D. Jamros

SDMS: 159631

08-0080

Corporate Environmental Programs
General Electric Company
100 Woodlawn Avenue, Pittsfield, MA 01201

December 15, 2001

Dean Tagliaferro
On-Scene Coordinator
U.S. Environmental Protection Agency
c/o Weston Environmental Engineering
One Lyman Street
Pittsfield, MA 01201

Re: GE Pittsfield/Housatonic River Site
Upper ½-Mile Reach Removal Action (GECD800)
2001 Annual Vegetative Monitoring Report

Dear Mr. Tagliaferro:

The General Electric Company (GE) has completed the 2001 vegetative monitoring events (spring and fall) in accordance with the requirements of the *Removal Action Work Plan – Upper ½-Mile Reach of Housatonic River* (Work Plan; BBL, August 1999). This letter transmits the 2001 Annual Monitoring Report (Annual Report) that summarizes the vegetative restoration activities performed during 2001. The Annual Report includes the results of the spring and summer/fall monitoring events, photo documentation of vegetative conditions, and maintenance activities performed as part of the vegetative restoration for the ½ Mile Reach.

If you have any questions regarding the Annual Report, please feel free to contact me.

Sincerely,

Andrew T. Silfer/mcg

Andrew T. Silfer, P.E.
GE Project Coordinator

ATS/dmn

Attachments

cc: R. Bell, DEP
J. Bieke, Shea & Gardner
M. Carroll, GE*
T. Conway, EPA
J. Lyn Cutler, DEP (2 copies)
Mayor Gerald Doyle, City of Pittsfield
C. Fredette, CDEP
R. Goff, USACE
M. Gravelding, BBL
N. Harper MA AG
H. Inglis, EPA
D. Jamros, Weston
S. Messur, BBL
K.C. Mitkevicius, USACE
T. O'Brien, EOEA
B. Olson, EPA
S. Steenstrup, DEP
A. Weinberg, DEP
D. Young, EOEA
Public Information Repositories
GE Internal Repositories

(*Cover Letter Only)

2001 ANNUAL MONITORING REPORT
ECOLOGICAL RESTORATION ACTIVITIES
UPPER ½ MILE REACH OF THE HOUSATONIC RIVER

Prepared For:

General Electric Company
Pittsfield, Massachusetts

Prepared By:

AMEC Earth & Environmental, Inc.
285 Davidson Ave., Suite 100
Somerset, New Jersey 08873

December 2001

TABLE OF CONTENTS

LIST OF TABLES

1.0 INTRODUCTION

This annual report summarizes the results of monitoring conducted during the 2001 calendar year of ecological restoration activities conducted along the Upper ½-Mile Reach of the Housatonic River in Pittsfield, Massachusetts. As detailed in the *Removal Action Work Plan – Upper ½-Mile Reach of Housatonic River* (Work Plan, Blasland, Bouck & Lee, Inc.,(BBL); 1999), habitat restoration activities were implemented in those areas where bank soils were excavated as part of the removal action and in areas that were cleared to allow access for the removal activities. The ecorestoration techniques outlined in the work plan are intended to restore the vegetative community in those disturbed riparian areas to a functional value that exceeds that of the riparian habitat prior to the removal action.

As part of the habitat restoration process, GE agreed to monitor those areas that were restored to ensure the success and biological integrity of the intended vegetative community. The monitoring program consists of two visits during each of the first three years after planting, and an annual visit to be conducted during the fifth year and seventh year after planting. In each of the first three years after planting, visits are conducted in the late spring after the first leaf flush (May/June) and in the summer (July/August) to assess plant survival. The single visit in the fifth year and seventh year after planting will be conducted in the summer (July/August). In the event of a significant loss of plantings (greater than 1/4 acre), the timing for monitoring will be restarted following actions to replant the lost trees or shrubs (except in the case where a third party is responsible for growth failure).

An annual summary monitoring report is required to prepared documenting the results of that year's monitoring visits and the conditions of the restored areas within the Upper ½-Mile Reach. The report summarizes the results of the monitoring visits, including photodocumentation, and documents any remedial actions that were implemented. The annual report is due to the Trustees by December 15 of each year of monitoring.

This document fulfills the annual summary monitoring report requirement for the calendar year 2001. As the restoration planting activities along the Upper ½-Mile Reach began in 2000, this is

the first year of monitoring. Monitoring visits were conducted on May 31/June 1 and on August 23/24. The first monitoring visit was conducted solely by AMEC Earth & Environmental (AMEC) on behalf of GE. The second monitoring visit was conducted jointly by AMEC, a representative of the Commonwealth of Massachusetts Executive Office of Environmental Affairs, Massachusetts Watershed Initiative (EOEA), and a representative of Woodlot Alternatives, Inc. (a EOEA contractor). Information regarding the results of each monitoring visit was prepared and submitted to the Agencies.

2.0 MONITORING METHODOLOGY

To ensure the establishment of the restored vegetative community on the banks, a program to monitor the success of the planted specimens will be implemented. This section provides a summary of the monitoring methodology that was used and establishes a detailed protocol for future monitoring events.

2.1 GENERAL MONITORING APPROACH

Survival is determined based on a stem count of trees and shrubs and percent of herbaceous cover. The measure of survivability of the plants is determined both by mortality and by apparent vigor, and any herbaceous planting areas with less than 100% cover will be supplemented with additional planting/seeding. Any dead trees or shrubs in excess of 20% of the original planting (80% survival) will be replaced before the first of October of the years in which monitoring occurs. Monitoring also assesses whether supplemental activities, such as additional fertilizing or watering, are necessary.

A certified arborist has been selected (in consultation with the Agency) to assist in the completion of the monitoring program. The arborist, Chris Frank of C.L. Frank & Company of Northampton, Massachusetts, utilizes best professional judgment to assess the apparent vigor of the planted specimens. The arborist observes the plantings and is involved with each monitoring visit.

During each of the monitoring visits, the restoration areas are inspected for the presence of invasive species. Invasive species of concern include:

- Asiatic Bittersweet — *Celastrus orbiculatus*
- Common Buckthorn — *Rhamnus cathartica*
- Norway Maple — *Acer platanoides*
- Staghorn Sumac — *Rhus typhina*
- Morrows Honeysuckle — *Lonicera morrowii*
- Amur Honeysuckle — *Lonicera maackii*
- Tatarian Honeysuckle — *Lonicera tatarica*

• Autumn-olive	*Elaeagnus umbellata*
• Russian-olive	*Elaeagnus angustifola*
• Black Locust	*Robinia pseudoacacia*
• Buckthorn	*Rhamnus frangula*
• Japanese Honeysuckle	*Lonicera japonica*
• Japanese Barberry	*Berberis thunbergii*
• European Barberry	*Berberis vulgaris*
• Porcelain Berry	*Ampelopsis brevipedunculosa*
• Black Swallow-wort	*Vincetoxicum nigrum*
• Garlic Mustard	*Allaria petiolata*
• Goutweed	*Aegopodium podagraria*
• Japanese Knotweed	*Polygonum cuspidatum*
• Multiflora Rose	*Rosa multiflora*
• Common Reed	*Phragmites australis*
• Purple Loosestrife	*Lythrum salicaria*
• Yellow Iris	*Iris pseudacorus*
• Winged euonymus (or burning bush)	*Euonymus alata*

No greater than 5% of the restoration area of either bank will be allowed to be covered by invasive species. Any invasive species in excess of the 5% coverage limit will be removed by appropriate means.

Each monitoring visit consists of a pedestrian survey of all areas on both banks in which restoration activities occurred. During the field visit, personnel conducting the inspection, supported by the certified arborist, perform a stem count of planted trees and shrubs to determine survival rates. Estimates of groundcover by herbaceous species are made to verify aerial coverage. Any indications of damage from trespassing or herbivory are noted. Signs of erosion are also noted and any actions to address invasive species will be initiated. The monitoring visits are documented through field notes and photographs. Based on the results of each visit, recommendations for remedial actions such as replanting, watering, repair of erosional areas, and implementation of measures to reduce herbivory are made.

2.2 DETAILED APPROACH

As GE and the Trustees were in disagreement over the interpretation of various points outlined in the monitoring program described in the 1999, a proposed consensus approach to the monitoring methodology was utilized in the August 23/24 visit. That approach provided more specific details to the methodology outlined in the Work Plan. The major points to the more detailed approach were as follows:

1. The areas of planting were monitored by slowly walking from one end of the area to the other;
2. In large planting areas, the areas were divided into 100' intervals for monitoring purposes;
3. In large planting areas with wide riparian zones, the monitoring interval could be further divided into near shore and far shore halves;
4. Woody species (canopy, understory and vines) were counted based on visual observation and counting of the stems;
5. Counting was conducted jointly by the GE contractor and the USEPA contractor, with the trustee representative keeping tally and serving as arbitrator if needed;
6. A tally was kept on a field data sheet that was developed by GE for the monitoring program; on the sheet, woody vegetation was listed as either live (either stressed or unstressed) or dead; general observations were also made of the area on the tally sheet;
7. The decision as to whether some specimen was stressed was based on visual observation of the plant and the agreed judgment of the two observers; however, replanting needs to meet performance criteria was based on the number of dead specimens or those missing from the final count for a particular species;
8. After completion of the August monitoring visit, it was determined that a separate tally should be kept for each understory planting plot; in large planting areas with more than one understory plot, it is necessary to keep separate tally's so as to ensure that performance standards are not biased by one area being very successful and another plot performing poorly;

9. For the red-osier dogwood band, it was determined that the ability to count individual stems was made problematic by the multiple-stem nature of the developing plant. Therefore, it was decided that performance determination for the band would be made simply by visually determining, based on best professional judgment of the observers, whether the band in a planting area appears to meet the 4-foot on center planting scheme. Areas of the band that were noted as not meeting the 4-foot on center planting scheme were measured, and identified as to location, then noted on the tally sheets;
10. Stump resprouts, both from trees and shrubs cut during clearing or cut by herbivorous actions were counted in the live, but stressed, column;
11. Woody specimens that were less than four feet in height were counted as live, but stressed specimens;
12. Canopy and understory stump resprouts from specimens cut during clearing activities were only counted as part of the tally if the stump was one of the species that was listed in the planting plan;
13. A determination of the percentage of open/bare ground in a planting area was made based on visual observation using best professional judgment of the two observers, agreement of the percentage had to be reached before the value was noted on the tally sheet;
14. A determination of the percentage of invasive species was made based on visual observation using best professional judgment of the two observers, agreement of the percentage had to be reached before the value was noted on the tally sheet; identification of the dominate invasive species in a given area were also noted on the tally sheets.

3.0 MONITORING RESULTS

Upon restoration of the banks to their planned grade, the vegetative community is restored along each bank in by planting a vegetative community referred to as a floodplain forest community. Common floodplain forest community species are utilized in the replanting include:

Canopy	Understory/Shrub
boxelder (*Acer negundo*)	serviceberry (*Amelanchier canadensis*)
eastern cottonwood (*Populus deltoides*)	northern arrowwood (*Viburnum dentatum*)
black willow (*Salix nigra*)	silky dogwood (*Cornus amomum*)
silver maple (*Acer saccharinum*)	red-osier dogwood (*Cornus sericea*)
	winterberry holly (*Ilex verticillata*)

Trees are planted on a uniform and random basis across the area using a planting density of 700 trees per acre. Understory vegetation (except red-osier dogwood) and woody vines are planted on a patchy basis along both banks. Understory species are planted in oblong patches 30 feet wide by 150 feet long. The patches are scattered such that a minimum distance of 40 feet is maintained between patches. Understory species within each patch are planted four-foot centers. Woody vines are planted in small, oblong patches measuring 15 feet wide by 30 feet long, scattered such that there is a minimum distance of 150 feet between patches, with plantings within each patch on four-foot centers. A readily available indigenous form of grape vine (*Vitis riparia*) is used for the woody vine plantings.

Attempts to establish the herbaceous community in the areas planted in 2000 and 2001 were originally made using a mixture of native warm-season grasses and wildflowers such as little bluestem (*Andropogon scoparius*), big bluestem (*Andropogon gerardi*), switchgrass (*Panicum virgatum*), deertongue (*Panicum clandestinum*), fox sedge (*Carex vulpinoidea*), Pennsylvania smartweed (*Polygonum pensylvanicum*), Canada wild-rye (*Elymus canadensis*), cup-plant

(*Silphium perfoliatum*), nodding bur-marigold (*Bidens cernua*), showy tick-trefoil (*Desmodium canadense*), butterfly milkweed (*Ascelpias tuberosa*), Canada goldenrod (*Solidago canadenis*), giant goldenrod (*Solidago gigantea*), and white snakeroot (*Eupatorium altissima*). To ensure soil stability and prevent erosion, a nurse crop of annual rye-grass (*Lolium temulentum*) was added to the seed mixture. The herbaceous plant mixture was seeded at a rate of 25 pounds per acre.

Subsequent attempts will use a seed mixture consisting of 25% riverbank wild rye (*Elymus riparius*), 15% Canada rye (*Elymus canadensis*), 15% deertongue, 10% fowl bluegrass (*Poa palustris*), 10% creeping bentgrass (*Agrostis stolonifera*), 7% Pennsylvania smartweed, 3% common milkweed (*Asclepias syriaca*), 2% common blackberry (*Rubus allegheniensis*), 4% boneset (*Eupatorium perfoliatum*), 3% calico aster (*Aster lateriflorus*), 3% big leaf aster, and 3% blue vervain (*Verbena hastata*).

The remediation areas that were covered in the 2001 monitoring activities included:

1. Area 1;
2. Area 2;
3. Area 3;
4. Part of Area 4 (Cell G-1); and
5. Area 5.

As previously noted, the 2001 monitoring visits were conducted on May 31/June 1 and August 23/24. The results of the monitoring are presented in Tables 1 through 5. Photodocumentation of the planting visits is included in Appendix A. A general discussion of the monitoring visits is presented below.

3.1 RESULTS OF THE MAY 31/JUNE 1 MONITORING VISIT

Areas 1, 2, and 3, which were planted in May 2000, showed good growth with the canopy and understory species and showed good herbaceous coverage of the slopes. A number of cottonwoods and boxelders that had been cut to ground surface during bank clearing showed excellent sprouting, and often had multiple shoots as tall as six feet in height.

Of the planted canopy specimens, boxelder had the greatest survival and plant success. Boxelder showed little stem die-off and had as much as 42 inches of new growth. Cottonwoods had done well, however a number of planted specimens had shown stem die-off. The remaining canopy species, silver maple and black willow, showed good growth, with full leaf flush. However, both silver maples and black willows appear to be have been the species of choice for woodchucks present in the riverbank. Both species showed extensive herbivory, including the cutting of main stems and removal of the top part of the vegetation. Silver maples, however, did show good root sprouting at the base of the cut stems.

Regarding the understory species, all of the planted specimens had excellent growth except for the serviceberry. Silky dogwood demonstrated the greatest growth, with as much as 32 inches of new growth in some instances. In general, the serviceberry did not appear to be thriving. While most specimens were leafed out, a number of the specimens (approximately 1/3) showed a lack of leaves or wilted leaves. Very little new growth was apparent in all specimens. Of all of the understory species, the greatest uniform growth was observed in the red-osier dogwood band located adjacent to the river. All specimens showed at least 18 inches of stem growth and excellent foliage development. Some collateral damage by herbicides used in the treatment of invasive species was noted.

The herbaceous coverage was less than 100%. Some of the species presented at this stratum were those species included in the seed mixture, though various grass species accounted for a portion of the herbaceous coverage. Of interest was the proliferation of New York fern (*Thelypteris noveboracensis*) in Area 1. This species has probably colonized through spore dispersal from areas immediately across the river.

Invasive species accounted for greater than 5% of the planted community. The main species of concern were oriental bittersweet (showing extensive regrowth), Morrow's honeysuckle, and garlic mustard. A few specimens of Japanese barberry, Norway maple, and winged euonymus (burning bush) were also noted.

3.2 RESULTS OF THE AUGUST 23/24 MONITORING VISIT

In general, Area 1 showed the lowest success rate of canopy species, understory species and herbaceous cover. Area 1, located adjacent to the Newell Street Bridge, was the first area that was remediated and restored. The canopy species were 45 below the target performance standard. Of those canopy species that were standing, 42% where considered to be stressed. Cottonwood and boxelder were the two species that showed the greatest success rate. Black willow showed the poorest success rate, though that appeared to be primarily due to herbivory. There are two understory cells in Area 1, with the one closest to the Newell Street Bridge showing less planting success than the understory cell located further downstream. As with all five of the monitoring areas, serviceberry showed the poorest survival of the understory specimens and if present, was generally stressed. Herbaceous coverage was poor in Area 1, ranging from 50% cover to 85% cover in the various sections that were monitored.

Of the remaining four areas, Area 5 showed the highest degree of planting success, which was expected noting that Area 5 was the most recently planted area. The section of Area 4 that was inspected had the highest degree of stressed specimens of any of the sections (52%) and the highest number of dead specimens (48). The impacts to canopy specimens in Area 4 appeared to be from a combination of herbivorous activities and herbicide drift. Area 4 also had some of the lowest herbaceous cover results (45% cover). While Area 5 had 70% herbaceous coverage, grasses dominated the coverage. Herbicidal impacts to desired specimens was seen, to varying degrees, in all five areas, except Area 5. All five areas, except Area 3, showed water stress in many of the planted specimens due to insufficient rainfall. As a result, supplemental watering was implemented.

In general, the red-osier dogwood showed excellent growth where planted. While some sparse sections of growth were noted in Area 1 and Area 4, Cell G1, overall this species is growing well.

Invasive plant species listed in the Work Plan were identified in each of the five areas. Bittersweet was the most commonly found invasive, showing wide coverage in all five areas, especially Area 1 and Area 4, Cell G1. Purple loosestrife was also noted in most areas, showing spotty distribution along the shoreline in Areas 1, 2, 3 and Area 4, Cell G1. Other invasive species included buckthorn, barberry, and Japanese knotweed. Japanese knotweed was only identified in Area 5, though the stand at that location was thriving and had encroached from areas outside of the riparian zone into the planted section of Area 5.

Herbivorous activity was seen in all five of the areas. The primary source of the herbivorous activity was the woodchuck. While all four of the canopy species were potential targets, the two species that were most predated upon where black willow and silver maple.

4.0 REMEDIAL ACTIONS AND CONCLUSIONS

The following conclusions were drawn from the monitoring visit of August 2001:

1. Canopy and understory strata in the areas monitored required additional plantings to raise the total count to meet the performance standard set in the work plan;
2. Additional seeding was necessary to cover bare spots and to increase the percentage of desired herbaceous species in that particular stratum;
3. To ensure the establishment of the desired herbaceous species, GE should not overseed with 100% annual rye grass seed;
4. Herbicidal actions were necessary to correct the infestation of invasive species in the five areas that were monitored, however, greater care was required in the herbicidal use to prevent impacts to desired specimens; and
5. It was recommended that herbicidal action to control invasive species, especially bittersweet, be initiated as future remedial areas are cleared and excavated, prior to planting.

In response to those conclusions, remedial actions to address identified deficiencies were planned and implemented. Remedial actions were initiated and included:

1. Herbicidal spraying to address the presence of invasive species, including the implementation of herbicidal use during clearing activities prior to replanting. Activities to address invasive species are noted in the Invasive Species Control Plan that is included as Appendix B;
2. Replanting in each of the areas to bring the various strata back to the performance standard requirements, replanting was conducted in accordance with the fall 2001 planting schedule presented as Appendix C;
3. The placement of salt marsh hay around each of the planted canopy and understory species to ensure proper moisture retention in the root ball, to control herbaceous growth around each planted species; and to allow ease of finding during monitoring events;

4. Performing herbivore (woodchuck) control activities. Based on recommendations from the Massachusetts Fish and Wildlife Service, woodchuck gas cartridges were inserted into the woodchuck burrows to asphyxiate the woodchucks. This method had limited effectiveness and additional measures to control herbivory (nuisance animal tree guards made of" 18"-diameter by approximately 36" high hardware cloth) were installed;
5. Mulching and reseeding of the herbaceous stratum of areas where the herbaceous cover was inadequate;
6. As approved by the Trustees, chokecherry (*Prunus virginiana*) was used as a replacement species for serviceberry;
7. Supplemental watering was implemented to relieve water stress observed in the planted specimens;
8. As approved by the Trustees, the herbaceous mixture was changed as noted in Section 3.0; and
9. Dead wood and branches were trimmed from the planted specimens to ensure plant health.

The next monitoring visit is schedule for May 2002.

TABLES

TABLE 1

RESULTS OF CANOPY MONITORING SURVEYS

Date	Area	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance	Notes
				Non-stressed	Stressed	Total			
5/31/2001	1	210	168	139	12	151		- 18	a, b,c
	2	118	94	79	3	82		- 9	d,e
	3	34	27	8	1	9		- 18	f
	4, Cell G1	142	114	117	12	129		+ 3	g, h
	5	66	53	55	4	59		+ 2	
8/23/2001[i]	1	210	168	71	52	123	1	- 45	j, h
	2	118	94	45	22	67		- 27	k
	3	34	27	11	2	13		- 14	l
	4, Cell G1	142	114	51	55	106	41	- 8	j, m
	5	66	53	44	16	60	3	+ 7	j

Notes on Canopy Surveys:

a. The stressed specimens were boxelder (5) and cottonwood (2).
b. Black willow and silver maple were significantly underrepresented in the count. Only 2 black willows and 7 silver maples were identified.
c. Resprouted species that were cut during remedial activities included eastern cottonwood, boxelder, black cherry (*Prunus serotina*), American elm (*Ulmus americana*), black willow, and red oak (*Quercus rubra*).
d. Black willow and silver maple were significantly underrepresented in the count. Only 1 black willow and 10 silver maples were identified.
e. Resprouted species that were cut during remedial activities included eastern cottonwood, boxelder, red oak and black cherry.
f. No black willow or silver maples were noted. Herbivory is probably the result of the loss.
g. Black willow and silver maple were significantly underrepresented in the count. Only 5 black willow and 10 silver maples were identified.
h. Resprouted species that were cut during remedial activities included eastern cottonwood, boxelder, black cherry, American elm, black willow, red oak, and shagbark hickory (*Carya ovata*).
i. Joint GE/Trustee monitoring event.
j. Cottonwood and boxelder are the dominant species surviving in this area.
k. Resprout species include black cherry, American elm, red oak, green ash (*Fraxinus pennsylvanica*), speckled alder (*Alnus rugosa*), bigtooth aspen (*Populus grandidentata*).
l. Resprout species in this area include American elm, green ash, red oak, white willow (*Salix alba*).
m. Resprout species in this are include red oak and American elm.

TABLE 2

RESULTS OF UNDERSTORY MONITORING SURVEYS

Date	Area	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance	Notes
				Non-stressed	Stressed	Total			
5/31/2001	1	146	117	93	4	97		- 20	
	2	--	--	--	--	--			a
	3	73	58	56	1	57		- 1	b
	4, Cell G1	73	58	54	8	62		+ 4	
	5	73	58	68	4	72		+ 14	
8/23/2001[e]	1	146	117	59	34	93		- 24	c, d
	2	--	--	--	--	--			
	3	73	58	47	2	49	2	- 9	d
	4, Cell G1	73	58	19	17	36	33	- 22	d
	5	73	58	44	19	63	7	+ 5	d

Notes on the Understory Surveys:

a. No understory specimens were planted in this area.
b. 54 understory specimens were originally planted in May 2000. An additional 18 were planted in October 2000.
c. Overall survival of the understory species is skewed towards the plot located in the western end of Area 1. There is very good survival in that plot and very poor survival in the plot located in the eastern end of Area 1.
d. In general, serviceberry had the poorest survival and tended to be that species with the greatest demonstrated stress.
e. Joint GE/Trustee monitoring event.

TABLE 3

RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

Date	Area	Quantity Required	Target Performance Standard	Monitoring Count[a]		Notes
				> 4 foot on center	< 4 foot on center	
5/31/2001	1	82	66	101 (by count)		
	2	--	--	--		b
	3	11	9	13 (by count)		
	4, Cell G1	74	59	74 (by count)		
	5	--	--	--		b
8/23/2001[c]	1	82	66	First 100' - Partial Second 100' – Partial Third 100' – 100%	First 100' – 10 foot section Second 100' – 20 foot section Third 100'	
	2	--	--	--	--	b
	3	11	9	100%		
	4, Cell G1	74	59	Partial	Sparse western 50', with no specimens left last 20'	
	5	--	--	--	--	b

Notes on Red-Osier Dogwood Surveys:

a. Based on discussions with the Trustees during the 8/23/2001 monitoring event, it was agreed that individual counts of red-osier dogwood would not be made. Instead, based on visual observation, it would be identified which parts of the bank did not meet the original planting scheme of one plant every 4 feet. If that measure is not met, then remedial plantings would be utilized to establish the red-osier dogwood to that required density.
b. No red-osier dogwood were planted in this area.
c. Joint GE/Trustee monitoring event.

TABLE 4

RESULTS OF GRAPE VINE MONITORING SURVEYS

Date	Area	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens		Dead	Variance	Notes
				Non-stressed	Stressed			
5/31/2001	1	22	18	22			+ 4	
	2	--	--	--	--		--	a
	3	--	--	--	--		--	a
	4, Cell G1	--	--	--	--		--	a
	5	--	--	--	--		--	a
8/23/2001[b]	1	22	18	8	8	6	- 2	
	2	--	--	--	--		--	a
	3	--	--	--	--		--	a
	4, Cell G1	--	--	--	--		--	a
	5	--	--	--	--		--	a

Notes on Grape Vine Surveys:

a. No grape vines were planted in this area.
b. Joint GE/Trustee monitoring event

TABLE 5

RESULTS OF HERBACEOUS GROUNDCOVER MONITORING SURVEYS AND IDENTIFICATION OF PRIMARY INVASIVE SPECIES IN AREAS

Date	Area	Target Performance Standard	Monitoring Results Percent Herbaceous Coverage	Primary Observed Invasive Species	Notes
8/23/2001[a]	1	100%	First 100' – 50% coverage Second 100' – 80% coverage Third 100' – 85% coverage Final 60' – 50% coverage	Bittersweet, Purple loosestrife, Common mullein, Bittersweet nightshade, Buckthorn	
	2	100%	75% coverage	Bittersweet, Buckthorn, Norway maple, Winged euonymus	
	3	100%	85% coverage	Bittersweet, Morrow's honeysuckle, Purple loosestrife	
	4, Cell G1	100%	First 100' – 45% coverage Second 100' – 75% coverage Third 100' – 85% coverage	Bittersweet, Japanese barberry, Morrow's honeysuckle, Bittersweet nightshade, Norway maple, Buckthorn	
	5	100%	70% coverage	Japanese knotweed, Bittersweet, Japanese barberry, Purple loosestrife	

Notes on Herbaceous Coverage Surveys:

a. Joint GE/Trustee monitoring event.

APPENDIX A

PHOTODOCUMENTATION OF MONITORING VISITS

Photo Log

Photograph 1 Planting Area 1 Near Newell Street Bridge

Photograph 2 Planting Area 1

Photo Log

Photograph 3 Planting Area 1 and 2

Photograph 4 Planting Area 2, Viewed Looking Downstream

Photo Log

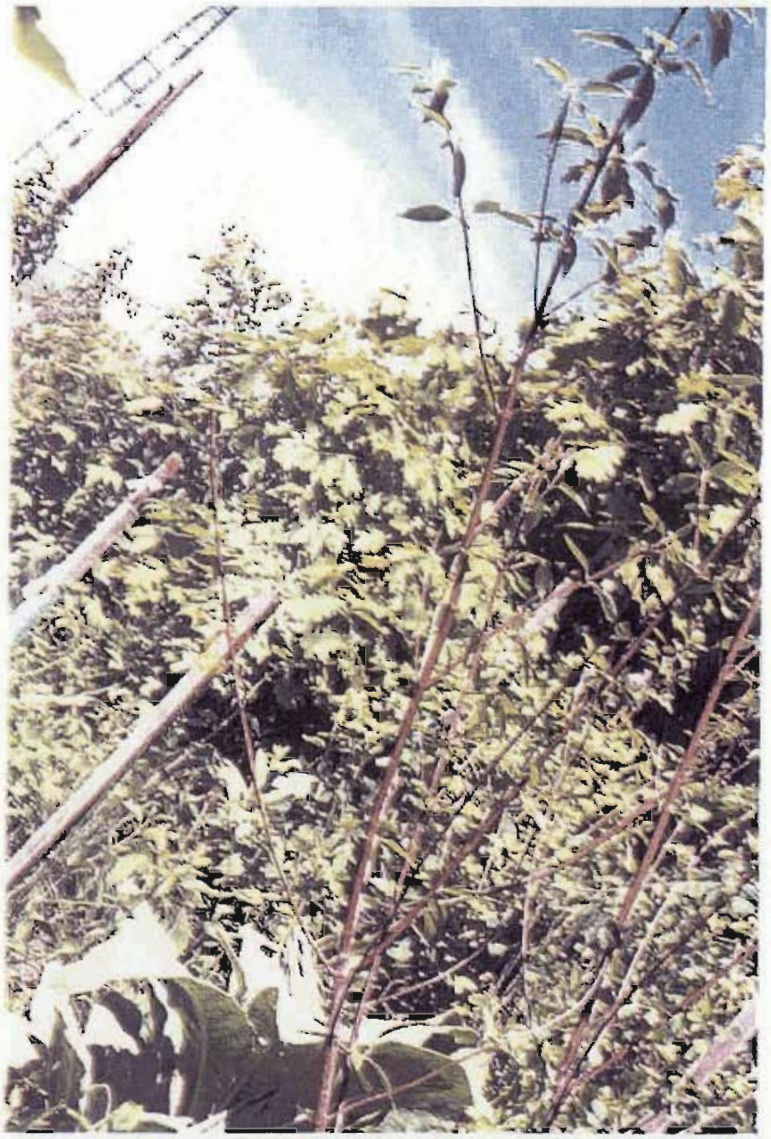
Photograph 5 Planting Area 4, Cell G1

Photograph 6 Planting Area 5

Photo Log

Photograph 7 **Planting Area 5**

Photo Log



Photograph 11 Silky Dogwood Showing Extensive New Growth

APPENDIX B

INVASIVE SPECIES CONTROL PLAN

HOUSATONIC RIVER
UPPER ½ MILE REACH REMOVAL ACTION

Invasive Species Control Plan

A) Invasive Species Control Schedule

1. Pre-Clearing Status

Areas to be cleared in order to perform bank soil removal and restoration activities will have invasive species control activities performed prior to vegetation clearing and removal/restoration actions for these areas. During the initial bank monitoring event, the certified arborist will identify invasive species in those areas scheduled for clearing activities. Based on the findings of the monitoring inspection, invasive species control will be implemented. The primary control activities will include manual removal methods (i.e., hand pruning, hand pulling, and/or digging) and the application of herbicide depending on the invasive species present. Following removal of the invasive species, the remaining stumps will be subject to herbicide application. Routine regular inspections will then be performed by the arborist to identify invasive species and additional control activities will be performed, as required.

2. Restored Status

Early in the growing season (i.e., first leaf flush), the restored bank areas will be inspected and the certified arborist will identify invasive species. In general, an initial manual cutting/trimming of invasive species will occur early in the growing season (i.e., April or May, as appropriate). Typically, an herbicide will be introduced to a freshly cut stump or as a foliar application if the plant material is actively growing early in the season. Additional manual trimming and applications of herbicide will be performed early in the growing season to control the invasive species as required to address re-growth. At the latter part of the growing season, manual trimming and removal of the invasive species are expected to be most effective for control. Ideally, the invasive plants will be removed to below the ground surface to remove the root of the plant. Where this is not possible, the invasive plant would be trimmed to the ground surface and the slash material removed from the area.

B) Herbicide Application Plan

1. Herbicide Type

Based on comments from the EOEA, the type of herbicide is being changed from Roundup to Rodeo for applications near the River

2. Application Method

Both topical (brush) and foliar (spray) application methodologies will be employed depending upon the field conditions. In general, topical application of herbicide is preferred over foliar application. Typically, herbicide will be applied using topical applications to freshly cut stumps. If topical methods have been shown not to be effective or if the treatment area is dominated be invasive species then some limited foliar applications may be utilized as an alternative application method. For the topical application of an herbicide, wicks, brushes, protective cones, or other contact devices would be employed to apply herbicide directly to the cut stems and plant material.

Where appropriate, foliar application would utilize hand-held sprayers with a concentrated distribution pattern to apply the herbicides directly to the invasive plant surface area (i.e., leaves). Throughout the herbicide application activities, care will be exercised near planted trees, shrubs, and vines, as appropriate, to ensure that freshly planted stock are not damaged. In addition, care will also be taken during the application of herbicides to avoid contact with desirable species.

3. Removal Methods

Following any cutting/trimming/removal activities, biomass generated will be raked and appropriately removed immediately following cutting activities. If an herbicide is applied, the biomass will be appropriately removed based on the effectiveness of the herbicide application (e.g, approximately one to two weeks following application of the herbicide).

APPENDIX C

FALL PLANTING SCHEDULE

General Electric Company - Pittsfield, Massacusetts

Removal Action Upper 1/2-Mile Reach of Housatonic River

Fall 2001 Planting Schedule

					Vines				Understory								Canopy								Dogwood Band		
Area	Planting Date	Cell Area	Planting Area (ac)	Toe Planting Length (lf)	Woody Vines *Vitus riparia*	Performance Standard	Aug-01 Count	Oct-01 Plant	Serviceberry *Amelanchier arborea*	Northern Arrowwood *Viburnum dentatum*	Silky Dogwood *Cornus amomum*	Winterberry Holly *Ilex verticillata*	Sub Total	Performance Standard	Aug-01 Count	Oct-01 Plant	Eastern Cottonwood *Populus deltoides*	Boxelder *Acer negundo*	Black Willow *Salix nigra*	Silver Maple *Acer saccharinum*	Sub Total	Performance Standard	Aug-01 Count	Oct-01 Plant	Red-Osier Dogwood *Cornus sericea*	Aug-01 Count	Oct-01 Plant
1	May-00	A,B,C	0.30	328	0	18	16	--	0	37	37	36	110	117	93	--	79	79	26	26	210	168	123	--	82	Partial	--
1	Oct-00	A,B,C	--	--	0	--	--	--	36	0	0	0	36	--	--	--	0	0	0	0	0	--	--	--	0	--	--
1	Jun-01	A,B,C	--	--	22	--	--	--	0	1	1	0	2	--	--	--	0	0	0	0	0	--	--	--	0	--	--
1	Oct-01	A,B,C	--	--	0	--	--	4	10	10	9	10	39	--	--	39	10	10	24	21	65	--	--	65	8	--	8
2	May-00	D	0.17	0	0	--	--	--	0	0	0	0	0	--	--	--	44	44	15	15	118	94	67	--	0	--	--
2	Oct-01	D	--	--	0	--	--	--	0	0	0	0	0	--	--	--	9	9	14	8	40	--	--	40	0	--	--
3	May-00	E	0.05	45	0	--	--	--	0	18	18	19	55	58	49	--	13	13	4	4	34	27	13	--	11	100%	--
3	Oct-00	E	--	--	0	--	--	--	18	0	0	0	18	--	--	--	0	0	0	0	0	--	--	--	0	--	--
3	Jun-01	E	--	--	0	--	--	--	0	0	0	1	1	--	--	--	1	1	0	0	2	--	--	--	0	--	--
3	Oct-01	E	--	--	0	0	0	--	5	4	4	4	17	--	--	17	5	5	4	4	18	--	--	18	0	--	--
Subtotal			**0.52**	**373**	**22**	**18**	**16**	**4**	**69**	**70**	**69**	**70**	**278**	**175**	**142**	**56**	**161**	**161**	**87**	**78**	**487**	**289**	**203**	**123**	**101**	**0**	**8**
4A	Oct-00	G1	0.16	250	0	--	--	--	19	18	18	18	73	58	36	--	64	63	5	10	142	114	106	--	74	Partial	--
4A	Oct-01	G1	--	--	0	--	--	--	12	6	6	6	30	--	--	30	3	4	10	5	22	--	--	22	12	--	12
4B	Jun-01	G2,G3	0.40	582	22	18	--	--	54	56	56	0	166	175	--	--	95	95	33	33	256	205	--	--	134	--	--
4B	Oct-01	G2,G3	--	--	0	--	--	--	0	0	0	53	53	--	--	53	0	0	0	0	0	--	--	0	0	--	--
5	Oct-00	F1,F2	0.10	0	0	--	--	--	19	18	18	18	73	58	63	--	25	25	8	8	66	53	60	--	0	--	--
6	Jun-01	F3	0.07	226	0	--	--	--	0	0	0	0	0	--	--	--	21	21	7	7	56	45	--	--	57	--	--
6A	Jun-01	F3	0.05	0	0	--	--	--	0	0	0	0	0	--	--	--	8	8	3	3	22	18	--	--	0	--	--
7	Jun-01	F3	0.01	0	0	--	--	--	0	0	0	0	0	--	--	--	3	3	1	1	8	6	--	--	0	--	--
Subtotal			**0.79**	**1058**	**22**	**18**	**0**	**0**	**104**	**98**	**98**	**95**	**395**	**291**	**99**	**83**	**219**	**219**	**67**	**67**	**572**	**441**	**166**	**22**	**277**	**0**	**12**
8	Oct-01	H1	0.02	32	0	--	--	--	0	0	0	0	0	--	--	--	6	4	2	2	14	13	--	14	6	--	6
8A	Oct-01	H1	0.05	128	0	--	--	--	0	0	0	0	0	--	--	--	12	7	4	4	27	29	--	27	29	--	29
9	Oct-01	H1,H2	0.01	0	0	--	--	--	0	0	0	0	0	--	--	--	3	2	1	1	7	6	--	7	0	--	0
9A	Oct-01	H1,H2	0.06	136	22	18	--	22	0	0	0	0	0	--	--	--	12	7	4	4	27	29	--	27	31	--	31
11	Oct-01	H2	0.04	88	0	--	--	--	0	0	0	0	0	--	--	--	8	6	3	3	20	21	--	20	20	--	20
11A	Oct-01	H2	0.06	120	0	--	--	--	0	0	0	0	0	--	--	--	12	7	4	4	27	29	--	27	28	--	28
Subtotal			**0.23**	**504**	**22**	**18**	**0**	**22**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**53**	**33**	**18**	**18**	**122**	**127**	**0**	**122**	**114**	**0**	**114**
10	Oct-01	H	0.18	0	0	--	--	--	36	36	37	37	146	117	--	146	47	47	16	16	126	101	0	126	0	--	--
Total			*1.72*	*1935*	*66*	*53*	*16*	*26*	*209*	*204*	*204*	*202*	*819*	*583*	*241*	*285*	*480*	*460*	*188*	*179*	*1307*	*958*	*369*	*393*	*492*	*0*	*134*

Notes:

- Areas 8A, 9A, and 11A final planting quantities to be determined subject to presence of existing native population.
- August 2001 inventory count only includes plantings that have been installed for 1 year.
- Per EOEA letter to GE dated 9/05/01: Chokecherry (Prunus virginiana) recommended as substitute for Serviceberry.
- Herbaceous seed mix re-planting to occur in Planting Areas 1, 2, and 4 for fall 2001 planting.
- Areas subject to fall 2001 planting.

Planting Requirements:

- Plant woody vines at an approximate density of 40 vines/acre on 4' centers in a 15'x30' patch, minimum of 150' between patches.
- Plant understory at an approximate density of 730 shrubs/acre (including red-osier dogwood) on 4' centers in a 30'x50' patch, minumum of 40' between patches.
- Plant canopy in varying densities, clumps, or if necessary, sinuous lines.
- Plant dogwood band on 4' centers in a single row along the toe of the bank.

Performance Standards:

Vines/Understory/Canopy - 80% survival

Red-Osier Dogwood - >4 foot on Center

Herbaceous - 100% areal coverage

Prepared by:
Blasland, Bouck Lee, Inc.