

# Human Health Risk Assessment Framework for Subsurface Contamination

## 1、Origin

Taiwan Environmental Protection Administration (TWEPA) promulgated the Soil and Groundwater Pollution Remediation Act (SGPRA) in 2000 and the protection of subsurface environment was officially merged with the comprehensive environmental protection program and policy. Given the nature of the subsurface contamination (e.g., uncertainty and mobility), the contamination management must gain balance between the public protection and the remediation feasibility so that the full protection of land can be attained. Consequently, by following the trend of global environmental policy, the SGPRA has integrated a risk-based contaminated site management concept. It is also the first environmental law which subsumes the risk-based framework in Taiwan.

## 2、Objectives

The establishment of the human health risk assessment (HHRA) mechanism can provide a tool for the risk-based decision making. The subsurface environment protection can achieve with a consistent and rational fashion. Additionally, the risk-based contaminated site management framework can then be fully supported. As to the long term environmental policy development, a HHRA system can be the decision tool with a sound scientific basis and public health protection. Also, the system is expected to be the foundation for risk-based environmental policy evolution.

Further integration of risk management and risk communication, the completed risk analysis system will become the basic protocol for facilitating rational discussion, information exchange, and consensus decision in determining the proper action for subsurface protection. To sustainable land use and development, the advocating of contaminated land use (or brownfield) will rely on a scientifically sound foundation. Without doubt, the foundation is the HHRA system. When the contaminated land can be revitalized with proper risk management measures, the land value can be reinstated and welfare can be brought back to the people and to the country. This is the ultimate vision that TWEPA believes the risk assessment will play a significant role.

## 3、Results

To embrace the risk-based environmental policy within the SGPRA, TWEPA has published the “Soil and Groundwater Contaminated Site Human Health Risk Assessment Guideline” and built the Human Health Risk Assessment Information System in order to provide the necessary tool for conducting contaminated site risk assessment. In the process of regulation enforcement, a series of supplemental guidelines to enhance the HHRA system, including reporting, reviewing procedures, and site classification (i.e., Control Site or Remediation Site), were also implemented. The system is in action for practical application of HHRA to contaminated sites And proven to be effective to appropriate management of contaminated sites.



▲ The Human Health Risk Assessment Information System (<http://sgw.epa.gov.tw/HRisk/>)

At the early phase, the HHRA system was opened for evaluating the risk or hazard posed to human health by a Control Site and for deciding the class of the contaminated site. Although the application scope was limited at the time, the concept and assessment methodology have gradually recognized by public and professions in related field. This also serves as a vehicle for integrating the health risk assessment into the contaminated site management framework.

With the effort over a decade, there has been variety of contaminated sites employed the HHRA as a tool for assessing the site conditions. This illustrates that the industry has gradually accepted the risk-based contaminated site management strategy. Several major contaminated sites, on the other hand, have proposed the remediation and risk management strategy not only based on the outcomes of risk assessment but also brought in the land revitalization concept. The trend has further demonstrated that the HHRA system in SGPRA which is leading the way to sustainable land use.

TWEPA recognizes the significance of knowledge regarding HHRA among stakeholders. Thus, the risk education has also become one of the major task in promoting the HHRA system. In recent years, the educational trainings and guidance seminars have been held to elevate the understanding to the risk-based concept of the public, industrial, as well as authority stakeholders. We believe that the risk-based environmental policy will not overall succeed without the participation of knowledgeable stakeholders.



▲ Risk-related trainings and guidance seminars held by TWEPA

## 4、Prospect

Risk management is one of the critical issues in 21st century and has been embraced by numerous disciplines. Among the different management aspects, the appropriate evaluation and management of risk will be the major subject. Similarly, seamless integration of risk assessment and risk management are the elements for accomplishing the risk-based environmental protection.

TWEPA have foreseen the completeness of the HHRA system as well as the integration of risk management and risk communication will provide a comprehensive mechanism for realization of risk-based decision making process in contaminated site management. Also, with the fully implemented risk analysis system, the efficiency of administrative tasks will increase and the public benefit will be further protected against environmental issues. As for the vision to the risk-based contaminated site management, the revitalization and restoring the value of the contaminated land is the ultimate goal of the contaminated site management framework.

