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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Performance Measures and Environmental Indicators

Federal Facilities Restoration and Reuse Office
Office of Superfund Remediation, And Technology Innovation
Environmental Protection Agency
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U.S. Environmental Protection Agency

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Overview

- ❑ Performance Measures and Targets
 - Tracking
- ❑ Environmental Indicators
 - Human Exposure
 - Groundwater Migration
- ❑ Other CERCLA Components
- ❑ Guidance and Tools

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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.

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Performance Measures and Targets

- Government Performance and Results Act (GPRA) Measures
- EPA Planning Targets and Measures
- Superfund Environmental Indicators



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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.

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**Government Performance and Results Act
(GPRA) & GPRA Modernization Act of 2010**

- ❑ Originated via 1993 [GPRA Statute](#)
- ❑ Addresses all Federal agencies
- ❑ Reform program performance by “setting program goals, measuring program performance against those goals, and reporting publicly on their progress”

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[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 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.

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Role of GPRA

- ❑ [2010 GPRAMA update](#) requires each agency to develop and publish a Strategic Plan
- ❑ [EPA's Strategic Plan](#) sets the foundation of agency's planning and budgeting process and established quantifiable goals and objectives over a five-year time horizon
 - The current EPA strategic plan covers FY 2018-2022
 - The Superfund program supports Goal 1, Objective 1.3: "Revitalize Land and Prevent Contamination"

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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.

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Superfund Performance Measures

- ❑ The Superfund Remedial program tracks [six performance measures](#) to demonstrate progress in accomplishing specific environmental results
- ❑ Measures are reported to Congress
- ❑ Each year, through EPA's [Congressional Justification](#), the Superfund program commits to accomplishing these measures

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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.

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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>.

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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

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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>)

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The screenshot shows a slide with a blue header and footer. The main content area has a white background. At the top left, it says "EPA Superfund Task Force (SFTF)". Below that is a list of items under a "□" symbol. To the right is a logo for the "UNITED STATES ENVIRONMENTAL PROTECTION AGENCY" with a circular emblem. Below the logo is a blue box containing the text "SUPERFUND TASK FORCE RECOMMENDATIONS". At the bottom of the slide, there is a small, faint text box.

EPA Superfund Task Force (SFTF)

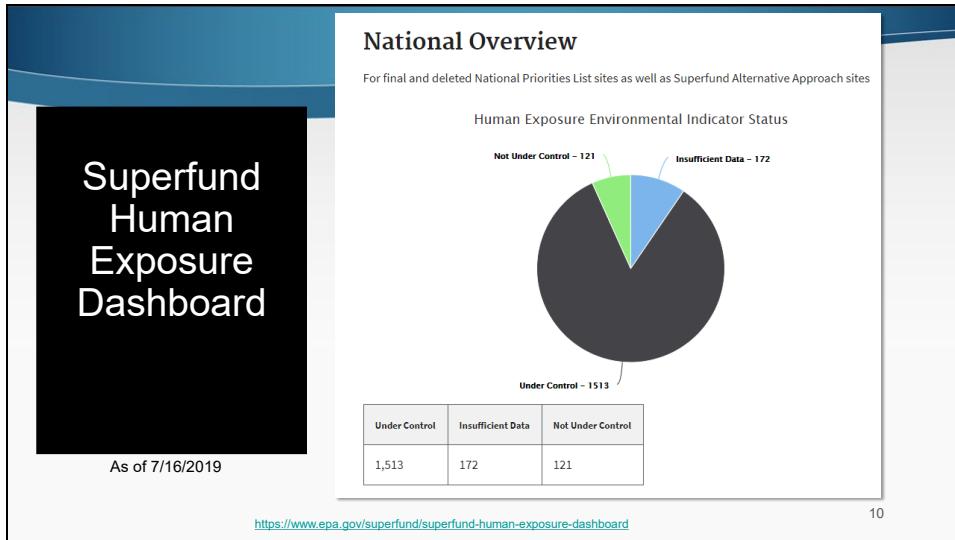
- Established in May 2017 to develop recommendations to expedite cleanup and remediation, among other goals
- [July 2017 SFTF Report](#) Recommendation 1:
 - “Target National Priority List (NPL) Sites That Are Not Showing Sufficient Progress Towards Site Cleanup and Completion,”
 - “Determine any site where human exposure is not under control and prioritize effecting control.”

Recommendations in response to Administrator Scott Pruitt's request on May 22, 2017. The recommendations address: expediting cleanup and remediation process; reducing financial burden on all parties involved in the entire cleanup process; encouraging private investment; promoting redevelopment and community revitalization; and, building and strengthening partnerships.

SUPERFUND TASK FORCE
RECOMMENDATIONS

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.

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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>.

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Human Exposure Status Table						
Site Name	Region	City	State	Federal Facility Status	NPL Status	Human Exposure Status
ATLANTIC FLEET WEAPONS TRAINING AREA	2	VIEQUES	PR	Federal	Final	Not under control
MCGUIRE AIR FORCE BASE #1	2	WRIGHTSTOWN	NJ	Federal	Final	Insufficient data
Human Exposure Status Description						
As of May 2019, there is insufficient information to determine the site-wide Human Exposure status at the McGuire Air Force Base Superfund Site. Currently, the Air Force is performing nine Remedial Investigations at 37 sites across the base, to identify the nature and extent of contamination. The						

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The EI Dashboard shows current Human Exposure status and a brief description of the statuses 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.

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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

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This slide is an introduction to Environmental Indicators (EIs).

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. These assessments are discussed in more detail on the next slides.

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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"

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This slide introduces the EI terms Human Exposure is under control (HEUC).

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.

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Human Exposure Determination Categories	
HEID	Insufficient data to determine human exposure control status
HENC	Current human exposure not under control
HEUC	Current human exposure under control
HEPR*	Current human exposure under control and protective remedy or remedies in place
HHPA*	Current human exposure under control and long-term human health protection achieved
*needs to be met to be eligible for SWRAU	

See Table 4-1 of EI Guidance
([EI Guidance Human Exposure Revisions](#))

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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 Superfund Environmental Indicators Guidance Human Revisions](#) provides descriptions and general site types associated with each level of human health protection.

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Insufficient Data to Determine Human Exposure (HEID)

- ❑ Site lacks enough information to determine whether people have the potential to be exposed to contamination
 - Typically, all potential exposure pathways are not yet identified
- ❑ May also apply to sites where new information calls into question a potential new exposure pathway
- ❑ Important to identify a date when sufficient data will be collected to make a determination

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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.

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Apply Your Understanding

Soil and groundwater samples have been collected at **Superfund Site X** as part of the remedial investigation. Data suggests there are no existing pathways for human exposure.

- What is your Human Exposure status determination?

More recent data suggests that vapor intrusion may be occurring in onsite buildings.

- What is your updated Human Exposure status?

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Based on the scenario described in this slide, what is your initial human exposure status determination? What about after considering the more recent data?

- 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)

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Current Human Exposure Not Under Control (HENC)

- ❑ Site data indicates that unacceptable exposure pathways are present and have not yet been controlled, mitigated or eliminated
 - Typically includes sites where response actions are underway but are not yet complete.
- ❑ At a site with multiple OUs, a single OU can keep the site's status as "not under control"
- ❑ Important to identify a date when human exposures will be brought under control

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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.

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Apply Your Understanding

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?


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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)

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Current Human Exposure Under Control (HEUC)

- Assessments indicate there are currently no unacceptable complete human exposure pathways
- Site is under control for current conditions sitewide
- Site has not yet attained Construction Completion status since cleanup levels have yet to be achieved

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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.

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Current Human Exposure Under Control and All Protective Remedy(ies) in Place (HEPR)

- Data indicate that there are currently no unacceptable complete human exposure pathways and site is under control sitewide
- All physical construction is complete, systems are operating as intended, and institutional controls are in place and effective.

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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. 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.

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

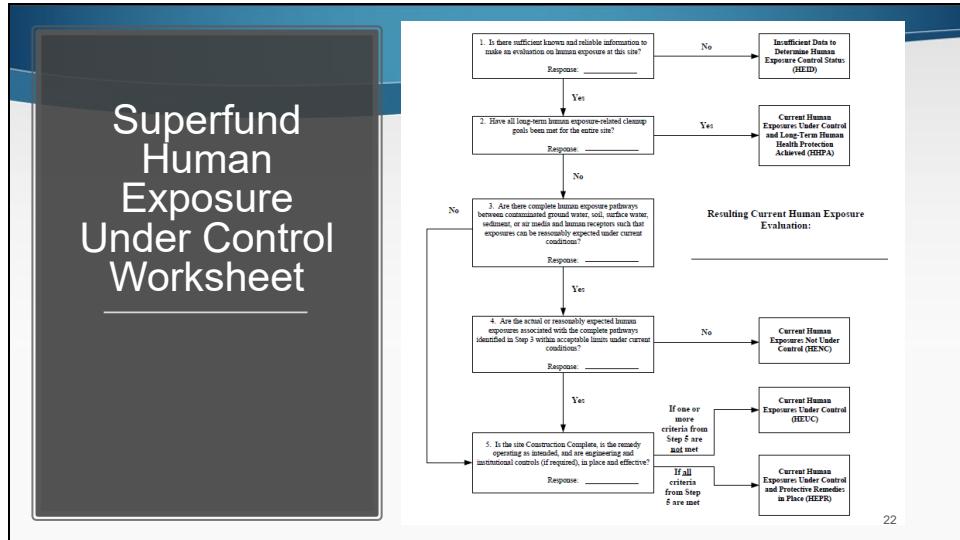
- Data indicate that there are no unacceptable complete human exposure pathways and site is under control sitewide
- All physical construction is complete and institutional controls are in place and effective.
- There are no on-going soil, groundwater or surface water restoration remedies and the site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

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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 site.

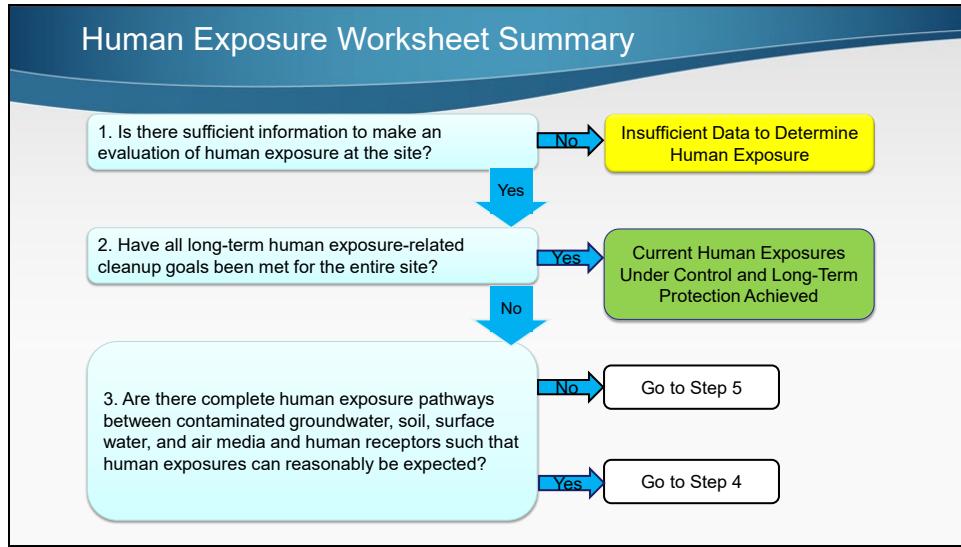
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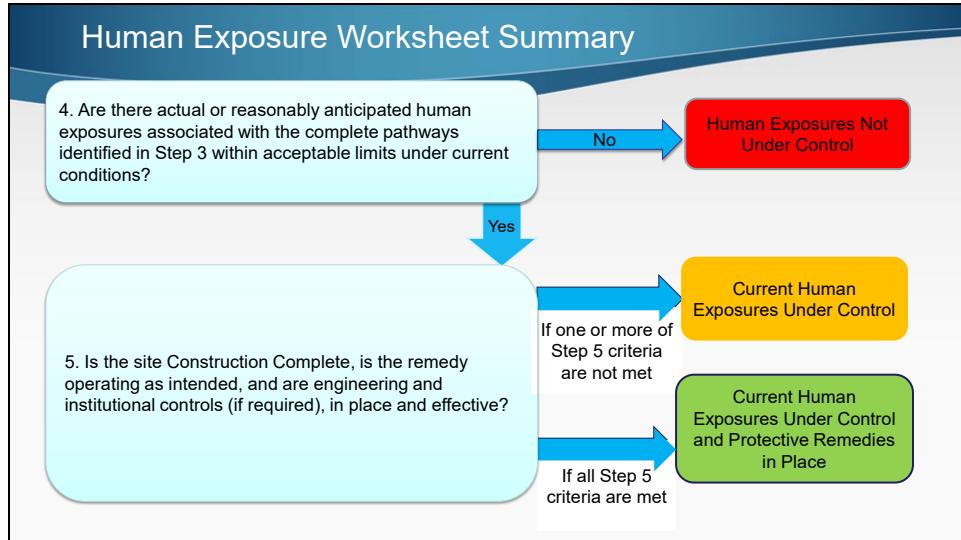
The Superfund Human Exposure Under Control Worksheet is taken from the Superfund Environmental Indicators Guidance Manual (2004). The following slides break out the steps in more detail.

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This graphic is adapted from the Human Exposure Worksheet in the EPA 2008 Human Exposure Environmental Indicator Guidance.

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This ends our discussion on human exposures EI's. On the following slides, we will look at the groundwater migration EI.

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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.

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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.

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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?



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Based on the scenario described in this slide, is groundwater migration under control?

- A. Yes
- B. No
- C. It depends

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Groundwater Migration Determination Categories	
GMNA	Site currently does not have contaminated groundwater or site conditions did not warrant investigation or remediation of groundwater contamination in the past
GMID	Insufficient Data to determine contaminated groundwater migration control status
GMNC	Contaminated Groundwater Migration Not Under Control
GMUC	Contaminated Groundwater Migration Under Control

See Section 5.1 of EI Guidance
[\(EI Guidance Human Exposure Revisions\)](#)

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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 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 **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 ground water is stabilized and there is no unacceptable discharge to surface water.

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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.

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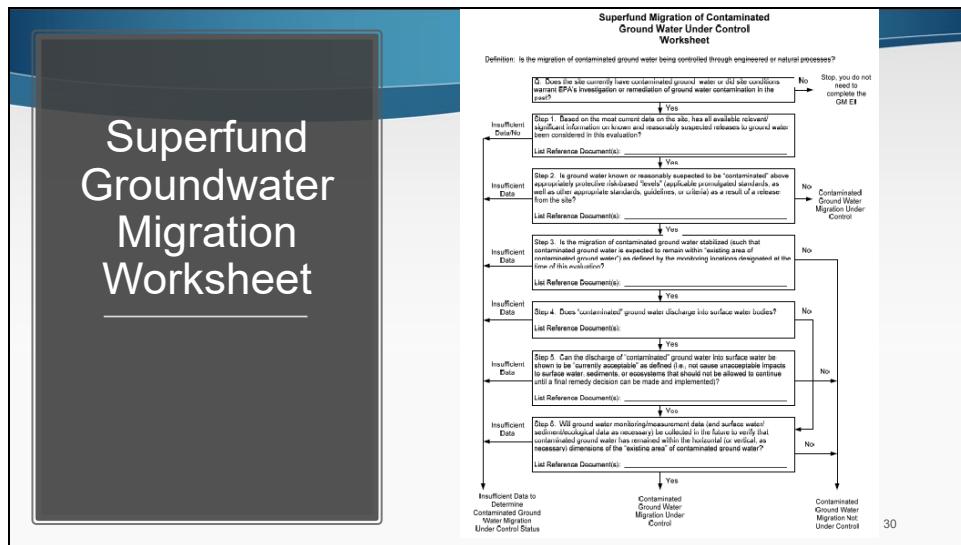
Groundwater Migration Evaluation

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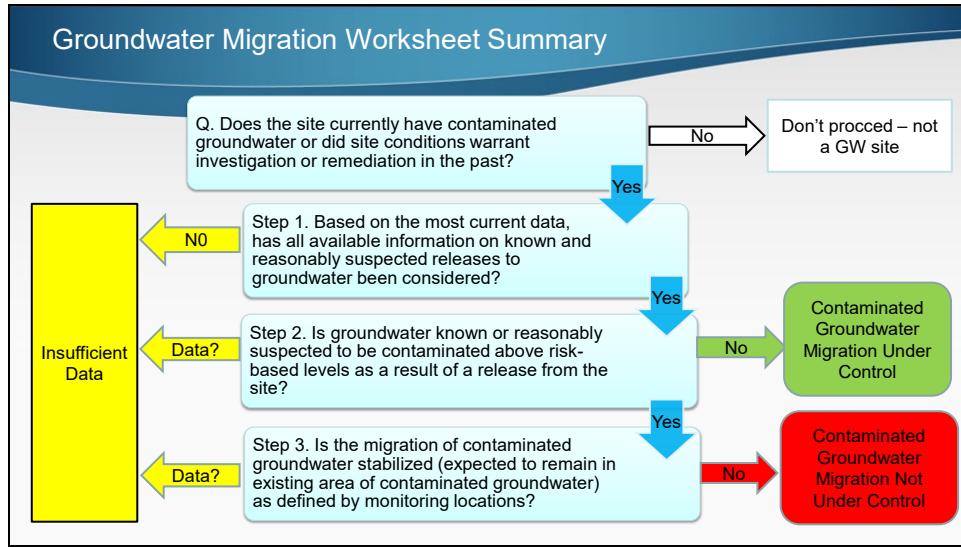
In evaluating the potential for contaminated groundwater migration, the evaluation should be conducted on a sitewide basis, with evaluation of distinct plumes. The plumes should be evaluated based on the boundaries of the plume areas, not on facility boundaries. Monitored Natural Attenuation (MNA) monitoring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

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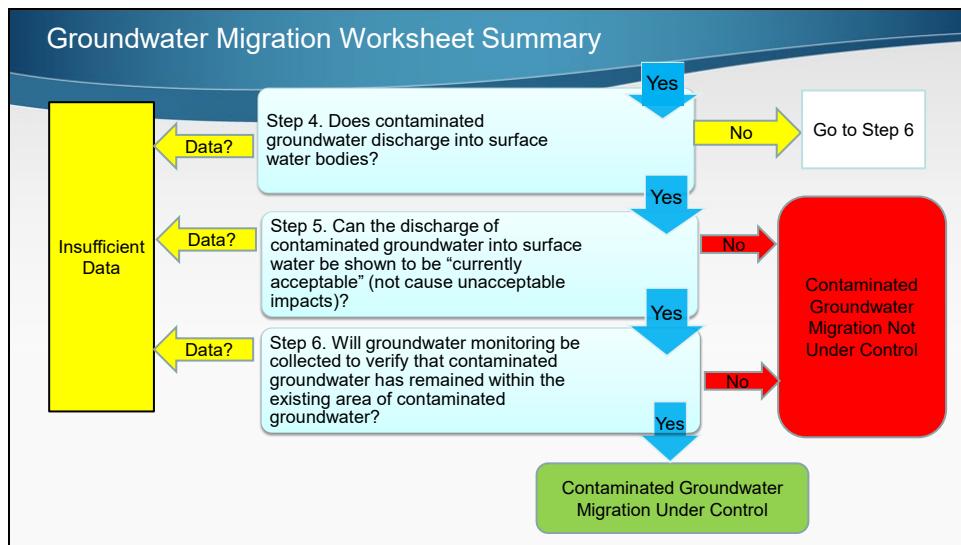
The Superfund Migration of Contaminated Groundwater Under Control Worksheet is found in the [2008 Superfund Environmental Indicators Guidance Human Exposure Revisions](#). The following slides break out the steps in more detail.

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This graphic is adapted from the Superfund Migration of Contaminated Groundwater Under Control Worksheet in the EPA 2008 Human Exposure Environmental Indicator Guidance.

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EI Best Management Practices

- Periodic Management Focus on EI
- 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

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Other CERCLA Components

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



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

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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.

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Sitewide Ready for Anticipated Reuse	
□ SWRAU must meet one of the following conditions:	Human Exposure Status and SWRAU Eligibility
▪ Current human exposure under control and protective remedy or remedies in place (HHPR)	HEID, HENC, HEUC Not eligible
▪ Current human exposure under control and long-term human health protection achieved (HHPA)	HEPR, HHPA Eligible 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 SWRAU 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> .

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Sitewide Ready for Anticipated Reuse

□ 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, thus a site's EI changes from HEUC to HENC, also impacting its SWRAU determination.



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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.

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EIs and Risk Determinations

- EIs are not intended to measure risk in the way a baseline risk assessment does
- May be possible to have EIs under control before a remedy is fully implemented
- Human Exposure EI does not consider ecological risk



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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 \(Public\)](#)

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- [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 \(Public\)](#)

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Summary

- ❑ EIIs are designed to communicate the tangible progress made in protecting human health and the environment
- ❑ The Human Exposure and Groundwater Migration EIIs are reported to Congress
- ❑ Use the tools and resources available when determining EIIs 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 EIIs (FYRs)

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Questions

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U.S. Environmental Protection Agency

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Human Exposure Evaluation Flowchart

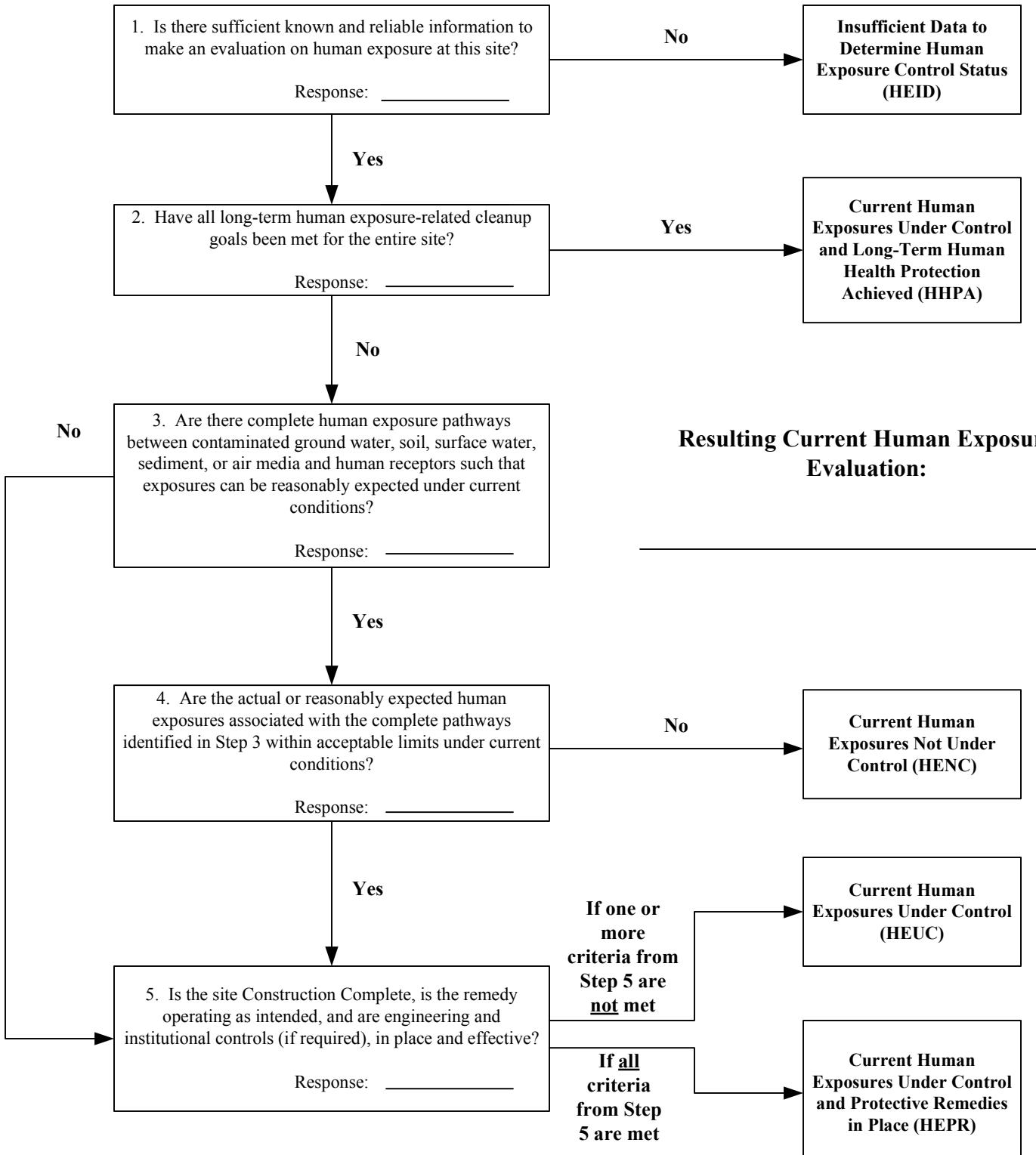
Site Name: _____

Date: _____ Estimated Current HE Under Control Date: _____

Estimated Current HE Under Control Date: _____

RPM Certified:

Justification for Change in HE Evaluation: _____



Superfund Migration of Contaminated Ground Water Under Control Worksheet

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

