Attachment 7

Excerpts from EPA's Comparative Analysis of Remedial Alternatives (May 2014) ("Comp. Analysis")

COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES FOR THE GENERAL ELECTRIC (GE)-PITTSFIELD/HOUSATONIC RIVER PROJECT REST OF RIVER

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disposal in an on-site upland disposal facility, for which three potential locations have been identified by GE (TD 3). The other two alternatives would involve treatment, either by a chemical extraction process (TD 4) or by thermal desorption (TD 5). EPA also evaluated an additional alternative based on TD 1 but specifying transport of excavated material by rail be maximized; this variation is termed TD 1 RR.

The results of a bench-scale test of a representative chemical extraction process indicate that PCB concentrations in the treated sediment and soil would not be sufficiently low to allow reuse on-site; therefore, the treated sediment and soil resulting from TD 4 would have to be transported to a landfill for disposal. For TD 5, it is assumed that the thermal desorption process would reduce the concentrations of PCBs in the treated solid materials to levels (around 1 to 2 mg/kg) that could allow reuse in the floodplain[11] and that it would not increase the leachability of metals from those materials so as to preclude such use. However, due to uncertainties regarding the ultimate effectiveness of the treatment process (as well as issues relating to the reuse of the treated soil), TD 5 has also been evaluated based on the additional alternate assumption that all the treated material would be transported to an off-site landfill for disposal.

All of the treatment/disposition alternatives except TD 2 were evaluated considering the same range of sediment and soil volumes that could be removed under any combination of the individual sediment and floodplain alternatives, not just the combinations of alternatives evaluated in Section 2. This range extends from 191,000 cy, based on a combination of SED 3 and FP 2, to 2.9 million cy, based on a combination of SED 8 and FP 7. Under TD 2, however, the in-water CDF(s) would be used only for the disposition of hydraulically dredged sediment from Reaches 5C and 6, which would be generated only under SED 6, SED 7, SED 8, or SED 9. Thus, TD 2 was evaluated for a range of hydraulically dredged sediment volumes from 300,000 cy for SED 6 to 1,240,000 cy for SED 8. For cost comparison purposes, the TD 2 analysis assumes that the sediment and soil not placed in the CDF(s) would be transported off-site for disposal. Under this assumption, the lower-bound costs for TD 2 are based on the combined volumes from SED 6 and FP 2, and the upper-bound costs are based on the combined volumes from SED 8 and FP 7.

All five alternatives were evaluated against the nine criteria discussed in Section 2.1. There is no comparison or evaluation of attainment of IMPGs because this is not applicable to material treatment/disposition.

3.2 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

As with the SED and FP alternatives, the evaluation of whether the treatment/disposition alternatives would provide overall human health and environmental protection draws on the evaluations under several other permit criteria, notably long-term effectiveness and permanence (including long-term adverse impacts), and short-term effectiveness.

TD 1 (off-site disposal) would provide protection of human health and the environment by providing for permanent disposal of the PCB-contaminated sediment and soil in permitted off-

[11] For reuse as backfill in the floodplain, only 50% of the volume is assumed to be the treated material because following thermal treatment the material would be sterile, requiring amendments to be suitable for floodplain restoration.

TD 5 (thermal desorption) would provide human health protection by reducing the PCB concentrations in the sediment and soil, followed by on-site reuse and/or off-site disposal of those treated materials and off-site disposal/destruction of the liquids containing the condensed PCBs. On-site reuse of a portion of the treated soil would be protective of human health because the treated solids would be sufficiently characterized to ensure that residual PCB concentrations would not cause adverse human health effects. However, if a portion of the treated soil is reused as backfill in the floodplain, that reuse would potentially result in long-term adverse environmental impacts in the forested floodplain and other wetland areas due to the differences in soil characteristics between those materials and the existing natural soil in those wetland areas unless the treated soil is properly amended. In addition, regardless of whether treated soil is reused in the floodplain, TD 5 would produce the greatest amount of GHG emissions of any of the alternatives.

3.3 CONTROL OF SOURCES OF RELEASES

All of the treatment/disposition alternatives would control the potential for PCB-contaminated sediment and soil to be released and transported within the river or onto the floodplain, although some alternatives would provide more effective control of such releases than others. TD 1 (or TD 1RR) best meet this criterion, followed by TD 3.

Under both TD 1 and TD 1 RR, placement of the removed PCB-contaminated sediment and soil in a permitted off-site landfill or landfills would effectively isolate those materials from being released into the environment.

Under TD 2, placement of the PCB-contaminated sediment and soil into CDF(s) would most likely effectively isolate the removed materials from being released into the environment. However, there is a potential for releases of sediment into the river during the CDF construction process.

TD 3 would address future releases through the placement of the materials in an upland disposal facility and the implementation of a long-term monitoring and maintenance program. Placement of the PCB-contaminated sediment and soil into an upland disposal facility would most likely effectively isolate the removed materials from being released into the environment. However, the potential remains for releases to occur to the Housatonic River watershed both during operations and in the long term if the facility, including potentially a water treatment plant, was not properly operated and maintained.

Under TD 4 and TD 5, the potential for the PCB-contaminated sediment and soil to be released within the river or onto the floodplain during treatment operations would be minimal. However, the potential remains for releases to occur to the Housatonic River watershed both during operations and in the long term if the facilities were not properly operated and maintained. Under TD 4, the treated solid materials would be transported to an off-site landfill for disposal, the wastewater would be subject to treatment prior to discharge to the river, and the water treatment sludge would also be transported to an off-site landfill for disposal. Under TD 5, to the extent that some of the treated solids are used as backfill in the floodplain, chemical characterization sampling would be performed to verify that those materials would not present concerns regarding future releases or exposure. The remainder of the treated solids, or all such

Under TD 4 and TD 5, it is not expected that there would be any significant residual risks, because: (1) all treatment operations would be performed within secured areas, and residual PCBs associated with the operations would be removed following completion of the treatment operations; (2) all treated materials would be subject to verification sampling and successfully and unsuccessfully treated material would be transported off-site for disposal, except for any such material reused on-site under TD 5; and (3) any such treated materials reused on-site under TD 5 would be sampled to verify that the material to be reused would not pose a residual risk.

In summary, all of the treatment/disposition alternatives would minimize future residual risk from exposure to the PCB-contaminated materials, although there would be a greater potential for such exposure under TD 2 and TD 3 than under the other alternatives, for the reasons noted above.

3.5.2 Adequacy and Reliability of Alternatives

There are considerable differences in the adequacy and reliability of the five treatment/disposition alternatives. Based on these differences, the adequacy and reliability criterion favors either TD 1, TD 1 RR, or TD 3 for disposal of the excavated materials under all alternatives.

Use of off-site disposal facilities (TD 1 and TD 1 RR) is a common and effective means for permanent disposition of PCB-contaminated material. As the volume of materials requiring disposal increases, multiple facilities may be required, but that is not expected to be a major consideration.

In-water CDFs (TD 2) have been used to dispose of dredged PCB-contaminated sediment at some sites. In this case, as discussed above, there is a somewhat greater potential for releases from the CDF(s) than from off-site or local upland disposal facilities.

On-site disposal of PCB-contaminated materials in an upland facility (TD 3) has been used as part of a final remedy at a number of sites and is an effective and reliable means for permanently isolating such materials, provided the facility is properly constructed, monitored, and maintained. However, the potential extended duration of the operation of such a facility for the range of volumes of sediment and soil and the length of remedy implementation could necessitate that the facility operate for an extended period of time. In addition, GE proposes to truck the leachate generated under TD 3 to its water treatment facility located in Pittsfield. This involves a one-way trip of between 10 and 20 miles along public roads for the foreseeable future. The proposed facility near Woods Pond could generate as much as 600,000 gallons of leachate per month (based on its maximum size of 18 acres for 2,000,000 cy) for 10 to 20 years, requiring over 1,000 truck trips per year (120 per month) while the facility is still receiving material. Based on SED 8/FP 7, which has a volume of 2,900,000 cy, the amount of leachate could be as high as 1,000,000 gallons per month (based on the maximum landfill footprint at the site near Rising Pond). This volume could occur for up to 52 years and would require 200 truck trips per month or 2,400 per year. Alternatively, GE would have to construct, operate, and maintain a treatment facility at each of the upland disposal facilities. If these treatment facilities were not operated properly, there would be the potential for releases of PCBs into the area where the facility is located or into the Housatonic River. TD 3 relies heavily on proper long-term operation, maintenance, and monitoring activities.

The use of chemical extraction (TD 4) has not been demonstrated at full scale on sediment and soil representative of the Rest of River. The results of bench-scale testing using site sediment and soil did not demonstrate that this technology would be effective. As a result, there are uncertainties about the long-term reliability and effectiveness of operating such a system for a project of the size and duration, and with the range of PCB concentrations, that would be involved at the Rest of River. These and other factors create uncertainties regarding the effectiveness and reliability of using the chemical extraction process in a full-scale application.

Thermal desorption (TD 5) has been used at several sites to treat PCB-contaminated soil; however, there is only limited precedent for use of this technology on sediment due in part to the time and cost of removing moisture from the sediment prior to treatment. At the sites identified where thermal desorption has been used, the volumes of materials that were treated were substantially smaller and the duration of the treatment operations was substantially shorter than the volumes and duration that could be required at the Rest of River. Furthermore, when on-site reuse of treated materials has occurred, the materials have typically been placed in a small area and covered with clean backfill. For these reasons, the adequacy and reliability of this process for a long-term treatment operation with a large volume of materials such as sediment/soil from the Rest of River is uncertain.

3.5.3 Potential Long-Term Adverse Impacts on Human Health or the Environment

Implementation of TD 1, TD 1 RR, TD 2, and TD 3 would isolate the removed sediment/soil from potential human and ecological exposure because the material would be contained in structures designed specifically for that purpose. Under TD 4, removed material would first be treated, and then disposed of off-site. For TD 5, materials would be treated, and then a portion might be reused in the floodplain, assuming that it has acceptable residual levels of contaminants, with the remainder disposed of off-site. Thus, under all the treatment/disposition alternatives, no long-term adverse impacts on humans or ecological receptors from exposure to the PCB-contaminated materials are expected, with the potential exception of TD 2 if a release were to occur (e.g., during an extreme storm event).

TD 1 would not cause any adverse long-term environmental impacts in the Rest of River area because it would involve off-site transport and disposal of the PCB-contaminated materials.

TD 1 RR would also not result in adverse long-term environmental impacts in the Rest of River area. The rail yard and loading facility would be demobilized following completion of the remedy and the area restored to its former condition.

For TD 2, the placement of an in-water CDF in Woods Pond and/or one of the two identified backwaters would have the most significant long-term adverse environmental impacts, including a permanent loss of the aquatic habitat in those areas. Depending on the location and size of the CDF(s), TD 2 could adversely affect the priority habitat of up to nine state-listed species. In addition, the CDF(s) would raise the topography of the CDF area(s), reduce available shoreline/wetland habitat, and produce a loss of the existing flood storage capacity.

For TD 3, the construction of the upland disposal facility, which, for the Woods Pond site, is located within an Area of Critical Environmental Concern, would result in the alteration of existing habitat within the operational footprint of that facility. In the landfill area itself, as well as any support areas (e.g., access roads) that would remain after closure, the habitat alteration would be permanent, although the landfill would be capped and planted. The significance of the change in habitat would depend on the existing habitat at the location of the facility, as well as the size of the facility.

Under TD 4 and TD 5, the construction and operation of a 5-acre treatment facility at the former DeVos property would result in some loss of the relatively low-quality habitat within that area (a former agricultural area that is now open grassland with scattered shrubs) during the period of treatment operations and for a few years thereafter. That loss, as well as increased noise and human presence in the area, would affect the wildlife in the area (which includes the priority habitat for some state-listed species) during that period. However, given the relatively small size of the facility, the altered nature of the habitat, and the planned reseeding of the area with a grassland mix following removal of the facility, long-term ecological impacts associated with construction and operation of the facility would be minimal.

Based on this analysis of the treatment/disposition alternatives, TD 2, and to a lesser extent TD 3 (depending on the actual landfill location selected), would have the greatest long-term adverse environmental impacts. TD 4 and TD 5 would have similar environmental impacts, but less than TD 3 because they would be in place only for the duration of the remedial construction. TD 1 and TD 1 RR would have the least long-term impacts.

3.6 ATTAINMENT OF IMPGs

Attainment of IMPGs is not applicable to evaluation of treatment and disposition alternatives.

3.7 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME

The degree to which the treatment/disposition alternatives would reduce the TMV of PCBs is discussed below.

3.7.1 Treatment Process Used and Materials Treated

TD 1 through TD 3 (including TD 1 RR) would not include any treatment processes that would reduce the toxicity of, or directly affect, PCB concentrations in the removed sediment and soil. TD 4 and TD 5 would incorporate treatment processes that can, to varying degrees, reduce concentrations of PCBs. Under TD 4, the chemical treatment process would reduce the toxicity of the sediment and soil by permanently removing some PCBs from these materials, although the effectiveness of this technology is questionable. Under TD 5, the indirect-fired thermal desorption system would reduce the toxicity of the PCB-contaminated sediment and soil by permanently removing PCBs from these materials, and the PCBs in the liquid stream would be sent to a permitted off-site disposal facility for destruction. The volume and nature of the materials to be treated would be determined by the selected remediation alternative and are, therefore, identical for all treatment/disposition alternatives.