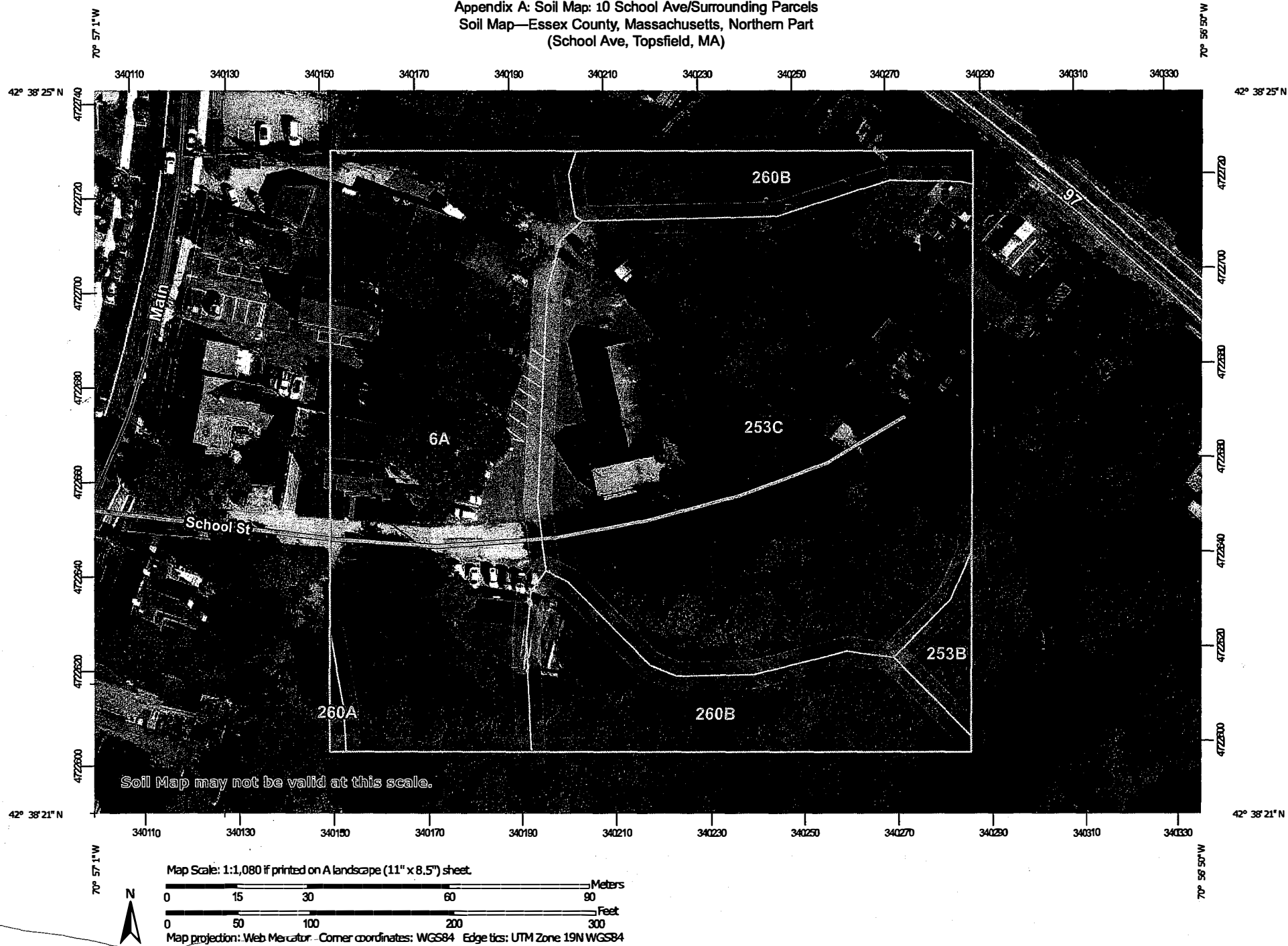


Appendix A: Soil Map: 10 School Ave/Surrounding Parcels
 Soil Map—Essex County, Massachusetts, Northern Part
 (School Ave, Topsfield, MA)



Map Unit Legend

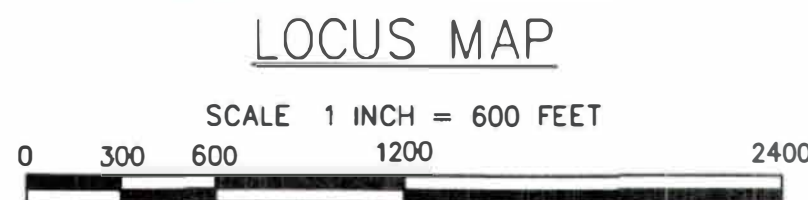
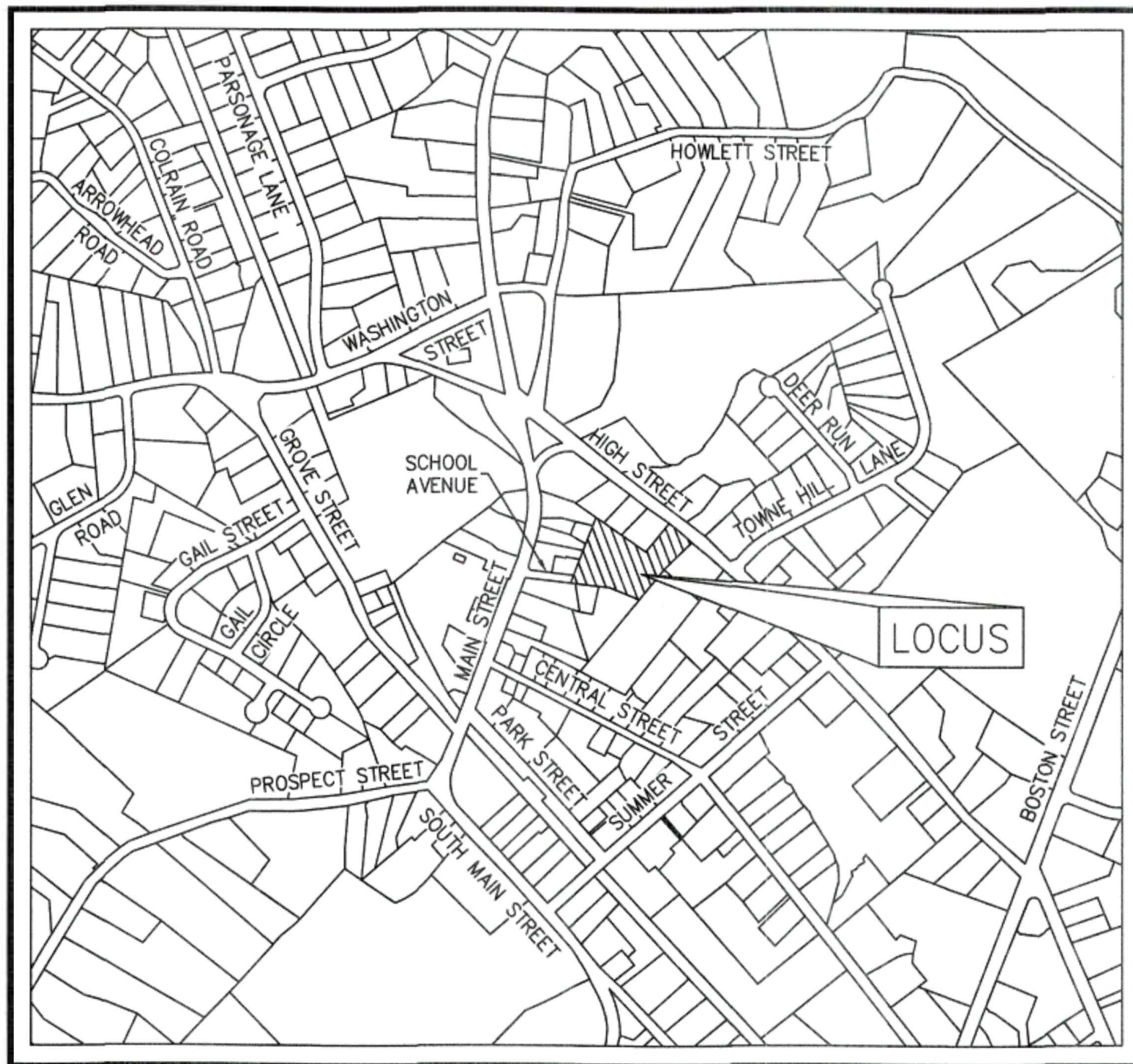
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
6A	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	1.4	33.0%
253B	Hinckley loamy sand, 3 to 8 percent slopes	0.1	1.7%
253C	Hinckley loamy sand, 8 to 15 percent slopes	2.1	48.3%
260A	Sudbury fine sandy loam, 0 to 3 percent slopes	0.0	0.3%
260B	Sudbury fine sandy loam, 3 to 8 percent slopes	0.7	16.7%
Totals for Area of Interest		4.3	100.0%

DEFINITIVE SUBDIVISION PLAN

- WAIVER REQUEST LIST:
1. SECTION 4.3.2.e: "A NONREFUNDABLE FEE IN ACCORDANCE WITH THE FEE SCHEDULE SHALL BE PAYABLE TO THE TOWN OF TOPSFIELD AT THE TIME OF SUBMISSION..."
PROPOSED: A WAIVER TO THE \$4,000 FEE (PER FEE SCHEDULE) IS REQUESTED DUE TO THE TOWN'S OWNERSHIP OF THE PROPERTY AND INVOLVEMENT IN THE DEFINITIVE SUBDIVISION PROCESS.
2. SECTION 4.3.2.g: "ONE COPY OF THE TEST PIT LOGS TO THE PLANNING BOARD, THE REVIEWING ENGINEER AND THE BOARD OF HEALTH."
PROPOSED: NO WORK PROPOSED, THEREFORE TEST PIT LOGS ARE NOT NECESSARY.
3. SECTION 4.3.2.h: "ONE COPY OF THE STORMWATER MANAGEMENT REPORTS TO THE PLANNING BOARD, HIGHWAY DEPARTMENT, AND REVIEWING ENGINEER."
PROPOSED: NO WORK PROPOSED, THEREFORE A STORMWATER REPORT IS NOT NECESSARY.
4. SECTION 4.3.2.i: "IN CONNECTION WITH ANY DEFINITIVE PLAN, THE APPLICANT SHALL ALSO SUBMIT AN ENVIRONMENTAL IMPACT STATEMENT (THE "STATEMENT") WHICH SHALL... CLEARLY SHOW THE RELATION OF THE PROPOSED PROJECT TO THE TOTAL ENVIRONMENT OF THE TOWN AND ITS INHABITANTS."
PROPOSED: NO WORK PROPOSED, THEREFORE AN ENVIRONMENTAL IMPACT STATEMENT IS NOT NECESSARY.
5. SECTION 4.4.3: "SOIL SURVEYS TO ESTABLISH THE SUITABILITY OF THE LAND FOR THE PROPOSED STORM AND SANITARY SEWERAGE INSTALLATIONS SHALL BE SUBMITTED."
PROPOSED: NO WORK PROPOSED, THEREFORE SOIL SURVEYS ARE NOT NECESSARY.
6. SECTION 5.1.2: "CROSS SECTIONS SHALL BE IN ACCORDANCE WITH THE STANDARDS AS SHOWN ON PLATES 1 AND 2."
PROPOSED: ALLOW EXISTING ROAD CONFIGURATION ON SCHOOL AVENUE AND 27 HIGH STREET TO SERVE SUBDIVISION.
7. SECTION 5.1.3: ALIGNMENT, GRADE, DEAD END, AND INTERSECTIONS SHALL BE IN ACCORDANCE WITH THE STANDARDS IN TABLE 1 (SUBDIVISION MINOR STREET):
- REQUIRED: RIGHT-OF-WAY = 50 FEET; PROPOSED = 30± FEET
 - REQUIRED: PAVEMENT = 26 FEET; PROPOSED = 18.5± TO 30.35±
 - REQUIRED: MAXIMUM GRADE = 8.0%; PROPOSED = 8.37%
 - REQUIRED: MINIMUM TURNAROUND RADIUS AT ROADWAY EDGE = 55 FEET; PROPOSED = NO TURNAROUND ON SCHOOL AVE.
 - REQUIRED: MINIMUM TURNAROUND RADIUS AT PROPERTY LINE = 65 FEET; PROPOSED = NO TURNAROUND ON SCHOOL AVE.
 - FOR FIRE DEPARTMENT ACCESS, AN ACCESS EASEMENT FROM LOT 60A WILL BE UTILIZED.
 - REQUIRED: MINIMUM SIGHT DISTANCE = 200 FEET; PROPOSED = EXISTING SITE DISTANCE TO SERVE SUBDIVISION.
8. SECTION 5.1.5: SITE AND EARTHWORK
- SECTION 5.1.5.a (MASSDOT SECTION 100)
 - SECTION 5.1.5.c (GRADING)
 - SECTION 5.1.5.d (CLEARING)
 - SECTION 5.1.5.e (TOPSOIL)
 - SECTION 5.1.5.h (SUBGRADE)
- PROPOSED: NO WORK PROPOSED, ALLOW EXISTING GRADES AND SUBGRADE TO SERVE SUBDIVISION.
9. SECTION 5.1.6 - PAVEMENT STRUCTURE
- SECTION 5.1.6.a (MASSDOT SECTION 400)
 - SECTION 5.1.6.b (GRAVEL BASE COURSE)
 - SECTION 5.1.6.c (CRUSHED STONE BASE)
 - SECTION 5.1.6.d (BINDER COURSE)
- PROPOSED: ALLOW EXISTING PAVEMENT STRUCTURE ON SCHOOL AVENUE AND 27 HIGH STREET TO SERVE SUBDIVISION.
10. SECTION 5.1.7.b: "DRIVEWAY APRONS SHALL BE PAVED, PROVIDED WITH A BITUMINOUS CONCRETE BERM AND SO GRADED TO PROVIDE POSITIVE DRAINAGE TOWARDS STREETS BY THE DEVELOPER AND/OR OWNER FROM THE EDGE OF PUBLIC ROADWAY TO THE PROPERTY LINE"
PROPOSED: ALLOW EXISTING GRADING ON DRIVEWAYS OF ABUTTING LOTS TO REMAIN ALONG WITH EXISTING DRAINAGE PATTERNS TO SERVE THE SUBDIVISION.
11. SECTION 5.2: "SHOULDERS SHALL NOT BE ALLOWED IN PLACE OF SIDEWALKS, CURBS, AND GRASS STRIPS SHOWN ON PLATES 1 AND 2 UNLESS PERMISSION IS SPECIFICALLY GRANTED BY THE BOARD. WHEN PERMITTED, THEY SHALL BE CONSTRUCTED OF GRAVEL, IN ACCORDANCE WITH SECTION 5.1.5.b, COVERED WITH 6 INCHES OF LOAM TO THE REQUIRED WIDTH. THEY SHALL BE BROUGHT TO A FINISHED GRADE FLUSH WITH THAT OF THE ADJACENT PAVEMENT OR CURBING."
PROPOSED: AS IN WAIVER REQUEST TO 5.1.2, ALLOW EXISTING ROAD CONFIGURATION ON SCHOOL AVENUE AND 27 HIGH STREET TO SERVE SUBDIVISION.
12. SECTION 5.3: "BITUMINOUS CONCRETE BERM SHALL CONFORM TO THE MATERIALS AND CONSTRUCTION METHODS AS SPECIFIED IN SECTION 470 OF THE STANDARD SPECIFICATIONS AND AS INDICATED ON PLATES 1 AND 2. IT SHALL BE INSTALLED ALONG BOTH EDGES OF ALL ROADWAYS IN TYPE II SUBDIVISIONS... THE BOARD MAY REQUIRE THAT IT ALSO BE INSTALLED ALONG ONE OR BOTH SIDES OF ALL ROADWAYS IN TYPE I SUBDIVISIONS..."
PROPOSED: NO WORK PROPOSED, ALLOW EXISTING DRAINAGE PATTERNS AND PAVEMENT TO SERVE SUBDIVISION.
13. SECTION 5.4 - SIDEWALKS
- SECTION 5.4.1: "BITUMINOUS CONCRETE SIDEWALKS SHALL CONFORM TO THE MATERIAL AND CONSTRUCTION METHODS AS SPECIFIED IN SECTION 701 OF THE STANDARD SPECIFICATIONS AND AS INDICATED ON PLATES 1 AND 2."
 - SECTION 5.4.2: "SIDEWALKS MAY BE CONSTRUCTED ONLY ON ONE SIDE OF THE ROADWAY AT THE PROPERTY LINE ON MINOR STREETS AS INDICATED ON PLATE 1 UNLESS, IN THE OPINION OF THE BOARD, THEY ARE NOT WARRANTED..."
 - SECTION 5.4.3: (LIFT DEPTHS, MATERIAL REQUIREMENTS AND DEPTHS)
- PROPOSED: NO SIDEWALK PROPOSED DUE TO RESTRICTIVE WIDTH OF RIGHT-OF-WAY ALONG STREAM CROSSING AND ABUTTING RESIDENTIAL LOTS.
14. SECTION 5.5 - GRASS STRIPS
- SECTION 5.5.1 (LOCATION BASED ON PLATES 1 AND 2)
 - SECTION 5.5.2 (FINISHED GRADE)
 - SECTION 5.5.3 (SHADE TREES)
 - SECTION 5.5.4 (LOAM AND SEED)
- PROPOSED: NO SIDEWALK PROPOSED, THEREFORE NO GRASS STRIP IS PROPOSED.
15. SECTION 5.9: "UNDERGROUND DISTRIBUTION SYSTEMS SHALL BE PROVIDED FOR ALL UTILITY SYSTEMS BOTH PUBLIC AND PRIVATE, INCLUDING WATER, SANITARY SEWERAGE, DRAINAGE, ELECTRICAL, TELEPHONE, TELEVISION, AND ANY SIMILAR SUCH SYSTEMS."
PROPOSED: ALLOW EXISTING UNDERGROUND UTILITY CONFIGURATION AND OVERHEAD WIRES TO SERVE SUBDIVISION.
16. SECTION 5.12.1.b: "ALL UTILITY LINES SHALL BE INSTALLED IN THE LOCATION INDICATED AND WITH THE MINIMUM COVER AS SHOWN ON PLATES 1 AND 2."
PROPOSED: ALLOW EXISTING UTILITY CONFIGURATION TO SERVE SUBDIVISION.
17. SECTION 5.12.1.f: "ALL LOT CONNECTIONS SHALL BE INSTALLED TO THE RIGHT-OF-WAY LINE, MARKED OR SURVEYED SO AS TO BE EASILY LOCATED IN THE FUTURE."
PROPOSED: ALLOW EXISTING UTILITY CONFIGURATION TO SERVE SUBDIVISION.
18. SECTION 5.12.2 - WATER
- SECTION 5.12.2.a: "THE APPLICANT SHALL CONNECT TO THE PUBLIC WATER SYSTEM..."
 - SECTION 5.12.2.c: "WATER PIPE DIAMETER SHALL NOT BE LESS THAN 8 INCHES..."
 - SECTION 5.12.2.d: "HYDRANTS SHALL BE LOCATED AT EACH STREET INTERSECTION AND NOT MORE THAN 500 FEET APART. EACH HYDRANT SHALL BE SERVED DIRECTLY FROM THE WATER MAIN."
- PROPOSED: ALLOW EXISTING HYDRANT AT EXISTING 1 1/2 STORY BRICK BUILDING TO SERVE SUBDIVISION. ALLOW EXISTING 8" WATER LINE SERVING THE 1 1/2 STORY BRICK BUILDING TO SERVE SUBDIVISION.
19. SECTION 5.12.3 - DRAINAGE
- SECTION 5.12.3.a: "THE CONSTRUCTION OF THE DRAINAGE SYSTEM, INCLUDING METHODS OF CONSTRUCTION AND QUALITY OF MATERIALS USED, SHALL BE IN CONFORMITY WITH THE DEFINITIVE PLAN AND SECTION 200 OF THE STANDARD SPECIFICATIONS."
 - SECTION 5.12.3.b (DRAIN PIPE CAPACITY AND RUNOFF CALCULATIONS)
 - SECTION 5.12.3.c (FLOOD IMPACT ANALYSIS)
 - SECTION 5.12.3.d: "THE DRAINAGE SYSTEM SHALL NOT WRONGFULLY OVERBURDEN CONTINUOUS EXISTING DRAINAGE SYSTEMS, EITHER NATURAL OR ARTIFICIAL..."
 - SECTION 5.12.3.e (DRAIN PIPE MATERIAL)
 - SECTION 5.12.3.f: "STORMWATER RUNOFF SHALL NOT BE PERMITTED TO FLOW UPON THE ROAD SURFACE FOR A LONGER DISTANCE THAN 300 FEET BEFORE IT ENTERS THE UNDERGROUND SYSTEM... CATCH BASINS SHALL BE LOCATED ON BOTH SIDES OF THE ROADWAY ON CONTINUOUS GRADES AT INTERVALS OF NOT MORE THAN 300 FEET, AT ALL SAGS IN THE ROADWAY, AND NEAR THE CORNERS OF THE ROADWAY AT INTERSECTING STREETS... GRANITE CURB INLETS CONFORMING TO SECTION 500 OF THE STANDARD SPECIFICATIONS SHALL BE INSTALLED AT ALL ROADWAY CATCH BASINS BUT SHALL NOT BE REQUIRED FOR AREA CATCH BASINS."
 - SECTION 5.12.3.g (EXISTING AND PROPOSED PEAK FLOW AND HYDROGRAPH)
 - SECTION 5.12.3.h (PIPE TRENCHING)
 - SECTION 5.12.3.i (MANHOLES AND CATCHBASINS)
 - SECTION 5.12.3.m (DRAIN MANHOLE LOCATIONS)
 - SECTION 5.12.3.n (FRAMES AND COVERS)
- PROPOSED: ALLOW EXISTING DRAINAGE SYSTEM, WHICH CONSISTS OF TWO (2) CATCH BASINS THAT PRESUMABLY OUTLET VIA PIPES OF UNKNOWN SIZE AND MATERIAL DIRECTLY TO THE STREAM, TO CONTINUE TO SERVE THE SUBDIVISION. ALLOW STORMWATER RUNOFF TO FLOW FOR APPROXIMATELY 325 FEET TO EXISTING CATCH BASINS. EXISTING CATCH BASINS DO NOT HAVE GRANITE CURB INLETS. SINCE NO WORK PROPOSED, RUNOFF CALCULATIONS ARE NOT NECESSARY.
20. SECTION 5.12.4.b: "PRIVATE ON-LOT SEWERAGE SYSTEMS SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE BOARD OF HEALTH OF THE TOWN OF TOPSFIELD AND ARTICLES OF THE SANITARY CODE OF THE COMMONWEALTH OF MASSACHUSETTS."
PROPOSED: ALLOW EXISTING SEWAGE DISPOSAL SYSTEMS ON-SITE TO SERVE THE SUBDIVISION. EXISTING BUILDINGS ARE TO REMAIN ON-SITE.
21. SECTION 5.20 - TREE PLANTING
- SECTION 5.20.1 (TREE SPECIES, QUANTITY, AND SPACING)
 - SECTION 5.20.2 (BRUSH CLEARING)
 - SECTION 5.20.3 (TREE HEALTH AND LIABILITY)
 - SECTION 5.20.4 (BANK STABILIZATION)
- PROPOSED: ALLOW EXISTING LAMN AND SHRUBBERY ON SCHOOL AVENUE AND 27 HIGH STREET TO SERVE THE SUBDIVISION. NO STREET TREES ARE PROPOSED.
22. SECTION 5.21: "AS-BUILT PLANS SHOWING THE LOCATION, GRADES, AND OTHER SIGNIFICANT INFORMATION REGARDING UTILITIES AND ROADS SHALL BE PREPARED BY THE APPLICANT AND SUBMITTED TO THE BOARD WITHIN SIX MONTHS FOLLOWING THE FINAL APPROVAL..."
PROPOSED: NO WORK PROPOSED, THEREFORE AN AS-BUILT IS NOT REQUIRED.

Appendix B 27 High Street
(A.K.A. 10 School Avenue)
Topsfield, Massachusetts 01983

FOR TOWN OF TOPSFIELD



RECORD OWNER:

TOWN OF TOPSFIELD
8 WEST COMMON STREET
TOPSFIELD, MA

APPLICANT:

TOWN OF TOPSFIELD
8 WEST COMMON STREET
TOPSFIELD, MA

CIVIL ENGINEER/LAND SURVEYOR:

HANCOCK ASSOCIATES
185 CENTRE STREET
DANVERS, MA 01923
(978) 777-3050

SHEET INDEX

SHEET 1	DF-1	TITLE SHEET
SHEET 2	DF-2	EXISTING CONDITIONS
SHEET 3	DF-3	DEFINITIVE PLAN OF LAND
SHEET 4	DF-4	PLAN AND PROFILE

ZONING TABULATION

CURRENT ZONING MAP: JANUARY 1, 2018			
ASSESSOR INFORMATION: MAP 41, LOT 60			
ZONING CLASSIFICATION: CENTRAL RESIDENTIAL (CR)			
TOTAL LOT AREA: 93,035± S.F.			
DIMENSIONAL REQUIREMENTS - CENTRAL RESIDENTIAL (CR) DISTRICT			
ITEM (BYLAW REFERENCE)	REQUIRED	LOT 60B	LOT 60A
MINIMUM LOT AREA (ART. IV)	20,000 S.F.	57,639 S.F.	32,430 S.F.
MINIMUM LOT FRONTAGE (ART. IV)	100 FEET	130.3 FEET	134.63 FEET
MINIMUM LOT DEPTH (ART. IV)	120 FEET	261.4 FEET	251.7 FEET
MINIMUM FRONT YARD (ART. IV)	20 FEET	30.1 FEET	43.1 FEET
MINIMUM SIDE YARD (ART. IV)	10 FEET	51.4 FEET	16.7 FEET
MINIMUM REAR YARD (ART. IV)	30 FEET	40.1 FEET	61.8 FEET
MAXIMUM HEIGHT (ART. IV)	35 FEET	<35 FEET	<35 FEET
MAXIMUM STORIES (ART. IV)	2 1/2	1 1/2	2 1/2
MAXIMUM BUILDING AREA % (ART. IV)	40	7.9	13.6
MINIMUM OPEN SPACE % (ART. IV)	40	63	40

I CERTIFY THAT 20 DAYS HAVE ELAPSED SINCE
PLANNING BOARD APPROVAL AND THAT NO
APPEAL HAS BEEN FILED IN THIS OFFICE.

TOPSFIELD TOWN CLERK

I CERTIFY THAT THIS PLAN CONFORMS TO THE
RULES AND REGULATIONS OF THE REGISTERS
OF DEEDS.

DATE PROFESSIONAL LAND SURVEYOR
FOR REGISTRY USE

#27 HIGH
STREET

(A.K.A. #10 School Ave.)
Topsfield, Massachusetts 01983

ASSESSORS

MAP LOT
41 60

PREPARED FOR

TOWN
OF
TOPSFIELD

8 West Common Street
Topsfield, Massachusetts 01983

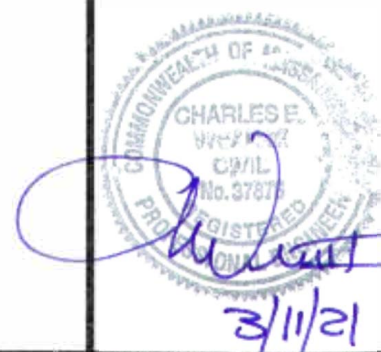
HANCOCK
ASSOCIATES

Civil Engineers

Land Surveyors

Wetland Scientists

185 CENTRE STREET, DANVERS, MA 01923
VOICE (978) 777-3050, FAX (978) 774-7816
WWW.HANCOCKASSOCIATES.COM



NO.	BY	APP	DATE	ISSUE/REVISION	DESCRIPTION
DATE:	3/11/21	DESIGN BY:	CEW		
SCALE:	AS SHOWN	DRAWN BY:	DJR		
APPRVD. BY:	CEW	CHECK BY:	JP		

TITLE
SHEET

PLOT DATE: Mar 11, 2021 1:40 pm
PATH: U:\a2_vet\c1w4 30 Projects\24553-Town of Topsfield\Eng\DWG\

DWG: 24553DF.dwg

LAYOUT: TS

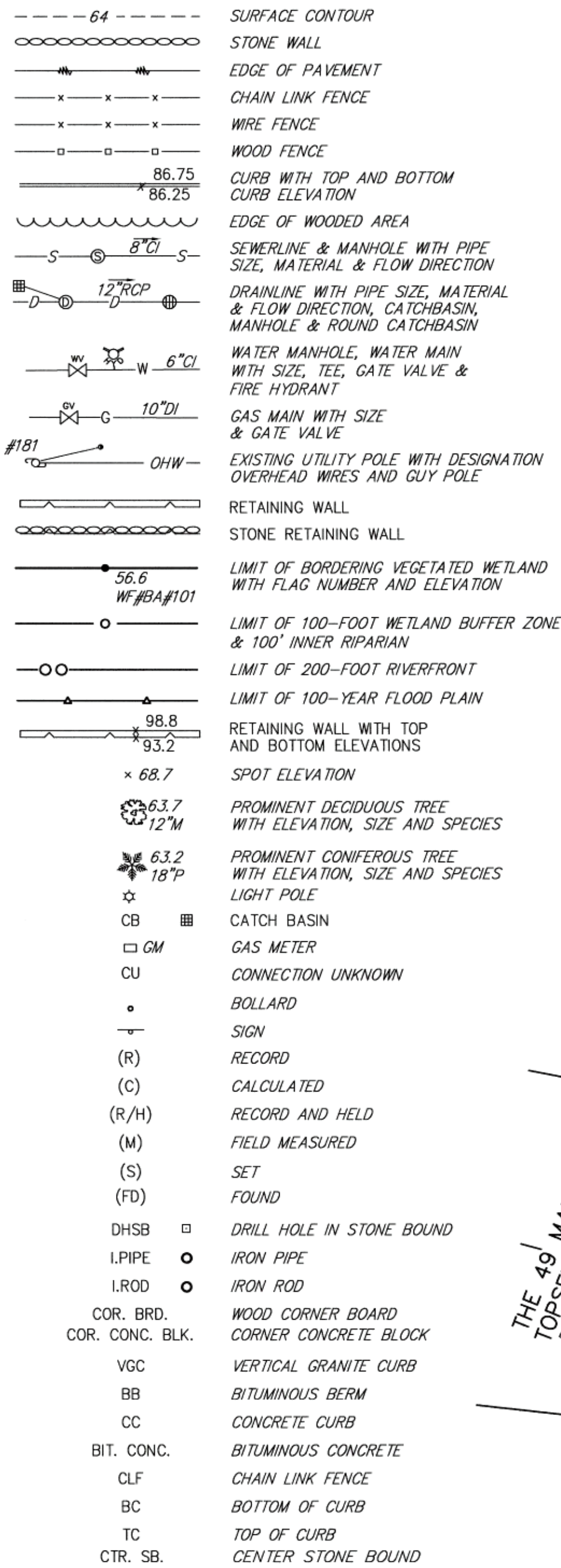
SHEET: 1 OF 4

PROJECT NO.:

DF-1

24553

LEGEND



NOTES:

- 1) ELEVATIONS SHOWN HEREON REFER TO NAVD OF 1988. SAID DATUM WAS ESTABLISHED UTILIZING GPS.
- 2) UNDERGROUND UTILITIES SHOWN HEREON ARE COMPILED FROM FIELD LOCATIONS OF STRUCTURES AND FROM AVAILABLE RECORD INFORMATION ON FILE AT THE TOWN ENGINEERING OFFICES, TOWN D.P.W., MASS. HIGHWAY DEPT. AND UTILITY COMPANIES. OTHER UNDERGROUND UTILITIES MAY EXIST. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE LOCATION, SIZE & ELEVATION OF ALL UTILITIES WITHIN THE AREA OF PROPOSED WORK AND TO CONTACT "DIG-SAFE" AT 811 AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION, DEMOLITION OR CONSTRUCTION.
- 3) LIMITS OF BORDERING VEGETATED WETLANDS SHOWN HEREON WERE DELINEATED BY HANCOCK ASSOCIATES ON 2/11/2021 AND LOCATED BY FIELD SURVEY.
- 4) APPROXIMATE LOCATION OF DPW GARAGE SEPTIC SYSTEM BASED ON PAROLE EVIDENCE BY TOWN OF TOPSFIELD. IT IS RECOMMENDED THAT SAID LOCATION BE VERIFIED BY THE OWNER. SEE NOTE 2.
- 5) RECORDS SHOWING LOCATION OF GAS LINE ARE SCHEMATIC IN NATURE AS RUNNING ALONG THE EDGE OF PAVEMENT. LOCATION OF GAS LINE SHOWN HEREON SHOULD BE CONSIDERED APPROXIMATE. SEE NOTE 2.
- 6) SNOW WAS ON SITE AT THE TIME OF SURVEY. SOME SITE DETAIL MAY HAVE BEEN OBSCURED AND NOT SHOWN HEREON.
- 7) BUILDING OFFSETS SHOWN TO CORNER BRICK UNLESS OTHERWISE NOTED.

ASSESSORS:

PARCEL ID: 41-60

REFERENCES:

DEED BOOK 741, PAGE 284

RECORD OWNER:

THE INHABITANTS OF THE TOWN OF TOPSFIELD

ZONING:

CENTRAL RESIDENTIAL DISTRICT

#27 HIGH STREET

(A.K.A. #10 School Ave.)
Topsfield, Massachusetts 01983

PREPARED FOR:

TOWN OF TOPSFIELD

8 West Common Street
Topsfield, Massachusetts 01983

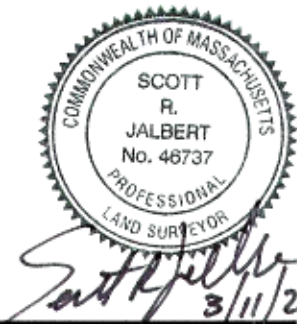
HANCOCK ASSOCIATES

Civil Engineers

Land Surveyors

Wetland Scientists

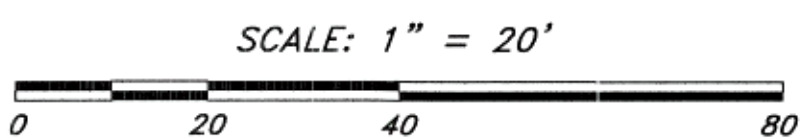
185 CENTRE STREET, DANVERS, MA 01923
VOICE (978) 777-3050, FAX (978) 774-7816
WWW.HANCOCKASSOCIATES.COM



APPROVAL UNDER THE SUBDIVISION
CONTROL LAW IS REQUIRED.

TOPSFIELD PLANNING BOARD

DATE: _____



ELEVATION BENCH MARKS		
DATUM: NAVD88(SEE NOTE 1)		
NO.	DESCRIPTION	ELEV.
1.	DOORWAY: CENTER CONC. THRESHOLD	63.71
2.	UTILITY POLE #4: MAGNETIC NAIL (1.0'A.G.)	76.93
3.		

EXISTING CONDITIONS
PLAN OF LAND
IN
TOPSFIELD, MA

PLOT DATE: Mar 11, 2021 1:24 pm
PLOT: F:\2021 30 Projects\24553-Town of Topsfield\Surv\DWG\

DWG: 24553ec.dwg

LAYOUT: EC

SHEET: 2 OF 4

PROJECT NO.:

DF-2

24553

I CERTIFY THAT THIS PLAN CONFORMS TO THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

3/11/21
DATE
Scott R. Jallibert
PROFESSIONAL LAND SURVEYOR

FOR REGISTRY USE

I CERTIFY THAT 20 DAYS HAVE ELAPSED SINCE PLANNING BOARD APPROVAL AND THAT NO APPEAL HAS BEEN FILED IN THIS OFFICE.

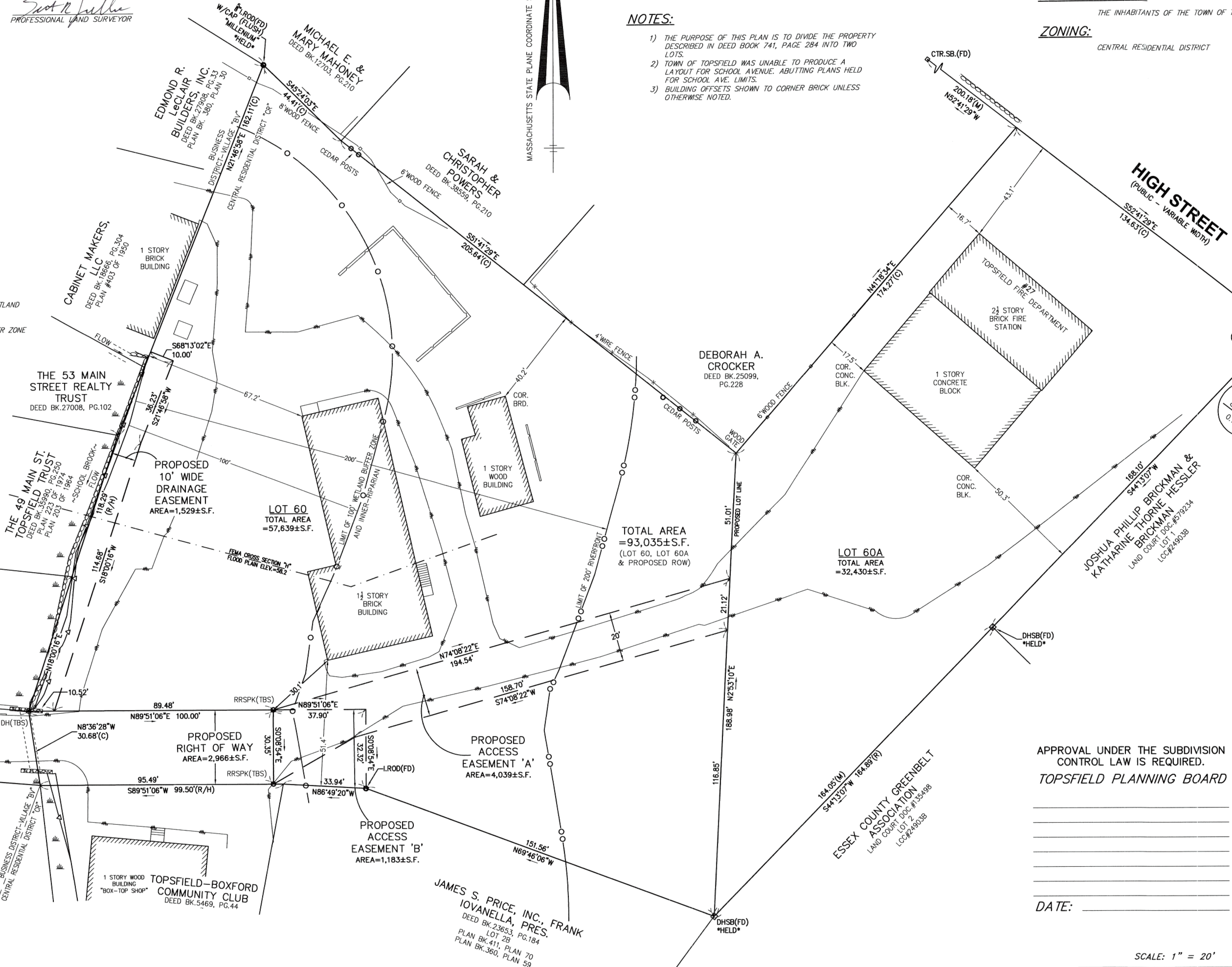
TOPSFIELD TOWN CLERK

LEGEND

- CHAIN LINK FENCE
- WIRE FENCE
- WOOD FENCE
- RETAINING WALL
- STONE RETAINING WALL
- LIMIT OF BORDERING VEGETATED WETLAND WITH FLAG NUMBER AND ELEVATION
- LIMIT OF 100-FOOT WETLAND BUFFER ZONE & 100' INNER RIPARIAN
- LIMIT OF 200-FOOT RIVERFRONT
- LIMIT OF 100-YEAR FLOOD PLAIN
- (R) RECORD
- (C) CALCULATED
- (R/H) RECORD AND HELD
- (M) FIELD MEASURED
- (FD) FOUND
- DHSB DRILL HOLE IN STONE BOUND
- LPIPE IRON PIPE
- LROD IRON ROD
- DH DRILL HOLE
- RRSPK RAIL ROAD SPIKE
- TBS TO BE SET
- CTR. SB. CENTER STONE BOUND
- COR. BRD. WOOD CORNER BOARD
- COR. CONC. BLK. CORNER CONCRETE BLOCK

LIMIT OF 100' WETLAND BUFFER ZONE AND INNER-RIPARIAN
100' FROM TOP OF BANK
186.01'(R/H)
SCHOOL AVENUE
(PUBLIC - VARIABLE WIDTH)

37 MAIN STREET CONDOMINIUM
DEED BK.20291, PG.387
PLAN BK. 366, PLAN 19



NOTES:

- 1) THE PURPOSE OF THIS PLAN IS TO DIVIDE THE PROPERTY DESCRIBED IN DEED BOOK 741, PAGE 284 INTO TWO LOTS.
- 2) TOWN OF TOPSFIELD WAS UNABLE TO PRODUCE A LAYOUT FOR SCHOOL AVENUE. ABUTTING PLANS HELD FOR SCHOOL AVE. LIMITS.
- 3) BUILDING OFFSETS SHOWN TO CORNER BRICK UNLESS OTHERWISE NOTED.

ASSESSORS:

PARCEL ID: 41-60

REFERENCES:

DEED BOOK 741, PAGE 284

RECORD OWNER:

THE INHABITANTS OF THE TOWN OF TOPSFIELD

ZONING:

CENTRAL RESIDENTIAL DISTRICT

APPROVAL UNDER THE SUBDIVISION CONTROL LAW IS REQUIRED.
TOPSFIELD PLANNING BOARD

DATE: _____

SCALE: 1" = 20'
0 20 40 80

#27 HIGH STREET

(A.K.A. #10 School Ave.)
Topsfield, Massachusetts 01983

PREPARED FOR:

TOWN OF TOPSFIELD

8 West Common Street
Topsfield, Massachusetts 01983

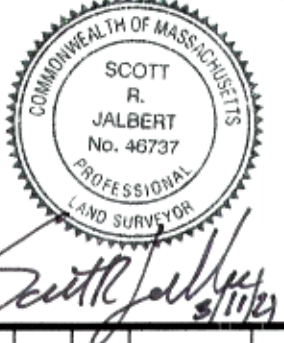
HANCOCK ASSOCIATES

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185 CENTRE STREET, DANVERS, MA 01923
VOICE (978) 777-3050, FAX (978) 774-7816
WWW.HANCOCKASSOCIATES.COM



NO.	BY	APP	DATE	ISSUE/REVISION	DESCRIPTION
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DATE:	3/11/2021	DRAWN BY:	MMM
SCALE:	1" = 20'	CHECK BY:	SRJ

PLAN OF LAND IN TOPSFIELD, MA

PLOT DATE: Mar 11, 2021 1:25 pm
PATH: F:\Civil 3D Projects\24553-Town of Topsfield\Plan\DWG\

DWG: 24553ec.dwg

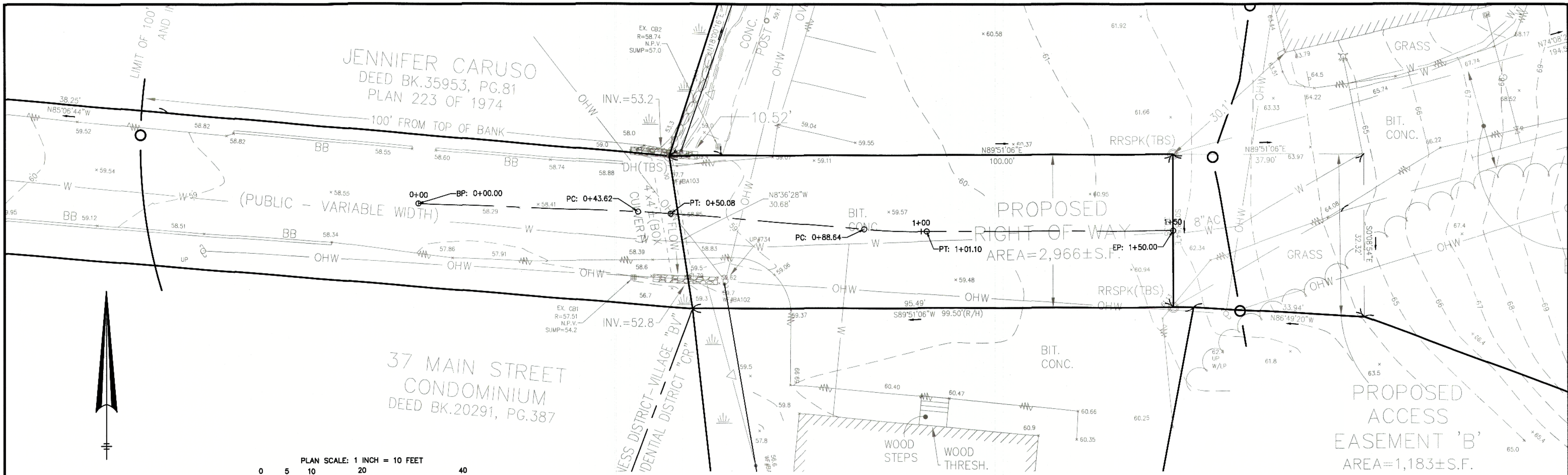
LAYOUT: Plan of Land

SHEET: 3 OF 4

PROJECT NO.:

DF-3

24553



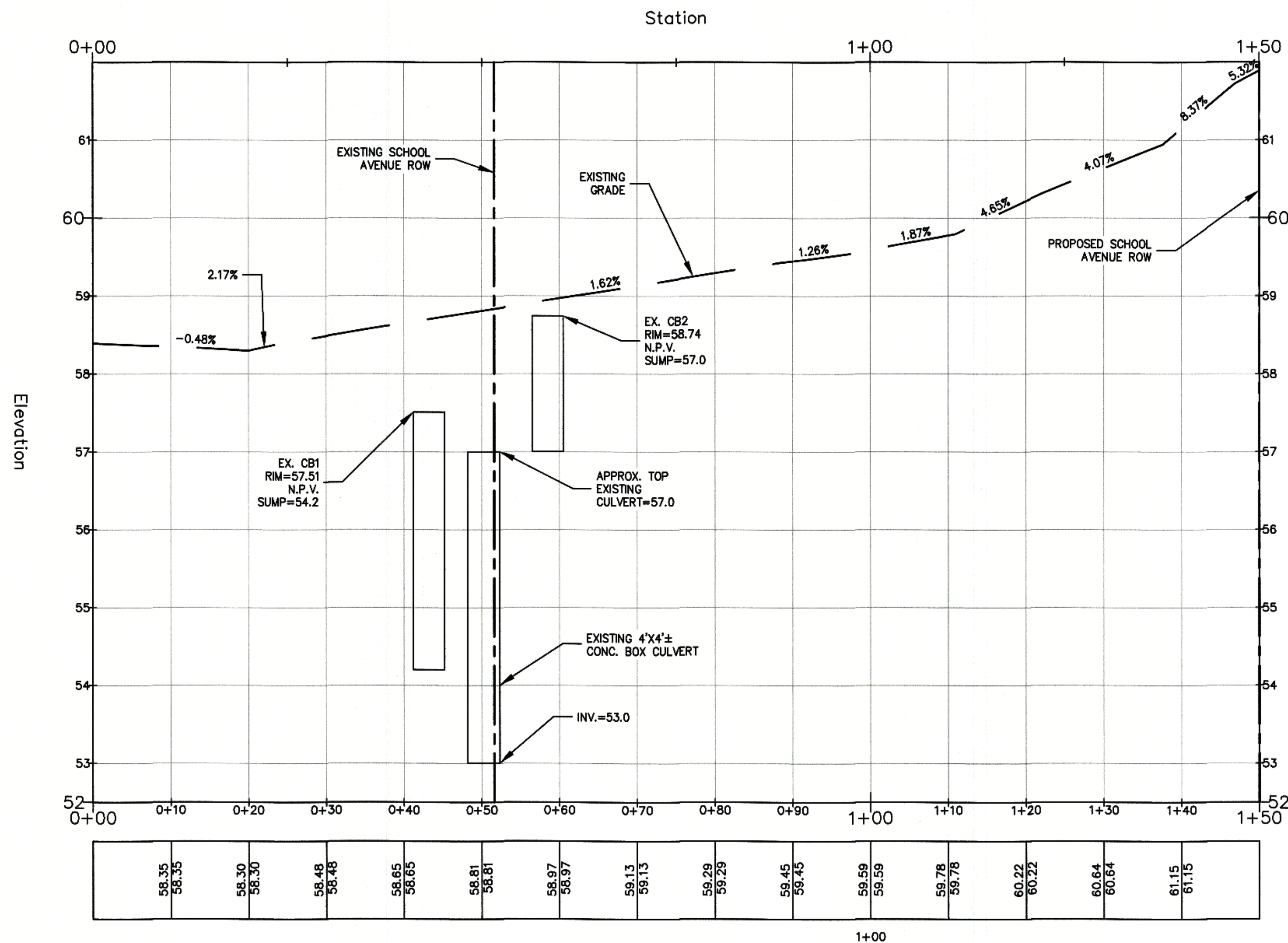
School Avenue Extension PROFILE

LEGEND

- EXISTING**
- 64 SURFACE CONTOUR
 - STONE WALL
 - EDGE OF PAVEMENT
 - CHAIN LINK FENCE
 - WIRE FENCE
 - WOOD FENCE
 - 86.75 CURB WITH TOP AND BOTTOM ELEVATION
 - 86.25
 - EDGE OF WOODED AREA
 - SEWERLINE & MANHOLE WITH PIPE SIZE, MATERIAL & FLOW DIRECTION
 - 12" FCP DRAINLINE WITH PIPE SIZE, MATERIAL & FLOW DIRECTION, CATCHBASIN, MANHOLE & ROUND CATCHBASIN
 - 6" CI WATER MANHOLE, WATER MAIN WITH SIZE, TEE, GATE VALVE & FIRE HYDRANT
 - 10" DI GAS MAIN WITH SIZE & GATE VALVE
 - OHW EXISTING UTILITY POLE WITH DESIGNATION OVERHEAD WIRES AND GUY POLE
 - RETAINING WALL
 - STONE RETAINING WALL
 - 56.6 LIMIT OF BORDERING VEGETATED WETLAND WITH FLAG NUMBER AND ELEVATION
 - WF#BA#101
 - 98.8 LIMIT OF 100-FOOT WETLAND BUFFER ZONE & 100' INNER RIPARIAN
 - 93.2 LIMIT OF 200-FOOT RIVERFRONT
 - 68.7 LIMIT OF 100-YEAR FLOOD PLAIN
 - 63.7 RETAINING WALL WITH TOP AND BOTTOM ELEVATIONS
 - 63.2 SPOT ELEVATION
 - 12" M PROMINENT DECIDUOUS TREE WITH ELEVATION, SIZE AND SPECIES
 - 18" P PROMINENT CONIFEROUS TREE WITH ELEVATION, SIZE AND SPECIES
 - CB LIGHT POLE
 - GM CATCH BASIN
 - GM GAS METER

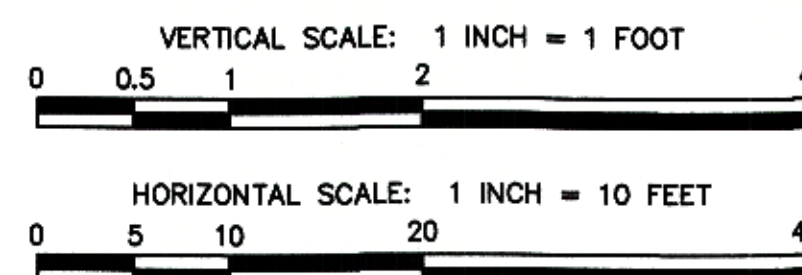
NOTES:

- CONTRACTOR SHALL CONTACT DIG-SAFE FOR UNDERGROUND UTILITY MARKING AT 1-888-344-7233 AT LEAST 72 HOURS PRIOR TO COMMENCEMENT OF ANY WORK.
- NO PHYSICAL IMPROVEMENTS ARE PROPOSED BY THIS PLAN.



APPROVAL UNDER THE SUBDIVISION CONTROL LAW REQUIRED.
TOPSFIELD PLANNING BOARD

DATE: _____



#27 HIGH STREET

(A.K.A. #10 School Ave.)
Topsfield, Massachusetts 01983

ASSESSORS:

MAP 41 LOT 60

PREPARED FOR:

TOWN OF TOPSFIELD

8 West Common Street
Topsfield, Massachusetts 01983

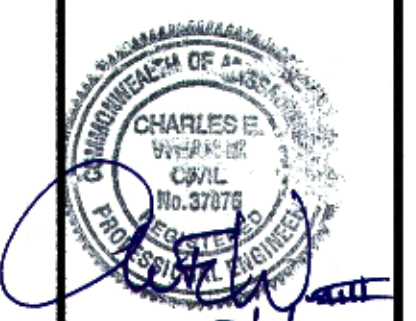
HANCOCK ASSOCIATES

Civil Engineers

Land Surveyors

Wetland Scientists

185 CENTRE STREET, DANVERS, MA 01923
VOICE (978) 777-3050, FAX (978) 774-7816
WWW.HANCOCKASSOCIATES.COM



NO.	BY	APP	DATE	ISSUE/REVISION DESCRIPTION
1	CEW		3/11/21	DESIGN BY: CEW
2	DJR			SCALE: 1" = 20' DRAWN BY: DJR
3	CEW			APPROVED BY: CEW CHECK BY: JP

PLAN AND PROFILE

PROJECT NO.: 24553

DF-4



HAYES ENGINEERING, INC.
603 SALEM STREET
WAKEFIELD, MA 01880
(781) 246-2800
FAX (781) 246-7596

Appendix C: Soil Suitability Assessment
FORM 11 - SOIL EVALUATOR FORM

Page 1 of 3

No. T-1

Date: _____

JOB FILE

Topo205

Commonwealth of Massachusetts
Topsheld, Massachusetts

Soil Suitability Assessment for On-site Sewage Disposal

Performed By: Gordon Rogerson Date: 5-4-01
Witnessed By: Joe Downing

Location Address or Lot # <u>School AVE</u>	Owner's Name, Address, and Telephone # <u>Town of Topsheld</u> <u>8 W. Common</u> <u>Topsheld, Ma</u> <u>Roberta Knight</u> <u>Selectman</u>
New Construction <input type="checkbox"/> Repair <input checked="" type="checkbox"/>	

Office Review

Published Soil Survey Available: No ☐ Yes ☐

Year Published _____ Publication Scale _____ Soil Map Unit Sr B

Drainage Class _____ Soil Limitations _____ Sudbury fsl

Surficial Geologic Report Available: No ☐ Yes ☐ Sandy, mixed, mesic

Year Published _____ Publication Scale _____ aquic Districhepts

Geologic Material (Map Unit) _____ INCEPTISOL

Landform _____

Flood Insurance Rate Map: _____

Above 500 year flood boundary No ☐ Yes ☐

Within 500 year flood boundary No ☐ Yes ☐

Within 100 year flood boundary No ☐ Yes ☐

Wetland Area:

National Wetland Inventory Map (map unit) _____

Wetlands Conservancy Program Map (map unit) _____

Current Water Resource Conditions (USGS): Month

Range : Above Normal ☐ Normal ☐ Below Normal ☐

Other References Reviewed: _____



Location Address or Lot No.

SCHOOL AVEOn-site ReviewDeep Hole Number T-1 Date: 5-4-01 Time: _____ Weather: _____

Location (identify on site plan) _____

Land Use _____ Slope (%) _____ Surface Stones _____

Vegetation _____

Landform _____

Position on landscape (sketch on the back)

Distances from:

Open Water Body _____ feet

Drainage way _____ feet

Possible Wet Area _____ feet

Property Line _____ feet

Drinking Water Well _____ feet

Other _____

DEEP OBSERVATION HOLE LOG*

Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)		
0 - 30	FILL	—	—	—	—	—	
30 - 66	C ₁	SI	2.5Y 5/4		gr	mfr	
66 - 78	C ₂	ls	10YR 4/4		1.5g	mfr	
78 - 120	C ₃	SI	2.5Y 5/4		blk	mfr	

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic)

Glacial till

Depth to Bedrock:

Depth to Groundwater:

Standing Water in the Hole:

No

Weeping from Pit Face:

No

Estimated Seasonal High Ground Water:

78"

HAYES ENGINEERING, INC.603 SALEM STREET
WAKEFIELD, MA 01880(781) 246-2800
FAX (781) 246-7596**FORM 11 - SOIL EVALUATOR FORM**

Page 3 of 3



DEP APPROVED FORM - 12/07/95

Location Address or Lot No. SCHOOL AVE
TOPSFIELD, MA**Determination for Seasonal High Water Table**Observation Hole Number: T-1
Method Used: _____

- ☐ Depth observed standing in observation hole _____ inches
☐ Depth weeping from side of observation hole _____ inches
☐ Depth to soil mottles 78 inches
☐ Ground water adjustment _____ feet

Index Well Number _____ Reading Date _____ Index well level _____
Adjustment factor _____ Adjusted ground water level _____**Depth of Naturally Occurring Pervious Material**Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system? yes

If not, what is the depth of naturally occurring pervious material? _____

CertificationI certify that on Nov. 1994 (date) I have passed the soil evaluator examination approved by the Department of Environmental Protection and that the above analysis was performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017.Signature *Borden R. Jerns* Date 5/4/01**DESCRIPTION OF HORIZONS****TEXTURE:**

gravel ---g
very coarse sand ---vcos
coarse sand ---cos
sand ---s
fine sand ---fs
very fine sand ---vfs
loamy coarse sand ---lcos
loamy sand ---ls
loamy fine sand ---lfs
sandy loam ---sl
fine sandy loam ---fsl
very fine sandy loam ---vfsl

gravelly sandy loam ---gs1
loam ---l
gravelly loam ---gl
stony loam ---stl
silt ---sl
silt loam ---sil
clay loam ---cl
silty clay loam ---sicl
sandy clay loam ---scl
stony clay loam ---stcl
silty clay ---sic
clay ---c

STRUCTURE:

Grade:
structureless ---0
weak ---1
moderate ---2
strong ---3

Size:
very fine ---vf
fine ---f
medium ---m
coarse ---c
very coarse ---vc

Form or Type:
platy ---pl
prismatic ---pr
columnar ---cpr
blocky ---bk
angular blocky ---abk
subangular blocky ---sbk
granular ---gr
single grain ---sg
massive ---m

CONSISTENCE:

Moist soil:
nonsticky ---nso
slightly sticky ---ss
sticky ---s
very sticky ---vs
nonplastic ---npo
slightly plastic ---spo
plastic ---po

Moist soil:
loose ---ml
very friable ---mvfr
friable ---mfr
firm ---mfi
very firm ---mvfi
extremely firm ---mefi

Dry soil:
loose ---dl
soft ---ds
slightly hard ---dsh
hard ---dh
very hard ---dvh
extremely hard ---deh

MOTTLING:

Abundance:
few ---f (0-2%)
common ---c (2-50%)
many ---m (50-100%)

Size:
fine ---f
medium ---m
coarse ---c

Contrast:
faint ---f
distinct ---d
prominent ---p



HOUSE

FIRE
STATION

N

F1

T-1

T-2

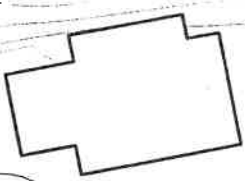
T-5

P-3

P-2

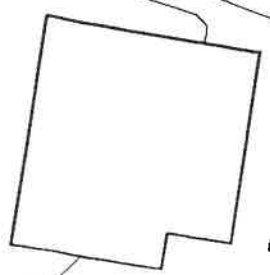
T-4

Salt
Shed



100' School Brook Buffer

School Brook





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FORM 11 - SOIL EVALUATOR FORM
Page 1 of 3

No. T-2

Date: _____

JOB FILE

Topozos

Commonwealth of Massachusetts
TOPSFIELD, Massachusetts

Soil Suitability Assessment for On-site Sewage Disposal

Performed By: Gordon Rogerson Date: 5-4-01
Witnessed By: Joe Downey

Location Address or Lot # <u>School Ave.</u>	Owner's Name, Address, and Telephone # <u>Roberta Knight.</u> <u>c/o Selectman</u> <u>B W. Commere</u> <u>Topofield, Ma</u>
New Construction <input type="checkbox"/> Repair <input checked="" type="checkbox"/>	

Office Review

Published Soil Survey Available: No ☐ Yes ☐

Year Published _____ Publication Scale _____ Soil Map Unit SrB

Drainage Class _____ Soil Limitations _____ Sudbury fal.

Surficial Geologic Report Available: No ☐ Yes ☐ Sandy, mixed, mesic

Year Published _____ Publication Scale _____ Aque Distichaepts

Geologic Material (Map Unit) _____ INCEPTISOL

Landform _____

Flood Insurance Rate Map: _____

Above 500 year flood boundary No ☐ Yes ☐

Within 500 year flood boundary No ☐ Yes ☐

Within 100 year flood boundary No ☐ Yes ☐

Wetland Area:

National Wetland Inventory Map (map unit) _____

Wetlands Conservancy Program Map (map unit) _____

Current Water Resource Conditions (USGS): Month

Range :Above Normal ☐ Normal ☐ Below Normal ☐

Other References Reviewed: _____



Location Address or Lot No. School Ave

On-site Review

Deep Hole Number T-2 Date: 5-4-01 Time: Weather Sunny 90°
 Location (identify on site plan)
 Land Use Slope (%) B Surface Stones NO
 Vegetation
 Landform
 Position on landscape (sketch on the back)
 Distances from:
 Open Water Body 7200 feet Drainage way feet
 Possible Wet Area 7200 feet Property Line feet
 Drinking Water Well feet Other

DEEP OBSERVATION HOLE LOG*							
Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)		
0-6	A	fsl	10YR 3/3		gv	mfr	0/0/0
6-24	Bw	fsl	10YR 5/6		gv	mfr	0/0/0
24-60	C ₁	sl	2.5Y 6/4		gv	mfr	0/5/0/0
60-120	C ₂	sl	2.5Y 7/4		blk	mlt	0/5/5/0

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial till Depth to Bedrock:
 Depth to Groundwater: Standing Water in the Hole: No Weeping from Pit Face: No
 Estimated Seasonal High Ground Water: 28'



HAYES ENGINEERING, INC.

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WAKEFIELD, MA 01880
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FAX (781) 246-7596



FORM 11 - SOIL EVALUATOR FORM

Page 3 of 3



DEP APPROVED FORM - 12/07/95

Location Address or Lot No.

SCHOOL AVE

TOPSFIELD, MA

Determination for Seasonal High Water Table

Observation Hole Number:

T-2

Method Used:

- ☐ Depth observed standing in observation hole inches
☐ Depth weeping from side of observation hole inches
☐ Depth to soil mottles 28 inches
☐ Ground water adjustment feet

Index Well Number

Reading Date

Index well level

Adjustment factor

Adjusted ground water level

Depth of Naturally Occurring Pervious Material

Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system? yes

If not, what is the depth of naturally occurring pervious material?

Certification

I certify that on Nov. 1994 (date) I have passed the soil evaluator examination approved by the Department of Environmental Protection and that the above analysis was performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017.

Signature Gordon Rogers

Date 5/4/01

DESCRIPTION OF HORIZONS

TEXTURE:

gravel ---g
 very coarse sand ---vcos
 coarse sand ---cos
 sand ---s
 fine sand ---fs
 very fine sand ---vfs
 loamy coarse sand ---lcos
 loamy sand ---ls
 loamy fine sand ---lfs
 sandy loam ---sl
 fine sandy loam ---fsl
 very fine sandy loam ---vfsl

gravelly sandy loam ---gs1
 loam ---l
 gravelly loam ---gl
 stony loam ---stl
 silt ---sl
 silt loam ---sil
 clay loam ---cl
 silty clay loam ---sic1
 sandy clay loam ---scl
 stony clay loam ---stcl
 silty clay ---sic
 clay ---c

STRUCTURE:

Grade:
 structureless ---0
 weak ---1
 moderate ---2
 strong ---3

Size:
 very fine ---vf
 fine ---f
 medium ---m
 coarse ---c
 very coarse ---vc

Form or Type:
 platy ---pl
 prismatic ---pr
 columnar ---cpr
 blocky ---bk
 angular blocky ---abk
 subangular blocky ---sbk
 granular ---gr
 single grain ---sg
 massive ---m

CONSISTENCE:

Moist soil:
 nonsticky ---nso
 slightly sticky ---ss
 sticky ---s
 very sticky ---vss
 nonplastic ---npo
 slightly plastic ---spo
 plastic ---p

Moist soil:
 loose ---ml
 very friable ---mvfr
 friable ---fr
 firm ---f
 very firm ---vff
 extremely firm ---eff

Dry soil:
 loose ---dl
 soft ---ds
 slightly hard ---dsh
 hard ---dh
 very hard ---dvh
 extremely hard ---dsh

MOTTLING:

Abundance:
 few ---f (0-2%)
 common ---c (2-20%)
 many ---m (20-100%)

Size:
 fine ---f
 medium ---m
 coarse ---c

Contrast:
 faint ---f
 distinct ---d
 prominent ---p

HOUSE

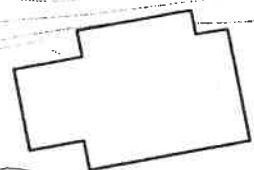
FIRE
STATION

N

F1
P1
T2
P2
T4

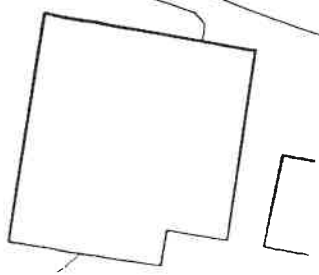
T5
T6
P3

SALT
SHED



100' School Brook Buffer

School Brook





HAYES ENGINEERING, INC.
603 SALEM STREET
WAKEFIELD, MA 01880
(781) 246-2800
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FORM 11 - SOIL EVALUATOR FORM
Page 1 of 3

No. T-3

Date: _____

JOB FILE

Top 0205

Commonwealth of Massachusetts
TOPSFIELD, Massachusetts

Soil Suitability Assessment for On-site Sewage Disposal

Performed By: Gordon Rogers Date: 5-4-01
Witnessed By: Joe Downing

Location Address or Lot # <u>School Ave.</u>	Owner's Name, Address, and Telephone # <u>Town of Topsfield</u> <u>8 W. Common</u> <u>Roberta Knight</u> <u>Topsfield, Ma. o/s Selectman</u>
New Construction <input type="checkbox"/> Repair <input type="checkbox"/>	

Office Review

Published Soil Survey Available: No ☐ Yes ☐
Year Published _____ Publication Scale _____ Soil Map Unit SrB
Drainage Class _____ Soil Limitations Sudbury fsl
Surficial Geologic Report Available: No ☐ Yes ☐ Sandy, mixed, resin
Year Published _____ Publication Scale _____ Aquic Distochrepts
Geologic Material (Map Unit) _____ INCEPTISOL
Landform _____
Flood Insurance Rate Map: _____
Above 500 year flood boundary No ☐ Yes ☐
Within 500 year flood boundary No ☐ Yes ☐
Within 100 year flood boundary No ☐ Yes ☐
Wetland Area: _____
National Wetland Inventory Map (map unit) _____
Wetlands Conservancy Program Map (map unit) _____
Current Water Resource Conditions (USGS): Month _____
Range : Above Normal ☐ Normal ☐ Below Normal ☐
Other References Reviewed: _____



Location Address or Lot No. School Ave

On-site Review

Deep Hole Number T-3 Date: 5-4-01 Time: _____ Weather: Sunny 90°

Location (identify on site plan) _____

Land Use _____ Slope (%) _____ Surface Stones _____

Vegetation _____

Landform _____

Position on landscape (sketch on the back)

Distances from:

Open Water Body 7200 feet

Drainage way _____ feet

Possible Wet Area 7200 feet

Property Line _____ feet

Drinking Water Well _____ feet

Other _____

DEEP OBSERVATION HOLE LOG*

Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)		
0-6	A	fsl	10YR 3/3		gr	mfr	0/0/0
6-20	Bw	sl	10YR 6/6		gr	mfr	10/0/0
20-34	C ₁	ls	7.5YR 6/6		gr	mfr	20/5/0
34-120	Cd	sl	2.5Y 5/1	10YR 6/8 5Y 7/3	blk	mfr	10/5/0/0

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial till

Depth to Bedrock: _____

Depth to Groundwater: Standing Water in the Hole: _____

No

Weeping from Pit Face: No

Estimated Seasonal High Ground Water: _____

43"





Location Address or Lot No. SCHOOL AVE
TOPSFIELD, MA

Determination for Seasonal High Water Table

Observation Hole Number: T-3
Method Used:

- ☐ Depth observed standing in observation hole inches
☐ Depth weeping from side of observation hole inches
☐ Depth to soil mottles 43 inches
☐ Ground water adjustment feet

Index Well Number Reading Date Index well level

Adjustment factor Adjusted ground water level

Depth of Naturally Occurring Pervious Material

Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system? yes

If not, what is the depth of naturally occurring pervious material? _____

Certification

I certify that on Nov. 1994 (date) I have passed the soil evaluator examination approved by the Department of Environmental Protection and that the above analysis was performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017.

Signature [Signature]

Date 5/4/01

DESCRIPTION OF HORIZONS

TEXTURE:

gravel ---g
 very coarse sand ---vcos
 coarse sand ---cos
 sand ---s
 fine sand ---fs
 very fine sand ---vfs
 loamy coarse sand ---lcos
 loamy sand ---ls
 loamy fine sand ---lfs
 sandy loam ---sl
 fine sandy loam ---fsl
 very fine sandy loam ---vfsl

gravelly sandy loam ---gs1
 loam ---l
 gravelly loam ---gl
 stony loam ---stl
 silt ---sl
 silt loam ---sil
 clay loam ---cl
 silty clay loam ---sicl
 sandy clay loam ---scl
 stony clay loam ---stcl
 silty clay ---sic
 clay ---c

STRUCTURE:

Grade:
 structureless ---0
 weak ---1
 moderate ---2
 strong ---3

Size:
 very fine ---vf
 fine ---f
 medium ---m
 coarse ---c
 very coarse ---vc

Form or Type:
 platy ---pl
 prismatic ---pr
 columnar ---cpr
 blocky ---bk
 angular blocky ---abk
 subangular blocky ---sbk
 granular ---gr
 single grain ---sg
 massive ---m

CONSISTENCE:

Moist soil:
 nonsticky ---nso
 slightly sticky ---vss
 sticky ---ss
 very sticky ---vss
 nonplastic ---npo
 slightly plastic ---sp
 plastic ---p

Moist soil:
 loose ---sl
 very friable ---svfr
 friable ---fr
 firm ---f
 very firm ---vff
 extremely firm ---eff

Dry soil:
 loose ---dl
 soft ---ds
 slightly hard ---dsh
 hard ---dh
 very hard ---dvh
 extremely hard ---deh

MOTTLING:

Abundance:
 few ---f (0-25%)
 common ---c (25-50%)
 many ---m (50-100%)

Size:
 fine ---f
 medium ---m
 coarse ---c

Contrast:
 faint ---f
 distinct ---d
 prominent ---p

HOUSE

FIRE STATION

N

F1
T-3 P-1
T-2
P-2 T-4

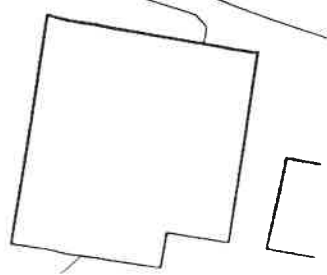
T-5
T-6 P-3

SALT SHED



100' School Brook Buffer

School Brook



School Ave

COMMONWEALTH OF MASSACHUSETTS

Topo205

TOPSFIELD , Massachusetts

Percolation Test*		
Date: 5-4-01		Time:
Observation Hole #	P-1	
Depth of Perc	50" + 18" = 63"	
Start Pre-soak	9:50	
End Pre-soak		
Time at 12"	10:05	11C 10:11 10C 10:18
Time at 9"	10:28 (23)	8C 10:38 7C 10:47
Time at 6"	10:57	
Time (9"-6")	29 min	
Rate Min./Inch	10 m/i	

* Minimum of 1 percolation test must be performed in both the primary area AND reserve area.

Site Passed

☒

Site Failed

9

Abandoned

Performed By:

Gordon Rogers on

Witnessed By:

Joe Downing

Comments:





HAYES ENGINEERING, INC.
603 SALEM STREET
WAKEFIELD, MA 01880
(781) 246-2800
FAX (781) 246-7596

FORM 11 - SOIL EVALUATOR FORM
Page 1 of 3

No. T4

Date: _____

JOB FILE

TOP0205

Commonwealth of Massachusetts
TOPSFIELD, Massachusetts

Soil Suitability Assessment for On-site Sewage Disposal

Performed By: Gordon Rogerson

Date: 5-4-01

Witnessed By: Joe Downing

Location Address or Lot # <u>School Ave</u>	Owner's Name, Address, and Telephone # <u>Roberta Knight</u> <u>c/o Selectmen</u> <u>8 W. Common</u> <u>Topsfield Ma</u>
New Construction <input type="checkbox"/> Repair <input checked="" type="checkbox"/>	

Office Review

Published Soil Survey Available: No ☐ Yes ☐

Year Published _____ Publication Scale _____

Drainage Class _____ Soil Limitations _____

Surficial Geologic Report Available: No ☐ Yes ☐

Year Published _____ Publication Scale _____

Geologic Material (Map Unit) _____

Landform _____

Flood Insurance Rate Map: _____

Above 500 year flood boundary No ☐ Yes ☐

Within 500 year flood boundary No ☐ Yes ☐

Within 100 year flood boundary No ☐ Yes ☐

Wetland Area:

National Wetland Inventory Map (map unit) _____

Wetlands Conservancy Program Map (map unit) _____

Current Water Resource Conditions (USGS): Month

Range : Above Normal ☐ Normal ☐ Below Normal ☐

Other References Reviewed: _____



Location Address or Lot No. School Ave

On-site Review

Deep Hole Number T-4 Date: 6-4-01 Time: _____ Weather: Sunny 90°
 Location (identify on site plan) _____
 Land Use _____ Slope (%) B Surface Stones: No
 Vegetation _____
 Landform _____
 Position on landscape (sketch on the back) _____
 Distances from:
 Open Water Body 7200 feet Drainage way _____ feet
 Possible Wet Area: 7200 feet Property Line _____ feet
 Drinking Water Well _____ feet Other _____

DEEP OBSERVATION HOLE LOG*							
Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)		
0 - 6	A	fsl	10YR 3/3		gr	mfr	0/0/0
6 - 14	Bw	sl	10YR 6/6		gr	mfr	0/0/0
14 - 120	C	g's	7.5YR 6/6		gr	onfr	20/50/0

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) 1st Contact Depth to Bedrock: _____
 Depth to Groundwater: Standing Water in the Hole: NO Weeping from Pit Face: NO
 Estimated Seasonal High Ground Water: NO





Location Address or Lot No. School Ave

JOB FILE

COMMONWEALTH OF MASSACHUSETTS

Top 0205

TOPSFIELD, Massachusetts

Percolation Test*		
Date: <u>5-4-01</u>		Time: _____
Observation Hole #	<u>P2</u>	
Depth of Perc	<u>48" + 18" = 66"</u>	
Start Pre-soak	<u>1:00</u>	
End Pre-soak		
Time at 12"	<u>1:15</u>	
Time at 9"	<u>1:35 (20)</u>	<u>80 1:44</u> <u>90 1:57</u>
Time at 6"	<u>2:12</u>	
Time (9"-6")	<u>37</u>	
Rate Min./Inch	<u>13 m/i</u>	

* Minimum of 1 percolation test must be performed in both the primary area AND reserve area.

Site Passed



Site Failed



Abandoned



Performed By:

Gordon Rogerson

Witnessed By:

Joe Downing

Comments: _____



HAYES ENGINEERING, INC.

603 SALEM STREET
WAKEFIELD, MA 01880
(781) 246-2800
FAX (781) 246-7596



FORM 11 - SOIL EVALUATOR FORM

Page 3 of 3



DEP APPROVED FORM - 12/07/95

Location Address or Lot No. SCHOOL AVE
TOPSFIELD, MA

Determination for Seasonal High Water Table

Observation Hole Number: T-4
Method Used: _____

- ☐ Depth observed standing in observation hole _____ inches
☐ Depth weeping from side of observation hole _____ inches
☐ Depth to soil mottles _____ inches
☐ Ground water adjustment _____ feet

Index Well Number _____ Reading Date _____ Index well level _____
Adjustment factor _____ Adjusted ground water level _____

Depth of Naturally Occurring Pervious Material

Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system? Yes

If not, what is the depth of naturally occurring pervious material? _____

Certification

I certify that on Nov. 1994 (date) I have passed the soil evaluator examination approved by the Department of Environmental Protection and that the above analysis was performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017.

Signature [Signature]

Date 5/4/01

DESCRIPTION OF HORIZONS

TEXTURE:

Gravel ---g
very coarse sand ---vcos
coarse sand ---cos
sand ---s
fine sand ---fs
very fine sand ---vfs
loamy coarse sand ---lcos
loamy sand ---ls
loamy fine sand ---lfs
sandy loam ---sl
fine sandy loam ---fsl
very fine sandy loam ---vfsl

gravely sandy loam ---gs
loam ---l
gravely loam ---gl
stony loam ---stl
silt ---sl
silt loam ---sil
clay loam ---cl
silty clay loam ---sicl
sandy clay loam ---scl
stony clay loam ---stcl
silty clay ---sic
clay ---c

STRUCTURE:

Grade:
structureless ---0
weak ---1
moderate ---2
strong ---3

Size:
very fine ---vf
fine ---f
medium ---m
coarse ---c
very coarse ---vc

Form or Type:
platy ---pl
prismatic ---pr
columnar ---cpr
blocky ---bk
angular blocky ---abk
subangular blocky ---sbk
granular ---gr
single grain ---sg
massive ---m

CONSISTENCE:

Wet soil:
nonsticky ---nss
slightly sticky ---sls
sticky ---ss
very sticky ---vss
nonplastic ---npo
slightly plastic ---sp
plastic ---p

Moist soil:
loose ---al
very friable ---avfr
friable ---fr
firm ---fl
very firm ---vfl
extremely firm ---efl

Dry soil:
loose ---dl
soft ---ds
slightly hard ---dsh
hard ---dh
very hard ---dvh
extremely hard ---dsh

MOTTLING:

Abundance:
few ---f (0-25%)
common ---c (25-50%)
many ---m (50-100%)

Size:
fine ---f
medium ---m
coarse ---c

Contrast:
faint ---f
distinct ---d
prominent ---p





HAYES ENGINEERING, INC.
603 SALEM STREET
WAKEFIELD, MA 01880
(781) 246-2800
FAX (781) 246-7596

FORM 11 - SOIL EVALUATOR FORM
Page 1 of 3

No. T-5

Date: _____

JOB FILE

Top0205

Commonwealth of Massachusetts
TOPSFIELD, Massachusetts

Soil Suitability Assessment for On-site Sewage Disposal

Performed By: Gordon Rogers

Date: 5-4-0

Witnessed By: Joe Downing

Location Address or Lot # <u>School Ave</u>	Owner's Name, Address, and Telephone # <u>Robert Knight</u> <u>c/o Selectman</u> <u>8 W. Common</u> <u>Topsfield, Ma</u>
New Construction <input type="checkbox"/> Repair <input checked="" type="checkbox"/>	

Office Review

Published Soil Survey Available: No ☐ Yes ☐

Year Published _____ Publication Scale _____ Soil Map Unit _____

Drainage Class _____ Soil Limitations _____

Surficial Geologic Report Available: No ☐ Yes ☐

Year Published _____ Publication Scale _____

Geologic Material (Map Unit) _____

Landform _____

Flood Insurance Rate Map: _____

Above 500 year flood boundary No ☐ Yes ☐

Within 500 year flood boundary No ☐ Yes ☐

Within 100 year flood boundary No ☐ Yes ☐

Wetland Area:

National Wetland Inventory Map (map unit) _____

Wetlands Conservancy Program Map (map unit) _____

Current Water Resource Conditions (USGS): Month

Range :Above Normal ☐ Normal ☐ Below Normal ☐

Other References Reviewed: _____



Location Address or Lot No. School Ave

On-site Review

Deep Hole Number T-5 Date: 5-4-01 Time: _____ Weather: Sunny 90°
 Location (identify on site plan) _____
 Land Use _____ Slope (%) A Surface Stones NO
 Vegetation _____
 Landform _____
 Position on landscape (sketch on the back) _____
 Distances from:
 Open Water Body 7200 feet Drainage way _____ feet
 Possible Wet Area 7200 feet Property Line _____ feet
 Drinking Water Well _____ feet Other _____

DEEP OBSERVATION HOLE LOG*							
Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)		
0-4	A	fsl	10YR 3/3		gr	mfi	
4-54	C ₁	ls	7.5YR 6/6		gr	mfi	
54-120	C ₂	gr-sl	7.5YR 6/6		gr	mfi	

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial till Depth to Bedrock: _____
 Depth to Groundwater: Standing Water in the Hole: NO Weeping from Pit Face: NO
 Estimated Seasonal High Ground Water: 54"



HAYES ENGINEERING, INC.

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FAX (781) 246-7596



FORM 11 - SOIL EVALUATOR FORM

Page 3 of 3



DEP APPROVED FORM - 12/07/95

Location Address or Lot No. SCHOOL AVE
TOPSFIELD, MA

Determination for Seasonal High Water Table

Observation Hole Number: T-5
Method Used: _____

- ☐ Depth observed standing in observation hole _____ inches
☐ Depth weeping from side of observation hole _____ inches
☐ Depth to soil mottles 54 inches
☐ Ground water adjustment _____ feet

Index Well Number _____ Reading Date _____ Index well level _____

Adjustment factor _____ Adjusted ground water level _____

Depth of Naturally Occurring Pervious Material

Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system? NO

If not, what is the depth of naturally occurring pervious material? _____

Certification

I certify that on Nov. 1994 (date) I have passed the soil evaluator examination approved by the Department of Environmental Protection and that the above analysis was performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017

Signature [Signature] Date 5/4/01

DESCRIPTION OF HORIZONS

TEXTURE:

gravel ---g
very coarse sand ---vcos
coarse sand ---cos
sand ---s
fine sand ---fs
very fine sand ---vfa
loamy coarse sand ---lcos
loamy sand ---ls
loamy fine sand ---lfs
sandy loam ---sl
fine sandy loam ---fsl
very fine sandy loam ---vfa

gravelly sandy loam ---gs
loam ---l
gravelly loam ---gl
stony loam ---stl
silt ---sl
silt loam ---sil
clay loam ---cl
silty clay loam ---sicl
sandy clay loam ---scil
stony clay loam ---stcl
silty clay ---scl
clay ---c

STRUCTURE:

Grade: _____
structureless ---0
weak ---1
moderate ---2
strong ---3

Size: _____
very fine ---vf
fine ---f
medium ---m
coarse ---c
very coarse ---vc

Form or Type: _____
platy ---pl
prismatic ---pr
columnar ---cpr
blocky ---bk
angular blocky ---abk
subangular blocky ---sbk
granular ---gr
single grain ---sg
massive ---m

CONSISTENCE:

Net soil: _____
nonsticky ---nso
slightly sticky ---vss
sticky ---ss
very sticky ---vss
nonplastic ---npo
slightly plastic ---mps
plastic ---mp

Moist soil: _____
loose ---al
very friable ---avfr
friable ---afr
firm ---af
very firm ---avf
extremely firm ---maf

Dry soil: _____
loose ---dl
soft ---ds
slightly hard ---dsh
hard ---dh
very hard ---dvh
extremely hard ---deh

MOTTLING:

Abundance: _____
few ---f (0-25%)
common ---c (25-50%)
many ---m (50-100%)

Size: _____
fine ---f
medium ---m
coarse ---c

Contrast: _____
faint ---f
distinct ---d
prominent ---p





Location Address or Lot No.

School Ave

JOB FILE

COMMONWEALTH OF MASSACHUSETTS

Top0205TOPSFIELD, Massachusetts

Percolation Test*

Date: 5-14-01

Time: _____

Observation Hole #	<u>P3</u>	
Depth of Perc	<u>48" / 16" = 64"</u>	
Start Pre-soak	<u>11:17</u>	
End Pre-soak		
Time at 12" <u>Q11"</u>	<u>11:39</u>	
Time at 9" <u>Q</u>	<u>1:09</u>	
Time at 6"	<u>90 min for 2 inches</u>	
Time (9"-6")		
Rate Min./Inch		

* Minimum of 1 percolation test must be performed in both the primary area AND reserve area.

Site Passed ☐Site Failed ☒Abandoned ☐

Performed By:

Gordon Rogerson

Witnessed By:

Joe Downing

Comments: _____





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WAKEFIELD, MA 01880
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FORM 11 - SOIL EVALUATOR FORM
Page 1 of 3

No. T-6

Date: _____

JOB FILE

Topo205

Commonwealth of Massachusetts
TOPSFIELD, Massachusetts

Soil Suitability Assessment for On-site Sewage Disposal

Performed By: Gordon Rogers

Date: 5-4-07

Witnessed By: Joe Downing

Location Address or Lot # <u>School Ave</u>	Owner's Name, Address, and Telephone # <u>Roberta Knight</u> <u>c/o Selectman</u> <u>B.W. Common</u> <u>TOPSFIELD MA</u>
New Construction <input type="checkbox"/> Repair <input checked="" type="checkbox"/>	

Office Review

Published Soil Survey Available: No ☐ Yes ☐

Year Published _____ Publication Scale _____ Soil Map Unit _____

Drainage Class _____ Soil Limitations _____

Surficial Geologic Report Available: No ☐ Yes ☐

Year Published _____ Publication Scale _____

Geologic Material (Map Unit) _____

Landform _____

Flood Insurance Rate Map: _____

Above 500 year flood boundary No ☐ Yes ☐

Within 500 year flood boundary No ☐ Yes ☐

Within 100 year flood boundary No ☐ Yes ☐

Wetland Area:

National Wetland Inventory Map (map unit) _____

Wetlands Conservancy Program Map (map unit) _____

Current Water Resource Conditions (USGS): Month

Range : Above Normal ☐ Normal ☐ Below Normal ☐

Other References Reviewed: _____



Location Address or Lot No. School Ave

On-site Review

Deep Hole Number T-6 Date: 5-4-01 Time: _____ Weather: Sunny 90°

Location (identify on site plan) _____

Land Use _____ Slope (%) A Surface Stones NO

Vegetation _____

Landform _____

Position on landscape (sketch on the back)

Distances from:

Open Water Body 7200 feet

Drainage way _____ feet

Possible Wet Area 7400 feet

Property Line _____ feet

Drinking Water Well _____ feet

Other _____

DEEP OBSERVATION HOLE LOG*

Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)		
0-18	A	fsl	10YR 3/3		gr	mf	0/40
18-68	C ₁	ls	7.5YR 6/6		gl	mf	20/0/0
68-120	C ₂	grsl	7.5YR 6/6		gr	mf	10/0/50

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial till Depth to Bedrock: NO

Depth to Groundwater: Standing Water in the Hole: NO Weeping from Pit Face: NO

Estimated Seasonal High Ground Water: 68"





Location Address or Lot No.

SCHOOL AVETOPSFIELD, MADetermination for Seasonal High Water Table

Observation Hole Number: _____

Method Used: _____

- ☐ Depth observed standing in observation hole _____ inches
☐ Depth weeping from side of observation hole _____ inches
☐ Depth to soil mottles, 68 inches
☐ Ground water adjustment _____ feet

Index Well Number _____

Reading Date _____

Index well level _____

Adjustment factor _____

Adjusted ground water level _____

Depth of Naturally Occurring Pervious Material

Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system? NO

If not, what is the depth of naturally occurring pervious material? _____

Certification

I certify that on Nov. 1994 (date) I have passed the soil evaluator examination approved by the Department of Environmental Protection and that the above analysis was performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017.

Signature [Signature]Date 5/4/01DESCRIPTION OF HORIZONSTEXTURE:

gravel ---g
 very coarse sand ---vcos
 coarse sand ---cos
 sand ---s
 fine sand ---fs
 very fine sand ---vfe
 loamy coarse sand ---lcos
 loamy sand ---ls
 loamy fine sand ---lfs
 sandy loam ---sl
 fine sandy loam ---fsl
 very fine sandy loam ---vfe1

gravelly sandy loam ---gs1
 loam ---l
 gravelly loam ---gl
 stony loam ---stl
 silt ---sl
 silt loam ---sl1
 clay loam ---cl
 silty clay loam ---scl1
 sandy clay loam ---scl
 stony clay loam ---stcl1
 silty clay ---scl
 clay ---c

STRUCTURE:

Grade:
 structureless ---0
 weak ---1
 moderate ---2
 strong ---3

Size:
 very fine ---vf
 fine ---f
 medium ---m
 coarse ---c
 very coarse ---vc

Form or Type:
 platy ---pl
 prismatic ---pr
 columnar ---cpr
 blocky ---bk
 angular blocky ---abk
 subangular blocky ---sbk
 granular ---gr
 single grain ---sg
 massive ---m

CONSISTENCE:

Wet soil:
 nonsticky ---nso
 slightly sticky ---ss
 sticky ---s
 very sticky ---vs
 nonplastic ---nps
 slightly plastic ---sp
 plastic ---p

Moist soil:
 loose ---ml
 very friable ---mvfr
 friable ---fr
 firm ---fl
 very firm ---vfl
 extremely firm ---mfl

Dry soil:
 loose ---dl
 soft ---ds
 slightly hard ---dsh
 hard ---dh
 very hard ---dvh
 extremely hard ---deh

MOTTLING:

Abundance:
 few ---f (0-25%)
 common ---c (25-50%)
 many ---m (50-100%)

Size:
 fine ---f
 medium ---m
 coarse ---c

Contrast:
 faint ---f
 distinct ---d
 prominent ---p

HOUSE

FIRE
STATION

N

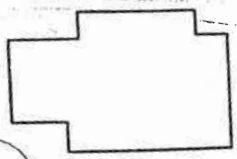
T-5
T-6
P-3

F1
T-3
P-1

T-2

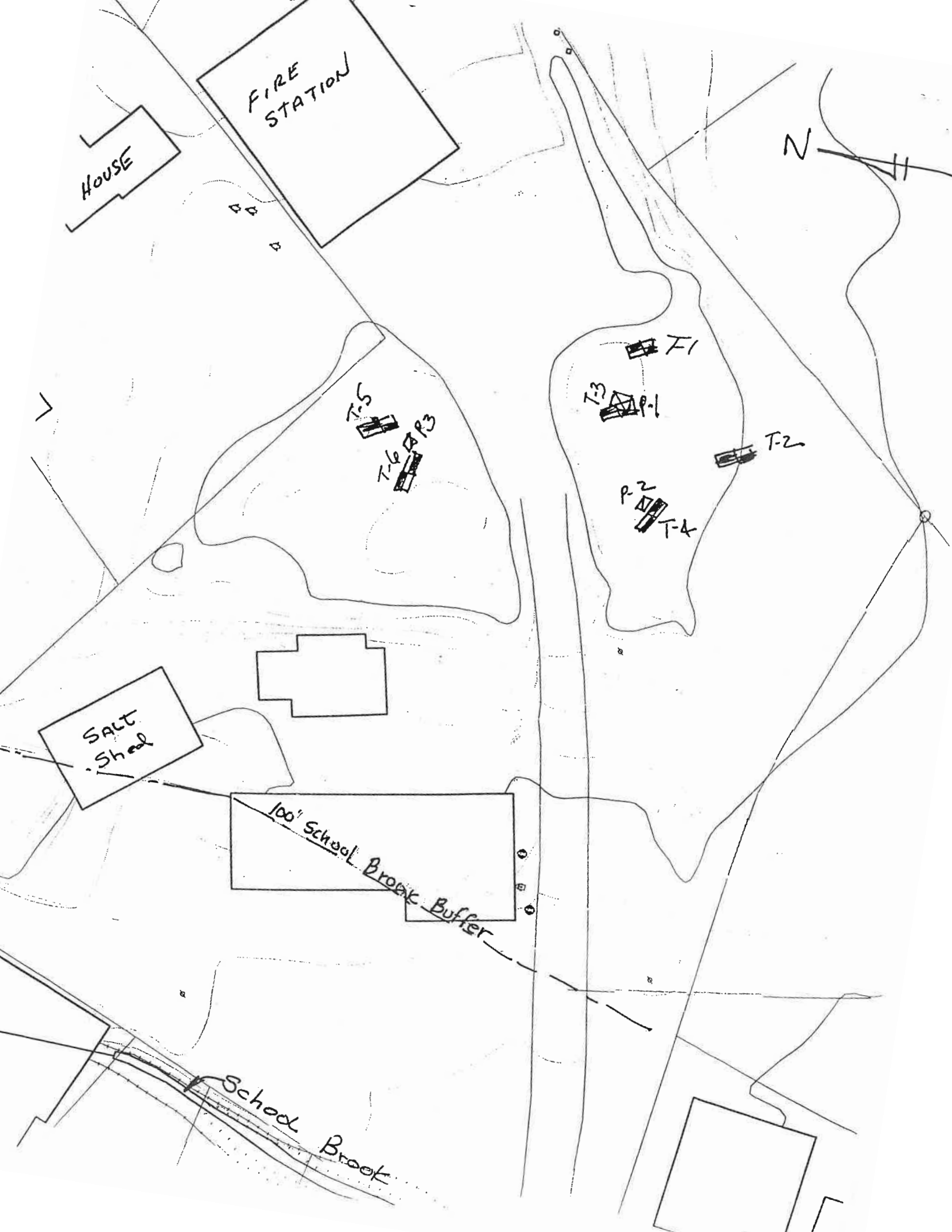
P-2
T-4

SALT
Shed



100' School Brook Buffer

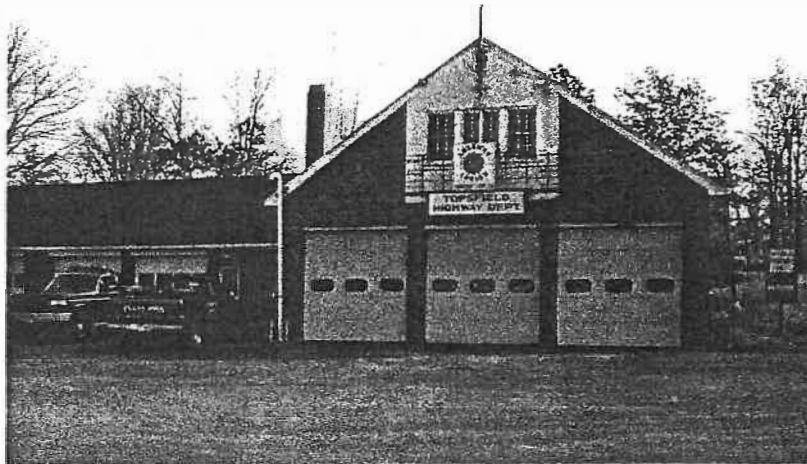
School Brook



Appendix D

LIMITED SUBSURFACE INVESTIGATION REPORT

**FORMER HIGHWAY DEPARTMENT GARAGE
INJECTION WELL AREA**



Picture of the Former Highway Department Garage w/ Floor Drain

Prepared for:
Mr. David Bond, Highway Superintendent
Town of Topsfield
Department of Public Works
279 Boston Street
Topsfield, MA 01983

CSE Project No. 2000.34

January 3, 2001

Oil & Hazardous Waste Assessment & Cleanup Professionals

POST OFFICE BOX 591, IPSWICH, MA 01938

Voice: 978.356.1177 Fax: 978.356.1849 E-mail: info@cleansoils.com Web site: <http://www.cleansoils.com>

1.0 INTRODUCTION

Clean Soils Environmental, Ltd. (CSE) is pleased to submit this report to the Town of Topsfield (the "Client") concerning the results of a Limited Subsurface Investigation (Investigation) conducted during the months of November and December 2000 at the former Topsfield Highway Department maintenance garage on School Avenue in Topsfield, hereafter referred to as the "Property".

The area of the Property impacted by contamination (discussed below) will hereafter be referred to as the "Disposal Site." The approximate location of the Disposal Site is shown on Figure 1 in Appendix A. The investigation was associated with the closure of a Class V injection well located in front of the garage, adjacent to the School Brook. This injection well served as the discharge for one floor drain located inside the garage. The injection well system includes one floor drain, oil/water separator, cesspool, and vent according to Mr. David Bond, Highway Superintendent. The approximate location of the injection well system is shown on Figure 1 in Appendix A. Photographs 1, 3, and 4 in Appendix E show the locations of the floor drain, oil/water separator, and injection well at the Property.

CSE was informed by Mr. Bond that the floor drain and the oil/water separator both have concrete walls and a floor. Therefore, contamination entering the floor drain can only discharge to the environment via the injection well (cesspool). Thus, this investigation focused on the area in the vicinity of the injection well.

2.0 BACKGROUND

On October 29, 1999, the Department of Environmental Protection (DEP) conducted a compliance audit at the Property. On December 7, 1999, DEP issued a Notice of Noncompliance (NON) for violations of 310 CMR 30.00 (Hazardous Waste regulations) and 310 CMR 27.00 (Industrial Wastewater regulations). A copy of the NON is provided in Appendix F. CSE understands that the Hazardous Waste issues have been resolved while the Industrial Wastewater issue has not. The remaining Industrial Wastewater

issue concerns one injection well, referred to in the NON as a "cesspool", which is connected to a floor drain inside the garage via an oil/water separator. According to 310 CMR 27.05, the cesspool constitutes a Class V injection well. According to 310 CMR 27.04, the Class V injection well at the Property is prohibited and therefore must be closed. Since the Topsfield Highway Department has been in the process of relocating from this garage to another facility, CSE understands that the DEP has extended the Town's compliance deadlines. The location of the floor drain, oil/water separator and injection well at the Property are shown on Figure 1 in Appendix A.

A DEP Site Scoring Map showing sensitive environmental areas in the vicinity of the injection well is provided as Figure 2 in Appendix A. In addition, Mr. Bond informed CSE that the Property is not located within a Zone I, II, or III of the Town Drinking Water Supply. Furthermore, Mr. Bond informed CSE that School Brook is not a tributary to a Class A Surface Water Body. Therefore, CSE has determined based on this information that groundwater in the area of the Property is not used for drinking water.

On November 7, 2000, CSE visited the Property to observe the floor drain system that included an oil/water separator and a Class V injection well. The floor drain is no longer in use, and CSE was informed that the walls and bottom of the floor drain and the oil/water separator are tight concrete subsurface containers and thus are not themselves injection wells. The oil/water separator has been cleaned out and the pipe leading to the Class V injection well has been sealed, according to Mr. Bond.

The close proximity of School Brook (a perennial stream located approximately 45 feet downgradient from the injection well) suggested that the water table was shallow in the area of the injection well. If significant contamination had entered the injection well and was subsequently discharged to the environment, it would have likely impacted soil and groundwater in the vicinity of the injection well and may have reached School Brook.

CSE therefore conducted an investigation of soil and groundwater in the immediate vicinity and downgradient of the injection well. The purpose of this limited subsurface investigation was to determine if a DEP Reportable Condition existed at this portion of

the Property. The investigation was conducted under the approval of the Topsfield Conservation Commission via Emergency Certification. A copy of this Emergency Certification is included in Appendix F.

3.0 LIMITED SUBSURFACE SITE INVESTIGATION

The limited subsurface investigation included the advancement of soil borings, collection of soil samples for field screening and laboratory analysis, installation/development of groundwater monitoring wells, collection of groundwater samples, and laboratory analysis of collected groundwater. The main purpose of this investigation was to determine if the discharge from the floor drain significantly contaminated soil and/or groundwater in the vicinity of the injection well shown on Figure 1 in Appendix A.

3.1 *Advancement Of Soil Borings*

On November 30, 2000, Soil Exploration Corp. of Leominster, MA, under the direction and oversight of CSE, advanced eight soil borings (identified as B1 through B8) via Direct Push Drilling Technology at the Property.

All soil borings were advanced to a maximum depth of 11 feet below the ground surface except for soil boring B1, which was advanced to 14 feet below the ground surface.

The locations of all borings at the Property are shown on Figure 1 in Appendix A.

3.2 *Collection Of Soil Samples For Field Screening Analysis*

On November 30, 2000, CSE collected 37 soil samples at the Property. These soil samples were collected at 2-foot intervals continuously from each soil boring (soil borings B1 – B8) as it was advanced. These soil samples were screened for Total Organic Vapors (TOV) with a Photoionization Detector (PID) using the Headspace Screening Procedure enclosed in Appendix F. TOV readings ranged from 0.0 – 2.0 parts per million by volume (ppmv). The majority of the TOV readings were 0 ppmv.

The headspace screening results are shown on Table 1 in Appendix B. The PID results also appear in the field boring logs provided in Appendix C.

3.3 Collection Of Soil Samples For Laboratory Analysis

On November 30, 2000, CSE collected three soil samples (i.e., one soil sample from soil borings B1, B6, and B8) for laboratory analysis. The soil sample collected from B1, closest to and downgradient of the injection well, was analyzed for Volatile Petroleum Hydrocarbons (VPH), Extractable Petroleum Hydrocarbons (EPH) fractions with target analytes, RCRA-8 Metals, Volatile Organic Compounds (VOCs), and Polychlorinated Biphenyls (PCBs). The gravel (believed to be fill) at soil boring B2 was too loose to obtain a sufficient sample. Therefore, a soil sample for laboratory analysis was collected from soil boring B8 instead. A soil sample was also collected from soil boring B6 to evaluate the downgradient migration of contamination toward School Brook from the injection well. The results of the field headspace screening indicated that significant TOVs were not present in the soil obtained from soil boring B6 and B8. Therefore, these samples were only analyzed for EPH, VOCs, and RCRA-8 Metals. Laboratory analyses were conducted by Groundwater Analytical Laboratories of Buzzards Bay, MA.

Please see Table 1 in Appendix B for the analysis performed on each sample and Table 2 in Appendix B for the corresponding tabulated laboratory soil results. Photographs 5 and 6 taken during the Investigation are provided in Appendix E and show the soil from 3 to 7 feet below the ground surface collected from soil borings B4 and B6.

3.4 Installation And Sampling Of Small Diameter Monitoring Wells

On November 30, 2000, soil borings B1, B5, and B7 were converted to 3/4-inch inner-diameter monitoring wells identified as MW1, MW2, and MW3, respectively. Monitoring well MW1 was installed directly next to and downgradient from the injection well. Monitoring wells MW2 and MW3 were installed to assess groundwater downgradient of the injection well.

Monitoring wells were installed by Soil Exploration, a Massachusetts Certified Well Driller. The monitoring wells were constructed of 0.010-inch machine slotted, small-diameter PVC well screen and solid PVC riser. The top and bottom of the well screen was installed approximately 5 feet above and 5 feet below the water table, respectively. The water table was approximately 5 feet below the ground surface in the area of the injection well. The annular space around the screen was filled with #2 sand to at least one foot above the well screen. A watertight locking road box was installed at each monitoring well location. A concrete seal was installed around the road box to complete the installation of each monitoring well. Figure 1 in Appendix A shows the locations of these three monitoring wells at the Property.

3.5 Development Of Monitoring Wells

On November 30, 2000, CSE developed the three monitoring by removing at least three well volumes of groundwater from each monitoring well. The purpose of this well development was to remove silt and to enhance the hydraulic connection between the well screen, filter pack, and the aquifer.

CSE used a peristaltic pump with dedicated tubing to remove the groundwater from monitoring wells MW1, MW2, and MW3.

3.6 Collection Of Groundwater Samples From The Monitoring Wells for Laboratory Analysis

On December 6, 2000, CSE collected a total of three groundwater samples (identified as MW1, MW2 and MW3), one from each of the three monitoring well at the Property.

CSE used a battery-operated peristaltic pump and dedicated HDPE tubing to purge three well volumes from the monitoring wells. The purging was conducted to remove stagnant groundwater from the monitoring wells prior to sampling.

Following purging, CSE collected a groundwater sample from each monitoring well. The groundwater samples were collected in laboratory grade sample bottles

using a peristaltic pump and dedicated tubing. The purged groundwater from each monitoring well was discharged back into the monitoring well from which it was purged following sample collection.

Evidence of contamination (i.e., petroleum sheen or odors) was not observed on the groundwater during sampling. Therefore, it is unlikely that significant VPH parameters are present in the groundwater at the Property, and therefore VPH analysis was not conducted on the groundwater samples. However, the three groundwater samples were analyzed for EPH, VOCs, and Total RCRA-8 Metals. The groundwater samples were collected without filtering and analyzed for Total RCRA-8 Metals as a conservative measure.

It should be noted that VPH target analytes are also included in the VOCs target compound list. Groundwater analyses were conducted by Groundwater Analytical Laboratories of Buzzards Bay, MA. Please see Table 3 in Appendix B for a summary of the groundwater analytical results. Copies of the Laboratory reports are provided in Appendix D.

3.7 Collection Of An Additional Groundwater Sample From Monitoring Well MW1 For Laboratory Analysis

In accordance with 310 CMR 40.0317(14) groundwater may be re-sampled if the sampling procedure employed did not accurately characterize site conditions. In this case, the Total RCRA-8 Metals analysis conducted on the unfiltered groundwater sample collected on December 6, 2000 from monitoring well MW1 did not accurately characterize the concentrations of metals *dissolved* in the groundwater at the Property.

Therefore, on December 15, 2000, an additional groundwater sample was collected from monitoring well MW1 using the method described in Section 3.6 of this report. However, unlike the groundwater sample collected on December 6, 2000 from monitoring well MW1, this groundwater sample was filtered in the field to remove excess sediment and was analyzed for *dissolved* rather than *total* RCRA-8 Metals. The Dissolved RCRA-8 Metals analysis accurately identifies

the concentrations of metals actually dissolved in the groundwater, which can migrate off-site.

The Total RCRA-8 Metals analysis conducted on groundwater collected from MW1 on December 6, 2000 indicated that a DEP 120-day reportable condition might be present in groundwater at the Property due to elevated concentrations of total lead. However, according to 310 CMR 40.0362(1), the DEP 120-day reportable conditions for groundwater are based on *dissolved* (rather than total) concentrations of contaminants in groundwater. Therefore, the results from the Dissolved RCRA-8 Metals analysis on groundwater collected from monitoring well MW1 on December 15, 2000 demonstrate that there is not a 120-day reportable condition for any of the 8 metals included in the Dissolved RCRA-8 Metals analysis. This analysis was also conducted by Groundwater Analytical Laboratories of Buzzards Bay, MA. Please see Table 3 in Appendix B for a summary of the groundwater analytical results. Copies of the Laboratory reports are provided in Appendix D.

4.0 DISPOSAL SITE

The investigation determined that the Disposal Site is relatively small as compared to what was assumed in CSE's proposal for this project. The Disposal Site was determined by this investigation to be localized in the immediate vicinity of the injection well. Therefore, the Disposal Site does not include School Brook as originally assumed. The location and approximate size of the Disposal Site is shown on Figure 1 in Appendix A.

A thin layer of impacted soil (approximately 4 inches thick and dark brown) was noted in the immediate vicinity of the injection well (see Photographs 5 and 6 in Appendix E). This layer of impacted soil was encountered at a depth of approximately 5 feet below the ground surface, which corresponds to the approximate depth of the water table. CSE did not note a petroleum odor on this impacted layer, but a septic odor was noted. All jar-headspace field screening results conducted on this impacted layer of soil were below 10 ppmv.

The investigation also determined that groundwater is not part of the Disposal Site and that groundwater has not been significantly impacted.

5.0 DEPARTMENT OF ENVIRONMENTAL PROTECTION REPORTABLE CONDITION

CSE tabulated the laboratory soil and groundwater data on Tables 2 and 3 in Appendix B and compared the results to their applicable DEP Reportable Concentrations in accordance with 310 CMR 40.1600. The RCS-1 Reportable Concentrations for soil apply because the release area is within 500 feet of a residence. Since the Disposal Site is not a potential drinking water source, according to the Town of Topsfield and Figure 2 (i.e., GIS Map), the RCGW-2 Reportable Concentrations for groundwater apply.

Although the concentrations of contaminants present in the vicinity of the injection well were lower than what might be expected, there were two exceedances of the DEP RCS-1 Reportable Concentrations. The concentration of the C₁₁-C₂₂ aromatic EPH fraction detected in soil from soil boring B1, 210 milligrams per kilogram (mg/kg), exceeded the RCS-1 Reportable Concentration of 200 mg/kg. The arsenic concentration in soil of 32 mg/kg from soil boring B6 also exceeded the RCS-1 Reportable Concentration of 30 mg/kg.

The above mentioned data indicates that a DEP 120-day reportable condition was discovered at the Property according to DEP regulations 310 CMR 40.0361. Therefore, notification to the DEP will be required within 120 days from December 15, 2000 (the time of knowledge of the reportable condition) unless the Town of Topsfield conducts a Limited Removal Action (LRA) according to 310 CMR 40.0318 before such time.

6.0 LIMITED REMOVAL ACTION

In this case, an LRA would include the excavation, removal, and disposal of the impacted soil. CSE would anticipate the excavation and removal of approximately 5 to 10 tons of contaminated soil. Removal of groundwater would also likely be required since the

contaminated soil is in the vicinity of the water table. At this time, CSE would propose re-injecting the groundwater back into the ground after completing the LRA.

However, CSE understands that the Town of Topsfield would like to leave the contamination in-place, if possible, without conducting an LRA. Therefore, CSE has prepared the following recommendations (see Section 8.0) to attempt to achieve this goal.

7.0 LICENSED SITE PROFESSIONAL OPINION

The investigation determined that a 120-day reportable condition for soil exists at the Property in the immediate vicinity of the injection well. The concentration of the C₁₁-C₂₂ aromatic EPH fraction at soil boring B1 of 210 mg/kg exceeds the applicable DEP 120-day Reportable Concentration of 200 mg/kg, and the arsenic concentration at soil boring B6 of 32 mg/kg exceeds the Reportable Concentration of 30 mg/kg. However, a reportable condition for groundwater was not discovered at the Property.

Furthermore, the Disposal Site is relatively small both horizontally and vertically which may indicate that the oil/water separator for the floor drain system was functioning as designed and pretreated the industrial wastewater from the floor drain before being injected into the ground via the injection well.

Nevertheless, the above data indicates that written notification must be filed with the DEP's Northeast Regional Office by April 14, 2001. However, no notification to DEP is required if the Disposal Site is cleaned up under an LRA, according to 310 CMR 40.0318, prior to April 14, 2001. DEP designed LRAs to clean up small reportable releases that impacted soil only. LRAs cannot be used if a reportable condition exists in groundwater.

However, since the concentration of contamination at the Property is relatively low (just above the DEP Reportable Concentrations), CSE will make the following recommendations to attempt to close this case without conducting an LRA or any excavation at the Property.

8.0 RECOMMENDATIONS

Additional work will be required to address the 120-Day reportable condition at the Property. This additional work will include limited additional assessment of soil at the bottom of the injection well. The outcome of this recommended work will be used to make a final determination if the contaminated soil can stay in-place without conducting an LRA to remove the reportable condition according to 310 CMR 40.0318. This recommendation is being made since CSE believes that the Town of Topsfield would prefer to leave the contamination in-place, if possible. Therefore, the additional testing of soil at the bottom of the injection well and the evaluation of all of the data using a Method 1 Risk Characterization according to 310 CMR 40.0900 may determine that the contaminated soil can stay in-place without conducting an LRA.

However, notification to DEP will still be required and the preparation and submittal of a Class B-1 Response Action Outcome (RAO) Statement (i.e. Closure Report) would still be required if all goes well with this approach.

\$1700- The following recommendations include a strategy to conduct some limited additional testing to make a final determination on how to proceed with the closure of the injection well

1. As soon as possible (i.e., by January 15, 2001) collect one additional soil sample with a Hand Auger from the bottom of the injection well.
2. Laboratory analyze this soil sample for TOVs, EPH, VPH, VOCs, RCRA-8 Metals, and PCBs. This recommendation assumes that all of the sludge in the bottom of the injection well is removed giving CSE easy access the soil in the bottom of the injection well.
3. Conduct a Method 1 Risk Characterization to compare the average concentrations (i.e., the Exposure Point Concentration) in soil to the DEP Method 1 Risk Characterization Cleanup Standards, and

4. Prepare a letter report with the results of this additional proposed work at the Property. At this point, a final recommendation will be made to determine if the contaminated soil can be left in-place. It is possible, however, that the results of additional analysis from the bottom of the injection well are such that the Disposal Site cannot be closed without some form of remediation or cleanup.

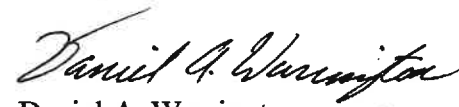
It is CSE's hope that the average concentration of soil contamination will allow the Town to leave the contaminated soil in-place. CSE is relatively confident that if the levels of petroleum and arsenic contamination in soil at the bottom of the injection well are not significantly elevated, the goal to attempt to close this case and the injection well will be achievable without conducting an LRA.

\$1700 { At your request, CSE will be happy to prepare an additional proposal to conduct the above recommendations.

If you have any questions, please do not hesitate to call.

Respectfully submitted,
CLEAN SOILS ENVIRONMENTAL, LTD.


William H. Mitchell, Jr., LSP
President


Daniel A. Warrington
Environmental Engineer

Appendix E

March 9, 2000

Ms. Amy Brewer, Data Entry Group
Department of Environmental Protection (DEP)
Bureau of Waste Site Cleanup
205 Lowell Street
Wilmington, MA 01887

Re: **Class B-1 Response Action Outcome Statement**
Former Town of Topsfield Highway Department Garage
10 School Avenue
Topsfield, MA 01983
DEP RTN Not Yet Assigned 3-20554
CSE Project No. 2000.34

Dear Ms. Brewer:

Clean Soils Environmental, Ltd. (CSE) is pleased to submit this Class B-1 Response Action Outcome (RAO) Statement regarding the above-referenced property. The following are enclosed:

- Release Notification Form (RNF) Transmittal Form (BWSC- 103),
- RAO Submittal Form (BWSC-104), and
- Class B-1 RAO Statement (Written Report)

CSE has enclosed the original BWSC Transmittal Forms with original signature(s) in the attached plastic liner immediately following this cover letter for your administrative review. Therefore, please do not administratively review any other BWSC Transmittal Forms that could be attached to this submittal. Since this RAO is being submitted less than 120 days from Notification, the \$750.00 RAO filing fee is not required.

Respectfully submitted,
CLEAN SOILS ENVIRONMENTAL, LTD.



William H. Mitchell, Jr., LSP
President/Geologist



Daniel A. Warrington
Environmental Engineer

cc: Mr. David Bond, Town of Topsfield Highway Superintendent

Oil & Hazardous Waste Assessment & Cleanup Professionals

POST OFFICE BOX 591, IPSWICH, MA 01938

Voice: 978.356.1177 Fax: 978.356.1849 E-mail: info@cleansoils.com Web site: http://www.cleansoils.com

COPY *DS*



Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC-104

**RESPONSE ACTION OUTCOME (RAO) STATEMENT &
DOWNGRADIANT PROPERTY STATUS TRANSMITTAL FORM**
Pursuant to 310 CMR 40.0180 (Subpart B), 40.0580 (Subpart E) & 40.1056 (Subpart J)

Release Tracking Number

3 - 20554

A. SITE OR DOWNGRADIANT PROPERTY LOCATION:

Site Name: (optional) _____
Street: 10 School Avenue Location Aid: Former Highway Dept. Garage
City/Town: Topsfield ZIP Code: 01983

☐ Check here if this Site location is Tier Classified. If a Tier I Permit has been issued, state the Permit Number: _____

Related Release Tracking Numbers that this Form Addresses: _____

If submitting an RAO Statement, you must document the location of the Site or the location and boundaries of the Disposal Site subject to this Statement. If submitting an RAO Statement for a PORTION of a Disposal Site, you must document the location and boundaries for both the portion subject to this submittal and, to the extent defined, the entire Disposal Site. If submitting a Downgradient Property Status Submittal, you must provide a site plan of the property subject to the submittal and, to the extent defined, the Disposal Site.

B. THIS FORM IS BEING USED TO: (check all that apply)

☒ Submit a Response Action Outcome (RAO) Statement (complete Sections A, B, C, D, E, F, H, I, J and L).

☐ Check here if this is a revised RAO Statement. Date of Prior Submittal: _____

☐ Check here if any Response Actions remain to be taken to address conditions associated with any of the Releases whose Release Tracking Numbers are listed above. This RAO Statement will record only an RAO-Partial Statement for those Release Tracking Numbers.

Specify Affected Release Tracking Numbers: _____

☐ Submit an optional Phase I Completion Statement supporting an RAO Statement or Downgradient Property Status Submittal (complete Sections A, B, H, I, J, and L).

☐ Submit a Downgradient Property Status Submittal (complete Sections A, B, G, H, I, J and K).

☐ Check here if this is a revised Downgradient Property Status Submittal. Date of Prior Submittal: _____

☐ Submit a Termination of a Downgradient Property Status Submittal (complete Sections A, B, I, J and L).

☐ Submit a Periodic Review Opinion evaluating the status of a Temporary Solution (complete Sections A, B, H, I, J and L).

Specify one: ☐ For a Class C RAO ☐ For a Waiver Completion Statement indicating a Temporary Solution

Provide Submittal Date of RAO Statement or Waiver Completion Statement: _____

You must attach all supporting documentation required for each use of form indicated, including copies of any Legal Notices and Notices to Public Officials required by 310 CMR 40.1400.

C. DESCRIPTION OF RESPONSE ACTIONS: (check all that apply)

☒ Assessment and/or Monitoring Only

☐ Removal of Contaminated Soils

☐ Re-use, Recycling or Treatment

☐ On Site ☐ Off Site Est. Vol.: _____ cubic yards

Describe: _____

☐ Landfill ☐ Cover ☐ Disposal Est. Vol.: _____ cubic yards

☐ Removal of Drums, Tanks or Containers

Describe: _____

☐ Removal of Other Contaminated Media

Specify Type and Volume: _____

☐ Other Response Actions

Describe: _____

☐ Deployment of Absorbent or Contaminant Materials

☐ Temporary Covers or Caps

☐ Bioremediation

☐ Soil Vapor Extraction

☐ Structure Venting System

☐ Product or NAPL Recovery

☐ Groundwater Treatment Systems

☐ Air Sparging

☐ Temporary Water Supplies

☐ Temporary Evacuation or Relocation of Residents

☐ Fencing and Sign Posting

RECEIVED

MAR 26 2001

**DEP
NORTHEAST REGIONAL OFFICE**

SECTION C IS CONTINUED ON THE NEXT PAGE.

COPY



Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC-104

**RESPONSE ACTION OUTCOME (RAO) STATEMENT &
 DOWNGRADE PROPERTY STATUS TRANSMITTAL FORM**

Pursuant to 310 CMR 40.0180 (Subpart B), 40.0580 (Subpart E) & 40.1056 (Subpart J)

Release Tracking Number

3 - 20554

C. DESCRIPTION OF RESPONSE ACTIONS: (continued)

- ☐ Check here if any Response Action(s) that serve as the basis for this RAO Statement involve the use of Innovative Technologies. (DEP is interested in using this information to create an Innovative Technologies Clearinghouse.)

Describe Technologies: _____

D. TRANSPORT OF REMEDIATION WASTE: (if Remediation Waste was sent to an off-site facility, answer the following questions)

Name of Facility: _____

Town and State: _____

Quantity of Remediation Waste Transported to Date: _____

E. RESPONSE ACTION OUTCOME CLASS:Specify the Class of Response Action Outcome that applies to the Site or Disposal Site. Select **ONLY** one Class:

- ☐ Class A-1 RAO: Specify one of the following:

☐ Contamination has been reduced to background levels. ☐ A Threat of Release has been eliminated.

- ☐ Class A-2 RAO: You **MUST** provide justification that reducing contamination to background levels is infeasible.

- ☐ Class A-3 RAO: You **MUST** provide both an implemented Activity and Use Limitation (AUL) and justification that reducing contamination to background levels is infeasible.

If applicable, provide the earlier of the AUL expiration date or date the design life of the remedy will end: _____

- ☒ Class B-1 RAO: Specify one of the following:

☐ Contamination is consistent with background levels ☒ Contamination is **NOT** consistent with background levels.

- ☐ Class B-2 RAO: You **MUST** provide an implemented AUL.

If applicable, provide the AUL expiration date: _____

- ☐ Class C RAO: ☐ Check here if you will conduct post-RAO Operation, Maintenance and Monitoring at the Site.

Specify One: ☐ Passive Operation and Maintenance ☐ Monitoring Only☐ Active Operation and Maintenance (defined at 310 CMR 40.0006)**F. RESPONSE ACTION OUTCOME INFORMATION:**

- ☐ If an RAO Compliance Fee is required, check here to certify that the fee has been submitted. You **MUST** attach a photocopy of the payment.

- ☐ Check here if submitting one or more AULs. You must attach an AUL Transmittal Form (BWSC-113) and a copy of each implemented AUL related to this RAO Statement. Specify the type of AUL(s) below: (required for all Class A-3 RAOs and Class B-2 RAOs)

☐ Notice of Activity and Use Limitation☐ Grant of Environmental Restriction

Number of AULs attached: _____

Specify the Risk Characterization Method(s) used to achieve the RAO described above and all Soil and Groundwater Categories applicable to the Site.

More than one Soil Category and more than one Groundwater Category may apply at a Site.

Be sure to check off all APPLICABLE categories, even if more stringent soil and groundwater standards were met.

Risk Characterization Method(s) Used:

☒ Method 1☐ Method 2☐ Method 3

Soil Category(ies) Applicable:

☐ S-1☐ S-2☒ S-3

Groundwater Category(ies) Applicable:

☐ GW-1☐ GW-2☒ GW-3

> When submitting any Class A-1 RAO or a Class B-1 RAO where contamination is consistent with background levels, do **NOT** specify a Risk Characterization Method.

> When submitting any Class A-2 RAO or a Class B-1 RAO where contamination is **NOT** consistent with background levels, you cannot use an AUL to maintain a level of no significant risk. Therefore, you must meet S-1 Soil Standards, if using Risk Characterization Method 1.



Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC-104

**RESPONSE ACTION OUTCOME (RAO) STATEMENT &
 DOWNGRADIANT PROPERTY STATUS TRANSMITTAL FORM**

Pursuant to 310 CMR 40.0180 (Subpart B), 40.0580 (Subpart E) & 40.1056 (Subpart J)

Release Tracking Number

3-20554

G. DOWNGRADIANT PROPERTY STATUS SUBMITTAL:

- ☐ If a Downgradient Property Status Submittal Compliance Fee is required, check here to certify that the fee has been submitted. You **MUST** attach a photocopy of the payment.
- ☐ Check here if a Release(s) of Oil or Hazardous Material(s), other than that which is the subject of this submittal, has occurred at this property.
- Release Tracking Number(s): _____
- ☐ Check here if the Releases identified above require further Response Actions pursuant to 310 CMR 40.0000.

Required documentation for a Downgradient Property Status Submittal includes, but is not limited to, copies of notices provided to owners and operators of both upgradient and downgradient abutting properties and of any known or suspected source properties.

H. LSP OPINION:

I attest under the pains and penalties of perjury that I have personally examined and am familiar with this transmittal form, including any and all documents accompanying this submittal. In my professional opinion and judgment based upon application of (i) the standard of care in 309 CMR 4.02(1), (ii) the applicable provisions of 309 CMR 4.02(2) and (3), and (iii) the provisions of 309 CMR 4.03(5), to the best of my knowledge, information and belief,

> if Section B indicates that a **Downgradient Property Status Submittal** is being provided, the response action(s) that is (are) the subject of this submittal (i) has (have) been developed and implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in 310 CMR 40.0183(2)(b), and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal;

> if Section B indicates that either an **RAO Statement, Phase I Completion Statement and/or Periodic Review Opinion** is being provided, the response action(s) that is (are) the subject of this submittal (i) has (have) been developed and implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal.

I am aware that significant penalties may result, including, but not limited to, possible fines and imprisonment, if I submit information which I know to be false, inaccurate or materially incomplete.

- ☒ Check here if the Response Action(s) on which this opinion is based, if any, are (were) subject to any order(s), permit(s) and/or approval(s) issued by DEP or EPA. If the box is checked, you **MUST** attach a statement identifying the applicable provisions thereof.

LSP Name: William H. Mitchell, Jr. LSP #: 1965 Stamp: _____
 Telephone: (978) 356-1177 Ext.: _____
 FAX: (optional) (978) 356-1849
 Signature: [Signature]
 Date: 3/9/01

SEE APPENDIX
 for



NON
 NE-99-9166-
 2A

I. PERSON MAKING SUBMITTAL:

Name of Organization: Town of Topsfield Highway Department
 Name of Contact: David Bond Title: Highway Superintendent
 Street: 279 Boston Street
 City/Town: Topsfield State: MA ZIP Code: 01983
 Telephone: (978) 887-1542 Ext.: _____ FAX: (optional) (978) 887-1543

J. RELATIONSHIP TO SITE OF PERSON MAKING SUBMITTAL: (check one)

☒ RP or PRP Specify: ☒ Owner ☐ Operator ☐ Generator ☐ Transporter Other RP or PRP: _____

☐ Fiduciary, Secured Lender or Municipality with Exempt Status (as defined by M.G.L. c. 21E, s. 2)

☐ Agency or Public Utility on a Right of Way (as defined by M.G.L. c. 21E, s. 5(j))

☐ Any Other Person Submitting This Form Specify Relationship: _____



Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup

BWSC-104

**RESPONSE ACTION OUTCOME (RAO) STATEMENT &
 DOWNGRAIDENT PROPERTY STATUS TRANSMITTAL FORM**

Pursuant to 310 CMR 40.0180 (Subpart B), 40.0580 (Subpart E) & 40.1056 (Subpart J)

Release Tracking Number

3 - 20554

K. CERTIFICATION OF PERSON SUBMITTING DOWNGRAIDENT PROPERTY STATUS SUBMITTAL:

I, _____, attest under the pains and penalties of perjury (i) that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this transmittal form; (ii) that, based on my inquiry of the/those individual(s) immediately responsible for obtaining the information, the material information contained herein is, to the best of my knowledge, information and belief, true, accurate and complete; (iii) that, to the best of my knowledge, information and belief, the person(s) or entity(ies) on whose behalf this submittal is made satisfy(ies) the criteria in 310 CMR 40.0183(2); (iv) that the person(s) or entity(ies) on whose behalf this submittal is made have provided notice in accordance with 310 CMR 40.0183(5); and (v) that I am fully authorized to make this attestation on behalf of the person(s) or entity(ies) legally responsible for this submittal. The person(s) or entity(ies) on whose behalf this submittal is made is/are aware that there are significant penalties, including, but not limited to, possible fines and imprisonment, for willfully submitting false, inaccurate, or incomplete information.

By: _____ Title: _____
 (signature)

For: _____ Date: _____
 (print name of person or entity recorded in Section I)

Enter address of the person providing certification, if different from address recorded in Section I:

Street: _____

City/Town: _____ State: _____ ZIP Code: _____

Telephone: _____ Ext.: _____ FAX: (optional) _____

L. CERTIFICATION OF PERSON MAKING SUBMITTAL:

If you are completing only a Downgradient Property Status Submittal, you do not need to complete this section of the form.

I, David Bond, attest under the pains and penalties of perjury (i) that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this transmittal form; (ii) that, based on my inquiry of those individuals immediately responsible for obtaining the information, the material information contained in this submittal is, to the best of my knowledge and belief, true, accurate and complete, and (iii) that I am fully authorized to make this attestation on behalf of the entity legally responsible for this submittal. The person or entity on whose behalf this submittal is made am/is aware that there are significant penalties, including, but not limited to, possible fines and imprisonment, for willfully submitting false, inaccurate, or incomplete information.

By: David M. Bond Title: Highway Superintendent
 (signature)

For: Town of Topsfield Highway Department Date: 3-15-01
 (print name of person or entity recorded in Section I)

Enter address of the person providing certification, if different from address recorded in Section I:

Street: _____

City/Town: _____ State: _____ ZIP Code: _____

Telephone: _____ Ext.: _____ FAX: (optional) _____

YOU MUST COMPLETE ALL RELEVANT SECTIONS OF THIS FORM OR DEP MAY RETURN THE DOCUMENT AS INCOMPLETE. IF YOU SUBMIT AN INCOMPLETE FORM, YOU MAY BE PENALIZED FOR MISSING A REQUIRED DEADLINE, AND YOU MAY INCUR ADDITIONAL COMPLIANCE FEES.



CLASS B -1 RESPONSE ACTION OUTCOME STATEMENT

In accordance with the Massachusetts Contingency Plan (MCP)

For

Town of Topsfield Highway Department
Former Highway Department Garage
10 School Avenue
Topsfield, MA 01983

Release Tracking Number (Not Yet Assigned)



Prepared for:
Town of Topsfield Highway Department
279 Boston Street
Topsfield, MA 01983

CSE Project No. 2000.34

March 9, 2001

Oil & Hazardous Waste Assessment & Cleanup Professionals

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CLEAN SOILS ENVIRONMENTAL, LTD.

APPENDIX A: FIGURES

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APPENDIX F: NOTICE OF NONCOMPLIANCE

APPENDIX G: HEADSPACE SCREENING PROCEDURE & MONITORING WELL CONSTRUCTION
DETAILS

1.0 EXECUTIVE SUMMARY

Clean Soils Environmental, Ltd. (CSE) is pleased to submit this Class B-1 Response Action Outcome (RAO) Statement for the property at 10 School Avenue in Topsfield, MA, hereafter referred to as the "Property". A Class B-1 RAO can be submitted when a reporting condition according to 310 CMR 40.0315 is discovered and neither remedial actions nor an Activity and Use Limitation is required to achieve or maintain a level of "No Significant Risk" according to 310 CMR 40.1045.

The location of the Property is shown on Figure 1 in Appendix A. The approximate location of the portion of the Property impacted by a release of oil and/or hazardous materials (OHM) from a floor-drain, hereafter referred to as the "Disposal Site", is shown on Figure 3 in Appendix A.

The Property is the former Town of Topsfield Highway Department Garage that was used by the Topsfield Highway Department until their recent move to a different location. The Property is currently vacant.

On October 29, 1999, the DEP Northeast Regional Office conducted a compliance audit at the Property and determined that untreated industrial effluent was being illegally discharged to the environment from the floor drain in the garage building that discharged through an oil/water separator to a Class V injection well. Please see Appendix F for a copy of the Notice of Noncompliance that was mailed to the Town of Topsfield documenting the above mentioned injection well.

On February 10, 2000, Safety-Kleen of Marlborough, MA removed 166 gallons of oily sludge (MADEP MA01 waste) from the oil/water separator at the Property under manifest number MAM086821. This action was conducted in conformance with DEP's 1994 guidance entitled *Massachusetts Closure Requirements for Shallow Injection Wells*.

On November 7, 2000, Safety-Kleen removed 600 gallons of oily sludge (MADEP MA01 waste) from the injection well at the Property under manifest number MAM396581. This action was conducted in conformance with DEP's 1994 guidance entitled *Massachusetts Closure Requirements for Shallow Injection Wells*.

On November 30, 2000, CSE conducted a Limited Subsurface Investigation at the Property to determine whether historic discharges to the injection well significantly impacted the environment. The Limited Subsurface Investigation included the advancement of soil borings and the installation of monitoring wells in the vicinity of the injection well. The Limited Subsurface Investigation determined that a 120-day DEP Reportable Condition existed at the Property due to levels of contamination detected in soil. However, the concentrations of the two contaminants detected above their reportable concentrations only slightly exceeded their respective Reportable Concentrations.

On January 24, 2001, CSE collected a soil sample from the bottom of the injection well at the Property. This soil sample was laboratory analyzed and the results were used along with the laboratory results from the November 30, 2000 Limited Subsurface Investigation to determine the exposure point concentration (EPC) in soil for the detected contaminants. In this case, the EPC for detected contaminants were below DEP's conservative Method 1 Risk Characterization Cleanup Standards which indicates that a conditions of "No Significant Risk" exist at the Disposal Site without conducting any remedial actions.

2.0 DISPOSAL SITE LOCATION AND DESCRIPTION

The Property is the former Topsfield Highway Department Garage located at 10 School Avenue in Topsfield, MA and is located in a mixed commercial/residential area. The building at the Property is a brick garage building with 7 bays.

Subsurface soils at the Property consist of sandy fill, silty sand, and sandy silt. The closest open water body to the Disposal Site is School Brook which is a small (approximately 4 feet wide) culverted brook that flows from north to south and is located approximately 50 feet to the west of the injection well at the Property. School Brook feeds into the Ipswich River approximately one mile southeast of the Property. Please see Figures 1 and 2 in Appendix A for the approximate location of the Property and School Brook. Please see Figure 3 in Appendix A for the approximate location of the Disposal Site at the Property.

3.0 DESCRIPTION OF THE RELEASE

CSE has determined, with input from David Bond (Town of Topsfield Highway Superintendent) that the source of the release at the Property is fuel and motor oil that has dripped into the floor drain from Highway Vehicles parked in the garage. Mr. Bond said that vehicles were sometimes washed in the garage. According to Mr. Bond, the floor drain was hooked up to the oil/water separator and to the injection well when it was installed approximately 20 years ago. Therefore, CSE believes that the source of the release at the Property has been ongoing for approximately the last 20 years. Please see Figure 3 in Appendix A for a Limited Site Plan showing the location of the floor drain, injection well, and oil/water separator at the Property.

4.0 SUMMARY OF RESPONSE ACTIONS CONDUCTED

4.1 Identification of a Reportable Condition and Notification

The proximity of residences to the Property indicated that the RCS-1 MADEP Reportable Concentrations applied to soil at the Disposal Site. Laboratory results for soil samples B1 showed an exceedence of the RCS-1 Reportable Concentration for the C₁₁ – C₂₂ aromatic EPH fraction. Soil sample B6 exceeded the RCS-1 Reportable Concentration for Arsenic. Both exceedances were slight (see Table 2). This information was

provided to the Topsfield Highway Department (the PRP) in a letter report dated January 3, 2001. However, CSE verbally informed the PRP of the Reportable Condition before this letter report was delivered. Therefore, CSE is conservatively placing the Time of Knowledge for this release at December 8, 2000, which is the date that CSE received the laboratory reports showing the exceedances. Since a 120-day reporting condition exists at the Property, the DEP Notification deadline is April 6, 2001. This RAO submittal therefore contains a written release notification (form BWSC-103) for this release.

4.2 *Determination of Extent of Disposal Site*

On November 30, 2000, CSE conducted a Limited Subsurface Investigation to determine if the discharge from the floor drain significantly contaminated soil and/or groundwater in the vicinity of the injection well shown on Figure 3 in Appendix A. The Limited Subsurface Investigation included the advancement of soil borings, collection of soil samples for field screening and laboratory analysis, installation/development of groundwater monitoring wells, collection of groundwater samples, and laboratory analysis of collected groundwater.

4.2.1 Advancement of Soil Borings

On November 30, 2000, Soil Exploration Corp. of Leominster, MA, under the direction and oversight of CSE, advanced eight soil borings (identified as B1 through B8) via Direct Push Drilling Technology at the Property. (Please see Figure 3.)

All soil borings were advanced to a maximum depth of 11 feet below the ground surface except for soil boring B1, which was advanced to 14 feet below the ground surface.

The locations of all borings at the Property are shown on Figure 3 in Appendix A.

4.2.2 Collection of Soil Samples for Field Screening Analysis

On November 30, 2000, CSE collected 37 soil samples at the Property. These soil samples were collected at 2-foot intervals continuously from each soil boring (soil borings B1 – B8) as it was advanced. These soil samples were screened for Total Organic Vapors (TOV) with a Photoionization Detector (PID) using the Headspace Screening Procedure enclosed in Appendix G. TOV readings ranged from 0.0 – 2.0 parts per million by volume (ppmv). The majority of the TOV readings were 0 ppmv. Table 1 in Appendix A shows the sample name, headspace readings, date of collection, and the depth at which the 37 soil samples were collected at the Property.

4.2.3 Collection of Soil Samples for Laboratory Analysis

On November 30, 2000, CSE collected three soil samples (i.e., one soil sample from soil borings B1, B6, and B8) for laboratory analysis. The soil sample collected from B1, closest to and downgradient of the injection well, was analyzed for Volatile Petroleum Hydrocarbons (VPH), Extractable Petroleum Hydrocarbons (EPH) fractions with target analytes, RCRA-8 Metals, Volatile Organic Compounds (VOCs), and Polychlorinated Biphenyls (PCBs). The gravel (believed to be fill) at soil boring B2 was too loose to obtain a sufficient sample. Therefore, a soil sample for laboratory analysis was collected from soil boring B8 instead. A soil sample was also collected from soil boring B6 to evaluate the downgradient migration of contamination toward School Brook from the injection well. The results of the field

headspace screening indicated that significant TOVs were not present in the soil obtained from soil boring B6 and B8. Therefore, these samples were only analyzed for EPH, VOCs, and RCRA-8 Metals. Laboratory analyses were conducted by Groundwater Analytical Laboratories of Buzzards Bay, MA.

Please see Table 1 in Appendix B for the analysis performed on each sample and Table 2 in Appendix B for the corresponding tabulated laboratory soil results. Photographs 5 and 6 taken during the Limited Subsurface Investigation are provided in Appendix D and show the soil from 3 to 7 feet below the ground surface collected from soil borings B4 and B6.

4.2.4 Installation and Sampling of Small Diameter Monitoring Wells

On November 30, 2000, soil borings B1, B5, and B7 were converted to 3/4-inch inner-diameter monitoring wells identified as MW1, MW2, and MW3, respectively. Monitoring well MW1 was installed directly next to and downgradient from the injection well. Monitoring wells MW2 and MW3 were installed to assess groundwater downgradient of the injection well.

Monitoring wells were installed by Soil Exploration, a Massachusetts Certified Well Driller. The monitoring wells were constructed of 0.010-inch machine slotted, small-diameter PVC well screen and solid PVC riser. The top and bottom of the well screen was installed approximately 5 feet above and 5 feet below the water table, respectively. The water table was approximately 5 feet below the ground surface in the area of the injection well. The annular space around the screen was filled with #2 sand to at least one foot above the well screen. A watertight locking road box was

installed at each monitoring well location. A concrete seal was installed around the road box to complete the installation of each monitoring well. Figure 3 in Appendix A shows the locations of these three monitoring wells at the Property. The monitoring well construction details are shown in Appendix G.

4.2.5 Development of Monitoring Wells

On November 30, 2000, CSE developed the three monitoring wells by removing at least three well volumes of groundwater from each monitoring well. The purpose of this well development was to remove silt and to enhance the hydraulic connection between the well screen, filter pack, and the aquifer.

CSE used a peristaltic pump with dedicated tubing to remove the groundwater from monitoring wells MW1, MW2, and MW3.

4.2.6 Collection of Groundwater Samples for Laboratory Analysis

On December 6, 2000, CSE collected a total of three groundwater samples (identified as MW1, MW2 and MW3), one from each of the three monitoring wells at the Property.

CSE used a battery-operated peristaltic pump and dedicated HDPE tubing to purge three well volumes from the monitoring wells. The purging was conducted to remove stagnant groundwater from the monitoring wells prior to sampling.

Following purging, CSE collected a groundwater sample from each monitoring well. The groundwater samples were collected in laboratory grade sample bottles using a peristaltic pump and dedicated tubing. The purged groundwater from each monitoring

well was discharged back into the monitoring well from which it was purged following sample collection.

Evidence of contamination (i.e., petroleum sheen or odors) was not observed on the groundwater during sampling. Therefore, it is unlikely that significant VPH parameters are present in the groundwater at the Property, and therefore VPH analysis was not conducted on the groundwater samples. However, the three groundwater samples were analyzed for EPH, VOCs, and Total RCRA-8 Metals. The groundwater samples were collected without filtering and analyzed for Total RCRA-8 Metals as a conservative measure.

It should be noted that VPH target analytes are also included in the VOCs target compound list. Groundwater analyses were conducted by Groundwater Analytical Laboratories of Buzzards Bay, MA. Please see Table 3 in Appendix B for a summary of the groundwater analytical results. Copies of the laboratory reports are provided in Appendix C.

4.2.7 Collection of An Additional Groundwater Sample from MW1 for Laboratory Analysis

In accordance with 310 CMR 40.0317(14) groundwater may be re-sampled if the sampling procedure employed did not accurately characterize site conditions. In this case, the Total RCRA-8 Metals analysis conducted on the unfiltered groundwater sample collected on December 6, 2000 from monitoring well MW1 did not accurately characterize the concentrations of metals *dissolved* in the groundwater at the Property.

Therefore, on December 15, 2000, an additional groundwater sample was collected from monitoring well MW1 using the method described in Section 4.2.6 of this report. However, unlike the groundwater sample collected on December 6, 2000 from monitoring well MW1, this groundwater sample was filtered in the field to remove excess sediment and was analyzed for *dissolved* rather than *total* RCRA-8 Metals. The Dissolved RCRA-8 Metals analysis accurately identifies the concentrations of metals actually dissolved in the groundwater, which can migrate off-site.

The Total RCRA-8 Metals analysis conducted on groundwater collected from MW1 on December 6, 2000 indicated that a DEP 120-day reportable condition might be present in groundwater at the Property due to elevated concentrations of total lead. However, according to 310 CMR 40.0362(1), the DEP 120-day reportable conditions for groundwater are based on *dissolved* (rather than total) concentrations of contaminants in groundwater. Therefore, the results from the Dissolved RCRA-8 Metals analysis on groundwater collected from monitoring well MW1 on December 15, 2000 demonstrate that there is not a 120-day reportable condition for any of the 8 metals included in the Dissolved RCRA-8 Metals analysis. This analysis was also conducted by Groundwater Analytical Laboratories of Buzzards Bay, MA. Please see Table 3 in Appendix B for a summary of the groundwater analytical results. Copies of the laboratory reports are provided in Appendix C.

4.2.8 Collection of Soil Sample from Bottom of Injection Well

On January 24, 2001, CSE collected one soil sample (identified as "IW") from the bottom of the injection well at approximately 5.8 feet bgs. The soil sample was collected with a stainless steel hand

auger. CSE collected this soil sample in order to assess impact in the middle of the injection well to make a determination as to whether the contaminated soil at the Disposal Site was at a level of "No Significant Risk". Soil sample IW was screened in the field via Headspace Analysis for TOVs and was sent to Groundwater Analytical for laboratory analysis for EPH with Targets, VPH, VOCs by 8260B, RCRA-8 Metals, and PCBs. Please see Tables 1 & 2 in Appendix B for headspace and laboratory results. Copies of the laboratory reports are provided in Appendix C.

5.0 CONCEPTUAL SITE MODEL

The Limited Subsurface Investigation indicated that the Disposal Site is localized to the immediate vicinity of the injection well at the Property as shown on Figure 3 in Appendix A. A thin layer of impacted soil (approximately 4 inches thick) was observed in the immediate vicinity of the injection well (see Photographs 5 and 6 in Appendix D) from approximately 5 to 5.5 feet below the ground surface. This depth corresponds roughly to the top of the water table. Significant groundwater contamination was not observed in the vicinity of the injection well.

Therefore, the Disposal Site is relatively small both horizontally and vertically which may indicate that the oil/water separator for the floor drain system was functioning as designed and pretreated the effluent from the floor drain before it was injected into the ground via the injection well.

6.0 REMEDIAL WASTE MANAGEMENT

Remediation was not conducted and therefore no remedial waste has been generated.

7.0 METHOD 1 RISK CHARACTERIZATION

A Method 1 Risk Characterization may be used to characterize the risk of harm to health, public welfare, and the environment at disposal sites where assessments conducted in accordance with 310 CMR 40.0000 have determined that the presence of oil and/or hazardous material is limited to soil and/or groundwater. School Brook (surface water body) is close to the Disposal Site, however it is not part of the Disposal Site.

7.1 Contaminants of Concern (COC)

Contaminants of Concern (COC) are defined (in DEP's 1995 guidance document entitled "Guidance For Disposal Site Risk Characterization") as *"all chemicals detected at the site..."* The release at the Property was characterized as drippings of fuel and motor oil from Topsfield Highway Department vehicles garaged in the building. Since these may include gasoline, diesel fuel, and lubricating oil, a wide range of contaminants could have potentially been discharged to the Disposal Site. Therefore, laboratory analyses was conducted for VPH, EPH with Targets, 8 RCRA Heavy Metals, PCBs and Volatile Organic Compounds in accordance with the Massachusetts Underground Injection Control (UIC) Program guidance. On the basis of the results of laboratory analysis, the COC are identified as follows:

- EPH Fraction C₉ – C₁₈ Aliphatics,
- EPH Fraction C₁₉ – C₃₆ Aliphatics,
- EPH Fraction C₁₁ – C₂₂ Aromatics,
- Fluoranthene
- Pyrene
- Arsenic
- Chromium
- Barium

- Lead
- 1,1-Dichloroethane

The objective of the Limited Subsurface Investigation was to characterize the concentrations of the COC in the Disposal Site in order to determine if a condition of No Significant Risk existed.

7.2 Identification of Background Conditions

Background is defined in the MCP (310 CMR 40.0006) as those levels of oil and hazardous materials that would exist in the absence of the disposal site of concern which are:

- a) ubiquitous and consistently present in the environment at and in the vicinity of the disposal site of concern; and
- b) attributable to geologic or ecological conditions, atmospheric deposition, industrial process, engine emissions, fill materials containing wood or coal ash, and/or petroleum residues that are incident of the normal operation of motor vehicles.

The background levels of the COC in groundwater in the vicinity of the Disposal Site is conservatively taken to be non-detect.

Concentrations of the COC were also below detection limits in soil samples collected at comparable depth to the release in soil adjacent to the Disposal Site. Therefore, background concentrations of the COC in soil are also non-detect.

7.3 Determination of Applicable Soil and Groundwater Categories

The Disposal Site is located completely within the former Town of Topsfield Highway Department Garage property. The surrounding properties are mostly residential. The Disposal Site is located more than 3 feet below the ground surface and the surface of the Disposal Site is paved.

Children are generally not present at the DPW Yard and therefore the Disposal Site is classified as "Adults Only Present". Workers do not reside at the DPW yard but are present for 8-hour sifts at the Disposal Site. No digging, planting, or other soil intensive activities normally occur at the Disposal Site. The Disposal Site therefore has a low frequency and intensity of use. According to DEP regulations (310 CMR 40.0933(9)) soil at the Disposal Site is categorized as S-3.

The water table is less than 15 feet from the ground surface and the Disposal Site is greater than 30 feet from any occupied dwelling. The Disposal Site is not located in a drinking water resource area according to the GIS Map enclosed in Appendix A as Figure 2. Furthermore, municipal water serve the Property and surrounding area, and no private drinking water wells have been identified in the vicinity of the Property. Therefore, CSE has categorized groundwater as GW-3 at the Disposal Site.

7.4 *Surrounding Receptors*

The surrounding receptors to this release include construction or utility workers conducting excavation at the Disposal Site. Since the Disposal Site is localized, residents of abutting properties are not potential receptors.

7.4.1 *Potential Human Receptors*

The Property is not residential but some of the abutting parcels are residential and are located as close as 100 feet from the Disposal Site. The Limited Subsurface Investigation conducted by CSE determined that the extent of the Disposal Site did not extend outside of the Topsfield Highway Department Property, and therefore people living in nearby dwellings are not potential receptors.

In addition to construction workers, trespassers through the Property are also considered potential receptors for short-term exposures to the contamination.

7.4.2 Potential Environmental Receptors

School Brook (a small culverted brook) is located approximately 40 feet west of the Disposal Site. Potential environmental receptors are the plant and animal species that live in School Brook, or exist for a portion of their life cycle in the brook. Since the brook drains directly into the Ipswich River, plants and animals associated with the river are also potential environmental receptors.

However, the Disposal Site is localized and analytical results from soil/groundwater from borings/monitoring wells (i.e., B5/MW2 & B7/MW3) advanced between the Disposal Site and the brook demonstrate that impact to the brook is not likely.

7.5 Determination of Exposure Pathways

Exposure Pathways identified for the Disposal Site are as follows:

1. Contact with contaminated soil during possible future excavation.
2. Contact with groundwater during possible future excavation.

The Property as well as the immediate vicinity is served by municipal water. No private drinking water wells have been identified in the vicinity of the Property and the Property is not in a Zone II of a public drinking water supply. Therefore, drinking water is not considered an Exposure Pathway.

7.6 *Determination of Exposure Point Concentrations (EPC) and Comparison to the Cleanup Standards*

7.6.1 Soil

All the soil in the Disposal Site is categorized as S-3 soil. Therefore, one exposure point can be considered for soil. The results of soil samples submitted for confirmatory laboratory analysis are summarized in Table 2 of Appendix B. Copies of the laboratory results are provided in Appendix C. The soil sample locations are conservative (i.e. collected where the highest PID reading was recorded or where evidence of contamination was physically observed during drilling). All of the soil results can therefore be averaged together to calculate a set of exposure point concentrations for the COC. However, in this case, CSE was more conservative and did not average the results from soil samples B6 and B8 (both were non-detect) when calculating the EPC for the EPH hydrocarbon fractions.

The exposure point concentrations for the contaminants of concern were compared to the applicable S-3/GW-3 standards. Table 2 in Appendix B shows that the average exposure point concentration for the COC are below the S-3/GW-3 Method 1 Risk Characterization cleanup standards. The average exposure point concentrations are also compared to the S-1/GW-3 soil cleanup standards, which are protective of unrestricted use. The fact that the average exposure point concentrations meet the Method 1 S-1/GW-3 standards indicates that a condition of "No Significant Risk" has been achieved at the Disposal Site for soil without the use of an AUL.

7.6.2 Groundwater

CSE collected a groundwater sample from the three monitoring wells (MW1, MW2, and MW3) installed at the Property. Monitoring well MW1 was conservatively placed approximately 2 feet from the injection well (i.e., source of the release) between the injection well and School Brook.

The results of the groundwater analysis are compared to the applicable GW-3 standards on Table 3 in Appendix B. The concentrations of the COC detected in groundwater from each of the monitoring wells at the Disposal Site do not exceed the applicable Method 1 Risk Characterization cleanup standards and therefore groundwater does not constitute a significant risk to human or environmental receptors.

7.7 *Risk of Harm to Safety*

The present condition at the Property does not present a risk of harm to safety. In this case, the Method 1 Risk Characterization was used to show that the Disposal Site does not present a Significant Risk of harm to health, safety, public welfare, and the environment.

The floor drain that was the source of the contamination at the Disposal Site has been removed from service pursuant to 310 CMR 40.1003(5). According to David Bond, Topsfield Highway Superintendent, the floor drain in the garage has been sealed with concrete and the catch basin, oil/water separator, and injection well have been filled with clean sand.

The exposure point concentrations of the COC meet the applicable Method 1 Risk Characterization Cleanup Standards for both soil and groundwater. The fact that soil and groundwater concentrations are below the S-1/GW-3 (soil) and GW-3 (groundwater) Method 1 Risk Characterization Cleanup

Standards indicates that a condition of No Significant Risk for unrestricted use has been achieved at the Disposal Site. This allows site closure without the need for an Activity and Use Limitation on the Property to protect human and environmental receptors in the foreseeable future.

8.0 RESPONSE ACTION OUTCOME

The level of oil and hazardous material in the environment at the Disposal Site is below the Method 1 Risk Characterization Cleanup Standards and thus a permanent solution has been achieved at the Disposal Site with no remediation. Therefore, a condition of No Significant Risk exists at the Disposal Site and Class B-1 RAO has been achieved. No further response actions are required.

8.1 *Control of Source of Contamination*

On February 21, 2001, the Town of Topsfield filled the catch basin (under the floor drain in the garage), the oil/water separator, and the injection well with clean sand. These three filled areas were capped with approximately six inches of concrete. In other words, the floor-drain system at the Property has been filled with clean sand and sealed with concrete. These activities were conducted as per the verbal instructions of DEP's Ron Stelling (UIC Program).

The closure and sealing of the floor drain system constitutes control of the source of the contamination.

8.2 *Feasibility Of Reducing Residual Contamination To Background Levels And Cost/Benefit Analysis*

The concentrations of contaminants remaining at the Disposal Site meet the applicable Method 1 Cleanup Standards and therefore do not pose a condition of Significant Risk. Since a condition of No Significant Risk has been achieved, the environmental benefit that might be gained from

additional remediation is negligible. The additional costs required to remove the residual concentrations of contamination to background levels is substantial and disproportionate to the incremental benefit of risk reduction, environmental restoration, and monetary and non-pecuniary values. The costs of additional remedial response actions are not justified by the benefits and are therefore considered technologically infeasible.

8.3 Performance Standard

CSE believes that the response action (i.e., environmental assessment) completed to date:

- (1) is sufficient in scope, detail, and level of effort to characterize and remove the risk of harm to health, safety, public welfare, and the environment;
- (2) is consistent with Response Action Performance Standards (RAPS);
- (3) is commensurate with the nature and extent of the release;
- (4) demonstrates the requirements of the applicable class of RAO; and
- (5) conforms with applicable requirements and procedures for conducting response actions specified in the MCP.

8.4 Public Notice

CSE has given public notice of this Class B-1 RAO to the Topsfield Board Of Health (BOH) and the Topsfield Chief Municipal Officer (CMO). A copy of this public notice is enclosed in Appendix E.

9.0 LICENSED SITE PROFESSIONAL OPINION

It is the opinion of CSE's LSP that a level of No Significant Risk of harm to health, safety, public welfare, and the environment exists at the Disposal Site. A level of No Significant Risk was determined to exist at the Disposal Site because the concentrations of the contaminants of concern met the applicable Method 1 Risk Characterization Cleanup Standards. This RAO is categorized as a Class B-1 and requires no Activity and Use Limitation at the Property. This is a permanent solution and no further action is required.

It should be noted that CSE reserves the right to revise this opinion in light of any additional information regarding the Property or Disposal Site that may be collected in the future.

Appendix A
FIGURES

42°39'16", 70°57'57"

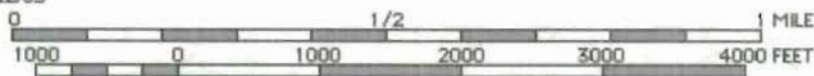
42°39'16", 70°55'55"



42°37'38", 70°57'57" NAD83

42°37'38", 70°55'55"

MN TN
16°



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**Topographic Map with Approximate Location of the
Property**

Former Topsfield Highway Department Garage
10 School Avenue, Topsfield, MA

Figure 1

Date: 2/06/01 Drawn By: DAW CSE Project 2000.34

MA DEP - Bureau of Waste Site Cleanup

Site Scoring Map: 500 feet & 0.5 Mile Radii

SITE NAME:

Former DPW Yard
10 School Avenue
Topsfield, MA 01983
423823n 705652ew



The information shown on this map is the best available at the date of printing. Please refer to the data source descriptions document.

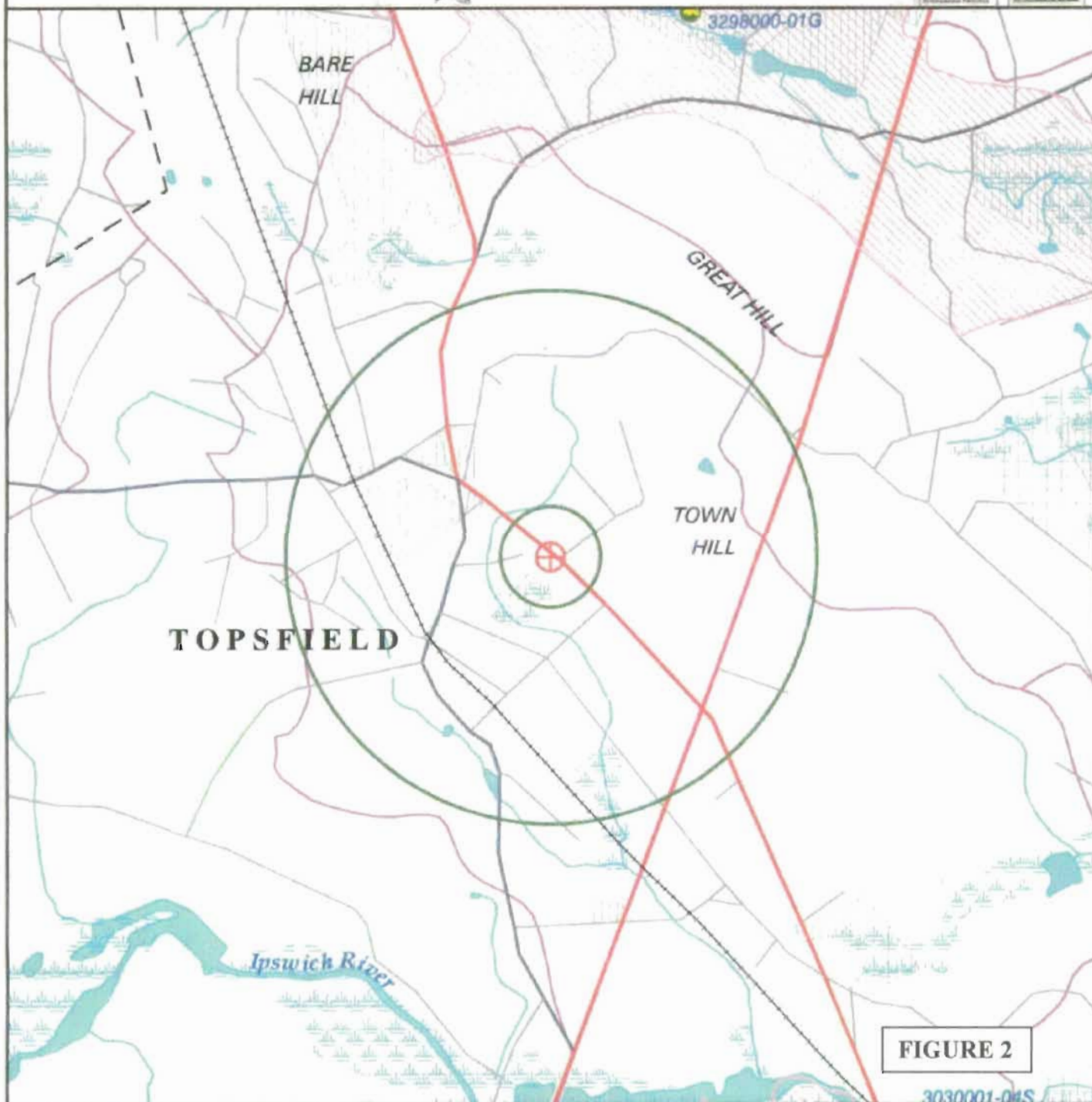
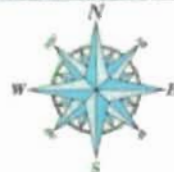


FIGURE 2

- | | |
|---|--|
| Roads: Limited Access, Divided, Major Road, Connector, Street, Track, Trail | EPA Designated Sole Source Aquifer |
| Boundaries: Town, County, DEP Region; Train; Powerline; Pipeline; Aqueduct | Public Water Supplies: Ground, Surface, Non Community |
| Basins: Major, Sub; Streams: Perennial, Intermittent, Man Made Shore, Dams | Approved Zone2: MPA; Surface Water Supply Zone A |
| Potentially Productive Aquifers: Medium, High Yield | Hydrography: Water Features, Public Surface Water Supply |
| Non-Potential Drinking Water Source Area: Medium, High Yield | Wetlands: Fresh, Salt, NHESP Wetlands Habitat |
| | Protected Open Space, ACEC |
| | DEP Permitted Solid Waste Facilities; Certified Vernal Pools |

SCALE 1:15000

0 1/2 1 KILOMETERS



December 04, 2000

NRS SCORING MAP DATA SOURCES

AQUIFERS: USGS-WRD/MassGIS, 1:48,000.

Automated by MassGIS from the USGS Water Resources Div. Hydrologic Atlas series manuscripts. The definitions of high and medium yield vary among basins. Source dates 1977 to 1988.

SOLE SOURCE AQUIFERS: US EPA/MA

DEP/MassGIS, various scales. They are defined by EPA as aquifers that are the 'sole or principal source' of drinking water for a given aquifer service area. Last updated July 1993.

NON POTENTIAL DRINKING WATER SOURCE

AREAS: DEP-BWSC (Bureau of Waste Site Cleanup).

Those portions of high and medium yield aquifers which may not be considered as areas of groundwater conducive to the locations of public water supplies. Please refer to the MCP guidelines for the definitions of these areas.

DEP APPROVED ZONE IIS: MA DEP, 1:25,000. As stated in 310 CMR 22.02 that area of an aquifer which contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated. Digitized from data provided to DEP in approved hydrologic engineering reports. Data is updated continuously.

INTERIM WELLHEAD PROTECTION AREAS:

DEP-DWS (Division of Water Supply), 1:25,000. These polygons represent an interim Zone II for a groundwater source until an actual one is approved by the DEP Division of Water Supply. The radius of an IWPA varies according to the approved pumping rate. Updated in parallel with the Public Water Supplies data.

PUBLIC WATER SUPPLIES: DEP-DWS, 1:25,000.

Community and non-community surface and withdrawal points were field collected using Global Positioning System receivers. The attributes were added from the DEP Division of Water Supply database. Continuously updated.

HYDROGRAPHY: USGS/MassGIS, 1:25000 USGS Digital Line Graph (DLG) data, modified by MassGIS.

Approximately 40% of the data was provided by USGS and the remainder was created by MassGIS to USGS specifications. Source dates 1977-1997.

DRAINAGE BASINS: USGS-WRD/MassGIS, 1:24,000. Automated by MassGIS from USGS Water Resources Division manuscripts with approximately 2400 sub-basins as interpreted from 1:24,000 USGS quadrangle contour lines. 1987-1993.

WETLANDS: UMass Amherst RMP/MassGIS, 1:25,000. Includes nonforested wetlands extracted from the 1971-1991 Land Use datalayer which was photointerpreted from Summer CIR photography. Interpretation was not done in stereo. Also includes, in most areas, forested wetlands from USGS Digital Line Graph (DLG) data.

PROTECTED OPEN SPACE: EOE (Executive Office of Environmental Affairs) MassGIS, 1:25,000. Includes federal, state, county, municipal, non profit, and protected private conservation and outdoor recreation lands. Ongoing updates.

ACECs: DEM, 1:25,000. Areas of Critical Environmental Concern are areas designated by the Secretary of ECEA as having a number of valuable environmental features coexisting. Projects in ACECs are subject to the highest standards of review and performance. Last updated October 1996.

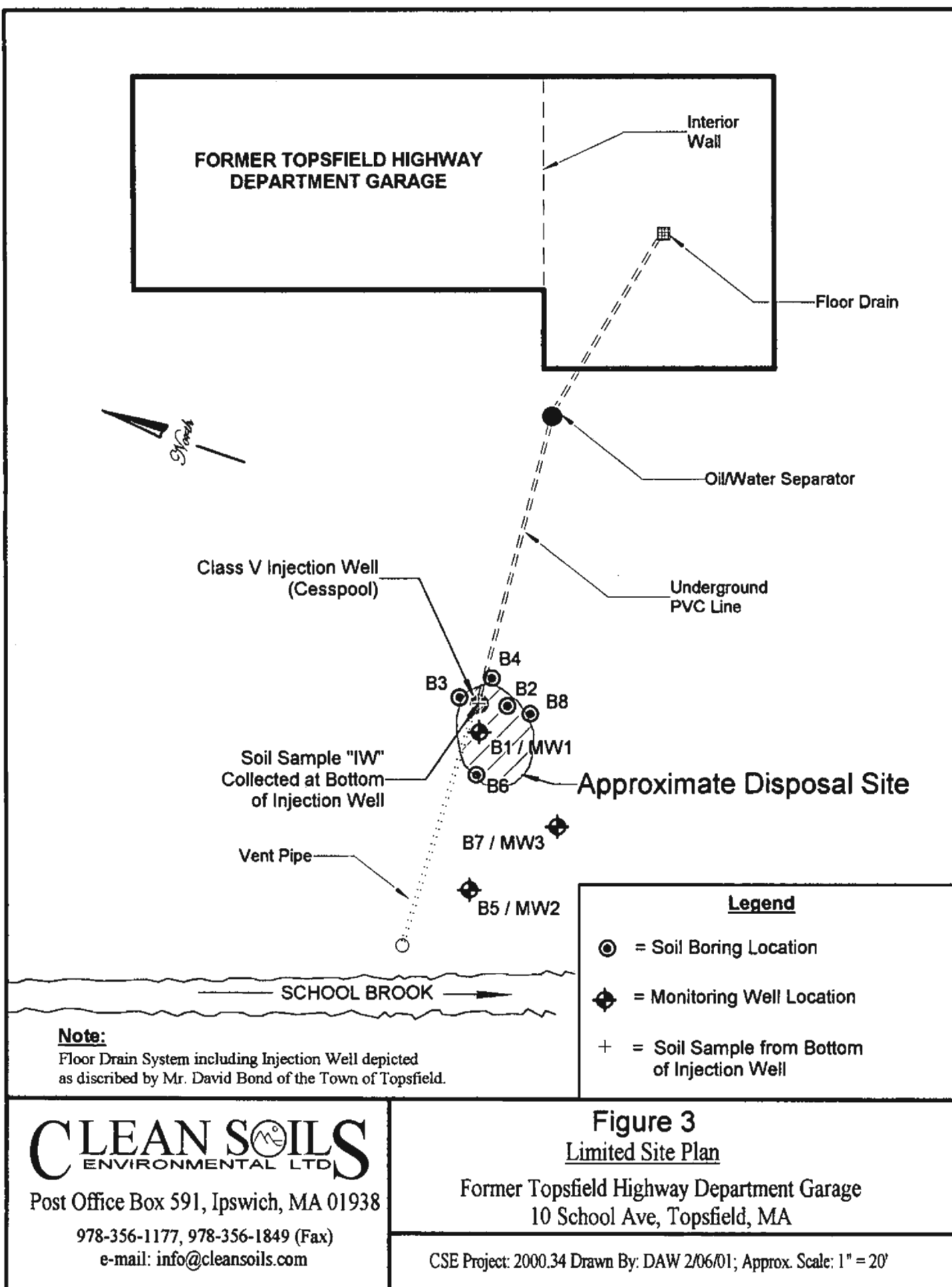
ROADS: USGS/MassGIS/MHD, 1:100,000. Massgis extracted roads from the USGS Transportation DLG files. MA Highway Dept. updated roads through 1997. MassGIS and MA DEP GIS group further edited this layer. Numbered routes are part of the state, US or Interstate highway systems.

POLITICAL BOUNDARIES: MassGIS/USGS, 1:25,000. This datalayer was digitized by MassGIS from mylar USGS quads. Source date is approximately 1985.

DEP PERMITTED SOLID WASTE FACILITIES: DEP-DSW (Division of Solid Waste), 1:25,000. Includes only facilities regulated since 1971. Data includes sanitary landfills, transfer stations and recycling or composting facilities. Facility boundaries were compiled or approximate facility point locations drafted onto USGS quadrangles and automated by the DEP Division of Solid Waste. Last updated 1997.

NHESP ESTIMATED HABITATS OF RARE WETLANDS WILDLIFE: Polygons show estimated habitats for all processed occurrences of rare wetlands wildlife. Data collected by Natural Heritage & Endangered Species Program and compiled at 1:24000 or 1:25000 scale. For use with Wetlands Protection Act Only. Effective Jan. 1, 1997 through Dec. 31, 1998.

NHESP CERTIFIED VERNAL POOLS: Points show all vernal pools certified by NHESP/MADFW (Fisheries and Wildlife) as of September 25, 1996. Data compiled at 1:24000 or 1:25000 scale. Effective January 1, 1997 through December 31, 1998.



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Appendix B
TABLES

Table 1 INDEX OF FIELD SCREENING AND LABORATORY SAMPLES											
Former Highway Department Garage, 10 School Ave., Topsfield, MA, CSE Project No. 2000.34											
Sample Location Identification	Sample Depth (ft)*	Sample Type	Date Collected	Headspace Screening Result (ppmv)	Lab Analyses					Figure Reference	Table Reference
					VPH (fractions only)	EPH/PAH	VOCs	RCRA-8 Metals	PCBs		
B1	1 - 3	SSS	11/30/2000	0.0						3	
	3 - 7	SSS	11/30/2000	1.1	X	X	X	X	X	3	2
	7 - 11	SSS	11/30/2000	0.0						3	
	11 - 14	SSS	11/30/2000	0.0						3	
B2	1 - 3	SSS	11/30/2000	0.0						3	
	3 - 7	SSS	11/30/2000	0.0						3	
	7 - 9	SSS	11/30/2000	0.0						3	
	9 - 11	SSS	11/30/2000	0.0						3	
B3	1 - 3	SSS	11/30/2000	0.0						3	
	3 - 7	SSS	11/30/2000	0.0						3	
	7 - 9	SSS	11/30/2000	0.0						3	
	9 - 11	SSS	11/30/2000	0.0						3	
B4	1 - 3	SSS	11/30/2000	0.0						3	
	3 - 5	SSS	11/30/2000	0.0						3	
	5 - 7	SSS	11/30/2000	0.0						3	
	7 - 9	SSS	11/30/2000	0.0						3	
	9 - 11	SSS	11/30/2000	0.0						3	
B5	1 - 3	SSS	11/30/2000	0.0						3	
	3 - 5	SSS	11/30/2000	0.0						3	
	5 - 7	SSS	11/30/2000	0.0						3	
	7 - 9	SSS	11/30/2000	0.0						3	
	9 - 11	SSS	11/30/2000	0.0						3	
B6	1 - 3	SSS	11/30/2000	0.6						3	
	3 - 5	SSS	11/30/2000	2.0						3	
	5 - 7	SSS	11/30/2000	1.8		X	X	X		3	2
	7 - 9	SSS	11/30/2000	1.5						3	
	9 - 11	SSS	11/30/2000	1.0						3	
B7	1 - 3	SSS	11/30/2000	0.5						3	
	3 - 5	SSS	11/30/2000	0.7						3	
	5 - 7	SSS	11/30/2000	0.8						3	
	7 - 9	SSS	11/30/2000	1.6						3	
	9 - 11	SSS	11/30/2000	0.5						3	
B8	1 - 3	SSS	11/30/2000	0.4						3	
	3 - 5	SSS	11/30/2000	0.6						3	
	5 - 7	SSS	11/30/2000	0.5		X	X	X		3	2
	7 - 9	SSS	11/30/2000	0.5						3	
	9 - 11	SSS	11/30/2000	0.8						3	
IW	5.8	GS	01/24/2001	0.2	X	X	X	X	X	3	2
MW1	4.63**	GW	12/06/2000	N/A		X	X	X		3	3
MW2	5.25**	GW	12/06/2000	N/A		X	X	X		3	3
MW3	4.96**	GW	12/06/2000	N/A		X	X	X		3	3
MW1 (retest)	4.92**	GW	12/15/2000	N/A				X		3	3

* All sample depths are approximately from top of ground surface (elevation 0).

** Depth to groundwater from top of riser (approximately ground surface)

Sample locations are shown on Figure 3.

MADEP = Massachusetts Department of Environmental Protection
N/A = Not Applicable
GW = Ground Water Sample
SSS = Split Spoon Soil Sample
GS = Grab Soil Sample
ppmv = parts per million by volume
PCB = Polychlorinated biphenyls
IW = Injection Well
RCRA = Resource Conservation and Recovery Act
EPH = Extractable Petroleum Hydrocarbons (MADEP)
PAH = Polynuclear Aromatic Hydrocarbons (MADEP)
VPH = Volatile Petroleum Hydrocarbons (MADEP)
VOC = Volatile Organic Compounds
MW1 = Monitoring Well MW1
B1 = Soil Boring B1

Table 2 LABORATORY RESULTS FOR SOIL FROM THE INSTALLATION OF BORINGS AND MONITORING WELLS

Former Highway Department Garage, 10 School Ave, Topsfield, MA, CSE Project No. 2000-34

Testing Methodology	Q14M	11/30/2000 B1	11/30/2000 B6	11/30/2000 B8	01/24/2001 IW	Reportable Concentrations (RCS-1) (mg/kg)	Exceeds RCS-1	Average EPC	MADEP Cleanup Standards for an S-1 soil S-1GW-1 S-1GW-2 S-1GW-3	MADEP Cleanup Standards for an S-2 soil S-2GW-1 S-2GW-2 S-2GW-3	MADEP Cleanup Standards for an S-3 soil S-3GW-1 S-3GW-2 S-3GW-3	Exceeds Applicable Cleanup Standards?
Extractable Petroleum Hydrocarbons w/ Target Analytes MADEP Method (1998) mg/kg	C 9 - C 10 Aliphatics	86	21	17	97	1,000	NO	91.5	1,000	2,500	5,000	NO
	C 10 - C 12 Aliphatics	350	21	17	390	2,500	NO	370	2,500	5,000	5,000	NO
	C 11 - C 22 Aromatics	210	21	17	150	200	YES	180	800	2,000	5,000	NO
	Naphthalene	0.30	0.35	0.28	0.28	4	NO	0.30	4	1,000	1,000	NO
	2-Methylnaphthalene	0.30	0.35	0.28	0.28	4	NO	0.30	4	1,000	1,000	NO
	Phenanthrene	0.30	0.35	0.28	0.28	100	NO	0.30	700	2,500	2,500	NO
	Acenaphthene	0.30	0.35	0.28	0.28	20	NO	0.30	70	2,500	2,500	NO
	Acenaphthylene	0.30	0.35	0.28	0.28	100	NO	0.30	100	2,500	2,500	NO
	Fluorene	0.30	0.35	0.28	0.28	400	NO	0.30	400	2,500	2,500	NO
	Anthracene	0.30	0.35	0.28	0.28	1,000	NO	0.30	1,000	2,500	2,500	NO
	Fluoranthene	0.67	0.35	0.28	0.28	1,000	NO	0.40	1,000	2,000	2,000	NO
	Pyrene	0.69	0.35	0.28	0.28	700	NO	0.40	700	2,000	2,000	NO
	Benzofluoranthene	0.30	0.35	0.28	0.28	0.7	NO	0.30	0.7	1	4	NO
	Chrysene	0.30	0.35	0.28	0.28	7	NO	0.30	7	10	40	NO
	Benzodihydroanthrene	0.30	0.35	0.28	0.28	0.7	NO	0.30	0.7	1	4	NO
	Benzofluoranthene	0.30	0.35	0.28	0.28	7	NO	0.30	7	10	40	NO
	Benzodiphenylene	0.30	0.35	0.28	0.28	0.7	NO	0.30	0.7	1	4	NO
	Indeno[1,2,3-cd]pyrene	0.30	0.35	0.28	0.28	0.7	NO	0.30	0.7	1	4	NO
	Dibenzofluoranthene	0.30	0.35	0.28	0.28	0.7	NO	0.30	0.7	1	4	NO
	Benzogluconiphenylene	0.30	0.35	0.28	0.28	1,000	NO	0.30	1,000	2,500	2,500	NO
	Benzodiphenylene	0.30	0.35	0.28	0.28	100	NO	0.30	100	2,500	2,500	NO
	C 9 - C 12 Aliphatics	0.50	NT	NT	5.50	1,000	NO	3	1,000	2,500	2,500	NO
	C 9 - C 10 Aromatics	0.50	NT	NT	7.60	100	NO	4	100	500	500	NO
Volatile Petroleum Hydrocarbons (mg/kg) by GC/MS/MS EPA Method 8260B (mg/kg)	Chloromethane	0.003	0.0065	0.003	0.285	0.3	NO	0.08	N/A	N/A	N/A	NO
	1,1-Dichloroethane	0.003	0.0065	0.003	0.285	3	NO	0.08	10	3	200	NO
	1,1,1-Trichloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,2-Dichloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,2,2-Tetrachloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,1,1-Tetrafluoroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,2,2-Tetrachloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,2,2-Tetrachloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,2,2-Tetrachloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,2,2-Tetrachloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,2,2-Tetrachloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,2,2-Tetrachloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,2,2-Tetrachloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,2,2-Tetrachloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,2,2-Tetrachloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,2,2-Tetrachloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,2,2-Tetrachloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,2,2-Tetrachloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,2,2-Tetrachloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,2,2-Tetrachloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,2,2-Tetrachloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,2,2-Tetrachloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
	1,1,2,2-Tetrachloroethane	0.003	0.0065	0.003	0.285	100	NO	0.08	N/A	N/A	N/A	NO
RCRA-8 Metals mg/kg	Carbon Disulfide	0.025	0.0325	0.025	1.4	0.1	NO	0.14	0.1	100	100	NO
	Methylene Chloride	0.025	0.0325	0.025	0.35	0.1	NO	0.04	4	500	500	NO
	Trans-1,2-Dichloroethene	0.025	0.0325	0.025	0.140	0.3	NO	0.04	0.3	100	100	NO
	Methylenedibutyl Ether (MTBE)	0.025	0.0325	0.025	0.140	3	NO	0.04	3	100	100	NO
	1,1-Dichloroethane	0.025	0.0325	0.025	0.140	3	NO	0.04	3	100	100	NO
	2-Butanone (MEK)	0.025	0.0325	0.025	1.4	0.3	NO	0.37	0.3	40	40	NO
	Chloroform	0.025	0.0325	0.025	0.140	30	NO	0.04	30	100	100	NO
	1,1,1-Trichloroethane	0.025	0.0325	0.025	0.140	1	NO	0.04	1	4	10	NO
	Carbon Tetrachloride	0.025	0.0325	0.025	0.140	10	NO	0.04	10	60	100	NO
	Benzene	0.025	0.0325	0.025	0.140	0.05	NO	0.04	0.05	0.2	0.2	NO
	1,2-Dichloroethane	0.025	0.0325	0.025	0.140	0.4	NO	0.04	0.4	20	100	NO
	Trichloroethene	0.025	0.0325	0.025	0.140	0.1	NO	0.04	0.1	0.2	10	NO
	1,2-Dichloropropane	0.025	0.0325	0.025	0.140	0.1	NO	0.04	0.1	20	20	NO
	Bromodichloromethane	0.025	0.0325	0.025	0.140	0.01	NO	0.04	N/A	N/A	N/A	NO
	4-Methyl-2-Pentanone (MIBK)	0.025	0.0325	0.025	1.4	0.5	NO	0.37	0.5	70	70	NO
	Toluene	0.025	0.0325	0.025	0.140	90	NO	0.04	90	500	500	NO
	Trans-1,3-Dichloropropene	0.025	0.0325	0.025	0.140	0.01	NO	0.04	N/A	N/A	N/A	NO
	1,1,2-Trichloroethane	0.025	0.0325	0.025	0.140	0.3	NO	0.04	0.3	3	3	NO
	Tetrachloroethene	0.025	0.0325	0.025	0.140	0.5	NO	0.04	0.5	30	30	NO
	2-Methanol	0.025	0.0325	0.025	1.4	100	NO	0.37	N/A	N/A	N/A	NO
	Dibromochloromethane	0.025	0.0325	0.025	0.140	8	NO	0.04	8	80	80	NO
	Chlorobenzene	0.025	0.0325	0.025	0.140	80	NO	0.04	80	500	500	NO
	Ethylbenzene	0.025	0.0325	0.025	0.140	500	NO	0.04	500	1000	1000	NO
Polychlorinated biphenyls by EPA Method 8087 mg/kg	meta- and para-Xylene	0.025	0.0325	0.025	0.140	500	NO	0.04	N/A	N/A	N/A	NO
	ortho-Xylene	0.025	0.0325	0.025	0.140	500	NO	0.04	N/A	N/A	N/A	NO
	Total Xylenes	0.050	0.070	0.050	0.280	500	NO	0.07	500	500	500	NO
	Styrene	0.025	0.0325	0.025	0.140	2	NO	0.04	2	20	20	NO
	Bromodim	0.025	0.0325	0.025	0.140	0.1	NO	0.04	0.1	20	20	NO
	1,1,2,2-Tetrachloroethane	0.025	0.0325	0.025	0.140	0.02	YES	16.3	0.02	0.2	0.2	NO
	Artenic	8.2	32.0	22.0	3.1	30	YES	16.3	30	30	30	NO
	Cadmium	0.3	0.3	0.3	0.3	30	NO	0.3	30	80	80	NO
	Chromium	13.0	19.0	12.0	16.0	1,000	NO	15.0	1,000	2,500	5,000	NO
	Lead	6.0	6.0	5.5	6.0	300	NO	5.9	300	600	600	NO
	Mercury	0.0	0.0	0.0	0.0	20	NO	0.0	20	60	60	NO
	Barium	12.0	49.0	38.0	72.0	1,000	NO	27.8	1,000	2,500	5,000	NO
	Selenium	6.0	6.0	6.0	6.0	400	NO	6.0	400	2,500	2,500	NO
	Silver	3.0	4.9	2.9	3.1	100	NO	3.5	100	200	200	NO
	Arachar 1016	0.047	NT	NT	0.048	2	NO	0.0475	2	2	2	NO
	Arachar 1221	0.047	NT	NT	0.048	2	NO	0.0475	2	2	2	NO
	Arachar 1232	0.047	NT	NT	0.048	2	NO	0.0475	2	2	2	NO
	Arachar 1242	0.047	NT	NT	0.048	2	NO	0.0475	2	2	2	NO
	Arachar 1248	0.047	NT	NT	0.048	2	NO	0.0475	2	2	2	NO
	Arachar 1254	0.047	NT	NT	0.048	2	NO	0.0475	2	2	2	NO
	Arachar 1260	0.047	NT	NT	0.048	2	NO	0.0475	2	2	2	NO

Soil sample locations are shown in Figure 3
Numbers in italics indicate half the laboratory's detection limit, or below Reportable Limit (RL)
MADEP = Massachusetts Department of Environmental Protection
RTN = Release Tracking Number
CHM = Oil and/or Hazardous Material
GC = Gas Chromatography
PID = Photoionization Detector
FD = Flame Ionization Detector
mg/kg = milligrams per kilogram
11/30/2000 = Typical date soil sample was collected
NT = Not tested for (Analysis not conducted)
S-1GW-2 = Typical MADEP Soil Category
RCS-1 = MADEP Reportable Concentrations for a S-1 soil (e.g. Residential Soil)

Table 3 LABORATORY RESULTS FOR GROUNDWATER FROM MONITORING WELLS AT THE PROPERTY

Former Highway Department Garage, 10 School Ave., Topsheld, MA, CSE Project No. 2000.34											
Testing Methodology	Q-4M	12/06/2000 MMW1	12/15/2000 MMW1	12/06/2000 MMW2	12/06/2000 MMW3	Applicable DEP Reportable Concentrations (RCGW-2) (ug/l)	Exceeds RCGW-2?	MADEP Method 1 Cleanup Standards GW-1 (ug/l)	MADEP Method 1 Cleanup Standards GW-2 (ug/l)	MADEP Method 1 Cleanup Standards GW-3 (ug/l)	Exceeds Applicable Cleanup Standards?
Extractable Petroleum Hydrocarbons w/ Target Analytes MADEP Method (1898) ug/l	C 8 - C 18 Aliphatics	250	NT	250	250	1,000	NO	4,000	1,000	20,000	NO
	C 18 - C 30 Aliphatics	250	NT	250	250	20,000	NO	5,000	N/A	70,000	NO
	C 11 - C 22 Aromatics	340	NT	100	100	30,000	NO	200	50,000	30,000	NO
	Naphthalene	5	NT	5	5	6,000	NO	20	6,000	6,000	NO
	2-Methylnaphthalene	2.5	NT	2.5	2.5	3,000	NO	10	10,000	3,000	NO
	Phenanthrene	5	NT	5	5	50	NO	300	N/A	50	NO
	Acenaphthene	5	NT	5	5	5,000	NO	20	N/A	5,000	NO
	Acenaphthylene	5	NT	5	5	3,000	NO	300	N/A	3,000	NO
	Fluorene	5	NT	5	5	3,000	NO	300	N/A	3,000	NO
	Anthracene	5	NT	5	5	3,000	NO	2,000	N/A	3,000	NO
	Fluoranthene	5	NT	5	5	200	NO	300	N/A	200	NO
	Pyrene	5	NT	5	5	3,000	NO	200	N/A	3,000	NO
	Benzo[a]anthracene	5	NT	5	5	3,000	NO	1	N/A	3,000	NO
	Chrysene	5	NT	5	5	3,000	NO	2	N/A	3,000	NO
	Benzo[b]fluoranthene	5	NT	5	5	3,000	NO	1	N/A	3,000	NO
	Benzo[k]fluoranthene	5	NT	5	5	3,000	NO	0.2	N/A	3,000	NO
	Indeno[1,2,3-cd]pyrene	5	NT	5	5	3,000	NO	0.5	N/A	3,000	NO
	Dibenz[ah]anthracene	5	NT	5	5	3,000	NO	0.5	N/A	3,000	NO
	Benzo[ghi]perylene	5	NT	5	5	3,000	NO	300	N/A	3,000	NO
	Volatile Organic Compounds by GC/MS EPA Method 8260B (ug/l)	Chloromethane	0.25	NT	0.25	0.25	10,000	NO	N/A	N/A	N/A
Vinyl Chloride		0.25	NT	0.25	0.25	2	NO	2	2	40,000	NO
Bromomethane		0.25	NT	0.25	0.25	2	NO	10	2	50,000	NO
Chloroethane		0.25	NT	0.25	0.25	10,000	NO	N/A	N/A	N/A	NO
1,1-Dichloroethane		0.25	NT	0.25	0.25	1	NO	7	1	50,000	NO
Acetone		2.5	NT	2.5	2.5	50,000	NO	3,000	50,000	50,000	NO
Carbon Disulfide		2.5	NT	2.5	2.5	10,000	NO	N/A	N/A	N/A	NO
Methylene Chloride		1	NT	1	1	50,000	NO	5	50,000	50,000	NO
trans-1,2-Dichloroethane		0.25	NT	0.25	0.25	20,000	NO	100	20,000	50,000	NO
cis-1,2-Dichloroethane		0.25	NT	0.25	0.25	9,000	NO	70	9,000	50,000	NO
2-Butanone (MEK)		2.5	NT	2.5	2.5	50,000	NO	350	50,000	50,000	NO
Chloroform		0.25	NT	0.25	0.25	400	NO	5	400	10,000	NO
1,1,1-Trichloroethane		0.25	NT	0.25	0.25	200	NO	200	4,000	50,000	NO
Carbon Tetrachloride		0.25	NT	0.25	0.25	20	NO	5	20	50,000	NO
Benzene		0.25	NT	0.25	0.25	2,000	NO	5	2,000	7,000	NO
1,2-Dichloroethane		0.25	NT	0.25	0.25	20	NO	5	20	50,000	NO
Trichloroethene		0.25	NT	0.25	0.25	300	NO	5	300	20,000	NO
1,2-Dichloropropane		0.25	NT	0.25	0.25	9	NO	5	9	30,000	NO
Bromodichloromethane		0.25	NT	0.25	0.25	50,000	NO	5	N/A	50,000	NO
RCRA-8 Metals ug/l		cis-1,3-Dichloropropene	0.25	NT	0.25	0.25	5	NO	N/A	N/A	N/A
	4-Methyl-2-Pentanone (MIBK)	2.5	NT	2.5	2.5	50,000	NO	350	50,000	50,000	NO
	Toluene	0.25	NT	0.25	0.25	6,000	NO	1,000	6,000	50,000	NO
	trans-1,3-Dichloropropene	0.25	NT	0.25	0.25	5	NO	N/A	N/A	N/A	NO
	1,1,2-Trichloroethane	0.25	NT	0.25	0.25	20,000	NO	5	20,000	50,000	NO
	1,1,2,2-Tetrachloroethane	0.25	NT	0.25	0.25	3,000	NO	5	3,000	6,000	NO
	2-Hexanone	2.5	NT	2.5	2.5	10,000	NO	N/A	N/A	N/A	NO
	Dibromochloromethane	0.25	NT	0.25	0.25	50,000	NO	5	50,000	50,000	NO
	Chlorobenzene	0.25	NT	0.25	0.25	500	NO	100	1,000	500	NO
	Ethylbenzene	0.25	NT	0.25	0.25	4,000	NO	700	30,000	4,000	NO
	meta- and para-Xylene	0.25	NT	0.25	0.25	6,000	NO	N/A	N/A	N/A	NO
	ortho-Xylene	0.25	NT	0.25	0.25	6,000	NO	N/A	N/A	N/A	NO
	Total Xylenes	0.50	NT	0.50	0.50	6,000	NO	10,000	6,000	50,000	NO
	Styrene	0.25	NT	0.25	0.25	900	NO	100	900	50,000	NO
	Bromodiform	0.25	NT	0.25	0.25	800	NO	5	800	50,000	NO
	1,1,2,2-Tetrachloroethane	0.25	NT	0.25	0.25	20	NO	2	20	20,000	NO
	Methyl tert-butyl Ether (MTBE)	0.25	NT	0.25	0.25	50,000	NO	70	50,000	50,000	NO
	Arsenic	30*	20	40	30	400	NO	50	N/A	400	NO
	Cadmium	2.5*	2.5	2.5	2.5	10	NO	5	N/A	10	NO
	Chromium	10*	5	5	10	2,000	NO	100	N/A	2,000	NO
Lead	31*	2.5	17	7	30	NO	15	N/A	30	NO	
Mercury	0.1*	0.1	0.1	0.1	1	NO	2	N/A	1	NO	
Barium	100*	800	100	100	30,000	NO	2,000	N/A	30,000	NO	
Selenium	5*	5	5	5	80	NO	50	N/A	80	NO	
Silver	5*	5	5	5	7	NO	40	N/A	7	NO	

Groundwater sample locations are shown on Figure 3.

*Numbers in *italics* indicate half the detection limit, or Below Reportable Limits (BRL).

* Sample analyzed for Total Metals and therefore not representative of dissolved groundwater concentrations. MMW1 was re-sampled for Dissolved Metals on 12/15/2000

MMW1 = Typical groundwater sampling location and typical groundwater sample ID

Q-4M = Oil and/or Hazardous Material

12/06/2000 = Typical date sample was collected

EPA = Environmental Protection Agency

MADEP = Massachusetts Department of Environmental Protection

ug/l = micrograms per liter

NT = Not tested for (Analysis not conducted)

VOC = Volatile Organic Compounds

EPH = Extractable Petroleum Hydrocarbons

GC/MS = Gas Chromatography with Mass Spectrometry Confirmation

RCRA = Resource Conservation and Recovery Act

RCGW-2 = Groundwater Reporting Category GW-2 (For All Groundwater that is not Categorized as RCGW-1)

RCGW-1 = Groundwater Reporting Category GW-1 (Groundwater for Current or Potential Drinking Water Source)

CSE does not believe that the RCGW-1 Reporting Category applies to this site.

GW-1, GW-2, & GW-3 = MADEP Groundwater Categories

Appendix C
LABORATORY REPORTS

GROUNDWATER ANALYTICAL

Groundwater Analytical, Inc.
P.O. Box 1200
228 Main Street
Buzzards Bay, MA 02532
Telephone (508) 759-4441
FAX (508) 759-4475

February 1, 2001

Mr. William Mitchell
Clean Soils Environmental
P.O. Box 591
Ipswich, MA 01938

Project: Topsfield DPW/2000.34
Lab ID: 38725
Sampled: 01-22-01 and 01-24-01

Dear Bill:

Enclosed are the Volatile Petroleum Hydrocarbons, Extractable Petroleum Hydrocarbons, Metals, PCBs and Volatile Organics Analyses performed for the above referenced project. This project was processed for Priority One Week turnaround.

This letter authorizes the release of the analytical results, and should be considered a part of this report. This report contains a project narrative indicating project changes and non-conformances, a brief description of the Quality Assurance/Quality Control procedures employed by our laboratory, and a statement of our state certifications.

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Should you have any questions concerning this report, please do not hesitate to contact me.

Sincerely,



Jonathan R. Sanford
President

JRS/amb
Enclosures

GROUNDWATER ANALYTICAL

EPA Method 8082 Polychlorinated Biphenyls (PCBs) by GC/ECD

Field ID: IW
Project: Topsfield DPW/2000.34
Client: Clean Soils Environmental
Container: 250 mL Glass
Preservation: Cool
Matrix: Soil
% Moisture: 17

Laboratory ID: 38725-01
QC Batch ID: PB-1226-M
Sampled: 01-24-01
Received: 01-25-01
Extracted: 01-26-01
Analyzed: 01-30-01
Dilution Factor: 1

CAS Number	Analyte	Concentration	Units	Reporting Limit
12674-11-2	Aroclor 1016	BRL	ug/Kg	96
11104-28-2	Aroclor 1221	BRL	ug/Kg	96
11141-16-5	Aroclor 1232	BRL	ug/Kg	96
53469-21-9	Aroclor 1242	BRL	ug/Kg	96
12672-29-6	Aroclor 1248	BRL	ug/Kg	96
11097-69-1	Aroclor 1254	BRL	ug/Kg	96
11096-82-5	Aroclor 1260	BRL	ug/Kg	96

QC Surrogate Compound	Recovery	QC Limits
Tetrachloro- <i>m</i> -xylene	68 %	25 - 121 %
Decachlorobiphenyl	98 %	28 - 138 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as Aroclor analytes formerly specified by EPA Method 8080A. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.

GROUNDWATER ANALYTICAL

Trace Metals by ICP-AES and CVAA

Field ID: IW
Project: Topsfield DPW/2000.34
Client: Clean Soils Environmental
Container: 250 mL Glass
Preservation: Cool
Matrix: Soil

Laboratory ID: 38725-01
Sampled: 01-24-01
Received: 01-25-01
% Solids 83

CAS Number	Analyte	Concentration	Units	Reporting Limit	Analyzed	QC Batch	Method
7440-38-2	Arsenic, Total	BRL	mg/Kg	6.1	01-26-01	MM-01214-S	6010B
7440-39-3	Barium, Total	BRL	mg/Kg	24	01-26-01	MM-01214-S	6010B
7440-43-9	Cadmium, Total	BRL	mg/Kg	0.61	01-26-01	MM-01214-S	6010B
7440-47-3	Chromium, Total	16	mg/Kg	12	01-26-01	MM-01214-S	6010B
7439-92-1	Lead, Total	BRL	mg/Kg	12	01-26-01	MM-01214-S	6010B
7439-97-6	Mercury, Total	BRL	mg/Kg	0.059	01-26-01	MP-0926-S	7471A
7782-49-2	Selenium, Total	BRL	mg/Kg	12	01-26-01	MM-01214-S	6010B
7440-22-4	Silver, Total	BRL	mg/Kg	6.1	01-26-01	MM-01214-S	6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions.
Reporting limits are adjusted for sample dilution and sample size.

GROUNDWATER ANALYTICAL

Massachusetts DEP EPH Method Extractable Petroleum Hydrocarbons by GC/FID

Field ID: IW
Project: Topsfield DPW/2000.34
Client: Clean Soils Environmental
Container: 120 mL Amber Glass
Preservation: Cool
Matrix: Soil
% Moisture: 20

Laboratory ID: 38725-02
QC Batch ID: EP-1096-M
Sampled: 01-24-01
Received: 01-25-01
Extracted: 01-26-01
Analyzed: 01-30-01
Dilution Factor: Aliphatic: 1 Aromatic: 1

EPH Ranges	Concentration	Units	Reporting Limit
n-C9 to n-C18 Aliphatic Hydrocarbons †	97	mg/Kg	34
n-C19 to n-C36 Aliphatic Hydrocarbons †	390	mg/Kg	34
n-C11 to n-C22 Aromatic Hydrocarbons †‡	150	mg/Kg	34
Unadjusted n-C11 to n-C22 Aromatic Hydrocarbons †	150	mg/Kg	34

CAS Number	Target Analytes	Concentration	Units	Reporting Limit
91-20-3	Naphthalene	BRL	mg/Kg	0.57
91-57-6	2-Methylnaphthalene	BRL	mg/Kg	0.57
85-01-8	Phenanthrene	BRL	mg/Kg	0.57
83-32-9	Acenaphthene	BRL	mg/Kg	0.57
208-96-8	Acenaphthylene	BRL	mg/Kg	0.57
86-73-7	Fluorene	BRL	mg/Kg	0.57
120-12-7	Anthracene	BRL	mg/Kg	0.57
206-44-0	Fluoranthene	BRL	mg/Kg	0.57
129-00-0	Pyrene	BRL	mg/Kg	0.57
56-55-3	Benzo[a]anthracene	BRL	mg/Kg	0.57
218-01-9	Chrysene	BRL	mg/Kg	0.57
205-99-2	Benzo[b]fluoranthene	BRL	mg/Kg	0.57
207-08-9	Benzo[k]fluoranthene	BRL	mg/Kg	0.57
50-32-8	Benzo[a]pyrene	BRL	mg/Kg	0.57
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL	mg/Kg	0.57
53-70-3	Dibenzo[a,h]anthracene	BRL	mg/Kg	0.57
191-24-2	Benzo[g,h,i]perylene	BRL	mg/Kg	0.57

QC Surrogate Compounds	Recovery	QC Limits
Fractionation: 2-Fluorobiphenyl	84 %	40 - 140 %
2-Bromonaphthalene	72 %	40 - 140 %
Extraction: Chloro-octadecane	57 %	40 - 140 %
ortho-Terphenyl	72 %	40 - 140 %

QA/QC Certification	
1. Were all QA/QC procedures required by the method followed?	Yes
2. Were all performance/acceptance standards for the required QA/QC procedures achieved?	Yes
3. Were any significant modifications made to the method, as specified in Section 11.3.1.1?	Yes
Method non-conformances indicated above are detailed below on this data report, or in the accompanying project narrative and project quality control report. Release of this data is authorized by the accompanying signed project cover letter. The accompanying cover letter, project narrative and quality control report are considered part of this data report.	

Method Reference: Method for the Determination of Extractable Petroleum Hydrocarbons, MA DEP (1998). Results are calculated on a dry weight basis. Method modified by use of microwave accelerated solvent extraction technique.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.
† Hydrocarbon range data excludes concentrations of any surrogate(s) and/or internal standards eluting in that range.
‡ n-C11 to n-C22 Aromatic Hydrocarbons range data excludes the method target analyte concentrations.

GROUNDWATER ANALYTICAL

Massachusetts DEP VPH Method Volatile Petroleum Hydrocarbons by GC/PID/FID

Field ID: IW
Project: Topsfield DPW/2000.34
Client: Clean Soils Environmental
Container: 60 mL Glass Vial
Preservation: Methanol / Cool
Matrix: Soil
% Moisture: 22

Laboratory ID: 38725-03
QC Batch ID: VG1-1189-E
Sampled: 01-24-01
Received: 01-25-01
Analyzed: 01-30-01
Dilution Factor: 1

VPH Ranges	Concentration	Units	Reporting Limit
n-C5 to n-C8 Aliphatic Hydrocarbons [†] ⊖	BRL	mg/Kg	1.5
n-C9 to n-C12 Aliphatic Hydrocarbons [†] ⊗	5.5	mg/Kg	1.5
n-C9 to n-C10 Aromatic Hydrocarbons [†]	7.6	mg/Kg	1.5
Unadjusted n-C5 to n-C8 Aliphatic Hydrocarbons [†]	BRL	mg/Kg	1.5
Unadjusted n-C9 to n-C12 Aliphatic Hydrocarbons [†]	13	mg/Kg	1.5
QC Surrogate Compounds	Recovery	QC Limits	
2,5-Dibromotoluene (PID)	94 %	70 - 130 %	
2,5-Dibromotoluene (FID)	93 %	70 - 130 %	

QA/QC Certification		
1. Were all QA/QC procedures required by the method followed?		Yes
2. Were all performance/acceptance standards for the required QA/QC procedures achieved?		Yes
3. Were any significant modifications made to the method, as specified in Section 11.3.2.11		No
Method non-conformances indicated above are detailed below on this data report, or in the accompanying project narrative and project quality control report. Release of this data is authorized by the accompanying signed project cover letter. The accompanying cover letter, project narrative and quality control report are considered part of this data report.		

Method Reference: Method for the Determination of Volatile Petroleum Hydrocarbons, MA DEP (1998). Results are calculated on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.

† Hydrocarbon range data excludes concentrations of any surrogate(s) and/or internal standards eluting in that range.

⊖ n-C5 to n-C8 Aliphatic Hydrocarbons range data excludes the method target analyte concentrations.

⊗ n-C9 to n-C12 Aliphatic Hydrocarbons range data excludes the method target analyte concentrations and the concentration for the n-C9 to n-C10 Aromatic Hydrocarbons range.

⊠ Analyte elutes in the n-C5 to n-C8 Aliphatic Hydrocarbons range.

‡ Analyte elutes in the n-C9 to n-C12 Aliphatic Hydrocarbons range.

GROUNDWATER ANALYTICAL

EPA Method 8260B TCL Volatile Organics by GC/MS

Field ID: IW
Project: Topsfield DPW/2000.34
Client: Clean Soils Environmental Ltd.
Container: 40 mL VOA Vial
Preservation: Methanol/Cool
Matrix: Soil
% Moisture: 22

Laboratory ID: 38725-04
QC Batch ID: VM1-1915-S
Sampled: 01-24-01
Received: 01-25-01
Analyzed: 01-29-01
Dilution Factor: 1

CAS Number	Analyte	Concentration	Units	Reporting Limit
74-87-3	Chloromethane	BRL	ug/Kg	570
75-01-4	Vinyl Chloride	BRL	ug/Kg	570
74-83-9	Bromomethane	BRL	ug/Kg	570
75-00-3	Chloroethane	BRL	ug/Kg	570
75-35-4	1,1-Dichloroethene	BRL	ug/Kg	280
67-64-1	Acetone	BRL	ug/Kg	2,800
75-15-0	Carbon Disulfide	BRL	ug/Kg	2,800
75-09-2	Methylene Chloride	BRL	ug/Kg	1,100
156-60-5	trans-1,2-Dichloroethene	BRL	ug/Kg	280
1634-04-4	Methyl tert-butyl Ether (MTBE) ^o	BRL	ug/Kg	280
75-34-3	1,1-Dichloroethane	BRL	ug/Kg	280
156-59-2	cis-1,2-Dichloroethene	BRL	ug/Kg	280
78-93-3	2-Butanone (MEK)	BRL	ug/Kg	2,800
67-66-3	Chloroform	BRL	ug/Kg	280
71-55-6	1,1,1-Trichloroethane	BRL	ug/Kg	280
56-23-5	Carbon Tetrachloride	BRL	ug/Kg	280
71-43-2	Benzene	BRL	ug/Kg	280
107-06-2	1,2-Dichloroethane	BRL	ug/Kg	280
79-01-6	Trichloroethene	BRL	ug/Kg	280
78-87-5	1,2-Dichloropropane	BRL	ug/Kg	280
75-27-4	Bromodichloromethane	BRL	ug/Kg	280
10061-01-5	cis-1,3-Dichloropropene	BRL	ug/Kg	280
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/Kg	2,800
108-88-3	Toluene	BRL	ug/Kg	280
10061-02-6	trans-1,3-Dichloropropene	BRL	ug/Kg	280
79-00-5	1,1,2-Trichloroethane	BRL	ug/Kg	280
127-18-4	Tetrachloroethene	BRL	ug/Kg	280
591-78-6	2-Hexanone	BRL	ug/Kg	2,800
124-48-1	Dibromochloromethane	BRL	ug/Kg	280
108-90-7	Chlorobenzene	BRL	ug/Kg	280
100-41-4	Ethylbenzene	BRL	ug/Kg	280
108-38-3/106-42-3	meta-Xylene and para-Xylene	BRL	ug/Kg	280
95-47-6	ortho-Xylene	BRL	ug/Kg	280
100-42-5	Styrene	BRL	ug/Kg	280
75-25-2	Bromoform	BRL	ug/Kg	280
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/Kg	280
QC Surrogate Compounds		Recovery	QC Limits	
Dibromofluoromethane		101 %	80 - 120 %	
1,2-Dichloroethane-d ₄		99 %	80 - 120 %	
Toluene-d ₈		101 %	81 - 117 %	
4-Bromofluorobenzene		93 %	74 - 121 %	

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as specified by the Target Compound List (TCL) of the US EPA Contract Laboratory Program. Results are reported on a dry weight basis. Analysis performed utilizing methanol extraction technique.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions.
Reporting limits are adjusted for sample dilution, percent moisture and sample size.
o Indicates additional target analyte.

GROUNDWATER ANALYTICAL

Massachusetts DEP VPH Method Volatile Petroleum Hydrocarbons by GC/PID/FID

Field ID: Trip Blank
Project: Topsfield DPW/2000.34
Client: Clean Soils Environmental
Container: 60 mL Glass Vial
Preservation: Cool
Matrix: Methanol
% Moisture: N/A

Laboratory ID: 38725-05
QC Batch ID: VG1-1189-E
Sampled: 01-24-01
Received: 01-25-01
Analyzed: 01-30-01
Dilution Factor: 1

VPH Ranges	Concentration	Units	Reporting Limit
n-C5 to n-C8 Aliphatic Hydrocarbons [†] ⊖	BRL	mg/Kg	1.0
n-C9 to n-C12 Aliphatic Hydrocarbons [†] ⊗	BRL	mg/Kg	1.0
n-C9 to n-C10 Aromatic Hydrocarbons [†]	BRL	mg/Kg	1.0
Unadjusted n-C5 to n-C8 Aliphatic Hydrocarbons [†]	BRL	mg/Kg	1.0
Unadjusted n-C9 to n-C12 Aliphatic Hydrocarbons [†]	BRL	mg/Kg	1.0
QC Surrogate Compounds	Recovery	QC Limits	
2,5-Dibromotoluene (PID)	100 %	70 - 130 %	
2,5-Dibromotoluene (FID)	97 %	70 - 130 %	

QA/QC Certification	
1. Were all QA/QC procedures required by the method followed?	Yes
2. Were all performance/acceptance standards for the required QA/QC procedures achieved?	Yes
3. Were any significant modifications made to the method, as specified in Section 11.3.2.1?	No
Method non-conformances indicated above are detailed below on this data report, or in the accompanying project narrative and project quality control report. Release of this data is authorized by the accompanying signed project cover letter. The accompanying cover letter, project narrative and quality control report are considered part of this data report.	

Method Reference: Method for the Determination of Volatile Petroleum Hydrocarbons, MA DEP (1998). Results are calculated on a wet weight basis.

Report Notations:

BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.

† Hydrocarbon range data excludes concentrations of any surrogate(s) and/or internal standards eluting in that range.

⊖ n-C5 to n-C8 Aliphatic Hydrocarbons range data excludes the method target analyte concentrations.

⊗ n-C9 to n-C12 Aliphatic Hydrocarbons range data excludes the method target analyte concentrations and the concentration for the n-C9 to n-C10 Aromatic Hydrocarbons range.

⊠ Analyte elutes in the n-C5 to n-C8 Aliphatic Hydrocarbons range.

‡ Analyte elutes in the n-C9 to n-C12 Aliphatic Hydrocarbons range.

GROUNDWATER ANALYTICAL

EPA Method 8260B TCL Volatile Organics by GC/MS

Field ID: Trip Blank
Project: Topsfield DPW/2000.34
Client: Clean Soils Environmental Ltd.
Container: 40 mL VOA Vial
Preservation: Cool
Matrix: Methanol
% Moisture: N/A

Laboratory ID: 38725-06
QC Batch ID: VM1-1915-S
Sampled: 01-24-01
Received: 01-25-01
Analyzed: 01-29-01
Dilution Factor: 1

CAS Number	Analyte	Concentration	Units	Reporting Limit
74-87-3	Chloromethane	BRL	ug/Kg	500
75-01-4	Vinyl Chloride	BRL	ug/Kg	500
74-83-9	Bromomethane	BRL	ug/Kg	500
75-00-3	Chloroethane	BRL	ug/Kg	500
75-35-4	1,1-Dichloroethene	BRL	ug/Kg	250
67-64-1	Acetone	BRL	ug/Kg	2,500
75-15-0	Carbon Disulfide	BRL	ug/Kg	2,500
75-09-2	Methylene Chloride	BRL	ug/Kg	1,000
156-60-5	trans- 1,2-Dichloroethene	BRL	ug/Kg	250
1634-04-4	Methyl tert- butyl Ether (MTBE) ^o	BRL	ug/Kg	250
75-34-3	1,1-Dichloroethane	BRL	ug/Kg	250
156-59-2	cis- 1,2-Dichloroethene	BRL	ug/Kg	250
78-93-3	2-Butanone (MEK)	BRL	ug/Kg	2,500
67-66-3	Chloroform	BRL	ug/Kg	250
71-55-6	1,1,1-Trichloroethane	BRL	ug/Kg	250
56-23-5	Carbon Tetrachloride	BRL	ug/Kg	250
71-43-2	Benzene	BRL	ug/Kg	250
107-06-2	1,2-Dichloroethane	BRL	ug/Kg	250
79-01-6	Trichloroethene	BRL	ug/Kg	250
78-87-5	1,2-Dichloropropane	BRL	ug/Kg	250
75-27-4	Bromodichloromethane	BRL	ug/Kg	250
10061-01-5	cis- 1,3-Dichloropropene	BRL	ug/Kg	250
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/Kg	2,500
108-88-3	Toluene	BRL	ug/Kg	250
10061-02-6	trans- 1,3-Dichloropropene	BRL	ug/Kg	250
79-00-5	1,1,2-Trichloroethane	BRL	ug/Kg	250
127-18-4	Tetrachloroethene	BRL	ug/Kg	250
591-78-6	2-Hexanone	BRL	ug/Kg	2,500
124-48-1	Dibromochloromethane	BRL	ug/Kg	250
108-90-7	Chlorobenzene	BRL	ug/Kg	250
100-41-4	Ethylbenzene	BRL	ug/Kg	250
108-38-3/106-42-3	meta- Xylene and para- Xylene	BRL	ug/Kg	250
95-47-6	ortho- Xylene	BRL	ug/Kg	250
100-42-5	Styrene	BRL	ug/Kg	250
75-25-2	Bromoform	BRL	ug/Kg	250
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/Kg	250

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	98 %	80 - 120 %
1,2-Dichloroethane-d ₄	96 %	80 - 120 %
Toluene-d ₈	98 %	81 - 117 %
4-Bromofluorobenzene	94 %	74 - 121 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as specified by the Target Compound List (TCL) of the US EPA Contract Laboratory Program. Results are reported on a wet weight basis. Analysis performed utilizing methanol extraction technique.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.

o Indicates additional target analyte.

Project Narrative

Project: **Topsfield DPW/2000.34**
Client: **Clean Soils Environmental**

Lab ID: **38725**
Received: **01-25-01**

A. Physical Condition of Sample(s)

This project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged in appropriate containers with the correct preservation.

B. Project Documentation

This project was accompanied by satisfactory Chain of Custody documentation. The sample container label(s) agreed with the Chain of Custody.

C. Analysis of Sample(s)

No analytical anomalies or non-conformances were noted by the laboratory during the processing of these sample(s). All data contained within this report are released without qualification.

Quality Assurance/Quality Control

A. Program Overview

Groundwater Analytical conducts an active Quality Assurance program to ensure the production of high quality, valid data. This program closely follows the guidance provided by *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*, US EPA QAMS-005/80 (1980), and *Test Methods for Evaluating Solid Waste*, US EPA, SW-846, Update III (1996).

Quality Control protocols include written Standard Operating Procedures (SOPs) developed for each analytical method. SOPs are derived from US EPA methodologies and other established references. Standards are prepared from commercially obtained reference materials of certified purity, and documented for traceability.

Quality Assessment protocols for most organic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. All samples, standards, blanks, laboratory control samples, matrix spikes and sample duplicates are spiked with internal standards and surrogate compounds. All instrument sequences begin with an initial calibration verification standard and a blank; and excepting GC/MS sequences, all sequences close with a continuing calibration standard. GC/MS systems are tuned to appropriate ion abundance criteria daily, or for each 12 hour operating period, whichever is more frequent.

Quality Assessment protocols for most inorganic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. Standard curves are derived from one reagent blank and four concentration levels. Curve validity is verified by standard recoveries within plus or minus ten percent of the curve.

B. Definitions

Batches are used as the basic unit for Quality Assessment. A Batch is defined as twenty or fewer samples of the same matrix which are prepared together for the same analysis, using the same lots of reagents and the same techniques or manipulations, all within the same continuum of time, up to but not exceeding 24 hours.

Laboratory Control Samples are used to assess the accuracy of the analytical method. A Laboratory Control Sample consists of reagent water or sodium sulfate spiked with a group of target analytes representative of the method analytes. Accuracy is defined as the degree of agreement of the measured value with the true or expected value. Percent Recoveries for the Laboratory Control Samples are calculated to assess accuracy.

Method Blanks are used to assess the level of contamination present in the analytical system. Method Blanks consist of reagent water or an aliquot of sodium sulfate. Method Blanks are taken through all the appropriate steps of an analytical method. Sample data reported is not corrected for blank contamination.

Surrogate Compounds are used to assess the effectiveness of an analytical method in dealing with each sample matrix. Surrogate Compounds are organic compounds which are similar to the target analytes of interest in chemical behavior, but which are not normally found in environmental samples. Percent Recoveries are calculated for each Surrogate Compound.

GROUNDWATER ANALYTICAL

Quality Control Report Laboratory Control Sample

Category: MA DEP EPH Method
QC Batch ID: EP-1096-M
Matrix: Soil
Units: mg/Kg

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
111-84-2	n-Nonane (C9)	5.0	2.4	47 %	40 - 140 %
629-59-4	n-Tetradecane (C14)	5.0	2.7	55 %	40 - 140 %
629-92-5	n-Nonadecane (C19)	5.0	3.6	73 %	40 - 140 %
112-95-8	n-Eicosane (C20)	5.0	3.8	76 %	40 - 140 %
630-02-4	n-Octacosane (C28)	5.0	4.3	86 %	40 - 140 %
91-20-3	Naphthalene	5.0	2.6	53 %	40 - 140 %
83-32-9	Acenaphthene	5.0	3.1	61 %	40 - 140 %
120-12-7	Anthracene	5.0	4.4	88 %	40 - 140 %
129-00-0	Pyrene	5.0	4.5	90 %	40 - 140 %
218-01-9	Chrysene	5.0	5.0	100 %	40 - 140 %

QC Surrogate Compounds		Recovery	QC Limits
Fractionation:	2-Fluorobiphenyl	93 %	40 - 140 %
	2-Bromonaphthalene	61 %	40 - 140 %
Extraction:	Chloro-octadecane	75 %	40 - 140 %
	ortho-Terphenyl	84 %	40 - 140 %

Method Reference: Method for the Determination of Extractable Petroleum Hydrocarbons, MA DEP (1998).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report Method Blank

Category: MA DEP EPH Method
QC Batch ID: EP-1096-M
Matrix: Soil

EPH Ranges	Concentration	Units	Reporting Limit
n-C9 to n-C18 Aliphatic Hydrocarbons †	BRL	mg/Kg	30
n-C19 to n-C36 Aliphatic Hydrocarbons †	BRL	mg/Kg	30
n-C11 to n-C22 Aromatic Hydrocarbons † ^o	BRL	mg/Kg	30
Unadjusted n-C11 to n-C22 Aromatic Hydrocarbons †	BRL	mg/Kg	30

CAS Number	Target Analytes	Concentration	Units	Reporting Limit
91-20-3	Naphthalene	BRL	mg/Kg	0.50
91-57-6	2-Methylnaphthalene	BRL	mg/Kg	0.50
85-01-8	Phenanthrene	BRL	mg/Kg	0.50
83-32-9	Acenaphthene	BRL	mg/Kg	0.50
208-96-8	Acenaphthylene	BRL	mg/Kg	0.50
86-73-7	Fluorene	BRL	mg/Kg	0.50
120-12-7	Anthracene	BRL	mg/Kg	0.50
206-44-0	Fluoranthene	BRL	mg/Kg	0.50
129-00-0	Pyrene	BRL	mg/Kg	0.50
56-55-3	Benzo[a]anthracene	BRL	mg/Kg	0.50
218-01-9	Chrysene	BRL	mg/Kg	0.50
205-99-2	Benzo[b]fluoranthene	BRL	mg/Kg	0.50
207-08-9	Benzo[k]fluoranthene	BRL	mg/Kg	0.50
50-32-8	Benzo[a]pyrene	BRL	mg/Kg	0.50
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL	mg/Kg	0.50
53-70-3	Dibenzo[a,h]anthracene	BRL	mg/Kg	0.50
191-24-2	Benzo[g,h,i]perylene	BRL	mg/Kg	0.50

QC Surrogate Compounds	Recovery	QC Limits
Fractionation: 2-Fluorobiphenyl	86 %	40 - 140 %
2-Bromonaphthalene	79 %	40 - 140 %
Extraction: Chloro-octadecane	80 %	40 - 140 %
ortho-Terphenyl	79 %	40 - 140 %

Method Reference: Method for the Determination of Extractable Petroleum Hydrocarbons, MA DEP (1998).

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.

† Hydrocarbon range data excludes concentrations of any surrogate(s) and/or internal standards eluting in that range.

^o n-C11 to n-C22 Aromatic Hydrocarbons range data excludes the method target analyte concentrations.

GROUNDWATER ANALYTICAL

Quality Control Report Laboratory Control Sample

Category: Metals

Matrix: Soil

CAS Number	Analyte	Method	QC Batch	Units	Spiked	Measured	Recovery	QC Limits
7440-38-2	Arsenic	6010B	MM-1214-SL	mg/Kg	100	92	92 %	80 - 120 %
7440-39-3	Barium	6010B	MM-1214-SL	mg/Kg	100	86	86 %	80 - 120 %
7440-43-9	Cadmium	6010B	MM-1214-SL	mg/Kg	100	88	88 %	80 - 120 %
7440-47-3	Chromium	6010B	MM-1214-SL	mg/Kg	100	91	91 %	80 - 120 %
7439-92-1	Lead	6010B	MM-1214-SL	mg/Kg	100	88	88 %	80 - 120 %
7439-97-6	Mercury	7471A	MP-0926-SL	mg/Kg	0.250	0.253	101 %	80 - 120 %
7782-49-2	Selenium	6010B	MM-1214-SL	mg/Kg	100	98	98 %	80 - 120 %
7440-22-4	Silver	6010B	MM-1214-SL	mg/Kg	5.0	4.6	91 %	80 - 120 %

Method References: Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Update III (1996).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report Method Blank

Category: Metals

Matrix: Soil

CAS Number	Analyte	Result	Units	Reporting Limit	QC Batch	Method
7440-38-2	Arsenic	BRL	mg/Kg	5.0	MM-1214-SB	6010B
7440-39-3	Barium	BRL	mg/Kg	20	MM-1214-SB	6010B
7440-43-9	Cadmium	BRL	mg/Kg	0.50	MM-1214-SB	6010B
7440-47-3	Chromium	BRL	mg/Kg	10	MM-1214-SB	6010B
7439-92-1	Lead	BRL	mg/Kg	10	MM-1214-SB	6010B
7439-97-6	Mercury	BRL	mg/Kg	0.050	MP-0926-SB	7471A
7782-49-2	Selenium	BRL	mg/Kg	10	MM-1214-SB	6010B
7440-22-4	Silver	BRL	mg/Kg	5.0	MM-1214-SB	6010B

Method References: Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Update III (1996).

Report Notations: BRL Indicates result, if any, is below reporting limit for analyte. Reporting limit is the lowest value that can be reliably quantified under routine laboratory operating conditions.
Reporting limits are adjusted for sample dilution and sample size.

GROUNDWATER ANALYTICAL

Quality Control Report Laboratory Control Sample

Category: MA DEP VPH Method
QC Batch ID: VG1-1189-E
Matrix: Soil
Units: mg/Kg

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
1634-04-4	Methyl tert-butyl Ether	2.5	2.7	106%	70 - 130 %
71-43-2	Benzene	2.5	2.7	106%	70 - 130 %
108-88-3	Toluene	2.5	2.8	112%	70 - 130 %
100-41-4	Ethylbenzene	2.5	2.7	108%	70 - 130 %
108-38-3 and 106-42-3	meta- Xylene and para - Xylene	5.0	5.7	114%	70 - 130 %
95-47-6	ortho- Xylene	2.5	2.7	110%	70 - 130 %
91-20-3	Naphthalene	2.5	2.8	113%	70 - 130 %

QC Surrogate Compounds	Recovery	QC Limits
2,5-Dibromotoluene (PID)	103 %	70 - 130 %
2,5-Dibromotoluene (FID)	101 %	70 - 130 %

Method Reference: Method for the Determination of Volatile Petroleum Hydrocarbons, MA DEP (1998).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report Method Blank

Category: MA DEP VPH Method
QC Batch ID: VG1-1189-E
Matrix: Soil

VPH Ranges	Concentration	Units	Reporting Limit
n-C5 to n-C8 Aliphatic Hydrocarbons †	BRL	mg/Kg	1.0
n-C9 to n-C12 Aliphatic Hydrocarbons †	BRL	mg/Kg	1.0
n-C9 to n-C10 Aromatic Hydrocarbons †	BRL	mg/Kg	1.0
Unadjusted n-C5 to n-C8 Aliphatic Hydrocarbons †	BRL	mg/Kg	1.0
Unadjusted n-C9 to n-C12 Aliphatic Hydrocarbons †	BRL	mg/Kg	1.0

QC Surrogate Compounds	Recovery	QC Limits
2,5-Dibromotoluene (PID)	111 %	70 - 130 %
2,5-Dibromotoluene (FID)	107 %	70 - 130 %

Method Reference: Method for the Determination of Volatile Petroleum Hydrocarbons, MA DEP (1998).

Report Notations:

- BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.
- † Hydrocarbon range data excludes concentrations of any surrogate(s) and/or internal standards eluting in that range.
- ◇ n-C5 to n-C8 Aliphatic Hydrocarbons range data excludes the method target analyte concentrations.
- ⊗ n-C9 to n-C12 Aliphatic Hydrocarbons range data excludes the method target analyte concentrations and the concentration for the n-C9 to n-C10 Aromatic Hydrocarbons range.
- ⊠ Analyte elutes in the n-C5 to n-C8 Aliphatic Hydrocarbons range.
- ‡ Analyte elutes in the n-C9 to n-C12 Aliphatic Hydrocarbons range.

GROUNDWATER ANALYTICAL

Quality Control Report Laboratory Control Sample

Category: EPA Method 8082
QC Batch ID: PB-1226-M
Matrix: Soil
Units: ug/Kg

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
11097-69-1	Aroclor 1254	330	280	83%	70 - 130 %
QC Surrogate Compound		Recovery		QC Limits	
Tetrachloro- <i>m</i> -xylene		82%		25 - 121 %	
Decachlorobiphenyl		81%		28 - 138 %	

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Results are calculated on a dry weight basis.

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report Method Blank

Category: EPA Method 8082
QC Batch ID: PB-1226-M
Matrix: Soil

CAS Number	Analyte	Concentration	Units	Reporting Limit
12674-11-2	Aroclor 1016	BRL	ug/Kg	80
11104-28-2	Aroclor 1221	BRL	ug/Kg	80
11141-16-5	Aroclor 1232	BRL	ug/Kg	80
53469-21-9	Aroclor 1242	BRL	ug/Kg	80
12672-29-6	Aroclor 1248	BRL	ug/Kg	80
11097-69-1	Aroclor 1254	BRL	ug/Kg	80
11096-82-5	Aroclor 1260	BRL	ug/Kg	80
QC Surrogate Compound		Recovery	QC Limits	
Tetrachloro- <i>m</i> -xylene		72 %	25 - 121 %	
Decachlorobiphenyl		76 %	28 - 138 %	

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as Aroclor analytes formerly specified by EPA Method 8080A. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.

GROUNDWATER ANALYTICAL

Quality Control Report Laboratory Control Sample

Category: EPA Method 8260B
QC Batch ID: VM1-1915-SL
Matrix: Soil
Units: ug/Kg

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
75-35-4	1,1-Dichloroethene	2,500	2,600	103 %	70 - 130 %
71-43-2	Benzene	2,500	2,600	104 %	70 - 130 %
79-01-6	Trichloroethene	2,500	2,500	101 %	70 - 130 %
108-88-3	Toluene	2,500	2,600	106 %	70 - 130 %
108-90-7	Chlorobenzene	2,500	2,700	108 %	70 - 130 %

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	98 %	80 - 120 %
1,2-Dichloroethane-d ₄	105 %	80 - 120 %
Toluene-d ₈	96 %	81 - 117 %
4-Bromofluorobenzene	96 %	74 - 121 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report Method Blank

Category: EPA Method 8260B
QC Batch ID: VM1-1915-SB
Matrix: Soil

CAS Number	Analyte	Concentration	Units	Reporting Limit
74-87-3	Chloromethane	BRL	ug/Kg	500
75-01-4	Vinyl Chloride	BRL	ug/Kg	500
74-83-9	Bromomethane	BRL	ug/Kg	500
75-00-3	Chloroethane	BRL	ug/Kg	500
75-35-4	1,1-Dichloroethene	BRL	ug/Kg	250
67-64-1	Acetone	BRL	ug/Kg	2,500
75-15-0	Carbon Disulfide	BRL	ug/Kg	2,500
75-09-2	Methylene Chloride	BRL	ug/Kg	1,000
156-60-5	trans- 1,2-Dichloroethene	BRL	ug/Kg	250
1634-04-4	Methyl tert- butyl Ether (MTBE) ^o	BRL	ug/Kg	250
75-34-3	1,1-Dichloroethane	BRL	ug/Kg	250
156-59-2	cis- 1,2-Dichloroethene	BRL	ug/Kg	250
78-93-3	2-Butanone (MEK)	BRL	ug/Kg	2,500
67-66-3	Chloroform	BRL	ug/Kg	250
71-55-6	1,1,1-Trichloroethane	BRL	ug/Kg	250
56-23-5	Carbon Tetrachloride	BRL	ug/Kg	250
71-43-2	Benzene	BRL	ug/Kg	250
107-06-2	1,2-Dichloroethane	BRL	ug/Kg	250
79-01-6	Trichloroethene	BRL	ug/Kg	250
78-87-5	1,2-Dichloropropane	BRL	ug/Kg	250
75-27-4	Bromodichloromethane	BRL	ug/Kg	250
10061-01-5	cis- 1,3-Dichloropropene	BRL	ug/Kg	250
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/Kg	2,500
108-88-3	Toluene	BRL	ug/Kg	250
10061-02-6	trans- 1,3-Dichloropropene	BRL	ug/Kg	250
79-00-5	1,1,2-Trichloroethane	BRL	ug/Kg	250
127-18-4	Tetrachloroethene	BRL	ug/Kg	250
591-78-6	2-Hexanone	BRL	ug/Kg	2,500
124-48-1	Dibromochloromethane	BRL	ug/Kg	250
108-90-7	Chlorobenzene	BRL	ug/Kg	250
100-41-4	Ethylbenzene	BRL	ug/Kg	250
108-38-3/106-42-3	meta- Xylene and para- Xylene	BRL	ug/Kg	250
95-47-6	ortho- Xylene	BRL	ug/Kg	250
100-42-5	Styrene	BRL	ug/Kg	250
75-25-2	Bromoform	BRL	ug/Kg	250
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/Kg	250

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	98 %	80 - 120 %
1,2-Dichloroethane-d ₄	101 %	80 - 120 %
Toluene-d ₈	97 %	81 - 117 %
4-Bromofluorobenzene	95 %	74 - 121 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as specified by the Target Compound List (TCL) of the US EPA Contract Laboratory Program. Results are reported on a dry weight basis. Analysis performed utilizing methanol extraction technique.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions.
Reporting limits are adjusted for sample dilution, percent moisture and sample size.

^o Indicates additional target analyte.

GROUNDWATER ANALYTICAL

Certifications and Approvals

CONNECTICUT, Department of Health Services, PH-0586

Potable Water, Wastewater/Trade Waste, Sewage/Effluent, and Soil

pH, Conductivity, Acidity, Alkalinity, Hardness, Chloride, Fluoride, Ammonia, Kjeldahl Nitrogen, Nitrate, Nitrite, Orthophosphate, Total Dissolved Solids, Cyanide, Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Total Chromium, Hexavalent Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Tin, Titanium, Vanadium, Zinc, Purgeable Halocarbons, Purgeable Aromatics, Pesticides, PCBs, PCBs in Oil, Ethylene Dibromide, Phenols, Oil and Grease.

MAINE, Department of Human Services, MA103

Drinking Water

Reciprocal certification in accordance with Massachusetts certification for drinking water analytes.

Waste Water

Reciprocal certification in accordance with Massachusetts certification for waste water analytes.

MASSACHUSETTS, Department of Environmental Protection, M-MA-103

Potable Water

Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Thallium, Nitrate-N, Nitrite-N, Fluoride, Sodium, Sulfate, Cyanide, Turbidity, Residual Free Chlorine, Calcium, Total Alkalinity, Total Dissolved Solids, pH, Trihalomethanes, Volatile Organic Compounds, 1,2-Dibromoethane, 1,2-Dibromo-3-chloropropane, Total Coliform, Fecal Coliform, Heterotrophic Plate Count, E-Coli

Non-Potable Water

Aluminum, Antimony, Arsenic, Beryllium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Mercury, Molybdenum, Nickel, Selenium, Silver, Strontium, Thallium, Titanium, Vanadium, Zinc, pH, Specific Conductance, Total Dissolved Solids, Total Hardness, Calcium, Magnesium, Sodium, Potassium, Total Alkalinity, Chloride, Fluoride, Sulfate, Ammonia-N, Nitrate-N, Kjeldahl-N, Orthophosphate, Total Phosphorus, Chemical Oxygen Demand, Biochemical Oxygen Demand, Total Cyanide, Non-Filterable Residue, Total Residual Chlorine, Oil and Grease, Total Phenolics, Volatile Halocarbons, Volatile Aromatics, Chlordane, Aldrin, Dieldrin, DDD, DDE, DDT, Heptachlor, Heptachlor Epoxide, Polychlorinated Biphenyls (water), Polychlorinated Biphenyls (oil).

MICHIGAN, Department of Environmental Quality

Drinking Water

Trihalomethanes, Regulated and Unregulated Volatile Organic Compounds by EPA Method 524.2; 1,2-Dibromoethane, 1,2-Dibromo-3-chloropropane by EPA Method 504.1

NEW HAMPSHIRE, Department of Environmental Services, 202798

Drinking Water

Metals by Graphite Furnace, Metals by ICP, Mercury, Nitrite-N, Orthophosphate, Residual Free Chlorine, Turbidity, Total Filterable Residue, Calcium Hardness, pH, Alkalinity, Sodium, Sulfate, Total Cyanide, Insecticides, Herbicides, Base/Neutrals, Trihalomethanes, Volatile Organics, Vinyl Chloride, DBCP, EDB, Nitrate-N.

Wastewater

Metals by Graphite Furnace, Metals by ICP, Mercury, pH, Specific Conductivity, TDS, Total Hardness, Calcium, Magnesium, Sodium, Potassium, Total Alkalinity, Chloride, Fluoride, Sulfate, Ammonia-N, Nitrate-N, Orthophosphate, TKN, Total Phosphorus, COD, BOD, Non-Filterable Residue, Oil & Grease, Total Phenolics, Total Residual Chlorine, PCBs in Water, PCBs in Oil, Pesticides, Volatile Organics, Total Cyanide.

RHODE ISLAND, Department of Health, 54

Surface Water, Air, Wastewater, Potable Water, Sewage

Chemistry: Organic and Inorganic

GROUNDWATER ANALYTICAL

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P.O. Box 1200
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Buzzards Bay, MA 02532
Telephone (508) 759-4441
FAX (508) 759-4475

December 22, 2000

Mr. Alex B. Pancic
Clean Soils Environmental
P.O. Box 591
Ipswich, MA 01938

Project: Topsfield DPW/2000.34
Lab ID: 38012
Sampled: 12-15-00

Dear Alex:

Enclosed is the Metals Analysis performed for the above referenced project. This project was processed for Priority One Week turnaround.

This letter authorizes the release of the analytical results, and should be considered a part of this report. This report contains a project narrative indicating project changes and non-conformances, a brief description of the Quality Assurance/Quality Control procedures employed by our laboratory, and a statement of our state certifications.

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Should you have any questions concerning this report, please do not hesitate to contact me.

Sincerely,



Jonathan R. Sanford
President

JRS/ss
Enclosures

GROUNDWATER ANALYTICAL

Trace Metals by ICP-AES and CVAA

Field ID: MW1
Project: Topsfield DPW/2000.34
Client: Clean Soils Environmental
Container: 500 mL Plastic
Preservation: HNO3 / Cool
Matrix: Aqueous

Laboratory ID: 38012-01
Sampled: 12-15-00
Received: 12-15-00
Preserved: 12-15-00

CAS Number	Analyte	Concentration	Units	Reporting Limit	Analyzed	QG Batch	Method
7440-38-2	Arsenic, Dissolved	0.02	mg/L	0.02	12-18-00	MM-1219-W	6010B
7440-39-3	Barium, Dissolved	0.8	mg/L	0.2	12-18-00	MM-1219-W	6010B
7440-43-9	Cadmium, Dissolved	BRL	mg/L	0.005	12-18-00	MM-1219-W	6010B
7440-47-3	Chromium, Dissolved	BRL	mg/L	0.01	12-18-00	MM-1219-W	6010B
7439-92-1	Lead, Dissolved	BRL	mg/L	0.005	12-18-00	MM-1219-W	6010B
7439-97-6	Mercury, Dissolved	BRL	mg/L	0.0002	12-20-00	MP-0890-W	7470A
7782-49-2	Selenium, Dissolved	BRL	mg/L	0.01	12-18-00	MM-1219-W	6010B
7440-22-4	Silver, Dissolved	BRL	mg/L	0.01	12-21-00	MM-1219-W	6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

GROUNDWATER ANALYTICAL

Project Narrative

Project: Topsfield DPW/2000.34
Client: Clean Soil Environmental

Lab ID: 38012
Received: 12-15-00

A. Physical Condition of Sample(s)

This project was received by the laboratory in satisfactory condition, and the sample(s) were received undamaged in appropriate containers with the correct preservation, except for the following non-conformance(s):

1. Sample 38012-01 for Metals analysis was not received preserved. The sample was preserved with HN03 upon receipt by the laboratory.

B. Project Documentation

This project was accompanied by satisfactory Chain of Custody documentation. The sample container label(s) agreed with the Chain of Custody.

C. Analysis of Sample(s)

No analytical anomalies or non-conformances were noted by the laboratory during the processing of these sample(s). All data contained within this report are released without qualification.

Quality Assurance/Quality Control

A. Program Overview

Groundwater Analytical conducts an active Quality Assurance program to ensure the production of high quality, valid data. This program closely follows the guidance provided by *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*, US EPA QAMS-005/80 (1980), and *Test Methods for Evaluating Solid Waste*, US EPA, SW-846, Update III (1996).

Quality Control protocols include written Standard Operating Procedures (SOPs) developed for each analytical method. SOPs are derived from US EPA methodologies and other established references. Standards are prepared from commercially obtained reference materials of certified purity, and documented for traceability.

Quality Assessment protocols for most organic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. All samples, standards, blanks, laboratory control samples, matrix spikes and sample duplicates are spiked with internal standards and surrogate compounds. All instrument sequences begin with an initial calibration verification standard and a blank; and excepting GC/MS sequences, all sequences close with a continuing calibration standard. GC/MS systems are tuned to appropriate ion abundance criteria daily, or for each 12 hour operating period, whichever is more frequent.

Quality Assessment protocols for most inorganic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. Standard curves are derived from one reagent blank and four concentration levels. Curve validity is verified by standard recoveries within plus or minus ten percent of the curve.

B. Definitions

Batches are used as the basic unit for Quality Assessment. A Batch is defined as twenty or fewer samples of the same matrix which are prepared together for the same analysis, using the same lots of reagents and the same techniques or manipulations, all within the same continuum of time, up to but not exceeding 24 hours.

Laboratory Control Samples are used to assess the accuracy of the analytical method. A Laboratory Control Sample consists of reagent water or sodium sulfate spiked with a group of target analytes representative of the method analytes. Accuracy is defined as the degree of agreement of the measured value with the true or expected value. Percent Recoveries for the Laboratory Control Samples are calculated to assess accuracy.

Method Blanks are used to assess the level of contamination present in the analytical system. Method Blanks consist of reagent water or an aliquot of sodium sulfate. Method Blanks are taken through all the appropriate steps of an analytical method. Sample data reported is not corrected for blank contamination.

Surrogate Compounds are used to assess the effectiveness of an analytical method in dealing with each sample matrix. Surrogate Compounds are organic compounds which are similar to the target analytes of interest in chemical behavior, but which are not normally found in environmental samples. Percent Recoveries are calculated for each Surrogate Compound.

GROUNDWATER ANALYTICAL

Quality Control Report Laboratory Control Sample

Category: Metals
Matrix: Aqueous

CAS Number	Analyte	Method	QC Batch	Units	Spiked	Measured	Recovery	QC Limits
7440-38-2	Arsenic	6010B	MM-1219-WL	mg/L	1.00	1.05	105 %	80 - 120 %
7440-39-3	Barium	6010B	MM-1219-WL	mg/L	1.00	0.99	99 %	80 - 120 %
7440-43-9	Cadmium	6010B	MM-1219-WL	mg/L	1.00	1.06	106 %	80 - 120 %
7440-47-3	Chromium	6010B	MM-1219-WL	mg/L	1.00	0.99	99 %	80 - 120 %
7439-92-1	Lead	6010B	MM-1219-WL	mg/L	1.00	1.04	104 %	80 - 120 %
7782-49-2	Selenium	6010B	MM-1219-WL	mg/L	1.00	1.05	105 %	80 - 120 %
7440-22-4	Silver	6010B	MM-1219-WL	mg/L	1.00	1.04	104 %	80 - 120 %
7439-97-6	Mercury	7470A	MP-0890-WL	mg/L	0.00100	0.00102	102 %	80 - 120 %

Method References: Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Update III (1996).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report Method Blank

Category: Metals
Matrix: Aqueous

CAS Number	Analyte	Result	Units	Reporting Limit	QC Batch	Method
7440-38-2	Arsenic	BRL	mg/L	0.02	MM-1219-WB	6010B
7440-39-3	Barium	BRL	mg/L	0.2	MM-1219-WB	6010B
7440-43-9	Cadmium	BRL	mg/L	0.005	MM-1219-WB	6010B
7440-47-3	Chromium	BRL	mg/L	0.01	MM-1219-WB	6010B
7439-92-1	Lead	BRL	mg/L	0.005	MM-1219-WB	6010B
7782-49-2	Selenium	BRL	mg/L	0.01	MM-1219-WB	6010B
7440-22-4	Silver	BRL	mg/L	0.01	MM-1219-WB	6010B
7439-97-6	Mercury	BRL	mg/L	0.0002	MP-0890-WB	7470A

Method References: Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Update III (1996).

Report Notations: BRL Indicates result, if any, is below reporting limit for analyte. Reporting limit is the lowest value that can be reliably quantified under routine laboratory operating conditions.
Reporting limits are adjusted for sample dilution and sample size.

GROUNDWATER ANALYTICAL

Certifications and Approvals

CONNECTICUT, Department of Health Services, PH-0586

Potable Water, Wastewater/Trade Waste, Sewage/Effluent, and Soil

pH, Conductivity, Acidity, Alkalinity, Hardness, Chloride, Fluoride, Ammonia, Kjeldahl Nitrogen, Nitrate, Nitrite, Orthophosphate, Total Dissolved Solids, Cyanide, Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Total Chromium, Hexavalent Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Tin, Titanium, Vanadium, Zinc, Purgeable Halocarbons, Purgeable Aromatics, Pesticides, PCBs, PCBs in Oil, Ethylene Dibromide, Phenols, Oil and Grease.

MAINE, Department of Human Services, MA103

Drinking Water

Reciprocal certification in accordance with Massachusetts certification for drinking water analytes.

Waste Water

Reciprocal certification in accordance with Massachusetts certification for waste water analytes.

MASSACHUSETTS, Department of Environmental Protection, M-MA-103

Potable Water

Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Thallium, Nitrate-N, Nitrite-N, Fluoride, Sodium, Sulfate, Cyanide, Turbidity, Residual Free Chlorine, Calcium, Total Alkalinity, Total Dissolved Solids, pH, Trihalomethanes, Volatile Organic Compounds, 1,2-Dibromoethane, 1,2-Dibromo-3-chloropropane, Total Coliform, Fecal Coliform, Heterotrophic Plate Count, E-Coli

Non-Potable Water

Aluminum, Antimony, Arsenic, Beryllium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Mercury, Molybdenum, Nickel, Selenium, Silver, Strontium, Thallium, Titanium, Vanadium, Zinc, pH, Specific Conductance, Total Dissolved Solids, Total Hardness, Calcium, Magnesium, Sodium, Potassium, Total Alkalinity, Chloride, Fluoride, Sulfate, Ammonia-N, Nitrate-N, Kjeldahl-N, Orthophosphate, Total Phosphorus, Chemical Oxygen Demand, Biochemical Oxygen Demand, Total Cyanide, Non-Filterable Residue, Total Residual Chlorine, Oil and Grease, Total Phenolics, Volatile Halocarbons, Volatile Aromatics, Chlordane, Aldrin, Dieldrin, DDD, DDE, DDT, Heptachlor, Heptachlor Epoxide, Polychlorinated Biphenyls (water), Polychlorinated Biphenyls (oil).

MICHIGAN, Department of Environmental Quality

Drinking Water

Trihalomethanes, Regulated and Unregulated Volatile Organic Compounds by EPA Method 524.2; 1,2-Dibromoethane, 1,2-Dibromo-3-chloropropane by EPA Method 504.1

NEW HAMPSHIRE, Department of Environmental Services, 202798

Drinking Water

Metals by Graphite Furnace, Metals by ICP, Mercury, Nitrite-N, Orthophosphate, Residual Free Chlorine, Turbidity, Total Filterable Residue, Calcium Hardness, pH, Alkalinity, Sodium, Sulfate, Total Cyanide, Insecticides, Herbicides, Base/Neutrals, Trihalomethanes, Volatile Organics, Vinyl Chloride, DBCP, EDB, Nitrate-N.

Wastewater

Metals by Graphite Furnace, Metals by ICP, Mercury, pH, Specific Conductivity, TDS, Total Hardness, Calcium, Magnesium, Sodium, Potassium, Total Alkalinity, Chloride, Fluoride, Sulfate, Ammonia-N, Nitrate-N, Orthophosphate, TKN, Total Phosphorus, COD, BOD, Non-Filterable Residue, Oil & Grease, Total Phenolics, Total Residual Chlorine, PCBs in Water, PCBs in Oil, Pesticides, Volatile Organics, Total Cyanide.

RHODE ISLAND, Department of Health, 54

Surface Water, Air, Wastewater, Potable Water, Sewage

Chemistry: Organic and Inorganic

GROUNDWATER ANALYTICAL

Groundwater Analytical, Inc.
P.O. Box 1200
228 Main Street
Buzzards Bay, MA 02532
Telephone (508) 759-4441
FAX (508) 759-4475

December 13, 2000

Mr. Alexander Pancic
Clean Soils Environmental
P.O. Box 591
Ipswich, MA 01938

Project: Topsfield DPW/2000.34
Lab ID: 37768
Sampled: 12-06-00

Dear Alex:

Enclosed are the Volatile Organics, Metals and Extractable Petroleum Hydrocarbons Analyses performed for the above referenced project. This project was processed for Priority One Week turnaround.

This letter authorizes the release of the analytical results, and should be considered a part of this report. This report contains a project narrative indicating project changes and non-conformances, a brief description of the Quality Assurance/Quality Control procedures employed by our laboratory, and a statement of our state certifications.

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Should you have any questions concerning this report, please do not hesitate to contact me.

Sincerely,



Jonathan R. Sanford
President

JRS/amb
Enclosures

GROUNDWATER ANALYTICAL

Massachusetts DEP EPH Method Extractable Petroleum Hydrocarbons by GC/FID

Field ID: MW1
Project: Topsfield DPW/2000.34
Client: Clean Soils Environmental
Container: 1 L Amber Glass
Preservation: H2SO4 / Cool
Matrix: Aqueous

Laboratory ID: 37768-08
QC Batch ID: EP-0770-F
Sampled: 12-06-00
Received: 12-06-00
Extracted: 12-07-00
Analyzed: 12-11-00
Dilution Factor: Aliphatic: 1 Aromatic: 1

EPH Ranges	Concentration	Units	Reporting Limit
n-C9 to n-C18 Aliphatic Hydrocarbons †	BRL	ug/L	500
n-C19 to n-C36 Aliphatic Hydrocarbons †	BRL	ug/L	500
n-C11 to n-C22 Aromatic Hydrocarbons † 0	340	ug/L	200
Unadjusted n-C11 to n-C22 Aromatic Hydrocarbons †	350	ug/L	200

CAS Number	Target Analytes	Concentration	Units	Reporting Limit
91-20-3	Naphthalene	BRL	ug/L	10
91-57-6	2-Methylnaphthalene	BRL	ug/L	5
85-01-8	Phenanthrene	BRL	ug/L	10
83-32-9	Acenaphthene	BRL	ug/L	10
208-96-8	Acenaphthylene	BRL	ug/L	10
86-73-7	Fluorene	BRL	ug/L	10
120-12-7	Anthracene	BRL	ug/L	10
206-44-0	Fluoranthene	BRL	ug/L	10
129-00-0	Pyrene	BRL	ug/L	10
56-55-3	Benzo[a]anthracene	BRL	ug/L	10
218-01-9	Chrysene	BRL	ug/L	10
205-99-2	Benzo[b]fluoranthene	BRL	ug/L	10
207-08-9	Benzo[k]fluoranthene	BRL	ug/L	10
50-32-8	Benzo[a]pyrene	BRL	ug/L	10
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL	ug/L	10
53-70-3	Dibenzo[a,h]anthracene	BRL	ug/L	10
191-24-2	Benzo[g,h,i]perylene	BRL	ug/L	10

QC Surrogate Compounds	Recovery	QC Limits
Fractionation: 2-Fluorobiphenyl	75 %	40 - 140 %
2-Bromonaphthalene	81 %	40 - 140 %
Extraction: Chloro-octadecane	65 %	40 - 140 %
ortho-Terphenyl	84 %	40 - 140 %

QA/QC Certification	
1. Were all QA/QC procedures required by the method followed?	Yes
2. Were all performance/acceptance standards for the required QA/QC procedures achieved?	Yes
3. Were any significant modifications made to the method, as specified in Section 11.3?	No
Method non-conformances indicated above are detailed below on this data report, or in the accompanying project narrative and project quality control report. Release of this data is authorized by the accompanying signed project cover letter. The accompanying cover letter, project narrative and quality control report are considered part of this data report.	

Method Reference: Method for the Determination of Extractable Petroleum Hydrocarbons, MA DEP (1998). Extraction performed utilizing separatory funnel technique.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

† Hydrocarbon range data excludes concentrations of any surrogate(s) and/or internal standards eluting in that range.

0 n-C11 to n-C22 Aromatic Hydrocarbons range data excludes the method target analyte concentrations.

GROUNDWATER ANALYTICAL

Trace Metals by ICP-AES and CVAA

Field ID: MW-1
Project: Topsfield DPW/2000.34
Client: Clean Soils Environmental
Container: 500 mL Plastic
Preservation: HNO3 / Cool
Matrix: Aqueous

Laboratory ID: 37768-05
Sampled: 12-06-00
Received: 12-06-00
Preserved: 12-06-00

CAS Number	Analyte	Concentration	Units	Reporting Limit	Analyzed	QC Batch	Method
7440-38-2	Arsenic, Total	0.03	mg/L	0.02	12-07-00	MM-1213-W	6010B
7440-39-3	Barium, Total	BRL	mg/L	0.2	12-07-00	MM-1213-W	6010B
7440-43-9	Cadmium, Total	BRL	mg/L	0.005	12-07-00	MM-1213-W	6010B
7440-47-3	Chromium, Total	0.01	mg/L	0.01	12-07-00	MM-1213-W	6010B
7439-92-1	Lead, Total	0.031	mg/L	0.005	12-07-00	MM-1213-W	6010B
7439-97-6	Mercury, Total	BRL	mg/L	0.0002	12-07-00	MP-0882-W	7470A
7782-49-2	Selenium, Total	BRL	mg/L	0.01	12-07-00	MM-1213-W	6010B
7440-22-4	Silver, Total	BRL	mg/L	0.01	12-07-00	MM-1213-W	6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

GROUNDWATER ANALYTICAL

EPA Method 8260B TCL Volatile Organics by GC/MS

Field ID: MW1
Project: Topsfield DPW/2000.34
Client: Clean Soils Environmental
Container: 40 mL VOA Vial
Preservation: HCl / Cool
Matrix: Aqueous

Laboratory ID: 37768-01
QC Batch ID: VM4-1591-W
Sampled: 12-06-00
Received: 12-06-00
Analyzed: 12-09-00
Dilution Factor: 1

CAS Number	Analyte	Concentration	Units	Reporting Limit
74-87-3	Chloromethane	BRL	ug/L	0.5
75-01-4	Vinyl Chloride	BRL	ug/L	0.5
74-83-9	Bromomethane	BRL	ug/L	0.5
75-00-3	Chloroethane	BRL	ug/L	0.5
75-35-4	1,1-Dichloroethene	BRL	ug/L	0.5
67-64-1	Acetone	BRL	ug/L	5
75-15-0	Carbon Disulfide	BRL	ug/L	5
75-09-2	Methylene Chloride	BRL	ug/L	2
156-60-5	trans- 1,2-Dichloroethene	BRL	ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL	ug/L	0.5
156-59-2	cis- 1,2-Dichloroethene	BRL	ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL	ug/L	5
67-66-3	Chloroform	BRL	ug/L	0.5
71-55-6	1,1,1-Trichloroethane	BRL	ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL	ug/L	0.5
71-43-2	Benzene	BRL	ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL	ug/L	0.5
79-01-6	Trichloroethene	BRL	ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL	ug/L	0.5
75-27-4	Bromodichloromethane	BRL	ug/L	0.5
10061-01-5	cis- 1,3-Dichloropropene	BRL	ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	5
108-88-3	Toluene	BRL	ug/L	0.5
10061-02-6	trans- 1,3-Dichloropropene	BRL	ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	0.5
127-18-4	Tetrachloroethene	BRL	ug/L	0.5
591-78-6	2-Hexanone	BRL	ug/L	5
124-48-1	Dibromochloromethane	BRL	ug/L	0.5
108-90-7	Chlorobenzene	BRL	ug/L	0.5
100-41-4	Ethylbenzene	BRL	ug/L	0.5
108-38-3/106-42-3	meta- Xylene and para- Xylene	BRL	ug/L	0.5
95-47-6	ortho- Xylene	BRL	ug/L	0.5
100-42-5	Styrene	BRL	ug/L	0.5
75-25-2	Bromofom	BRL	ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	0.5
1634-04-4	Methyl tert- butyl Ether (MTBE) °	BRL	ug/L	0.5

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	102 %	86 - 118 %
1,2-Dichloroethane-d ₄	108 %	80 - 120 %
Toluene-d ₈	99 %	88 - 110 %
4-Bromofluorobenzene	96 %	86 - 115 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as specified by the Target Compound List (TCL) of the US EPA Contract Laboratory Program. Analysis performed utilizing 25mL sample purge volume.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

° Indicates additional target analyte.

GROUNDWATER ANALYTICAL

Massachusetts DEP EPH Method Extractable Petroleum Hydrocarbons by GC/FID

Field ID: MW2
Project: Topsfield DPW/2000.34
Client: Clean Soils Environmental
Container: 1 L Amber Glass
Preservation: H2SO4 / Cool
Matrix: Aqueous

Laboratory ID: 37768-09
QC Batch ID: EP-0770-F
Sampled: 12-06-00
Received: 12-06-00
Extracted: 12-07-00
Analyzed: 12-11-00
Dilution Factor: Aliphatic: 1 Aromatic: 1

EPH Ranges	Concentration	Units	Reporting Limit
n-C9 to n-C18 Aliphatic Hydrocarbons [†]	BRL	ug/L	500
n-C19 to n-C36 Aliphatic Hydrocarbons [†]	BRL	ug/L	500
n-C11 to n-C22 Aromatic Hydrocarbons ^{† 0}	BRL	ug/L	200
Unadjusted n-C11 to n-C22 Aromatic Hydrocarbons [†]	BRL	ug/L	200

CAS Number	Target Analytes	Concentration	Units	Reporting Limit
91-20-3	Naphthalene	BRL	ug/L	10
91-57-6	2-Methylnaphthalene	BRL	ug/L	5
85-01-8	Phenanthrene	BRL	ug/L	10
83-32-9	Acenaphthene	BRL	ug/L	10
208-96-8	Acenaphthylene	BRL	ug/L	10
86-73-7	Fluorene	BRL	ug/L	10
120-12-7	Anthracene	BRL	ug/L	10
206-44-0	Fluoranthene	BRL	ug/L	10
129-00-0	Pyrene	BRL	ug/L	10
56-55-3	Benzo[a]anthracene	BRL	ug/L	10
218-01-9	Chrysene	BRL	ug/L	10
205-99-2	Benzo[b]fluoranthene	BRL	ug/L	10
207-08-9	Benzo[k]fluoranthene	BRL	ug/L	10
50-32-8	Benzo[a]pyrene	BRL	ug/L	10
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL	ug/L	10
53-70-3	Dibenzo[a,h]anthracene	BRL	ug/L	10
191-24-2	Benzo[g,h,i]perylene	BRL	ug/L	10

QC Surrogate Compounds	Recovery	QC Limits
Fractionation: 2-Fluorobiphenyl	77 %	40 - 140 %
2-Bromonaphthalene	79 %	40 - 140 %
Extraction: Chloro-octadecane	63 %	40 - 140 %
ortho-Terphenyl	80 %	40 - 140 %

QA/QC Certification	
1. Were all QA/QC procedures required by the method followed?	Yes
2. Were all performance/acceptance standards for the required QA/QC procedures achieved?	Yes
3. Were any significant modifications made to the method, as specified in Section 11.3?	No
Method non-conformances indicated above are detailed below on this data report, or in the accompanying project narrative and project quality control report. Release of this data is authorized by the accompanying signed project cover letter. The accompanying cover letter, project narrative and quality control report are considered part of this data report.	

Method Reference: Method for the Determination of Extractable Petroleum Hydrocarbons, MA DEP (1998). Extraction performed utilizing separatory funnel technique.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

† Hydrocarbon range data excludes concentrations of any surrogate(s) and/or internal standards eluting in that range.

0 n-C11 to n-C22 Aromatic Hydrocarbons range data excludes the method target analyte concentrations.

GROUNDWATER ANALYTICAL

Trace Metals by ICP-AES and CVAA

Field ID: MW-2
Project: Topsfield DPW/2000.34
Client: Clean Soils Environmental
Container: 500 mL Plastic
Preservation: HNO₃ / Cool
Matrix: Aqueous

Laboratory ID: 37768-06
Sampled: 12-06-00
Received: 12-06-00
Preserved: 12-06-00

CAS Number	Analyte	Concentration	Units	Reporting Limit	Analyzed	QCBatch	Method
7440-38-2	Arsenic, Total	0.04	mg/L	0.02	12-07-00	MM-1213-W	6010B
7440-39-3	Barium, Total	BRL	mg/L	0.2	12-07-00	MM-1213-W	6010B
7440-43-9	Cadmium, Total	BRL	mg/L	0.005	12-07-00	MM-1213-W	6010B
7440-47-3	Chromium, Total	BRL	mg/L	0.01	12-07-00	MM-1213-W	6010B
7439-92-1	Lead, Total	0.017	mg/L	0.005	12-07-00	MM-1213-W	6010B
7439-97-6	Mercury, Total	BRL	mg/L	0.0002	12-07-00	MP-0882-W	7470A
7782-49-2	Selenium, Total	BRL	mg/L	0.01	12-07-00	MM-1213-W	6010B
7440-22-4	Silver, Total	BRL	mg/L	0.01	12-07-00	MM-1213-W	6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

GROUNDWATER ANALYTICAL

EPA Method 8260B TCL Volatile Organics by GC/MS

Field ID: MW2
Project: Topsfield DPW/2000.34
Client: Clean Soils Environmental
Container: 40 mL VOA Vial
Preservation: HCl / Cool
Matrix: Aqueous

Laboratory ID: 37768-02
QC Batch ID: VM4-1591-W
Sampled: 12-06-00
Received: 12-06-00
Analyzed: 12-09-00
Dilution Factor: 1

CAS Number	Analyte	Concentration	Units	Reporting Limit
74-87-3	Chloromethane	BRL	ug/L	0.5
75-01-4	Vinyl Chloride	BRL	ug/L	0.5
74-83-9	Bromomethane	BRL	ug/L	0.5
75-00-3	Chloroethane	BRL	ug/L	0.5
75-35-4	1,1-Dichloroethene	BRL	ug/L	0.5
67-64-1	Acetone	BRL	ug/L	5
75-15-0	Carbon Disulfide	BRL	ug/L	5
75-09-2	Methylene Chloride	BRL	ug/L	2
156-60-5	trans- 1,2-Dichloroethene	BRL	ug/L	0.5
75-34-3	1,1-Dichloroethane	4	ug/L	0.5
156-59-2	cis- 1,2-Dichloroethene	BRL	ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL	ug/L	5
67-66-3	Chloroform	BRL	ug/L	0.5
71-55-6	1,1,1-Trichloroethane	BRL	ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL	ug/L	0.5
71-43-2	Benzene	BRL	ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL	ug/L	0.5
79-01-6	Trichloroethene	BRL	ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL	ug/L	0.5
75-27-4	Bromodichloromethane	BRL	ug/L	0.5
10061-01-5	cis- 1,3-Dichloropropene	BRL	ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	5
108-88-3	Toluene	BRL	ug/L	0.5
10061-02-6	trans- 1,3-Dichloropropene	BRL	ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	0.5
127-18-4	Tetrachloroethene	BRL	ug/L	0.5
591-78-6	2-Hexanone	BRL	ug/L	5
124-48-1	Dibromochloromethane	BRL	ug/L	0.5
108-90-7	Chlorobenzene	BRL	ug/L	0.5
100-41-4	Ethylbenzene	BRL	ug/L	0.5
108-38-3/106-42-3	meta- Xylene and para- Xylene	BRL	ug/L	0.5
95-47-6	ortho- Xylene	BRL	ug/L	0.5
100-42-5	Styrene	BRL	ug/L	0.5
75-25-2	Bromoform	BRL	ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	0.5
1634-04-4	Methyl tert- butyl Ether (MTBE) ^o	BRL	ug/L	0.5

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	100 %	86 - 118 %
1,2-Dichloroethane-d ₄	101 %	80 - 120 %
Toluene-d ₈	100 %	88 - 110 %
4-Bromofluorobenzene	100 %	86 - 115 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as specified by the Target Compound List (TCL) of the US EPA Contract Laboratory Program. Analysis performed utilizing 25mL sample purge volume.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

^o Indicates additional target analyte.

GROUNDWATER ANALYTICAL

Massachusetts DEP EPH Method Extractable Petroleum Hydrocarbons by GC/FID

Field ID: MW3
Project: Topsfield DPW/2000.34
Client: Clean Soils Environmental
Container: 1 L Amber Glass
Preservation: H2SO4 / Cool
Matrix: Aqueous

Laboratory ID: 37768-10
QC Batch ID: EP-0770-F
Sampled: 12-06-00
Received: 12-06-00
Extracted: 12-07-00
Analyzed: 12-11-00
Dilution Factor: Aliphatic: 1 Aromatic: 1

EPH Ranges	Concentration	Units	Reporting Limit
n-C9 to n-C18 Aliphatic Hydrocarbons [†]	BRL	ug/L	500
n-C19 to n-C36 Aliphatic Hydrocarbons [†]	BRL	ug/L	500
n-C11 to n-C22 Aromatic Hydrocarbons ^{†‡}	BRL	ug/L	200
Unadjusted n-C11 to n-C22 Aromatic Hydrocarbons [†]	BRL	ug/L	200

CAS Number	Target Analytes	Concentration	Units	Reporting Limit
91-20-3	Naphthalene	BRL	ug/L	10
91-57-6	2-Methylnaphthalene	BRL	ug/L	5
85-01-8	Phenanthrene	BRL	ug/L	10
83-32-9	Acenaphthene	BRL	ug/L	10
208-96-8	Acenaphthylene	BRL	ug/L	10
86-73-7	Fluorene	BRL	ug/L	10
120-12-7	Anthracene	BRL	ug/L	10
206-44-0	Fluoranthene	BRL	ug/L	10
129-00-0	Pyrene	BRL	ug/L	10
56-55-3	Benzo[a]anthracene	BRL	ug/L	10
218-01-9	Chrysene	BRL	ug/L	10
205-99-2	Benzo[b]fluoranthene	BRL	ug/L	10
207-08-9	Benzo[k]fluoranthene	BRL	ug/L	10
50-32-8	Benzo[a]pyrene	BRL	ug/L	10
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL	ug/L	10
53-70-3	Dibenzo[a,h]anthracene	BRL	ug/L	10
191-24-2	Benzo[g,h,i]perylene	BRL	ug/L	10

QC Surrogate Compounds	Recovery	QC Limits
Fractionation: 2-Fluorobiphenyl	79 %	40 - 140 %
2-Bromonaphthalene	81 %	40 - 140 %
Extraction: Chloro-octadecane	66 %	40 - 140 %
ortho-Terphenyl	77 %	40 - 140 %

QA/QC Certification	
1. Were all QA/QC procedures required by the method followed?	Yes
2. Were all performance/acceptance standards for the required QA/QC procedures achieved?	Yes
3. Were any significant modifications made to the method, as specified in Section 11.3?	No
Method non-conformances indicated above are detailed below on this data report, or in the accompanying project narrative and project quality control report. Release of this data is authorized by the accompanying signed project cover letter. The accompanying cover letter, project narrative and quality control report are considered part of this data report.	

Method Reference: Method for the Determination of Extractable Petroleum Hydrocarbons, MA DEP (1998). Extraction performed utilizing separatory funnel technique.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

† Hydrocarbon range data excludes concentrations of any surrogate(s) and/or internal standards eluting in that range.

‡ n-C11 to n-C22 Aromatic Hydrocarbons range data excludes the method target analyte concentrations.

GROUNDWATER ANALYTICAL

Trace Metals by ICP-AES and CVAA

Field ID: MW-3
Project: Topsfield DPW/2000.34
Client: Clean Soils Environmental
Container: 500 mL Plastic
Preservation: HNO3 / Cool
Matrix: Aqueous

Laboratory ID: 37768-07
Sampled: 12-06-00
Received: 12-06-00
Preserved: 12-06-00

CAS Number	Analyte	Concentration	Units	Reporting Limit	Analyzed	QC Batch	Method
7440-38-2	Arsenic, Total	0.03	mg/L	0.02	12-07-00	MM-1213-W	6010B
7440-39-3	Barium, Total	BRL	mg/L	0.2	12-07-00	MM-1213-W	6010B
7440-43-9	Cadmium, Total	BRL	mg/L	0.005	12-07-00	MM-1213-W	6010B
7440-47-3	Chromium, Total	0.01	mg/L	0.01	12-07-00	MM-1213-W	6010B
7439-92-1	Lead, Total	0.007	mg/L	0.005	12-07-00	MM-1213-W	6010B
7439-97-6	Mercury, Total	BRL	mg/L	0.0002	12-07-00	MP-0882-W	7470A
7782-49-2	Selenium, Total	BRL	mg/L	0.01	12-07-00	MM-1213-W	6010B
7440-22-4	Silver, Total	BRL	mg/L	0.01	12-07-00	MM-1213-W	6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

GROUNDWATER ANALYTICAL

EPA Method 8260B TCL Volatile Organics by GC/MS

Field ID: MW3
Project: Topsfield DPW/2000.34
Client: Clean Soils Environmental
Container: 40 mL VOA Vial
Preservation: HCl / Cool
Matrix: Aqueous

Laboratory ID: 37768-03
QC Batch ID: VM4-1591-W
Sampled: 12-06-00
Received: 12-06-00
Analyzed: 12-09-00
Dilution Factor: 1

CAS Number	Analyte	Concentration	Units	Reporting Limit
74-87-3	Chloromethane	BRL	ug/L	0.5
75-01-4	Vinyl Chloride	BRL	ug/L	0.5
74-83-9	Bromomethane	BRL	ug/L	0.5
75-00-3	Chloroethane	BRL	ug/L	0.5
75-35-4	1,1-Dichloroethene	BRL	ug/L	0.5
67-64-1	Acetone	BRL	ug/L	5
75-15-0	Carbon Disulfide	BRL	ug/L	5
75-09-2	Methylene Chloride	BRL	ug/L	2
156-60-5	trans-1,2-Dichloroethene	BRL	ug/L	0.5
75-34-3	1,1-Dichloroethane	5	ug/L	0.5
156-59-2	cis-1,2-Dichloroethene	BRL	ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL	ug/L	5
67-66-3	Chloroform	BRL	ug/L	0.5
71-55-6	1,1,1-Trichloroethane	BRL	ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL	ug/L	0.5
71-43-2	Benzene	BRL	ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL	ug/L	0.5
79-01-6	Trichloroethene	BRL	ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL	ug/L	0.5
75-27-4	Bromodichloromethane	BRL	ug/L	0.5
10061-01-5	cis-1,3-Dichloropropene	BRL	ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	5
108-88-3	Toluene	BRL	ug/L	0.5
10061-02-6	trans-1,3-Dichloropropene	BRL	ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	0.5
127-18-4	Tetrachloroethene	BRL	ug/L	0.5
591-78-6	2-Hexanone	BRL	ug/L	5
124-48-1	Dibromochloromethane	BRL	ug/L	0.5
108-90-7	Chlorobenzene	BRL	ug/L	0.5
100-41-4	Ethylbenzene	BRL	ug/L	0.5
108-38-3/106-42-3	meta-Xylene and para-Xylene	BRL	ug/L	0.5
95-47-6	ortho-Xylene	BRL	ug/L	0.5
100-42-5	Styrene	BRL	ug/L	0.5
75-25-2	Bromoform	BRL	ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	0.5
1634-04-4	Methyl tert-butyl Ether (MTBE) ^o	BRL	ug/L	0.5

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	102 %	86 - 118 %
1,2-Dichloroethane-d ₄	103 %	80 - 120 %
Toluene-d ₈	99 %	88 - 110 %
4-Bromofluorobenzene	100 %	86 - 115 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as specified by the Target Compound List (TCL) of the US EPA Contract Laboratory Program. Analysis performed utilizing 25mL sample purge volume.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

^o Indicates additional target analyte.

GROUNDWATER ANALYTICAL

EPA Method 8260B TCL Volatile Organics by GC/MS

Field ID: Trip Blank
Project: Topsfield DPW/2000.34
Client: Clean Soils Environmental
Container: 40 mL VOA Vial
Preservation: HCl / Cool
Matrix: Aqueous

Laboratory ID: 37768-04
QC Batch ID: VM4-1591-W
Sampled: 12-06-00
Received: 12-06-00
Analyzed: 12-09-00
Dilution Factor: 1

CAS Number	Analyte	Concentration	Units	Reporting Limit
74-87-3	Chloromethane	BRL	ug/L	0.5
75-01-4	Vinyl Chloride	BRL	ug/L	0.5
74-83-9	Bromomethane	BRL	ug/L	0.5
75-00-3	Chloroethane	BRL	ug/L	0.5
75-35-4	1,1-Dichloroethene	BRL	ug/L	0.5
67-64-1	Acetone	BRL	ug/L	5
75-15-0	Carbon Disulfide	BRL	ug/L	5
75-09-2	Methylene Chloride	BRL	ug/L	2
156-60-5	trans- 1,2-Dichloroethene	BRL	ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL	ug/L	0.5
156-59-2	cis- 1,2-Dichloroethene	BRL	ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL	ug/L	5
67-66-3	Chloroform	BRL	ug/L	0.5
71-55-6	1,1,1-Trichloroethane	BRL	ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL	ug/L	0.5
71-43-2	Benzene	BRL	ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL	ug/L	0.5
79-01-6	Trichloroethene	BRL	ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL	ug/L	0.5
75-27-4	Bromodichloromethane	BRL	ug/L	0.5
10061-01-5	cis- 1,3-Dichloropropene	BRL	ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	5
108-88-3	Toluene	BRL	ug/L	0.5
10061-02-6	trans- 1,3-Dichloropropene	BRL	ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	0.5
127-18-4	Tetrachloroethene	BRL	ug/L	0.5
591-78-6	2-Hexanone	BRL	ug/L	5
124-48-1	Dibromochloromethane	BRL	ug/L	0.5
108-90-7	Chlorobenzene	BRL	ug/L	0.5
100-41-4	Ethylbenzene	BRL	ug/L	0.5
108-38-3/106-42-3	meta- Xylene and para- Xylene	BRL	ug/L	0.5
95-47-6	ortho- Xylene	BRL	ug/L	0.5
100-42-5	Styrene	BRL	ug/L	0.5
75-25-2	Bromoform	BRL	ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	0.5
1634-04-4	Methyl tert- butyl Ether (MTBE) ^o	BRL	ug/L	0.5

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	98 %	86 - 118 %
1,2-Dichloroethane-d ₄	103 %	80 - 120 %
Toluene-d ₈	99 %	88 - 110 %
4-Bromofluorobenzene	101 %	86 - 115 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as specified by the Target Compound List (TCL) of the US EPA Contract Laboratory Program. Analysis performed utilizing 25mL sample purge volume.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

^o Indicates additional target analyte.

GROUNDWATER ANALYTICAL

Project Narrative

Project: **Topsfield DPW/2000.34**
Client: **Clean Soils Environmental**

Lab ID: **37768**
Received: **12-06-00**

A. Physical Condition of Sample(s)

This project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged in appropriate containers with the correct preservation.

B. Project Documentation

This project was accompanied by satisfactory Chain of Custody documentation. The sample container label(s) agreed with the Chain of Custody.

C. Analysis of Sample(s)

No analytical anomalies or non-conformances were noted by the laboratory during the processing of these sample(s). All data contained within this report are released without qualification.

2228 Main Street, P.O. Box 1200
Buzzards Bay, MA 02532
Telephone (508) 759-4441
FAX (508) 759-4475

CHAIN-OF-CUSTODY RECORD AND WORK ORDER

No. 42597

ANALYSIS REQUEST

[illegible]

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

Run RCRA-8 samples for metals Dissolved

Use RCGW-2 Reportable Concentrations

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. For water samples, each MS, MSD and Sample Duplicate requires an additional sample aliquot.

☐ Safe Drinking Water Act
☐ MA DEP Form
☐ NPDES/Clean Water Act
 Specify State: _____
☐ RCRA/Haz. Waste Char.
☐ RCRA MCP (310 CMR 40)
☒ RCRA MCP (310 CMR 40)
 Reportable Concentrations
☒ RCGW - 1 ☐ RCS - 1
☐ RCGW - 2 ☐ RCS - 2
☐ MA Dredge Disposal
☐ NH ☐ RI ☐ CT ☐ ME
 Specify Category: _____

Relinquished by: Alan Maddipati Date: 12-01-15 Time: _____
 Relinquished by: _____ Date: _____ Time: _____
 Relinquished by: _____ Date: _____ Time: _____

Received by: Alan Maddipati Date: 12-01-15 Time: _____
 Received by: _____ Date: _____ Time: _____
 Received by: _____ Date: _____ Time: _____

Shipping/Airbill Number: _____
 Shipping/Airbill Number: _____
 Shipping/Airbill Number: _____

Custody Seal/ Cooler Serial Number: _____
 Custody Seal/ Cooler Serial Number: _____
 Custody Seal/ Cooler Serial Number: _____

Method of Shipment: ☒ Ground Courier ☐ Express Mail ☐ Federal Express
☐ UPS ☐ Hand ☐ _____

Quality Assurance/Quality Control

A. Program Overview

Groundwater Analytical conducts an active Quality Assurance program to ensure the production of high quality, valid data. This program closely follows the guidance provided by *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*, US EPA QAMS-005/80 (1980), and *Test Methods for Evaluating Solid Waste*, US EPA, SW-846, Update III (1996).

Quality Control protocols include written Standard Operating Procedures (SOPs) developed for each analytical method. SOPs are derived from US EPA methodologies and other established references. Standards are prepared from commercially obtained reference materials of certified purity, and documented for traceability.

Quality Assessment protocols for most organic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. All samples, standards, blanks, laboratory control samples, matrix spikes and sample duplicates are spiked with internal standards and surrogate compounds. All instrument sequences begin with an initial calibration verification standard and a blank; and excepting GC/MS sequences, all sequences close with a continuing calibration standard. GC/MS systems are tuned to appropriate ion abundance criteria daily, or for each 12 hour operating period, whichever is more frequent.

Quality Assessment protocols for most inorganic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. Standard curves are derived from one reagent blank and four concentration levels. Curve validity is verified by standard recoveries within plus or minus ten percent of the curve.

B. Definitions

Batches are used as the basic unit for Quality Assessment. A Batch is defined as twenty or fewer samples of the same matrix which are prepared together for the same analysis, using the same lots of reagents and the same techniques or manipulations, all within the same continuum of time, up to but not exceeding 24 hours.

Laboratory Control Samples are used to assess the accuracy of the analytical method. A Laboratory Control Sample consists of reagent water or sodium sulfate spiked with a group of target analytes representative of the method analytes. Accuracy is defined as the degree of agreement of the measured value with the true or expected value. Percent Recoveries for the Laboratory Control Samples are calculated to assess accuracy.

Method Blanks are used to assess the level of contamination present in the analytical system. Method Blanks consist of reagent water or an aliquot of sodium sulfate. Method Blanks are taken through all the appropriate steps of an analytical method. Sample data reported is not corrected for blank contamination.

Surrogate Compounds are used to assess the effectiveness of an analytical method in dealing with each sample matrix. Surrogate Compounds are organic compounds which are similar to the target analytes of interest in chemical behavior, but which are not normally found in environmental samples. Percent Recoveries are calculated for each Surrogate Compound.

GROUNDWATER ANALYTICAL

Quality Control Report Laboratory Control Sample

Category: EPA Method 8260B
QC Batch ID: VM4-1591-WL
Matrix: Aqueous
Units: ug/L

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
75-35-4	1,1-Dichloroethene	10	7	73 %	70 - 130 %
71-43-2	Benzene	10	8	81 %	70 - 130 %
79-01-6	Trichloroethene	10	8	79 %	70 - 130 %
108-88-3	Toluene	10	8	82 %	70 - 130 %
108-90-7	Chlorobenzene	10	8	83 %	70 - 130 %

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	99 %	86 - 118 %
1,2-Dichloroethane-d ₄	96 %	80 - 120 %
Toluene-d ₈	101 %	88 - 110 %
4-Bromofluorobenzene	100 %	86 - 115 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report Method Blank

Category: EPA Method 8260B
QC Batch ID: VM4-1591-WB
Matrix: Aqueous

CAS Number	Analyte	Concentration	Units	Reporting Limit
74-87-3	Chloromethane	BRL	ug/L	0.5
75-01-4	Vinyl Chloride	BRL	ug/L	0.5
74-83-9	Bromomethane	BRL	ug/L	0.5
75-00-3	Chloroethane	BRL	ug/L	0.5
75-35-4	1,1-Dichloroethene	BRL	ug/L	0.5
67-64-1	Acetone	BRL	ug/L	5
75-15-0	Carbon Disulfide	BRL	ug/L	5
75-09-2	Methylene Chloride	BRL	ug/L	2
156-60-5	trans-1,2-Dichloroethene	BRL	ug/L	0.5
1634-04-4	Methyl tert-butyl Ether (MTBE) ^o	BRL	ug/L	0.5
75-34-3	1,1-Dichloroethane	BRL	ug/L	0.5
156-59-2	cis-1,2-Dichloroethene	BRL	ug/L	0.5
78-93-3	2-Butanone (MEK)	BRL	ug/L	5
67-66-3	Chloroform	BRL	ug/L	0.5
71-55-6	1,1,1-Trichloroethane	BRL	ug/L	0.5
56-23-5	Carbon Tetrachloride	BRL	ug/L	0.5
71-43-2	Benzene	BRL	ug/L	0.5
107-06-2	1,2-Dichloroethane	BRL	ug/L	0.5
79-01-6	Trichloroethene	BRL	ug/L	0.5
78-87-5	1,2-Dichloropropane	BRL	ug/L	0.5
75-27-4	Bromodichloromethane	BRL	ug/L	0.5
10061-01-5	cis-1,3-Dichloropropene	BRL	ug/L	0.5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/L	5
108-88-3	Toluene	BRL	ug/L	0.5
10061-02-6	trans-1,3-Dichloropropene	BRL	ug/L	0.5
79-00-5	1,1,2-Trichloroethane	BRL	ug/L	0.5
127-18-4	Tetrachloroethene	BRL	ug/L	0.5
591-78-6	2-Hexanone	BRL	ug/L	5
124-48-1	Dibromochloromethane	BRL	ug/L	0.5
108-90-7	Chlorobenzene	BRL	ug/L	0.5
100-41-4	Ethylbenzene	BRL	ug/L	0.5
108-38-3/106-42-3	meta-Xylene and para-Xylene	BRL	ug/L	0.5
95-47-6	ortho-Xylene	BRL	ug/L	0.5
100-42-5	Styrene	BRL	ug/L	0.5
75-25-2	Bromoform	BRL	ug/L	0.5
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/L	0.5

QC Surrogate Compounds	Recovery %	QC Limits %
Dibromofluoromethane	96 %	86 - 118 %
1,2-Dichloroethane-d ₄	96 %	80 - 120 %
Toluene-d ₈	98 %	88 - 110 %
4-Bromofluorobenzene	100 %	86 - 115 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as specified by the Target Compound List (TCL) of the US EPA Contract Laboratory Program. Analysis performed utilizing 25mL sample purge volume.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.

^o Indicates additional target analyte.

GROUNDWATER ANALYTICAL

Quality Control Report Laboratory Control Sample

Category: Metals
Matrix: Aqueous

CAS Number	Analyte	Method	QC Batch	Units	Spiked	Measured	Recovery	QC Limits
7440-38-2	Arsenic	6010B	MM-1213-WL	mg/L	1.0	0.98	98 %	80 - 120 %
7440-39-3	Barium	6010B	MM-1213-WL	mg/l	1.0	0.95	95 %	80 - 120 %
7440-43-9	Cadmium	6010B	MM-1213-WL	mg/L	1.0	0.99	99 %	80 - 120 %
7440-47-3	Chromium	6010B	MM-1213-WL	mg/L	1.0	0.99	99 %	80 - 120 %
7439-92-1	Lead	6010B	MM-1213-WL	mg/L	1.0	0.99	99 %	80 - 120 %
7439-97-6	Mercury	7470A	MP-0882-WL	mg/L	0.0010	0.0010	98 %	80 - 120 %
7782-49-2	Selenium	6010B	MM-1213-WL	mg/L	1.0	1.0	97 %	80 - 120 %
7440-22-4	Silver	6010B	MM-1213-WL	mg/L	1.0	0.93	93 %	80 - 120 %

Method References: Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Update III (1996).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report Method Blank

Category: Metals
Matrix: Aqueous

CAS Number	Analyte	Result	Units	Reporting Limit	QCBatch	Method
7440-38-2	Arsenic	BRL	mg/L	0.02	MM-1213-WB	6010B
7440-39-3	Barium	BRL	mg/L	0.20	MM-1213-WB	6010B
7440-43-9	Cadmium	BRL	mg/L	0.005	MM-1213-WB	6010B
7440-47-3	Chromium	BRL	mg/L	0.01	MM-1213-WB	6010B
7439-92-1	Lead	BRL	mg/L	0.005	MM-1213-WB	6010B
7439-97-6	Mercury	BRL	mg/L	0.0002	MP-0882-WB	7470A
7782-49-2	Selenium	BRL	mg/L	0.01	MM-1213-WB	6010B
7440-22-4	Silver	BRL	mg/L	0.01	MM-1213-WB	6010B

Method References: Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Update III (1996).

Report Notations: BRL Indicates result, if any, is below reporting limit for analyte. Reporting limit is the lowest value that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

GROUNDWATER ANALYTICAL

Quality Control Report Laboratory Control Sample

Category: MA DEP EPH Method
QC Batch ID: EP-0770-F
Matrix: Water
Units: ug/L

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
111-84-2	n-Nonane (C9)	50	24	47 %	40 - 140 %
629-59-4	n-Tetradecane (C14)	50	34	68 %	40 - 140 %
629-92-5	n-Nonadecane (C19)	50	39	78 %	40 - 140 %
112-95-8	n-Eicosane (C20)	50	40	80 %	40 - 140 %
630-02-4	n-Octacosane (C28)	50	38	77 %	40 - 140 %
91-20-3	Naphthalene	50	32	65 %	40 - 140 %
83-32-9	Acenaphthene	50	38	76 %	40 - 140 %
120-12-7	Anthracene	50	50	99 %	40 - 140 %
129-00-0	Pyrene	50	47	95 %	40 - 140 %
218-01-9	Chrysene	50	53	105 %	40 - 140 %

QC Surrogate Compounds	Recovery	QC Limits
Fractionation:		
2-Fluorobiphenyl	88 %	40 - 140 %
2-Bromonaphthalene	94 %	40 - 140 %
Extraction:		
Chloro-octadecane	78 %	40 - 140 %
ortho-Terphenyl	98 %	40 - 140 %

Method Reference: Method for the Determination of Extractable Petroleum Hydrocarbons, MA DEP (1998).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report Method Blank

Category: MA DEP EPH Method
QC Batch ID: EP-0770-F
Matrix: Water

EPH Ranges	Concentration	Units	Reporting Limit
n-C9 to n-C18 Aliphatic Hydrocarbons †	BRL	ug/L	500
n-C19 to n-C36 Aliphatic Hydrocarbons †	BRL	ug/L	500
n-C11 to n-C22 Aromatic Hydrocarbons † ^o	BRL	ug/L	200
Unadjusted n-C11 to n-C22 Aromatic Hydrocarbons †	BRL	ug/L	200

CAS Number	Target Analytes	Concentration	Units	Reporting Limit
91-20-3	Naphthalene	BRL	ug/L	10
91-57-6	2-Methylnaphthalene	BRL	ug/L	5
85-01-8	Phenanthrene	BRL	ug/L	10
83-32-9	Acenaphthene	BRL	ug/L	10
208-96-8	Acenaphthylene	BRL	ug/L	10
86-73-7	Fluorene	BRL	ug/L	10
120-12-7	Anthracene	BRL	ug/L	10
206-44-0	Fluoranthene	BRL	ug/L	10
129-00-0	Pyrene	BRL	ug/L	10
56-55-3	Benzo[a]anthracene	BRL	ug/L	10
218-01-9	Chrysene	BRL	ug/L	10
205-99-2	Benzo[b]fluoranthene	BRL	ug/L	10
207-08-9	Benzo[k]fluoranthene	BRL	ug/L	10
50-32-8	Benzo[a]pyrene	BRL	ug/L	10
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL	ug/L	10
53-70-3	Dibenzo[a,h]anthracene	BRL	ug/L	10
191-24-2	Benzo[g,h,i]perylene	BRL	ug/L	10

QC Surrogate Compounds	Recovery	QC Limits
Fractionation: 2-Fluorobiphenyl	87 %	40 - 140 %
2-Bromonaphthalene	88 %	40 - 140 %
Extraction: Chloro-octadecane	79 %	40 - 140 %
ortho-Terphenyl	90 %	40 - 140 %

Method Reference: Method for the Determination of Extractable Petroleum Hydrocarbons, MA DEP (1998).

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

† Hydrocarbon range data excludes concentrations of any surrogate(s) and/or internal standards eluting in that range.

° n-C11 to n-C22 Aromatic Hydrocarbons range data excludes the method target analyte concentrations.

Certifications and Approvals

CONNECTICUT, Department of Health Services, PH-0586

Potable Water, Wastewater/Trade Waste, Sewage/Effluent, and Soil

pH, Conductivity, Acidity, Alkalinity, Hardness, Chloride, Fluoride, Ammonia, Kjeldahl Nitrogen, Nitrate, Nitrite, Orthophosphate, Total Dissolved Solids, Cyanide, Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Total Chromium, Hexavalent Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Tin, Titanium, Vanadium, Zinc, Purgeable Halocarbons, Purgeable Aromatics, Pesticides, PCBs, PCBs in Oil, Ethylene Dibromide, Phenols, Oil and Grease.

MAINE, Department of Human Services, MA103

Drinking Water

Reciprocal certification in accordance with Massachusetts certification for drinking water analytes.

Waste Water

Reciprocal certification in accordance with Massachusetts certification for waste water analytes.

MASSACHUSETTS, Department of Environmental Protection, M-MA-103

Potable Water

Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Thallium, Nitrate-N, Nitrite-N, Fluoride, Sodium, Sulfate, Cyanide, Turbidity, Residual Free Chlorine, Calcium, Total Alkalinity, Total Dissolved Solids, pH, Trihalomethanes, Volatile Organic Compounds, 1,2-Dibromoethane, 1,2-Dibromo-3-chloropropane, Total Coliform, Fecal Coliform, Heterotrophic Plate Count, E-Coli

Non-Potable Water

Aluminum, Antimony, Arsenic, Beryllium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Mercury, Molybdenum, Nickel, Selenium, Silver, Strontium, Thallium, Titanium, Vanadium, Zinc, pH, Specific Conductance, Total Dissolved Solids, Total Hardness, Calcium, Magnesium, Sodium, Potassium, Total Alkalinity, Chloride, Fluoride, Sulfate, Ammonia-N, Nitrate-N, Kjeldahl-N, Orthophosphate, Total Phosphorus, Chemical Oxygen Demand, Biochemical Oxygen Demand, Total Cyanide, Non-Filterable Residue, Total Residual Chlorine, Oil and Grease, Total Phenolics, Volatile Halocarbons, Volatile Aromatics, Chlordane, Aldrin, Dieldrin, DDD, DDE, DDT, Heptachlor, Heptachlor Epoxide, Polychlorinated Biphenyls (water), Polychlorinated Biphenyls (oil).

MICHIGAN, Department of Environmental Quality

Drinking Water

Trihalomethanes, Regulated and Unregulated Volatile Organic Compounds by EPA Method 524.2; 1,2-Dibromoethane, 1,2-Dibromo-3-chloropropane by EPA Method 504.1

NEW HAMPSHIRE, Department of Environmental Services, 202798

Drinking Water

Metals by Graphite Furnace, Metals by ICP, Mercury, Nitrite-N, Orthophosphate, Residual Free Chlorine, Turbidity, Total Filterable Residue, Calcium Hardness, pH, Alkalinity, Sodium, Sulfate, Total Cyanide, Insecticides, Herbicides, Base/Neutrals, Trihalomethanes, Volatile Organics, Vinyl Chloride, DBCP, EDB, Nitrate-N.

Wastewater

Metals by Graphite Furnace, Metals by ICP, Mercury, pH, Specific Conductivity, TDS, Total Hardness, Calcium, Magnesium, Sodium, Potassium, Total Alkalinity, Chloride, Fluoride, Sulfate, Ammonia-N, Nitrate-N, Orthophosphate, TKN, Total Phosphorus, COD, BOD, Non-Filterable Residue, Oil & Grease, Total Phenolics, Total Residual Chlorine, PCBs in Water, PCBs in Oil, Pesticides, Volatile Organics, Total Cyanide.

RHODE ISLAND, Department of Health, 54

Surface Water, Air, Wastewater, Potable Water, Sewage

Chemistry: Organic and Inorganic

GROUNDWATER ANALYTICAL

Groundwater Analytical, Inc.
P.O. Box 1200
228 Main Street
Buzzards Bay, MA 02532

Telephone (508) 759-4441
FAX (508) 759-4475

December 8, 2000

Mr. Alexander Pancic
Clean Soils Environmental
P.O. Box 591
Ipswich, MA 01938

Project: Topsfield DPW Yard/2000.34
Lab ID: 37700
Sampled: 11-30-00

Dear Alex:

Enclosed are the PCBs, Extractable Petroleum Hydrocarbons, Hydrocarbon Fingerprint, Metals, Volatile Organics, and Metals Analyses performed for the above referenced project. This project was processed for Priority One Week turnaround.

This letter authorizes the release of the analytical results, and should be considered a part of this report. This report contains a project narrative indicating project changes and non-conformances, a brief description of the Quality Assurance/Quality Control procedures employed by our laboratory, and a statement of our state certifications.

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Should you have any questions concerning this report, please do not hesitate to contact me.

Sincerely,



Jonathan R. Sanford
President

JRS/myr
Enclosures

GROUNDWATER ANALYTICAL

Massachusetts DEP VPH Method Volatile Petroleum Hydrocarbons by GC/PID/FID

Field ID: B-1
Project: Topsfield DPW Yard/2000.34
Client: Clean Soils Environment
Container: 60 mL Glass Vial
Preservation: Methanol / Cool
Matrix: Soil
% Moisture: 17

Laboratory ID: 37700-05
QC Batch ID: VG1-1161-E
Sampled: 11-30-00
Received: 12-01-00
Analyzed: 12-05-00
Dilution Factor: 1

VPH Ranges	Concentration	Units	Reporting Limit
n-C5 to n-C8 Aliphatic Hydrocarbons [†] ⊖	BRL	mg/Kg	1.0
n-C9 to n-C12 Aliphatic Hydrocarbons [†] ⊗	BRL	mg/Kg	1.0
n-C9 to n-C10 Aromatic Hydrocarbons [†]	BRL	mg/Kg	1.0
Unadjusted n-C5 to n-C8 Aliphatic Hydrocarbons [†]	BRL	mg/Kg	1.0
Unadjusted n-C9 to n-C12 Aliphatic Hydrocarbons [†]	1.2	mg/Kg	1.0
QC Surrogate Compounds	Recovery	QC Limits	
2,5-Dibromotoluene (PID)	94 %	70 - 130 %	
2,5-Dibromotoluene (FID)	98 %	70 - 130 %	

QA/QC Certification	
1. Were all QA/QC procedures required by the method followed?	Yes
2. Were all performance/acceptance standards for the required QA/QC procedures achieved?	Yes
3. Were any significant modifications made to the method, as specified in Section 11.3.2.1?	No
Method non-conformances indicated above are detailed below on this data report, or in the accompanying project narrative and project quality control report. Release of this data is authorized by the accompanying signed project cover letter. The accompanying cover letter, project narrative and quality control report are considered part of this data report.	

Method Reference: Method for the Determination of Volatile Petroleum Hydrocarbons, MA DEP (1998). Results are calculated on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.

† Hydrocarbon range data excludes concentrations of any surrogate(s) and/or internal standards eluting in that range.

⊖ n-C5 to n-C8 Aliphatic Hydrocarbons range data excludes the method target analyte concentrations.

⊗ n-C9 to n-C12 Aliphatic Hydrocarbons range data excludes the method target analyte concentrations and the concentration for the n-C9 to n-C10 Aromatic Hydrocarbons range.

⊞ Analyte elutes in the n-C5 to n-C8 Aliphatic Hydrocarbons range.

‡ Analyte elutes in the n-C9 to n-C12 Aliphatic Hydrocarbons range.

GROUNDWATER ANALYTICAL

EPA Method 8260B TCL Volatile Organics by GC/MS

Field ID: B1
Project: Topsfield DPW Yard/2000.34
Client: Clean Soils Environmental
Container: 40 mL VOA Vial
Preservation: NaHSO₄ / Cool
Matrix: Soil
% Moisture: 17

Laboratory ID: 37700-01
QC Batch ID: VM5-1360-S
Sampled: 11-30-00
Received: 12-01-00
Analyzed: 12-05-00
Dilution Factor: 1

CAS Number	Analyte	Concentration	Units	Reporting Limit
74-87-3	Chloromethane	BRL	ug/Kg	10
75-01-4	Vinyl Chloride	BRL	ug/Kg	10
74-83-9	Bromomethane	BRL	ug/Kg	10
75-00-3	Chloroethane	BRL	ug/Kg	10
75-35-4	1,1-Dichloroethene	BRL	ug/Kg	5
67-64-1	Acetone	BRL	ug/Kg	200
75-15-0	Carbon Disulfide	BRL	ug/Kg	50
75-09-2	Methylene Chloride	BRL	ug/Kg	10
156-60-5	trans- 1,2-Dichloroethene	BRL	ug/Kg	5
1634-04-4	Methyl tert- butyl Ether (MTBE) ^o	BRL	ug/Kg	5
75-34-3	1,1-Dichloroethane	BRL	ug/Kg	5
156-59-2	cis- 1,2-Dichloroethene	BRL	ug/Kg	5
78-93-3	2-Butanone (MEK)	BRL	ug/Kg	50
67-66-3	Chloroform	BRL	ug/Kg	5
71-55-6	1,1,1-Trichloroethane	BRL	ug/Kg	5
56-23-5	Carbon Tetrachloride	BRL	ug/Kg	5
71-43-2	Benzene	BRL	ug/Kg	5
107-06-2	1,2-Dichloroethane	BRL	ug/Kg	5
79-01-6	Trichloroethene	BRL	ug/Kg	5
78-87-5	1,2-Dichloropropane	BRL	ug/Kg	5
75-27-4	Bromodichloromethane	BRL	ug/Kg	5
10061-01-5	cis- 1,3-Dichloropropene	BRL	ug/Kg	5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/Kg	50
108-88-3	Toluene	BRL	ug/Kg	5
10061-02-6	trans- 1,3-Dichloropropene	BRL	ug/Kg	5
79-00-5	1,1,2-Trichloroethane	BRL	ug/Kg	5
127-18-4	Tetrachloroethene	BRL	ug/Kg	5
591-78-6	2-Hexanone	BRL	ug/Kg	50
124-48-1	Dibromochloromethane	BRL	ug/Kg	5
108-90-7	Chlorobenzene	BRL	ug/Kg	5
100-41-4	Ethylbenzene	BRL	ug/Kg	5
108-38-3/106-42-3	meta- Xylene and para- Xylene	BRL	ug/Kg	5
95-47-6	ortho- Xylene	BRL	ug/Kg	5
100-42-5	Styrene	BRL	ug/Kg	5
75-25-2	Bromoform	BRL	ug/Kg	5
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/Kg	5
QC Surrogate Compounds		Recovery	QC Limits	
Dibromofluoromethane		103 %	80 - 120 %	
1,2-Dichloroethane-d ₄		116 %	80 - 120 %	
Toluene-d ₈		99 %	81 - 117 %	
4-Bromofluorobenzene		97 %	74 - 121 %	

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as specified by the Target Compound List (TCL) of the US EPA Contract Laboratory Program. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions.
Reporting limits are adjusted for sample dilution, percent moisture and sample size.
o Indicates additional target analyte.

GROUNDWATER ANALYTICAL

Massachusetts DEP EPH Method Extractable Petroleum Hydrocarbons by GC/FID

Field ID: B1
Project: Topsfield DPW Yard/2000.34
Client: Clean Soils Environmental
Container: 120 mL Amber Glass
Preservation: Cool
Matrix: Soil
% Moisture: 17

Laboratory ID: 37700-07
QC Batch ID: EP-1062-M
Sampled: 11-30-00
Received: 12-01-00
Extracted: 12-04-00
Analyzed: 12-05-00
Dilution Factor: Aliphatic: 1 Aromatic: 1

EPH Ranges	Concentration	Units	Reporting Limit
n-C9 to n-C18 Aliphatic Hydrocarbons [†]	86	mg/Kg	36
n-C19 to n-C36 Aliphatic Hydrocarbons [†]	350	mg/Kg	36
n-C11 to n-C22 Aromatic Hydrocarbons [†] [◊]	210	mg/Kg	36
Unadjusted n-C11 to n-C22 Aromatic Hydrocarbons [†]	210	mg/Kg	36

CAS Number	Target Analytes	Concentration	Units	Reporting Limit
91-20-3	Naphthalene	BRL	mg/Kg	0.60
91-57-6	2-Methylnaphthalene	BRL	mg/Kg	0.60
85-01-8	Phenanthrene	BRL	mg/Kg	0.60
83-32-9	Acenaphthene	BRL	mg/Kg	0.60
208-96-8	Acenaphthylene	BRL	mg/Kg	0.60
86-73-7	Fluorene	BRL	mg/Kg	0.60
120-12-7	Anthracene	BRL	mg/Kg	0.60
206-44-0	Fluoranthene	0.67	mg/Kg	0.60
129-00-0	Pyrene	0.69	mg/Kg	0.60
56-55-3	Benzo[a]anthracene	BRL	mg/Kg	0.60
218-01-9	Chrysene	BRL	mg/Kg	0.60
205-99-2	Benzo[b]fluoranthene	BRL	mg/Kg	0.60
207-08-9	Benzo[k]fluoranthene	BRL	mg/Kg	0.60
50-32-8	Benzo[a]pyrene	BRL	mg/Kg	0.60
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL	mg/Kg	0.60
53-70-3	Dibenzo[a,h]anthracene	BRL	mg/Kg	0.60
191-24-2	Benzo[g,h,i]perylene	BRL	mg/Kg	0.60

QC Surrogate Compounds	Recovery	QC Limits
Fractionation: 2-Fluorobiphenyl	86 %	40 - 140 %
2-Bromonaphthalene	90 %	40 - 140 %
Extraction: Chloro-octadecane	65 %	40 - 140 %
ortho -Terphenyl	79 %	40 - 140 %

QA/QC Certification	
1. Were all QA/QC procedures required by the method followed?	Yes
2. Were all performance/acceptance standards for the required QA/QC procedures achieved?	Yes
3. Were any significant modifications made to the method, as specified in Section 11.3.1.1?	Yes
Method non-conformances indicated above are detailed below on this data report, or in the accompanying project narrative and project quality control report. Release of this data is authorized by the accompanying signed project cover letter. The accompanying cover letter, project narrative and quality control report are considered part of this data report.	

Method Reference: Method for the Determination of Extractable Petroleum Hydrocarbons, MA DEP (1998). Results are calculated on a dry weight basis. Method modified by use of microwave accelerated solvent extraction technique.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.
[†] Hydrocarbon range data excludes concentrations of any surrogate(s) and/or internal standards eluting in that range.
[◊] n-C11 to n-C22 Aromatic Hydrocarbons range data excludes the method target analyte concentrations.

GROUNDWATER ANALYTICAL

Trace Metals by ICP-AES and CVAA

Field ID: B1
Project: Topsfield DPW Yard/2000.34
Client: Clean Soils Environmental
Container: 250 mL Glass
Preservation: Cool
Matrix: Soil

Laboratory ID: 37700-10
Sampled: 11-30-00
Received: 12-01-00
% Solids 83

CAS Number	Analyte	Concentration	Units	Reporting Limit	Analyzed	QC Batch	Method
7440-38-2	Arsenic, Total	8.2	mg/Kg	5.9	12-05-00	MM-01175-S	6010B
7440-39-3	Barium, Total	BRL	mg/Kg	24	12-05-00	MM-01175-S	6010B
7440-43-9	Cadmium, Total	BRL	mg/Kg	0.59	12-05-00	MM-01175-S	6010B
7440-47-3	Chromium, Total	13	mg/Kg	12	12-05-00	MM-01175-S	6010B
7439-92-1	Lead, Total	BRL	mg/Kg	12	12-05-00	MM-01175-S	6010B
7439-97-6	Mercury, Total	BRL	mg/Kg	0.058	12-05-00	MP-0890-S	7471A
7782-49-2	Selenium, Total	BRL	mg/Kg	12	12-05-00	MM-01175-S	6010B
7440-22-4	Silver, Total	BRL	mg/Kg	5.9	12-05-00	MM-01175-S	6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions.
Reporting limits are adjusted for sample dilution and sample size.

GROUNDWATER ANALYTICAL

EPA Method 8082 Polychlorinated Biphenyls (PCBs) by GC/ECD

Field ID: B1
Project: Topsfield DPW Yard/2000.34
Client: Clean Soils Environmental
Container: 250 mL Glass
Preservation: Cool
Matrix: Soil
% Moisture: 17

Laboratory ID: 37700-10
QC Batch ID: PB-1192-M
Sampled: 11-30-00
Received: 12-01-00
Extracted: 12-05-00
Analyzed: 12-06-00
Dilution Factor: 1

CAS Number	Analyte	Concentration	Units	Reporting Limit
12674-11-2	Aroclor 1016	BRL	ug/Kg	93
11104-28-2	Aroclor 1221	BRL	ug/Kg	93
11141-16-5	Aroclor 1232	BRL	ug/Kg	93
53469-21-9	Aroclor 1242	BRL	ug/Kg	93
12672-29-6	Aroclor 1248	BRL	ug/Kg	93
11097-69-1	Aroclor 1254	BRL	ug/Kg	93
11096-82-5	Aroclor 1260	BRL	ug/Kg	93
QC Surrogate Compound		Recovery	QC Limits	
Tetrachloro- <i>m</i> -xylene		81 %	25 - 121 %	
Decachlorobiphenyl		102 %	28 - 138 %	

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as Aroclor analytes formerly specified by EPA Method 8080A. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.

GROUNDWATER ANALYTICAL

EPA Method 8260B TCL Volatile Organics by GC/MS

Field ID: B6
Project: Topsfield DPW Yard/2000.34
Client: Clean Soils Environmental
Container: 40 mL VOA Vial
Preservation: NaHSO₄ / Cool
Matrix: Soil
% Moisture: 29

Laboratory ID: 37700-02
QC Batch ID: VM5-1360-S
Sampled: 11-30-00
Received: 12-01-00
Analyzed: 12-05-00
Dilution Factor: 1

CAS Number	Analyte	Concentration	Units	Reporting Limit
74-87-3	Chloromethane	BRL	ug/Kg	13
75-01-4	Vinyl Chloride	BRL	ug/Kg	13
74-83-9	Bromomethane	BRL	ug/Kg	13
75-00-3	Chloroethane	BRL	ug/Kg	13
75-35-4	1,1-Dichloroethene	BRL	ug/Kg	7
67-64-1	Acetone	BRL	ug/Kg	260
75-15-0	Carbon Disulfide	BRL	ug/Kg	65
75-09-2	Methylene Chloride	BRL	ug/Kg	13
156-60-5	trans-1,2-Dichloroethene	BRL	ug/Kg	7
1634-04-4	Methyl tert-butyl Ether (MTBE) ^o	BRL	ug/Kg	7
75-34-3	1,1-Dichloroethane	BRL	ug/Kg	7
156-59-2	cis-1,2-Dichloroethene	BRL	ug/Kg	7
78-93-3	2-Butanone (MEK)	BRL	ug/Kg	65
67-66-3	Chloroform	BRL	ug/Kg	7
71-55-6	1,1,1-Trichloroethane	BRL	ug/Kg	7
56-23-5	Carbon Tetrachloride	BRL	ug/Kg	7
71-43-2	Benzene	BRL	ug/Kg	7
107-06-2	1,2-Dichloroethane	BRL	ug/Kg	7
79-01-6	Trichloroethene	BRL	ug/Kg	7
78-87-5	1,2-Dichloropropane	BRL	ug/Kg	7
75-27-4	Bromodichloromethane	BRL	ug/Kg	7
10061-01-5	cis-1,3-Dichloropropene	BRL	ug/Kg	7
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/Kg	65
108-88-3	Toluene	BRL	ug/Kg	7
10061-02-6	trans-1,3-Dichloropropene	BRL	ug/Kg	7
79-00-5	1,1,2-Trichloroethane	BRL	ug/Kg	7
127-18-4	Tetrachloroethene	BRL	ug/Kg	7
591-78-6	2-Hexanone	BRL	ug/Kg	65
124-48-1	Dibromochloromethane	BRL	ug/Kg	7
108-90-7	Chlorobenzene	BRL	ug/Kg	7
100-41-4	Ethylbenzene	BRL	ug/Kg	7
108-38-3/106-42-3	meta-Xylene and para-Xylene	BRL	ug/Kg	7
95-47-6	ortho-Xylene	BRL	ug/Kg	7
100-42-5	Styrene	BRL	ug/Kg	7
75-25-2	Bromoform	BRL	ug/Kg	7
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/Kg	7
QC Surrogate Compounds		Recovery	QC Limits	
Dibromofluoromethane		102 %	80 - 120 %	
1,2-Dichloroethane-d ₄		118 %	80 - 120 %	
Toluene-d ₈		100 %	81 - 117 %	
4-Bromofluorobenzene		99 %	74 - 121 %	

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as specified by the Target Compound List (TCL) of the US EPA Contract Laboratory Program. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.
o Indicates additional target analyte.

GROUNDWATER ANALYTICAL

Massachusetts DEP EPH Method Extractable Petroleum Hydrocarbons by GC/FID

Field ID: B6
Project: Topsfield DPW Yard/2000.34
Client: Clean Soils Environmental
Container: 120 mL Amber Glass
Preservation: Cool
Matrix: Soil
% Moisture: 29

Laboratory ID: 37700-08
QC Batch ID: EP-1062-M
Sampled: 11-30-00
Received: 12-01-00
Extracted: 12-04-00
Analyzed: 12-06-00
Dilution Factor: Aliphatic: 1 Aromatic: 1

EPH Ranges	Concentration	Units	Reporting Limit
n-C9 to n-C18 Aliphatic Hydrocarbons †	BRL	mg/Kg	42
n-C19 to n-C36 Aliphatic Hydrocarbons †	BRL	mg/Kg	42
n-C11 to n-C22 Aromatic Hydrocarbons †°	BRL	mg/Kg	42
Unadjusted n-C11 to n-C22 Aromatic Hydrocarbons †	BRL	mg/Kg	42

CAS Number	Target Analytes	Concentration	Units	Reporting Limit
91-20-3	Naphthalene	BRL	mg/Kg	0.69
91-57-6	2-Methylnaphthalene	BRL	mg/Kg	0.69
85-01-8	Phenanthrene	BRL	mg/Kg	0.69
83-32-9	Acenaphthene	BRL	mg/Kg	0.69
208-96-8	Acenaphthylene	BRL	mg/Kg	0.69
86-73-7	Fluorene	BRL	mg/Kg	0.69
120-12-7	Anthracene	BRL	mg/Kg	0.69
206-44-0	Fluoranthene	BRL	mg/Kg	0.69
129-00-0	Pyrene	BRL	mg/Kg	0.69
56-55-3	Benzo[a]anthracene	BRL	mg/Kg	0.69
218-01-9	Chrysene	BRL	mg/Kg	0.69
205-99-2	Benzo[b]fluoranthene	BRL	mg/Kg	0.69
207-08-9	Benzo[k]fluoranthene	BRL	mg/Kg	0.69
50-32-8	Benzo[a]pyrene	BRL	mg/Kg	0.69
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL	mg/Kg	0.69
53-70-3	Dibenzo[a,h]anthracene	BRL	mg/Kg	0.69
191-24-2	Benzo[g,h,i]perylene	BRL	mg/Kg	0.69

QC Surrogate Compounds	Recovery	QC Limits
Fractionation: 2-Fluorobiphenyl	84 %	40 - 140 %
2-Bromonaphthalene	83 %	40 - 140 %
Extraction: Chloro-octadecane	62 %	40 - 140 %
ortho-Terphenyl	79 %	40 - 140 %

QA/QC Certification	
1. Were all QA/QC procedures required by the method followed?	Yes
2. Were all performance/acceptance standards for the required QA/QC procedures achieved?	Yes
3. Were any significant modifications made to the method, as specified in Section 11.3.1.1?	Yes
Method non-conformances indicated above are detailed below on this data report, or in the accompanying project narrative and project quality control report. Release of this data is authorized by the accompanying signed project cover letter. The accompanying cover letter, project narrative and quality control report are considered part of this data report.	

Method Reference: Method for the Determination of Extractable Petroleum Hydrocarbons, MA DEP (1998). Results are calculated on a dry weight basis. Method modified by use of microwave accelerated solvent extraction technique.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.
† Hydrocarbon range data excludes concentrations of any surrogate(s) and/or internal standards eluting in that range.
° n-C11 to n-C22 Aromatic Hydrocarbons range data excludes the method target analyte concentrations.

GROUNDWATER ANALYTICAL

Trace Metals by ICP-AES and CVAA

Field ID: B6
Project: Topsfield DPW Yard/2000.34
Client: Clean Soils Environmental
Container: 250 mL Glass
Preservation: Cool
Matrix: Soil

Laboratory ID: 37700-11
Sampled: 11-30-00
Received: 12-01-00
% Solids: 84

CAS Number	Analyte	Concentration	Units	Reporting Limit	Analyzed Date	QC Batch	Method
7440-38-2	Arsenic, Total	32	mg/Kg	5.8	12-05-00	MM-01175-S	6010B
7440-39-3	Barium, Total	49	mg/Kg	23	12-05-00	MM-01175-S	6010B
7440-43-9	Cadmium, Total	BRL	mg/Kg	0.58	12-05-00	MM-01175-S	6010B
7440-47-3	Chromium, Total	19	mg/Kg	12	12-05-00	MM-01175-S	6010B
7439-92-1	Lead, Total	BRL	mg/Kg	12	12-05-00	MM-01175-S	6010B
7439-97-6	Mercury, Total	BRL	mg/Kg	0.062	12-05-00	MP-0890-S	7471A
7782-49-2	Selenium, Total	BRL	mg/Kg	12	12-05-00	MM-01175-S	6010B
7440-22-4	Silver, Total	BRL	mg/Kg	5.8	12-05-00	MM-01175-S	6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions.
Reporting limits are adjusted for sample dilution and sample size.

GROUNDWATER ANALYTICAL

Massachusetts DEP EPH Method Extractable Petroleum Hydrocarbons by GC/FID

Field ID: B8
Project: Topsfield DPW Yard/2000.34
Client: Clean Soils Environmental
Container: 120 mL Amber Glass
Preservation: Cool
Matrix: Soil
% Moisture: 16

Laboratory ID: 37700-09
QC Batch ID: EP-1062-M
Sampled: 11-30-00
Received: 12-01-00
Extracted: 12-04-00
Analyzed: 12-06-00
Dilution Factor: Aliphatic: 1 Aromatic: 1

EPH Ranges	Concentration	Units	Reporting Limit
n-C9 to n-C18 Aliphatic Hydrocarbons [†]	BRL	mg/Kg	34
n-C19 to n-C36 Aliphatic Hydrocarbons [†]	BRL	mg/Kg	34
n-C11 to n-C22 Aromatic Hydrocarbons ^{†,‡}	BRL	mg/Kg	34
Unadjusted n-C11 to n-C22 Aromatic Hydrocarbons [†]	BRL	mg/Kg	34

CAS Number	Target Analytes	Concentration	Units	Reporting Limit
91-20-3	Naphthalene	BRL	mg/Kg	0.56
91-57-6	2-Methylnaphthalene	BRL	mg/Kg	0.56
85-01-8	Phenanthrene	BRL	mg/Kg	0.56
83-32-9	Acenaphthene	BRL	mg/Kg	0.56
208-96-8	Acenaphthylene	BRL	mg/Kg	0.56
86-73-7	Fluorene	BRL	mg/Kg	0.56
120-12-7	Anthracene	BRL	mg/Kg	0.56
206-44-0	Fluoranthene	BRL	mg/Kg	0.56
129-00-0	Pyrene	BRL	mg/Kg	0.56
56-55-3	Benzo[a]anthracene	BRL	mg/Kg	0.56
218-01-9	Chrysene	BRL	mg/Kg	0.56
205-99-2	Benzo[b]fluoranthene	BRL	mg/Kg	0.56
207-08-9	Benzo[k]fluoranthene	BRL	mg/Kg	0.56
50-32-8	Benzo[a]pyrene	BRL	mg/Kg	0.56
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL	mg/Kg	0.56
53-70-3	Dibenzo[a,h]anthracene	BRL	mg/Kg	0.56
191-24-2	Benzo[g,h,i]perylene	BRL	mg/Kg	0.56

QC Surrogate Compounds	Recovery	QC Limits
Fractionation: 2-Fluorobiphenyl	80 %	40 - 140 %
2-Bromonaphthalene	80 %	40 - 140 %
Extraction: Chloro-octadecane	72 %	40 - 140 %
ortho-Terphenyl	77 %	40 - 140 %

QA/QC Certification	
1. Were all QA/QC procedures required by the method followed?	Yes
2. Were all performance/acceptance standards for the required QA/QC procedures achieved?	Yes
3. Were any significant modifications made to the method, as specified in Section 11.3.1.1?	Yes
Method non-conformances indicated above are detailed below on this data report, or in the accompanying project narrative and project quality control report. Release of this data is authorized by the accompanying signed project cover letter. The accompanying cover letter, project narrative and quality control report are considered part of this data report.	

Method Reference: Method for the Determination of Extractable Petroleum Hydrocarbons, MA DEP (1998). Results are calculated on a dry weight basis. Method modified by use of microwave accelerated solvent extraction technique.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.

† Hydrocarbon range data excludes concentrations of any surrogate(s) and/or internal standards eluting in that range.

‡ n-C11 to n-C22 Aromatic Hydrocarbons range data excludes the method target analyte concentrations.

GROUNDWATER ANALYTICAL

EPA Method 8260B TCL Volatile Organics by GC/MS

Field ID: 88
Project: Topsfield DPW Yard/2000.34
Client: Clean Soils Environmental
Container: 40 mL VOA Vial
Preservation: NaHSO4 / Cool
Matrix: Soil
% Moisture: 16

Laboratory ID: 37700-03
QC Batch ID: VM5-1360-S
Sampled: 11-30-00
Received: 12-01-00
Analyzed: 12-05-00
Dilution Factor: 1

CAS Number	Analyte	Concentration	Units	Reporting Limit
74-87-3	Chloromethane	BRL	ug/Kg	10
75-01-4	Vinyl Chloride	BRL	ug/Kg	10
74-83-9	Bromomethane	BRL	ug/Kg	10
75-00-3	Chloroethane	BRL	ug/Kg	10
75-35-4	1,1-Dichloroethene	BRL	ug/Kg	5
67-64-1	Acetone	BRL	ug/Kg	200
75-15-0	Carbon Disulfide	BRL	ug/Kg	50
75-09-2	Methylene Chloride	BRL	ug/Kg	10
156-60-5	trans-1,2-Dichloroethene	BRL	ug/Kg	5
1634-04-4	Methyl tert-butyl Ether (MTBE) ^o	BRL	ug/Kg	5
75-34-3	1,1-Dichloroethane	BRL	ug/Kg	5
156-59-2	cis-1,2-Dichloroethene	BRL	ug/Kg	5
78-93-3	2-Butanone (MEK)	BRL	ug/Kg	50
67-66-3	Chloroform	BRL	ug/Kg	5
71-55-6	1,1,1-Trichloroethane	BRL	ug/Kg	5
56-23-5	Carbon Tetrachloride	BRL	ug/Kg	5
71-43-2	Benzene	BRL	ug/Kg	5
107-06-2	1,2-Dichloroethane	BRL	ug/Kg	5
79-01-6	Trichloroethene	BRL	ug/Kg	5
78-87-5	1,2-Dichloropropane	BRL	ug/Kg	5
75-27-4	Bromodichloromethane	BRL	ug/Kg	5
10061-01-5	cis-1,3-Dichloropropene	BRL	ug/Kg	5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/Kg	50
108-88-3	Toluene	BRL	ug/Kg	5
10061-02-6	trans-1,3-Dichloropropene	BRL	ug/Kg	5
79-00-5	1,1,2-Trichloroethane	BRL	ug/Kg	5
127-18-4	Tetrachloroethene	BRL	ug/Kg	5
591-78-6	2-Hexanone	BRL	ug/Kg	50
124-48-1	Dibromochloromethane	BRL	ug/Kg	5
108-90-7	Chlorobenzene	BRL	ug/Kg	5
100-41-4	Ethylbenzene	BRL	ug/Kg	5
108-38-3/106-42-3	meta-Xylene and para-Xylene	BRL	ug/Kg	5
95-47-6	ortho-Xylene	BRL	ug/Kg	5
100-42-5	Styrene	BRL	ug/Kg	5
75-25-2	Bromoform	BRL	ug/Kg	5
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/Kg	5
QC Surrogate Compounds		Recovery	QC Limits	
Dibromofluoromethane		103 %	80 - 120 %	
1,2-Dichloroethane-d ₄		114 %	80 - 120 %	
Toluene-d ₈		100 %	81 - 117 %	
4-Bromofluorobenzene		98 %	74 - 121 %	

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as specified by the Target Compound List (TCL) of the US EPA Contract Laboratory Program. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.
o Indicates additional target analyte.

GROUNDWATER ANALYTICAL

Trace Metals by ICP-AES and CVAA

Field ID: B8
Project: Topsfield DPW Yard/2000.34
Client: Clean Soils Environmental
Container: 250 mL Glass
Preservation: Cool
Matrix: Soil

Laboratory ID: 37700-12
Sampled: 11-30-00
Received: 12-01-00
% Solids 86

CAS Number	Analyte	Concentration	Units	Reporting Limit	Analyzed	QC Batch	Method
7440-38-2	Arsenic, Total	22	mg/Kg	5.7	12-05-00	MM-01175-S	6010B
7440-39-3	Barium, Total	38	mg/Kg	23	12-05-00	MM-01175-S	6010B
7440-43-9	Cadmium, Total	BRL	mg/Kg	0.57	12-05-00	MM-01175-S	6010B
7440-47-3	Chromium, Total	12	mg/Kg	11	12-05-00	MM-01175-S	6010B
7439-92-1	Lead, Total	BRL	mg/Kg	11	12-05-00	MM-01175-S	6010B
7439-97-6	Mercury, Total	BRL	mg/Kg	0.068	12-05-00	MP-0890-S	7471A
7782-49-2	Selenium, Total	BRL	mg/Kg	11	12-05-00	MM-01175-S	6010B
7440-22-4	Silver, Total	BRL	mg/Kg	5.7	12-05-00	MM-01175-S	6010B

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).
Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions.
Reporting limits are adjusted for sample dilution and sample size.

GROUNDWATER ANALYTICAL

Massachusetts DEP VPH Method Volatile Petroleum Hydrocarbons by GC/PID/FID

Field ID: Trip Blank
Project: Topsfield DPW Yard/2000.34
Client: Clean Soils Environmental
Container: 60 mL Glass
Preservation: Cool
Matrix: Methanol
% Moisture: N/A

Laboratory ID: 37700-06
QC Batch ID: VG1-1161-E
Sampled: 11-30-00
Received: 12-01-00
Analyzed: 12-05-00
Dilution Factor: 1

VPH Ranges	Concentration	Units	Reporting Limit
n-C5 to n-C8 Aliphatic Hydrocarbons ^{† 0}	BRL	mg/Kg	1.0
n-C9 to n-C12 Aliphatic Hydrocarbons ^{† 0}	BRL	mg/Kg	1.0
n-C9 to n-C10 Aromatic Hydrocarbons [†]	BRL	mg/Kg	1.0

Unadjusted n-C5 to n-C8 Aliphatic Hydrocarbons [†]	BRL	mg/Kg	1.0
Unadjusted n-C9 to n-C12 Aliphatic Hydrocarbons [†]	BRL	mg/Kg	1.0

QC Surrogate Compounds	Recovery	QC Limits
2,5-Dibromotoluene (PID)	112 %	70 - 130 %
2,5-Dibromotoluene (FID)	106 %	70 - 130 %

QA/QC Certification	
1. Were all QA/QC procedures required by the method followed?	Yes
2. Were all performance/acceptance standards for the required QA/QC procedures achieved?	Yes
3. Were any significant modifications made to the method, as specified in Section 11.3.2.1?	No
Method non-conformances indicated above are detailed below on this data report, or in the accompanying project narrative and project quality control report. Release of this data is authorized by the accompanying signed project cover letter. The accompanying cover letter, project narrative and quality control report are considered part of this data report.	

Method Reference: Method for the Determination of Volatile Petroleum Hydrocarbons, MA DEP (1998). Results are calculated on a wet weight basis.

Report Notations:

- BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.
- † Hydrocarbon range data excludes concentrations of any surrogate(s) and/or internal standards eluting in that range.
- 0 n-C5 to n-C8 Aliphatic Hydrocarbons range data excludes the method target analyte concentrations.
- ⊗ n-C9 to n-C12 Aliphatic Hydrocarbons range data excludes the method target analyte concentrations and the concentration for the n-C9 to n-C10 Aromatic Hydrocarbons range.
- ⊠ Analyte elutes in the n-C5 to n-C8 Aliphatic Hydrocarbons range.
- ‡ Analyte elutes in the n-C9 to n-C12 Aliphatic Hydrocarbons range.

GROUNDWATER ANALYTICAL

EPA Method 8260B TCL Volatile Organics by GC/MS

Field ID: Trip Blank
Project: Topsfield DPW Yard/2000.34
Client: Clean Soils Environmental
Container: 60 mL Glass
Preservation: Cool
Matrix: Methanol
% Moisture: N/A

Laboratory ID: 37700-04
QC Batch ID: VM1-1895-S
Sampled: 11-30-00
Received: 12-01-00
Analyzed: 12-06-00
Dilution Factor: 1

CAS Number	Analyte	Concentration	Units	Reporting Limit
74-87-3	Chloromethane	BRL	ug/Kg	500
75-01-4	Vinyl Chloride	BRL	ug/Kg	500
74-83-9	Bromomethane	BRL	ug/Kg	500
75-00-3	Chloroethane	BRL	ug/Kg	500
75-35-4	1,1-Dichloroethene	BRL	ug/Kg	250
67-64-1	Acetone	BRL	ug/Kg	2,500
75-15-0	Carbon Disulfide	BRL	ug/Kg	2,500
75-09-2	Methylene Chloride	BRL	ug/Kg	250
156-60-5	trans-1,2-Dichloroethene	BRL	ug/Kg	250
75-34-3	1,1-Dichloroethane	BRL	ug/Kg	250
156-59-2	cis-1,2-Dichloroethene	BRL	ug/Kg	250
78-93-3	2-Butanone (MEK)	BRL	ug/Kg	2,500
67-66-3	Chloroform	BRL	ug/Kg	250
71-55-6	1,1,1-Trichloroethane	BRL	ug/Kg	250
56-23-5	Carbon Tetrachloride	BRL	ug/Kg	250
71-43-2	Benzene	BRL	ug/Kg	250
107-06-2	1,2-Dichloroethane	BRL	ug/Kg	250
79-01-6	Trichloroethene	BRL	ug/Kg	250
78-87-5	1,2-Dichloropropane	BRL	ug/Kg	250
75-27-4	Bromodichloromethane	BRL	ug/Kg	250
10061-01-5	cis-1,3-Dichloropropene	BRL	ug/Kg	250
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/Kg	2,500
108-88-3	Toluene	BRL	ug/Kg	250
10061-02-6	trans-1,3-Dichloropropene	BRL	ug/Kg	250
79-00-5	1,1,2-Trichloroethane	BRL	ug/Kg	250
127-18-4	Tetrachloroethene	BRL	ug/Kg	250
591-78-6	2-Hexanone	BRL	ug/Kg	2,500
124-48-1	Dibromochloromethane	BRL	ug/Kg	250
108-90-7	Chlorobenzene	BRL	ug/Kg	250
100-41-4	Ethylbenzene	BRL	ug/Kg	250
108-38-3/106-42-3	meta-Xylene and para-Xylene	BRL	ug/Kg	250
95-47-6	ortho-Xylene	BRL	ug/Kg	250
100-42-5	Styrene	BRL	ug/Kg	250
75-25-2	Bromoform	BRL	ug/Kg	250
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/Kg	250

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	97 %	80 - 120 %
1,2-Dichloroethane-d ₄	95 %	80 - 120 %
Toluene-d ₈	99 %	81 - 117 %
4-Bromofluorobenzene	93 %	74 - 121 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as specified by the Target Compound List (TCL) of the US EPA Contract Laboratory Program. Results are reported on a wet weight basis. Analysis performed utilizing methanol extraction technique.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.

Project Narrative

Project: **Topsfield DPW Yard/2000.34**
Client: **Clean Soils Environmental**

Lab ID: **37700**
Received: **12-01-00**

A. Physical Condition of Sample(s)

This project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged in appropriate containers with the correct preservation.

B. Project Documentation

This project was accompanied by satisfactory Chain of Custody documentation. The sample container label(s) agreed with the Chain of Custody.

C. Analysis of Sample(s)

No analytical anomalies or non-conformances were noted by the laboratory during the processing of these sample(s). All data contained within this report are released without qualification.

Quality Assurance/Quality Control

A. Program Overview

Groundwater Analytical conducts an active Quality Assurance program to ensure the production of high quality, valid data. This program closely follows the guidance provided by *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*, US EPA QAMS-005/80 (1980), and *Test Methods for Evaluating Solid Waste*, US EPA, SW-846, Update III (1996).

Quality Control protocols include written Standard Operating Procedures (SOPs) developed for each analytical method. SOPs are derived from US EPA methodologies and other established references. Standards are prepared from commercially obtained reference materials of certified purity, and documented for traceability.

Quality Assessment protocols for most organic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. All samples, standards, blanks, laboratory control samples, matrix spikes and sample duplicates are spiked with internal standards and surrogate compounds. All instrument sequences begin with an initial calibration verification standard and a blank; and excepting GC/MS sequences, all sequences close with a continuing calibration standard. GC/MS systems are tuned to appropriate ion abundance criteria daily, or for each 12 hour operating period, whichever is more frequent.

Quality Assessment protocols for most inorganic analyses include a minimum of one laboratory control sample, one method blank, one matrix spike sample, and one sample duplicate for each sample preparation batch. Standard curves are derived from one reagent blank and four concentration levels. Curve validity is verified by standard recoveries within plus or minus ten percent of the curve.

B. Definitions

Batches are used as the basic unit for Quality Assessment. A Batch is defined as twenty or fewer samples of the same matrix which are prepared together for the same analysis, using the same lots of reagents and the same techniques or manipulations, all within the same continuum of time, up to but not exceeding 24 hours.

Laboratory Control Samples are used to assess the accuracy of the analytical method. A Laboratory Control Sample consists of reagent water or sodium sulfate spiked with a group of target analytes representative of the method analytes. Accuracy is defined as the degree of agreement of the measured value with the true or expected value. Percent Recoveries for the Laboratory Control Samples are calculated to assess accuracy.

Method Blanks are used to assess the level of contamination present in the analytical system. Method Blanks consist of reagent water or an aliquot of sodium sulfate. Method Blanks are taken through all the appropriate steps of an analytical method. Sample data reported is not corrected for blank contamination.

Surrogate Compounds are used to assess the effectiveness of an analytical method in dealing with each sample matrix. Surrogate Compounds are organic compounds which are similar to the target analytes of interest in chemical behavior, but which are not normally found in environmental samples. Percent Recoveries are calculated for each Surrogate Compound.

GROUNDWATER ANALYTICAL

Quality Control Report Laboratory Control Sample

Category: EPA Method 8260B
QC Batch ID: VM5-1360-SL
Matrix: Soil
Units: ug/Kg

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
75-35-4	1,1-Dichloroethene	50	45	89 %	70 - 130 %
71-43-2	Benzene	50	45	90 %	70 - 130 %
79-01-6	Trichloroethene	50	44	88 %	70 - 130 %
108-88-3	Toluene	50	45	90 %	70 - 130 %
108-90-7	Chlorobenzene	50	45	91 %	70 - 130 %

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	99 %	80 - 120 %
1,2-Dichloroethane-d ₄	98 %	80 - 120 %
Toluene-d ₈	100 %	81 - 117 %
4-Bromofluorobenzene	101 %	74 - 121 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report Method Blank

Category: EPA Method 8260B
QC Batch ID: VM5-1360-SB
Matrix: Soil

CAS Number	Analyte	Concentration	Units	Reporting Limit
74-87-3	Chloromethane	BRL	ug/Kg	10
75-01-4	Vinyl Chloride	BRL	ug/Kg	10
74-83-9	Bromomethane	BRL	ug/Kg	10
75-00-3	Chloroethane	BRL	ug/Kg	10
75-35-4	1,1-Dichloroethene	BRL	ug/Kg	5
67-64-1	Acetone	BRL	ug/Kg	50
75-15-0	Carbon Disulfide	BRL	ug/Kg	50
75-09-2	Methylene Chloride	BRL	ug/Kg	10
156-60-5	trans-1,2-Dichloroethene	BRL	ug/Kg	5
1634-04-4	Methyl tert-butyl Ether (MTBE) ^o	BRL	ug/Kg	5
75-34-3	1,1-Dichloroethane	BRL	ug/Kg	5
156-59-2	cis-1,2-Dichloroethene	BRL	ug/Kg	5
78-93-3	2-Butanone (MEK)	BRL	ug/Kg	50
67-66-3	Chloroform	BRL	ug/Kg	5
71-55-6	1,1,1-Trichloroethane	BRL	ug/Kg	5
56-23-5	Carbon Tetrachloride	BRL	ug/Kg	5
71-43-2	Benzene	BRL	ug/Kg	5
107-06-2	1,2-Dichloroethane	BRL	ug/Kg	5
79-01-6	Trichloroethene	BRL	ug/Kg	5
78-87-5	1,2-Dichloropropane	BRL	ug/Kg	5
75-27-4	Bromodichloromethane	BRL	ug/Kg	5
10061-01-5	cis-1,3-Dichloropropene	BRL	ug/Kg	5
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/Kg	50
108-88-3	Toluene	BRL	ug/Kg	5
10061-02-6	trans-1,3-Dichloropropene	BRL	ug/Kg	5
79-00-5	1,1,2-Trichloroethane	BRL	ug/Kg	5
127-18-4	Tetrachloroethene	BRL	ug/Kg	5
591-78-6	2-Hexanone	BRL	ug/Kg	50
124-48-1	Dibromochloromethane	BRL	ug/Kg	5
108-90-7	Chlorobenzene	BRL	ug/Kg	5
100-41-4	Ethylbenzene	BRL	ug/Kg	5
108-38-3/106-42-3	meta-Xylene and para-Xylene	BRL	ug/Kg	5
95-47-6	ortho-Xylene	BRL	ug/Kg	5
100-42-5	Styrene	BRL	ug/Kg	5
75-25-2	Bromoform	BRL	ug/Kg	5
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/Kg	5

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	101 %	80 - 120 %
1,2-Dichloroethane-d ₄	100 %	80 - 120 %
Toluene-d ₈	100 %	81 - 117 %
4-Bromofluorobenzene	101 %	74 - 121 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as specified by the Target Compound List (TCL) of the US EPA Contract Laboratory Program. Results are reported on a dry weight basis.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.

^o Indicates additional target analyte.

GROUNDWATER ANALYTICAL

Quality Control Report Laboratory Control Sample

Category: EPA Method 8260B
QC Batch ID: VM1-1895-SL
Matrix: Soil
Units: ug/Kg

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
75-35-4	1,1-Dichloroethene	2,500	2,600	104 %	70 - 130 %
71-43-2	Benzene	2,500	2,500	100 %	70 - 130 %
79-01-6	Trichloroethene	2,500	2,500	99 %	70 - 130 %
108-88-3	Toluene	2,500	2,500	100 %	70 - 130 %
108-90-7	Chlorobenzene	2,500	2,600	105 %	70 - 130 %

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	97 %	80 - 120 %
1,2-Dichloroethane-d ₄	105 %	80 - 120 %
Toluene-d ₈	96 %	81 - 117 %
4-Bromofluorobenzene	97 %	74 - 121 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report Method Blank

Category: EPA Method 8260B
QC Batch ID: VM1-1895-SB
Matrix: Soil

CAS Number	Analyte	Concentration	Units	Reporting Limit
74-87-3	Chloromethane	BRL	ug/Kg	500
75-01-4	Vinyl Chloride	BRL	ug/Kg	500
74-83-9	Bromomethane	BRL	ug/Kg	500
75-00-3	Chloroethane	BRL	ug/Kg	500
75-35-4	1,1-Dichloroethene	BRL	ug/Kg	250
67-64-1	Acetone	BRL	ug/Kg	2,500
75-15-0	Carbon Disulfide	BRL	ug/Kg	2,500
75-09-2	Methylene Chloride	BRL	ug/Kg	250
156-60-5	trans- 1,2-Dichloroethene	BRL	ug/Kg	250
1634-04-4	Methyl tert- butyl Ether (MTBE) ⁰	BRL	ug/Kg	250
75-34-3	1,1-Dichloroethane	BRL	ug/Kg	250
156-59-2	cis- 1,2-Dichloroethene	BRL	ug/Kg	250
78-93-3	2-Butanone (MEK)	BRL	ug/Kg	2,500
67-66-3	Chloroform	BRL	ug/Kg	250
71-55-6	1,1,1-Trichloroethane	BRL	ug/Kg	250
56-23-5	Carbon Tetrachloride	BRL	ug/Kg	250
71-43-2	Benzene	BRL	ug/Kg	250
107-06-2	1,2-Dichloroethane	BRL	ug/Kg	250
79-01-6	Trichloroethene	BRL	ug/Kg	250
78-87-5	1,2-Dichloropropane	BRL	ug/Kg	250
75-27-4	Bromodichloromethane	BRL	ug/Kg	250
10061-01-5	cis- 1,3-Dichloropropene	BRL	ug/Kg	250
108-10-1	4-Methyl-2-Pentanone (MIBK)	BRL	ug/Kg	2,500
108-88-3	Toluene	BRL	ug/Kg	250
10061-02-6	trans- 1,3-Dichloropropene	BRL	ug/Kg	250
79-00-5	1,1,2-Trichloroethane	BRL	ug/Kg	250
127-18-4	Tetrachloroethene	BRL	ug/Kg	250
591-78-6	2-Hexanone	BRL	ug/Kg	2,500
124-48-1	Dibromochloromethane	BRL	ug/Kg	250
108-90-7	Chlorobenzene	BRL	ug/Kg	250
100-41-4	Ethylbenzene	BRL	ug/Kg	250
108-38-3/106-42-3	meta- Xylene and para- Xylene	BRL	ug/Kg	250
95-47-6	ortho- Xylene	BRL	ug/Kg	250
100-42-5	Styrene	BRL	ug/Kg	250
75-25-2	Bromoform	BRL	ug/Kg	250
79-34-5	1,1,2,2-Tetrachloroethane	BRL	ug/Kg	250

QC Surrogate Compounds	Recovery	QC Limits
Dibromofluoromethane	99 %	80 - 120 %
1,2-Dichloroethane-d ₄	105 %	80 - 120 %
Toluene-d ₈	96 %	81 - 117 %
4-Bromofluorobenzene	91 %	74 - 121 %

Method Reference: Test Methods for Evaluating Solid Waste, US EPA, SW-846, Third Edition, Update III (1996). Analyte list as specified by the Target Compound List (TCL) of the US EPA Contract Laboratory Program. Results are reported on a dry weight basis. Analysis performed utilizing methanol extraction technique.

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions.
Reporting limits are adjusted for sample dilution, percent moisture and sample size.

0 Indicates additional target analyte.

GROUNDWATER ANALYTICAL

Quality Control Report Method Blank

Category: MA DEP VPH Method
QC Batch ID: VG1-1161-E
Matrix: Soil

VPH Ranges	Concentration	Units	Reporting Limit
n-C5 to n-C8 Aliphatic Hydrocarbons [†] ⊖	BRL	mg/Kg	1.0
n-C9 to n-C12 Aliphatic Hydrocarbons [†] ⊗	BRL	mg/Kg	1.0
n-C9 to n-C10 Aromatic Hydrocarbons [†]	BRL	mg/Kg	1.0
Unadjusted n-C5 to n-C8 Aliphatic Hydrocarbons [†]	BRL	mg/Kg	1.0
Unadjusted n-C9 to n-C12 Aliphatic Hydrocarbons [†]	BRL	mg/Kg	1.0

CAS Number	Target Analytes	Concentration	Units	Reporting Limit
1634-04-4	Methyl tert-butyl Ether ^π	BRL	mg/Kg	0.10
71-43-2	Benzene ^π	BRL	mg/Kg	0.10
108-88-3	Toluene ^π	BRL	mg/Kg	0.10
100-41-4	Ethylbenzene [†]	BRL	mg/Kg	0.10
108-38-3 and 106-42-3	meta- Xylene and para- Xylene [†]	BRL	mg/Kg	0.10
95-47-6	ortho- Xylene [†]	BRL	mg/Kg	0.10
91-20-3	Naphthalene	BRL	mg/Kg	0.50

QC Surrogate Compounds	Recovery	QC Limits
2,5-Dibromotoluene (PID)	108 %	70 - 130 %
2,5-Dibromotoluene (FID)	104 %	70 - 130 %

Method Reference: Method for the Determination of Volatile Petroleum Hydrocarbons, MA DEP (1998).

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.

† Hydrocarbon range data excludes concentrations of any surrogate(s) and/or internal standards eluting in that range.

⊖ n-C5 to n-C8 Aliphatic Hydrocarbons range data excludes the method target analyte concentrations.

⊗ n-C9 to n-C12 Aliphatic Hydrocarbons range data excludes the method target analyte concentrations and the concentration for the n-C9 to n-C10 Aromatic Hydrocarbons range.

π Analyte elutes in the n-C5 to n-C8 Aliphatic Hydrocarbons range.

‡ Analyte elutes in the n-C9 to n-C12 Aliphatic Hydrocarbons range.

GROUNDWATER ANALYTICAL

Quality Control Report Method Blank

Category: MA DEP VPH Method
QC Batch ID: VG1-1161-E
Matrix: Soil

VPH Ranges	Concentration	Units	Reporting Limit
n-C5 to n-C8 Aliphatic Hydrocarbons [†]	BRL	mg/Kg	1.0
n-C9 to n-C12 Aliphatic Hydrocarbons [†] ⊗	BRL	mg/Kg	1.0
n-C9 to n-C10 Aromatic Hydrocarbons [†]	BRL	mg/Kg	1.0
Unadjusted n-C5 to n-C8 Aliphatic Hydrocarbons [†]	BRL	mg/Kg	1.0
Unadjusted n-C9 to n-C12 Aliphatic Hydrocarbons [†]	BRL	mg/Kg	1.0

CAS Number	Target Analytes	Concentration	Units	Reporting Limit
1634-04-4	Methyl tert-butyl Ether ^π	BRL	mg/Kg	0.10
71-43-2	Benzene ^π	BRL	mg/Kg	0.10
108-88-3	Toluene ^π	BRL	mg/Kg	0.10
100-41-4	Ethylbenzene [†]	BRL	mg/Kg	0.10
108-38-3 and 106-42-3	meta- Xylene and para - Xylene [†]	BRL	mg/Kg	0.10
95-47-6	ortho- Xylene [†]	BRL	mg/Kg	0.10
91-20-3	Naphthalene	BRL	mg/Kg	0.50

QC/Surrogate Compounds	Recovery	QC Limits
2,5-Dibromotoluene (PID)	108 %	70 - 130 %
2,5-Dibromotoluene (FID)	104 %	70 - 130 %

Method Reference: Method for the Determination of Volatile Petroleum Hydrocarbons, MA DEP (1998).

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.

† Hydrocarbon range data excludes concentrations of any surrogate(s) and/or internal standards eluting in that range.

◊ n-C5 to n-C8 Aliphatic Hydrocarbons range data excludes the method target analyte concentrations.

⊗ n-C9 to n-C12 Aliphatic Hydrocarbons range data excludes the method target analyte concentrations and the concentration for the n-C9 to n-C10 Aromatic Hydrocarbons range.

π Analyte elutes in the n-C5 to n-C8 Aliphatic Hydrocarbons range.

‡ Analyte elutes in the n-C9 to n-C12 Aliphatic Hydrocarbons range.

GROUNDWATER ANALYTICAL

Quality Control Report Laboratory Control Sample

Category: MA DEP VPH Method
QC Batch ID: VG1-1161-E
Matrix: Soil
Units: mg/Kg

CAS Number	Analyte	Spiked	Measured	Recovery %	QC Limits
1634-04-4	Methyl tert-butyl Ether	2.5	2.4	96%	70 - 130 %
71-43-2	Benzene	2.5	2.5	101%	70 - 130 %
108-88-3	Toluene	2.5	2.7	107%	70 - 130 %
100-41-4	Ethylbenzene	2.5	2.5	100%	70 - 130 %
108-38-3 and 106-42-3	meta- Xylene and para- Xylene	5.0	5.4	109%	70 - 130 %
95-47-6	ortho- Xylene	2.5	2.6	104%	70 - 130 %
91-20-3	Naphthalene	2.5	2.4	98%	70 - 130 %

QC Surrogate Compounds	Recovery	QC Limits
2,5-Dibromotoluene (PID)	99 %	70 - 130 %
2,5-Dibromotoluene (FID)	98 %	70 - 130 %

Method Reference: Method for the Determination of Volatile Petroleum Hydrocarbons, MA DEP (1998).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report Laboratory Control Sample

Category: MA DEP EPH Method
QC Batch ID: EP-1062-M
Matrix: Soil
Units: mg/Kg

CAS Number	Analyte	Spiked	Measured	Recovery	QC Limits
111-84-2	n-Nonane (C9)	5.0	2.1	41 %	40 - 140 %
629-59-4	n-Tetradecane (C14)	5.0	3.5	70 %	40 - 140 %
629-92-5	n-Nonadecane (C19)	5.0	3.8	75 %	40 - 140 %
112-95-8	n-Eicosane (C20)	5.0	4.2	85 %	40 - 140 %
630-02-4	n-Octacosane (C28)	5.0	4.1	81 %	40 - 140 %
91-20-3	Naphthalene	5.0	2.6	52 %	40 - 140 %
83-32-9	Acenaphthene	5.0	3.1	63 %	40 - 140 %
120-12-7	Anthracene	5.0	3.9	78 %	40 - 140 %
129-00-0	Pyrene	5.0	3.8	76 %	40 - 140 %
218-01-9	Chrysene	5.0	4.0	81 %	40 - 140 %

QC Surrogate Compounds	Recovery	QC Limits
Fractionation: 2-Fluorobiphenyl	74 %	40 - 140 %
2-Bromonaphthalene	73 %	40 - 140 %
Extraction: Chloro-octadecane	81 %	40 - 140 %
ortho-Terphenyl	83 %	40 - 140 %

Method Reference: Method for the Determination of Extractable Petroleum Hydrocarbons, MA DEP (1998).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report Method Blank

Category: MA DEP EPH Method
QC Batch ID: EP-1062-M
Matrix: Soil

EPH Ranges	Concentration	Units	Reporting Limit
n-C9 to n-C18 Aliphatic Hydrocarbons [†]	BRL	mg/Kg	30
n-C19 to n-C36 Aliphatic Hydrocarbons [†]	BRL	mg/Kg	30
n-C11 to n-C22 Aromatic Hydrocarbons [†] ^o	BRL	mg/Kg	30
Unadjusted n-C11 to n-C22 Aromatic Hydrocarbons [†]	BRL	mg/Kg	30

CAS Number	Target Analytes	Concentration	Units	Reporting Limit
91-20-3	Naphthalene	BRL	mg/Kg	0.50
91-57-6	2-Methylnaphthalene	BRL	mg/Kg	0.50
85-01-8	Phenanthrene	BRL	mg/Kg	0.50
83-32-9	Acenaphthene	BRL	mg/Kg	0.50
208-96-8	Acenaphthylene	BRL	mg/Kg	0.50
86-73-7	Fluorene	BRL	mg/Kg	0.50
120-12-7	Anthracene	BRL	mg/Kg	0.50
206-44-0	Fluoranthene	BRL	mg/Kg	0.50
129-00-0	Pyrene	BRL	mg/Kg	0.50
56-55-3	Benzo[a]anthracene	BRL	mg/Kg	0.50
218-01-9	Chrysene	BRL	mg/Kg	0.50
205-99-2	Benzo[b]fluoranthene	BRL	mg/Kg	0.50
207-08-9	Benzo[k]fluoranthene	BRL	mg/Kg	0.50
50-32-8	Benzo[a]pyrene	BRL	mg/Kg	0.50
193-39-5	Indeno[1,2,3-c,d]pyrene	BRL	mg/Kg	0.50
53-70-3	Dibenzo[a,h]anthracene	BRL	mg/Kg	0.50
191-24-2	Benzo[g,h,i]perylene	BRL	mg/Kg	0.50

QC Surrogate Compounds	Recovery	QC Limits
Fractionation: 2-Fluorobiphenyl	70 %	40 - 140 %
2-Bromonaphthalene	68 %	40 - 140 %
Extraction: Chloro-octadecane	83 %	40 - 140 %
ortho-Terphenyl	71 %	40 - 140 %

Method Reference: Method for the Determination of Extractable Petroleum Hydrocarbons, MA DEP (1998).

Report Notations: BRL Indicates concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution, percent moisture and sample size.

† Hydrocarbon range data excludes concentrations of any surrogate(s) and/or internal standards eluting in that range.

o n-C11 to n-C22 Aromatic Hydrocarbons range data excludes the method target analyte concentrations.

GROUNDWATER ANALYTICAL

Quality Control Report Laboratory Control Sample

Category: Metals

Matrix: Soil

CAS Number	Analyte	Method	QC Batch	Units	Spiked	Measured	Recovery	QC Limits
7440-38-2	Arsenic	6010B	MM-1175-SL	mg/Kg	100	89	89 %	80 - 120 %
7440-39-3	Barium	6010B	MM-1175-SL	mg/Kg	100	89	89 %	80 - 120 %
7440-43-9	Cadmium	6010B	MM-1175-SL	mg/Kg	100	88	88 %	80 - 120 %
7440-47-3	Chromium	6010B	MM-1175-SL	mg/Kg	100	90	90 %	80 - 120 %
7439-92-1	Lead	6010B	MM-1175-SL	mg/Kg	100	82	82 %	80 - 120 %
7439-97-6	Mercury	7471A	MP-0890-SL	mg/Kg	0.25	0.26	104 %	80 - 120 %
7782-49-2	Selenium	6010B	MM-1175-SL	mg/Kg	100	86	86 %	80 - 120 %
7440-22-4	Silver	6010B	MM-1175-SL	mg/Kg	100	86	86 %	80 - 120 %

Method References: Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Update III (1996).

Report Notations: All calculations performed prior to rounding. Quality Control Limits are defined by the methodology, or alternatively based upon the historical average recovery plus or minus three standard deviation units.

GROUNDWATER ANALYTICAL

Quality Control Report Method Blank

Category: Metals

Matrix: Soil

CAS Number	Analyte	Result	Units	Reporting Limit	QC Batch	Method
7440-38-2	Arsenic	BRL	mg/Kg	5.0	MM1175-SB	6010B
7440-39-3	Barium	BRL	mg/Kg	20	MM1175-SB	6010B
7440-43-9	Cadmium	BRL	mg/Kg	0.50	MM1175-SB	6010B
7440-47-3	Chromium	BRL	mg/Kg	10	MM1175-SB	6010B
7439-92-1	Lead	BRL	mg/Kg	10	MM1175-SB	6010B
7439-97-6	Mercury	BRL	mg/Kg	0.05	MP-0890-SB	7471A
7782-49-2	Selenium	BRL	mg/Kg	10	MM1175-SB	6010B
7440-22-4	Silver	BRL	mg/Kg	5.0	MM1175-SB	6010B

Method References: Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Update III (1996).

Report Notations: BRL Indicates result, if any, is below reporting limit for analyte. Reporting limit is the lowest value that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

GROUNDWATER ANALYTICAL

Certifications and Approvals

CONNECTICUT, Department of Health Services, PH-0586

Potable Water, Wastewater/Trade Waste, Sewage/Effluent, and Soil

pH, Conductivity, Acidity, Alkalinity, Hardness, Chloride, Fluoride, Ammonia, Kjeldahl Nitrogen, Nitrate, Nitrite, Orthophosphate, Total Dissolved Solids, Cyanide, Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Total Chromium, Hexavalent Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Tin, Titanium, Vanadium, Zinc, Purgeable Halocarbons, Purgeable Aromatics, Pesticides, PCBs, PCBs in Oil, Ethylene Dibromide, Phenols, Oil and Grease.

MAINE, Department of Human Services, MA103

Drinking Water

Reciprocal certification in accordance with Massachusetts certification for drinking water analytes.

Waste Water

Reciprocal certification in accordance with Massachusetts certification for waste water analytes.

MASSACHUSETTS, Department of Environmental Protection, M-MA-103

Potable Water

Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Thallium, Nitrate-N, Nitrite-N, Fluoride, Sodium, Sulfate, Cyanide, Turbidity, Residual Free Chlorine, Calcium, Total Alkalinity, Total Dissolved Solids, pH, Trihalomethanes, Volatile Organic Compounds, 1,2-Dibromoethane, 1,2-Dibromo-3-chloropropane, Total Coliform, Fecal Coliform, Heterotrophic Plate Count, E-Coli

Non-Potable Water

Aluminum, Antimony, Arsenic, Beryllium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Mercury, Molybdenum, Nickel, Selenium, Silver, Strontium, Thallium, Titanium, Vanadium, Zinc, pH, Specific Conductance, Total Dissolved Solids, Total Hardness, Calcium, Magnesium, Sodium, Potassium, Total Alkalinity, Chloride, Fluoride, Sulfate, Ammonia-N, Nitrate-N, Kjeldahl-N, Orthophosphate, Total Phosphorus, Chemical Oxygen Demand, Biochemical Oxygen Demand, Total Cyanide, Non-Filterable Residue, Total Residual Chlorine, Oil and Grease, Total Phenolics, Volatile Halocarbons, Volatile Aromatics, Chlordane, Aldrin, Dieldrin, DDD, DDE, DD1, Heptachlor, Heptachlor Epoxide, Polychlorinated Biphenyls (water), Polychlorinated Biphenyls (oil).

MICHIGAN, Department of Environmental Quality

Drinking Water

Trihalomethanes, Regulated and Unregulated Volatile Organic Compounds by EPA Method 524.2; 1,2-Dibromoethane, 1,2-Dibromo-3-chloropropane by EPA Method 504.1

NEW HAMPSHIRE, Department of Environmental Services, 202798

Drinking Water

Metals by Graphite Furnace, Metals by ICP, Mercury, Nitrite-N, Orthophosphate, Residual Free Chlorine, Turbidity, Total Filterable Residue, Calcium Hardness, pH, Alkalinity, Sodium, Sulfate, Total Cyanide, Insecticides, Herbicides, Base/Neutrals, Trihalomethanes, Volatile Organics, Vinyl Chloride, DBCP, EDB, Nitrate-N.

Wastewater

Metals by Graphite Furnace, Metals by ICP, Mercury, pH, Specific Conductivity, TDS, Total Hardness, Calcium, Magnesium, Sodium, Potassium, Total Alkalinity, Chloride, Fluoride, Sulfate, Ammonia-N, Nitrate-N, Orthophosphate, TKN, Total Phosphorus, COD, BOD, Non-Filterable Residue, Oil & Grease, Total Phenolics, Total Residual Chlorine, PCBs in Water, PCBs in Oil, Pesticides, Volatile Organics, Total Cyanide.

RHODE ISLAND, Department of Health, 54

Surface Water, Air, Wastewater, Potable Water, Sewage

Chemistry: Organic and Inorganic

Appendix D
PHOTOGRAPHS



Photograph 1. Former Topsfield Highway Department Garage



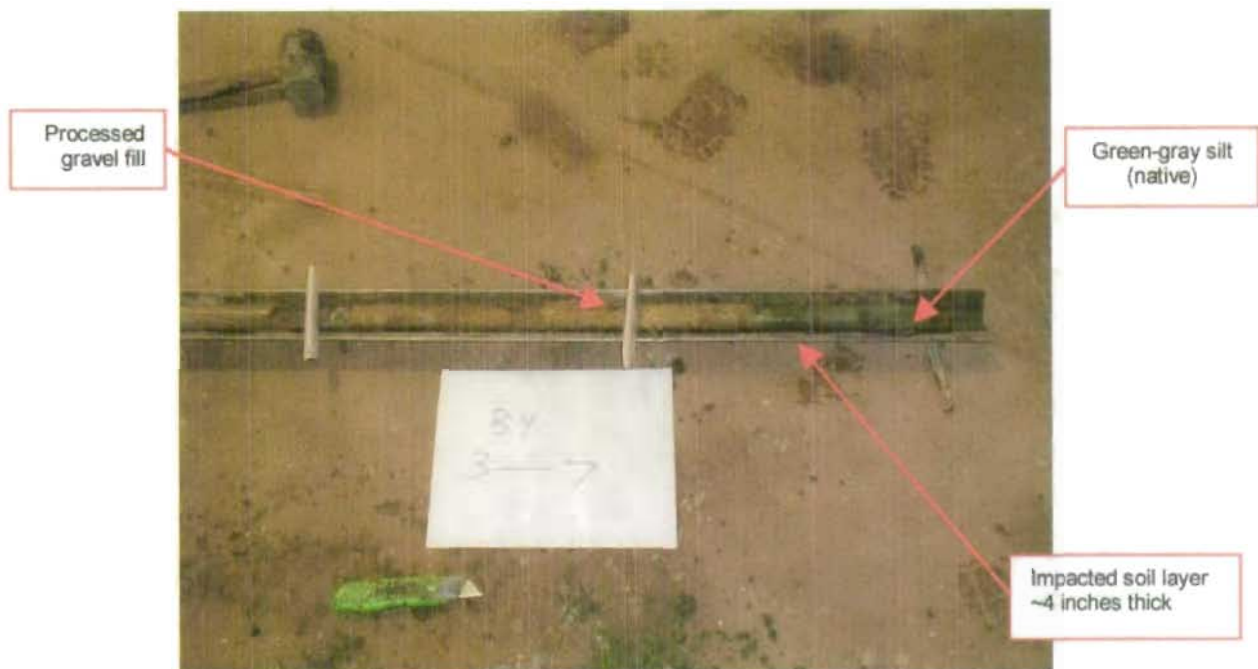
Photograph 2. School Brook adjacent to the Property



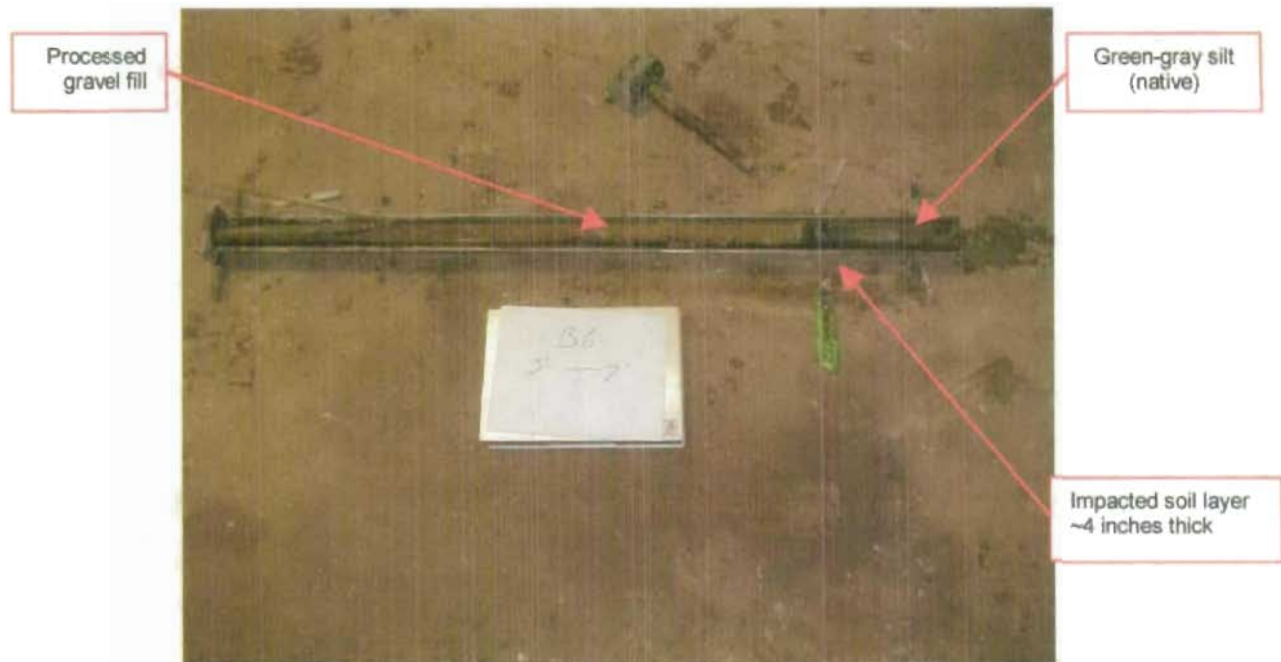
Photograph 3. Floor drain inside garage



Photograph 4. Injection well with inlet shown



Photograph 5. Split spoon sample from boring B4 collected from 3-7 feet bgs.



Photograph 6. Split spoon sample from boring B6 collected from 3-7 feet bgs.

Appendix E
PUBLIC NOTICE

CLEAN SOILS

ENVIRONMENTAL LTD.

March 9, 2001

Ms. Roberta Knight, Executive Secretary to the Board of Selectmen
Ms. Leo Cormier, Health Agent
Town of Topsfield
Town Hall
8 West Common Street
Topsfield, MA 01983
978-887-1502 (Fax)

VIA FAX ONLY

Re: Notice of a Class B-1 Response Action Outcome Statement
Former Town of Topsfield Highway Department Garage
10 School Avenue
Topsfield, MA
DEP RTN Not Yet Assigned
CSE Project No. 2000.34

Dear Ms. Knight and Mr. Cormier:

The Massachusetts Contingency Plan requires that people conducting response actions associated with releases of oil and/or hazardous material (OHM) notify you when a Response Action Outcome (RAO) Statement (i.e., closure report) is submitted to the Department of Environmental Protection (DEP).

A release of OHM associated with historic discharges from a floor drain at the former Topsfield Highway Department garage impacted soil and groundwater at the above-mentioned location. "Assessment Only Activities" (i.e., soil and groundwater testing) were conducted according to 310 CMR 40.0000. Clean Soils Environmental, Ltd. recently completed the RAO, which is on file at DEP's Northeast Regional Office in Wilmington, MA.

Therefore, a permanent solution was achieved by completing a Class B-1 RAO. If you are interested in reviewing the RAO statement, please set up a file review appointment with Ms. Holly Migliacci at DEP (978-661-7600).

Respectfully,

CLEAN SOILS ENVIRONMENTAL, LTD.



William H. Mitchell, Jr., LSP
President

cc: DEP, Northeast Regional Office

Oil & Hazardous Waste Assessment & Cleanup Professionals

POST OFFICE BOX 591, IPSWICH, MA 01938

Voice: 978.356.1177 Fax: 978.356.1849 E-mail: info@cleansoils.com Web site: <http://www.cleansoils.com>

Appendix F
NOTICE OF NONCOMPLIANCE



COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Metropolitan Boston – Northeast Regional Office

ARGEO PAUL CELLUCCI
Governor

JANE SWIFT
Lieutenant Governor

BOB DURAND
Secretary

LAUREN A. LISS
Commissioner

DEC 07 1999

Town of Topsfield
Highway Department
10 School Avenue
Topsfield, MA 01983

Attn: David M. Bond

RE: BWP - TOPSFIELD
NONCOMPLIANCE with M.G.L.
Chapters 21C & 21 §43 (2)
310 CMR 30.000
314 CMR 3.00-7.00
MV9788871542
VSQG-Waste Oil
VSQG- Hazardous Waste
IWW-Non-notifier
FMF Facility #326886
File No: NON-NE-99-9166-2A

RE: NOTICE OF NONCOMPLIANCE

ENCLOSED IS AN IMPORTANT NOTICE. FAILURE TO TAKE ADEQUATE ACTION IN RESPONSE TO THIS NOTICE COULD RESULT IN SERIOUS LEGAL CONSEQUENCES.

Dear Mr. Bond:

Department personnel have observed that on October 29, 1999, activity occurred at Town of Topsfield, Highway Department, 10 School Ave., Topsfield, Massachusetts in noncompliance with one or more laws, regulations, orders, licenses, permits, or approvals enforced by the Department.

Enclosed is a Notice of Noncompliance, which describes (1) the activity referred to above, (2) the requirements violated, (3) the action the Department now wants you to take, and (4) the deadline for taking such action. An administrative penalty may be assessed for every day from now on that you are in noncompliance with the requirements described in this Notice of Noncompliance.

Notwithstanding this Notice of Noncompliance, the Department reserves the right to exercise the full extent of its legal authority in order to obtain full compliance with all applicable requirements, including, but not limited to, criminal prosecution, civil action including court-imposed civil penalties, or administrative penalties assessed by the Department.

This information is available in alternate format by calling our ADA Coordinator at (617) 574-6872.

205A Lowell St. Wilmington, MA 01887 • Phone (978) 661-7800 • Fax (978) 661-7815 • TTD# (978) 661-7879

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Topsfield Highway Department
Page 2

SOURCE REDUCTION OPPORTUNITIES

You may be able to cut environmentally driven costs and possibly reduce the regulatory requirements and fees applied to your firm if you eliminate or reduce the use of toxic materials or the generation of wastes (referred to as "source reduction"). As a result, you may save money, and improve quality and productivity.

Moreover, tracking annual usage of toxic substances and other inputs, if you are not already doing so, may lead to identification of additional source reduction opportunities.

For further information on source reduction of toxics and other waste you may contact:

- * the Office of Technical Assistance (617-727-3260) for free, confidential technical assistance including on-site assessments, financial evaluations, and other resources.
- * DEP's Toxics Use Reduction Implementation Team (617-292-5870) for guidance material on TUR planning.
- * the Toxics Use Reduction Institute (978-934-3262) for courses for certified Toxics Use Reduction Planners.

Should you have any questions relative to this matter, contact David P. LaBrode of this office at the letterhead address or by calling (978) 661-7632.

Very truly yours,



Edward J. Pawlowski
Chief, Compliance and Enforcement
Bureau of Waste Prevention

EDPL/DPL/ml-topspdw

Certified Mail

non-topspdw

cc: Fire Dept., High Street, Topsfield, MA 01983
Board of Health, Town Hall, Topsfield, MA 01983
Town of Topsfield, Town Hall, 8 West Common Street, Topsfield, MA 01983
ATTN: Roberta Knight, Executive Secretary
OTA, 100 Cambridge St., Suite 2109, Boston, MA 02108
Attn: Richard Bizzozero
NERO - LaBrode, Stelline

Topsfield Highway Department
Notice of Noncompliance

NOTICE OF NONCOMPLIANCE
NONCOMPLIANCE SUMMARY

NAME OF ENTITY IN NONCOMPLIANCE: Town of Topsfield, Highway Department

LOCATION WHERE NONCOMPLIANCE OCCURRED OR WAS OBSERVED: 10
School Avenue, Topsfield, Massachusetts

DATE WHEN NONCOMPLIANCE WAS OBSERVED: October 29, 1999

**DESCRIPTION OF NONCOMPLIANCE AND OF THE REQUIREMENTS NOT
COMPLIED WITH:**

Personnel from the Department conducted a compliance inspection at Town of
Topsfield, Highway Department. The following are the observed violations:

HAZARDOUS WASTE

(1) 310 CMR 30.353(5): On the inspection date, it was noted that the Topsfield Highway Department is accumulating hazardous waste and waste oil but is not registered with the Department as a Very Small Quantity Generator (VSQG) of hazardous waste and waste oil. The regulation requires...A very small quantity generator shall register with the Department by notifying the department in writing of its activity involving hazardous waste or regulated recyclable material. If the Department prescribes a form for such registration, the generator shall use such form when submitting such registration. Such a registration shall be signed and submitted in compliance with 310 CMR 30.006 and 30.009. The generator shall follow such procedures as may be required, requested or authorized by the Department to obtain and keep his status as a very small quantity generator. If the very small quantity generator intends to transfer custody or possession of the hazardous waste or regulated recyclable material to another person or persons, the registration shall set forth the name, address, and EPA identification number, if applicable, of each such person. If the very small quantity generator intends to itself treat or recycle the hazardous waste or regulated recyclable material, the registration shall set forth the process by which the hazardous waste or regulated recyclable material shall be treated or recycled. If the site has an EPA identification number, or has been assigned an identification number by DEP, that number shall be included in the registration. An identification number for the site is required if the very small quantity generator is using a manifest.

(2) 310 CMR 30.331(1): Facility signed Copy's (Copy 1 of four part manifests and Copy 3 of eight part manifests) were not available for review. The regulation requires that...a generator shall keep a Copy of each manifest, signed in compliance with 310 CMR 30.314 through 30.316, for three years after the waste was accepted by the initial transporter or until the generator receives a signed copy from the designated

Topsfield Highway Department
Notice of Noncompliance
Page 2

facility which received the waste. The generator shall keep, for at least three years from the date the waste was accepted by the initial transporter, the Copy of the manifest signed by the owner or operator of the facility which received the waste.

(3) 310 CMR 30.302: On the inspection date, it was noted that the Topsfield Highway Department was accumulating/storing a one-gallon container of unknown contents located next to the outside 275-gallon waste oil tank. The regulation requires...Any person who generates a waste shall determine if that waste is a hazardous waste, as identified or otherwise described in 310 CMR 30.100, as follows:

(1) First, determine whether his waste is excluded from regulation pursuant to 310 CMR 30.104.

(2) Next, determine if the waste is listed as a hazardous waste in 310 CMR 30.130 through 30.136.

(3) If the waste is not listed as a hazardous waste in 310 CMR 30.130 through 30.136, determine whether the waste is hazardous waste pursuant to 310 CMR 30.120 through 30.125 by doing either of the following:

(a) Testing the waste according to the methods set forth in 310 CMR 30.151 through 30.156 or according to an equivalent method approved by the Administrator of EPA pursuant to 40 CFR Section 260.21 and by the Department.

(b) Applying knowledge of the hazardous characteristics of the waste in light of the materials or the process used.

(4) If the waste is determined to be hazardous, determine, using the methods described in 310 CMR 30.302(3) and 310 CMR 30.791, whether the waste is subject to the land disposal restrictions set forth in 310 CMR 30.750.

(4) 310 CMR 30.253(9)(b), (refers to 30.353(9)): On the inspection date, receipts for waste oil shipped offsite to Boxford Department of Public Works were not being kept onsite. The regulation requires...If a hazardous waste manifest does not accompany a shipment of hazardous waste generated and transported by a very small quantity generator to a person described in 310 CMR 30.355(8), the person receiving that material shall give to the very small quantity generator delivering the material, and the very small quantity generator delivering the material shall receive from the person receiving the material, a receipt for the material. Said receipt shall set forth the content and quantity of the material and the date of delivery. Said receipt shall be signed by both the person receiving the material and the very small quantity generator delivering the material. Said receipt shall consist of two copies, one each for the person

Topsfield Highway Department
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Page 3

receiving the material and the very small quantity generator delivering the material. The person receiving the material and the very small quantity generator delivering shall keep these receipts in their records for at least three years after possession of the material is transferred from the very small quantity generator to the person receiving the material. Such records shall be furnished upon request of, employee, or representative of the Department, or of the EPA. This period shall be extended automatically during the course of any unresolved enforcement action regarding the activity in question, or as requested or ordered by the Department.

(5) M.G.L., CHAPTER 21C, MASSACHUSETTS HAZARDOUS WASTE MANAGEMENT ACT, Section 5: **Wastewater contaminated with oily water and sludge, (settled solids) has been illegally disposed of through an improperly maintained oil/water separator.** The Law stipulates that... No person shall collect, transport, store, dispose of, treat, use or transport hazardous waste in a manner which could endanger human health, safety or welfare, or the environment.

(6) 310 CMR 30.253(5)(c), (refers to 30.353(6)(g)), (refers to 30.682): **The following containers of waste oil were not marked with the words "Hazardous Waste" "Waste Oil", or "Toxic":**

- one 55-gallon container located in the garage.
- one 275-gallon above ground tank

The regulation requires that...Throughout the period of storage, the side of each container of hazardous waste shall be clearly labelled and marked in a manner which identifies, in words, the hazardous waste(s) being stored in that container (e.g., acetone, toluene), and the hazard(s) associated with the waste (e.g., ignitable, toxic, dangerous when wet). Each container shall also be marked with the words "Hazardous Waste". Containers accumulating waste oil (in VSQG quantities) shall be marked with following information:

- (1) The words "Hazardous Waste";
- (2) The words "Waste Oil";
- (3) The word "Toxic";.

Marks and labels shall be placed on the sides of each tank or container in such a manner that they are clearly visible for inspection.

(7) 310 CMR 30.253(5)(c), (refers to 30.353(6)(h)), (refers to 30.685(1)): **A fifty five-gallon container used for the accumulation of waste oil was found to be open.**

Topsfield Highway Department
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The regulation requires that...a container holding hazardous waste shall always be closed during storage, except when waste is being added or removed. In the event that Federal, State or local law or regulation requires a container to be vented, the container shall be vented in a manner that does not present a threat to public health, safety or welfare, or the environment.

(8) 310 CMR 30.253(5)(c), (refers to 30.353(6)(h)), (refers to 30.340(1)(f)): On the inspection date, the following containers of waste oil were observed being accumulated on a surface which is not impervious:

- one 55-gallon container located in the garage.
- one 275-gallon above ground tank.

The regulation requires...underlying all containers and all above-ground tanks in which hazardous waste is accumulated shall be a surface that is designed and at all times operated so that it is free of cracks and gaps and is sufficiently impervious to contain leaks, spills, and accumulated precipitation until the collected material is detected and removed. All aboveground tanks shall be placed so that all the surface beneath each such tank can be inspected for spills and structural integrity.

(9) 310 CMR 30.253(5)(c), (refers to 30.353(3)(h)), (refers to 30.340(1)(g)): Waste oil is being accumulated outdoors in a 275-gallon above ground tank in an area which is not bermed. The regulation requires that...if a generator accumulates hazardous waste in containers or above-ground tanks which are outdoors, such containers and above-ground tanks shall be located at all times in an area that has a containment system that is designed and at all times operated so that it has the capacity to contain either 10% of the total possible contained volume of the containers and above-ground tanks, or 110% of the volume of the largest container or above ground-tank, whichever is greater. Without limiting the generality of the foregoing, the generator shall promptly remove from the area all accumulated spillage and/or precipitation.

(10) 310 CMR 30.253(5)(c), (refers to 30.353(6)(h)), (refers to 30.340(1)(j)): A sign with the words "WASTE OIL" was not posted in the waste oil accumulation areas. The regulation requires that...all areas where waste oil and/or used oil fuel is accumulated or stored shall have posted at all times a sign with the words "WASTE OIL", in capital letters at least one inch high.

(11) 310 CMR 30.253(5)(c), (refers to 30.353(6)(h)), (refers to 30.340(1)(k)): The waste oil accumulation areas were not marked clearly from generation areas. The regulation requires that...all areas where wastes are accumulated for the purposes of

Topsfield Highway Department
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complying with 310 CMR 30.000 generally shall be clearly marked (e.g., by a clearly visible line or piece of tape on the floor, or by a gate or fence, or by a sign at the boundary of a clearly distinguishable area) so that they are clearly distinguishable at all times from all specific points of generation where wastes are initially accumulated solely for the purpose of 310 CMR 30.340(4), and from all areas at the site of generation where wastes are not accumulated.

(12) 310 CMR 30.253(5)(c), (refers to 30.353(6)(h), (refers to 30.340(1)(i): **On the inspection date, the waste oil accumulation area located outside of the main garage was lacking in appropriate security measures. Specifically, the area was open with no means of preventing unauthorized entry. The regulation requires...All areas where wastes are accumulated shall be operated with appropriate security measures at all times to prevent the unknowing entry of persons, reduce as much as possible the unauthorized entry of persons, and prevent the entry of livestock into such areas.**

INDUSTRIAL WASTEWATER

Untreated industrial effluent (from the facility's floor drains) is illegally being discharged to groundwater, (via an oil/water separator system and cesspool).

The requirements state respectively:

- (1) M.G.L. c.21, s.43(2) provides, in part, as follows:

"No person shall discharge pollutants into waters of the Commonwealth nor construct, install, modify, operate or maintain an outlet for such discharge or any treatment works, without a currently valid permit issued by the Director. No person shall engage in any other activity that may reasonably be expected to result, directly or indirectly, in discharge of pollutants into waters of the Commonwealth, nor construct, effect, maintain, modify or use any sewer extension or connection, without a currently valid permit issued by the Director, unless exempted by regulation of the Director."

- (2) 314 CMR 5.03 provides in part as follows:

"No person shall discharge pollutants to ground waters of the Commonwealth without a currently valid permit from the director pursuant to M.G.L. c. 21, s. 43 and 314 CMR 5.00, unless exempted in 314 CMR 5.05. No person shall construct, install, modify, operate or maintain an outlet for such a discharge or any treatment works required to treat such discharge without having first obtained a discharge permit in accordance with this

Topsfield Highway Department
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subsection and written approval from the Department for such activity. Any person who discharges or proposes to discharge to ground waters of the Commonwealth may obtain a permit by filing the appropriate application forms in accordance with 314 CMR 5.00 and 2.00."

(3) 310 CMR 27.04 provides in part as follows:

"No underground injection shall be allowed where a Class V well causes or allows movement of fluid containing any pollutant into underground sources of drinking water and the presence of that pollutant causes or is likely to cause a violation of any Massachusetts Drinking Water Regulation, 310 CMR 22.00, or which in the opinion of the Department adversely affects or is likely to adversely affect the health of persons."

(4) 310 CMR 27.05 provides in part as follows:

"Class V wells shall include but not be limited to the following types:

- a. Dry wells, seepage pits, and leaching pits used for the introduction of waste fluids, other than those treated in septic systems.
- b. Dry wells or leaching pits used to dispose of septic system effluents.

(5) Activities which constitute discharges of pollutants requiring a permit under 314 CMR 5.03(1) include, but are not limited to:

- a. Any facility which discharges a liquid effluent onto or below the land surface;
- b. Any facility which discharges a liquid effluent to a percolation pit, pond or lagoon;
- c. Any facility which discharges a liquid effluent via subsurface leaching facilities including but not limited to: leaching pits, galleries, chambers, trenches, fields, and pipes;
- d. Any facility which discharges a liquid effluent into a class V injection well as defined in 310 CMR 27.00; or
- e. Any facility with an associated unlined pit, pond, lagoon, or surface impoundment in which wastewaters or sludges are collected, stored, treated, or disposed and from which a liquid portion seeps into the ground.

Topsfield Highway Department
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ACTION TO BE TAKEN, AND THE DEADLINE FOR TAKING SUCH ACTION:

HAZARDOUS WASTE

(1) Immediately upon receipt of this Notice, notify as a very small quantity generator of hazardous waste and a very small quantity generator of waste oil by submitting the notification form. The proper notification forms were filled out during the October 29, 1999 inspection.

(2) Immediately upon receipt of this Notice, keep appropriate Copy 1's and 3's of all hazardous waste manifests, in accordance with the above referenced regulation. Photocopies of the missing facility signed manifest(s) shall be obtained from the destination facility identified on the hazardous waste manifest(s) and sent to this office. Within thirty (30) days of your receipt of this Notice, this office must be in receipt of written confirmation that this has been done.

(3) Immediately upon receipt of this Notice, determine if the waste in question is a hazardous waste, and make arrangements for its proper disposal. Within thirty (30) days of your receipt of this Notice, this office must be in receipt of written confirmation that this has been done.

(4) Immediately upon receipt of this Notice, keep appropriate receipts of all hazardous waste shipments, in accordance with the above referenced regulation. Within thirty (30) days of your receipt of this Notice, this office must be in receipt of written confirmation that this has been done.

(5) Immediately upon receipt of this Notice, clean out the oil/water separator that Topsfield Highway Department has on site. These wastes must be shipped off-site for legal disposal via a licensed hazardous waste transporter using a Massachusetts Hazardous Waste Manifest. Within thirty (30) days of your receipt of this Notice, this Office must be in receipt of written confirmation that this has been done, and will continue to be done. In addition, the Department requires that photocopies of the completed manifest(s) be forwarded to this office as soon as the shipment is made.

(6) Immediately upon receipt of this Notice, mark the above referenced containers with the required information. Within thirty (30) days of your receipt of this Notice, this office must receive from you written confirmation that this has been done, and will continue to be done.

(7) Immediately upon receipt of this Notice, close all containers accumulating waste oil, and continue to keep them closed except when waste is being added or

Topsfield Highway Department
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removed. Within thirty (30) days of your receipt of this Notice, this office must be in receipt of written confirmation that this has been done, and will continue to be done.

(8) and (9) immediately upon receipt of this Notice, modify the waste oil accumulation areas to come into compliance with the above referenced regulation. Within thirty (30) days of your receipt of this Notice, this office must be in receipt of written confirmation that this has been done.

(10) Immediately upon receipt of this Notice, post a sign with the words "WASTE OIL", in accordance with the above referenced regulation. Within thirty (30) days of your receipt of this Notice, this office must be in receipt of written confirmation that this has been done.

(11) Immediately upon receipt of this Notice, clearly distinguish waste accumulation areas from areas where wastes are not accumulated. Within thirty (30) days of your receipt of this Notice, this office must be in receipt of written confirmation that this has been done.

(12) Immediately upon receipt of this Notice, secure the outside waste oil accumulation area from unauthorized entry. Within thirty (30) days of your receipt of this Notice, this office must be in receipt of written confirmation that this has been done.

INDUSTRIAL WASTEWATER

(1) Within fifteen (15) days of receipt of this Notice, temporarily plug the points of entry to the injection well and cease using the injection well for the discharge or disposal of any substance.

(2) Within thirty (30) days of receipt of this Notice, submit to Ron Stelline at this office a plan for approval for permanently closing the injection well(s) according to the following criteria:

- a. Decommissioning injection well-All floor drains (or other points of entry to the injection wells) shall be either:
 - i. Sealed within 60 days of the date of this Notice in accordance with the state plumbing code, 248 CMR 2.09(1)(c)(3). Before commencing work, a revised DEP Form WS1 (Notice of Plumbing Inspector Approval to Seal Floor Drain) must be filed with Ron Stelline at this office; or,
 - ii. connected within 6 months of this Notice to a municipal sewer system (if available) in accordance with a permit issued by the

Topsfield Highway Department
Notice of Noncompliance
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Department and/or local sewer authority under 314 CMR 7.00 and/or local sewer regulations; or,

iii. Connected within 6 months of this Notice to a DEP approved holding tank.

- b. Required Remedial Activities-Remove sludge and perform excavation, sampling, and other remedial activities in accordance with the process described in the "UIC Package", which includes "Massachusetts closure Requirements For Shallow Injection Wells. Call the DEP Service Center at (978) 661-7678 for the Closure Package. Within 120 days of this Notice, submit to the Department the results of sampling conducted and information to Ron Stelling of the UIC Program at the letterhead address.

(3) When all work specified in items (1) and (2) has been completed, submit a completed and signed UIC Notification Form to Ron Stelling of the Department's UIC Program at the letterhead address.

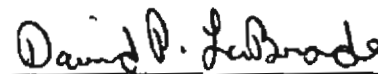
(4) Within thirty (30) days of receipt of this Notice this office must be in receipt of written confirmation as to the actions taken or planned to correct the industrial wastewater violation(s) cited herein. Please direct your response to David LaBrode.

DATE:

Dec 6, 1999



Edward J. Pawlowski
Chief, Compliance and Enforcement
Bureau of Waste Prevention



David P. LaBrode
Environmental Analyst

Certified Mail

Appendix G

**HEADSPACE SCREENING PROCEDURE &
MONITORING WELL CONSTRUCTION DETAILS**



Headspace Screening Procedures

Clean Soils Environmental, Ltd. (CSE) screened soil samples for Total Organic Vapors (TOVs) with a portable photoionization detector (PID) calibrated with isobutylene to a benzene equivalent. The soil sample screening was performed by filling a pre-cleaned 16 oz. glass mason jar or a dedicated 16 oz. zip lock bag approximately half-full with a soil sample, covering the jar top with two layers of aluminum foil and then tightening the screw cap or using the zip lock to tightly seal the bag. The soil sample was vigorously shaken and then allowed to sit for a minimum of ten minutes at approximately 25°C. The headspace (i.e., air in the top of the container) was then screened by puncturing the aluminum seal or the zip lock bag with the portable PID Photovac MicroTip probe, inserting the probe tip to a distance approximately one-half the headspace depth, drawing a headspace air sample, and recording the highest reading displayed on the PID display.



BORING, JAR-HEADSPACE LOG, WELL CONSTRUCTION DETAILS

PAGE 1 OF 1

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Oil & Hazardous Waste Assessment & Cleanup Professionals

POST OFFICE BOX 591, IPSWICH, MA 01938

Voice: 978.356.1177 Fax: 978.356.1849 E-mail: info@cleansoils.com Web site: <http://www.cleansoils.com>

Appendix I
DISCLOSURE STATEMENT FOR
TRANSACTION WITH A PUBLIC AGENCY CONCERNING REAL PROPERTY
M.G.L. c. 7C, s. 38 (formerly M.G.L. c. 7, s. 40J)

INSTRUCTION SHEET

NOTE: The Division of Capital Asset Management and Maintenance (DCAMM) shall have no responsibility for insuring that the Disclosure Statement has been properly completed as required by law. Acceptance by DCAMM of a Disclosure Statement for filing does not constitute DCAMM's approval of this Disclosure Statement or the information contained therein. Please carefully read M.G.L. c. 7C, s. 38 which is reprinted in Section 8 of this Disclosure Statement.

Section (1): Identify the real property, including its street address, and city or town. If there is no street address then identify the property in some other manner such as the nearest cross street and its tax assessors' parcel number.

Section (2): Identify the type of transaction to which this Disclosure Statement pertains --such as a sale, purchase, lease, etc.

Section (3): Insert the exact legal name of the Public Agency participating in this Transaction with the Disclosing Party. The Public Agency may be a Department of the Commonwealth of Massachusetts, or some other public entity. Please do not abbreviate.

Section (4): Insert the exact legal name of the Disclosing Party. Indicate whether the Disclosing Party is an individual, tenants in common, tenants by the entirety, corporation, general partnership, limited partnership, LLC, or other entity. If the Disclosing Party is the trustees of a trust then identify the trustees by name, indicate that they are trustees, and add the name of the trust.

Section (5): Indicate the role of the Disclosing Party in the transaction by checking one of the blanks. If the Disclosing Party's role in the transaction is not covered by one of the listed roles then describe the role in words.

Section (6): List the names and addresses of every legal entity and every natural person that has or will have a direct or indirect beneficial interest in the real property. The only exceptions are those stated in the first paragraph of the statute that is reprinted in Section 8 of this Disclosure Statement. If the Disclosing Party is another public entity such as a city or town, insert "inhabitants of the (name of public entity)." If the Disclosing Party is a non-profit with no individual persons having any beneficial interest then indicate the purpose or type of the non-profit entity. If additional space is needed, please attach a separate sheet and incorporate it by reference into Section 6.

Section (7): Check "NONE" in the box if none of the persons mentioned in Section 6 is employed by DCAMM or an official elected to public office in the Commonwealth of Massachusetts. Otherwise list any parties disclosed in Section 6 that are employees of DCAMM or an official elected to public office.

Section (8): The individual signing this statement on behalf of the Disclosing Party acknowledges that he/she has read the included provisions of Chapter 7C, Section 38 (formerly Chapter 7, Section 40J) of the General Laws of Massachusetts.

Section (9): Make sure that this Disclosure Statement is signed by all required parties. If the Disclosing Party is a corporation, please make sure that this Disclosure Statement is signed by a duly authorized officer of the corporation as required by the statute reprinted in Section 8 of this Disclosure Statement.

DCAMM's acceptance of a statement for filing does not signify any opinion by DCAMM that the statement complies with applicable law.

This completed and signed Disclosure Statement should be mailed or otherwise delivered to:

Deputy Commissioner for Real Estate
Division of Capital Asset Management and Maintenance
One Ashburton Place, 15th Floor, Boston, MA 02108

**DISCLOSURE STATEMENT FOR
TRANSACTION WITH A PUBLIC AGENCY CONCERNING REAL PROPERTY
M.G.L. c. 7C, s. 38 (formerly M.G.L. c. 7, s. 40J)**

The undersigned party to a real property transaction with a public agency hereby discloses and certifies, under pains and penalties of perjury, the following information as required by law:

(1) REAL PROPERTY:

(2) TYPE OF TRANSACTION, AGREEMENT, or DOCUMENT:

(3) PUBLIC AGENCY PARTICIPATING in TRANSACTION:

(4) DISCLOSING PARTY'S NAME AND TYPE OF ENTITY:

(5) ROLE OF DISCLOSING PARTY (Check appropriate role):

____ Lessor/Landlord

____ Lessee/Tenant

____ Seller/Grantor

____ Buyer/Grantee

____ Other (Please describe): _____

(6) The names and addresses of all persons and individuals who have or will have a direct or indirect beneficial interest in the real property excluding only 1) a stockholder of a corporation the stock of which is listed for sale to the general public with the securities and exchange commission, if such stockholder holds less than ten per cent of the outstanding stock entitled to vote at the annual meeting of such corporation or 2) an owner of a time share that has an interest in a leasehold condominium meeting all of the conditions specified in M.G.L. c. 7C, s. 38, are hereby disclosed as follows (attach additional pages if necessary):

NAME

RESIDENCE

(7) None of the above- named persons is an employee of the Division of Capital Asset Management and Maintenance or an official elected to public office in the Commonwealth of Massachusetts, except as listed below (Check "NONE" if NONE):

☐

NONE

NAME:

POSITION:

**DISCLOSURE STATEMENT FOR
TRANSACTION WITH A PUBLIC AGENCY CONCERNING REAL PROPERTY
M.G.L. c. 7C, s. 38 (formerly M.G.L. c. 7, s. 40J)**

- (8) The individual signing this statement on behalf of the above-named party acknowledges that he/she has read the following provisions of Chapter 7C, Section 38 (formerly Chapter 7, Section 40J) of the General Laws of Massachusetts:

No agreement to rent or to sell real property to or to rent or purchase real property from a public agency, and no renewal or extension of such agreement, shall be valid and no payment shall be made to the lessor or seller of such property unless a statement, signed, under the penalties of perjury, has been filed by the lessor, lessee, seller or purchaser, and in the case of a corporation by a duly authorized officer thereof giving the true names and addresses of all persons who have or will have a direct or indirect beneficial interest in said property with the commissioner of capital asset management and maintenance. The provisions of this section shall not apply to any stockholder of a corporation the stock of which is listed for sale to the general public with the securities and exchange commission, if such stockholder holds less than ten per cent of the outstanding stock entitled to vote at the annual meeting of such corporation. In the case of an agreement to rent property from a public agency where the lessee's interest is held by the organization of unit owners of a leasehold condominium created under chapter one hundred and eighty-three A, and time-shares are created in the leasehold condominium under chapter one hundred and eighty-three B, the provisions of this section shall not apply to an owner of a time-share in the leasehold condominium who (i) acquires the time-share on or after a bona fide arms length transfer of such time-share made after the rental agreement with the public agency is executed and (ii) who holds less than three percent of the votes entitled to vote at the annual meeting of such organization of unit owners. A disclosure statement shall also be made in writing, under penalty of perjury, during the term of a rental agreement in case of any change of interest in such property, as provided for above, within thirty days of such change.

Any official elected to public office in the commonwealth, or any employee of the division of capital asset management and maintenance disclosing beneficial interest in real property pursuant to this section, shall identify his position as part of the disclosure statement. The commissioner shall notify the state ethics commission of such names, and shall make copies of any and all disclosure statements received available to the state ethics commission upon request.

The commissioner shall keep a copy of each disclosure statement received available for public inspection during regular business hours.

- (9) This Disclosure Statement is hereby signed under penalties of perjury.

PRINT NAME OF DISCLOSING PARTY (from Section 4, above)

AUTHORIZED SIGNATURE of DISCLOSING PARTY DATE (MM / DD / YYYY)

PRINT NAME & TITLE of AUTHORIZED SIGNER