Attachment D
LPR FFS Review
Lower Eight Miles of the Lower Passaic River
Dredging Production Rates and Time Estimates

to the Comments on behalf of the Lower Passaic River Study Area Site Cooperating Parties Group on the Proposed Plan for the Lower Eight Miles of the Lower Passaic River Study Area Portion of the Diamond Alkali Superfund Site

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INTRODUCTION:

I have reviewed the 2014 USEPA FFS focusing on Alternative 3 where the EPA has estimated the environmental dredge production goals on broad undocumented assumptions and comparisons to other projects and also built a time frame for project duration based on similar assumptions and comparisons. In the following discussion, I will present and discuss those technical factors and variables that must be established/quantified and used to establish the feasibility of a sediment remediation project and associated dredging production estimates and overall project duration. All of these issues must be addressed to develop an FFS with a reasonable degree of certainty. EPA failed to consider these factors and variables in the FFS. The dredge production goals and timelines set forth in the FFS are therefore highly uncertain and cannot be relied on for remedy selection.

Dr. Engler has 40 years dealing with the identification, assessment, and management of contaminated sediment from industrial harbors. His academic pursuits included geochemistry , biology, microbiology and radiology of sediments and soils. He spent 30 years with the U.S. Army Corps of Engineers as Senior Scientist at the Engineer Research and Development Center responsible for broad aspects of dredged material research to include regulatory, assessment, management, treatment, removal and beneficial uses. Since 2005, he has worked for Moffatt & Nichol advising responsible parties regarding, dredging, assessment, treatment, capping, and contained aquatic disposal at several Superfund sites to include Hudson River, New Bedford Harbor, Newark Bay, Hackensack River, Passaic River, and Iron Mountain.

BACKGROUND:

All dredging sites are unique due to natural variability, water body uses, anthropogenic, historical and current activities and situations. As such, and without a complete and quantitative pre-dredge assessment of the below considerations at the proposed site, a proper design of the dredging project and plans and specifications cannot be completed, and a successful dredging bid cannot be carried out. Meaningful dredging production goals and estimates of project duration, are then based on the quantification of the role of the following variables, all of which seriously constrain the entire dredging, transportation and rehandling processes, and negatively impact dredge production goals with a high degree of certainty.

DISCUSSION:

- **Project Comparisons**

  It is very risky and uncertain to use project design and production information from other dredging or cleanup projects as each dredging project is unique and each project site is physically, historically, geologically, and anthropogenically unique. The Passaic lower river trial dredging in December, 2005, upon which EPA based many of its FFS assumptions, is illustrative of these unique and site specific issues. During this dredging, a winter storm occurred, the site chosen was free of debris, the cable arm dredge that was not operated properly for several days and dredging operated about 6 hours per day (review project report and contractor reports and appendices) giving very weak

production data. It was essentially a failure and was inappropriate for EPA to use it as a cornerstone to support many of their assumptions especially dredging production and project duration. A previous review of this Trial is attached. EPA has also based its FFS assumptions on the Fox River and Hudson River cleanups, both of which were totally different from this project, geologically, anthropogenically, physically, historically, industrially, etc. For example, the Fox River cleanup was deemed successful, but it was dredged with a cutter head pipeline dredge (hydraulic dredge). EPA proposes to use mechanical dredging, at least in part at this site. The Hudson River's first year used up to a dozen dredges and 100 vessels on the river at peak time. All equipment was very small and the sediments had plenty of wood debris that had to be accounted for and unplanned dredging depth changes. There were also environmental stoppages. The dredging areas were very shallow and equipment access navigation was required. The differences between the Passaic and the upper Hudson are significant. The Passaic is a complex river configuration in an urban setting, is crowded and busy, and contains many utilities and very limited access. The upper Hudson cleanup site is in rural setting that includes a small historic Victorian town with a limited population, has multiple access points with natural, forested, surroundings and meandering streams Projecting design and production information from these disparate and unrelated sites without careful consideration of site specific factors is not a proper or reliable basis for developing production and time estimates for the LPR.

- **Dredge Selection**

  In the FFS, EPA does not clarify if a mechanical or hydraulic dredge will be used for implementation of the selected remedy. The FFS hints at using a mechanical dredge, but has not quantified the subject, but also notes that a hydraulic dredge can be considered. These two dredges are radically different where a mechanical dredge picks up the sediment "in situ" and delivers the same amount to the rehandling/treatment site. Production rate of mechanical dredge is slow compared to the hydraulic dredge and results in resuspension and residuals. The hydraulic dredge delivers four times the volume of sediment excavated from the site to the rehandling/treatment site because of hydraulic transport requirements in a pipeline, about 4 parts of site water are needed to transport one part excavated sediment. Hydraulic dredging 1 million cu yds of sediment

excavated results in 4 million cu yds of sediment treated. However, the hydraulic dredge has higher production, but can be difficult in tight working conditions. This information is absolutely necessary to make production or construction duration.

The required number of dredges and their sizes to work the project were not clearly indicated in the FFS. Usually one mechanical dredge use 2 barges (1 filling and 1 transporting). Without this information, EPA's production and project duration estimate has a high level of uncertainty.

- **Site Characteristics**

  Site Geometry. An unobstructed space available for X number of dredges and 2 barges each per dredge (I am assuming mechanical environmental dredges will be used) was not shown. Barge transport mapping to the rehandling site is necessary to establish production and project duration and is not available. Size of dredges and barges must also be established. Since none of this information was addressed in the FFS, dredge production and project duration cannot be established.

  Debris. The FFS lacks a reasonable assessment of the quantity and distribution of debris, and importantly, lacks an assessment of the associated impacts on dredge production rates and the overall project schedule. It was reported that there was a number of buried car bodies and other large debris. The depth sounding device, often used to do bottom searches, only detects larger metal objects and very hard objects such as concrete rubble. It will, generally, not detect deteriorated wood, smaller woody objects, i.e., limbs, brush, old abandoned wharf pilings (common to older industrial shipping) and other softer material. Unknown presence and lack of quantification of size, precise location, and type of debris will seriously slow production. It is integral to maintaining production goals and project duration management. It does not seem to exist. The majority of the debris that can be removed prior to dredging should be removed and if not, will result in a higher suspended release during dredging and barge loading and seriously lengthen the project operations. Debris does not allow the environmental dredge to close properly resulting in higher resuspension and residuals. Silt curtains or sheet piles may be

necessary to contain the sediment and dredging area. Some debris will be barged to the rehandling and treatment site. The FFS dredging production goal estimates and project duration assumptions cannot be published due to their high level of uncertainty due to the lack of this type of information. The production and project duration estimates in the USEPA FFS are meaningless without the above information.

Site Physical Conditions. Water depths, elevations, magnitude of side slopes and sediment characteristics are variables that must be quantified to establish any degree of certainty in production and project duration estimates, and they are not established. As an example, acreage of underwater slopes to be dredged and depending on the angle of repose is critical to production and project duration estimates. A mechanical dredge generally makes a level cut as such the cuts are made step-wise up or down slope with re-dredging, extend time and slow production. Sediment characteristics (geotechnical, water content, density, particle size distribution and degree of consolidation) can all impact production and project duration time. Also, sediment horizontal layering with different physical characteristics can negatively impact dredge production and project duration estimates and would have very high uncertainty. Water depths and their significant variability are also a key factor. If shallow, there is a need for navigation dredging equipment to reach the removal site resulting in more sediment removal. Smaller equipment may be required resulting in lower production and more time. The dredging site physical conditions/situations including water obstructions, such as pilings, bridges, and other non-removable supporting devices may require small dredges, tugs, and barges for access resulting in low production and delay at a crowded site. Shallow water at the site requires small shallow barges and navigation dredging required for the remediation dredging equipment access. Other water uses at the site that are necessary are integrated with the remediation resulting in delays. Associated with the site physical conditions are major infrastructure, e. g., bridges, and utility crossings, buried gas, oil and sewage pipelines, that require special dredging and constrains dredge production and project duration. Utilities are a special concern to dredging in complex crowded older industrial/urban areas and should be carefully considered during the FFS to assess potential impacts on dredging production and project duration estimates. Overhead

electrical wires have long been a serious safety hazard to crane operations such as will occur with mechanical dredging. A serious plan for managing utility crossings, and crane reach and height to safely dredge those areas is needed. Dredging will be much slower as a result of these types of issues. Pipes for utilities such as electrical, gas, sewage, and drinking water that are buried in the sediment as they go under the Passaic must be considered. The precise location and depth of these utilities needs to be identified as well as the regulations regarding required distances the dredge must maintain from these pipes and plans for the hazardous sediment that may remain over and near these pipes. Again, this seriously affects project duration. Because of a serious lack of this information, the FFS cannot publish the highly uncertain dredge production goal estimates or the project duration.

Physical Locations. The FFS makes no mention of the installation of 3-dimensional positioning and recording devices for all in-place measurements, surveys, obstruction locations, sampling, dredge drops, etc., that complete a continuous and permanent record of all events throughout the project. This is a time consuming, but absolutely necessary process. Precise property locations of project sediment rehandling, treatment and further transportation points, and distance from dredging area to rehandling and further transport were not given or discussed in the FFS. The locations of access points and problems of ingress and egress for all steps impacting various distances among active locations are not presented. All of the variables discussed in this paragraph have serious impacts affecting the amount of time to carry out various project steps or the entire project itself. The FFS is completely absent any quantification of these variables that results in little, to no, certainty related to project duration estimates.

Environmental Controls/Quality Issues. Serious environmental windows were only touched upon in the FFS with no description or discussion of their potential impacts on the project schedule. There are at least 2 important windows; 1 window for flat fish, and another for anadramous fish covering 5 months from February to late June where absolutely no in-water construction is allowed. EPA has failed to indicate how these windows would affect the FFS estimates of project duration. There are other

environmental quality issues concerning potential failure of standards (ARARS) that call for project stoppage or delays. Assessment of the 3 R's (Release, Resuspension, and Residuals) is also part of this time-consuming effort.

CONCLUSION:

The FFS has not sufficiently quantified most of the sediment remediation variables that have a profound effect on dredging production goals and project duration requirements. As such, it is not possible in the FFS to estimate dredge production goals and project duration requirements at any level of certainty. Hard production goal and project duration numbers, as published in the FFS have not been supported due to the lack of documentation and must be removed as they will be treated by interested readers as real and certain and would appear to be fixed in stone. Unfortunately, they would be used as fixed, but exceptionally uncertain, for the dredging production goals and project duration estimates. This FFS did not follow the documentation step, especially in relation to the number of actions being deferred to the Design Phase of the project and the estimation of project duration. Subsequently the FFS was unsupported by any useful quantification or documentation to add any certainty whatsoever to dredge production goals or project time. Moreover, the FFS deferred many action items that should be part of the FFS. Submerged debris and utilities are examples of key factors that can have significant impacts on dredge production rates and should be carefully evaluated during the FS process. In addition, the FFS relies on two unrelated and dissimilar projects (Fox/Hudson) that are vastly different anthropogenically, geographically, and geologically. Having reviewed both the 2007 and 2014 FFS reports, I was surprised to find little improvement in the second. Projecting design and production information from the disparate and unrelated sites discussed herein without careful consideration of site specific factors is not a proper or reliable basis to develop dredge production and time estimates for the LPR.

The following references are included:

USEPA. 1994. Remediation Guidance Document. EPA 905-B94-003. Assessment and Remediation of Contaminated Sediments Program. USEPA Great Lakes National Program Office. Chicago, IL, USA. http://www.epa.gov/greatlakes/arcs/EPA-905-B94-003/B94-003.ch7.html. Accessed November 17, 2012;

USEPA. 2005. Contaminated Sediment Remediation Guidance for Hazardous Waste Sites. OWER 9355.0-85. USEPA Office of Solid Waste and Emergency Response, Washington, DC, USA. http://www.epa.gov/superfund/health/conmedia/sediment/guidance.htm. November 17, 2012:

Reible, Danny D. 2014. Processes, Assessment and Remediation of Contaminated Sediments. SERDP and ESTEP Remediation Technology Monograph Series. Springer, New York, Library of Congress Control number, 2013939317.

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EDUCATION

PhD Chemistry of Flooded Soils, Louisiana State University at Baton Rouge, 1972

MS Flooded Soil Microelement Fertility, Louisiana State University, 1969

BS Soil Chemistry, Louisiana State, 1967

REGISTRATION

Registered Soil Scientist, National, 1969

AFFILIATIONS

International Navigation Association -PIANC

PIANC International Environmental Commission, Chairman, 1994

PIANC International Executive Committee, 1994

Western Dredging Association

American Society of Civil Engineers

Coastal, Oceans, Ports and Rivers Institute

Waterways Committee

Dredging Subcommittee, Chairman, 1994

Diplomate-Distinguished Navigation Engineering

EXPERIENCE

Dredging

Dr. Engler is senior environmental scientist with a background in geochemistry of flooded soils and sediments, soil science, radioisotope methodology, microelement soil fertility, and wetlands plant nutrition. He was previously employed by the U.S. Army Corps of Engineers (USACE) Waterways Experiment Station (WES), where he served as a program manager, supervisor, technical lead, geochemist, and researcher for several national research and development programs supporting the USACE Navigation Mission. While there, he also made notable technical contributions that have advanced the state-of-the-art in the geochemistry of dredged material, flooded soils, wetlands, sediments, toxic substances, aquatic disposal, and domestic/international regulatory criteria, including assisting with development of the Elutriate Test for assessing the mobility of contaminants from dredged material proposed for aquatic disposal; this test is the most widely used test in the world for assessment of chemical mobility from dredged material. He also worked on the development of a practical sediment extraction procedure for evaluating the distribution, mobility, and bioavailability of contaminants in dredged material that maintained the anaerobic integrity of the sediment sample, resulting in a previously unattained realistic assessment procedure. In addition, he was the sole author of ocean disposal guidelines for dredged material that were promulgated by the London Dumping Convention (LDC), an environmental/regulatory treaty to which the U.S. and 61 other nations are signatory. These guidelines contain all aspects of testing, evaluation, and management of contaminated and non-contaminated dredged materials.

Wetlands/Soils & Sediments

Prior to joining Moffatt & Nichol as a Geochemist/Wetlands Soils and Sediments after completing a career at the USACE Waterways Experiment Station, Dr. Engler completed his Doctorate of Philosophy Studies majoring in the Geochemistry of Flooded Soils and Sediments and minoring in Radioisotope Methodology. For his Master's Degree studies, he majored in Microelement Soil Fertility and minored in Botany (Wetlands Plant Nutrition). His undergraduate studies majored in Soil Science and minored in Chemistry. His level of accomplishment with these studies was recognized by selection to membership in three honorary scientific societies – Alpha Zeta (1964), Gamma Sigma Delta (1969), and Sigma Xi (1980).

Dr. Engler, while employed by the USACE Waterways Experiment Station (WES), he was a Geochemist-Wetlands Soils and Sediments, researcher, Program Manager, upper-management supervisor and technical lead of several national R&D programs supporting the USACE Navigation Mission which include:

- The Dredging Operations and Environmental Research Program: Environmental and engineering risk based research regarding navigation, regulatory, modeling, dredging technology, and monitoring and disposal management at a cost of $50 million.
- Wetlands Research Program: Wetlands restoration, jurisdictional/regulatory, environmental management, and water quality in coastal and fresh water areas at a cost of $30 million.
- USACE Field Validation Program; Field validation of regulatory assessment and testing protocols required for Clean Water and Ocean Dumping Acts for

dredged material management in upland, wetland and aquatic disposal sites at a cost of $6million.

While at WES he has made notable technical contributions that have advanced the state-of-the-art in the geochemistry of dredged material, flooded soils, wetlands, sediments, toxic substances, and aquatic disposal, or domestic/international regulatory criteria. These accomplishments include:

- Development of a soil assessment technique for assessing the micronutrient (heavy metal) bioavailability to terrestrial and wetland plant systems (1969).
- Development of a technique for assessing the availability of various chemicals (macronutrients, micronutrient metals & toxic metals) in flooded and non-flooded soils and sediments (1972).
- Development (with Dr. John W. Keeley) of the "Elutriate Test" for assessing the mobility of contaminants from dredged material proposed for aquatic disposal. It is the most widely used test in the World for assessment of chemical mobility from dredged material (1975).
- Development of a practical sediment extraction procedure for evaluating the distribution, mobility, and bioavailability of contaminants in dredged material. The procedure maintained the anaerobic integrity of the sediment sample resulting in a previously unattained realistic assessment procedure (1978).
- Development of procedures for assessing the effects of various levels of anaerobic intensity on the chemistry of hazardous and nonhazardous materials in sediments and flooded soils (1980).
- Development of ocean disposal guidelines for dredged material that were promulgated by the London Dumping Convention (LDC), an environmental/regulatory treaty that the U.S. and 61 other nations are signatory. These guidelines contain all aspects of testing, evaluation, and management of contaminated and noncontaminated dredged materials (sole author). Presented and successfully defended through appropriate U.S. review agencies and presented/successfully defended at the LDC (1987).
- Development of a human health risk assessment for sediments and other bulky materials proposed for ocean disposal when there is a reason to believe the sediment has radionuclide contamination. Dr. Engler was the sediment expert on U.S. team at the International Atomic Energy Agency (IAEA) that developed the assessment protocol. It serves as a manual for regulators when making such an assessment. It is supported by a policy document for the application of radiological exclusion and exemption principles to sea disposal; this protocol is required for use by all nations (76) signatory to the London Convention (2001).

Regulatory Guidance Documents

Other countries have used Dr. Engler's work as a guideline to develop similar regulations. International agencies have used his work as a starting point to develop their own regulatory guidelines, as have other countries. In addition, other researchers have conducted investigations that are extensions of or build upon these contributions to further the state-of-the-art in these areas. Examples of these occurrences include:

- Seventy six signatory nations to the London Dumping Convention are now using the Dredged Material Disposal guidelines that Dr. Engler was instrumental in developing, as part of their individual domestic ocean dumping regulations. The member nations' domestic R&D community modified the guidelines as appropriate to account for regional variables and policies (1987-present).
- The London Convention 1972 adopted a Dredged Material Disposal Guidelines in 1987 for its 72-nation membership. Dr. Engler was instrumental in revising

these guidelines into the mandatory Dredge Material Assessment Framework (DMAF) that was unanimously adopted by the Convention in 1996. The DMAF allows for management of contaminated dredged material in ocean waters that was previously prohibited.

- As required by regulation, the Elutriate Test developed by Keeley and Engler is used by all USACE FOA's with a dredging mission. Several researchers have modified the approach for other disposal media (e.g., land disposal) (1975-present).
- The USACE Ecological Evaluation of Proposed Discharge of Dredged or Fill Material into Navigable Waters (Interim Guidance for Implementation of Section 404(b)(1) of Public Law 92-500 (Federal Water Pollution Control Act Amendments of 1972), 1976. This is the first manual for the Corps' Regulatory and O&M Dredging Program that resulted in a nationally consistent approach in assessing dredged sediments. It is still the only inland manual in 1997.
- The Corps/EPA Ocean Dumping Implementation Manual, as required by regulation, has been modified by the EPA research and Regional Staff for use with drilling mud and sewage sludge disposal. The manual has withstood legal challenges in Federal Court and is the basis for revision of the ocean criteria and revised implementation manual (1981-present).
- The selective extraction techniques developed by Engler and Brannon for quantifying contaminants in soils and sediments are used and referenced by quantifying researchers in the United States, Canada, the Netherlands, the United Kingdom, Germany, Italy, and Japan (1978- present).
- The Corps/EPA manual for "Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual - Inland Testing Manual." This manual replaced the Corps "Interim Guidance" in late 1997 and will be used for disposal in all U.S. waters inland of the baseline.

Training Activities

Dr. Engler's expertise has been further recognized through invitations to be an instructor in many non-Government and Government-sponsored training courses. These include:

- Instructor, Texas A&M University Dredging Short Course, Environmental Impacts and Regulations, 1975-present.
- Lecturer, Annual Dredging Technology Seminar, Old Dominion University, Norfolk-District- Sponsored, Norfolk VA, 1980-1985.
- Lecturer, Center for Environmental Dispute Resolution, Humboldt State University, Arcata, CA, 1993.
- Lecturer, Dredged Material Management Training Course – PROSPECT.
- Instructor, CE Committee on Water Quality Seminars, 1977 to present.
- Lecturer, CE Wetland Delineation, Assessment and Management Course on Chemistry of Flooded Soils.
- Lecturer, United Nations (UNEP and IMO sponsorship) Regional workshop on Hazardous Waste Management Policies and Strategies for East African Countries, Mauritius, Jun 1991; Cape town SA 1998; Ochoa Rios, JA 2000; Townsville Aust 2002.
- Lecturer, EPA Regional Seminar on Remediation of Contaminated Sediments, Jun 1991.
- Lecturer and Chair, EPA/CE Dredged Material Assessment and Management Regional Seminars, Pensacola, FL, 1991, Newport, RI, San Francisco, CA, 1992, Ann Arbor, MI, 1993, New Orleans, LA, 1994, Baltimore, MD, 1995, Portland, OR, 1995, Savannah, GA, 1997, Buffalo, NY, 1998, San Diego, CA, 2000, Baltimore, MD, 2001, San Francisco, CA, 2002, San Diego, CA, 2003, and Cleveland, OH, 2004.
- Lecturer, EPA Superfund/Sediment Remediation Workshop, 1992.

- Lecturer and Chair, CE Public Training Seminar on Dredged Material Disposal Alternative Selection, San Diego, CA, 1992.
- Lecturer, DOD Southeastern Region Environmental Management Training, Atlanta, GA, 1993.

Dr. Engler participated in numerous technical negotiations with the EPA concerning the development and publication of regulatory criteria and guidelines for the ecological evaluation of the discharge of dredged and fill material pursuant to Section 404 of Public Law 92-500 (Federal Water Pollution Control Act Amendments-FWPCA of 1972 and subsequent amending legislation) and Section 103 of Public Law 92-532 (Marine Protection, Research, and Sanctuaries Act-MPRSA of 1972 and subsequent amending legislation). Several negotiations were adversarial and were conducted before members of the Office of Management and Budget, 1974 to present. Dr. Engler joined Moffatt & Nichol Jan 2006 and has worked on numerous environmental, dredging and contaminated sediments related projects. The projects ranged from harbor deepening to Super fund sediment cleanup activities.

REPRESENTATIVE PROJECT EXPERIENCE

New Bedford Harbor Superfund Remediation Review, New Bedford, Massachusetts. Review for the Potential Responsible Party, EPA proposed remedial plans for PCB contaminated sediments, including dredging contained aquatic disposal, transport and past experience with this remedial alternative. Discuss technical pros and cons and present technical supporting documentation to prepare and submit a design review paper to the EPA Project Public Notice. 7243

Hudson River Remediation Progress Review, Albany, New York. Provided technical review, documentation and recommendations of the dredging, transport and disposal plans and specifications for the required Super Fund cleanup – Technical review of ongoing cleanup operations. 6967, 6967-01

Jasper Ocean Terminal, Jasper County, South Carolina. Developed a supplement to the District Dredged Material Management Plan and Long term management Strategy to replace the lower confined disposal facility for future port construction and find capacity for one million cubic yards annually for a fifty year planning window. 6820, 6820-10

Lower Passaic River Restoration Technical Review and Focused Feasibility Study, New Jersey. Provided review, documentation and technical advice to the Potentially Responsible Parties and selection of most practical remediation technologies and current technical documentation supporting the EPA remediation plan. 6306

Craney Island Expansion, Portsmouth, Virginia. Contributed regulatory components of ocean disposal of 25-30 million cubic yards of clean sediment removed for construction and gave a fatal error review of the contractors final regulatory testing report. 6300, 6300-02

Atlantic Sea Island Safe Harbor, New York, New York. Permitting and ocean disposal. Advised and made recommendations for assessment at contaminated sediments pursuant to Clean Water and Ocean Dumping Act regulations, guidelines and criteria. 5999

Center Point Terminal Maintenance Dredging, Newark, New Jersey. Completed all regulatory requirements (NJ and USACE), dredged material management plan and documentation as well as dredging best management practices, treatment technologies for maintenance dredging of highly contaminated dredged material

(Super Fund Site). Responsibilities also included the selection of competent dredging contractor. 5966

Newark Bay Environmental Assessment (EA), Newark, New Jersey. Provided technical advice and deposition on controversial Newark Bay deepening dredging in a Superfund Study Area. Co-author of court ordered Environmental Assessment. Recommended best management practices for dredging, transport and disposal. 5926

Honeywell Hackensack River Remediation Plan Review, Morristown, New Jersey. Provided technical review on all aspects of the court ordered remedial plans and technical documentation for dredging and capping of chromium contaminated sediments. Provided a summary declaration on the entire plan for client submittal to the court. 5951

Salton Sea Restoration, Salton Sea, California. Provided technical report on remediation of selenium contaminated lake sediments as part of a dredging, restoration and sediment reuse program. 5828

Golden Pass LNG Terminal, Port Arthur, Texas. Dredged material management. Advised and made recommendations on ocean disposal, confined disposal and beneficial use for the dredged material. 5659

South Brooklyn Marine Terminal, New York, New York. Dredged material permitting. Provided technical review, advice and recommendations for regulatory compliance and dredged material management and disposal alternatives for a highly contaminated turning basin and berthing area expansion. 5630-01

Bayshore Marina, Tampa, Florida. Dredged material permitting and testing. Described and advised on full Clean Water Act dredged material assessment and regulatory protocols in relation to dredging and upload disposal. 4620-07

AGL Marine Terminal Project. Environmental aspects of dredging. Advised and made recommendations on testing and management of contaminated dredged material for ocean dumping or alternatives.

Chevron Litigation Advisor. Technical Advisor regarding severe PAH sediment contamination and provided technical depositions on degree of contamination, risks and dredging and treatment technologies.

Hunter River PAH, Newcastle, Australia. Technical advisor and reviewer of all contractual plans and specifications for a major sediment remediation of severely PAH contaminated sediments. Recommended technical changes and dredged material management alternatives to client. Provided international ocean disposal regulatory constraints and developed the regulatory compliance plan.

Elizabeth River Contaminated Sediment Restoration. Member of the design team for a highly contaminated sediments remediation and restoration plan for the Elizabeth River, Republic location. Design plans included dredging technology, contaminated sediments management, dredging, transport and treatment alternatives for the Elizabeth River restoration

Regional Sediment Management-Marketing Dredged Sediment for Beneficial Uses. Directed project for USACE HQ and ERDC to promote the beneficial uses of sediments dredged from the Great Lakes harbors by mapping sediment sources, quantifying sediment demands and by estimating sediment transportation infrastructure needs and cost components. Partners include USACE Buffalo, Detroit, and Chicago Districts, The Great Lakes Commission (GLC), other state and Federal agencies, and Moffatt & Nichol.

Port of Morgan City. Conduct a sediment management study for the Atchafalaya River Bar Channel that has high sedimentation and fluid mud where navigation cannot be maintained by routine means. The proposed work focuses on determining if it is possible to. (1) keep sediment from consolidating in the channel by various agitation and water injection dredging means, and (2) using concepts of navigable depth and associated measurements, make the case to pilots that it is safe to navigate through the ABC mounds of unconsolidated fluid mud.

New Bedford Harbor Superfund Remediation: Review for the Potential Responsible Party, EPA proposed remedial plans for PCB contaminated sediments, including dredging contained aquatic disposal, transport and past experience with this remedial alternative. Discuss technical pros and cons and present technical supporting documentation to prepare and submit a design review paper to the EPA Project Public Notice.

Apex Centerpoint Terminal: Successful permitting, dredging, treatment and disposal of Passaic River, New Jersey emergency maintenance dredging of highly contaminated sediments located in a Super Fund area. Operations included environmental assessments, obtaining all Federal, State and local approvals, selection of dredging contractor, selection and contracting solidification and stabilization treatment technology and obtaining an approved placement. Treated sediments were used beneficially as construction fill

PUBLICATIONS

Engler, R.M. and W.H. Patrick, Jr., *"Sulfate Reduction and Sulfide Oxidation in Flooded Soil as Affected by Chemical Oxidants,"* Soil Science Society of America Proceedings, Vol 37, No. 5, 1973. (80%)

Engler, R.M. and W.H. Patrick, Jr., *"Nitrate Removal from Floodwater Overlying Flooded Soils and Sediments,"* Journal of Environmental Quality, Vol 3, No. 4, 1974. (80%)

Engler, R.M. and W.H. Patrick, Jr., "*Stability of Sulfides of Manganese, Iron, Zinc, Copper, Mercury in Flooded and Nonflooded Soil*," Soil Science, Vol 119, No. 3, 1975. (80%)

Joint Group of Experts on the Scientific Aspects Marine Protection, *"The State of the Marine Environment, GESAMP (IMO, FAO, UNESCO, WMO, IAEA, UN, UNEP),"* Blackwell Scientific Publications, USA, 3 Cambridge, Cambridge MA, 02142, 1990.

Engler, R.M., *"Managing Dredged Materials,"* Oceanus, Vol. 33, No. 2, Summer 1990.

Engler, R. and L. Saunders, and T. Wright, *"Environmental Effects of Aquatic Disposal of Dredged Material,"* Environmental Professional, 13:317-325, 1991. (70%).

Palermo, M.R. and R.M. Engler, and N.R. Francingues, *"The United States Army Corps of Engineer Perspective on Environmental Dredging,"* Buffalo Environmental Law Journal, S.U.N.Y. at Buffalo School of Law, April 1993. (30%).

International Navigation Association (PIANC) Group of Experts, *"Application of Radiological Exclusion and Exemption Principles to Sea Disposal,"* IAEA-Technical Document-1068, Vienna Austria, 1999.

"Guidance on Assessment of Sediment Quality," Program of Global Investigations of Marine Pollution in the Marine Environment (GIPME). Pub. No. 439/00. International Maritime Organization (UN), London, UK, 2000.

Engler, R.M., *"An Introduction to Sediments,"* In Handbook on Sediment Quality, Water Environment Federation. Alexandria VA. ISBN I-57278-3. 2002.

Engler, R. M. and D.J. Van den Bos, A. Macknight Kostiainen, P. Mortensen, T. Holm-Karlsen, T. Vellinga, G.J. de Wolf, H. Bergmann, J.H. Sargent, V. Korolov, and G. Axelsson, *"Disposal of Dredged Material at Sea,"* Permanent International Association of Navigational Congresses, Report of a Working Group of the Permanent Technical Committee II, Bull. No. 50; Brussels, Belgium; May 1986. (60%)

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