MAY - SEPTEMBER TECHNICAL REPORT
AMERICAN CYANAMID SUPERFUND SITE

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My most recent Technical Report was devoted to Impoundments 13, 17 and 24, and to the Ecological Risk Assessment presently underway at those three (3) impoundments. CRISIS had the benefit on March 26, 2015 of a presentation by EPA and Pfizer on the progress made to date in conducting that Ecological Risk Assessment (ERA).*

1.0 EPA'S 2012 RECORD OF DECISION AS RELATED TO IMPOUNDMENTS 13, 17 & 24

EPA specified the conduct of an ERA in its Record of Decision (ROD) of 2012, noting that each of these 3 impoundments contains hazardous chemicals and is located in a flood-prone area within the 100-year flood zone on the Am Cyan. site. EPA's ROD stated "the ERA was needed to "*confirm the appropriate treatment for these materials,"* and "*if the ecological risk assessment identifies any impoundment contents that present an unacceptable risk, these materials would be relocated and consolidated in the North Area in areas where the same types of controls are warranted*".

CRISIS has been alarmed by flood hazards at the American Cyanamid site, and is particularly concerned with the prospect of capping soils and impoundments in the flood plain that contain high concentrations of hazardous waste material. CRISIS' concerns are related to the potential for hazardous substances to be washed into the Raritan River. This prospect is addressed in the section of the ROD describing the selected remedy with the following specification:

> All engineered caps will be designed and constructed to withstand the effects of a 500-year flood event. In addition, the engineered caps will be designed and constructed to protect against all Site-specific hazards which may pose a threat to their integrity, such as flooding, inadequate drainage, slope instability, erosion, freeze/thaw cycle effects, surface vegetation and any other risks associated with being located in a flood hazard area. An inspection and maintenance program for the

* It should be noted that the ERA has identified a small number of mammals and birds at risk, but does not consider impacts on aquatic life in the Raritan River, nor humans who could be impacted by waste materials transported as a result of flood flows.

engineered capping systems will be developed as part of the ongoing operation plan for the Site.

While the ROD provides a measure of assurance to public concerns, CRISIS is continuing to take a closer look at the risks associated with the remediation of Impoundments 13, 17 and 24. Will the engineered caps really withstand the largest floods that historically plague the Raritan River?

2.0 CHARACTERISTICS OF IMPOUNDMENTS 13, 17 AND 24

The three impoundments are described as follows in Pfizer's work plan for its Pre-Design Investigation (PDI), October 2013:

- Impoundment 13 – An approximately 3.9 acre area located outside of the southwest corner of the flood control dike of the former Main Plant area. From approximately 1948 to 1959 the impoundment was first used for lime storage for Cyanamid's wastewater treatment facility, and subsequently used for disposal of sludges.
- Impoundment 17 – An approximately 6.2 acre area located outside of the flood control dike, just south of the Conrail (former Port Reading) Railroad tracks. This area was in active operation from 1966 to 1969 originally for storage of primary sludge generated from the settlement of lime-neutralized effluent, and later for disposal of plant debris.
- Impoundment 24 – An approximately 3.2 acre area located in the southwestern area of the Site, just north of the Conrail (former Lehigh Valley) Railroad tracks. This area was actively used at its inception in approximately 1940 for storage of lime for the primary treatment facilities and later for disposal of sludges and general plant wastes.

2.01 Contents of the Impoundments

Because these three impoundments were used to store solids (waste by-products or sludge) from waste water treatment operations, their contents are different from some of the other waste storage areas on the Am Cyan site in the following ways:

- A wide variety of COPeCs (Contaminants of Potential Ecological Concern) are found in each of these impoundments
- Concentrations of these chemicals may be lower than at other locations on the site where they are present and are not classified by EPA as "principal threat wastes".

Significant hazardous materials in the 3 impoundments include:

Volatile Organics (VOCs)	Benzene

	Xylene
	Tetrachloroethene (PCE)
Semi Volatile Organics (SVOCs)	Anthracene
	bis (2-Ethylhexyl) Phthalate
	Fluorene
	Pyrene
Metals	Arsenic
	Chromium
	Lead
	Mercury
PCBs	Arochlors

The material of concern in the impoundments is a solid material, i.e. soil, not a liquid or viscous substance found in other impoundments.

For the Ecologic Risk Assessment, samples were taken only of the top two (2) feet of the impoundment contents, as this is considered to be the layer exposed to the species of animals and birds potentially at risk from exposure to the COPeCs.

2.02Recent Studies of Impoundments 13, 17 & 24

The Ecological Risk Assessment described in my March – April 2015 Technical Report focused on the terrestrial ecological risk as per the 2012 Record of Discussion.

Certain chemicals were found to be of concern with regard to ecological impacts on those species at risk, specifically short tailed shrews and robins. The risk is multiplied by the propensity for the chemicals to accumulate up through the food chain for those species. In the primary example presented to us by Pfizer for Impoundment 24, Antimony (a metal), Analene (a SVOC) and Arochlor 1254 (a PCB) were of primary concern, leading the study report to recommend further risk assessment or potential risk management measures.

2.03Potential Remediation and Risk Management Measures

While the ERA for Impoundments 13, 17 & 24 is not yet complete, EPA and Pfizer are likely to be looking at the following remediation and/or risk management measures that would render these three areas free of unacceptable risk to potential human and/or ecological receptors.

Potential Remediation/ Risk

Management Measure	Rationale for Selection
1. No Remediation Action	If the ERA determines that the material in the impoundments is stable, and represents no hazard to potential ecological receptors, "no action" may be the selected remedy.
1. Hot Spot Removal	It may be determined that discrete "hot spots" are present in these impoundments in the top two foot layer. Hot spots would be removed and transferred to the Impoundment 8 facility in an upland area of the site. The Impoundment 8 area is designated for treatment and/or disposal of material from elsewhere on-site. The remainder of Impoundments 13, 17 & 24 would be maintained as is.
1. Capping	A finding by EPA that the entire contents of one or all of Impoundments 13, 17 & 24 warrant treatment could lead to a determination that the impoundment(s) should be capped in conformity with the 2012 ROD, such that all engineered caps will be designed and constructed to withstand the effects of a 500-year flood event.
1. Excavation	If EPA finds that the contents of Impoundments 13, 17 & 24 warrant treatment and/or other remediation; and if EPA determines that the location of Impoundments 13, 17 & 24 present an *unacceptable flood hazard*, EPA could decide to have the contents of these impoundments excavated and transported to a safe zone, likely Impoundment 8 elsewhere on-site.

3.0 FLOOD HAZARDS AT AM CYAN SITE

3.01Raritan River

The Raritan River floods, and will continue to flood. In a world (Am Cyan Site) of environmental hazards of varying certainty and uncertainty, continued flooding of the Raritan River *is a certainty.*

Based on National Weather Service data, with a U.S. Geological Survey (USGS) river gage at Bound Brook, the river has reached flood stage on 28 different occasions since 1970, a

frequency of one flood every 1.6 years. The two most significant flood stages were #1, Hurricane Floyd – September 1999 and #2, Hurricane Irene – August 2011. In both cases the river was approximately 14 feet above flood stage, and nearly 4 feet higher that the next highest flood stage which occurred in 2007.

Many of the flood events on the river were not hurricane storm events. Floods occur during all seasons in this watershed. Winter floods may be exacerbated by frozen ground unable to absorb water, and by snow melt. Ice jams also have potential for contributing to flood stages. The resulting flood elevation during a flood event may be impacted by such factors as:

- The intensity of the rain vs. the duration.
- The direction in which the storm moves across Central New Jersey.
- The flood storage capacity in several reservoirs upstream of Bridgewater/Bound Brook at the time of the storm.

While the National Weather Service has developed the means to accurately forecast flooding, the variables cited above limit their ability to be consistently accurate regarding the actual elevation at which the river will crest. Hence, even with today's computer model based predictions, uncertainty regarding future flood stages can be anticipated, and waste materials stored within the flood plain may not be secured well enough to prevent their being dislodged from their protected storage areas.

3.02On-Site Flooding & Storm Runoff

Pfizer was very helpful in detailing on-site runoff conditions for me in advance of this report. Among the important factors:

- In the north area of the property, storm sewers collect runoff in low areas which is then pumped for storage in Lagoon 7.
- Storm water from Lagoon 7 is treated after being pumped out.
- The site presently receives storm water from the area of the adjacent Somerset Patriots baseball stadium; however these flows will be diverted elsewhere as the on-site remediation proceeds.
- As a consequence, we are more concerned about floods from the river than internally generated runoff.

3.03On-Site Flood Protections

In my Technical Report of March – April 2015, I indicated that EPA has designated the site into 5 discrete areas:

- Impoundment 8 Facility
- North Area
- East Area
- South Area
- West Area

The flood protections in each of these areas are described by Pfizer as follows:

3.03.1 Impoundment 8 Facility

According to EPA, the entire site lies within the flood hazard area of the Raritan River except for the Impoundment 8 Facility, which is designated as the on-site *Corrective Action Management Unit.* 34 acres in area, Impoundment 8 is situated within a flood control berm (wall) on higher ground than the remainder of the site, and has never flooded. Impoundment 8 is, and will be, the permanent on-site storage location for most of the hazardous wastes present on the Am Cyan site.

3.03.2 North Area

The North Area is approximately 200 acres, situated entirely within the on-site flood control berm. The elevation of the flood protection berm is approximately equal to FEMA's determination of the statistical 100 year flood stage*. This flood perimeter berm has been topped 3 times in the last 45 years; 1971, 1999 and 2011. Some of the impoundments within the North Area have their own individual control berms.

3.03.3 East Area

The area east of I-287 is a low area where no manufacturing or waste treatment/storage took place. There are no issues of exposure of hazardous materials to flood waters in the East Area.

3.03.4 South Area

Impoundments 1, 2, 15, 16, 17 and 18 are located in the South Area. While each impoundment has a protective berm to the elevation of approximately the 25 year flood, water from the river trapped by the Conrail line can overtop these impoundments.

3.03.5 West Area

Within this area (directly exposed to the river) most impoundments are protected with berms. Their status is:

- Impoundments (lagoons) 6 & 7 are used in the management of storm water.
- Impoundment 11 has been remediated.
- Impoundment 12 was not used for waste storage.

**The "100 year flood" (or any other frequency flood) is based on a statistical analysis of historic storms/historic floods over the time period for which records exist. This statistical determination will change over time as new floods occur, and as conditions in the watershed and on the site change.

- Impoundments 13 and 24 are vulnerable to floods, and are subject to the current Ecological Risk Assessment along with Impoundment 17, which is located in the South Area.

4.0 SUMMARY

While CRISIS appreciates Pfizer's steady (but slow) progress in remediating the Am. Cyan site, the flood issue remains an element with the potential to seriously impact the public's health and well being.

Impoundments 13, 17 & 24 are at the intersection of ecological risk, remediation, and flood vulnerability, which is why CRISIS (and EPA) have focused attention on these three waste storage locations. The Ecological Risk Assessment for Impoundments 13, 17 & 24 is continuing, and we will continue to monitor not only Pfizer's progress, but the outcome of the assessment. Based on our discussions with EPA and Pfizer at our bi-monthly teleconference of September 20, 2015, it is likely that we will not have the results of the ERA until late in 2016.

The expected outcome from this study is the "Hot-Spot Removal" described in Section 2.3 of this report. However, because of the uncertainty presented by flooding from the Raritan River, CRISIS will push for the remediation approach at Impoundments 13, 17 & 24 that will minimize future risks to the public from hazardous wastes being stored in areas prone to continued flooding, and therefore at risk of being washed out of place.

If you have any questions or comments, please contact CRISIS' Technical Advisor by email at iwhitman@whitmanco.com.

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