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Appendix N

Revised Evaluation of Work Site and Transportation Accident Risks

Appendix N
Estimation of Work Site and Transportation Accident Risks

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Date:
October 2010

Project Number:
21-14339D

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N.1 Introduction

The Revised CMS Report describes and evaluates various remedial alternatives for addressing PCB-containing sediments and floodplain soils in different sections (reaches) of the Housatonic River and adjacent floodplain, as well as certain combinations of those sediment and floodplain alternatives; and it also describes and evaluates alternatives for treatment and/or disposition of sediments and soils that are removed from the river and floodplain. These alternatives are evaluated in accordance with the three General Standards and six Selection Decision Factors set out in the Revised RCRA Permit issued by the U.S. Environmental Protection Agency (EPA) to the General Electric Company (GE) for the Rest of River. One of the Selection Decision Factors is Short-Term Effectiveness, which involves consideration of the impacts to nearby communities, workers, and the environment during implementation of the alternatives. These impacts include the potential for worker accidents during on-site construction/remediation activities and the potential for transportation accidents during the transport of materials to and from the site, which could affect the general public. GE has requested ENVIRON to develop quantitative estimates of these short-term worker and transport accident risks for the various remedial alternatives that involve removal and/or capping of sediments or floodplain soils, as well as the identified combinations of those alternatives, and for the treatment/disposition alternatives for removed sediments and soils. (These remedial alternatives and combinations of alternatives are referred to generally herein as “the alternatives” unless otherwise noted.)

This appendix describes the methodology used to estimate the short-term risks of work site and transportation accidents associated with these alternatives, and presents the resulting estimates. Short-term accident risks associated with the remedial alternatives include: (a) possible worker injuries and fatalities during on-site construction, excavation, and materials handling operations (similar to the risks experienced in the construction and general materials handling industries); and (b) potential injuries and/or fatalities that result from traffic accidents on public roads involving trucks transporting raw materials to the site or removing sediments and soils from the site.

N.2 Risk Estimation Methodologies

The short-term risks of injuries and fatalities resulting from work site and traffic accidents on public roads were quantified by combining “rate estimates” of injuries and fatalities arising from work site operations and material transportation with estimates of the number of worker hours or vehicle miles traveled associated with each alternative. For work site accidents, estimates were first developed of the probability of such an accident resulting in an injury or fatality for each hour of work conducted during remediation. Once these probabilities were developed, estimates of the number of work hours involved in each remedial alternative were used to calculate the risk of accident-related injuries or fatalities associated with the various alternatives. Similarly, for transportation-related risks, the probability of a transportation accident (resulting in injury or fatality) was developed for each mile traveled by trucks hauling materials to or from the site, and then estimates of the number of vehicle miles that would need to be traveled for each remedial alternative were used to calculate the risk of accident-related injuries or fatalities

associated with the alternatives. Transportation risks on the site's access roads and to on-site, local disposal or treatment facilities were calculated as work site accident risks. Risk estimation methods are outlined below.

N.2.1 Methodology for Estimating Work Site Accident Risks

All work site activities involve some risk of accidents, which may result in injuries or fatalities, and which vary with the work being done. The probability of a work site accident was evaluated for each sediment remedial alternative that involves sediment removal and/or capping (i.e., SED-3 through SED-10), each floodplain remedial alternative that involves soil removal (i.e., FP-2 through FP-9), each combination of sediment and floodplain removal alternatives (i.e., SED 3/FP 3 through SED 10/FP 9),[1] and each treatment/disposition alternative that involves on-site work (i.e., TD-2 through TD-5), as described in the text of the Revised CMS Report. These probabilities were calculated using methods similar to those developed by Hoskin et al. (1994),[2] site-specific information regarding the type and duration of activities taking place during each remedial alternative, and published fatal and non-fatal accident statistics.

Because accident rates vary by work task and occupation, site-specific information on work hours for different occupations is required for the work site accident risk analysis. For the alternatives identified above, site-specific estimates of labor time were developed for 20 different labor categories, though each alternative did not involve labor time in each category. These categories are:

- Construction Manager,
- Field Technician,
- Foreman—Land,
- Foreman—Water,
- Laborer—Land,
- Laborer—Water,
- Mechanic,

[1] The combinations of sediment and floodplain alternatives differ in some respects from the sum of their individual sediment and floodplain components. For example, a separate set of access roads and staging areas has been identified for each combination (eliminating overlaps from their components), and the estimated duration of each combination is equivalent to the duration of its sediment component (based on the assumption that the floodplain component can be implemented within that same timeframe).

[2] Hoskin et al. (1994) quantified the risks of occupational fatalities associated with three remedial alternatives for a typical hazardous waste site. The authors first calculated fatality rates for workers in 17 specific occupations that were selected based on the types of work that would be performed under the various remedial alternatives. The authors then estimated the number of hours required during the remedial alternatives for each occupation and calculated the percentage of total work time that was contributed by each occupation. The calculated fatality rates and percentage of total worker hours contributed by a particular occupation were multiplied to produce a weighted fatality rate for the remedial alternative, which was then used with the number of person-years worked during each remedial alternative to arrive at the predicted fatality rate for each remedial alternative.

- Operator—Land,
- Operator—Water,
- Superintendent,
- Survey Technician,
- Wastewater Treatment System (WWTS) Technician,
- Gate Attendant,
- Health and Safety Officer,
- Treatment Plant Engineer,
- Treatment Plant Laborer,
- Treatment Plant Manager,
- Treatment Plant Operator,
- Treatment Plant Shift Supervisor, and
- Industrial Truck Driver.[3]

Tables N-1 through N-4 list the estimated labor hours for on-site remediation workers in each of the above relevant categories required to implement the different sediment alternatives, floodplain alternatives, combinations of sediment and floodplain alternatives, and treatment/disposition alternatives, respectively.[4] These estimates were taken from the cost estimates for each alternative.

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[3] Truck driver hours for the sediment and floodplain alternatives (and combinations) were calculated for the movement of excavated materials from the removal areas to the on-site staging areas along site access roads (and, for SED-9, on access roads built in the river in Reach 5A while water remains flowing). These truck driver hour estimates do not include the movement of imported clean fill and building materials on the site's roads. For the treatment/disposition alternatives, the truck driver hours that are part of worker site risks include the movement of excavated material from the staging areas (by reach) to each of the three potential locations that have been identified for an Upland Disposal Facility under TD-3 (as discussed below) or to the location identified for a treatment facility under TD-4 and TD-5. These hours were evaluated as worker hours because the nature of the work (and associated risks) is more similar to on-site construction material movement work than to long-haul trucking.

[4] Labor hours are not provided for treatment/disposition alternative TD-1 (off-site disposal) because it is assumed that the risks to workers would consist solely of risks to the truck drivers and employees of the off-site disposal facilities, rather than to on-site remediation workers. The estimated labor hours for the remaining treatment/disposition alternatives are provided as a range from the minimum to the maximum hours, based on, respectively, the smallest and largest potential volumes of removed materials that could be subject to that alternative (depending on the sediment and floodplain alternatives selected). As discussed in the Revised CMS Report, it is assumed that TD-2 would be used only for the disposal of hydraulically dredged sediments from Reaches 5C and 6 under alternatives SED-6 through SED-9, and that all other excavated materials would be transported off-site for disposal. Hence, for TD-2, the low end of the range of labor hours was based on the sediment alternative with the smallest volume of these alternatives (SED-6), and the high end of the range was based on the alternative with the largest volume (SED 8). For TD-3, TD-4, and TD-5, the low end of the range of labor hours was based on the combination of sediment and floodplain alternatives with the smallest volume (SED-3 and FP-2), and the high end of the range was based on the combination with the largest volume (SED-8 and FP-7) or, for TD-3, the maximum capacity of an Upland Disposal Facility at the given location (if less than the total volume of SED-8 and FP-7).

N.2.1.1 Work Site Accidents Resulting in Fatality

In order to develop fatal accident rates for these labor categories, information on the total number of fatal accidents per year for Standard Occupational Classification (SOC) System occupations that correlate to the labor categories listed above were obtained from the Bureau of Labor Statistics (BLS), United States Department of Labor (USDOL) (2003a, 2004a, 2005a, 2006a, 2007a, 2008a).[5] For example, the SOC occupation "Surveying and mapping technicians" was used to represent the labor category "Survey Technician," and the SOC occupation "Sailors and marine oilers" was used to represent the labor category "Laborer – Water." Table N-5 lists the SOC occupation selected to represent each labor category.[6]

Using BLS occupational fatality data and information on the total numbers of workers in each SOC occupation obtained from the U.S. Census Bureau's Current Population Survey (U.S. Census Bureau 2008; USDOL, 2009), the estimated average annual rate of fatal accidents for each occupation was calculated for 2003 through 2008. This was done by dividing the sum of fatalities for each occupation for years 2003–2008 by the sum of workers in each occupation for years 2003–2008. To obtain the hourly fatal accident rate, this yearly result was divided by an assumed 2000 work-hours per year.

Table N-5 summarizes the results of these calculations and shows the hourly fatality rate calculated for each of the 20 labor categories. Using these rates, and the labor hour estimates developed for each remedial alternative, the predicted number of fatalities for each labor category during the implementation of each alternative was calculated using Equation 1.

$$\mu_{lc} = H \times F_R \qquad \text{Equation 1}$$

where

μ_{lc} = Estimated number of fatalities for a given labor category

H = Estimated work hours within a given labor category, and

F_R = Calculated hourly fatality rate.

For all types of alternatives, support service hours are not included in the categories listed in Tables N-1 through N-4, so this analysis will slightly underestimate potential work site accident risks associated with each remedial alternative.

[5] In 2003, BLS began using the SOC system to classify workers into occupational categories when publishing fatal occupational injury data. Due to this change, injury and fatality rate data by occupation from 2003 and later cannot be compared directly with data from previous years.

[6] Certain occupations were not included in every USDOL report. For example, "Surveying and mapping technicians" was used only in the 2003 to 2005 reports, and "Dredge, excavating, and loading machine operators" were not listed in the 2008 report. For these occupations, the risk was calculated as described herein using the available data from these reports.

The overall number of work site accident related fatalities predicted to be associated with a given alternative, μ, is equal to the sum of the predicted fatalities for each individual labor category.[7]

In addition to calculating the estimated number of fatalities likely to occur during implementation of each alternative, the probability that at least one fatality would occur during implementation of each of the alternatives was calculated by applying the Poisson distribution function. The Poisson distribution is useful for evaluating the number of events (fatalities in this case) that may occur in a given period, assuming that the events are rare and occur independently of one another (e.g., the occurrence of one event does not affect the probability of a subsequent event). It is reasonable to assume that fatality events meet these requirements. In the Poisson distribution, the probability of an individual event occurring during a given time period is related to the number of times the event will likely occur during that same period. As described by Hoskin et al. (1994), the probability, or risk, of exactly *x* events occurring can be calculated using the Poisson function, described quantitatively using Equation 2 (Snedecor and Cochran 1980).

$$P(x) = (e^{-\mu} \times \mu^{x})/x! \qquad \text{Equation 2}$$

where

$P(x)$ = Probability, or risk, of *x* numbers of fatalities occurring,

x = Number of fatalities occurring, and

μ = The mean of the Poisson distribution, equal to the estimated number of fatalities during implementation of an alternative.

The probability of at least one fatality occurring during the implementation of a remedial alternative can be calculated by first calculating the probability that no fatalities occur ($x = 0$ in Equation 2) and then calculating the probability of at least one fatality $P(\geq 1)$ using Equation 3.

$$P(\geq 1) = 1 - P(0) \qquad \text{Equation 3}$$

In addition to the total number of fatalities estimated to occur under each alternative, the average annual number of fatalities was calculated. For the sediment and floodplain alternatives (and combinations), this was done by dividing the estimated total number of fatalities by the estimated total duration of each alternative (or combination). For the

[7] This procedure is mathematically equivalent to the method used by Hoskin et al. (1994), but follows a slightly different calculation order. Specifically, Hoskin et al. combined the fatality rates for the different labor categories with the relative number of hours worked in each category to derive a single weighted average fatality rate for a remedial alternative. This single rate was then multiplied by the total number of worker years to establish an estimate of fatalities.

treatment/disposition alternatives, a range of average annual fatalities was calculated, based on the minimum to maximum years of operation for each of those alternatives.[8]

N.2.1.2 Work Site Accidents Resulting in Lost-Time Injury

Non-fatal injury/illness rates are not available from BLS for the various labor categories used in the fatal accident analysis. Rather, BLS provides non-fatal injury rate data[9] at the industry level, as identified by the North American Industry Classification System (NAICS). Therefore, in order to evaluate the risk of non-fatal accidents during site remediation, each of the 20 labor categories was assigned to a NAICS industry. For example, the "Construction Manager" labor category was best represented by the "Heavy and civil engineering construction" NAICS industry, while the "Foreman – Water" category was assessed to the "Water transportation" industry. Table N-6 shows the industry classifications for each of the 20 labor categories.[10] Accident rates for years 2003–2008 were averaged to obtain the overall recent rate of non-fatal injuries/illnesses in each of the selected industries (USDOL 2003b, 2004b, 2005b, 2006b, 2007b, 2008b).[11]

The non-fatal injury rates shown in Table N-6 were used with estimated labor hour data for each alternative and Equation 1 to calculate the expected number of non-fatal injuries for each labor category.[12] As with the fatality risk estimate, these labor category values were summed to estimate the total number of non-fatal worker injuries expected during the implementation of each alternative. The probability of at least one non-fatal injury during implementation of each alternative was calculated in the same way that the probability of at least one fatality was calculated, using Equations 2 and 3.

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[8] Annual average statistics for the treatment/disposition alternatives have been calculated based on the assumed years of operation for each of those alternatives, as opposed to the total durations (from beginning to end) associated with the sediment and floodplain alternatives. The years of operation for a TD alternative represent the number of years during which materials removed from the river or floodplain would be delivered to the disposal or treatment facility (i.e., excluding years within the overall duration of the sediment and floodplain alternatives when the only activities associated with those alternatives would be capping, backfilling, or restoration activities that would not require operation of the disposal or treatment facility). The minimum years of operation were based on the years of operation under the sediment alternative with the smallest volume to be disposed of or treated (not the shortest-duration alternative), and the maximum years of operation were based on the years of operation under the sediment alternative with the largest volume to be disposed of or treated (or, for TD-3, the maximum capacity of an Upland Disposal Facility at the given location, if less). It is assumed that the associated floodplain soil removals would be conducted during the same years of operation as the sediment alternatives.

[9] For purposes of this analysis, non-fatal injuries include only those that result in days away from work.

[10] The non-fatal injury rates are relatively similar across these industries, varying by only a factor of 2.3 from the lowest (4.27×10^{-6} injuries per worker hour) to the highest (9.87×10^{-6} injuries per worker hour) rate.

[11] Accident rate data are reported at different industrial classification levels from year to year. Table N-6 lists the most detailed classification level for which data are consistently available from 2003–2008.

[12] It should be noted that some of the industrial truck driver hours for SED-9 would be spent on access roads within the river channel in Reach 5A while water remains flowing in the channel. The risk of fatality or injury associated with driving with under these conditions would likely be higher than the risk of driving on a dry-land road. However, for this analysis, all industrial truck driver hours for SED-9 were considered to be over dry-land roads, and thus this analysis will underestimate the risk of fatalities and injuries from SED-9 to some degree.

The average annual number of non-fatal injuries for each alternative (or range of average annual numbers of injuries for each treatment/disposition alternative) was also calculated, using the same procedure described above for fatalities.

N.2.2 Methodology for Estimating Traffic Accident Risks

As discussed in the text of the Revised CMS Report, construction materials and excavated sediments and soils would be transported to or from the site during implementation of the remedial alternatives, though different material disposition methods and locations are used in the different treatment/disposition alternatives. Inherent in the transport of materials to and from the site is the risk of an accident during transit, which may result in fatality or injury.

To quantify the risk of transportation accidents on public roads associated with each alternative, publicly available accident rate data collected by government agencies were combined with site- and project-specific information to estimate the number of accidents involving remediation-related vehicles and the associated fatalities and injuries. For simplicity, the estimates of potential transport-related accidents were based on the following scenarios.

For the sediment and floodplain removal alternatives and the combinations of those alternatives (i.e., SED-3 through SED-10, FP-2 through FP-9, and SED 3/FP 3 through SED 10/FP 9), transport-related risks were quantified only for trucks used to import clean backfill and other materials (e.g., riprap) to the site over off-site, publicly accessible roads, as well as to export the materials used for the staging areas and access roads following completion of sediment/soil remediation. As noted above, risks associated with the transport of removed sediments and soils on the site's access roads from their place of removal to the on-site staging areas were calculated as work site accident risks for these alternatives.[13]

For the treatment/disposition alternatives, the risks were calculated for the transportation of the following materials:

- TD-1 (disposal at off-site disposal facilities): Truck transport of excavated materials (after dewatering where necessary) from the staging areas over off-site roads to off-site disposal locations.
- TD-2 (disposition at local in-water Confined Disposal Facility [CDF]): Truck transport to import materials over off-site roads for construction and closure of the CDF(s).[14]

[13] Risks associated with the transport of such materials from the staging areas to the local disposal or treatment facilities under TD-3, TD-4, and TD-5 were calculated as part of work site accident risks for those alternatives. Risks associated with the transport of excavated materials from the staging areas to off-site disposal facilities under TD-1 and those associated with transport of treated solids from the treatment facility to off-site disposal facility(ies) under TD-4 and TD-5 were assessed as transportation accident risks under the relevant treatment/disposition alternatives, as discussed below.

[14] As noted in the Revised CMS Report, it is assumed that the CDF(s) would be used only for the disposal of hydraulically dredged sediments from Reaches 5C and 6 under alternatives SED-6 through SED-9, and that all other

- TD-3 (disposition at local Upland Disposal Facility [UDF], assumed to be constructed at one or more of three potential locations – the Woods Pond, Forest Street, and Rising Pond Sites – as described in the text of the Revised CMS Report): Truck transport to import materials over off-site roads for construction and closure of the Upland Disposal Facility.
- TD-4 (chemical extraction): Truck transport for off-site disposal of treated materials from the chemical extraction facility over off-site roads to off-site disposal locations.
- TD-5 (thermal desorption): Alternative estimates depending on method of disposition of treated materials from the thermal desorption facility – specifically: (a) assuming on-site reuse of some treated materials (approximately half of the excavated floodplain soils, after mixing with organic topsoil) in the floodplain and truck transport of the remaining treated material over off-site roads to off-site disposal locations (alternative TD-5a); and (b) assuming off-site truck transport of all treated materials over off-site roads to off-site disposal locations (alternative TD-5b).[15]

As noted above, the risks associated with on-site truck transport of materials from on-site staging areas to the Upland Disposal Facility, the chemical extraction facility, or the thermal desorption facility, or from the thermal desorption facility for on-site reuse, were calculated as worker risks for these alternatives, not as transportation risks.

N.2.2.1 Traffic Accident Frequency Information for Truck Transport

To estimate the number of injuries and fatalities arising from truck transportation accidents on off-site roads, publicly available data on large trucks[16] from the United States Federal Highway Administration, the National Highway Traffic Safety Administration (NHTSA) Fatality Analysis Reporting System, and the NHTSA General Estimates System (USDOT 2008) were used to calculate the rate of fatalities and injuries. This accident frequency information was combined with estimates of the vehicle-miles traveled on roads by trucks transporting remediation-related materials to calculate the risk of fatalities and injuries arising from paved road truck transportation.

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sediments and all excavated floodplain and riverbank soils would be transported off-site for disposal. The risks associated with the off-site transport of those remaining materials were not estimated as part of TD-2. Thus, the risk estimates calculated for TD-2 are not comparable to those calculated for the other treatment/disposition alternatives, because they do not reflect the risks that would be associated with disposition of all removed materials.

[15] Although alternatives TD-5a and TD-5b would also generate treatment residuals (e.g., liquid condensate) that would be transported off-site for destruction, the transportation of these materials was not considered in the risk calculation, since the volume of these materials is low relative to the volume of other materials transported off-site under this alternative. Therefore, the transportation risk assessment will slightly underestimate the risks of this alternative.

[16] A large truck, as referred to here, is defined by the Federal Motor Carrier Safety Administration as a truck with a gross vehicle weight rating greater than 10,000 pounds.

Data regarding the number of injuries and fatalities per mile driven by large trucks in the United States are available for several years. The average of the most recent five years of available data (2004 through 2008) was used in our estimates. This analysis of federal large-truck statistics indicates that fatalities occur at a rate of 2.2×10^{-8} per truck mile traveled, while injuries occur at a rate of 4.7×10^{-7} per truck mile traveled. These rates were used in the calculation of traffic accident risks from transport on public roads.

N.2.2.2 Estimation of Traffic Accident Risks for Sediment and Floodplain Alternatives and Combinations

As noted in Section N.2.2 above, transport-related risks for the sediment and floodplain alternatives and the combinations of those alternatives were quantified only for truck transport used to import clean backfill and other materials (e.g., riprap) to the site over public roads and to export staging area and access road materials following completion of site remediation. For each of these alternatives, the estimated number of truck trips that would be required to import and export such materials was based on the estimated weight (in U.S. tons) of the materials needed to implement the alternative, and an assumption that 16-ton trucks would be used for importing backfill and other materials and that 20-ton trucks would be used for exporting the staging area/access road materials.[17] The material weight estimates and the calculated number of material importation and exportation truck trips are shown in Tables N-7 through N-9 for the sediment alternatives, floodplain alternatives, and sediment-floodplain combinations, respectively.

To determine the distance of each such truck trip, it was assumed that clean backfill and other imported materials would be available from suppliers within 25 miles of the site. Thus, a round-trip distance of 50 miles was assumed for each truck trip. It was also assumed that exported staging area/access road materials would be transported to the High Acres Landfill in Fairport, New York (a distance of 550 miles roundtrip). The assumed travel distance was then combined with the estimated number of truck trips, using Equation 4, to calculate the total vehicle miles traveled (VMT) for each sediment and floodplain alternative and combination. This calculation was performed for both importing and exporting material, with the results added to get the overall VMT for each alternative.

$$VMT = D \times N \qquad \text{Equation 4}$$

where

VMT = Total vehicle miles traveled,

D = Distance traveled (vehicle miles/trip), and

N = Number of vehicle trips on the designated route.

[17] The importation of construction materials has been assumed to be performed using fixed-body 16-ton dump trucks making repeated short trips to and from local quarries and/or stock yards. Larger 20-ton trucks associated with over-the-road hauling have been assumed for exportation of materials to off-site disposal facilities.

This overall estimated VMT (see Tables N-7 through N-9) was then combined with the above-described rates of fatalities and injuries predicted per truck mile traveled on public roads to calculate the potential number of fatalities and injuries associated with truck transport for each sediment and floodplain alternative, as follows:

$$A = VMT \times A_R \qquad \text{Equation 5}$$

where

A = Number of fatalities or injuries involving trucks carrying remediation materials on roads,

VMT = Round-trip vehicle-miles traveled on roads by trucks carrying remediation materials, and

A_R = Fatality or injury rate (per VMT)

In addition to these calculations, an estimate was made of the probability of at least one fatality or injury arising from truck transport for each remedial alternative using the Poisson distribution, as described above. Further, the average annual number of fatalities or injuries was calculated for each alternative by dividing the estimated total number of fatalities or injuries by the duration of the alternative.

N.2.2.3 Estimation of Traffic Accident Risks for Treatment/Disposition Alternatives

As noted in Section N.2.2 above, transport-related risks for the treatment/disposition alternatives were quantified for the truck transport of different materials, depending on the alternative. A range of material volumes was also used for each alternative (from the smallest potential volume to the largest potential volume), resulting in a range of truck trips and vehicle miles traveled for each alternative. Estimated vehicle miles traveled for each of the selected alternatives were calculated as follows**:**

- For TD-1, the estimated number of truck trips that would be required to transport excavated materials to off-site disposal locations was first calculated using material disposal weights, which were based the total weight of material to be transported. This calculation incorporated the use of stabilization/drying agents (where necessary), and assumed that the material would be transported in 20-ton loads in over-the-road haul trucks. Based on these inputs, truck trip estimates were prepared for a range of disposal quantities – from a combination of SED-3 and FP-2 (at the low end of the range) to a combination of SED-8 and FP-7 (at the high end of the range). Once truck trip estimates were prepared, vehicle miles traveled were estimated by assuming, for present purposes, that materials regulated under the Toxic Substances Control Act (TSCA) would be transported to the CWM Chemical Services facility in Model City, New York (a distance of 720 miles roundtrip), and that non-TSCA materials would be transported to the High Acres Landfill in Fairport, New York (a distance of 550 miles roundtrip). The ranges of assumed

volumes (both TSCA and non-TSCA), disposal weights, truck trips, and vehicle miles traveled are shown in Table N-10.

- For TD-2, the estimated number of truck trips required to import materials over off-site roads for construction and closure of the CDF(s) was calculated based on a range of weights of the materials needed to construct and close the CDF(s), with the low end based on the estimated size of the CDF for SED-6 and the high end based on the size of the CDFs for SED-8, and based on an assumption that 16-ton trucks would be used to import these materials.[18] In order to calculate the vehicle miles traveled by these trucks, it was estimated that materials for construction and closure of the CDF(s) would be available within 25 miles of the site, resulting in a round trip distance of 50 miles per truck trip. The range of estimated volumes of materials to import and the associated number of truck trips and vehicles miles traveled under alternative TD-2 are shown in Table N-11.

- For TD-3, three separate transportation alternatives were considered, based on the assumption that the Upland Disposal Facility (UDF) would be located at one of the following sites (as described in the text of the Revised CMS Report): Woods Pond Site, Forest Street Site, or Rising Pond Site. The estimated number of truck trips to import materials over off-site roads for construction and closure of the UDF was calculated based on the assumption that 16-ton trucks would be used to import these materials and on a range of the weights of materials needed to construct and close the UDF. The low end of this range was based on the weight of materials necessary to construct and close a UDF for the excavated materials under SED-3 and FP-2, and the high end was based on the weight of materials necessary to construct and close a UDF for the excavated materials under SED-8 and FP-7 or, if lower, the maximum capacity of a UDF at the given location. To calculate the range of vehicle miles traveled under each TD-3 alternative, it was estimated that materials for construction and closure of the UDF would be available within 25 miles of the site, resulting in a round trip distance of 50 miles per truck trip. The range of weights of materials to import and the associated number of truck trips and vehicle miles traveled under alternative TD-3 are shown in Table N-11.

- For TD-4, the materials to be transported off-site would be the treated solid materials resulting from the treatment process. For this alternative, it was assumed that the volume of such materials (and thus the number of truck trips) would be equal to the volume transported under alternative TD-1, but that all such treated materials could be transported to a non-TSCA regulated landfill pursuant to an EPA determination under the TSCA regulations. As with TD-1, truck trip estimates were prepared for a range of material volumes – from the volume that would be excavated under SED-3 and FP-2 to the volume that would be excavated under SED-8 and FP-7. Estimates of the vehicle miles traveled were prepared by assuming that the treated materials would be transported to the High Acres Landfill in Fairport, New York (a distance of 550 miles roundtrip). The ranges of

[18] As noted above, it is assumed that the CDF(s) would be used only for the disposal of hydraulically dredged sediments from Reaches 5C and 6 under SED-6 through SED-9, not as part of any other remedial alternative or for any other sediment or soil.

material volumes, truck trips, and vehicle miles traveled associated with alternative TD-4 are shown in Table N-10.

- For TD-5, two separate transportation alternatives were considered, depending on the method selected for disposition of treated solid materials. The two alternatives were: (a) on-site reuse of some treated materials (approximately half of the treated floodplain soils, after mixing with organic topsoil) in the floodplain areas and off-site disposal of the remaining materials (alternative TD-5a); and (b) off-site disposal of all such treated materials (alternative TD-5b).[19] For both TD-5a and TD-5b, a range of treated material volumes and truck trips were considered – from the volume that would be excavated under SED-3 and FP-2 to the volume that would be excavated under SED-8 and FP-7. Estimates of the vehicle miles traveled were prepared by assuming that all treated solid materials to be transported off-site would be considered non-TSCA materials and would be transported to the High Acres Landfill in Fairport, New York (a distance of 550 miles roundtrip). For TD-5 it was assumed that there would be a 10% reduction in the total weight as a result of the thermal treatment; as such, there is an associated reduction in the number of truck trips relative to TD-4. It was further assumed that, under alternative TD-5a, a portion of the treated materials would be reused as backfill in the floodplain and thus would not need off-site disposal; as a result, there is a further reduction in the number of truck trips associated with TD-5a. The estimated volumes of materials to transport under alternatives TD-5a and TD-5b, the number of truck trips, and the associated vehicle miles traveled are presented in Table N-10.

For each TD alternative, the lower and upper bounds of the estimated VMT range were then combined with the above-described rates of fatalities and injuries predicted per truck mile traveled on public roads, using Equation 5 (above), to calculate a range of potential fatalities and injuries associated with truck transport for each TD alternative. As noted above, the risks calculated for TD-2 are not comparable to those calculated for the other treatment/disposition alternatives, because they do not include the risks that would be associated with off-site transport of the material that would not be placed in the CDF(s).

In addition, for each TD alternative, based on the lower and upper bounds of the fatality and injury estimates, estimates were made of the probability of at least one fatality or injury, using the Poisson distribution, as described above. Further, the range of average annual fatalities or injuries was calculated for each TD alternative by dividing the lower and upper bounds of the total fatality and injury estimates by the minimum and maximum years of operation, respectively.[20]

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[19] Treatment residuals (e.g., liquid condensate from the thermal desorption process) were excluded from the analysis, as previously discussed.

[20] Years of operation are defined in note 8 above. As also noted there, the minimum years of operation were based on the years of operation of the disposal or treatment facility under the sediment alternatives with the smallest volume to be disposed of or treated, and the maximum years of operation were based on the years of operation under the sediment alternatives with the largest volume to be disposed of or treated (or, for TD-3, the maximum capacity of an Upland Disposal Facility at the given location, if less). It is assumed that the associated floodplain soil removals and

N.3 Estimated Risks

The estimated number of work site fatalities for the various sediment alternatives, floodplain alternatives, combinations of sediment and floodplain alternatives, and treatment/disposition alternatives are summarized in Tables N-12 through N-15, respectively. These tables show that the estimated numbers of fatalities for the various alternatives range from 0.02 to 0.28 (0.004 to 0.008 per year) for the sediment alternatives, 0.003 to 0.08 (0.003 to 0.004 per year) for the floodplain alternatives, 0.05 to 0.34 (0.005 to 0.009 per year) for the combinations of sediment and floodplain alternatives, and 0.007 to 0.11 (0.0009 to 0.003 per year) for the treatment/disposition alternatives. The probability of at least one worker fatality during each alternative is predicted to be less than 30% in all cases and much less for most alternatives.

The estimated number of non-fatal work site injuries for the various sediment alternatives, floodplain alternatives, combinations of sediment and floodplain alternatives, and treatment/disposition alternatives are summarized in Tables N-16 through N-19, respectively. These tables indicate that the estimated numbers of non-fatal injuries for the various alternatives range from 2.2 to 22.2 (0.43 to 0.61 per year) for the sediment alternatives, 0.37 to 9.5 (0.37 to 0.46 per year) for the floodplain alternatives, 2.6 to 30.2 (0.6 to 0.8 per year) for the combinations of sediment and floodplain alternatives, and 0.7 to 16.4 (0.12 to 0.41 per year) for the treatment/disposition alternatives. The probability of a non-fatal injury from the implementation of some of the alternatives is effectively 100%.[21]

The estimated number of fatalities and non-fatal injuries associated with traffic accidents during the importation of materials to support the implementation of sediment, floodplain soil, and combined remedial alternatives are summarized in Table N-20, while the estimated number of fatalities and non-fatal injuries associated with truck transportation during implementation of the treatment/disposition alternatives are listed in Table N-21.

For the importation/exportation of materials to support implementation of sediment and floodplain alternatives and combinations, the estimated number of transportation-related fatalities ranges from 0.04 to 0.36 (0.008 to 0.02 per year) for the sediment alternatives, 0.01 to 0.1 (0.004 to 0.01 per year) for the floodplain alternatives, and 0.05 to 0.5 (0.009 to 0.02 per year) for the combinations of sediment and floodplain alternatives. The probability of a fatality from transportation of materials ranges from 1% to 40%. The number of non-fatal injuries predicted to be associated with the transport of these materials ranges from 0.89 to 7.8 (0.15 to 0.33 per year) for the sediment alternatives, 0.23 to 2.1 (0.09 to 0.24 per year) for the floodplain alternatives, and 1.1 to 11.0 (0.18 to 0.4 per year) for the combinations. The probability of a

disposal or treatment would be performed during the same years of operation as the sediment alternatives.

[21] The probability of at least one non-fatal injury from implementation of SED, FP, and TD alternatives is as high as 99.96%, or effectively 100%. Hereafter, very high probabilities (i.e., greater than 99.5%) will be referred to as effectively 100%.

non-fatal injury from the implementation of the alternatives ranges from 20% to effectively 100% (see Table N-20).

The estimated number of transportation-related fatalities for the treatment/disposition alternatives (based on the ranges of potential volumes and thus truck trips) ranges from a low of 0.002 to 0.004 (0.0001 to 0.0002 per year) (for TD-3 at the Woods Pond Site) to a high of 0.2 to 3.1 (0.03 to 0.08 per year) (for TD-1), while the probability of at least one traffic accident related fatality during the alternatives ranges from a low of 0.2 to 0.4% (for TD-3 at the Woods Pond Site) to a high of 19 to 96% (for TD-1). The estimated number of non-fatal injuries resulting from material transportation along public roads ranges from a low of 0.03 to 0.08 (0.003 to 0.004 per year) (for TD-3 at the Woods Pond Site) to a high of 4.4 to 67.1 (0.55 to 1.7 per year) (for TD-1). The probability of at least one non-fatal injury resulting from the implementation of the alternatives is effectively 100% for all the alternatives except TD-2 and TD-3 (see Table N-21).

N.4 References

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Table N-1
Estimated Labor Hours for Sediment Remedial Alternatives

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Labor Category	SED-1	SED-2	SED-3	SED-4	SED-5	SED-6	SED-7	SED-8	SED-9	SED-10
Construction Manager	--	--	22,425	31,335	30,911	34,894	43,196	101,843	34,314	8,543
Field Technician	--	--	15,147	25,418	31,297	36,039	44,894	91,123	32,668	7,983
Foreman - Land	--	--	31,581	30,886	39,226	41,907	52,222	95,409	35,681	10,815
Foreman - Water	--	--	2,303	7,609	10,700	13,433	17,724	54,296	21,549	2,458
Laborer - Land	--	--	133,173	157,424	183,086	207,987	238,913	366,825	150,111	50,914
Laborer - Water	--	--	9,211	30,434	42,801	45,016	60,600	169,188	68,982	9,833
Mechanic	--	--	25,090	28,162	32,903	42,249	52,808	107,307	40,559	10,319
Operator - Land	--	--	87,276	119,359	150,346	158,940	197,150	335,687	121,667	40,863
Operator - Water	--	--	32,237	106,520	149,803	162,895	196,655	551,835	222,011	34,415
Superintendent	--	--	15,147	23,032	28,911	32,814	41,116	99,763	32,634	7,983
Survey Technician	--	--	25,439	33,046	39,123	39,123	48,598	57,092	11,964	11,161
Industrial Truck Driver	--	--	49,240	95,241	97,666	96,294	126,718	224,019	87,235	25,506
WWTS Technician	--	--	29,236	41,632	56,154	65,243	84,488	149,037	53,058	21,775
Total	**--**	**--**	**477,505**	**730,098**	**892,927**	**976,834**	**1,205,082**	**2,403,424**	**912,433**	**242,568**

Table N-2
Estimated Labor Hours for Floodplain Remedial Alternatives

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Labor Category	FP-1	FP-2	FP-3	FP-4	FP-5	FP-6	FP-7	FP-8	FP-9
Construction Manager	--	1,291	4,821	7,530	6,648	20,575	38,583	11,298	1,527
Field Technician	--	1,291	4,821	7,530	6,648	20,575	38,583	11,298	1,527
Foreman - Land	--	2,750	9,360	13,952	12,180	35,798	66,693	20,229	3,375
Laborer - Land	--	15,414	50,657	77,764	71,883	206,636	368,237	115,005	18,945
Mechanic	--	1,291	4,821	7,530	6,648	20,575	38,583	11,298	1,527
Operator - Land	--	8,637	28,814	44,330	40,751	118,222	212,028	65,679	10,572
Superintendent	--	1,931	6,341	9,210	8,008	22,895	42,343	13,138	2,407
Survey Technician	--	2,582	9,642	15,061	13,296	41,150	77,166	22,595	3,054
Industrial Truck Driver	--	4,002	14,946	23,344	20,608	63,783	119,608	35,023	4,733
WWTS Technician	--	1,043	4,587	7,298	6,363	20,269	29,923	10,781	1,280
Total	**--**	**40,232**	**138,810**	**213,549**	**193,033**	**570,478**	**1,031,747**	**316,344**	**48,947**

Table N-3
Estimated Labor Hours for Combinations of Sediment and Floodplain Remedial Alternatives

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Labor Category	SED 3/FP 3	SED 5/FP 4	SED 6/FP 4	SED 8/FP 7	SED 9/FP 8	SED 10/FP 9
Construction Manager	27,647	38,841	42,825	142,266	46,412	10,629
Field Technician	19,968	38,827	43,570	129,706	43,965	9,509
Foreman - Land	39,821	51,898	54,579	160,182	54,870	13,871
Foreman - Water	2,303	10,700	13,433	54,296	21,549	2,458
Laborer - Land	180,553	250,992	275,893	692,639	251,739	67,940
Laborer - Water	9,211	42,801	45,016	169,188	68,982	9,833
Mechanic	30,311	40,834	50,179	147,730	52,656	12,406
Operator - Land	111,803	186,098	194,692	507,211	175,009	49,835
Operator - Water	32,237	149,803	162,895	551,835	222,011	34,415
Superintendent	15,147	28,911	32,814	99,763	32,634	7,983
Survey Technician	35,082	54,184	54,184	134,258	34,560	14,215
Industrial Truck Driver	64,186	121,010	119,638	343,627	122,258	30,239
WWTS Technician	29,236	56,154	65,243	149,037	53,058	21,775
Total	**597,504**	**1,071,053**	**1,154,960**	**3,281,738**	**1,179,703**	**285,106**

Table N-4
Estimated Labor Hours for Treatment/Disposition Alternatives[1]

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Labor Category	TD-1	TD-2		TD-3 - Woods Pond		TD-3 Forest Street		TD-3 - Rising Pond		TD-4		TD-5	
		Minimum (SED-6)	Maximum (SED-8)	Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)	Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)	Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)	Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)	Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)
Construction Manager	--	950	1,820	15,643	57,581	15,643	37,086	15,643	79,151	--	--	--	--
Field Technician	--	950	1,820	15,643	57,581	15,643	37,086	15,643	79,151	--	--	--	--
Foreman - Land	--	2,050	5,869	18,772	69,097	20,336	44,503	18,772	94,981	--	--	--	--
Laborer - Land	--	48,640	171,055	91,512	336,849	99,334	235,495	91,512	463,031	12,664	127,294	12,664	127,294
Mechanic	--	950	1,820	15,643	57,581	15,643	44,503	15,643	79,151	--	--	--	--
Operator - Land	--	15,730	69,833	32,851	146,832	46,147	109,403	32,851	201,834	--	--	--	--
Industrial Truck Driver	--	--	--	37,544	184,259	37,544	118,674	50,058	443,243	25,327	189,961	25,327	189,961
Superintendent	--	950	1,820	15,643	57,581	15,643	37,086	15,643	79,151	--	--	--	--
Survey Technician	--	1,900	3,640	31,286	115,162	31,286	74,172	31,286	158,301	--	--	--	--
Gate Attendant	--	--	--	15,643	57,581	15,643	37,086	15,643	79,151	--	--	--	--
Health and Safety Officer	--	950	1,820	15,643	57,581	15,643	37,086	15,643	79,151	--	--	--	--
Treatment Plant Engineer	--	--	--	--	--	--	--	--	--	10,243	73,567	10,243	73,567
Treatment Plant Laborer	--	--	--	--	--	--	--	--	--	24,367	241,847	24,367	241,847
Treatment Plant Manager	--	--	--	--	--	--	--	--	--	10,243	73,567	10,243	73,567
Treatment Plant Operator	--	--	--	--	--	--	--	--	--	60,917	846,468	60,917	846,468
Treatment Plant Shift Supervisor	--	--	--	--	--	--	--	--	--	16,836	120,924	16,836	120,924
Total	**--**	**73,070**	**259,497**	**305,823**	**1,197,685**	**328,505**	**812,180**	**318,337**	**1,836,296**	**160,597**	**1,673,628**	**160,597**	**1,673,628**

Notes:

1. Minimum and maximum hours are based on, respectively, the smallest and largest potential volumes of removed materials that could be subject to the specified TD alternative.

Table N-5
Remediation Labor Categories and Associated
SOC Occupations and Average Hourly Fatality Rates

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Labor Category	SOC Occupation[(1)]	Average Hourly Fatality Rate (2003-2008) (fatalities/worker-hr)
Construction Manager	First-line supervisors/managers of construction trades and extraction workers	6.32E-8
Field Technician	Engineering technicians, except drafters	1.39E-8
Foreman - Land	First-line supervisors/managers of construction trades and extraction workers	6.32E-8
Foreman - Water	Ship and boat captains and operators	1.42E-7
Laborer - Land	Construction laborers	1.05E-7
Laborer - Water	Sailors and marine oilers	5.70E-7
Mechanic	Heavy vehicle and mobile equipment service technicians and mechanics	6.53E-8
Operator - Land	Dredge, excavating, and loading machine operators	1.04E-7
Operator - Water	Dredge, excavating, and loading machine operators	1.04E-7
Superintendent	First-line supervisors/managers of construction trades and extraction workers	6.27E-8
Survey Technician	Surveying and mapping technicians	1.20E-8
WWTS Technician	Water and liquid waste treatment plant and system operators	3.86E-8
Gate Attendant	Security guards and gaming surveillance officers	4.28E-8
Health and Safety Officer	Civil engineer	1.14E-8
Treatment Plant Engineer	Civil engineer	1.14E-8
Treatment Plant Laborer	Laborers and freight, stock, and material movers, hand	3.48E-8
Treatment Plant Manager	Civil engineer	1.14E-8
Treatment Plant Operator	Miscellaneous plant and system operators	5.15E-8
Treatment Plant Shift Supervisor	Miscellaneous plant and system operators	5.15E-8
Industrial Truck Driver	Industrial truck and tractor operators	3.67E-8

Note:
1. SOC = Standard Occupational Classification

Table N-6
Remediation Labor Categories and Associated
NAICS Industries and Average Hourly Non-fatal Injury Rates

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Labor Category	NAICS Industry [1]	Average Hourly Non-fatal Injury Rate (2003-2008) (injuries/worker-hr)
Construction Manager	Heavy and civil engineering construction	9.73E-6
Field Technician	Remediation services	7.36E-6
Foreman - Land	Heavy and civil engineering construction	9.73E-6
Foreman - Water	Water transportation	8.91E-6
Laborer - Land	Heavy and civil engineering construction	9.73E-6
Laborer - Water	Water transportation	8.91E-6
Mechanic	Commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance	9.49E-6
Operator - Land	Heavy and civil engineering construction	9.73E-6
Operator - Water	Water transportation	8.91E-6
Superintendent	Heavy and civil engineering construction	9.73E-6
Survey Technician	Surveying and mapping (except geophysical) services	4.27E-6
WWTS Technician	Water, sewage and other systems	9.87E-6
Gate Attendant	Investigation and security services	5.26E-6
Health and Safety Officer	Heavy and civil engineering construction	9.73E-6
Treatment Plant Engineer	Remediation services	7.36E-6
Treatment Plant Laborer	Remediation services	7.36E-6
Treatment Plant Manager	Remediation services	7.36E-6
Treatment Plant Operator	Remediation services	7.36E-6
Treatment Plant Shift Supervisor	Remediation services	7.36E-6
Industrial Truck Driver	Heavy and civil engineering construction	9.73E-6

Note:
1. NAICS = North American Industry Classification System

Table N-7
Estimated Weight, Truck Trips, and Vehicle Miles Traveled for
Sediment Remedial Alternatives Material Importation and Exportation

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Transportation Parameter	SED-3	SED- 4	SED-5	SED-6	SED-7	SED-8	SED-9	SED-10
Tons of Material Imported [1]	412,094	797,667	1,057,931	1,240,065	1,720,871	3,801,703	1,189,241	117,846
Number of Import Truck Trips [3,7]	25,800	49,900	66,100	77,500	107,600	237,600	74,300	11,100
Average Import Truck Trips Per Year [7]	2,600	3,300	3,700	3,700	4,100	4,600	5,300	2,200
Number of Import Vehicle Miles Traveled [5]	1,290,000	2,495,000	3,305,000	3,875,000	5,380,000	11,880,000	3,715,000	555,000
Average Import Vehicle Miles Traveled Per Year [7]	129,000	166,000	184,000	185,000	207,000	228,000	265,000	111,000
Tons of Material Exported [2]	79,466	96,854	109,789	122,082	131,999	168,101	224,177	48,320
Number of Export Truck Trips [4,7]	3,973	4,843	5,489	6,104	6,600	8,405	11,209	2,416
Average Export Truck Trips Per Year [7]	400	300	300	300	300	200	800	500
Number of Export Vehicle Miles Traveled [6]	2,185,000	2,664,000	3,019,000	3,357,000	3,630,000	4,623,000	6,165,000	1,329,000
Average Export Vehicle Miles Traveled Per Year [7]	219,000	178,000	168,000	160,000	140,000	89,000	440,000	266,000

Notes:
1. Imported material includes common fill and topsoil used for backfill, materials for staging area and access roads, as well as material stabilization agents.
2. Exported material includes staging area and access road materials subject to off-site diposal.
3. Assumes 16-ton capacity trucks.
4. Assumes 20-ton capacity trucks.
5. Assumes 50 mile round trip.
6. Assumes 550 mile round trip.
7. Based on estimated total duration of each alternative.

Table N-8
Estimated Weight, Truck Trips, and Vehicle Miles Traveled for
Floodplain Remedial Alternatives Material Importation and Exportation

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Transportation Parameter	FP-2	FP-3	FP-4	FP-5	FP-6	FP-7	FP-8	FP-9
Tons of Material Imported [1]	47,491	136,041	215,700	187,053	553,672	1,081,271	311,241	54,485
Number of Import Truck Trips [3,7]	3,000	8,500	13,500	11,700	34,600	67,600	19,500	3,400
Average Import Truck Trips Per Year [7]	3,000	2,830	2,700	2,930	2,660	2,820	2,790	3,400
Number of Import Vehicle Miles Traveled [5]	150,000	425,000	675,000	585,000	1,730,000	3,380,000	975,000	170,000
Average Import Vehicle Miles Traveled Per Year [7]	150,000	142,000	135,000	146,000	133,000	141,000	139,000	170,000
Tons of Material Exported [2]	11,191	13,941	16,050	15,453	25,672	40,121	19,191	11,585
Number of Export Truck Trips [4,7]	600	700	800	800	1,300	2,000	1,000	600
Average Export Truck Trips Per Year [7]	600	230	160	200	100	80	140	600
Number of Export Vehicle Miles Traveled [6]	330,000	385,000	440,000	440,000	715,000	1,100,000	550,000	330,000
Average Export Vehicle Miles Traveled Per Year [7]	330,000	128,000	88,000	110,000	55,000	46,000	79,000	330,000

Notes:
1. Imported material includes common fill and topsoil used for backfill, materials for staging area and access roads.
2. Exported material includes staging area and access road materials subject to off-site diposal.
3. Assumes 16-ton capacity trucks.
4. Assumes 20-ton capacity trucks.
5. Assumes 50 mile round trip.
6. Assumes 550 mile round trip.
7. Based on estimated total duration of each alternative.

Table N-9
Estimated Weight, Truck Trips, and Vehicle Miles Traveled for
Combinations of Sediment and Floodplain Remedial Alternatives Material Importation and Exportation

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Transportation Parameter	SED 3/FP 3	SED 5/FP 4	SED 6/FP 4	SED 8/FP 7	SED 9/FP 8	SED 10/FP 9
Tons of Material Imported [1]	546,000	1,279,800	1,458,300	4,952,500	1,519,100	235,000
Number of Import Truck Trips [3,7]	36,700	69,900	93,900	313,700	98,400	15,400
Average Import Truck Trips Per Year [7]	3,670	3,880	4,470	6,030	7,030	3,080
Number of Import Vehicle Miles Traveled [5]	1,835,000	3,495,000	4,695,000	15,685,000	4,920,000	770,000
Average Import Vehicle Miles Traveled Per Year [7]	184,000	194,000	224,000	302,000	351,000	154,000
Tons of Material Exported [2]	86,573	127,661	140,673	277,780	241,072	56,038
Number of Export Truck Trips [4,7]	4,329	6,383	7,034	13,889	12,054	2,802
Average Export Truck Trips Per Year [7]	430	350	330	270	860	560
Number of Export Vehicle Miles Traveled [6]	2,381,000	3,511,000	3,869,000	7,639,000	6,629,000	1,541,000
Average Export Vehicle Miles Traveled Per Year [7]	238,000	195,000	184,000	147,000	474,000	308,000

Notes:
1. Imported material includes common fill and topsoil used for backfill, materials for staging area and access roads, as well as material stabilization agents.
2. Exported material includes staging area and access road materials subject to off-site diposal.
3. Assumes 16-ton capacity trucks.
4. Assumes 20-ton capacity trucks.
5. Assumes 50 mile round trip.
6. Assumes 550 mile round trip.
7. Based on estimated total duration for each combination of alternatives.

Table N-10
Estimated Weight, Truck Trips, and Vehicle Miles Traveled for
Treatment/Disposition Alternatives Exportation

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Waste Classification	Transportation Parameter	TD-1		TD-2	TD-3 [8]	TD-4		TD-5a (with reuse) [1]		TD-5b (without reuse)	
		Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)			Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)	Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)	Minimum (SED-3 and FP-2)	Maximum (SED 8 and FP 7)
TSCA	In-Situ Volume (cubic yards)	42,800	638,400	0	0	0	0	0	0	0	0
	Tons of Material Exported [2]	70,700	1,054,900	0	0	0	0	0	0	0	0
	Number of Truck Trips [3,4]	3,500	52,700	0	0	0	0	0	0	0	0
	Average Truck Trips Per Year [7]	440	1,320	0	0	0	0	0	0	0	0
	Vehicle Miles Traveled [5]	2,520,000	37,944,000	0	0	0	0	0	0	0	0
	Average Vehicle Miles Traveled Per Year [7]	315,000	949,000	0	0	0	0	0	0	0	0
Non-TSCA	In-Situ Volume (cubic yards)	148,200	2,281,400	0	0	191,000	2,919,800	191,000	2,919,800	191,000	2,919,800
	Tons of Material Exported [2]	247,100	3,808,900	0	0	317,800	4,863,800	266,000	3,810,000	286,000	4,378,000
	Number of Truck Trips [3,4]	12,400	190,400	0	0	15,900	243,200	13,300	190,500	14,300	218,900
	Average Truck Trips Per Year [7]	1,550	4,760	0	0	1,990	6,080	1,660	4,760	1,790	5,470
	Vehicle Miles Traveled [6]	6,820,000	104,720,000	0	0	8,745,000	133,760,000	7,315,000	104,775,000	7,865,000	120,395,000
	Average Vehicle Miles Traveled Per Year [7]	853,000	2,618,000	0	0	1,093,000	3,344,000	914,000	2,619,000	983,000	3,010,000

Notes:
1. TD-5 volumes assume a 10% loss of material mass following treatment.
2. Transport weight includes a 20% bulking factor and an assumed density of 1.25 tons/cubic yard.
3. Only the transport of non-TSCA materials was considered for alternatives TD-4 and TD-5. Treatment residuals, a limited volume component, were not included.
4. Assumes 20-ton capacity trucks will be used.
5. Assumes a 720 mile round trip for all trucks carrying TSCA materials.
6. Assumes a 550 mile round trip for all trucks carrying non-TSCA materials.
7. Based on years of operation (as defined in the text) for disposal or treatment under the SED alternatives specified above.
8. Export activities for TD-3 are included in industrial truck driver labor hours.

Table N-11
Estimated Weight, Truck Trips, and Vehicle Miles Traveled for Treatment/Disposition Alternatives Importation

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Transportation Parameter	TD-1	TD-2		TD-3 - Woods Pond		TD-3 - Forest Street		TD-3 - Rising Pond		TD-4	TD-5
		Minimum (SED-6)	Maximum (SED-8)	Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)	Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)	Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)		
Tons of Material Imported [1]	--	88,729	312,672	23,213	52,278	98,806	1,087,732	23,298	86,184	0	0
Number of Truck Trips [2]	--	5,546	19,542	1,451	3,267	6,175	67,983	1,456	5,387	0	0
Average Import Truck Trips Per Year [3]	--	900	1,000	200	100	800	3,600	200	100	0	0
Number of Import Vehicle Miles Traveled [4]	--	277,000	977,000	73,000	163,000	309,000	3,399,000	73,000	269,000	0	0
Average Import Vehicle Miles Traveled Per Year [3]	--	46,000	49,000	9,000	6,000	39,000	179,000	9,000	7,000	0	0

Notes:
1. Imported material includes common fill and topsoil used for backfill as well as materials for staging area and access road construction.
2. Assumes 16-ton capacity trucks.
3. Based on years of operation (as defined in the text) for disposal or treatment under the SED alternatives specified above (subject, under TD-3, to the capacity of an Upland Disposal Facility at the given site).
4. Assumes 50 mile round trip.

Table N-12
Estimated Worker Fatalities by Labor Category for Sediment Remedial Alternatives

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Labor Category	SED-1	SED-2	SED-3	SED-4	SED-5	SED-6	SED-7	SED-8	SED-9	SED-10
Construction Manager	--	--	1.42E-3	1.98E-3	1.95E-3	2.20E-3	2.73E-3	6.43E-3	2.17E-3	5.40E-4
Field Technician	--	--	2.11E-4	3.54E-4	4.36E-4	5.02E-4	6.25E-4	1.27E-3	4.55E-4	1.11E-4
Foreman - Land	--	--	1.99E-3	1.95E-3	2.48E-3	2.65E-3	3.30E-3	6.03E-3	2.25E-3	6.83E-4
Foreman - Water	--	--	3.27E-4	1.08E-3	1.52E-3	1.91E-3	2.51E-3	7.70E-3	3.06E-3	3.49E-4
Laborer - Land	--	--	1.39E-2	1.65E-2	1.91E-2	2.17E-2	2.50E-2	3.84E-2	1.57E-2	5.32E-3
Laborer - Water	--	--	5.25E-3	1.74E-2	2.44E-2	2.57E-2	3.46E-2	9.65E-2	3.93E-2	5.61E-3
Mechanic	--	--	1.64E-3	1.84E-3	2.15E-3	2.76E-3	3.45E-3	7.01E-3	2.65E-3	6.74E-4
Operator - Land	--	--	9.12E-3	1.25E-2	1.57E-2	1.66E-2	2.06E-2	3.51E-2	1.27E-2	4.27E-3
Operator - Water	--	--	3.37E-3	1.11E-2	1.57E-2	1.70E-2	2.05E-2	5.77E-2	2.32E-2	3.60E-3
Superintendent	--	--	9.50E-4	1.44E-3	1.81E-3	2.06E-3	2.58E-3	6.26E-3	2.05E-3	5.01E-4
Survey Technician	--	--	3.05E-4	3.97E-4	4.69E-4	4.69E-4	5.83E-4	6.85E-4	1.44E-4	1.34E-4
Industrial Truck Driver	--	--	1.81E-3	3.50E-3	3.59E-3	3.54E-3	4.65E-3	8.23E-3	3.20E-3	9.37E-4
WWTS Technician	--	--	1.13E-3	1.61E-3	2.17E-3	2.52E-3	3.26E-3	5.75E-3	2.05E-3	8.40E-4
Total Estimated Fatalities [1]	**--**	**--**	**0.04**	**0.07**	**0.09**	**0.10**	**0.12**	**0.28**	**0.11**	**0.02**
Probability of at Least One Fatality [2]	**--**	**--**	**0.04**	**0.07**	**0.09**	**0.09**	**0.12**	**0.24**	**0.10**	**0.02**
Alternative Duration (years)	**--**	**--**	**10**	**15**	**18**	**21**	**26**	**52**	**14**	**5**
Average Annual Fatalities [3]	**--**	**--**	**0.004**	**0.005**	**0.005**	**0.005**	**0.005**	**0.005**	**0.008**	**0.005**

Notes:
1. Sum of the estimated number of fatal injuries in each labor category.
2. Assuming a Poisson probability distribution.
3. Total Estimated Fatalities divided by duration.

Table N-13
Estimated Worker Fatalities by Labor Category for Floodplain Remedial Alternatives

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Labor Category	FP-1	FP-2	FP-3	FP-4	FP-5	FP-6	FP-7	FP-8	FP-9
Construction Manager	--	8.15E-5	3.04E-4	4.76E-4	4.20E-4	1.30E-3	2.44E-3	7.14E-4	9.64E-5
Field Technician	--	1.80E-5	6.71E-5	1.05E-4	9.26E-5	2.87E-4	5.37E-4	1.57E-4	2.13E-5
Foreman - Land	--	1.74E-4	5.91E-4	8.81E-4	7.69E-4	2.26E-3	4.21E-3	1.28E-3	2.13E-4
Laborer - Land	--	1.61E-3	5.30E-3	8.13E-3	7.52E-3	2.16E-2	3.85E-2	1.20E-2	1.98E-3
Mechanic	--	8.43E-5	3.15E-4	4.92E-4	4.34E-4	1.34E-3	2.52E-3	7.38E-4	9.97E-5
Operator - Land	--	9.03E-4	3.01E-3	4.63E-3	4.26E-3	1.24E-2	2.22E-2	6.86E-3	1.10E-3
Superintendent	--	1.21E-4	3.98E-4	5.77E-4	5.02E-4	1.44E-3	2.65E-3	8.24E-4	1.51E-4
Survey Technician	--	3.10E-5	1.16E-4	1.81E-4	1.60E-4	4.94E-4	9.26E-4	2.71E-4	3.66E-5
Industrial Truck Driver	--	1.47E-4	5.49E-4	8.57E-4	7.57E-4	2.34E-3	4.39E-3	1.29E-3	1.74E-4
WWTS Technician	--	4.02E-5	1.77E-4	2.81E-4	2.45E-4	7.82E-4	1.15E-3	4.16E-4	4.94E-5
Total Estimated Fatalities [1]	**--**	**0.003**	**0.011**	**0.02**	**0.02**	**0.04**	**0.08**	**0.02**	**0.004**
Probability of at Least One Fatality [2]	**--**	**0.003**	**0.011**	**0.02**	**0.02**	**0.04**	**0.08**	**0.02**	**0.004**
Alternative Duration (years)	**--**	**1**	**3**	**5**	**4**	**13**	**24**	**7**	**1**
Average Annual Fatalities [3]	**--**	**0.003**	**0.004**	**0.003**	**0.004**	**0.003**	**0.003**	**0.004**	**0.004**

Notes:
1. Sum of the estimated number of fatal injuries in each labor category.
2. Assuming a Poisson probability distribution.
3. Total Estimated Fatalities divided by duration.

Table N-14
Estimated Worker Fatalities by Labor Category for Combinations of Sediment and Floodplain Remedial Alternatives

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Labor Category	SED 3/FP 3	SED 5/FP 4	SED 6/FP 4	SED 8/FP 7	SED 9/FP 8	SED 10/FP 9
Construction Manager	1.75E-3	2.45E-3	2.70E-3	8.98E-3	2.93E-3	6.71E-4
Field Technician	2.78E-4	5.41E-4	6.07E-4	1.81E-3	6.12E-4	1.32E-4
Foreman - Land	2.51E-3	3.28E-3	3.45E-3	1.01E-2	3.47E-3	8.76E-4
Foreman - Water	3.27E-4	1.52E-3	1.91E-3	7.70E-3	3.06E-3	3.49E-4
Laborer - Land	1.89E-2	2.62E-2	2.88E-2	7.24E-2	2.63E-2	7.10E-3
Laborer - Water	5.25E-3	2.44E-2	2.57E-2	9.65E-2	3.93E-2	5.61E-3
Mechanic	1.98E-3	2.67E-3	3.28E-3	9.65E-3	3.44E-3	8.10E-4
Operator - Land	1.17E-2	1.94E-2	2.03E-2	5.30E-2	1.83E-2	5.21E-3
Operator - Water	3.37E-3	1.57E-2	1.70E-2	5.77E-2	2.32E-2	3.60E-3
Superintendent	9.50E-4	1.81E-3	2.06E-3	6.26E-3	2.05E-3	5.01E-4
Survey Technician	4.21E-4	6.50E-4	6.50E-4	1.61E-3	4.15E-4	1.71E-4
Industrial Truck Driver	2.36E-3	4.44E-3	4.39E-3	1.26E-2	4.49E-3	1.11E-3
WWTS Technician	1.13E-3	2.17E-3	2.52E-3	5.75E-3	2.05E-3	8.40E-4
Total Estimated Fatalities [(1)]	**0.05**	**0.11**	**0.11**	**0.34**	**0.13**	**0.03**
Probability of at Least One Fatality [(2)]	**0.05**	**0.10**	**0.11**	**0.29**	**0.12**	**0.03**
Alternative Duration (years)	**10**	**18**	**21**	**52**	**14**	**5**
Average Annual Fatalities [(3)]	**0.005**	**0.006**	**0.005**	**0.007**	**0.009**	**0.005**

Notes:
1. Sum of the estimated number of fatal injuries in each labor category.
2. Assuming a Poisson probability distribution.
3. Total Estimated Fatalities divided by duration.

Table N-15
Estimated Worker Fatalities by Labor Category for Treatment/Disposition Alternatives

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Labor Category	TD-1	TD-2		TD-3 - Woods Pond		TD-3 Forest Street		TD-3 - Rising Pond		TD-4		TD-5	
		Minimum (SED-6)	Maximum (SED-8)	Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)	Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)	Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)	Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)	Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)
Construction Manager	--	6.00E-5	1.15E-4	9.88E-4	3.64E-3	9.88E-4	2.34E-3	9.88E-4	5.00E-3	--	--	--	--
Field Technician	--	1.32E-5	2.53E-5	2.18E-4	8.02E-4	2.18E-4	5.17E-4	2.18E-4	1.10E-3	--	--	--	--
Foreman - Land	--	1.29E-4	3.71E-4	1.19E-3	4.36E-3	1.28E-3	2.81E-3	1.19E-3	6.00E-3	--	--	--	--
Laborer - Land	--	5.09E-3	1.79E-2	9.57E-3	3.52E-2	1.04E-2	2.46E-2	9.57E-3	4.84E-2	1.32E-3	1.33E-2	1.32E-3	1.33E-2
Mechanic	--	6.21E-5	1.19E-4	1.02E-3	3.76E-3	1.02E-3	2.91E-3	1.02E-3	5.17E-3	--	--	--	--
Operator - Land	--	1.64E-3	7.30E-3	3.43E-3	1.53E-2	4.82E-3	1.14E-2	3.43E-3	2.11E-2	--	--	--	--
Industrial Truck Driver [1]	--	--	--	1.38E-3	6.77E-3	1.38E-3	4.36E-3	1.84E-3	1.63E-2	9.30E-4	6.98E-3	9.30E-4	6.98E-3
Superintendent	--	5.96E-5	1.14E-4	9.81E-4	3.61E-3	9.81E-4	2.33E-3	9.81E-4	4.96E-3	--	--	--	--
Survey Technician	--	2.28E-5	4.37E-5	3.75E-4	1.38E-3	3.75E-4	8.90E-4	3.75E-4	1.90E-3	--	--	--	--
Gate Attendant	--	--	--	6.70E-4	2.47E-3	6.70E-4	1.59E-3	6.70E-4	3.39E-3	--	--	--	--
Health and Safety Officer	--	1.09E-5	2.08E-5	1.79E-4	6.59E-4	1.79E-4	4.25E-4	1.79E-4	9.06E-4	--	--	--	--
Treatment Plant Engineer	--	--	--	--	--	--	--	--	--	1.17E-4	8.42E-4	1.17E-4	8.42E-4
Treatment Plant Laborer	--	--	--	--	--	--	--	--	--	8.49E-4	8.43E-3	8.49E-4	8.43E-3
Treatment Plant Manager	--	--	--	--	--	--	--	--	--	1.17E-4	8.42E-4	1.17E-4	8.42E-4
Treatment Plant Operator	--	--	--	--	--	--	--	--	--	3.14E-3	4.36E-2	3.14E-3	4.36E-2
Treatment Plant Shift Supervisor	--	--	--	--	--	--	--	--	--	8.67E-4	6.23E-3	8.67E-4	6.23E-3
Total Estimated Fatalities[2]	**--**	**0.01**	**0.03**	**0.02**	**0.08**	**0.02**	**0.05**	**0.02**	**0.11**	**0.007**	**0.08**	**0.007**	**0.08**
Probability of at Least One Fatality[3]	**--**	**0.01**	**0.03**	**0.02**	**0.08**	**0.02**	**0.05**	**0.02**	**0.11**	**0.007**	**0.08**	**0.007**	**0.08**
Years of Operation[4]	**--**	**6**	**20**	**8**	**29**	**8**	**19**	**8**	**40**	**8**	**40**	**8**	**40**
Average Annual Fatalities[5]	**--**	**0.0012**	**0.0013**	**0.002**	**0.003**	**0.003**	**0.003**	**0.003**	**0.003**	**0.0009**	**0.002**	**0.0009**	**0.002**

Notes:
1. Based on hours required to move material from staging areas to treatment/disposal areas for TD-3, TD-4 and TD-5 alternatives.
2. Sum of the estimated number of fatal injuries in each labor category.
3. Assuming a Poisson probability distribution.
4. Based on years of operation (as defined in the text) for disposal or treatment under the SED alternatives specified above (subject, under TD-3, to the capacity of an Upland Disposal Facility at the given site).
5. Total Estimated Fatalities divided by Years of Operation.

Table N-16
Estimated Worker Non-fatal Injuries by Labor Category for Sediment Remedial Alternatives

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Labor Category	SED-1	SED-2	SED-3	SED-4	SED-5	SED-6	SED-7	SED-8	SED-9	SED-10
Construction Manager	--	--	2.18E-1	3.05E-1	3.01E-1	3.40E-1	4.20E-1	9.91E-1	3.34E-1	8.32E-2
Field Technician	--	--	1.11E-1	1.87E-1	2.30E-1	2.65E-1	3.30E-1	6.70E-1	2.40E-1	5.87E-2
Foreman - Land	--	--	3.07E-1	3.01E-1	3.82E-1	4.08E-1	5.08E-1	9.29E-1	3.47E-1	1.05E-1
Foreman - Water	--	--	2.05E-2	6.78E-2	9.53E-2	1.20E-1	1.58E-1	4.84E-1	1.92E-1	2.19E-2
Laborer - Land	--	--	1.30E+0	1.53E+0	1.78E+0	2.02E+0	2.33E+0	3.57E+0	1.46E+0	4.96E-1
Laborer - Water	--	--	8.20E-2	2.71E-1	3.81E-1	4.01E-1	5.40E-1	1.51E+0	6.14E-1	8.76E-2
Mechanic	--	--	2.38E-1	2.67E-1	3.12E-1	4.01E-1	5.01E-1	1.02E+0	3.85E-1	9.80E-2
Operator - Land	--	--	8.49E-1	1.16E+0	1.46E+0	1.55E+0	1.92E+0	3.27E+0	1.18E+0	3.98E-1
Operator - Water	--	--	2.87E-1	9.49E-1	1.33E+0	1.45E+0	1.75E+0	4.91E+0	1.98E+0	3.06E-1
Superintendent	--	--	1.47E-1	2.24E-1	2.81E-1	3.19E-1	4.00E-1	9.71E-1	3.18E-1	7.77E-2
Survey Technician	--	--	1.09E-1	1.41E-1	1.67E-1	1.67E-1	2.08E-1	2.44E-1	5.11E-2	4.77E-2
Industrial Truck Driver	--	--	4.79E-1	9.27E-1	9.51E-1	9.37E-1	1.23E+0	2.18E+0	8.49E-1	2.48E-1
WWTS Technician	--	--	2.89E-1	4.11E-1	5.54E-1	6.44E-1	8.34E-1	1.47E+0	5.24E-1	2.15E-1
Total Estimated Non-fatal Injuries [(1)]	**--**	**--**	**4.43**	**6.74**	**8.23**	**9.02**	**11.1**	**22.2**	**8.48**	**2.24**
Probability of at Least One Non-fatal Injury [(2)]	**--**	**--**	**0.99**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**0.89**
Alternative Duration (years)	**--**	**--**	**10**	**15**	**18**	**21**	**26**	**52**	**14**	**5**
Average Annual Non-fatal Injuries [(3)]	**--**	**--**	**0.44**	**0.45**	**0.46**	**0.43**	**0.43**	**0.43**	**0.61**	**0.45**

Notes:
1. Sum of the estimated number of non-fatal injuries in each labor category.
2. Assuming a Poisson probability distribution.
3. Total Estimated Non-fatal Injuries divided by duration.

Table N-17
Estimated Worker Non-fatal Injuries by Labor Category for Floodplain Remedial Alternatives

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Labor Category	FP-1	FP-2	FP-3	FP-4	FP-5	FP-6	FP-7	FP-8	FP-9
Construction Manager	--	1.26E-2	4.69E-2	7.33E-2	6.47E-2	2.00E-1	3.76E-1	1.10E-1	1.49E-2
Field Technician	--	9.50E-3	3.55E-2	5.54E-2	4.89E-2	1.51E-1	2.84E-1	8.31E-2	1.12E-2
Foreman - Land	--	2.68E-2	9.11E-2	1.36E-1	1.19E-1	3.48E-1	6.49E-1	1.97E-1	3.29E-2
Laborer - Land	--	1.50E-1	4.93E-1	7.57E-1	7.00E-1	2.01E+0	3.58E+0	1.12E+0	1.84E-1
Mechanic	--	1.23E-2	4.58E-2	7.15E-2	6.31E-2	1.95E-1	3.66E-1	1.07E-1	1.45E-2
Operator - Land	--	8.41E-2	2.80E-1	4.31E-1	3.97E-1	1.15E+0	2.06E+0	6.39E-1	1.03E-1
Superintendent	--	1.88E-2	6.17E-2	8.96E-2	7.79E-2	2.23E-1	4.12E-1	1.28E-1	2.34E-2
Survey Technician	--	1.10E-2	4.12E-2	6.43E-2	5.68E-2	1.76E-1	3.29E-1	9.65E-2	1.30E-2
Industrial Truck Driver	--	3.90E-2	1.45E-1	2.27E-1	2.01E-1	6.21E-1	1.16E+0	3.41E-1	4.61E-2
WWTS Technician	--	1.03E-2	4.53E-2	7.20E-2	6.28E-2	2.00E-1	2.95E-1	1.06E-1	1.26E-2
Total Estimated Non-fatal Injuries [(1)]	**--**	**0.37**	**1.29**	**1.98**	**1.79**	**5.28**	**9.52**	**2.93**	**0.46**
Probability of at Least One Non-fatal Injury [(2)]	**--**	**0.31**	**0.72**	**0.86**	**0.83**	**0.99**	**1.00**	**0.95**	**0.37**
Alternative Duration (years)	**--**	**1**	**3**	**5**	**4**	**13**	**24**	**7**	**1**
Average Annual Non-fatal Injuries [(3)]	**--**	**0.37**	**0.43**	**0.40**	**0.45**	**0.41**	**0.40**	**0.42**	**0.46**

Notes:
1. Sum of the estimated number of non-fatal injuries in each labor category.
2. Assuming a Poisson probability distribution.
3. Total Estimated Non-fatal Injuries divided by duration.

Table N-18
Estimated Worker Non-fatal Injuries by Labor Category for Combinations of Sediment and Floodplain Remedial Alternatives

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Labor Category	SED 3/FP 3	SED 5/FP 4	SED 6/FP 4	SED 8/FP 7	SED 9/FP 8	SED 10/FP 9
Construction Manager	2.69E-1	3.78E-1	4.17E-1	1.38E+0	4.52E-1	1.03E-1
Field Technician	1.47E-1	2.86E-1	3.20E-1	9.54E-1	3.23E-1	6.99E-2
Foreman - Land	3.88E-1	5.05E-1	5.31E-1	1.56E+0	5.34E-1	1.35E-1
Foreman - Water	2.05E-2	9.53E-2	1.20E-1	4.84E-1	1.92E-1	2.19E-2
Laborer - Land	1.76E+0	2.44E+0	2.69E+0	6.74E+0	2.45E+0	6.61E-1
Laborer - Water	8.20E-2	3.81E-1	4.01E-1	1.51E+0	6.14E-1	8.76E-2
Mechanic	2.88E-1	3.88E-1	4.76E-1	1.40E+0	5.00E-1	1.18E-1
Operator - Land	1.09E+0	1.81E+0	1.89E+0	4.94E+0	1.70E+0	4.85E-1
Operator - Water	2.87E-1	1.33E+0	1.45E+0	4.91E+0	1.98E+0	3.06E-1
Superintendent	1.47E-1	2.81E-1	3.19E-1	9.71E-1	3.18E-1	7.77E-2
Survey Technician	1.50E-1	2.31E-1	2.31E-1	5.73E-1	1.48E-1	6.07E-2
Industrial Truck Driver	6.25E-1	1.18E+0	1.16E+0	3.34E+0	1.19E+0	2.94E-1
WWTS Technician	2.89E-1	5.54E-1	6.44E-1	1.47E+0	5.24E-1	2.15E-1
Total Estimated Non-fatal Injuries (1)	**5.5**	**9.9**	**10.7**	**30.2**	**10.9**	**2.6**
Probability of at Least One Non-fatal Injury (2)	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**0.93**
Alternative Duration (years)	**10**	**18**	**21**	**52**	**14**	**5**
Average Annual Non-fatal Injuries (3)	**0.55**	**0.55**	**0.51**	**0.58**	**0.78**	**0.53**

Notes:
1. Sum of the estimated number of non-fatal injuries in each labor category.
2. Assuming a Poisson probability distribution.
3. Total Estimated Non-fatal Injuries divided by duration.

Table N-19
Estimated Worker Non-fatal Injuries by Labor Category for Treatment/Disposition Alternatives

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Labor Category	TD-1	TD-2		TD-3 - Woods Pond		TD-3 Forest Street		TD-3 - Rising Pond		TD-4		TD-5	
		Minimum (SED-6)	Maximum (SED-8)	Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)	Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)	Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)	Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)	Minimum (SED-3 and FP-2)	Maximum (SED-8 and FP-7)
Construction Manager	--	9.25E-3	1.77E-2	1.52E-1	5.60E-1	1.52E-1	3.61E-1	1.52E-1	7.70E-1	--	--	--	--
Field Technician	--	6.99E-3	1.34E-2	1.15E-1	4.24E-1	1.15E-1	2.73E-1	1.15E-1	5.82E-1	--	--	--	--
Foreman - Land	--	2.00E-2	5.71E-2	1.83E-1	6.73E-1	1.98E-1	4.33E-1	1.83E-1	9.24E-1	--	--	--	--
Laborer - Land	--	4.73E-1	1.66E+0	8.91E-1	3.28E+0	9.67E-1	2.29E+0	8.91E-1	4.51E+0	1.23E-1	1.24E+0	1.23E-1	1.24E+0
Mechanic	--	9.02E-3	1.73E-2	1.48E-1	5.47E-1	1.48E-1	4.22E-1	1.48E-1	7.51E-1	--	--	--	--
Operator - Land	--	1.53E-1	6.80E-1	3.20E-1	1.43E+0	4.49E-1	1.06E+0	3.20E-1	1.96E+0	--	--	--	--
Industrial Truck Driver [1]	--	--	--	3.65E-1	1.79E+0	3.65E-1	1.16E+0	4.87E-1	4.31E+0	2.47E-1	1.85E+0	2.47E-1	1.85E+0
Superintendent	--	9.25E-3	1.77E-2	1.52E-1	5.60E-1	1.52E-1	3.61E-1	1.52E-1	7.70E-1	--	--	--	--
Survey Technician	--	8.11E-3	1.55E-2	1.34E-1	4.92E-1	1.34E-1	3.17E-1	1.34E-1	6.76E-1	--	--	--	--
Gate Attendant	--	--	--	8.22E-2	3.03E-1	8.22E-2	1.95E-1	8.22E-2	4.16E-1	--	--	--	--
Health and Safety Officer	--	9.25E-3	1.77E-2	1.52E-1	5.60E-1	1.52E-1	3.61E-1	1.52E-1	7.70E-1	--	--	--	--
Treatment Plant Engineer	--	--	--	--	--	--	--	--	--	7.53E-2	5.41E-1	7.53E-2	5.41E-1
Treatment Plant Laborer	--	--	--	--	--	--	--	--	--	1.79E-1	1.78E+0	1.79E-1	1.78E+0
Treatment Plant Manager	--	--	--	--	--	--	--	--	--	7.53E-2	5.41E-1	7.53E-2	5.41E-1
Treatment Plant Operator	--	--	--	--	--	--	--	--	--	4.48E-1	6.23E+0	4.48E-1	6.23E+0
Treatment Plant Shift Supervisor	--	--	--	--	--	--	--	--	--	1.24E-1	8.89E-1	1.24E-1	8.89E-1
Total Estimated Non-fatal Injuries [2]	**--**	**0.70**	**2.50**	**2.69**	**10.6**	**2.92**	**7.23**	**2.82**	**16.4**	**1.27**	**13.1**	**1.27**	**13.1**
Probability of at Least One Non-fatal Injury [3]	**--**	**0.50**	**0.92**	**0.93**	**1.00**	**0.95**	**1.00**	**0.94**	**1.00**	**0.72**	**1.00**	**0.72**	**1.00**
Years of Operation[4]	**--**	**6**	**20**	**8**	**29**	**8**	**19**	**8**	**40**	**8**	**40**	**8**	**40**
Average Annual Non-fatal Injuries [5]	**--**	**0.12**	**0.13**	**0.34**	**0.37**	**0.36**	**0.38**	**0.35**	**0.41**	**0.16**	**0.33**	**0.16**	**0.33**

Notes:
1. Based on hours required to move material from staging areas to treatment/disposal areas for TD-3, TD-4 and TD-5 alternatives.
2. Sum of the estimated number of non-fatal injuries in each labor category.
3. Assuming a Poisson probability distribution.
4. Based on years of operation (as defined in the text) for disposal or treatment under the SED alternatives specified above (subject, under TD-3, to the capacity of an Upland Disposal Facility at the given site).
5. Total Estimated Non-fatal Injuries divided by Years of Operation.

Table N-20
Estimated Fatalities and Non-fatal Injuries Related to
Truck Transportation of Imported and Exported Materials for
Sediment, Floodplain, and Combinations of Sediment and Floodplain Remedial Alternatives

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

	Total Project Risk					Average Annual Project Risk		
Remedial Alternative	Total VMT [1]	Fatality Estimate [2]	Probability of at Least One Fatality	Injury Estimate [3]	Probability of at Least One Injury	Average Annual VMT [4]	Fatality Estimate [2]	Injury Estimate [3]
SED-3	3,475,000	0.08	0.07	1.63	0.80	348,000	0.0077	0.16
SED-4	5,159,000	0.11	0.11	2.42	0.91	344,000	0.0076	0.16
SED-5	6,324,000	0.14	0.13	2.97	0.95	352,000	0.0077	0.17
SED-6	7,232,000	0.16	0.15	3.40	0.97	345,000	0.0076	0.16
SED-7	9,010,000	0.20	0.18	4.23	0.99	347,000	0.0076	0.16
SED-8	16,503,000	0.36	0.30	7.76	1.00	317,000	0.007	0.15
SED-9	9,880,000	0.22	0.20	4.64	0.99	705,000	0.02	0.33
SED-10	1,884,000	0.04	0.04	0.89	0.59	377,000	0.008	0.18
FP-2	480,000	0.01	0.01	0.23	0.20	480,000	0.011	0.23
FP-3	810,000	0.02	0.02	0.38	0.32	270,000	0.006	0.13
FP-4	1,115,000	0.02	0.02	0.52	0.41	223,000	0.005	0.10
FP-5	1,025,000	0.02	0.02	0.48	0.38	256,000	0.006	0.12
FP-6	2,445,000	0.05	0.05	1.15	0.68	188,000	0.004	0.09
FP-7	4,480,000	0.10	0.09	2.11	0.88	187,000	0.004	0.09
FP-8	1,525,000	0.03	0.03	0.72	0.51	218,000	0.005	0.10
FP-9	500,000	0.01	0.01	0.24	0.21	500,000	0.011	0.24
SED 3/FP 3	4,216,000	0.09	0.09	1.98	0.86	422,000	0.009	0.20
SED 5/FP 4	7,006,000	0.15	0.14	3.29	0.96	389,000	0.009	0.18
SED 6/FP 4	8,564,000	0.19	0.17	4.03	0.98	408,000	0.009	0.19
SED 8/FP 7	23,324,000	0.51	0.40	11.0	1.00	449,000	0.010	0.21
SED 9/FP 8	11,549,000	0.25	0.22	5.43	1.00	825,000	0.018	0.39
SED 10/FP 9	2,311,000	0.05	0.05	1.09	0.66	462,000	0.010	0.22

Notes:
1. Vehicle Miles Traveled (VMT)
2. Assumes a fatality rate of 2.2×10^{-8} fatalities per vehicle mile traveled.
3. Assumes a non-fatal injury rate of 4.7×10^{-7} injuries per vehicle mile traveled.
4. Total VMT divided by duration.

Table N-21
Estimated Fatalities and Non-fatal Injuries Related to Truck Transportation of Imported and Excavated Materials for Various Combinations of Treatment/Disposition and Sediment and Floodplain Remedial Alternatives

Revised Corrective Measures Study for the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Treatment/ Disposition Alternative	Remediation Alternatives	Total Fatality Estimate [1]		Probability of at Least One Fatality		Total Injury Estimate [2]		Probability of at Least One Injury		Average Annual Fatality Estimate [3]		Average Annual Injury Estimate [3]	
		Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
TD-1	SED-3 and FP-2 to SED-8 and FP-7	0.21	3.14	0.19	0.96	4.39	67.05	0.99	1.00	0.0257	0.0785	0.55	1.68
TD-2	SED-6 to SED-8	0.01	0.02	0.01	0.02	0.13	0.46	0.12	0.37	0.0010	0.0011	0.02	0.02
TD-3 - Woods Pond	SED-3 and FP-2 to SED-8 and FP-7	0.002	0.004	0.002	0.004	0.03	0.08	0.03	0.07	0.0002	0.0001	0.004	0.003
TD-3 - Forest Street	SED-3 and FP-2 to SED-8 and FP-7	0.007	0.07	0.007	0.07	0.15	1.60	0.14	0.80	0.0009	0.0039	0.018	0.084
TD-3 - Rising Pond	SED-3 and FP-2 to SED-8 and FP-7	0.002	0.01	0.002	0.01	0.03	0.13	0.03	0.12	0.00020	0.00015	0.0042	0.0033
TD-4	SED-3 and FP-2 to SED-8 and FP-7	0.19	2.94	0.18	0.95	4.11	62.87	0.98	1.00	0.0240	0.0736	0.51	1.57
TD-5A	SED-3 and FP-2 to SED-8 and FP-7	0.16	2.31	0.15	0.90	3.44	49.24	0.97	1.00	0.0201	0.0576	0.43	1.23
TD-5B	SED-3 and FP-2 to SED-8 and FP-7	0.17	2.65	0.16	0.93	3.70	56.59	0.98	1.00	0.0216	0.0662	0.46	1.41

Notes:

1. Assumes a fatality rate of 2.2×10^{-8} fatalities per vehicle mile traveled.
2. Assumes a non-fatal injury rate of 4.7×10^{-7} injuries per vehicle mile traveled.
3. Total fatalities/injuries divided by years of operation (as defined in the text) for disposal or treatment under the specified SED alternatives (subject, under TD-3, to the capacity of an Upland Disposal Facility at the given site).