

## Introduction

The Department of Defense (DoD) identified certain per- and polyfluoroalkyl substances (PFAS) as emerging contaminants of concern which affected installations across the Air Force. Specifically, perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS) are components of legacy Aqueous Film Forming Foam (AFFF) that the Air Force began using in the 1970s as a firefighting agent to extinguish petroleum fires. The U.S. Environmental Protection Agency (EPA) issued lifetime drinking water Health Advisories (HA) for PFOS and PFOA, and health-based regional screening levels for PFBS.

The Air Force has systematically evaluated potential AFFF releases on all Installations and former Installations. It began with the Preliminary Assessments, or PAs, that identified potential release areas. First responders, fire chiefs, and hangar staff were interviewed to determine where a release or a spill may have occurred on an Installation (for example, aircraft crash site or an accidental hangar AFFF release). Once the information in the PA was collected, the Site Inspection (SI) began and thru this process, soil and water samples taken from potential release areas were evaluated for the presence of 16 different PFAS compounds to determine if a release had occurred, and if so, the overall impacts to soil and/or groundwater. The next step in the process is called the Relative Risk Site Evaluation, or RRSE, which is a tool used to allocate funding for sites/installations having the highest priority requiring a Remedial Investigation (RI). Air Force Installations are at the beginning of the RI to determine where action is needed and to identify remedial technologies required.

More information on the Air Force response to PFOS and PFOA can be found at: <https://www.afcec.af.mil/WhatWeDo/Environment/Perfluorinated-Compounds/>.

## Questions and Answers

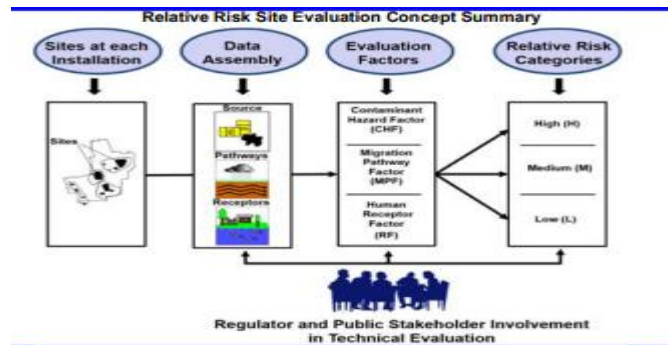
Q. What is the Relative Risk Site Evaluation (RRSE)?

A. RRSE is a methodology to sequence environmental restoration work used by the Department of Defense (DoD). The RRSE process is used to evaluate the relative risk posed by an environmental restoration site in relation to other sites. The DoD fundamental premise in site prioritization is “worst first,” meaning the DoD Component shall address sites that pose a relatively greater potential risk to public safety, human health, or the environment before sites posing a lesser risk. Relative risk is not the sole factor in determining the sequence of environmental restoration work, but it is an important consideration in the priority setting process. The methodology is described in the DoD, Relative Risk Site Evaluation Primer, Summer 1997 Revised Edition [https://www.denix.osd.mil/references/dod/policy-guidance/relative-risk-site-evaluation-primer/RRSE\\_Primer\\_Summer1997.pdf](https://www.denix.osd.mil/references/dod/policy-guidance/relative-risk-site-evaluation-primer/RRSE_Primer_Summer1997.pdf).

Q. What is the RRSE framework?

A. The RRSE framework provides a DoD-wide approach for evaluating the relative risk to human health and the environment posed by contamination present at sites. The Relative Risk Site Evaluation Concept Summary (shown in the figure) illustrates the selection of sites, evaluation of the site data using three evaluation factors, and placement into high, medium, and low categories. The relative risk site evaluation framework is based on information fundamental to risk assessment: sources, pathways, and receptors to sequence restoration work. The RRSE is not a baseline risk assessment or health assessment in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

process. Regulators and public stakeholders in the environmental restoration process are provided the opportunity to participate in the process in accordance with the DoD Defense Environmental Restoration Program.



Q. What restoration sites are required to be evaluated in the RRSE process?

A. Restoration sites in CERCLA phases prior to remedy-in-place are evaluated in the process. Worksheets are developed environmental media (such as, groundwater and surface soil) at each site. Environmental media lacking sufficient information to conduct a relative risk evaluation are assigned a "Not Evaluated" designation. The figure shows the process for a media to be evaluated using the contaminant hazard factor (CHF), the migration pathway factor (MPF), and the receptor factor (RF). Each media is scored to obtain a relative risk rating of High, Medium, or Low. The highest media rating determines the Overall Site Category.

Q. How is the Contaminant Hazard Factor (CHF) determined?

A. The Contaminant Hazard Factor (CHF) is determined by dividing the maximum level for a contaminant at each site by the approved screening values (i.e., comparison values). Contaminant concentration ratios are totaled to arrive at a Contaminant Hazard Factor (CHF). A CHF sum of greater than 100 earns a High ranking. Moderate is when the total is 2 to 100. Minimal is when a CHF is less than two.

Q. How is the Migration Pathway Factor (MPF) determined?

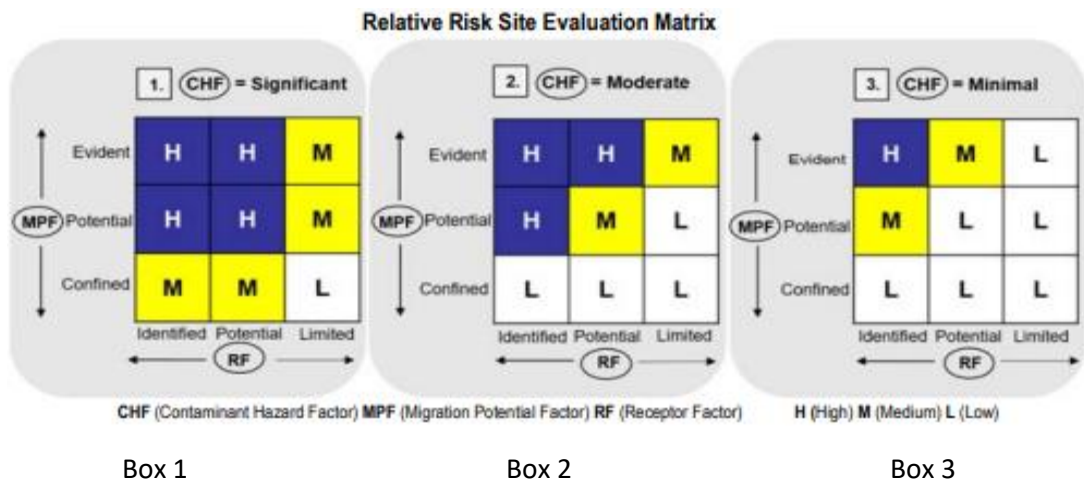
A. The movement of contamination at a site is evaluated and assigned a Migration Pathway Factor (MPF) rating. Ratings for MPFs are designated as: evident, potential, or confined (for High, Medium, and Low). Evident exposure means the contamination is at a point where exposure to humans or the environment can occur, such as at a drinking water well. Potential ratings are given to sites where exposure may happen. A confined rating is given to sites where a low possibility for exposure may occur.

Q. How is the Receptor Factor (RF) determined?

A. The Receptor Factor (RF) is determined by a receptor's, such as humans, potential to come into contact with contaminated media. RFs are designated as: identified, potential, or limited (High, Medium, and Low). Identified rating is given when receptors are in contact or threat of contact with contaminated media. Potential is given when receptor may contact contaminated media. Limited is given when there is little or no contact with contaminated media.

Q. How is the media relative risk rating determined?

A. Use the chart to determine the relative risk rating for each media evaluated. Start by choosing the CHF result of the evaluation. If the CHF is Significant, use box 1.; if Moderate, use box 2.; if Minimal, use box 3. Then find the MPF and RF results and move to the square where the results meet. That square indicates the media relative risk rating. For example, if the CHF is Significant (go to box 1.), the MPF is Potential and the RF is Identified, then the rating is High (H).



Q. How do I determine the Overall Site Category?

A. The highest relative risk media rating becomes the Overall Site Category for the site. For example, if a site has a groundwater relative risk rating of High, and soil relative risk rating of Low, then the Overall Site Category rating for the site is High.

Q. How do I participate as Stakeholder?

A. To offer opportunity to participate, the Air Force announces a public comment period in your local newspaper.

### Acronyms

AFFF - Aqueous Film Forming Foam  
 AST - Aboveground Storage Tank  
 CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act  
 CHF - Contaminant Hazard Factor  
 EPA - US Environmental Protection Agency  
 FTA - Fire Training Area

HA - Health Advisory  
 MPF - Migration Pathway Factor  
 PA - Preliminary Assessment  
 PFAS - Per- and polyfluoroalkyl substances  
 PFBS - Perfluorobutane sulfonate  
 PFOS - Perfluorooctane sulfonate  
 PFOA - Perfluorooctanoic acid

RCRA - Resource Conservation and Recovery Act  
 RF - Reception Factor  
 RI - Remedial Investigation  
 RRSE - Relative Risk Site Evaluation  
 SI - Site Inspection  
 SWMU - Solid Waste Management

