

# **A Brief History of the Navy's Innovative Technology Transfer Program from 1991 to the Present**

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# Navy ER,N Program/Innovative Technology in the Early 1990's



- Navy program in norming and storming mode
- Industry and Navy learning about how to implement the EPA guidance issued in the late 1980's (e.g., RI/FS, RAGs)
- Innovative technology is anything other dig and haul and pump and treat
- Chlorinated solvents do not degrade
- Petroleum sites were a big issue

# Navy ER,N Program in the Early 1990's



- In 1992, Bill Quade, NAVFAC Director of Environment, called together a NAVFAC-wide meeting of Environmental Cleanup folks in Port Hueneme to figure out how to increase the use of innovative technology into the Cleanup Program because this metric has been incorporated into his annual performance appraisal
- Birth of the Alternative Restoration Technology Team (ARTT) – NAVFAC-wide (Guam to Maine) team of innovative technology advocates and gatekeepers

# Technology in the 1990s to Early 2000s



- This timeframe saw the development, deployment, and mainstreaming of many now common technologies/techniques
  - In-situ chemical oxidation
  - Use of zero valent metals
  - Evaluation of natural attenuation for multiple contaminants
  - Enhanced bioremediation for multiple contaminants
  - Air sparging/Soil Vapor Extraction
  - Thermal heating
- It was a time of exponential increasing knowledge and tools

# Innovative Technology Transfer in the 1990s to Early 2000s



- ARTT advocated and supported deployment of innovative technologies
  - ZVI multi-site case study
  - ISCO pilot deployments across the country
  - Identified internal barriers to innovative technology deployment
  - Identify sites for R&D projects
- NAVFAC components set up technical groups (Remedial Technical Managers) to support with the implementation of study design, risk assessment, cleanup technology assessment, remedy selection, etc.
- NFESC supports innovative deployment with:
  - Broad Agency Announcement – contract vehicle for sole source contracting
  - Assigned each EFD/EFA a representation who became knowledgeable RPMs/sites and would identify potential innovative solutions for problems
  - Remediation Innovative Technology Seminar (RITS)
  - Development of policy/guidance documents for different contaminants/technologies
  - BADCAT/NELP technology demonstration programs
  - Tiger Teams
- Annual Environmental Restoration Program Conference

# Innovative Technology Transfer from mid-2000s to the Present



- Growth in innovative technologies/improvements slows, no longer exponential, more incremental
- Emerging contaminants have limited programmatic impact/relatively easy to handle
- NAVFAC goes through several BRAC related reorganizations (Philadelphia office closes, Charleston, SC office relocated to Jacksonville, FL – significant loss of personnel/knowledge)
- Remedial Technical Managers dwindle away over time
- NFESC assigned customer contact fades away
- ARTT lacks focus on what needs to be brought to the field and is folded into the RAO/LTM Workgroup
- Environmental Restoration Conference becomes bi-annual and ended for a while as a cost savings measure
- Pre-PFAS – program is moving to Remedy in Place
- Like many organizations NAVFAC is going through a significant amount of retirement
- **For various reasons, Navy over time slowly invests less and less in the technology advocate aspect of technology transfer without realizing the long-term ramification**

# Innovative Technology Transfer from mid-2000s to the Present



- Remediation Innovative Technology Seminar (RITS) continues annually – 2 days with approximately 40% of content related to something innovative
- Big push to make innovative technology information more accessible with a recently completed major revamp of the NAVFAC EXWC Environmental Restoration and BRAC website – lots of great information about tech transfer (T2) products on numerous topics
- Open Environmental Restoration Resources (OER2) webinars – occurs 2-3 times/year - covers a wide ranges of Environmental Program topics, occasionally something innovative
- TIPS – internal Navy only
- ERB Garden – Monthly newsletter covering a wide range of topics, sometimes something innovative
- Biennial RPM Training “Conference”
- NESDI (Navy Environmental Sustainability Development to Integration) program – Navy-specific R&D program
- **Multiple opportunities to market and reinforce innovative technologies by the Navy but the valley of death for technology transfer remains. No funding for technical support for moving a technology to the field.**



# Other Innovative Technology Transfer Programs



- **US EPA**
  - CLU-IN
  - Office of Superfund Remediation and Technology Innovation
  - Federal Remediation Technologies Roundtable
- **Interstate Technology and Regulatory Council**
  - Lots of great guidance documents
- **SERDP/ESTCP**
  - Going through website revamp to make information more accessible
  - Project PIs wrote a guidance document, journal article, and make a presentation
  - Enviro Wiki (website down?)
  - YouTube videos (really like the 1,4-dioxane video)
  - Online repository for ER projects for data mining of past results
- **Lots of great information but an RPM needs to be willing and have time to look for information that is relevant to an unmet need**

# RPM Considerations for an Innovative Technology Deployment aka The Valley of Death Issues



- Where does it fit into the program timing?
- How proven it is? Does it work with multiple contaminants?
- How much does it cost? Does it work with my budget? Potential for cost reduction?
- Is it more cost-effective than a more tried and true technologies
- What improvement does the innovative technology provide?
- Is the funding available for implementation and operation? Support if there is a failure?
- How difficult will it be to contract for?
- How well does the potential prime contractor(s) understand the technology?
- What are the issues with scale-up?
- How green and sustainable is the technology?
- Are there trusted sources of unbiased information about the technology?
- Where else was the technology used, what were the lessons-learned, and how did it perform?
- Regulatory agency acceptance usually is not a significant impediment
- **These issues will always exist but how quickly they are resolved depends on the RPM's resources – time, funding, support**

# How does an innovative technology get deployed to the field today?



- 5-15% of RPMs are early adopters of new techniques/technologies
- No longer have semi-official organization innovative technology advocates/gatekeepers.
- It operates off a network of who do you know that can help get a technology into the field combined with funding and timing
  - EXWC contacts RPMs to see if they would be interested in hosting a demonstration
  - RPM submits a need to a R&D program and receives funding for an accepted project
  - Contractor brings it to the RPM for consideration, who has to figure out the contracting and find other resources for help
  - Sometimes a RPM will go shopping for a solution
  - RPMs talk among themselves and may get recommendations
  - RPM identifies something from RITS, OER2, Battelle conference, etc. that seems to be a potential solution for a problem

# Where do we go from here?

- **Those who fail to learn from history are doomed to repeat it and will fail to avoid the valley of death**
- PFAS is now going through the emergent chemical cycle that has occurred for chlorinated solvents, MTBE, and perchlorate (similar to the stages of grief – bargaining phase?)
- Seems everyone is coming up with something to do something/treat PFAS
- Overwhelming amount of information is available on the Internet
- It is difficult for a RPM to discern what to believe with a high level of certainty
- Difference for PFAS from previous emergent chemicals is the lack of innovative technology advocates/gatekeepers/curators who can help all RPMs with moving technological solutions to the field (aka Good Housekeeping Seal of Approval)
- **Recommendations**
  - **Bring back the innovative technology advocates with the ability to leverage the multiple innovative technology programs**
  - **Higher level of support required from successful R&D projects DOD want to deployment to the field**

# What is the Navy Doing Now?

- Lack of innovative technology support has been recognized as a problem
- Early discussions underway for potential solutions
  - Technical Warrant Holder for Environmental Restoration Technologies
    - Purpose would be to provide performance verification of innovative environmental restoration technologies (e.g., new treatment technologies for chemicals of emerging concern, new munitions response technologies, remediation methods for recalcitrant contaminants)
    - Maintain cost and performance data – a verified/validated data base
      - Maintain current understanding of technology effectiveness and limitations
      - Updated cost information
      - Consolidates/assembles vendor information
    - Provide one authoritative place for innovative technology information for the Navy