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Table of Contents

A Few Words from Editor

Dear SCCAEPA Online Journal Readers:

In this issue of the Southern California Chinese American Environmental Protection Association (SCCAEPA) Online Journal (ISSN 1944-8945), we published a short article for a beginning of government program in US. In addition, we include 2017 Los Angeles Environmental Forum Abstracts (Session A1) for those who were not able to attend the symposium. Enjoy the reading.

To sustain the journal, we need members' contributions. I invite you to submit your work and written materials from your experience. To make things easier, I would like to suggest short articles that can be modified from your conference presentations and slides. The Journal is also open to outside of our association.

Enjoy!

Sincerely,

Yue Rong, Ph.D.
Editor-in-Chief
SCCAEPA Online Journal
January 2015
board@sccaepa.org

Disclaimer

The company names and any trade names of a product mentioned in the articles of this journal do not reflect the endorsement of the Southern California Chinese American Environmental Protection Association (SCCAEPA).

美国政府到底为水做了什么?

吴基衔

我们都知道水对生活的重要性，也知道无论中国还是美国，政府都把保障水的来源和品质放在首位。但是政府究竟为此做了什么，我们如何为水质保护尽自己的一份力量，想必是大家曾经思考过的问题。我希望借本篇文章，简单描述美国政府为了保护水资源所尽的努力，促进中美学术交流，让每个人都意识到水资源的重要性。也希望这个栏目能够越办越好，真正让大家参与到环境保护这项伟大的事业中来。

地表水

地表水泛指所有的河川、湖泊以及海洋。雨水和雪水是地表水保持存储量的要素。雨水虽然是我们未来用水非常重要的来源之一，但是这些雨水在流动的过程，可能多少会带走地表的污染物，因此我们就必须控制流入地表水雨水的品质。

提到雨水品质的规范，可能立刻想到的是MS4 (Municipal Separate Storm Sewer System)的雨水许可证。他肩负着对地表水水质的保护，而总量管制 TMDL (Total Maximum Daily Load)则是保护地表水水质的纲领。

过去20年来，美国加州政府致力于TMDL的发展及设定。可是对于雨水如此广的面源，要移除其中所含的污染物是很具有挑战性的。因此，应TMDL要求，低影响开发(Low Impact Development, LID)，或者大家所熟悉的"海绵城市"，就成为目前一个很好地解决方法。海绵城市包含了两层作用：第一，隔离掉部分雨水中所含的污染物，其次对水资源的开发来讲，可以把雨水留置在地下水层当中作为以后供水之用。

除了雨水之外还有一些公共废水处理厂，将我们使用过的生活污水，经由处理以后，再排入河川。而规范这些公共污水处理厂的许可证就是所谓的NPDES (National Pollutant Discharge Elimination System) permit。这些公共污水处理厂的放流水质，同时也受到TMDL的管理。

地下水

在文明发展初期，人们更倾向于打井取水，那是因为地下水相较于地表水比较不容易被污染，而且经过土壤的过滤之后会变得更加干净。然而，随着工业和制造业的发展，污水排放不受管制，被污染的地表水和土壤慢慢渗透到地下水层从而污染了地下水。由于当前的水资源紧缺，修复再利用地下水成为了一个很大的课题。

过去我们主要把土壤地下水的污染从地底下里面抽取出来做修复，之后再排放回原来的地下水层。现在因为化学及生物科技的进步，比较具有经济效益的是使用原位修复。而执行原位修复，污染责任方必须要取得排污许可证(Waste Discharge Requirements, WDR) 以确保修复的过程中不会造成二度污染。

这个WDR，它的作用不仅止于原位修复，它还被用来规范所有排放于土壤的水质。许多污水处理厂因为距离地表水太远，所以排到土壤表面，渗透到地下水，一来经济二来达到可持续发展的目的。因此WDR变成近年来大家争相申请的许可证之一。

政府的工作不仅包含了对科学的要求、对工程的设计，还涉及到法规的制定和执行推广的一些窍门。这只是一篇开胃文章，我会在后续文章里深刻解读每一项目，希望能解答您的疑问。

关于作者

吴基衔博士目前任职于加州环境署，洛杉矶水资源管理局。主管排污许可证(WDR)的发放。在转任地下水许可证的主管之前，吴博士担任总量管制（TMDL)主管，主导垃圾总量管制以及州政府政策的发展，指导TMDL的制定及执行，并将TMDL的要求付诸于雨水许可证。

吴基衔博士获得约翰霍普金斯大学的硕士学位以及南加州大学的博士学位，曾任职于环境咨询顾问公司，也是加州注册工程师。目前担任南加州华人环保协会会长，多次参与两岸三地之间举办的研讨会，并应邀在各个大学（南加州大学，加州大学洛杉矶分校等）演讲。

1. A STUDY OF PLUME LENGTHS AT SMALL CHLORINATED SOLVENT RELEASE SITES IN CALIFORNIA.

Ravi Arulanantham, GeoSyntec
Yue Rong, California Regional Water Quality Control Board

An understanding of the general nature, magnitude and the behavior of chlorinated solvent plumes over time is important for the site cleanup decision making and eventually for the protection of human health, environment and water quality. This study describes the findings from a California wide analysis of groundwater plume lengths at small chlorinated solvent release sites.

The 79 candidate sites that were included in this study were primarily selected by the staff of respective RWQCBs to represent small release sites (e.g., drycleaners, auto repair shops etc.) throughout California. All plume characteristics for each of the candidate sites were obtained from the Geotracker database. Of the 79 sites, 53 sites had PCE plume lengths defined and 29 sites had TCE plume lengths defined to the current MCL. 59 sites had PCE groundwater concentration data and 60 sites had TCE groundwater concentration data. Using proUCL (a statistical software (version 5.0.00) for Environmental datasets), a statistical analysis was completed on the data set to estimate various plume characteristics and to get an idea of the general pattern(s) of plume behavior. This presentation will describe the results of the plume study.

2. ANALYSIS AND SIGNIFICANCE OF SOURCES AND OCCURRENCE STATE OF HEAVY METAL CONTAMINANTS IN FARMLAND SOIL

Jun Lu[1], Gongde Chen[2] and Chunyou Zhu[1]
1= China Aerospace Kaitian Environmental Technology Co., Ltd.
2 = University of Riverside

Heavy metal contamination in the soil of China farmland has promoted the research and development of numerous treatment methods and remediation reagents. Although they have been successfully applied into some cases, many factors caused their unsatisfactory performance in other scenarios. One main factor is lack of understanding on the sources and occurrence state of heavy metal contaminants in the soil. Many sources contribute to heavy metal contamination including mining, metal ore separation and metallurgy, wastewater irrigation, solid waste discharge, etc. Heavy metals could exist in multiple states in soils including free ions, carbonate, iron-manganese-bound oxides, organic-bound compounds, residue forms, etc. This paper highlights the source and occurrence state of heavy metal contaminants and their significance in soil remediation. State-of-art analytical methods are briefly introduced including chemical analysis, chemical fingerprinting, phase equilibria, optical microscopy, scanning electron microscopy, electron microprobe, X-ray diffraction, isotope trace method, synchrotron analysis, and statistics.

3. SOIL VAPOR INTRUSION AT DRY CLEANER SITES -- CURRENT PRACTICE BASED ON SEVERAL CASE STUDIES

Xihong Scarlett Zhai, PhD, Project Manager, Cal EPA, Department of Toxic Substances Control

Soil vapor intrusion issue has drawn a lot of attention in the past decades. The scientific foundation on soil vapor transportation is still evolving. Perchloroethylene (PCE) released at dry cleaner sites are commonly encountered at shallow soil, and potential vapor intrusion is often a concern. Soil vapor extraction (SVE) is a frequently used as a remediation measure. Since the risk exposure point is mostly indoor air, the cleanup levels are set for indoor air concentrations. In site cleanup practice, soil vapor concentrations are measured to monitor cleanup progress. Therefore the attenuation factor from soil vapor to indoor air plays a critical role in determining the cleanup end points.
This paper will use several case studies from dry cleaner sites to illustrate the importance of attenuation factor in site cleanup process. PCE concentrations in soil vapor, which rebound after SVE shutdown, will be examined and compared to cleanup levels based on various attenuation factors. The current regulatory guidance and their upcoming evolution will be discussed.

4. FIELD PERFORMANCE OF DISPERSIVE COLLOIDAL ACTIVATED CARBON – LESSONS LEARNED FROM MULTIPLE GEOLOGICAL SETTINGS

Dan Nunez, SWD Manage, Regenesis, San Clemente, CA, USA
Jeremy Birnstingl, PhD, Craig Sandefur, and Kristen Thoreson, PhD, Regenesis, San Clemente, CA, USA

Background/Objectives. There is growing interest in the use of carbon injectables to expedite groundwater clean-up through coupling contaminant destruction with sorption. While an appreciation of the theoretical benefits of this approach is widespread, so is a natural caution among experienced remediation practitioners, as is understandable with any new technology. Among questions related to effective practical application of the technology are concerns regarding the ability to secure adequate subsurface distribution in the field, applicability in low-permeability or heterogeneous formations, efficacy against NAPL and limits of treatable contaminant mass. Further important questions include long-term efficacy, and the related validation of post-sorption field degradation.

Approach/Activities. This presentation will examine evidence from the field exploring these and other concerns. Data will be drawn from over 20 field applications, variously addressing chlorinated solvent and hydrocarbon impacted sites and encompassing a variety of geological settings within both the United States and Europe. Contaminants investigated range from chlorinated ethenes and ethanes to aromatic and aliphatic hydrocarbons and PAHs. Sites considered include legacy MNA sites, dry-cleaners, industrial sites, post-industrial development sites and filling stations. Field data will be presented describing performance against remediation goals, performance validation and also lessons learned with regard to material placement, site characterization and the importance of application-feasibility pre-testing. Results/Lessons Learned. Results include multiple achievements of 'three nines' contaminant reductions over short timeframes (<3 months) and lines of evidence of post-sorption degradation using microbial diagnostic techniques coupled with geochemical analysis. Such data provide a valuable means of mechanism validation underpinning sustained contaminant capture beyond the point of predicted sorptive equilibrium. Further lessons learned relate to divergence of encountered field conditions from documented characterization, and the potential to avoid unforeseen project failure (false positive) or unnecessary project abandonment (false negative) through use of appropriate pre-testing methodologies. Examples are given of each. Data will be drawn from over 20 field applications to review the overall performance vs remediation goals and discuss lessons learned about placement of a carbon based injectable, site characterization and importance in application -feasibility pre-testing.

5. SOUTHERN CALIFORNIA SITE TREATED WITH ELECTRICAL RESISTANCE HEATING

David Fleming, TRS Group, Inc., Longview, Washington, USA
John Sankey, True Blue Technologies, Inc., Long Beach, California, USA

Electrical resistance heating (ERH) is an in-situ method of groundwater, soil, and bedrock remediation that is typically used to reduce concentrations of volatile organic compounds (VOCs) by 99% to 99.99%. Electricity is conducted through the soil or bedrock in the desired treatment region and the flow of electricity directly generates heat in situ between electrodes. The subsurface is heated to the boiling point of water and then steam is generated. In a typical remediation, 1000's of pore volumes of steam are produced in all soil types, regardless of their permeability or state of water saturation. For this reason, ERH is equally effective in all soil and sedimentary rock types, and in the vadose zone, saturated zone, or perched water.

Simultaneous to heating, a vacuum is applied to the subsurface to recover the steam, air, and contaminant vapor. At the surface, the steam is condensed and then the contaminant vapor is treated with granular activated carbon or other vapor treatment methods. The above grade treatment train is similar to a soil vapor extraction system. Because of the in-situ steam production method, ERH is very reliable and guarantees of performance are common, including guarantees of no groundwater rebound.
This presentation will include the fundamentals of how ERH works and a project description of remediation of chlorinated solvents in soil and groundwater at a site located in Southern CA. In 1998, they discovered a release of dry cleaning solvents from a dry cleaner. The highest concentration of tetrachloroethylene (PCE) detected during the

initial assessment was 17.7 milligrams per liter (mg/L) in soil vapor, 55 milligrams per kilogram (mg/kg) in soil at 1 foot below ground surface (bgs) and 0.066 mg/L in groundwater. In the source area, the solvents were significantly reduced by operating a soil vapor extraction (SVE) remediation system. However, the solvents migrated to a larger area and the consultant decided to install an ERH remediation system. TRS evaluated multiple electrode element designs. Driven sheetpiles were chosen to minimize the impact to local businesses and roadway by decreasing installation time and decrease operation time by increasing the electrode surface area. Each electrode has a co-located chimney boring to provide a vertical conduit of higher permeable material to allow for the steam and entrained contaminant vapors to be captured more efficiently by the vacuum recovery system.

The primary remediation objective for this interim remedy is to reduce the average concentration of PCE and TCE in groundwater to less than 100 µg/L. A mass reduction of 1,4-dioxane of approximately 70% is projected.

The ERH system design will accomplish the following:
• Attain the Site-specific remediation goals.
• Maintain in situ vacuum to capture steam and vapors.
• Treat the recovered vapors to meet atmospheric discharge standards.
• Minimize visual and auditory impact to the area.
• Operate an active remediation system while minimizing impact on operations at the retail area.
• Maintain Health and Safety standards for workers and the public throughout installation, operations, and decommissioning.

The remediation design will include instrumentation and control systems that allow timely data acquisition, reporting, interpretation, and decision making to verify that operational requirements are being met and to optimize each component of the remediation system. These systems will also ensure that the treatment progress is accurately tracked, that the rate and volume of VOCs removal are measured, and that compliance with regulatory standards is maintained.

6. MANAGING COMPLEX SITES WITH HIGH RESOLUTION CHARACTERIZATION AND REMEDIATION

John Sankey, True Blue Technologies, Inc., Long Beach, California, USA

Background/Objectives. Recent groundwater characterization and instrumentation approaches have proven helpful in providing a sound and defensible Conceptual Site Model to help design a range of different remedies to reach the overall goal at a complex site. High Resolution Characterization. An integrated approach has been developed to characterize baseline groundwater conditions, give a three-dimensional picture of the problem with Ultra-High Resolution Scanning Technology and highlight the microbial community with Next Generation Sequencing.

High Resolution Remediation. To efficiently target remedies in a complex stratified regime will optimize the remedial design, we can use the following; Thermal, excavation and surfactant for the source zone, ISCO, ISCR for the sub-source zone. Bioremediation to polish the source/sub-source and remediate the downgradient plume. The presentation will bring together three case studies of complex sites with high resolution characterization that resulted in high resolution remediation.