, including changes in remedy function or new discoveries about site contamination. Once any issues are resolved, sites may regain this status.

Summary

- EIs are designed to communicate the tangible progress made in protecting human health and the environment
- Remember that a change in EI status can impact other program measures (e.g., SWRAU) and that other program components may impact EIs (FYRs)
- The HEUC, SWRAU, and RAPC measures are reported to Congress, but the Superfund program tracks six performance measures on its website
- Use the tools and resources available when determining EIs for your sites and work with your project teams and EI coordinator