

**MAY-JUNE TECHNICAL REPORT  
AMERICAN CYANAMID SUPERFUND SITE**

**CRISIS, Inc.**

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As readers may be aware, Superfund site investigations and remediation projects are often sub-divided by EPA into “Operating Units” or OU in EPA-speak. Each operating unit is initiated and organized into a separate administrative unit by EPA under separate legal authorities, consent orders, and Records of Decisions (RODs). As the remediation project moves forward, new issues may emerge, schedules get modified, and new Operating Units may be established. Over the 30 history of the American Cyanamid Superfund action several OUs were initiated, with some being closed out or superseded, and others continuing to the present and foreseeable future.

At present, work at the Bridgewater site is being conducted under two operating units, OU 4 Site - Wide Remediation and OU 8, Impoundments 1 & 2. Since I came on board as Technical Advisor to CRISIS in November 2012, the majority of my TA Reports and much of the focus by Pfizer in its communication with CRISIS has been on Areas of Concern under OU 4, including Site - Wide Ground Water Extraction, Injection and Treatment.

In the “early days” of my tenure with CRISIS, through part of 2014, much of the focus was on OU 8. Four of my early TA reports were totally or largely devoted to Impoundments 1 & 2, because at the time of my arrival Pfizer and EPA were planning and designing a major field pilot study in Impoundments 1 & 2, which were considered the most difficult elements on the entire site to treat and remediate. Approximately 15 years ago EPA and Pfizer’s owner/predecessors had a plan to remediate these impoundments which was subsequently judged to be technically infeasible - as in “back to the drawing board”. It was at that point that work on these 2 impoundments was separated from the rest of the site, and authorized under the separate operating unit, OU 8.

The following Technical Reports (available on the CRISIS web site) were devoted largely to Impoundments 1 & 2:

- July 2013: Impoundment 1 & 2 Update
- Sept. 2013: Focused Feasibility Study/Impoundments 1 & 2
- Oct/Nov 2013: Impoundment 1 & 2 Field Pilot Study
- March/April 2014: Impoundment 1 & 2 Field Study

- May 2014: Impoundment 2 and Site-Wide Ground Water

Since the Field Pilot Study was conducted in the first half of 2014. Pfizer and its consultants have been analyzing the data collected from that effort, supplementing it with further laboratory tests, and determining the feasibility of alternative approaches - and combinations of methods for remediating the two lagoons and in managing or treating the wastes they contain. Each impoundment is approximately 2 acres in size. The effort to determine the future remediation approach to these 2 difficult waste storage impoundments is being documented by Pfizer in its “Focused Feasibility Study” submitted to EPA.

CRISIS has been advised by EPA that in the near future (July?) they will give CRISIS a “high level briefing” on the findings from all of the studies on these 2 impoundments, an update that CRISIS welcomes. As we await that meeting, we felt it was a good time to bring readers up to date on the issues that make OU 8 and the two impoundments unique.

## **1.0 UNIQUE ELEMENTS OF IMPOUNDMENTS 1 & 2**

As noted above, EPA had determined years ago that the proposed methods for remediating these 2 impoundments were not technically feasible. Therefore, in EPA’s Record of Decision of September 2012, the first step toward dealing with the difficulties in remediating Impoundments 1 & 2 was to conduct a large scale field pilot study in the impoundments following laboratory bench scale testing to get a handle on the parameters of what such a pilot study should include. Among the unique elements of these two storage impoundments, the following were to be considered:

- The wastes stored in Impoundments 1 & 2 were the by-product of refining coal light oil from 1947 to 1965. The light oil was used to produce benzene, toluene and xylene, all major volatile organic contaminants when discharged to the environment.
- The material in the impoundments is highly volatile, and presently is capped with water to prevent vapor releases into the atmosphere.
- As an acid by-product, the waste has a very low pH, and is highly corrosive.
- The waste has unique and difficult physical properties; it is tacky, stringy and rubbery in some places and hard and crumbly in others.
- These impoundments are the area of concern on the site located closest to the Raritan River, about 700 feet north of the river in the active floodway
- Seepage from this area of the site had been reaching and contaminating the river until intercepted and controlled a couple of years ago.

## **2.0 REMEDIAL TECHNOLOGIES EVALUATED – FIELD PILOT STUDY**

Members of CRISIS and Bridgewater Township officials were given a tour of the pilot study area in the spring of 2014, and were able to observe the engineering and construction methods used to conduct the very elaborate field pilot study being carried out in Impoundment 2. The following technologies were tested during the large scale field study, with each test continuing for about a month:

- In-situ Thermal Treatment
- Stabilization and Solidification
- Combined Thermal Treatment and Stabilization

The testing of these methodologies also required collection and treatment of vapors released by the thermal treatment, to minimize air pollution to the neighboring community.

Following the completion of the field pilot study, CRISIS was given some indication of the outcomes of the tests conducted on the proposed technologies, with all of the technologies seeming to be potentially appropriate for the difficult scale - up to full scale remediation. It had been CRISIS' judgment that enlarging the treatment scope to full scale would be the toughest element of the entire determination as to what treatment methods would be feasible. Pfizer submitted its data from the 2014 field pilot study of Impoundments 1 & 2 to EPA early in 2015, and it has been under review and discussion ever since. More recently, three additional tests were run to try to enhance the results of the 2014 field pilot study to focus on the most appropriate and effective applications of technology to remediate the wastes stored on this area of the American Cyanamid site. These new tests were:

- A field study of the compatibility of various liner materials with the highly acid tar present in the impoundments
- A laboratory bench-scale test to evaluate Thermally Enhanced In-Situ Stabilization and Solidification
- A laboratory bench-scale test to evaluate the use of Mechanical Dewatering as a means of solidifying waste material and rendering it more suitable for handling.

Reports on these three supplemental processes were scheduled for transmittal to EPA in May 2016.

## **3.0 POTENTIAL REMEDIATION ALTERNATIVES FOR IMPOUNDMENTS 1 & 2**

It is CRISIS' understanding that there are three principal alternatives being considered by Pfizer and EPA for the remediation of the nasty waste materials being stored in Impoundments 1 & 2, using technologies tested in 2014.

### **3.01 In-Situ Remediation**

The difficult physical properties of the wastes in the impoundments suggests that it could be safer and easier to treat the wastes in place, contain them, and leave them in place. While we have not seen the data from the field pilot studies conducted in 2014, it is understood that by the processes tested the wastes would become both less toxic and more stable with the combined heat treatment and stabilization/solidification processes investigated. If, following treatment and stabilization a secure engineered cap were constructed on top of the lagoons to provide a impermeable barrier, it might be possible to meet CERCLA (Superfund) remediation objectives by allowing the waste material to remain encapsulated in the two impoundments.

### **3.02 Treatment in Place and Disposal Elsewhere on Site**

The area of the AmCyan site known as Impoundment 8 is a secure RCRA landfill that is upland and apart from the Raritan River flood plain, which is authorized for the storage and disposal of treated wastes. Once treated in place, the waste materials stored in Impoundments 1 & 2 may be of a character that makes it feasible to transport them to Impoundment 8 and to secure them in compliance with the RCRA standards for storage facilities for hazardous wastes.

Note: RCRA, the Federal Resource Conservation and Recovery Act (1976) regulates the transport and storage of hazardous and solid wastes.

### **3.03 Combustion Off-Site at Cement Kilns**

One of the reasons that Pfizer has been testing mechanical dewatering for the treated waste materials in Impoundments 1 & 2 is to render the material suitable for combustion off-site in thermal facilities, including cement kilns. Waste materials with a suitable content of combustible energy is commonly mixed with fuels at thermal facilities such as cement kilns. The consideration of mechanical dewatering for the residual wastes from Impoundments 1 & 2 anticipates the potential utility of the waste for high temperature combustion. If this is both technically and economically feasible it could result in the desirable circumstance that the end-point location for these wastes would be away from the AmCyan site in Bridgewater.

### **3.04 CRISIS' Concerns with Remediation Alternatives for Impoundments 1 & 2**

In November 2012 Pfizer presented its plans to CRISIS for its field pilot studies to test the feasibility of different treatment approaches for the wastes stored in Impoundments 1 & 2. One of the points made clear at that time was the very difficult chemical and physical characteristics

of these materials. We have followed their work closely on these two facilities, and understand the difficult issues they are confronting. Nevertheless, we have concerns regarding Impoundments 1 & 2, most notably the following:

- **Scale:** The field pilot studies were a major scale up in size from the original laboratory scale. The caissons used as test chambers for the treatment methods tested on-site were 7 feet in diameter, for a cross-sectional area of about 38 square feet, quite large for a test being conducted on the feasibility of treatment processes. The tests were largely successful in confirming the feasibility of the processes at that scale. Impoundments 1 & 2 are each over 2 acres in area, totaling roughly 90,000 square feet, over 2,000 times the area of each test chamber. Taking a process that works and scaling it up by 2,000 times, while theoretically possible, may be too difficult and impractical to accomplish - and thus the remedial technologies that proved useful in pilot tests may not be feasible at full scale.
- **Vulnerability:** The in-place, in-situ alternative for treating the wastes in Impoundments 1 & 2 minimizes the difficulties in transporting the treated wastes, but keep them within the Raritan River floodway zone, which we believe to be particularly vulnerable to future flood events. Removing the wastes from the flood zone is a CRISIS priority.

#### **4.0 IMPOUNDMENTS 13, 17 & 24 (UPDATED)**

My Technical Reports in 2015 had a heavy emphasis on Impoundments 13, 17 & 24.

The report issued in April of that year focused on Pfizer and EPA's conduct of an Ecological Risk Assessment (ERA) at these impoundments as specified under EPA's Record Of Decision (ROD) of 2012. The ERA studied the impacts of contaminants at those 3 impoundments on a wide variety of land based species and birds that may come in contact with the wastes at the locations of the impoundments (excluding aquatic species in the river that were the subject of previous ecological studies).

In my September 2015 Technical Report I outlined the potential remediation and risk management measures under consideration for Impoundments 13, 17 & 24 based on the final results of the Ecological Risk Assessment. The potential measures included:

- No Remediation Action
- Hot Spot Removal
- Capping
- Excavation and Disposal in a Safe Zone

I also discussed the hazards of flooding at the site, and the fact that these three impoundments are located in the flood zone within the west area of the site, and therefore are vulnerable to floods. CRISIS expressed its concerns that under two of the above-listed alternative measures, the majority of the waste material in Impoundments 13, 17 & 24 would remain in place, within the potential reach of flood waters.

Note: The wastes stored in Impoundments 13, 17 & 24 are “hazardous”, but not nearly as toxic or difficult in character to work with as the wastes stored in Impoundments 1 & 2.

In its latest progress conference call with CRISIS, Pfizer indicated that the present plan for Impoundments 13, 17 & 24 is to excavate and remove the entire top 2’ of surface material, but allow the deeper material to stay in place with an engineered cap. This approach exceeds the no action, hot spot removal and capping options listed above, but still keeps the bulk of the contaminated material within the flood zone.

We believe that Pfizer and EPA have paid attention to our concerns, BUT, we are still concerned and will continue to press for the excavation and removal of waste from these 3 vulnerable impoundments.

If you have any questions or comments, please contact CRISIS’ Technical Advisor by e-mail at [iwhitman@whitmanco.com](mailto:iwhitman@whitmanco.com).

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