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To: Wanda Green, BRAC Environmental Coordinator
OACSIM - U. S. Army Fort Monmouth (FM)

From: William Simmons, Environmental Health Coordinator

Re: Comments on FOST for the Phase 1 Properties Charles Wood Area (CWA) /Parcel B

Date: April 26, 2013

At the Restoration Advisory Board (RAB) meeting on 4/4/13 you discussed sending in comments for this Finding of Suitability to Transfer (FOST), that you explained included the entire golf course, except for certain areas that are not ready for transfer ("carve outs").

The sludge from the former sewer plants had been applied to the golf course as fill or fertilizer since as early as the 1940s. As far as I know from RAB discussions and reading the documents that were provided, soil in only one 1.8-acre area of the 235-acre golf course has been analyzed for heavy metals, and the sediment in the freshwater pond on the golf course upstream of Wampum Lake has never been sampled for heavy metals.

How will the Army respond should more extensive sampling in the future of the soil or sediment indicate levels of heavy metals that will necessitate remediation due to historic practices?

Can FM provide whatever guidelines and standards FM used regarding the land application of sludge during the operation of the CWA STP from 1942 to 1975? What were the permissible levels of metals in the sludge that was used as fill or soil conditioner; and what were the land application practices regarding rain and the prevention of sludge runoff to the freshwater pond on the golf course that is upstream of Wampum Lake.

The basis for these comments is as follows. The CWA Sewage Treatment Plant (STP) operated for 33 years, from the opening of the CWA in 1942 until the STP was closed in 1975. This was three years after the passage of the Clean Water Act in 1972. The Act's requirements for more effective removal of pollutants from wastewater eventually resulted nationally in the production of large quantities of sewage sludge. When section 405 of the Act was amended in 1987, the EPA was required to develop a comprehensive program to reduce environmental risks and maximize the beneficial use of sewage sludge. In February 1993, EPA promulgated Title 40, Code of Federal Regulations, Part 503, "Standards for the Use or Disposal of Sewage

Sludge", eighteen years after the CWA STP was closed (1). In 1978, the NJDEP began to focus on the regulation of the land application of sludge due to public concerns about the ocean dumping of sludge. These regulations were not adopted until 1987, twelve years after the CWA STP was closed (2).

Decades before these regulations, sludge from the FM sewer plants had been used as fill, soil conditioner, and fertilizer on the Suneagles Golf Course, beginning as early as the 1940s (3). An example of sludge being used as fill is: "According to long-term Fort Monmouth employees, at least three other fairways (8, 10, and 11) have 4 to 5 inches of sludge over the native sand; sludge may have been used to fill in low areas" (4). Sludge had also been disposed of at FM landfills and taken offpost for home use (5).

Suneagles is nearly 235 acres of the 489 acres of CWA (6). As far as I know from RAB discussions and reading the documents that were provided, soil in only one 1.8-acre area of the 235-acre golf course has been analyzed for heavy metals: the former sludge disposal site (FTMM-31, CW-9, ECP Category 3, Parcel 6). This was tested and was given a No Further Action letter by the DEP in 1996 (7). Another area by the former pesticide storage building (FTMM-28, CW-6, ECP Category 4, ECP Parcel 7) was tested for a target compound list of organics and pesticides, but apparently not heavy metals, and this received an NFA from the DEP on 4/30/12 (8). The former PCB Transformer Location (FTMM-29, CW-7) on the golf course was also sampled for PCBs but not metals (9).

Building 2700 (Myers Building, Hexagon Building) in the CWA was the most significant source of the heavy metals in the influent to the CWA STP (FTMM-27, CW-5, ECP Cat 1, ECP Parcel 35):

"Wastewater at FM consists almost entirely of domestic sewage. There is, however, one significant source of industrial wastewater. This is the Hexagon Building (Building 2700) in the CWA of FM. This source comprises nearly 10 percent of the 0.4 million gallons/day (MGD) influent to the CWA sewage treatment plant (STP)... The Hexagon Building contains a wide diversity of shops, such as photoprocessing, metal treatment, and painting. It also contains a number of laboratories in which experimentation with communications/electronics equipment, and components is conducted. At any given time, the effluent from the Hexagon Building may contain almost any kind and quantity of industrial wastewater. No central control over the dumping of such wastes exists. The wastes are all fed through a limestone acid neutralization bed to the sanitary sewer system of the CWA... There is little value in discussing the effluents from this building in terms of averages or medians because of the apparent randomness of discharging wastes from the building. Our survey was not of sufficient length to establish any cyclic patterns in the discharges." (10). Regarding the magnitude of the heavy metal content in this waste stream, the inspectors from the U.S. Army Environmental Hygiene Agency advised in their 1976 report that "This influent contains a melange of solvents, metals and other assorted industrial wastes...Disposal instructions for the dried sludge may be obtained from this Agency, once sufficient information about the nature has been obtained. One possibility is that it may be economically feasible to recover metals from the sludge" (11).

The 40,000 gallons per day of wastewater discharged from Building 2700 to the CWA STP specifically refers to the chemical waste stream, not the additional sanitary sewage: "The Hexagon Building contains many shops, hundreds of laboratories, and has been the site of continuous maintenance operations. As a result, chemical waste streams of 150 m3 per day [40,000 gpd] have been generated" (12). The inspection by the U.S. Army Environmental

Hygiene Agency (from 9/23 - 10/9 1974; 4/15-17 1975; and 6/10-12 1975) gives several examples in their report of chromium, copper pickling waste, and an unknown discharge (maybe copper and ammonia) in the effluent from Building 2700. It notes that the "data reported here reflect the extremes seen during this survey, but long term extremes may exceed these" (13). During the inspection, 5300 ug/l (ppb) of chromium, and 992,000 ug/l (ppb) of copper temporarily spiked in their sample of the effluent from Bldg. 2700 (14).

As a result of this inspection, FM subsequently reorganized operations at Building 2700 and "effected a reduction in the amount of industrial waste output to approximately 115 m3 per day [30,380 gpd]", and a licensed scavenger was hired "by Fort Monmouth in 1977-1978 for disposal of concentrated wastes (e.g., etchants and organic solvents)", three years after the CWA STP was closed (15).

The STP at the CWA that was designed for treating mostly domestic sewage, was built in 1942 had an 800,000-gallon/day capacity and was manned 16 hours/day, 7 days/week, operating at about 50 percent capacity (400,000 gallons per day(gpd), also reported as 0.4 million gallons/day). "It is a trickling filter secondary treatment plant, whose primary treatment consists of grit chamber screening, comminution, and primary settling. Secondary treatment consists of a constantly and uniformly dosed biofilter, followed by secondary clarification and chlorination" (16).

"Sludge is treated in one of the two digesters, dewatered, and concentrated. It is then drawn off onto underdrained open sand beds for drying. Supernatant liquid from each digester and drainage from the drying beds are routed back to the plant influent." (16). At the last RAB meeting, it was "confirmed sand beds removed the metals", as recorded in the draft minutes for 04/04/13. The underdrain sand beds are designed to dry out sludge and return the liquid (supernatant) to the plant for further decomposition and settling. It is not their purpose to remove heavy metals, it is to dry out the sludge. They are not a Heavy Metal Removal & Recovery System. Any heavy metals that remain in the sand when the sand is removed periodically for maintenance are incidental levels. Removing heavy metals from industrial waste streams requires additional treatment: "the heavy metal contents of wastewaters can be effectively removed to acceptable levels by precipitating the metal in an insoluble form. Heavy metals are typically precipitated from wastewater as: hydroxides, sulfides or sometime sulfates carbonates. Metal co-precipitation during flocculation with iron or aluminum salts is also possible for some metals (e.g., arsenic)" (17).

The U.S. Army Environmental Hygiene Agency reported several times that the CWA STP was generally well run with good solids removal (18). Organic and inorganic solids are removed from the liquid and stored in the sludge when a plant is running efficiently, which occurs when it is not raining heavily. The report states that their inspection occurred during a dry period, except for precipitation "on the night and morning of 29-30 September, which amounted to 0.52 inches of rain" (19).

In fact, the stream flows were so low during the inspection period that a layer of sludge formed below the Main Post STP, which would normally have broken up and moved downstream into the Parkers Creek estuary during heavier rainfall than had occurred during this period:

"A second problem within the upper Parker's Creek estuary is a thick (up to 6 or more inches), black sludge layer on the bottom of the study reach. This anaerobic layer has been described as deposited sewage solids, which it most probably is. It is largely, if not entirely, from the FM

proper STP. The presence of this layer may be caused in part by a "lip", or shallows downstream of the STP outfall which prevents free drainage a t low tide ... One phenomenon of significant interest was not observed. This is the effect of a large freshwater discharge through the study reach. During and following a significant rainfall event, there may be substantial flushing of the reach" (20).

We now know from recent RAB meetings that the Eatontown Sewerage Authority has discovered significant ongoing I&I leakage into the sewer lines at FM. It is unfortunate that the inspection conducted by the U.S. Army Environmental Hygiene Agency in the mid-70s did not address the effect of heavy rainfall on the efficiency of the CWA STP, when the sewer infrastructure was then about 30 years old. The volume of the influent to a STP will increase if rain enters the sewerage infrastructure due to Infiltration and Inflow (I&I) problems. When this happens, the STP will lose its efficiency, and some of the organic and inorganic solids that normally would have had time to settle into sludge will remain in the effluent. This effluent and its solids then discharge to the receiving stream, which is also flowing quickly due to storm conditions. These solids, especially the finer particles that contaminants like heavy metals preferably bind to, eventually deposit into a lake or other slow moving areas located downstream in the watershed, where these fine particles are able to slowly settle into the sediment. How much the full plant capacity of the CWA STP (which normally operated at about 50 percent) would have compensated for I&I volume increases during heavy rainfall from the 489-acre CWA property is unknown.

Heavy metals preferably bind to organic material, not sand. This means that the environmental fate of the heavy metals, that were predominately discharged from Building 2700 to the CWA STP, was either to the effluent that was discharged from the STP to the watershed, or to the sludge which had been land applied to the golf course since the 1940s - with some incidental removal from the effluent and sludge streams when the underdrain sands were removed for maintenance.

Can FM provide whatever guidelines and standards FM used regarding the land application of sludge during the operation of the CWA STP from 1942 to 1975? What were the permissible levels of metals in the sludge that was used as fill or soil conditioner; and what were the land application practices regarding rain and the prevention of sludge runoff to the freshwater pond on the golf course, upstream of Wampum Lake.

Given the above, how will the Army respond should more extensive sampling in the future of the soil or sediment indicates levels of heavy metals that will necessitate remediation due to historic practices?

NOTES

Pdf pages are used instead of document pages to simplify locating the references to these scanned or online documents using the 'Find' tool.

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2. NJDEP. Accessed 4/23/13. State Wide Solid Waste Management Plan 2006. K. SEWAGE SLUDGE. Solid and Hazardous Waste Management Program. http://www.nj.gov/dep/dshw/recycling/swmp/doc/section_k_06.doc . Main index: http://www.state.nj.us/dep/dshw//recycling/swmp/index.html

3. U.S. Army BRAC 2005 Environmental Condition of Property Report Fort Monmouth Monmouth County, New Jersey Final 29-January-2007. Pdf pps 108, 163, 171, 173.

4. Weston (Roy F. Weston, Inc.). 1995. Site Investigation Report – Main Post and Charles Wood Areas, Fort Monmouth, New Jersey. December. pdf p 323

5. U.S. Army Toxic and Hazardous Materials Agency, 1980. Installation Assessment of Fort Monmouth, Report No. 171. May 1980. Pdf p 38.

6. Fort Monmouth Reuse and Redevelopment Plan Technical Memorandum: Site Characteristics Prepared for: Fort Monmouth Economic Revitalization Planning Authority Prepared by: EDAW, Inc. September 14, 2007 http://www.fortmonmouthredevelopment.com/pdf/tmsite_final.pdf

7. Weston (Roy F. Weston, Inc.). 1995. Site Investigation Report – Main Post and Charles Wood Areas, Fort Monmouth, New Jersey. December. Pdf p 323; and U.S. Army BRAC 2005 Environmental Condition of Property Report Fort Monmouth Monmouth County, New Jersey Final 29-January-2007. pdf pps 173 & 208.

8. U.S. Army BRAC 2005 Environmental Condition of Property Report Fort Monmouth Monmouth County, New Jersey Final 29-January-2007 pdf pps 171-2; and CALIBRE Systems, Inc. March, 2013. Draft Finding Of Suitability To Transfer (FOST) Fort Monmouth, New Jersey Fort Monmouth, Charles Wood Area. (Charles Wood Area/Parcel B) http://www.pica.army.mil/FtMonmouth/Documents/FTMM%20DraftFOST%20P1%20Public%20comm_032713_red.pdf pdf p 9.

9. U.S. Army BRAC 2005 Environmental Condition of Property Report Fort Monmouth Monmouth County, New Jersey Final 29-January-2007 pdf p 172-3.

10. USAEHA, 1976. Water Quality Engineering Special Study No. 24-016-75-76, Sanitary and Industrial Wastewater, Fort Monmouth, New Jersey. September 23 - October 9, 1974; April 15-17, 1975; June 10-12, 1975. Pdf pps 10, 13 and 21.

11. USAEHA, 1976. Water Quality Engineering Special Study No. 24-016-75-76, Sanitary and Industrial Wastewater, Fort Monmouth, New Jersey. September 23 - October 9, 1974; April 15-17, 1975; June 10-12, 1975. pdf p 285 (App. G)

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14. USAEHA, 1976. Water Quality Engineering Special Study No. 24-016-75-76, Sanitary and Industrial Wastewater, Fort Monmouth, New Jersey. September 23 - October 9, 1974; April 15-17, 1975; June 10-12, 1975. pdf pps 32 and 34.

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16. USAEHA, 1976. Water Quality Engineering Special Study No. 24-016-75-76, Sanitary and Industrial Wastewater, Fort Monmouth, New Jersey. September 23 - October 9, 1974; April 15-17, 1975; June 10-12, 1975. pdf p 14; and U.S. Army BRAC 2005 Environmental Condition of Property Report Fort Monmouth Monmouth County, New Jersey Final 29-January-2007 pdf pps 163 and 171.

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19. USAEHA, 1976. Water Quality Engineering Special Study No. 24-016-75-76, Sanitary and Industrial Wastewater, Fort Monmouth, New Jersey. September 23 - October 9, 1974; April 15-17, 1975; June 10-12, 1975. pdf pps 21 and 72.

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