Ensign Bickford Co The
CTD058509712
R-13

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)

Current Human Exposures Under Control

RDMS DocID 00100122

Facility Name: **The Ensign-Bickford Company**
Facility Address: **660 Hopmeadow Street, Simsbury, CT 06070**
Facility EPA ID #: **CTD058509712**

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

__X__ If yes - check here and continue with #2 below.

_____ If no - re-evaluate existing data, or

_____ if data are not available skip to #6 and enter"IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

References

References used to prepare this Environmental Indicator Evaluation include the documents listed below. These can be found in the site file in the RCRA Records Center.

1. RCRA Facility Assessment, May 7, 1992.
2. Site Analysis, Ensign-Bickford Haz Pros, Inc. May 1993.
3. Part B Application, Revision 3.0. Section III B3, Existing Conditions: Groundwater, Surface Water, and Sediments, Volume I: Text, Figures, Tables. April 1997.
4. Groundwater Assessment, EBCo Operational Area West of Route 10/202. December 1997.
5. Background Surficial Soil Characterization Project, dated May 1998.
6. Technical Memoranda on Areas of Concern (AOCs 1-47), July 1998.
7. Description of Current Conditions, August 1998
8. Addendum: Supplemental Metals Data, Background Surficial Soil Characterization Project, dated January 1999.
9. Addendum: Residential Soil Sampling Background Surficial Soil Characterization Project, dated March 1999.
10. Revised Draft "Documentation of Environmental Indicator Determination" forms, dated October 8, 1999.
11. Groundwater Assessment, EBCo Operational Area East of Route 10/202. October 1999.
12. AOC No Further Action Required Reports (6, 8, 9, 10, 13, 14a, 15, 21, 25, 26, 27, 28, 29, 31, 35, 37, 41, 45, and 47. November 4, 1999.

13. No Further Action Required Reports for AOCs (21,26, 31, 35, 37, 41, 45, and 47), March 1, 2000.
14. Supplemental Groundwater Screening, EBCo Operational Area East of Route 10/202. April 20, 2000.
15. Environmental Indicator Determination, Voluntary Corrective Action Program, Volumes 1-4, dated April 2001.
16. Final Report; 2000 Phytoremediation of the Open Burn and Open Detonation Areas; Simsbury, CT, dated April 2001.
17. Remediation Report of Interim Measures (AOC 39, Open Detonating Area Sand Berm), dated March 2002.
18. Ecological Risk Assessment, Hazel Meadow Pond, April 2002.
19. 2001 Annual Groundwater Sampling Summary Report, April 2002.
20. June 2002 Sampling Results, OB/OD Area, Operational Area East of Route 10/202, August 15, 2002.
21. June 2002 Sampling Results, AOCs 20, 23, 36, and 38, October 2, 2002.
22. Environmental Indicators Determination Update, September 9, 2002, volumes 1 and 2.
23. Letter with attachments to David Nash, CTDEP, from Dorothy T. Hammett, Ensign Bickford, dated November 15, 2002, re: RCRA Interim Status Closure and Voluntary Corrective Action Approach.
24. No Further Action Required Reports for AOCs (4, 5, 7, 9, 12, 17, 18c, 19, 21, and 31). February 24, 2003.
25. 2002 Annual Groundwater Sampling Summary Report, Open Burning/Open Detonating Area, March 2003.
26. Letter with attachments from Dorothy Hammett, Dyno Nobel, Inc. regarding property transfer, ECAF, and consent order, June 13, 2003.
27. OB/OD Units Closure Plan, Volumes 1&2, June 2003.
28. 2,3,7,8-TCDD TE Work Sheet from M. Ballew, August 2003.
29. Description of Facility Controls, Dyno-Nobel, Inc., September 2003.

A. Background Facility Information

The former Ensign Bickford Company, Inc. (EBCo) facility is located at 660 Hopmeadow Street (Routes 10/202) in Simsbury, Connecticut. EBCo has manufactured explosive products at this facility since 1851. On May 2, 2003, Dyno Nobel Inc. acquired certain assets of EBCo., including the business operation. Title to the property was vested in Simsbury Hopmeadow Street LLC (SHS), and the ownership interest in SHS was assigned to Dyno Nobel, Inc. At the time of the transaction, Dyno Nobel, Inc. entered into a Consent Order with the CTDEP, as discussed below. For purposes of this EI determination, the facility will continue to be referred to as EBCo.

EBCo produced blast initiation products for the commercial blasting industry and explosive devices for the aerospace industry. In the course of manufacturing, waste explosives and

pyrotechnics were generated. EBCo was a Large Quantity Generator of hazardous wastes and a TSD with interim status. EBCo submitted a Part B Permit Application to CTDEP for three units at the site: an Open Burn/Open Detonation (OB/OD) unit, a Detonation Confinement Chamber (DCC), and a Lead Grinding System (LGS). EBCo ceased the open burning of heavy metal containing wastes (waste containing more than 0.1% heavy metals) in September 1994. After 1994, heavy metal bearing wastes were treated at the LGS, or desensitized and shipped off-site. EBCo entered into a consent order with CTDEP in 1995. EBCo did not conduct OB/OD activities after 1999, although the DCC and LGS continue to operate. On May 1, 2003, Dyno Nobel, Inc. entered into a consent order with CTDEP, which supercedes the 1995 consent order. The 2003 consent order covers matters such as use of the DCC and LGS units, the Part B application, closure of the OB/OD area, and Corrective Action. Dyno Nobel Inc. submitted an Environmental Condition Assessment Form (ECAF) in May 2003, and a two volume closure plan for the OB/OD area in June 2003.

EPA completed an RFA of the site in 1992 which identified 46 AOCs requiring further investigation. Since that time, several additional AOCs have been identified at the site.

The 356 acre site can be divided into two sections: 1) the 202 acre operational area west of Routes 10 and 202; and 2) the 154 acre operational area east of Routes 10 and 202 which is bounded to east by the Farmington River. The site is underlain by the New Haven Arkose, a sedimentary rock. Depth to bedrock is approximately 100 to 200 feet beneath portions of the site, and at least 25 feet below grade at the shallowest point. A layer of glacial till mantles bedrock.

The **operational area west of Routes 10/202** is heavily wooded, with bunkers for the storage of raw materials and finished product in a number of locations, as well as a few process buildings. A mix of residential and commercial properties abut this portion of the site. The surficial geology is described as numerous small hills comprised of kame terrace deposits of fine to coarse sand. The topography and water table (located from 0 to 50 feet below grade) are highest along the western border and slope downward to the east toward the residential and commercial properties along the western side of Route 10/202. The entire western operational area is surrounded by a four foot wire fence posted with No Trespassing signs. Hop Brook (class A), Stebbins Brook (class B/A), and Second Brook (class B/A) are the primary surface drainage features which discharge to the Farmington River (class B). Hazel Meadow Pond (class A) is a major surface water body on the western side of this area. Groundwater is classified as GA.

The **operational area east of Routes 10/202** includes the main manufacturing portion of the facility, located between Routes 10/202 and the railroad tracks. This area is predominantly covered by buildings, pavement, and landscaping. The topography, formed by terrace alluvium deposits, slopes gently toward the Farmington River. This area is predominantly above the 100 year flood zone. Hop Brook flows easterly through the northern portion of the main manufacturing area. A small drainage ditch flows north-westward, and provides drainage for

part of the paved areas west of the railroad tracks. The depth to groundwater is generally less than 10 feet.

The operational area east of Routes 10/202 also includes facility property located between the railroad tracks and the Farmington River. This area is moderately wooded with several large open areas, and is used for various purposes, including the storage, testing, and detonation of products and wastes. Residential and light commercial properties abut this area on the northern, southwestern and southern boundaries. Topography is relatively flat and predominantly within the 100 year flood zone. Flood plain alluvium deposits overlie a silt/clay layer which thins to the west. The silt/clay layer varies from 1 to 18 feet in thickness, is found at depths of 6 to 17 feet below grade, and acts as a confining layer resulting in upward gradients in wells screened below this aquitard. The water table is typically 2 to 4 feet below grade. Several small intermittent brooks discharge to the Farmington River.

B. Remedial Investigation and Cleanup Activities

In support of the Part B Permit application, EBCo submitted several volumes of information on the environmental quality of soil, groundwater, surface water and sediments in 1997. Also in 1997, EBCo began conducting Corrective Action activities on a voluntary basis. Since that time, EBCo has made significant progress with several phases of site investigation and cleanup measures, some of which are summarized below.

Groundwater Monitoring in the Open Burn/Open Detonating Area

or semi annual RWB 9/23/03

EBCo has conducted quarterly groundwater monitoring in the OB/OD area since 1991. The vertical groundwater gradient is upward, helping to prevent contaminated groundwater in the upper aquifer from entering the lower aquifer below the silt/clay aquitard. EBCo. submitted the 2002 Annual Groundwater Sampling Summary Report for the OB/OD Area in March 2003 which describes the June and December 2002 sampling events (which occurred after the 130 feet long by 8 feet high sand berm was removed in mid December 2001). EBCo's report includes a discussion of Point of Compliance (POC) wells MW-6, MW-7, and MW- 8 S/D, which are approximately 300 feet upgradient of the Farmington River, and MW-12 and MW-14, which are within 70 feet of a small stream. Results were that metals exceeded GWPC at three POC wells. Lead and copper were detected above the SWPC in MW-7, and copper was detected above the SWPC in wells MW-8S and MW-14. The furthest downgradient wells (MW-16S, located approximately 50 feet north of a stream, and MW-17S, located approximately 200 feet west of the Farmington River) were sampled for copper, lead and nickel. Nickel was detected above the GWPC in MW-17 at 129 ppb.

Technical Memoranda and No Further Action Required (NFAR) Reports for AOCs. July 1998, and updates in November 1999, March 2000, and February 2003.

EBCo. submitted several volumes of technical memoranda and NFAR reports which include summaries of the physical attributes of each AOC, dates of operation, wastes handled, sampling and investigation results, and additional work to be conducted.

Phytoremediation

EBCo. conducted phytoremediation in the OB/OD area with the goal of reducing lead concentrations in soils. This stabilization activity began with a successful field trial of a 0.75 acre plot in 1996. In 1997, a full scale phytoremediation project was undertaken on an approximately 1.5 acre plot which accounts for approximately 90% of the OB/OD area. The project was continued in 1998, 1999, and 2000. In April, 2001, EBCo submitted the Final Report; 2000 Phytoremediation of the OB/OD Areas.

Background Surficial Soil Characterization Project, dated May 1998. Prepared by Fuss & O'Neill.

The purpose of this study was to collect and analyze off-site surficial soil samples to determine background concentrations of lead in the region and to assess whether historic on-site operations may have impacted off-site surficial soils. A total of 37 samples were collected. Samples were analyzed for mass lead and SPLP lead. Results were that none of the mass results exceeded 500 ppm. The study concluded that EBCo's historic activities had not produced statistically elevated impacts to nearby off-site soils, and that concentrations of lead in the study areas were consistent with estimated background concentrations.

Addendum: Supplemental Metals Data, Background Surficial Soil Characterization Project, dated January 1999. Prepared by Fuss & O'Neill

As a supplement to the background lead study, 15 of the 34 samples were further analyzed for 18 additional metals. Samples were analyzed for mass metals and SPLP. None of the mass metals exceeded the RSRs.

Addendum: Residential Soil Sampling Background Surficial Soil Characterization Project, dated March 1999. Prepared by Fuss & O'Neill

The objective of this study was to gain an understanding of lead concentrations in nearby residential soils and supplement the Background Surficial Soil Characterization Project Report, dated May 1998. Soil samples were collected primarily from private residences within 1/4 mile of the EBCo property. Study areas included east of the Farmington River, north of the EBCo property, and west of the EBCo property. Eleven surficial soil samples were collected and analyzed for lead and leachable (SPLP) lead. None of the mass lead results exceeded the Residential DEC of 500 ppm. The 95% UCL background concentration of lead was calculated at 65 ppm.

The new data were evaluated with the earlier May 1998 data. The results indicated that concentrations of mass lead and SPLP lead in properties neighboring EBCo belong to the same population as the regional background concentrations of lead.

Groundwater Assessment, EBCO Operational Area West of Route10/202. December 1997

The purpose of the study was to gain a broad overview of the hydrogeology and soil and groundwater quality in the operational area west of 10/202. Thirteen sampling wells and nine piezometers (in Stebbins and Second Brook and near Hazel Meadow Pond) were installed during the summer of 1997. Split spoon soil samples were screened for explosive compounds.

None of the soil samples from the borings exhibited contamination via odors, staining, or discoloration. A total of 61 samples were screened for explosives. One sample at MW-117 from 0-2 feet had a positive screen for TNT at 1 ppm. The sample was submitted to the lab and no explosives were found.

Four existing and thirteen new wells were sampled in the western area. Many locations were selected to provide a general overview of groundwater conditions. Only a few wells were installed directly downgradient of AOCs. Wells were sampled for Appendix IX constituents (excluding pesticides, herbicides, dioxins, and PCBs), and nitroaromatics and nitramines. Results were that no samples exceeded the Surface Water Protection Criteria (SWPC), although the Groundwater Protection Criteria (GWPC) were exceeded at several wells for PCE and its breakdown products, and some metals.

Groundwater Assessment, EBCO Operational Area East of Route 10/202, October 1999

During the spring of 1999, EBCo conducted a groundwater screening assessment program in the operational area east of Route 10/202. The study included drilling and groundwater sampling via direct push technology at numerous locations. Groundwater samples were analyzed for VOCs, explosives, and metals. In addition, some points were sampled for TPH, SVOCs, and dioxins. A total of 112 groundwater samples were collected at screening points and screening areas, and a total of 31 monitoring wells were sampled. Two piezometers were installed in Hop brook, three in two small tributary streams, and one in the Farmington River. Groundwater samples collected at screening points and screening areas exhibited high turbidity because the direct push technology causes agitation of the surrounding groundwater. The high turbidity likely contributed to elevated metals concentrations. Groundwater samples from standard monitoring wells were sampled using low flow and were generally not turbid.

Arsenic, chromium, and lead were most often detected in groundwater. In the main manufacturing facility area, four AOCs had screening results above criteria (AOCs 1, 2, 32, and 46).

Supplemental Groundwater Screening, EBCO Operational Area East of Route 10/202, April 20, 2000.

Based on the results of the October 1999 Groundwater Assessment Report, EBCo conducted additional groundwater investigations in the eastern area. The investigation focused on the installation and sampling of six new wells and six existing wells downgradient of targeted screening areas and screening points with elevated concentrations of COCs. The COCs analyzed were based on previous results. Results of the sampling indicated only a minor exceedence of the GWPC for lead in one well. No VOCs or TPH were detected from the selected wells sampled.

April 2001 Environmental Indicator Determination

EBCo. submitted a revised 4 volume EI determination to EPA based on a review of available information, including 2,295 soil samples and 559 groundwater sample results. Soil quality was evaluated for each AOC using the CT RSR Industrial/Commercial Direct Exposure Criteria, and the Pollutant Mobility Criteria for a GA area. Recent groundwater data was compared to CT RSR GA Groundwater Protection Criteria and the Industrial/Commercial Volatilization Criteria. The EI Determination includes summary data tables of data, tables of exceedances of the CT RSRs, and locations where the exceedances occurred. CT RSR criteria or other appropriate criteria are also provided.

September 2002 Environmental Indicators Update

In September 2002, EBCo submitted a two volume response to EPA draft comments on the April 2001 EI Determination, and provided summaries and data regarding various investigations and remedial actions completed by EBCo since the 2001 EI Determination submission. The report includes a summary of the results of additional groundwater investigations/sampling at AOCs 20, 23, 36, and 38 (located west of Route10/202), and investigations and remedial activities in areas east of Routes 10/202. The report also includes additional information regarding historical data and their relationship to various AOCs, and a Draft Facility Control Plan and plans to minimize exposures through the construction of a chain-link fence around the OB/OD area.

C. Basis for CA 725 Environmental Indicator Determination.

EPA reviewed all known applicable soil, groundwater, surface water and sediment data. Since the facility is zoned industrial, EPA compared soil and sediment data to the CT RSR Industrial / Commercial Direct Exposure Criteria (I/C DEC), as well as EBCo-calculated I/C DECs for RDX (52 ppm), HMX (40,000 ppm), and PETN (8,176 ppm). EPA has not approved these EBCo-calculated criteria, which are discussed in Volume 1, Tab 5 of the April 2001 EI. Groundwater is classified as GA, although the nearest public water supply well is located approximately 1.7 miles west of the facility and all nearby businesses and residents are serviced by the municipal water supply. EPA compared groundwater data to CT RSR Groundwater Protection Criteria

(GWPC) for a GA aquifer, Surface Water Protection Criteria (SWPC), and the I/C Volatilization Criteria. Surface water data were compared to Connecticut Water Quality Standards (CTWQS). In addition, EBCo-calculated groundwater, surface water, and sediment risk based concentration limits (RBCLs) for RDX were used for comparison against site data. EPA has not approved these EBCo-calculated criteria, which are discussed in Volume 1, Tab 1 of the April 2001 EI. Mary Ballew of EPA Region I's Corrective Action Section provided information on typical background concentrations of 2,3,7,8-TCDD TE in surface water, surface soils, and sediments, and an approximate concentration of dioxin corresponding to a 10-5 risk for drinking water.

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

	Yes	No	?	Rationale / Key Contaminants
Groundwater	_X_	___	___	Contaminants exceed CT RSR GWPC, SWPC, and I/C VC criteria. See the following: Table 2.6, Tab 2, Vol 1 of EBCo's 4/01 EI; Dyno Nobel's 5/03 ECAF Addendum Sheet 8, Part V, Item 6; and discussion below.
Air (indoors)[2]	___	_X_	___	Indoor air not sampled, but VOCs not detected in groundwater near buildings above CT RSR I/C VC.
Surface Soil (e.g., <2 ft)	_X_	___	___	Contaminants exceed the I/C DEC. See the following: Table 2.3, Tab 2, Vol.1 of EBCo's 4/01 EI; Dyno Nobel's 5/03 ECAF Addendum Sheet 8, Part V, Item 6; and discussion below.
Surface Water	_X_	_ _	___	Contaminants exceed CT WQS. See the following: Table 2.2, Tab 2, Vol. 1 of EBCo's 4/01 EI; Dyno Nobel's 5/03 ECAF Addendum Sheet 8, Part V, Item 6; and discussion below.

Sediment	_X_	___	___	Benzo(a)pyrene detected above I/C DEC. See Table 2.1, Tab 2, Vol 1 of EBCo's 4/01 EI, and discussion below.
Subsurf. Soil (e.g., >2 ft)	_X_	___	___	Contaminants detected above I/C DEC. See the following: Table 2.3, Tab 2, Vol 1; Dyno Nobel's 5/03 ECAF Addendum Sheet 8, Part V, Item 6; and discussion below.
Air (outdoors)	___	_X__	___	EBCo not currently open burning.

_____ If no (for all media) - skip to #6, and enter "YE," status code after providing or citing appropriate "levels," and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

__X__ If yes (for any media) - continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

_____ If unknown (for any media) - skip to #6 and enter "IN" status code.

Rationale and Reference(s):

For **Groundwater** data collected prior to 2001, see the EBCo 4/01 EI, Volume 1, Tab 2, Table 2.6, which lists exceedances of GWPC and SWPC in groundwater. Contaminants with one or more exceedances include arsenic, barium, beryllium, chromium, copper, lead, nickel, thallium, vanadium, zinc, 1,1,1 TCA, Benzene, PCE, methylene chloride, TPH, and Bis(2-ethylhexyl)phthalate. Dyno Nobel's 5/03 ECAF provides additional information regarding maximum concentrations detected (Sheet 7) and data sorted by AOC (Sheet 8). A maximum of 5.9 Pg/L of 2,3,7,8-TCDD TE, which roughly corresponds to a 10-5 risk for drinking water, was detected in a groundwater sample collected near AOC 18a.

For **Surface Soil** data collected prior to 2001, see 4/01 EI, Volume 1, Tab 2, Table 2.3, which lists exceedances of the I/C DEC for arsenic, beryllium, chromium, lead, PETN, RDX, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and TPH. Dyno Nobel's 5/03 ECAF provides additional information regarding maximum concentrations detected (Sheet 6) and data sorted by AOC (Sheet 8). A maximum detection of 2.66 ppm of 2,3,7,8-TCDD TE was found in a soil sample from AOC 18a. Concentrations of dioxin detected in other areas were several orders of magnitude lower.

For **Subsurface Soil** data collected prior to 2001, see 4/01 EI, Volume 1, Tab 2, Table 2.3, which lists exceedances of the I/C DEC for arsenic, lead, and RDX. Dyno Nobel's 5/03 ECAF provides additional information regarding maximum concentrations detected (Sheet 6) and data sorted by AOC (Sheet 8).

For **Surface Water** data collected prior to 2001, see 4/01 EI, Volume 1, Tab 2, Table 2.2, which lists exceedances of the CT Water Quality Standards for 2,3,7,8-TCDD TE, 4-Am-DNT/2-Am-DNT, arsenic, beryllium, lead, and thallium. Dyno Nobel's 5/03 ECAF provides additional information regarding data sorted by AOC (Sheet 8).

For **Sediment**, see 4/01 EI, Volume 1, Tab 2, Table 2.1, which lists exceedances of the I/C DEC for benzo(a)pyrene. The highest concentration (2 ppm) was found in Hop Brook at the outlet to the Farmington River. However, it was also detected in a background sample at a concentration of 1.7 ppm. In addition, 2,3,7,8-TCDD TE was detected in a sediment sample collected in a small stream approximately 350 feet southeast of the OB/OD area at a concentration of 13 parts per trillion (ppt). A duplicate sample found significantly less. A sediment sample collected downstream from this location detected 2.6 ppt. Typical concentrations of 2,3,7,8-TCDD TE found in rural areas of Connecticut are approximately 6 ppt (reference 28).

Footnotes: [1] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

[2] Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

3. Are there **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

Potential **Human Receptors** (Under Current Conditions)

"Contaminated" Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food[3]
Groundwater	No	No	No	Yes	No	No	No
~~Air (indoors)~~							
Soil (surface, e.g., <2 ft)	No	Yes	No	Yes	No	No	No

Surface Water	No	Yes	No	Yes	No	Yes	Yes
Sediment	No	Yes	No	Yes	No	Yes	Yes
Soil (subsurface e.g., >2 ft)	No	No	No	Yes	No	No	No
~~Air (outdoors)~~							

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors' spaces for Media which are not "contaminated") as identified in #2 above.

2. enter "yes" or "no" for potential "completeness" under each "Contaminated" Media -- Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media - Human Receptor combinations (Pathways) do not have check spaces ("___"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

_____ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

__X__ If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.

_____ If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code

Rationale and Reference(s):

For **Groundwater**, although residential areas are downgradient of contaminated groundwater detected in MW-118 (located approximately 1200 feet to the west), the residential areas are more directly downgradient of "clean" wells MW-105 and MW-109 (located approximately 300 feet to the west). In any case, the facility and nearby businesses and residential areas are connected to a municipal water supply. Workers would not be expected to encounter groundwater. Therefore, only construction workers performing or working in excavations would be expected to come into contact with groundwater.

For **Surface Soil**, workers and construction workers could be exposed to surficial soil contamination. No site-related surficial soil contamination has been found in residential areas,

and there are no day care centers on the site. Strict facility security controls limit any access by trespassers.

For **Surface Water**, workers and construction workers, and people swimming, fishing, or consuming fish caught near the site could be exposed to contaminants in surface water or in fish exposed to contaminated surface water.

For **Sediment**, workers, construction workers, and people swimming, fishing, or consuming fish caught near the site could be exposed to contaminants in sediments or in fish exposed to contaminated sediments.

For **Subsurface Soil**, construction workers are the only potential human receptors.

[3] Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

4 Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **"significant"**[4] (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

__**NO** If no (exposures can not be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

____ If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

_____ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code

Rationale and Reference(s):

Surface Soils: Workers and construction workers would be expected to be exposed to surficial soil contamination. Workers would be expected to have greater overall frequency of exposure to surface soils than construction workers. For purposes of this EI determination, potentially significant exposures are based on the I/C DEC, and modified based on an evaluation of the likely actual extent of exposures.

Tab 3 of Volume 1 of EBCo's 4/01 EI Determination contains a summary of soil exceedances. Examination of this information indicates exceedances of the I/C DEC in several AOCs, although they are generally less than an order of magnitude above the I/C DEC. Since the 4/01 EI, EBCo has conducted remediation at several AOCs (7, 11, 12, 16, 18C, 23, 32, and 39 and additional investigations at several other AOCs, including groundwater sampling at AOCs 20, 23, 36, and 38 (see 9/02 EI Update). EBCo also installed a fence around the open burning area, open detonation area, and all adjacent areas where phytoremediation has occurred, including AOCs 39 and 16. The most recent information is contained in NFAR reports dated 2/03 and the 5/03 ECAF.

Although some soil samples do show concentrations above the I/C DEC criteria, mean concentrations are generally well below the criteria. However, EPA has identified several AOCs where additional surficial soil investigation and/or remediation appears warranted (AOCs 14B, 18a, 24, 30, 36, 38, 40). In addition, exceedances of CT WQC for 2,3,7,8,-TCDD-TE in surface water samples from on-site streams suggest a possible source may be surficial soils and/or sediments. The source(s) of this contamination should be further evaluated.

In addition to the remediation efforts and installation of a fence around the most heavily contaminated area, Dyno Nobel has instituted facility controls to prevent trespassers from entering the site, and a facility control plan to prevent or minimize any exposure by employees in areas where contaminants exceed the I/C DEC. Potential exposures of authorized employees and contractors who work in contaminated areas in conjunction with Corrective Action are maintained within safe limits through compliance with the Health and Safety Plan.

<u>Based on this information, EPA concludes that it is unlikely that under current conditions, there are potentially significant exposures to workers or construction workers to surficial soils at the site.</u>

Groundwater: Groundwater is classified by CTDEP as GA, suitable for drinking, and the long-term goal is expected to be to achieve drinking water standards (GWPC), and where groundwater discharges to a surface water body, groundwater should meet SWPC. However, the site and surrounding area is serviced by a municipal water supply. There are no known domestic or public wells in the area, and nearby surface water bodies are

not currently used for drinking. Examination of Table 2.6 from the 4/01 EI indicates that exceedances of the GWPC and SWPC are generally less than an order of magnitude. Chlorinated solvents have not been detected in groundwater above the I/C Volatilization Criteria in areas around buildings. Current exposures to contaminated groundwater are expected to be limited to construction workers who would have dermal, ingestion, and inhalation exposures of a limited duration and frequency. Therefore, the combination of relatively minor exceedances of drinking water standards with limited exposure indicates that exposures to groundwater are not likely to be significant.

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EPA has identified the lack of data regarding perchlorate ~~as a data gap. Monitoring wells~~ should be sampled and analyzed for perchlorate.

Dyno Nobel has conducted groundwater sampling for perchlorate in wells in the OB/OD area in 2003. No perchlorate was detected.

Surface Water: Workers, construction workers, and people swimming, fishing, or consuming fish caught near the site could be exposed to contaminants in surface water or from eating fish. Surface water data were compared to CT WQS human health criteria for the consumption of water and organisms. Examination of Table 2.2. from the 4/01 EI indicates that there were exceedances for arsenic, beryllium, lead, thallium, and 2,3,7,8-TCDD TE which were greater than an order of magnitude above CT WQS. However, surface water sample concentrations were found to be consistent with background surface water samples. Also, the CT WQS are conservative standards for comparison since it is unlikely that anyone is drinking the water or eating fish from the streams on a continuing basis. Dyno Nobel has instituted facility controls to prevent trespassers from entering the site. EPA concludes that it is unlikely that anyone is currently using on-site surface water bodies for swimming or fishing, and the magnitude of exposure to surface water for on-site workers and construction workers is likely to be low. It is possible that these activities could be occurring in the Farmington River, which is classified as Class B. However, the volume of surface water entering the Farmington River from on-site steams is small compared to the volume of the Farmington River. EPA concludes that the water quality in the Farmington River is not likely to be significantly impacted by on-site sources and/or on-site surface water discharging to the river.

No significant exposures are considered likely for surface water since the magnitude of exposures is expected to be low, and sample results were generally low and/or consistent with background.

EPA has identified several data gaps regarding surface water. Impacts from the site to the surface waters of the Farmington River should be evaluated. Concerns include explosives, benzo(a)pyrene, and 2,3,7,8-TCDD TE found in on-site streams in surface water and sediment.

Sediment: Workers, construction workers, people swimming or fishing, or people who consume fish caught near the site could be exposed to contaminants in or from sediments. For purposes of this EI determination, data were compared to the I/C DEC. According to

Table 2.1 in Tab 2, relatively minor exceedances of the I/C DEC (up to two times the criteria) for benzo(a)pyrene were detected in Hop Brook and the unnamed stream. EBCo used a conservative screening model to calculate the risk to a trespasser who consumes fish once per week for six months per year over a ten year period, based on concentrations of benzo(a)pyrene found in sediment samples (see Tab 5, Volume 1 of the 4/01 EI). EBCo calculated the risk to be 1x10-5 excess cancer risk. This risk calculation is considered conservative because Dyno Nobel, Inc. maintains a strict security program, and it is unlikely a trespasser would be exposed at the frequency used in the model. Therefore, the combination of relatively minor exceedances of I/C DEC standards with limited exposures indicates that exposures to sediments are not likely to be significant.

EPA has identified several data gaps. Impacts from the site to the surface waters of the Farmington River should be evaluated. Concerns include explosives, benzo(a)pyrene, and 2,3,7,8-TCDD TE found in on-site streams in surface water and sediment.

Subsurface Soil: Construction workers are the only potential human receptors. For purposes of this EI determination, use of the I/C DEC (which were derived for workers and which are generally applicable only to accessible soil, (soils not under a building, and less than 4 feet in depth, or less than 2 feet deep if covered by pavement)) is considered highly conservative as a measure of current potentially significant exposures to construction workers.

Tab 3 of Volume 1 includes summary information of soil exceedances of the IC/DEC. Examination of this information indicates that the exceedances of the I/C DEC are generally less than an order of magnitude above the conservative I/C DEC standard. Therefore, the combination of relatively minor exceedances of I/C DEC standards with the relatively limited overall magnitude of exposure for a construction worker indicates that current exposures to subsurface soils are not likely to be significant.

[4] If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

5 Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable** limits?

____ If yes (all "significant" exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

____ If no (there are current exposures that can be reasonably expected to be "unacceptable")- continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

_____ If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

__X_ YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Ensign Bickford Company facility, EPA ID # CTD058509712, located at 660 Hopmeadow Street, Simsbury, CT under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

___ NO - "Current Human Exposures" are NOT "Under Control."

____ IN - More information is needed to make a determination.

Completed by (signature) Robert W. Brackett Date 9/8/03
(print) Robert W. Brackett
(title) RCRA Facility Manager

Supervisor (signature) _____ Date 9/8/03
(print) Matthew R. Hoagland
(title) Chief, RCRA Corrective Action Section
(EPA Region or State) EPA New England

Contact telephone and e-mail numbers

(name)_Robert W. Brackett _____
(phone #) 617-918-1364_____
(e-mail)__brackett.bob@epa.gov_____

FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.