INTEGRATED MANAGEMENT STRATEGY FOR USINA PRESIDENTE VARGAS (UPV) MEGASITE

Author and co-authors

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Short CV

José Carlos Rocha Gouvêa Junior, Geologist, specializing in petroleum geology, Master of Environmental Technology with emphasis on contaminated areas and evaluation of soil vapor intrusion. José Gouvêa has 15 years of experience in environmental consulting activities focused on the investigation and remediation of contaminated areas in various regions of Brazil. His work was promoted by the company with 500 major projects in different areas: petroleum hydrocarbon sites, heavy metals, organochlorine compounds and PCBs, including industries, fueling positions, distribution bases and airports. He is currently Manager of Environmental Projects and Liabilities at Companhia Siderúrgica Nacional and at the leadership of the Working Group on Intrusion of Soil Vapor at NICOLE – BRASIL.

Introduction

In Europe, seaports, chemical industry complexes, metal mining areas, military complexes that are installed in large areas and regions, are refered as megasites. In these areas, soil, groundwater and surface water are usually contaminated with a wide variety of pollutants.

The traditional remediation approach is often impossible on short terms, because of the nature and extent of the pollution. Consequently, the pollution will remain a risk factor for humans and ecosystems and will limit free use of resources use such as surface and groundwater.

For this reason, the European Union founded The WELCOME-project (acronym for Water, Environment and Landscape management at COntaminated MEgasites) to develop an Integrated Management Strategy for Megasites (IMS, 2018). From January 2002 until December 2004, the WELCOME IMS was developed in the chemical industrial area in the German city of Bitterfeld (Weiss et al., 2006); the chemical plant in the Polish city of Tarnowskie Góry, and the heavily industrialized harbours of Rotterdam (Marsman, 2015) and Antwerp. These megasites have complexities related to site conditions, contaminant characteristics, organizations involved, regulatory aspects and considerable costs. These case studies are examples of the application of IMS in the step-wise approach to establish integrated risk based management plans for contaminated megasites (IMS, 2018).

In this work, IMS is applied to the management of the Usina Presidente Vargas (UPV) megasite, in Volta Redonda (RJ). The contamination situation at the UPV megasite is related to the activities in this industrial complex area, which began in 1943. The major contaminants are polyaromatic hydrocarbons (PAH) and metals, which can be found in adsorbed phase in soil, free and dissolved phase in groundwater.

It is important that IMS comply with national CONAMA (2009) or local environmental regulations related to contaminated land and groundwater.

Objective

The objective of these studies were to distinguish the areas of the megasite with the highest risk and set up priorities for the level of risk reduction, degree of decontamination and consequently, related investments on the basis of risk assessment for the area. In addition, the studies also aimed to show the applicability of these IMS in Brazil to the Usina Presidente Vargas area.

Methodology

The methodology to apply risk-based management at the UPV megasite consists to follow the stepwise sequence based on IMS-manual (IMS, 2018)

1. Identify site challenges within the context of the CSM.
2. Identify the data gaps in the CSM
3. Elaborate a working plan to solve these gaps and to identify distribution, absorption & path disruptors for pollutants
4. Modelling to reduce risk by identifying non-acceptable pollutants for action and offers substantial cost reductions.
5. Refine CSM.
6. Set or revisit site objectives.
7. Develop interim objectives and adaptive remedial strategy.
8. Develop IMS: Building a Megasite Management Plan, Monitoring Programme, Review Plan

Results

Based on this information the megasite has been divided into clusters. For each cluster long-term risk reduction targets have been defined, and a cost-efficiency analysis has been performed to determine and select the Preferred RMS.

The results expected are the elaboration of the following plans:

1) Classification of all on-site areas of concern, according their priority for remedial action considering the sensitive receptors and potential for migration;

2) Elaboration of an investigation plan/ monitoring programme for the different areas of concern, ranked according to urgency;

3) Definition of the limits and contours of a buffer zone (i.e., the area near the site boundary with a potential for off-site migration) using mathematical modelling;

Conclusion

Megasites are characterized not only for their large extension, but also for the technical complexity related to their geological conditions, diversity of industrial process developed, variety of pollutants, regulatory aspects and elevated costs estimated for rehabilitation. In this context, traditional approaches for remediation couldn’t be applied for short term and the best worldwide practices, includes the

adoption of a global remediation strategy, based on a long term, step-wise, approach management program, like IMS. The case studies evaluated in this work and compared with the UPV megasite show the feasibility of applying IMS in Brazil to have an effective Megasite Management Plan, Monitoring Program and Review Plan.

Next Steps

The next steps to be planned and implemented are:

1. Develop a long-term management plan.
2. Design and implement remedy.
3. Monitor and evaluate performance.
4. Apply decision criteria to adjust, optimize, or reevaluate the remedy.

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