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April 6, 2007

FOR INCLUSION IN THE ADMINISTRATIVE RECORD

Eve Vaudo, Esq.
U.S. EPA, Region I
One Congress Street
Boston, MA 02114-2023

RE: Centredale Manor Site
NECC Customer Group de minimis Offer and Hass Report

Dear Eve:

As we discussed, the NECC Customer Group and its consultants have carefully examined the "Hass Report" submitted to USEPA by Emhart and we have prepared a detailed response to it that we believe effectively debunks his assertion that the NECC drum recycling operation was responsible for the 2,3,7,8-TCDD contamination at the Site rather than his own client, Emhart. Please ensure that this memorandum is included in the administrative record for the Centredale Manor site.

Please also allow this letter to serve as a renewed request that the agency consider the merits of the NECC Customer Group de minimis settlement proposal. At the time of your November 13, 2006 letter regarding the proposal, you indicated that EPA had "not yet conducted a complete evaluation of the proposal's substantive elements." While we respectfully disagree with the agency that our de minimis proposal is premature, it would prepare U.S. EPA for making a decision when the agency deems the timing to be correct if the substantive analysis was to proceed apace.

If we can furnish additional information that would assist the agency or meet with you again to answer questions and discuss the matter, please let me know.

Sincerely,

David

David B. Graham

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Exponent®

EXTERNAL MEMORANDUM

TO: NECC Customer Group

FROM: Paul Turnham (Exponent)
John Griffin (Exponent)
Noemi Barabas (Limno-Tech)
Greg Peterson (Limno-Tech)

DATE: April 4, 2007

PROJECT: VA10504.000

SUBJECT: Review of Dr. J. Ronald Hass's evaluation of EPA's Conceptual Site Model for the Centredale Manor Restoration Project Superfund site.

The objective of this memorandum is to assess the validity of the arguments put forth by J. Ronald Hass, Ph.D., a consultant working on behalf of Emhart Industries, in his October 19, 2006 report titled "Evaluation and Opinions on the Conceptual Site Model Contained in U.S. EPA's Interim-Final Remedial Investigation Report and Human Health and Ecological Risk Assessment Reports."

Essentially, Dr. Hass's arguments attempt to shift the responsibility for the dioxin (specifically 2,3,7,8-tetrachlorodibenzo-p-dioxin [2,3,7,8-TCDD]) contamination present at the Centredale Manor Restoration Project (CMRP) Superfund site from his client, the successor in interest to the former chemical manufacturer at the site, Metro-Atlantic (MA), to New England Container Company (NECC), which operated a drum reconditioning operation at the site. He concludes that EPA's Interim-Final Remedial Investigation (EPA's RI) is flawed on several points, in particular, its conclusion that the dioxin contamination at the site is attributable to MA's manufacture of hexachlorophene at the CMRP Site. We disagree with a number of his conclusions.

The NECC Customer Group is a group of nine companies that have been identified as Potentially Responsible Parties at the site because they allegedly sent drums for reconditioning to NECC. Dr. Hass's comments do not mention or directly implicate the NECC Customer Group. However, EPA has cited his report as one of the reasons for its determination that at this point the NECC Customer Group's proposed de-minimis settlement is premature.[1]

EPA's risk assessment has shown that 2,3,7,8-TCDD (the most toxic of the members of three closely related families: the chlorinated dibenzo-p-dioxins (CDDs), chlorinated dibenzofurans (CDFs) and certain polychlorinated biphenyls) is the primary driver of risk at the site and as such is likely to have the most influence on the scope and cost of future remedial activities. PCBs are a secondary risk driver. Dioxins and furans other than 2,3,7,8-TCDD contribute minor amounts to the risk posed by the site. EPA associates the presence of 2,3,7,8-TCDD at the site with MA's manufacture of hexachlorophene (HCP) beginning in or around 1964. Although another chemical found at the site, hexachloroxanthene (HCX), has also been associated by EPA with the HCP process, its presence has little influence on the risk. Dr. Hass, however, dedicates much of his discussion to this compound because it potentially represents evidence of releases from MA's hexachlorophene process.

Dr. Hass's main arguments can be summarized in two points:

1. The 2,3,7,8-TCDD in the feedstock (2,4,5-trichlorophenol (2,4,5-TCP)) for MA's HCP manufacturing process was the only dioxin that the MA process ever contained. He claims that this dioxin was removed from the HCP process stream by adsorption to activated carbon and surmises that the contaminated carbon was subsequently removed from the site by a waste hauler.

2. All dioxin contamination at the site can be attributed to NECC's operations. For example, without any factual basis for doing so, he speculates that NECC received drums containing 2,4,5-TCP and created new dioxin in its tight head drum-cleaning tank.

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[1] See November 13, 2006 letter from E. Vaudo to NECC Customer Group representatives.

This memorandum addresses these and other points made by Dr. Hass. It is organized by reference to the main section headings in his report.

A. "The hexachlorophene production process employed at the CMRP Site was incapable of producing 2,3,7,8-TCDD or HCX."

We do not dispute his assertion that the MA process could not have formed 2,3,7,8-TCDD. Dr. Hass points out that Mr. Thomas Cleary, the chemist who was instrumental in designing the HCP process at MA, concludes the same.[2] 2,3,7,8-TCDD was probably not produced during the hexachlorophene manufacturing process, but is a known impurity in the main feedstock material, namely 2,4,5-TCP, and Dr. Hass does not dispute this fact.

On Page 2 of his report, Dr. Hass begins a description of MA's HCP process. We find that Dr. Hass's process flow diagram (on Page 3) and description (Pages 3 through 7) for MA's HCP process are generally consistent with the available information (the most important of which are Thomas Cleary's 2003 deposition and exhibits and his patents).

The 2,4,5-TCP brought on site by MA was as an aqueous solution of sodium 2,4,5-TCP at a concentration of 36-38% (Cleary 2003 Exhibit 8). Diamond Alkali (the source of MA's TCP) test results for its sodium 2,4,5-TCP solution during the period May 1965-January 1967 indicate that 2,3,7,8-TCDD concentrations in the "crude" TCP solution range from 7-38 mg/kg.[3] For 1965 the average 2,3,7,8-TCDD concentration in the crude TCP solution was 22 mg/kg. Dr. Hass has acknowledged the presence of 2,3,7,8-TCDD in the feedstock with 50 ppm (mg/kg) "worst case" 2,3,7,8-TCDD content. However, Dr. Hass asserts that "essentially all" the 2,3,7,8-TCDD was captured in the activated carbon used in the HCP process.

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[2] Thomas Cleary deposition, February 10, 2003, Page 92.

[3] Dioxin Registry Report. Report Prepared by Review Documents from Diamond Shamrock Corporation, Diamond Alkali Company, Newark, New Jersey, Report Mo. IWS-117-16. Division of Surveillance, Hazard Evaluations and Field Studies, NIOSH, U.S. Department of Health and Human Services, Cincinnati, Ohio, June 1986.

Dr. Hass discusses the use of activated charcoal "Nuchar" during the TCP purification process, which he claims would remove the majority of the 2,3,7,8-TCDD. The information available on the process suggests that carbon (or charcoal) was added in two stages of the process:

1) During purification. Cleary's Exhibit 8 indicates 10 pounds of carbon "Nuchar" was used for every 1,000 pounds of TCP contained in the crude TCP feedstock solution. This carbon was added after the initial separation of the TCP from the aqueous components of the feedstock solution that was achieved by crystallization and centrifuge, and its subsequent dissolution or "extraction" into the carrier solvent perchloroethylene (this is shown on Dr. Hass's process flow diagram as "Step B").

2) Post reaction. Carbon was also used after the purified TCP had been reacted to form HCP. This carbon was collected on a filter.

Dr. Hass's conclusion that the carbon captured "essentially all" the 2,3,7,8-TCDD present in the crude TCP feedstock is inconsistent with the available information on the HCP manufacturing process described by Mr. Cleary. The latter information strongly suggests that approximately 12% to 21% of the TCP in the feedstock solution was lost in the first stage of the purification process prior to any carbon being added as explained below.

Dr. Hass's schematic of the MA hexachlorophene process shows an aqueous waste stream from the first stage of the process (Step A) and the carbon added after the TCP had been centrifuged and extracted into perchloroethylene (in Step B). Dr. Hass, in Footnote "a" on Page 5 of his report, further describes MA's TCP purification process, noting in several instances that any 2,3,7,8-TCDD would remain tightly bound to the TCP. Mr. Cleary, in his February 10, 2003 deposition, described his Exhibit # 8 entitled "ZEP Manufacture Phase 1" as a materials list for the purification stage (Hass process flow Steps A and B). Cleary Exhibit # 8 states that for every 1,000 pounds of TCP in solution (as received), one can expect to yield between 787 pounds and 880 pounds of purified TCP. Thus, during the purification process approximately 12% to 21% of the TCP in the feedstock was not recovered and not carried through to latter stages and was entrained in the aqueous waste stream. Using this information and quantities

and time of operation provided by Mr. Cleary in his deposition and during a conference call with counsel and technical consultants on October 21, 2005, the amount of 2,3,7,8-TCDD contained in the lost TCP can be estimated. Table 1 provides this calculation.

Table 1. Estimated 2,3,7,8-TCDD lost from initial 2,4,5-TCP purification stage

Description	Low	High	Units	Source
TCDD content of TCP solution	22		mg TCDD/Kg TCP soln.	Diamond Alkali average for 1965
TCP content of TCP solution	37%			Cleary deposition Exhibit 8
TCDD content of TCP	59		mg TCDD/Kg TCP	Calculated
# Batches per day	2		batches/day	Cleary conference call 2005
Months of operation	9	12	months	Cleary conference call 2005
Days of operation	274	365	days	Calculated
TCP solution per batch*	1,351	1,351	lbs/batch	Exhibit 8 and Cleary 2005 cc
TCP solution used total	335,597	447,463	Kg TCP	Calculated
TCP used	124,171	165,561	Kg TCP	Calculated
TCDD brought onsite	**7.4**	**9.8**	Kg TCDD	Calculated
% TCP lost in Stage A	12%	21%		Cleary deposition Exhibit 8
TCDD lost in Stage A	**0.9**	**2.1**	**Kg TCDD**	

** So as to contain 500 lbs TCP*

The above calculation shows that of the approximately 7 to 10 Kg of 2,3,7,8-TCDD brought on site by MA, approximately 1 to 2 Kg of this was lost in the first stage of the purification process. It does not account for any other losses that may have occurred through wastage, spillage, discharge of bad batches (the process was according to Cleary "tricky"[4]). unused feedstock, etc. The actual mass of 2,3,7,8-TCDD released could have been larger.

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[4] When describing the process of making hexachlorophene, Mr. Cleary stated:

"*...there are very tricky chemical aspects to the manufacture of hexachlorophene which one can only determine by experimental work of trying to make the substance in the laboratory. And one of them, the primary one, is that in order to get good yields of a good product, you need to start with a raw material – namely, 2,4,5-trichlorophenol – which is very high in purity. Another important aspect of manufacturing it is that the proportions of the reaction – the reactants that you use in this preparation have to be exact with relationship to one another. If there is too much of one and not enough of another, why the results are not good, the yield is not good, the quality is not good, and, accordingly, the cost is bad and the customer is not interested.*" Thomas Cleary deposition February 10, 2003, page 22, lines 7-22.

Dr. Hass neglects the possibility of any of the above in his rationale for why MA could not have released 2,3,7,8-TCDD. Even today, 100% efficiency is unattainable in process engineering, even when processes are designed with a specific and known target chemical in mind. In the case of MA, the target chemical was unknown, the design was not specific, and it is unreasonable to assume that purification did not leave behind residuals, or that material transfer, in a time before environmental regulations, did not result in spills and left-over liquid and solid materials, either feed materials, or waste materials. In summary, Dr. Hass implausibly assumes that for the 2,3,7,8-TCDD containing materials that MA brought onto the site in the 1960s, at a time prior to environmental regulations, a zero-emission operation took place.

With respect to the removal of 2,3,7,8-TCDD by carbon, occurring in Step B after the initial separation and in later stages of the HCP process, Dr. Hass claims that it would achieve a better than 630,000,000-fold reduction in concentration of 2,3,7,8-TCDD in the TCP.[5] However, this removal efficiency, which he derived from consideration of 2,3,7,8-TCDD's octanol-water partition coefficient, is not supported by empirical data. Diamond Alkali, the source of MA's TCP, added a purification column filled with activated charcoal to its TCP manufacturing process in September 1967 (after MA use) which resulted in a drop from approximately 16 ppm to 1.1 ppm. This approximately 15-fold reduction when applied to the example given by Hass results in a 2,3,7,8-TCDD content of carbon-treated TCP of approximately 3 parts per million (50ppm/15), not, as concluded by Dr. Hass, "much less than 0.5 parts per trillion" (this is a 6-million fold difference).

Furthermore, on Page 15 of his report Dr. Hass states, "It is well established that removal of 2,3,7,8-TCDD and/or PCDD/PCDF from charcoal is very difficult." As one support to this claim, he cites Patent 4,102,816. However, according to Patent 4,102,816, "Recovery of the polynuclear compounds from the adsorbent may generally be accomplished by treatment of the loaded adsorbent with a suitable solvent. e.g., where a column is employed for adsorption of 2,3,7,8-TCDD, recovery of the 2,3,7,8-TCDD from the adsorbent may be achieved by washing

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[5] It is acknowledged by Dr. Hass and Mr. Cleary that at the time of HCP production at MA, 2,3,7,8-TCDD was an unknown impurity. Activated carbon (or charcoal) was not used with the intention of removing dioxin. Rather, according to Mr. Cleary, it was used for color removal.

the column with toluene or benzene-toluene mixtures." During the 2005 conference call, Mr. Cleary stated that the filter and carbon were washed with solvent and not disposed of as waste (he had no knowledge of the disposition of the rinsate). Thus, it is possible that 2,3,7,8-TCDD initially captured on the carbon was transferred into the solvent, which in turn may have been disposed of on site or discharged into the river.

Beginning on Page 7 of his report, Dr. Hass says the properties of the soil samples at the site preclude the possibility that 2,3,7,8-TCDD and HCX originated from the HCP process. He briefly recaps his earlier arguments on the impossibility that MA could be responsible for the 2,3,7,8-TCDD at the site. In this section of his report, Dr. Hass assumes that 2,3,7,8-TCDD bound to activated charcoal would have to be present at the site in order for the 2,3,7,8-TCDD to be associated with MA. He then states that the analytical data are inconsistent with this proposition.

We have shown that solvent rinsing of the charcoal may have removed the 2,3,7,8-TCDD and that it may have been released in the TCP lost in the first step. In addition, any 2,3,7,8-TCDD associated with carbon that may have been disposed of on site and subsequently collected as part of a soil sample would likely have been recovered and analyzed with the sample extract. Therefore, his argument lacks merit.

Dr. Hass then dedicates several pages to HCX, concluding that the HCX data must be disregarded and "...there is no basis to support U.S. EPA's contention in the RI that the alleged contamination by 2,3,7,8-TCDD on the CMRP Site is a consequence of waste discharge from the hexachlorophene manufacturing operation..." We do not specifically address the points made on Pages 8-13 in regard to HCX, but we note that the confirmed presence of HCX at the site is not a necessary condition for an association between MA and 2,3,7,8-TCDD at the site as implied in Dr. Hass's conclusory statement.

B. "There is no evidence that furans are byproducts of the hexachlorophene production."

Dr. Hass claims that no evidence exists that furans (CDFs) are by products of the HCP process, and states that they may have originated in NECC's operations. We note that the influence of furans on the site risk is insignificant compared to that of 2,3,7,8-TCDD. (We also note that Dr. Hass uses this opportunity to suggest that dioxins (CDDs) may also be associated with NECC.)

C. "There is no evidence of 'high variability' in the manufacturing process used at the CMRP Site."

Dr. Hass claims that there is no evidence of "high variability" in the HCP process, which EPA states as a possible reason for a lack of correlation between 2,3,7,8-TCDD and HCX in the environment at the CMRP Site.

An alternative explanation for variations of ratios between HCX and 2,3,7,8-TCDD is the existence of different release patterns. 2,3,7,8-TCDD may have been released from the TCP purification process, i.e., at the front end of the HCP process, whereas HCX, assuming it was in fact produced during the HCP manufacturing process, could only have been released at the back end of the process.

D. "The sampling results do not support the conclusion that dioxins and furans generated as hexachlorophene byproducts were discharged directly into the Woonasquatucket River and/or the Allendale Pond."

Dr. Hass alleges that the sampling results do not support the conclusion that dioxins and furans were discharged directly to the river.[6] We note the following problems with his analysis, where reference is made to the attached figure (Attachment 1):

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[6] We note that Dr. Hass's title for this Section, including both dioxins and furans, is misleading since he has already stated that furans cannot be associated with MA's HCP process.

- The extensive re-grading that occurred during the construction of the Centredale Manor and Brookside Village buildings renders unreliable the use of the localized surficial spatial patterns of surface soil and sediment concentrations. Deeper samples are more likely to be undisturbed and therefore may be more representative of the spatial pattern of past activities at the site. This is also pointed out by Emhart's legal representative in the cover letter for Dr. Hass's report: "the RI Report does not address...the significant reworking of site soils during construction of the Brook Village and Centredale Manor apartment buildings in 1977 and 1982 respectively, and the remediation supervised by the Rhode Island Department of Environmental Management in 1982."[7]

- In an attempt to relate the concentrations to operations at NECC, Dr. Hass points out that the highest concentration of HCX in the Source Area was at SD-30, which is on the Tail Race side of the property. However, he fails to mention that SD-30 is below (south of) the location of the on-site dump and that it is a surface sample. Residues from MA operations that were disposed of in the dumpsite could have washed into the Tail Race or been pushed into the Tail Race during re-grading. In addition, there is deposition testimony indicating that some of the floor drains from MA buildings discharged into the Tail Race[8].

- Dr. Hass states that there were higher levels of 2,3,7,8-TCDD "from the tailrace area (SD-30, CMS-4104, CMS-4109, CMS-4110, and CMS-4111) than in the samples from the Woonasquatucket River just downstream of the hexachlorophene plant." This statement ignores the fact that there were several samples collected below the footprint of the former hexachlorophene building, CMS-451 (140.0 ppb 2,3,7,8-TCDD at 5-6 ft depth) and CMS-453 (62.0 ppb 2,3,7,8-TCDD at 6-7 ft depth), that show significantly higher levels than the maximum collected in the Tail Race area, SD-30 (15.7 ppb 2,3,7,8-TCDD in the surface sediment). As discussed earlier, the surface soils have been disturbed and re-graded, so the deeper samples are more likely to be undisturbed than the surface samples.

- Dr. Hass also discusses the spatial distribution of samples WRC-SD-2009 – WRC-SD-2014 and suggests that the pattern is not consistent with release from the HCP manufacturing process. However, the pattern of the samples in relation to the HCP manufacturing building (see Attachment 1) does not support his conclusion. Sample 2009 is upstream of the HCP manufacturing building, and, therefore, the lower value is

[7] Cover letter for submission of Dr. Hass's report by Bingham McCutchen LLP October 19, 2006.

[8] See Footnote 20.

not unexpected. As one moves downstream from the location of the former HCP building, the 2,3,7,8-TCDD concentrations increase. Sample 2013 does not follow the pattern, but the overall pattern of the 5 other samples is consistent with the conceptual model of a release of 2,3,7,8-TCDD from the HCP manufacturing building.

E. "NECC's drum reconditioning operations are a more likely source than MA for the dioxins found at the CMRP Site."

Dr. Hass starts this section by stating that, beginning in 1948, NECC was a drum recycler serving a wide customer base. However, he fails to point out that for most of period from 1948 until closure of NECC in 1970, much of the evidence suggests that MA was NECC's largest customer. Consequently, much of the residual materials in the drums that NECC received that Dr. Hass alleges resulted in the contamination at the site can be reasonably associated with MA as the original source. Further, of all the customers identified, the only one for which there is evidence that it used 2,4,5-TCP (which is known to contain dioxins) is MA.

- In his March 25, 2003 deposition in response to how NECC came to be in business, Mr. Vincent Buonanno, an NECC employee, responded;

"And Metro Atlantic making those liquids, which it prepared for textile companies, received liquids to make those liquids in different kinds of containers. Sometimes tank trucks, sometimes wooden barrels at the beginning of the 1930's and 40's, and then steel drums. So it was always receiving raw materials to make its product in steel drums, or drum, barrels. And it was always then refilling them with a product that it made of these different compounds back out in wooden barrels originally and then steel drums. So there came a time when it seemed logical for Metro Atlantic to have some sort of a recycling operation, where containers were received in empty of raw materials could be cleaned up and put back in service to be shipped back out again."[9]

When asked when, in either late 1940 or around 1950, NECC started their business, whether Metro Atlantic was its sole customer, he responded;

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[9] Vincent Buonanno deposition on March 25, 2003, Page 15, line 7-24.

"Yes it was."[10]

When asked whether it was fair to say that Metro Atlantic was still the largest customer for NECC in the later part of the 1950's and the 1960s, he responded:

"It remained – It probably remained a very large or one of its largest customers."[11]

When asked why he started his full time employment (March 1967[12]) at NECC, he stated;

"So I went there, and the objective was to try to sell containers to people other than Metro Atlantic, whose fortunes were waning because Metro Atlantic had already moved part of its operation to South Carolina where the textile industry had moved to...So the center of gravity of a major customer of ours was kind of diminishing and moving away."[13]

With regard to the use of the dumpsite located to the south of NECC and MA, Dr. Hass concludes (on Page 18) that; "My research revealed no evidence that MA made any use of the dumpsite located approximately 100 yards south of the NECC facility." However, the deposition transcripts that he allegedly reviewed as well as later trial testimony contradict this statement, as follows:

- Mr. Raymond Nadeau, a NECC employee between 1956 and 1969, in his September 2006 testimony, establishes MA's use of the dumpsite. He testified as follows when asked about MA personnel discarding materials at the dumpsite located south of the NECC plant;

"Just the [MA] truck drivers went down there. That's all I seen, the truck drivers went down there, and they dumped it, then they brought the empty barrel back to us."[14]

In earlier testimony, Mr. Raymond Nadeau described the types of materials disposed of at the dumpsite to include plastic bags, and sand from sandblasting, as well as "black sludge".[15]

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[10] Vincent Buonanno deposition on March 25, 2003, Page 16, line 19.

[11] Vincent Buonanno deposition on March 25, 2003, Page 17, line 9-10

[12] Vincent Buonanno deposition on March 25, 2003, Page 8, line 17-19

[13] Vincent Buonanno deposition on March 25, 2003, Page 19, line 13-24

[14] Raymond Nadeau trial testimony September 14 and 15, Page 74, lines 4-7

During his deposition testimony, Mr. Nadeau stated that the black sludge came from MA's presses.[16] Mr. Nadeau stated that "a few times a week" MA made this type disposal into the dumpsite for the duration of his employment at NECC.[17] Mr. Nadeau again confirmed that MA used the dumpsite located below the NECC plant by stating that his brother-in-law Felix Palumbo, a truck driver for MA, would honk his horn at Mr. Nadeau as he traveled to and from the dump.[18] Mr. Nadeau goes on to describe the grading operation that occurred at the dumpsite, stating;

"They just pushed everything into the point.... [w]here they [the rivers] came together."

Mr. Nadeau also reiterated that the material at the dumpsite included MA's "black sludge".[19]

- Mr. Joseph Nadeau, Raymond Nadaeu's brother, was a worker at MA in the mid-60s. He testified in 2006 that there were floor trough drains, or "French drains", in the basement of the main MA building that ran the length of the building and drained out to the Tail Race.[20] He stated that the basement floor was washed down daily and after leaks occurred and that material on the basement floor included "black or gray" carbon sludge originating from filter presses used daily for two products, reserve salt and 40S.[21] He stated that usually the sludge was shoveled into drums and then disposed, and the floors were rinsed off with water, which then drained to the Tail Race but, occasionally, the black carbon sludge was not shoveled and was just washed into the drains. From Raymond Nadeau's testimony, discussed above, it is apparent that the carbon/black sludge that was shoveled into barrels and then "disposed", was routinely dumped at the dumpsite on the south of the property.

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[15] Raymond Nadeau trial testimony September 14 and 15, 2006, Page 73, lines 3-8

[16] Raymond Nadeau deposition testimony, December 17, 2002, Page 16, line 7-16

[17] Raymond Nadeau trial testimony September 14 and 15, 2006, Page 79, lines 16-25

[18] Raymond Nadeau trial testimony September 14 and 15, 2006, Page 80-81, lines 14-5

[19] Raymond Nadeau trial testimony September 14 and 15, 2006, Page 75, line 5-18

[20] Joseph Nadeau trial testimony September 14 and 15, 2006, Pages 30-35

[21] Reserve salt is m-nitrobenzene sulfonic acid sodium salt. It is used in the textile industry. The nature of the product 40S is unknown.

- On Page 17 of his report, Dr. Hass mentions the Providence Journal article of June 19, 1964 in which Mr. Bernard Buonanno, Sr. indicated that the company planned to eliminate the dump. Since Bernard Buonanno was Metro-Atlantic's General Manager, his statement to the press clearly implies MA's ownership or use of the dump.

- Further indication of MA's releases to the environment is provided in deposition testimony of August 31, 2000 of an unnamed MA employee who described his employment at MA lasting from 1952 to 1977, during which time he acted as an operator and production manager.[22] The witness, when asked about disposition of liquid residues, stated;

  "Well, when a reaction was completed and the reactor was emptied, very often there would be a residue. You would take out all that you could. When everything was out, you would flush it down, wash the tank down. Most of that went down the river...It would go down into the drains and out to the river."[23]

  He stated later in his testimony that;

  "On occasions the drum would leak. We'd salvage what we could. The minute we saw it, we would empty the drum and then we would flush it down the river."[24]

- Mr. Turcone, employed by MA from August 1963 through January 1965, described the drying process employed by MA during the manufacture of powdered compounds and the disposal of the material filtered out from that process.[25] Mr. Turcone stated;

  "When I first started here, they used to wash it down the drain. Then they started to put it into [d]umpsters."[26]

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[22] Witness unnamed, deposition August 31, 2000, Page 4-6, lines 18-3.

[23] Witness unnamed, deposition August 31, 2000, Page 15, lines 11-20

[24] Witness unnamed, deposition August 31, 2000, Page 16, lines 2-5

[25] John Turcone disposition November 30, 1999, Page 7, lines 19-20

[26] John Turcone disposition November 30, 1999, Page14, lines 1-3

Mr. Turcone later described the "acid" as being disposed of in the river from pipes leading from MA's building.[27]

In Pages 16-20 of his report, Dr. Hass postulates three ways in which NECC could be held responsible for the contamination at the site:

1) Disposal of residual ash from the NECC containment pit.

On Page 16 of his report Dr. Hass writes, "Given materials listed in the NECC 104(e) response, 2,3,7,8-TCDD and PCDD/PCDF would have been formed during this process", where "this process" refers to the drum recycling oven system.

This statement is unpersuasive because the information in the 104(e) response letter by NECC does not indicate chemicals to the detail necessary to conclude that 2,3,7,8-TCDD would be formed from the drum contents. Dr. Hass provides no factual specifics when stating that residues in the drums would generate 2,3,7,8-TCDD when combusted. Further, if it were formed, it would be in conjunction with other PCDDs and PCDFs and these other congeners would be present in much greater proportions relative to the 2,3,7,8-TCDD concentrations observed in the site data.[28]

Limno-Tech Inc., fingerprint analysis compared the site data using multivariate statistical analysis (PVA, a statistical fingerprinting method) to dioxin patterns in 6 different source types as contained in an EPA database[28]. Each source type has a distinct distribution (pattern) of dioxin and furan congeners. Using PVA, two distinct source types accounted for the blended distribution of dioxins seen in the site data: 1) a crude 2,4,5-TCP source (or alternatively a hexachlorophene product source) that accounts for the relatively high concentrations of 2,3,7,8-TCDD seen in the site data; and 2) other minor dioxin/furan sources that contain relatively low

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[27] John Turcone disposition November 30, 1999, Page18, lines 10-20

[28] The Database of Sources of Environmental Releases of Dioxin-like Compounds in the United States (US)(EPA/600/C-01/012, March, 2001)

levels of 2,3,7,8-TCDD but are comprised mostly of other dioxin and furans (sources for these could be combustion, incineration, or impurities in other chemicals).

From a risk perspective, the dominant risk-driving source was one that was consistent with a distribution that is characteristic of the patterns that EPA measured in 2,4,5–TCP and at sites where hexachlorophene production was known to be the single dominant source. The dioxins and furans other than 2,3,7,8-TCDD that are likely attributable to sources other than the hexachlorophene operation are minor contributors in comparison to the risks associated with 2,3,7,8-TCDD (which likely was associated with hexachlorophene production at the site).

2) Combustion of 2,4,5-TCP

On Page 17, Dr. Hass postulates that NECC operations could have formed 2,3,7,8-TCDD though combustion of 2,4,5-TCP, "One alternate hypothesis is that combustion of 2,4,5-TCP contaminated drums recycled by NECC is the source of the 2,3,7,8-TCDD contaminated wastes at the CMRP Site." He alleges that site data support this hypothesis but provides no analysis or further insight as to how he reached this conclusion.

In the next sentence, Dr. Hass criticizes NewFields (EPA's environmental forensics contractor) for not recognizing that the dioxin data "are inadequate to support establishing a dioxin fingerprint for either MA or NECC." Our understanding was that NewFields was only saying that based upon their statistical evaluations, the sediments contaminated by 2,3,7,8-TCDD were not caused by sources other than those that were on the CMRP property (as indicated by the source area soils). In other words, it wasn't upstream or background sources that caused the elevated levels.

Dr. Hass then proceeds to criticize EPA's RI, stating that the 2,3,7,8-TCDD found in Source Area soils is inconsistent with EPA's conceptual model which he says hypothesizes that that all waste from the MA's HCP process went directly into the river. He also states his contention that "any waste water discharged by MA from the hexachlorophene process should have met drinking water standards for 2,3,7,8-TCDD contamination." We can only assume that this

statement is based on his belief that 2,3,7,8-TCDD-containing wastewater was treated with activated carbon prior to release. As we have pointed out, this theory is not supported by the information on the process or, indeed, Dr. Hass's own rendition of the HCP process.

3) NECC created 2,3,7,8-TCDD from 2,4,5-TCP in its tight-head drum cleaning bath

Beginning at the bottom of Page 18, Dr. Hass postulates that NECC in its tight head drum cleaning tank (using a heated caustic solution) created 2,3,7,8-TCDD from 2,4,5-TCP contained in the tight head drums. While it is possible that 2,3,7,8-TCDD can be formed by condensation of 2,4,5-TCP under alkaline and high temperature conditions[29], Dr. Hass has not provided any evidence that 1) the NECC tight head drums did in fact contain 2,4,5-TCP (he provides no discussion of the possible source of the TCP), and 2) that quantities and chemical conditions were sufficient to explain the contamination at the site. Instead of providing such evidence in many instances, he appears to be working backwards from the assumption that NECC is responsible for all of the 2,3,7,8-TCDD at the CMRP Site. In general, Dr. Hass's arguments implicating NECC as the source of the contamination at the site are speculative, lack any evidence and contradict the sampling data. They form the basis of a long argument about how 2,3,7,8-TCDD would have been generated if these unvalidated assumptions were true.

Dr. Hass continues with a discussion of how the 2,3,7,8-TCDD generated in NECC's tight head drum bath may have entered the environment. In this discussion he further speculates on the nature and outflow of wastewater pipes.

Lastly, on Page 20 (the final page of his report), Dr. Hass mentions sample CMS-451-F which, as he points out, shows the highest TCDD levels anywhere at the site. He says that this sample comes from a location "approximately at the corner of the NECC building and several feet

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[29] "*2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) is generally synthesized by the condensation of two molecules of 2,4,5-trichlorophenol in the presence of a base at high temperatures.*" Toxicological Profile for Chlorinated Dibenzo-p-dioxins (CDDs). The Agency for Toxic Substances and Disease Registry. December 1998

deep. This is reportedly the location of NECC's fire pit."[30] However, the sample maps of the property in EPA's RI indicate that this sample is located at the corner of the former MA hexachlorophene manufacturing building. In addition to the high 2,3,7,8-TCDD result, we note that this sample also shows the presence of 2,4,5-TCP, indicating it was associated with MA's manufacture of hexachlorophene.

[30] It is assumed that Dr. Hass's "NECC fire pit" is the containment basin beneath the NECC drum conveyor/oven line.