

US EPA ARCHIVE DOCUMENT

# ASSESSORS ONLINE DATABASE For Woburn, MA

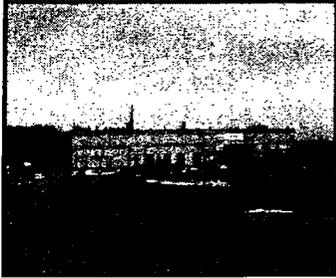
[New Search](#)

[Print](#)

[Google Map](#)

[Log Out](#)

## 240 SALEM ST



[Click to enlarge](#)

**MBLU :** 37/ 05/ 07/ / /

**Location:** 240 SALEM ST

**Owner Name:** ORGANIX L L C

**Account Number:** 21698575431700

[Search for Similiar Sale Properties](#)



### Parcel Value

	Assessed Value
Buildings	1,434,800
Extra Building Features	0
Outbuildings	0
Land	663,600
<b>Total:</b>	<b>2,098,400</b>



### Owner of Record

ORGANIX L L C  
240 SALEM STREET  
WOBURN, MA 01801



### Ownership History

Owner Name	Book/Page	Sale Date	Sale Price
ORGANIX L L C	1178/ 191	10/20/1997	0



### Land Use [\(click here for a list of codes and descriptions\)](#)

Land Use Code	Land Use Description
4040	R-D FACIL MDL-96



## Land Line Valuation

Size	Zone	Assessed Value
3.62 AC	I-P	663,600



## Construction Detail

Item	Value
STYLE	Research/Devel
MODEL	Industrial
Stories:	1
Occupancy	1
Exterior Wall 1	Brick Veneer
Roof Structure	Flat
Roof Cover	Tar & Gravel
Interior Wall 1	Drywall/Sheet
Interior Floor 1	Vinyl/Asphalt
Heating Fuel	Gas
Heating Type	Forced Air-Duc
AC Type	Unit/AC
Bldg Use	R-D FACIL MDL-96
Total Bedrms	00
Total Baths	0
1st Floor Use:	4040
Heat/AC	TYPICAL
Frame Type	MASONRY
Baths/Plumbing	AVERAGE
Ceiling/Wall	CEIL & WALLS
Rooms/Prtns	AVERAGE
Wall Height	21
% Corn Wall	0



## Building Valuation

Item	Value
Living Area	20,130 square feet
Year Built	1999



## Outbuildings [\(click here for a list of codes and descriptions\)](#)

Code	Description	Units
	No Outbuildings	

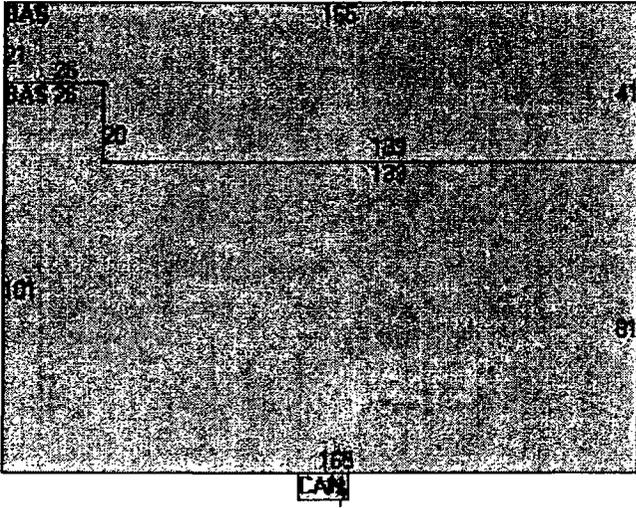


## Extra Features [\(click here for a list of codes and descriptions\)](#)

Code	Description	Units
------	-------------	-------

No Extra Building Features

 **Building Sketch** (click here for a list of codes and descriptions)



**Subarea Summary** (click here for a list of codes and descriptions)

Code	Description	Gross Area	Living Area
	First Floor	20130	20130
	Canopy	91	0
	<b>Total</b>	<b>20221</b>	<b>20130</b>

Online Database for Woburn, MA Powered by **Vision Appraisal Technology**



## Transfer Certificate of Title

BK.1178 PG.191

No. 209741

From Transfer Certificate No. 209740 in Registration Book 1178, Page 190  
Originally Registered October 20, 1997 for the South Registry District of  
Middlesex County

This is to Certify that

ORGANIX, L.L.C., a Massachusetts Limited Liability Company,  
of Woburn in the County of Middlesex and Commonwealth of Massachusetts  
is the owner in fee simple,  
of that certain parcel of land situate in Woburn  
in the County of Middlesex and said Commonwealth, described as follows:

Northwesterly by lots 14 and 10 as shown on plan hereinafter mentioned  
and by land now or formerly of John W. Buckley et al,  
four hundred ninety-four and 48/100 feet;  
Northwesterly by said John W. Buckley et al land, seventy-five  
and 42/100 feet;  
Easterly, Southeasterly and Easterly, again, by land now or formerly of  
Boston and Maine Railroad (Montreal Div.), five hundred forty-nine  
and 65/100 feet;  
Southeasterly by lot 17 on said plan, two hundred thirty-eight  
and 15/100 feet;  
Northeasterly by said lot 17 and by lot 11 on said plan,  
two hundred forty-nine and 66/100 feet;  
Northeasterly, again, by said lot 11 on said plan, fifty-three  
and 52/100 feet;  
Southeasterly by Salem Street, one hundred and twenty-five feet;  
Northwesterly by lot 15 on said plan, sixty and 01/100 feet;  
Southwesterly by said lot 15 and by lot 13 on said plan,  
three hundred nine and 23/100 feet; and  
Northwesterly, twenty and 19/100 feet,  
Westerly, one hundred sixty and 59/100 feet, and  
Northwesterly, twenty feet, all by lot 14 on said plan.

Said parcel is shown as lot 18 on said plan, (Plan No. 22628<sup>B</sup>).

All of said boundaries are determined by the Court to be located as shown on  
a subdivision plan, as approved by the Court, filed in the Land Registration  
Office, a copy of which is filed in the Registry of Deeds for the South  
Registry District of Middlesex County in Registration Book 1166, Page 129,  
with Certificate 207279.

So much of the above described land as is included within the area marked  
Sewer Easement-City of Woburn on said plan is subject to a sewer easement as  
set forth in a grant made by John J. Riley Company to the City of Woburn,  
dated April 10, 1931, duly recorded in Book 5570, Page 140.

The above described land is subject to the flow of an ancient water course  
running through the same as shown on said plan.

The above described land is subject to, and has the benefit of, the  
provisions contained in two indentures, one between the Boston and Maine  
Railroad and John J. Riley Company, dated December 3, 1945, duly recorded in  
Book 6918 Page 262 and the other between said Boston and Maine Railroad and  
the Woburn Packing Company dated November 29, 1945 duly recorded in Book 6917  
Page 497.

The above described land is subject to, and has the benefit of, easement as  
shown on said plan, running between lots 11 and 17 on the east of said  
easement and lots 13 and 15 on the west of said easement, set forth in  
Document No. 1044428.

There is appurtenant to the above described land the right to use the area  
marked easement to the east of lot 14 as shown on said plan, for sewer and gas  
utility purposes, in common with others entitled thereto, set forth in said  
Document No. 1044428.

Certificate No. 209741 cont'd.

And it is further certified that said land is under the operation and provisions of Chapter 185 of the General Laws and any amendments thereto, and that the title of said

ORGANIX, L.L.C.

to said land is registered under said Chapter subject, however, to any of the encumbrances mentioned in Section forty-six of said Chapter, and any amendments thereto, which may be subsisting, and subject also as aforesaid.

Witness PETER W. KILBORN, Chief Justice of the Land Court, Department of the Trial Court, at Cambridge in said County of Middlesex

the twentieth day of October the year nineteen hundred and ninety-seven  
at 2 o'clock and 14 minutes in the afternoon.

Attest, with the Seal of said Court, .....

*Eugene L. Jones*  
Assistant Recorder

Address of owner: 65 Cummings Park, Woburn, MA 01801

Land Court Case No. 22628

ID# 3048

LC-SHR 4

Organix Inc. 240 Salem St. Woburn, MA 01801

[HOME](#)   [OPPORTUNITIES](#)   [SERVICES](#)   [STAFF](#)   [PUBLICATIONS](#)   [CONTACT US](#)



---

# Contact Us

---

---

## Quick Links

[Services](#)

[Outsourcing  
Chemistry](#)

[Tour Organix](#)

[Our Brochure](#)

---

### Mailing

#### Address:

Organix Inc.  
240 Salem St.  
Woburn, MA  
01801

**Tel:** (781)932-

4142

**Fax:** (781)933-

6695

### E-mail:

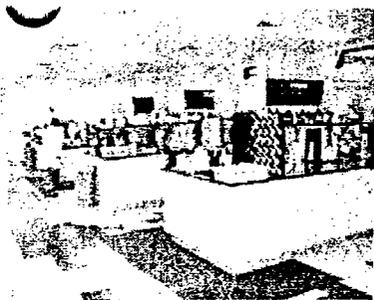
[organix@organixinc.com](mailto:organix@organixinc.com)



Tel: (781)932-4142 Fax: (781)933-6695

Organix Inc. 240 Salem St. Woburn, MA 01801

[HOME](#) [OPPORTUNITIES](#) [SERVICES](#) [STAFF](#) [PUBLICATIONS](#) [CONTACT US](#)



# Staff

Organix has a staff of 30 scientists.  
Twenty eight have Ph.D. degrees in organic chemistry.

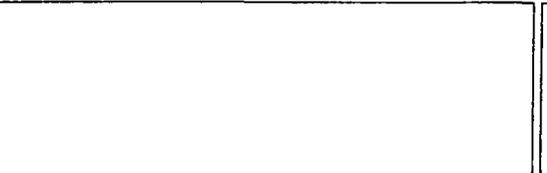
## Quick Links

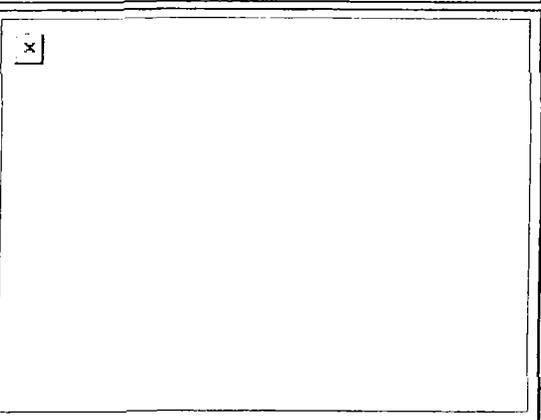
[Services](#)

[Outsourcing Chemistry](#)

[Tour Organix](#)

[Our Brochure](#)

	<p><u>Raj Razdan, PhD</u></p>	<p>C.E.O.</p>
	<p><u>Peter Meltzer, PhD</u></p>	<p>Presiden</p>
	<p><u>Howard Sard, PhD</u></p>	<p>Vice Presid</p>
	<p></p>	<p></p>

	<p><u>Paul Blundell, PhD</u></p>	<p>Vice Presic</p>
	<p><u>Anu Mahadevan, PhD</u></p>	<p>Vice Presic</p>

Tel: (781)932-4142 Fax: (781)933-6695

# ASSESSORS ONLINE DATABASE FOR WOBURN, MA

[New Search](#)

[Print](#)

[Google Map](#)

[Log Out](#)

## SALEM ST R

NO  
PHOTO

**MBLU :** 32/ 01/ 15/ / /

**Location:** SALEM ST R

**Owner Name:** WILDWOOD CONSERVATION CO

**Account Number:** 166990054410 0

[Search for Similiar Sale Properties](#)



### Parcel Value

Item	Assessed Value
Buildings	0
Extra Building Features	0
Buildings	0
Land	193,800
<b>Total:</b>	<b>193,800</b>



### Owner of Record

WILDWOOD CONSERVATION CO  
C/O JOHN J RILEY, JR  
154 OCEAN BLVD  
SEABROOK, NH 03874



### Ownership History

Owner Name	Book/Page	Sale Date	Sale Price
WILDWOOD CONSERVATION CO	975/ 79	9/23/1983	0



### Land Use (click here for a list of codes and descriptions)

Land Use Code	Land Use Description
IND LD UD MDL-00	



### Land Line Valuation

<b>Size</b>	<b>Zone</b>	<b>Assessed Value</b>
14.73 AC	I-P	193,800

 **Construction Detail**

<b>Item</b>	<b>Value</b>
STYLE	Vacant Land

 **Building Valuation**

<b>Item</b>	<b>Value</b>
Living Area	0 square feet
Year Built	

 **Outbuildings** (click here for a list of codes and descriptions)

Code	Description	Units
	No Outbuildings	

 **Extra Features** (click here for a list of codes and descriptions)

Code	Description	Units
	No Extra Building Features	

 **Building Sketch** (click here for a list of codes and descriptions)

**Vacant Land, No Sketch**

Online Database for Woburn, MA Powered by **Vision Appraisal Technology**

Transfer Certificate of Title

SK.975 PG.73

No. 169029

Certificate No. 157009 in Registration Book 915, Pages 59  
157070 126

Recorded December 28, 1978  
January 4, 1979 for the South Registry District of

that

and Conservation Corporation, a Massachusetts corporation  
County of Middlesex and Commonwealth of Massachusetts  
as a trustee,

parcel of land situate in Woburn

Middlesex and said Commonwealth, described as follows:

by land now or formerly of City of Woburn, five hundred  
and 39/100 feet;  
by land now or formerly of Mabel F. Quinn, thirty-seven  
and 85/100 feet, and  
by land now or formerly of Boston and Maine Corporation,  
four hundred two and 83/100 feet, by land now or formerly  
of Realty Co., Inc.;  
by land now or formerly of Massachusetts Rifle Association,  
four hundred and fifty feet;  
by land now or formerly of Mabel F. Quinn, about two hundred  
and thirty feet.

shown as lot 1 on plan hereinafter mentioned, (Plan No.

certain parcel of land situate in said Woburn, described as

by land now or formerly of City of Woburn,  
five and 60/100 feet;  
by land now or formerly of Mabel F. Quinn, thirty-seven  
and 80/100 feet; and  
by land now or formerly of Boston and Maine Corporation,  
four and 83/100 feet.

shown as lot 2 on said plan hereinafter mentioned, (Plan No.

boundaries, except the water lines, are determined by the Court  
shown on a plan, as modified and approved by the Court, filed  
in the Registry Office, a copy of a portion of which is filed in the  
Registry Office for the South Registry District of Middlesex County in  
Book 756, Page 36, with Certificate 125186.

said lot 1 as lies within the area marked \*20.00 wide M.D.C.  
approximately shown on said plan, is subject to the easement  
created by the Commonwealth of Massachusetts, Metropolitan  
Highway Commission, dated July 22, 1959, duly recorded in Book 9834, Page 149.

subject to the flow of a natural water course running through  
said plan as Aberjona River.

certain parcel of land situate in said Woburn, described as

by lands now or formerly of John J. Riley, Co.,  
of City of Woburn, about three hundred and sixty feet;  
by land now or formerly of Abajona River;  
by lots 1 and 2 as shown on plan hereinafter mentioned,  
six hundred and two feet;  
by land now or formerly of Mabel F. Quinn, eighty-one and 12/100 feet, and  
by land now or formerly of Mabel F. Quinn, two hundred seventy-three and 75/100 feet, by land now  
or formerly of Mabel F. Quinn at all; and  
by land now or formerly of Boston and Maine Railroad,  
three hundred sixty-nine and 81/100 feet.

US EPA ARCHIVE DOCUMENT

Certificate 169029 cont'd.

Said parcel is shown as lot 3 on said plan, (Plan No. 35070).

All of said boundaries, except the river line, are determined by the Court to be located as shown on a subdivision plan, as approved by the Court, filed in the Land Registration Office, a copy of which is filed in the Registry of Deeds for the South Registry District of Middlesex County in Registration Book 975, Page 79, with Certificate 169029

The above described land is subject to flowage rights as may legally exist as set forth in Document No. 338765.

The above described land is subject to a Grant of Easement for use of well, electricity &c., Document 633353.

And it is further certified that said land is under the operation of the provisions of Chapter 185 of the General Laws and any amendments thereto, in that the title of said

Wildwood Conservation Corporation

to said land is registered under said Chapter subject, however, to any of the encumbrances mentioned in Section forty-six of said Chapter, and amendments thereto, which may be subsisting and subject also as aforesaid.

Witness WILLIAM I. RANDALL, Esquire, Justice of the Land Court, Department of the Trial Court, at Cambridge in said County of Middlesex

the twenty-third day of September the year nineteen hundred and eighty-three at 12 o'clock and 5 minutes in the after-noon.

Attest, with the Seal of said Court,

*John J. Riley*  
Assistant Justice

Address of owner: c/o John J. Riley, 9 Huntington Road, Lynnfield, MA 01940

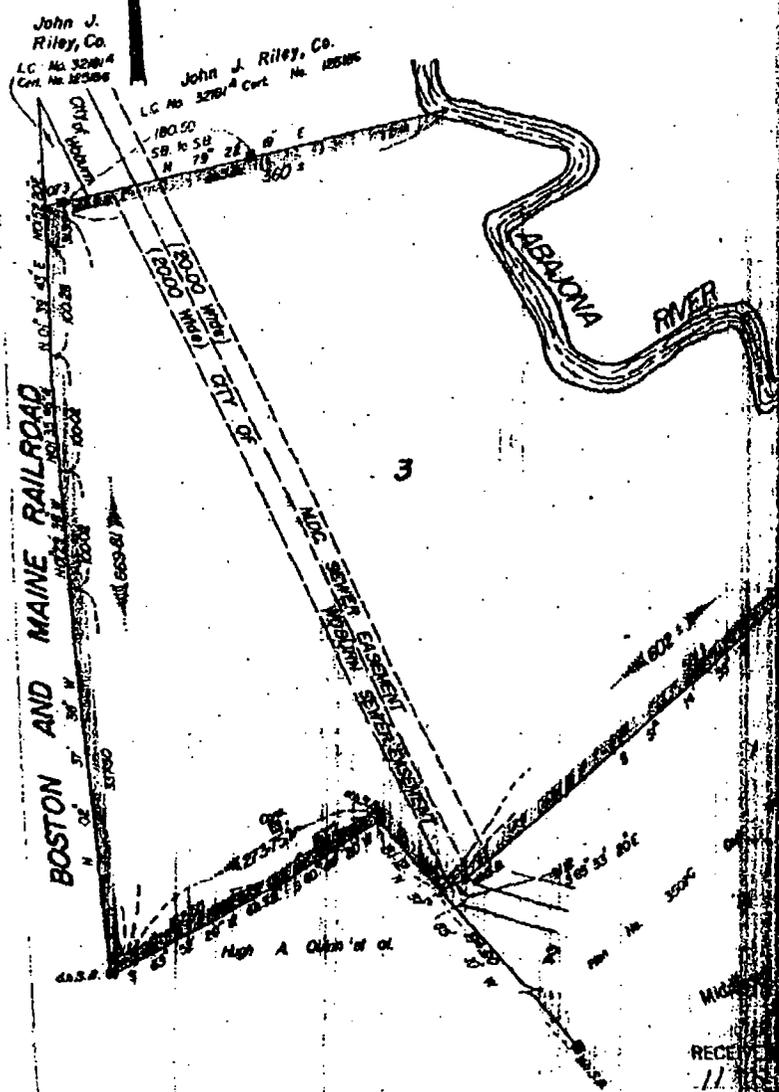
Land Court Case Nos. 12861 & 3407

ID# 7369a Dkt 618

SUBDIVISION PLAN OF LAND IN WOBURN

Hayes Engineering Inc., Surveyors

January 14, 1983



Subdivision of Part of Lot 5  
 Shown on Plan 35072  
 Filed with Cert. of Title No. 10815  
 South Registry District of Middlesex County

Some of the titles of title may be issued for land  
 shown on this plan.

*[Signature]*  
 Deputy Recorder

**WELLS G & H  
JOHN J. RILEY TANNERY  
PROPERTY SUB-DIVISIONS**

Prior to 1994, the properties commonly referred to as 195 Wildwood Avenue, 199 Wildwood Avenue, 240 Salem Street and 242 Salem Street were all part of a larger parcel shown as Lots 1, 2 and 3 on Plan No. 22628A. Beginning in 1994, the owner at the time, Wedel Corporation, began sub-dividing the land and selling off the respective parcels. A brief explanation of these subdivisions is provided below:

**195 Wildwood Avenue:**

- On February 13, 1997, Wedel Corporation sold Parcels 13, 15 and 16 (as shown on Subdivision Plan No. 22628D) to Paul Maggiore Builders Corporation. Parcels 13, 15 and 16 constitute a portion of the land formerly identified as Lot 1 on Plan No. 22628A.
- The current owners of the property are Robert E. and Alice E. Krueger, Trustees for Neit Realty Trust (transferred by deed dated February 13, 1997).
- Parcels 13, 15 and 16 combine to form the property commonly referred to as 195 Wildwood Avenue. (See also Woburn Tax Assessor's Map 37, Block 5, Lot 4.)

**199 Wildwood Avenue:**

- On November 1, 1994, Wedel Corporation sold Parcel 14 (as shown on Subdivision Plan No. 22628D) to Paul Maggiore Builders Corporation. Parcel 14 constitutes a portion of the land formerly identified as Lot 1 on Plan No. 22628A.
- The current owner of the property is Robert M. Duffy, Trustee for Wildwood Trust (transferred by deed dated November 1, 1994).
- Parcel 14 is commonly referred to as 199 Wildwood Avenue. (See also Woburn Tax Assessor's Map 37, Block 5, Lot 3.)

**240 Salem Street:**

- On October 20, 1997, Wedel Corporation sold Parcel 18 (as shown on Subdivision Plan No. 22628E) to Paul Maggiore Builders Corporation.<sup>1</sup> Parcel 18 constitutes a portion of the land formerly identified as Lots 2 and 3 on Plan No. 22628A.
- The current owner of the property is Organix, L.L.C. (transferred by deed dated October 20, 1997).
- Parcel 18 is commonly referred to as 240 Salem Street. (See also Woburn Tax Assessor's Map 37, Block 5, Lot 7.)

**242 Salem Street:**

- On September 2, 1994, Wedel Corporation sold Parcel 11 (as shown on Subdivision Plan Nos. 22628D and 22628E) to Paul Maggiore Builders Corporation. Parcel 11 constitutes a portion of the land formerly identified as Lots 2 and 3 on Plan No. 22628A.
- Subsequently, on January 2, 1997, Wedel Corporation sold Parcel 17 (as shown on Subdivision Plan No. 22628E) to Paul Maggiore Builders Corporation. Parcel 17 constitutes a portion of the land formerly identified as Parcel 12 on Plan No. 22628D.
- The current owners of the property are Beryl E. and Charles J. Rotondo (transferred by deeds dated September 2, 1994 and January 2, 1997).
- Parcels 11 and 17 combine to form the property commonly referred to as 242 Salem Street. (See also Woburn Tax Assessor's Map 37, Block 5, Lot 8.)

---

<sup>1</sup> "Parcel 18" is also identified as Parcel 12 on Subdivision Plan No. 22826D.

7322 Book 485 Page 165

22628A  
SHEET - 1

22628A  
SHEET - 2

PLAN OF LAND IN WOBURN  
R. Kingman Abbott, Surveyor  
August 1950

See Subdivision Plan  
of Lots 2 and 3 and other  
in Book 1132, Page 8

Woburn  
Packing  
Co.

John W. Buckley  
et al.

BOSTON AND MAINE RAILROAD  
Center Line of Location  
= 819.04 =  
(Montreal Div.)

759.32

2

1

1

Walter M. Heald et al.

Julia F. Watts  
et al.  
See Subdivision Plan  
of Lot 1  
in Book 998, Page 36

Copy of part of plan  
filed in  
LAND REGISTRATION OFFICE  
OCT. 20, 1950  
Scale of this plan 80 feet to an inch.  
W. T. Fairclough, Engineer for Court.

JUN 26 1961  
REGISTERED FOR REGISTRATION  
10  
1.00

Walter M. Heald et al.

Scale of this plan 80 feet to an inch.

Figure 3

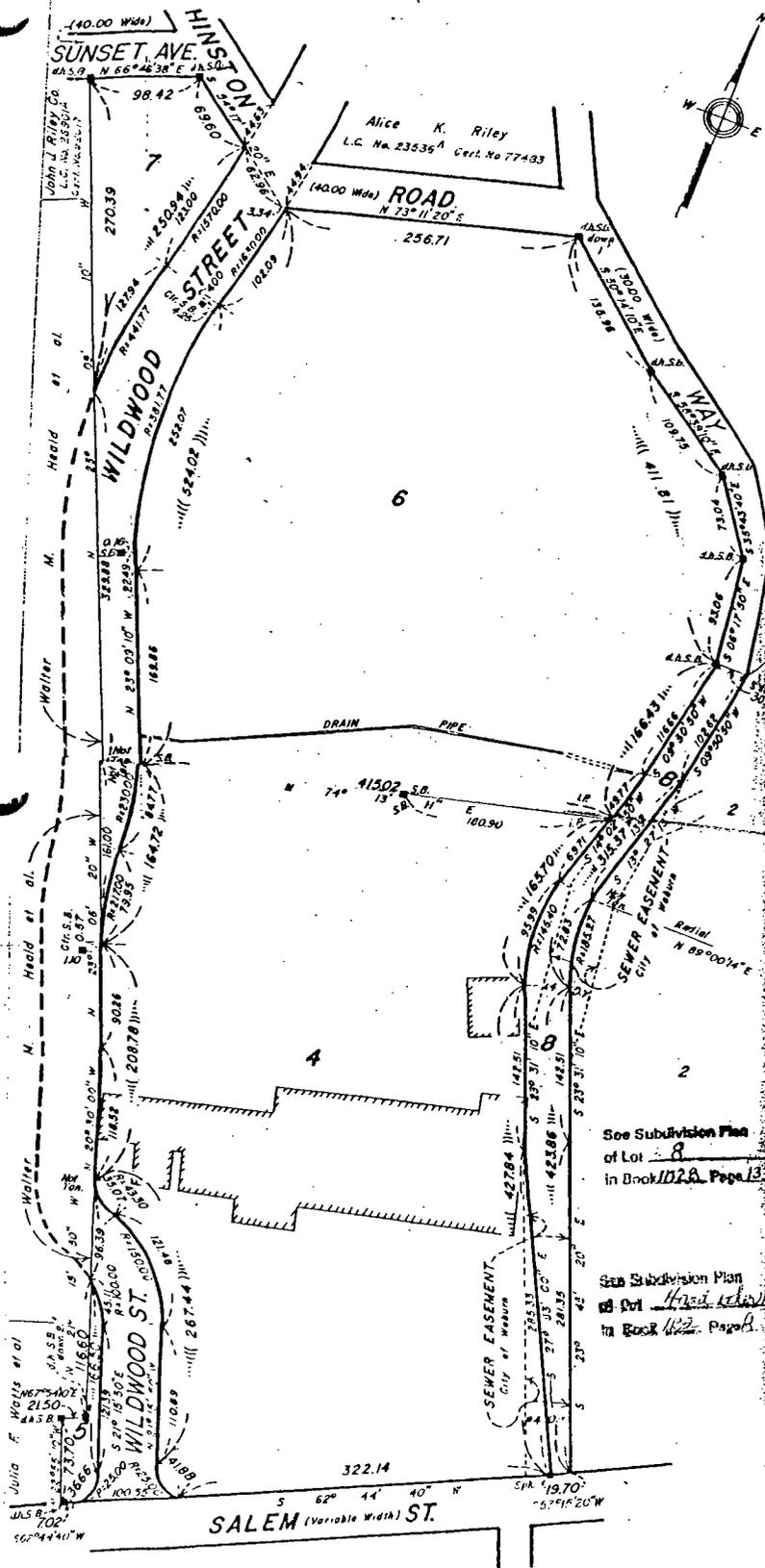
SUBDIVISION PLAN OF LAND IN WOBURN

Hayes Engineering, Inc., Surveyors

March 14, 1985

22628B

(Sheet 1 of 2)



See Subdivision Plan  
of Lot 8  
in Book 1028, Page 13

See Subdivision Plan  
of Lot 4 and 5  
in Book 1028, Page 13

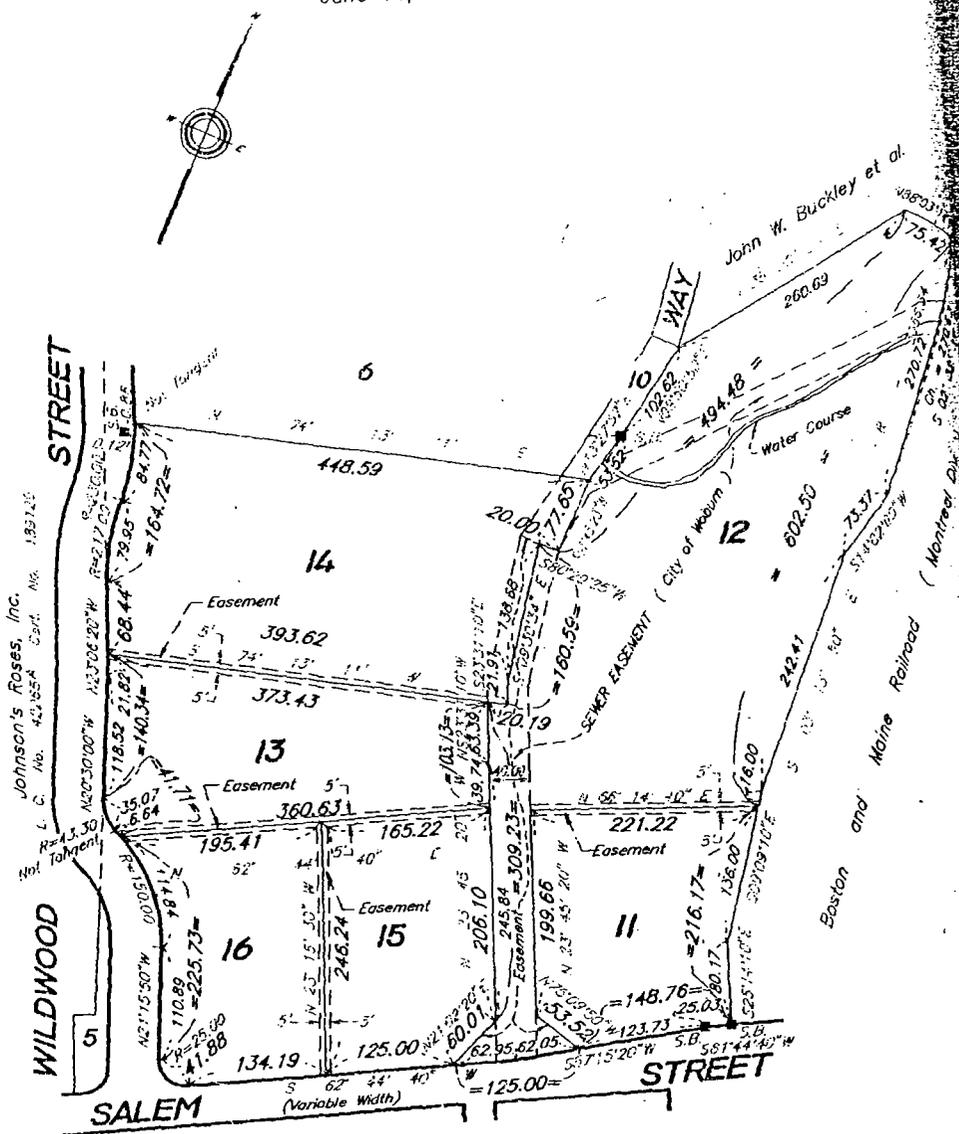
Said  
Also  
follow

Said  
Also  
follow

Said  
Also  
a subdi  
Office,  
Registr  
Certifi

SUBDIVISION PLAN OF LAND IN WOBURN  
 Eastern Land Survey Associates, Inc., Surveyors  
 June 14, 1994

22628-D



Johnson's Roses, Inc.  
 L. C. No. 42755-A Cert. No. 189125  
 No. 43,301 Tolment

Subdivision of Lots 2 and 3, Lot 4 and Lot 9  
 Shown on Plan 22628-A sh. 1 and 2, 22628-B sh. 2 and 22628-C  
 Filed with Cert. of Title No. 73122, 173576 and 179683.  
 South Registry District of Middlesex County

Separate certificates of title may be issued for land  
 shown hereon as Lots 11 through 16  
 By the Court.

JULY 28, 1994  
*James M. Maloney*  
 Deputy Recorder

KEC-0020

INDEXED South Registry DISTRICT  
 FEB 11 1995  
 MASS. DEPT. OF REVENUE  
 3  
 Pl. # 20-

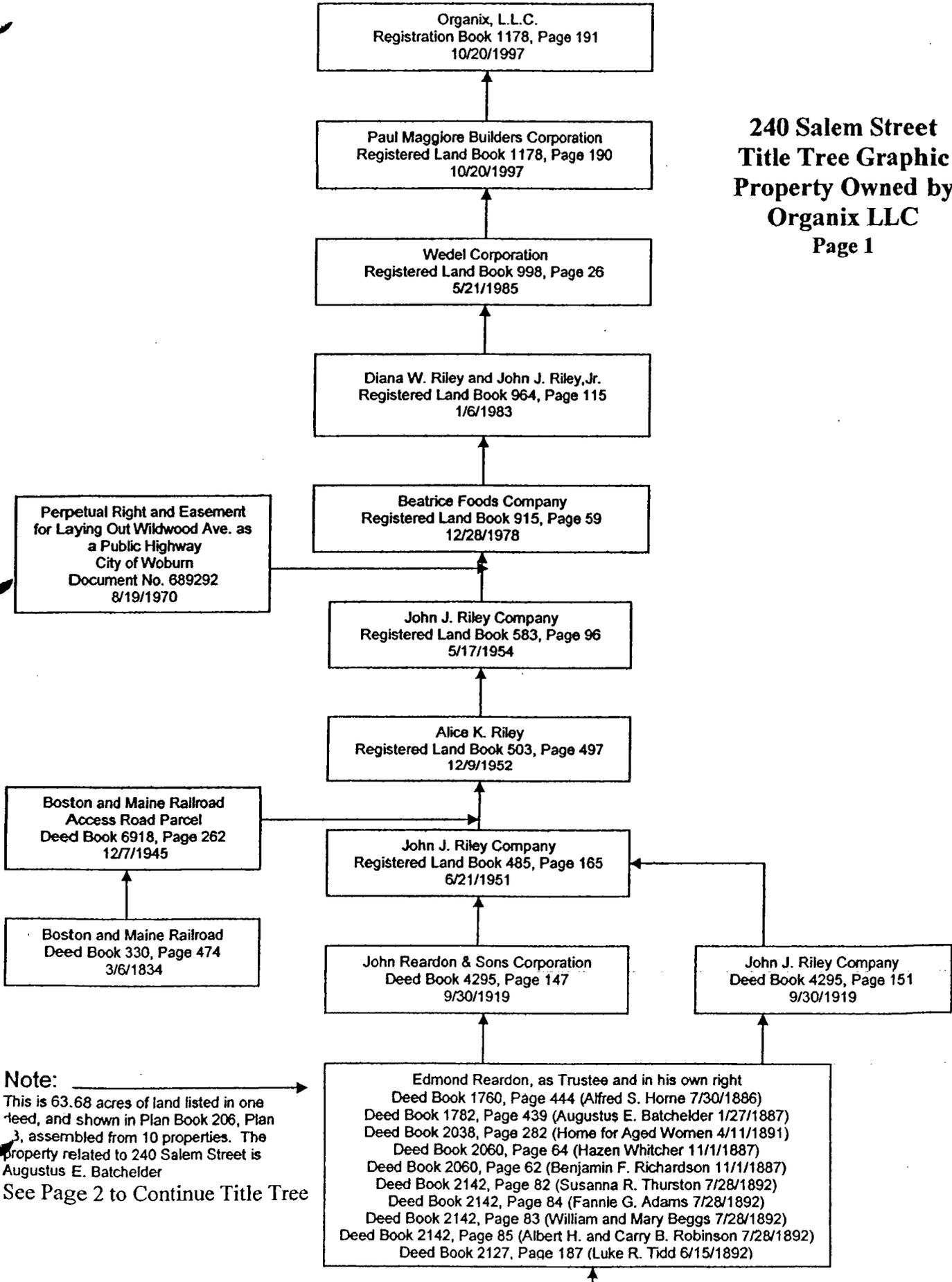
Abutters are shown as  
 on original decree plan.

Copy of part of plan  
 filed in  
 LAND REGISTRATION OFFICE  
 JULY 28, 1994  
 Scale of this plan 120 feet to an inch  
 Louis A. Moore, Engineer for Court

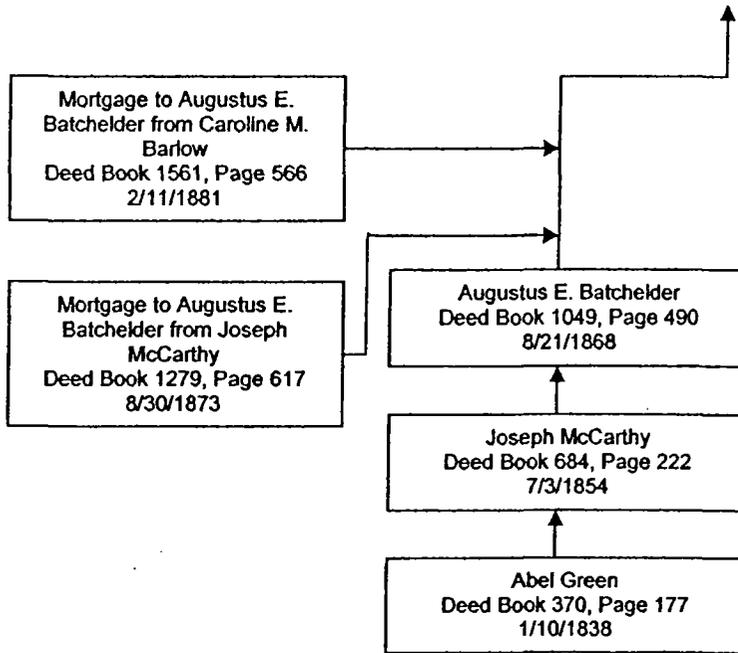
Figure 4



**240 Salem Street  
Title Tree Graphic  
Property Owned by  
Organix LLC  
Page 1**



**Note:** This is 63.68 acres of land listed in one deed, and shown in Plan Book 206, Plan 3, assembled from 10 properties. The property related to 240 Salem Street is Augustus E. Batchelder  
See Page 2 to Continue Title Tree



**240 Salem Street  
Title Tree Graphic  
Property Owned by  
Organix, LLC  
Page 2**

**WELLS G & H OU-2**  
**TITLE SEARCH NARRATIVE**  
**240 SALEM STREET, WOBURN, MA**  
Prepared by PCI/RAI Joint Venture

**October 20, 1997**

Organix LLC acquired Lot 18 of Land Court Plan No. 22628E, registered land, from the Paul Maggiore Builders Corporation for an undisclosed consideration.

**October 20, 1997**

Paul Maggiore Builders Corporation acquired Lot 18 of Land Court Plan No. 22628E, registered land, from the Wedel Corporation for an undisclosed consideration.

**May 21, 1985**

The Wedel Corporation acquired Lots 2 and 3 of Land Court Plan No. 22628A, drawn by H. Kingman Abbott, Surveyor, dated August, 1950, and Lots 4, 5 and 8 of Land Court Plan 22628B, all being registered land, from John J. Riley, Jr. And Diana W. Riley for an undisclosed consideration.

**January 6, 1983**

John J. Riley, Jr. And Diana W. Riley acquired Lots 1,2 and 3 of Land Court Plan No. 22628A, registered land, from the Beatrice Foods Company for an undisclosed consideration.

**December 28, 1978**

Beatrice Foods Company acquired Lots 1, 2 and 3 of Land Court Plan No. 22628A, registered land, from the John J. Riley Company for an undisclosed consideration.

**May 17, 1954**

The John J. Riley Company, acquired a parcel of land shown on Land Court Plan No. 23536A, registered land, from Alice K. Riley for an undisclosed consideration.

**December 9, 1952**

Alice K. Riley acquired a parcel of land shown on Land Court Plan No. 23536A, registered land, from the John J. Riley Company for an undisclosed consideration.

**WELLS G & H OU-2**  
**TITLE SEARCH NARRATIVE**  
**240 SALEM STREET, WOBURN, MA**  
Prepared by PCI/RAI Joint Venture

**June 21, 1951**

The John J. Riley Company registered Lots 1, 2 and 3 of Land Court Plan No. 22628A, drawn by H. Kingman Abbott, Surveyor, dated August, 1950.

**December 3, 1945**

The John J. Riley Company acquired 0.46 acres of land from the Boston and Maine Railroad for an undisclosed consideration.

**September 30, 1919**

The John J. Riley Company acquired 3.4 acres, being Lot E on Plan 38, Plan Book 239, recorded with the Middlesex South District Registry of Deeds, from The John Reardon and Sons Corporation for a consideration of \$1 and other valuable considerations.

**September 30, 1919**

The John J. Riley Company acquired a parcel of land from Edmund Reardon for an undisclosed consideration.

**June 27, 1898**

John Reardon and Sons, Corp. acquired 10 parcels of land totaling 63.68 acres from Edmund Reardon for a consideration of \$1 and other valuable considerations. Edmund Reardon acquired the 10 parcels over the period 1886 to 1892 from the following sellers: Alfred S. Horn, Augustus E. Batchelder, Home for Aged Women, Hazen Whitcher, Benjamin F. Richardson, Susanna R. Thurston, Fannie G. Adams, William and Mary Beggs, Albert H. and Carry B. Robinson, and Luke R. Tidd. The land acquired from Batchelder contains part of the present land at 240 Salem Street.

**January 27, 1887**

Edmund Reardon acquired 13.5 acres of land from Augustus E. Batchelder for a consideration of \$1 and "other good and sufficient considerations."

**WELLS G & H OU-2**  
**TITLE SEARCH NARRATIVE**  
**240 SALEM STREET, WOBURN, MA**  
Prepared by PCI/RAI Joint Venture

**September 21, 1868**

Augustus E. Batchelder acquired a parcel of land from Joseph McCarthy for a consideration of \$2,000.

**July 3, 1854**

Joseph McCarthy acquired a parcel of land from Abel Green for a consideration of \$500.

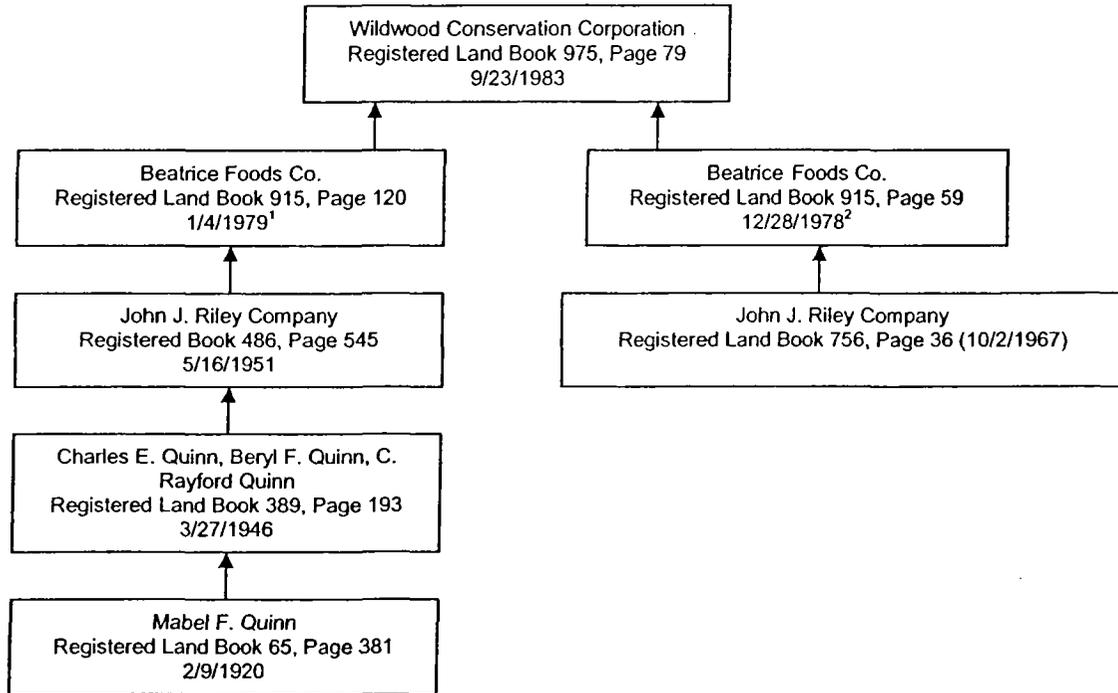
**January 10, 1838**

Able Green acquired a parcel of land from Luther Holden for a consideration of \$190.

**March 6, 1834**

The Boston and Lowell Railroad Corporation (later the Boston and Maine Railroad Corporation) acquired a parcel of land near "Frog Hole" from Junius Richardson for a consideration of \$100.50.

**Wildwood Conservation; Salem Street  
Title Tree Graphic  
Property Owned by Wildwood Conservation  
Corporation**



**Notes:**

1. The property referenced in the conveyance from the John J. Riley Company to Beatrice Foods Co., dated January 4, 1979 represents the southern section of the Wildwood Conservation Property. This property is subject to a right of way in favor of land owned by Birton et al. This property is also subject to a taking by the Middlesex County Commissioners for the relocation of Salem Street and a taking by the City of Woburn for the construction of a sewer.
2. The property referenced in the conveyance from the John J. Riley Company to Beatrice Foods Co., dated December 28, 1978 represents the northern section of the Wildwood Conservation Property located between the Boston & Maine Railroad tracks and the Aberjona River and is subject to a MDC sewer easement. The deed for this property also includes the conveyance of the former tannery property and several other properties located on Sunset Avenue and Hinston Road in Woburn, MA. The properties located on Sunset Avenue and Hinston Road do not appear to be related to the tannery operation or the property currently known as the Wildwood Conservation Property.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION I

J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

Site:	WELLS G&H
Break:	11-9
Other:	

CERTIFIED MAIL  
RETURN RECEIPT REQUESTED

October 13, 1987

John J. Riley, President  
John J. Riley Co.  
c/o Mary Ryan, Esq.  
Nutter, McClennen & Fish  
One International Place  
Boston, MA 02110

RE: Request for Information Pursuant to Section 104 of CERCLA and Section 3007 of RCRA, for certain activities occurring at the John J. Riley Co. property at 228 Salem Street, in Woburn, Massachusetts, hereinafter referred to as "the Facility".

Dear Mr. Riley:

The United States Environmental Protection Agency (EPA) is currently investigating the source, extent and nature of the release or threatened release of hazardous substances, pollutants or contaminants, or hazardous wastes on or about the Wells G & H Superfund Site, in Woburn, Massachusetts, "the Site". At present the Site boundaries are: Route 128 to the North, Salem and Cedar Streets to the South, Wildwood Avenue to the West, and Interstate 93 to the East. This investigation requires inquiry into the identification, nature, and quantity of materials that have been or are generated, treated, stored, or disposed of at or transported to the Site, and the nature or extent of a release or threatened release of a hazardous substance or pollutant or contaminant at or from the Site. EPA also is seeking information relating to the ability of a person to pay for or to perform a cleanup of the Site.

Pursuant to the authority of Section 104 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9604, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), P.L. 99-499, and Section 3007 of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6927, you are hereby requested to respond to the Information Request set forth in Attachment A.

Compliance with the Information Request set forth in Attachment A is mandatory. Failure to respond fully and truthfully to the Information Request within fifteen (15) business days of receipt of this letter, or to adequately justify such failure to respond, can result in enforcement action by EPA pursuant to Section 104(e)

of CERCLA, as amended, and/or Section 3008 of RCRA. Each of these statutes permits EPA to seek the imposition of penalties of up to twenty-five thousand dollars (\$25,000) for each day of continued non-compliance. Please be further advised that provision of false, fictitious, or fraudulent statements or representations may subject you to criminal penalties under 18 U.S.C. § 1001 or Section 3008(d) of RCRA.

This Information Request is not subject to the approval requirements of the Paperwork Reduction Act of 1980, 44 U.S.C. § 3501, et seq.

Your response to this Information Request should be mailed to:

U.S. Environmental Protection Agency  
Barbara Newman, Project Manager  
Massachusetts Waste Management Section  
Waste Management Division  
JFK Federal Building, HRS- 1903  
Boston, MA 02203

If you have any legal questions, please direct such questions to Lisa Gollin Evans of the Office of Regional Counsel at (617) 565-3441. If you have any technical questions, please direct such questions to Barbara Newman, at the above address, or at (617) 565-3679.

Due to the seriousness of the problem at the Site and the legal ramifications of your failure to respond properly, EPA strongly encourages you to give this matter your immediate attention and respond to this Information Request within the time specified above.

Thank you for your cooperation in this matter.

Sincerely,



Merrill S. Hohman, Director  
Waste Management Division

Enclosure

cc. Lisa Gollin Evans, Office of Regional Counsel  
Barbara Newman, Waste Management Division  
Gene Lucero, Director  
Office of Waste Programs Enforcement  
Winston Porter, Director  
Office of Emergency and Remedial Response  
Edward Reich, Director, Office of Enforcement  
and Compliance Monitoring  
Rodine DeRice, Department of  
Environmental Quality Engineering

## FIRST INFORMATION REQUEST

Instructions

1. A separate response must be made to each of the Questions set forth in this Information Request.
2. Precede each answer with the number of the Question to which it corresponds.
3. If information which is not known or not available to you as of the date of submission of a response to this Information Request should later become known or available to you, you must supplement your response to EPA. Moreover, should you find at any time after the submission of this response that any portion of the submitted information is false or misrepresents the truth, you must notify EPA thereof as soon as possible.
4. For each document produced in response to this Information Request indicate on the document, or in some other reasonable manner, the number of the Question to which it responds.
5. The information requested herein must be provided notwithstanding its possible characterization as confidential information or trade secrets. You may, if you desire, assert a confidentiality claim covering part or all of the information requested, pursuant to Sections 104(e)(7)(E) and (F) of CERCLA, as amended by SARA, 42 U.S.C. §§ 9604(e)(7)(E) and (F), and 40 C.F.R. 2.203(b), by attaching to such information at the time it is submitted, a cover sheet, stamped or typed legend, or other suitable form of notice employing language such as "trade secret," or "proprietary" or "company confidential." Information covered by such a claim will be disclosed by EPA only to the extent, and only by means of the procedures set forth in 40 C.F.R. Part 2, Subpart B. If no such claim accompanies the information when it is received by EPA, it may be made available to the public by EPA without further notice to you. You should read the above cited regulations carefully before asserting a business confidentiality claim, since certain categories of information are not properly the subject of such a claim.
6. Where specific information has not been memorialized in any document, but is nonetheless responsive to a Question, you must respond to the Question with a written response.

Definitions

The following definitions shall apply to the following words as they appear in this Attachment A:

1. The term "you" or "Respondent" shall mean the addressee of this Request, the addressee's officers, managers, employees, contractors, trustees, successors, assigns, and agents.
2. The term "person" as used herein includes, in the plural as well as the singular, any natural person, firm, unincorporated association, partnership, corporation, trust or other entity.
3. The term "the Facility" shall mean and include the property on or about the John J. Riley Company tannery located at 228 Salem Street, in Woburn, Massachusetts, Block 21000, lot 37 and lot 96 on the Assessor's Map #21 in Woburn, Massachusetts.
4. The term "the Site" shall mean and include all the property that is bounded by: Route 128 to the North, Salem and Cedar Streets to the South, Wildwood Avenue to the West, and I-93 to the East in Woburn, Massachusetts.
5. The term "hazardous substance" shall have the same definition as that contained in Section 101(14) of CERCLA and includes any mixtures of such hazardous substances with any other substances, including petroleum products.
6. The term "pollutant or contaminant," shall have the same definition as that contained in Section 101(33) of CERCLA, and includes any mixtures of such pollutants and contaminants with any other substances, including petroleum products.
7. The term "hazardous waste" shall have the same definition as that contained in Section 1004(5) of RCRA.
8. The term "solid waste" shall have the same definition as that contained in Section 1004(27) of RCRA.
9. The term "materials" shall mean all substances that have been generated, treated, stored, removed, or disposed of or otherwise handled at or transported to or from the Facility, including, but not limited to, all hazardous substances, pollutants and contaminants, hazardous wastes and solid wastes, as defined above including, but not limited to, benzene, toluene, tetrachloroethene, trichloroethene, 1,2 trans-dichloroethene, 1,1,1-trichloroethane and any petroleum product such as fuel oil or gasoline.

10. The term "hazardous material" shall mean all hazardous substances, pollutants or contaminants, and hazardous wastes, as defined above.

11. The term "non-hazardous material" shall mean all material as defined above, excluding hazardous substances, pollutants and contaminants, and hazardous waste.

12. The term "identify" means, with respect to a natural person, to set forth the person's name, present or last known business address and business telephone number, present or last known home address and home telephone number, and present or last known job title, position or business.

13. The term "identify" means, with respect to a corporation, partnership, business trust or other association or business entity (including a sole proprietorship) to set forth its full name, address, legal form (e.g. corporation, partnership, etc.), organization, if any, and a brief description of its business.

14. The term "identify" means, with respect to a document, to provide its customary business description, its date, its number if any (invoice or purchase order number), the identity of the author, addressor, addressee and/or recipient, and the substance or the subject matter.

15. The term "release" has the same definition as that contained in Section 101(22) of CERCLA, 42 U.S.C. § 9601(22), and includes any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment, including the abandonment or discharging of barrels, containers, and other closed receptacles containing any hazardous substance or pollutant or contaminant.

16. The terms "document" and "documents" shall include writings of any kind, formal or informal, whether or not wholly or partially in handwriting, including by way of illustration and not by way of limitation, any invoice, receipt, endorsement, check, bank draft, cancelled check, deposit slip, withdrawal slip, order, correspondence, record book, minutes, memorandum of telephone and other conversations including meetings, agreements and the like, diary, calendar, desk pad, scrapbook, notebook, bulletin, circular, form, pamphlet, statement, journal, postcard, letter, telegram, telex, report, notice, message, analysis, comparison, graph, chart, interoffice or intraoffice communications, photostat or other copy of any documents, microfilm or other film record, any photograph, sound recording on any type of device, any punch card, disc or disc pack; any tape or other type of memory generally associated with computers and data processing (together with the programming instructions and other written material necessary to use such punch card, disc, or disc pack,

punch card, disc, or disc pack, tape or other type of memory); and (a) every copy of each document which is not an exact duplicate of a document which is produced, (b) every copy which has any writing, figure or notation, annotation or the like of it, (c) drafts, (d) attachments to or enclosures with any document and (e) every document referred to in any other document.

17. The terms "and" and "or" shall be construed either disjunctively or conjunctively as necessary to bring within the scope of this Information Request any information which might otherwise be construed to be outside its scope.

18. The term "arrangement" means every separate contract or other agreement between two or more persons.

19. The term "property interest" means any interest in property, including but not limited to, any ownership interest, any interest in the rental of property, any interest in a corporation that owns or rents or owned or rented property, and any interest as either the trustee or beneficiary of a trust that owns or rents, or owned or rented property.

20. The term "asset" shall include the following: real estate, buildings or other improvements to real estate, equipment, vehicles, furniture, inventory, supplies, customer lists, accounts receivable, interest in insurance policies, interests in partnerships, corporations and unincorporated companies, securities, patents, stocks, bonds, and other tangible as well as intangible property.

#### QUESTIONS

1. Identify the person(s) answering these Questions on behalf of Respondent.
2. For each and every Question contained herein, identify all persons consulted in the preparation of the answer.
3. For each and every Question contained herein, identify all documents consulted, examined, or referred to in the preparation of the answer and provide true and accurate copies of all such documents.
4. Provide the RCRA Identification number of the Facility.

5. If you have reason to believe that there may be persons able to provide a more detailed or complete response to any Question contained herein or who may be able to provide additional responsive documents, identify such persons and the additional information or documents that they may have.

6. For each and every Question contained herein, if information responsive to this Information Request is not in your possession, custody or control, then identify the persons from whom such information may be obtained.

7. Identify the current owners. State the dates during which the current owner owned, operated or leased any portion of the facility and provide copies of all documents evidencing or relating to such ownership, operation or lease, including, but not limited to, purchase and sale agreements, deeds, leases, etc.

8. Identify all prior owners of the Facility. For each prior owner, further identify:

a. The dates of their ownership.

b. Any evidence that hazardous materials were released or threatened to be released at the Facility during the period that they owned the Facility.

9. In response to EPA's prior information request, you submitted a letter written by Edward Lawler from Cambridge Analytical Associates to Richard Jones, forwarding volatile organic analyses taken from three soil samples analyzed on March 24, 1983, at the Facility. Attached to this letter were the results of only one sample (W-1). In addition, the concentrations of volatiles detected were not listed on this one page. Please submit the analytical results for all three soil samples referred to in that letter, (Exhibit 8).

10. Describe the physical structures that exist or that existed at the Facility including but not limited to the following:

a. Surface structures (e.g., buildings, tanks, etc.).

b. Groundwater production well(s) and test wells installed for the purpose of groundwater production or for evaluating the Facility for groundwater production wells at the Facility.

c. Underground structures e.g., storm water drainage system, sanitary sewer system, septic tank(s) and subsurface disposal field(s).

d. Underground storage tanks that contain or contained petroleum products, including the age and size of the tank, the type and quantity of petroleum stored, and any leak tests done on the tanks.

e. Any and all additions, removals, demolitions or changes of any kind to physical structures on, under or about the Facility, or to the property itself (e.g., filling regrading or excavation) and state the dates on which such changes occurred.

f. Well production rate or design yield.

11. Submit all documentation to support your answers to question 10, including, but not limited to:

a. drilling logs,

b. lithologic and stratigraphic logs,

c. drillers well completion data and construction method.

12. Describe the acts or omissions of any persons, other than your employees, agents or those persons with whom you had a contractual relationship, that may have caused the release or threat of release of hazardous substances at the Site or at the Facility and the damages relating therefrom and identify such persons. In addition, describe all precautions that you took against foreseeable acts or omissions of any such third parties and the consequences that could foreseeably result from such acts or omissions.

13. At the time you acquired the parcels of the Facility, did you know or have reason to know that any material was disposed of on, in, or at the Facility? Describe all investigations of the Facility you undertook prior to acquiring/leasing the Facility and all of the facts on which you base the answer to the preceding question.

14. Submit the page of data containing analyses performed by Clean Harbors on a soil sample collected from Test Pit #5 at the Facility in 1986. This information was found missing from Appendix B of the report entitled "Test Pit Explorations Vacant Parcel Off Wildwood Street, Woburn, Massachusetts," written by Kurz Associates, on August 4, 1986, when it was submitted to EPA in response to the November 18, 1986 information request.

15. Have you ever generated, purchased, stored, treated, disposed, removed or otherwise handled any hazardous materials at the Facility? If the answer to the preceding question is anything but an unqualified "no" identify:

a. In general terms, the nature and quantity of the non-hazardous materials so transported, used, purchased, generated, stored, treated, disposed, removed or otherwise handled.

b. The chemical composition, characteristics, physical state (e.g., solid, liquid) and quantity of each hazardous material so removed, transported, used, purchased, generated, stored, treated, disposed, or otherwise handled.

c. The persons who supplied you with each such hazardous material.

d. How each such hazardous material was used, purchased, generated, stored, treated, transported, disposed, removed or otherwise handled by you.

e. When each such hazardous material was used, purchased, generated, stored, treated, transported, disposed, removed or otherwise handled by you.

f. Specify, with drawings and maps, where each such hazardous material was used, purchased, generated, stored, treated, transported, disposed, removed or otherwise handled by you.

16. Identify all liability insurance policies held by Respondent. In identifying such policies, state:

a. The name and address of each insurer and of the insured;

b. The amount of coverage under each policy;

c. The commencement and expiration dates for each policy;

d. Whether or not the policy contains a "pollution exclusion" clause; and

e. Whether or not the policy covers sudden, nonsudden or both types of accidents.

In lieu of providing this information, you may submit complete copies of all insurance policies that may cover the release or threatened release of hazardous materials.

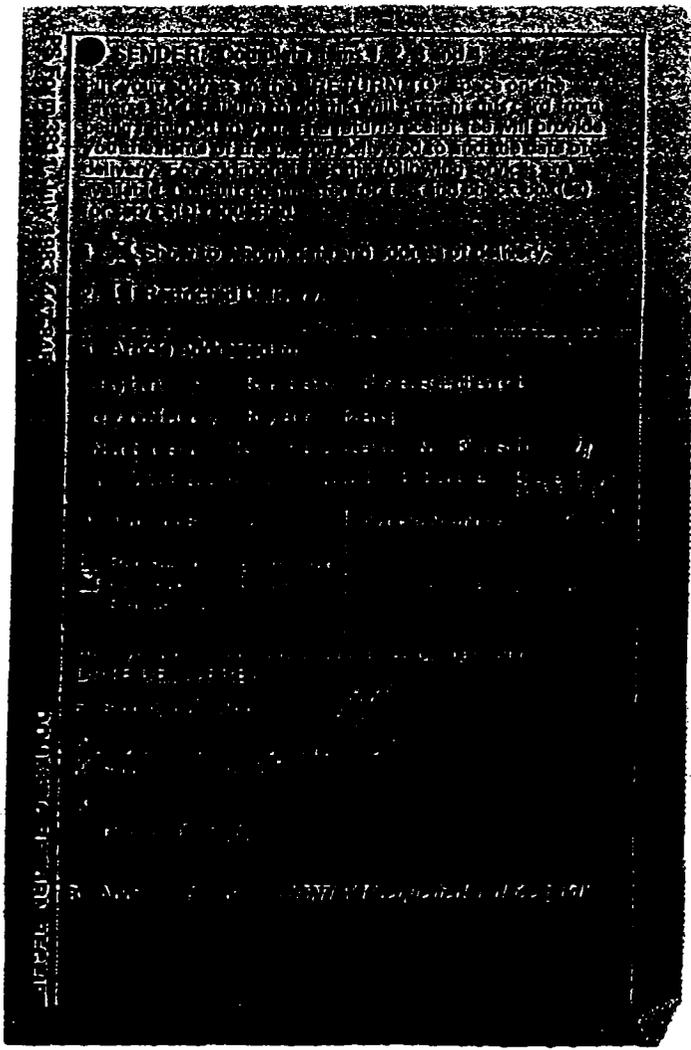
17. Provide all financial statements for the past five fiscal years, including, but not limited to, those filed with the federal and State Internal Revenue Service and Securities and Exchange Commission.

18. Identify all of Respondent's current assets and liabilities and the person(s) who currently own or are responsible for such assets and liabilities.

19. Identify all subsidiaries and parent corporations of Respondent.

20. Provide a copy of the most current Articles of Incorporation and By-Laws of Respondent.

21. Identify the managers and majority shareholders of Respondent and the nature of their management duties or amount of shares held respectively.



P 480 786 818

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED—  
NOT FOR INTERNATIONAL MAIL

(See Reverse)

Sent to John J. Riley c/o Mary Ryan, Esq.	
Street and No. Nutter, McClennon International Place	
City, State and ZIP Code Boston, MA 02110	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to whom and Date Delivered	
Return Receipt Showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	\$
Postmark or Date	

PS Form 3800, Feb. 1982

NUTTER, McCLENNEN & FISH

ONE INTERNATIONAL PLACE  
BOSTON, MASSACHUSETTS 02110-2699

(617) 439-2000

TELEX 940790  
TELECOPIER (617) 973-9748

Wells G+H  
11.9

COUNSEL  
LONDON  
TOKYO

HYANNIS  
WASHINGTON  
SAN FRANCISCO  
PALO ALTO  
AMSTERDAM

November 13, 1987  
2346-96

HAND DELIVER

Lisa Gollin Evans, Esquire  
Assistant Regional Counsel  
Environmental Protection Agency  
Region 1  
JFK Federal Building, Suite 2203  
Boston, MA 02203

Re: EPA Information Request to  
John J. Riley Company, Inc.

Dear Ms. Evans:

Pursuant to our agreement on Monday, November 10, I am forwarding the enclosed documents to you today in connection with the above-captioned information request. As we discussed, EPA will treat production of these documents as an incomplete response pending the final response of the John J. Riley Company, Inc. on November 20, 1987.

Very truly yours,

  
Mary K. Ryan

MKR:jap

Enclosures

cc: Barbara Newman, Project Officer (w/o enc.)

0661e

US EPA ARCHIVE DOCUMENT



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION I

J. F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203

Site: Wells G+H  
Break: 11.9  
Other: Riley Leather

CERTIFIED MAIL  
RETURN RECEIPT REQUESTED

March 24, 1988

John J. Riley, President  
Wedel Corporation  
Riley Leather Company  
c/o Mary Ryan, Esq.  
Nutter, McClennen & Fish  
One International Place  
Boston, MA 02110

Re: Request for Information Pursuant to Section 104 of CERCLA and Section 3007 of RCRA, for certain activities occurring at the Wedel Corporation property at 228 Salem Street, in Woburn, Massachusetts, hereinafter referred to as "the Facility".

Dear Mr. Riley:

The United States Environmental Protection Agency (EPA) is currently investigating the source, extent and nature of the release or threatened release of hazardous substances, pollutants or contaminants, or hazardous wastes on or about the Wells G & H Superfund Site, in Woburn, Massachusetts, "the Site". At present the Site boundaries are: Route 128 to the North, Salem and Cedar Streets to the South, Wildwood Avenue to the West, and Interstate 93 to the East. This investigation requires inquiry into the identification, nature, and quantity of materials that have been or are generated, treated, stored, or disposed of at or transported to the Site, and the nature or extent of a release or threatened release of a hazardous substance or pollutant or contaminant at or from the Site. EPA also is seeking information relating to the ability of a person to pay for or to perform a cleanup of the Site.

This letter is being sent to John J. Riley as President of Riley Leather Company and Wedel Corporation, and is requesting information regarding the property, as defined herein, that is owned, operated or leased by both of these companies.

Due to the seriousness of the problem at the Site and the legal ramifications of your failure to respond properly, EPA strongly encourages you to give this matter your immediate attention and respond to this Information Request within the time specified above.

Thank you for your cooperation in this matter.

Sincerely,

  
Merrill S. Hohman, Director  
Waste Management Division

Enclosure

cc. Gretchen Muench, Office of Regional Counsel  
Barbara Newman, Waste Management Division  
Gene Lucero, Director  
Office of Waste Programs Enforcement  
Winston Porter, Director  
Office of Emergency and Remedial Response  
Rodine DeRice, Department of  
Environmental Quality Engineering

Definitions

The following definitions shall apply to the following words as they appear in this Attachment A:

1. The term "you" or "Respondent" shall mean the addressees of this Request, the addressees' officers, managers, employees, contractors, trustees, successors, assigns, and agents.
2. The term "person" as used herein includes, in the plural as well as the singular, any natural person, firm, unincorporated association, partnership, corporation, trust or other entity.
3. The term "the Facility" shall mean and include the property on or about the Wedel Corp. property located at 228 Salem Street, in Woburn, Massachusetts, Block 21000, lot 37 and lot 96 on the Assessor's Map #21 in Woburn, Massachusetts.
4. The term "the Site" shall mean and include all the property that is bounded by: Route 128 to the North, Salem and Cedar Streets to the South, Wildwood Avenue to the West, and I-93 to the East in Woburn, Massachusetts.
5. The term "hazardous substance" shall have the same definition as that contained in Section 101(14) of CERCLA and includes any mixtures of such hazardous substances with any other substances, including petroleum products.
6. The term "pollutant or contaminant," shall have the same definition as that contained in Section 101(33) of CERCLA, and includes any mixtures of such pollutants and contaminants with any other substances, including petroleum products.
7. The term "hazardous waste" shall have the same definition as that contained in Section 1004(5) of RCRA.
8. The term "solid waste" shall have the same definition as that contained in Section 1004(27) of RCRA.
9. The term "materials" shall mean all substances that have been generated, treated, stored, removed, or disposed of or otherwise handled at or transported to or from the Facility, including, but not limited to, all hazardous substances, pollutants and contaminants, hazardous wastes and solid wastes, as defined above including, but not limited to, benzene, toluene, tetrachloroethene, trichloroethene, 1,2 trans-dichloroethene, 1,1,1-trichloroethane and any petroleum product such as fuel oil or gasoline.

programming instructions and other written material necessary to use such punch card, disc, or disc pack, associated with computers and data processing (together with the punch card, disc, or disc pack, tape or other type of memory); and (a) every copy of each document which is not an exact duplicate of a document which is produced, (b) every copy which has any writing, figure or notation, annotation or the like of it, (c) drafts, (d) attachments to or enclosures with any document and (e) every document referred to in any other document.

17. The terms "and" and "or" shall be construed either disjunctively or conjunctively as necessary to bring within the scope of this Information Request any information which might otherwise be construed to be outside its scope.

18. The term "arrangement" means every separate contract or other agreement between two or more persons.

19. The term "property interest" means any interest in property, including but not limited to, any ownership interest, any interest in the rental of property, any interest in a corporation that owns or rents or owned or rented property, and any interest as either the trustee or beneficiary of a trust that owns or rents, or owned or rented property.

20. The term "asset" shall include the following: real estate, buildings or other improvements to real estate, equipment, vehicles, furniture, inventory, supplies, customer lists, accounts receivable, interest in insurance policies, interests in partnerships, corporations and unincorporated companies, securities, patents, stocks, bonds, and other tangible as well as intangible property.

#### QUESTIONS

1. Identify the person(s) answering these Questions on behalf of Respondent.
2. For each and every Question contained herein, identify all persons consulted in the preparation of the answer.
3. For each and every Question contained herein, identify all documents consulted, examined, or referred to in the preparation of the answer and provide true and accurate copies of all such documents.
4. Provide the RCRA Identification number of the Facility.

d. Underground storage tanks that contain or contained petroleum products, including the age and size of the tank, the type and quantity of petroleum stored, and any leak tests done on the tanks.

e. Any and all additions, removals, demolitions or changes of any kind to physical structures on, under or about the Facility, or to the property itself (e.g., filling regrading or excavation) and state the dates on which such changes occurred.

11. List, but do not submit, all documentation used to support your answers to Question #10.

12. Describe the acts or omissions of any persons, including your employees, agents or those persons with whom you had a contractual relationship, that may have caused the release or threat of release of hazardous substances at the Site or at the Facility and the damages relating therefrom and identify such persons. In addition, describe all precautions that you took against foreseeable acts or omissions of any such third parties and the consequences that could foreseeably result from such acts or omissions.

13. At the time you acquired the parcels of the Facility, did you know or have reason to know that any material was disposed of on, in, or at the Facility? Describe all investigations of the Facility you undertook prior to acquiring/leasing the Facility and all of the facts on which you base the answer to the preceding question.

14. Have you ever generated, purchased, stored, treated, disposed, removed or otherwise handled any hazardous materials at the Facility? If the answer to the preceding question is anything but an unqualified "no" identify:

a. In general terms, the nature and quantity of the non-hazardous materials so transported, used, purchased, generated, stored, treated, disposed, removed or otherwise handled.

b. The chemical composition, characteristics, physical state (e.g., solid, liquid) and quantity of each hazardous material so removed, transported, used, purchased, generated, stored, treated, disposed, or otherwise handled.

c. The persons who supplied you with or transported to you each such hazardous material.

d. How each such hazardous material was used, purchased, generated, stored, treated, transported, disposed, removed or otherwise handled by you.

- c. The purpose of the investigations.
  - d. The dates when such investigations will take place and be completed.
  - e. Where at the Facility such investigations will take place.
19. Identify all liability insurance policies held by Respondent. In identifying such policies, state:
- a. The name and address of each insurer and of the insured;
  - b. The amount of coverage under each policy;
  - c. The commencement and expiration dates for each policy;
  - d. Whether or not the policy contains a "pollution exclusion" clause; and
  - e. Whether or not the policy covers sudden, nonsudden or both types of accidents.

In lieu of providing this information, you may submit complete copies of all insurance policies that may cover the release or threatened release of hazardous materials.

20. Provide all financial statements for the past five fiscal years, including, but not limited to, those filed with the federal and State Internal Revenue Service and Securities and Exchange Commission.
21. Identify all of Respondent's current assets and liabilities and the person(s) who currently own or are responsible for such assets and liabilities.
22. Identify all subsidiaries and parent corporations of Respondent.
23. Provide a copy of the most current Articles of Incorporation and By-Laws of Respondent.
24. Identify the managers and majority shareholders of Respondent and the nature of their management duties or amount of shares held respectively.



UNITED STATES

POSTAGE

Certified Mail - Return Receipt Requested

May 16, 1988

Charles Sheehan  
Riley Leather Co.  
228 Salem Street  
Woburn, MA 01801

*Riley Leather*

Dear Sheehan:

This letter is requesting information regarding the Tannery operated by the Riley Leather Co. As you know, the EPA is currently preparing documentation to support a final remedy on the Wells G & H Superfund Site. There is some information we need regarding the use of water for processing by Riley Tannery. I would appreciate your responding to this informal request for information as soon as possible, rather than requiring a formal demand for information.

Please answer, and submit with supportive documentation, the following questions:

1. Where, during the tannery operations, is water that is extracted from the well on the Wildwood Conservation Corp. property used. Please describe the locations, what it is used for, and how it is used.
2. Submit all air monitoring reports you have of the air quality inside the facility.
3. The flow rate and quantity of the water used at the facility. Please quantify only that water that is taken from the Aberjona River aquifer and that is exposed to the indoor environment, i.e., used for washing, not run through pipes.
4. The size of the building in which the water use occurs. Please submit a diagram showing height, length and width of the buildings.

If you have any problems answering these questions within ten days, please call me at 573-5736. Thank you for your prompt attention to this mater.

Sincerely,

*Barbara Newman*

Barbara Newman  
Project Manager

**RILEY LEATHER CO., INC.**  
**LEATHER MANUFACTURERS**

228 SALEM STREET  
P.O. BOX 316  
WOBURN, MA 01801

Wells  
TEL. (617) 933-5900

11.9  
Riley Leather

May 25, 1988

Barbara Newman  
United States Environmental Protection Agency  
Region 1  
J. F. Kennedy Federal Building  
Boston, MA. 02203-2211

Dear Barbara:

The following is a response to your May 16, 1988 inquiry. As we discussed I have not answered question no. 4 at this time as monitoring reports are available in response to question no. 2.

Question 1. Where, during the tannery operations, is water that is extracted from the well on the Wildwood Conservation Corp. property used. Please describe the locations, what it is used for, and how it is used.

Answer: Water from the well on the Wildwood Conservation Corp. property is used in the wet end processing at the tannery. Specifically the well is the source of water for the Hide House, Tan Room, Color Room, Chrome Room and Chrome Recovery. It is the source of hot water for the Beam House and Rendering Room. It is also used to water the lawn.

The tannery uses water as the medium in which the chemical treatment of the hides and leather is accomplished. It is used for washing the hides and leather and for washing the floors. The vessels holding the water and hides or leather are of two types: wooden drums up to 10' x 10' in size which rotate to provide mechanical agitation and wooden paddle vats (similar in shape to half a drum) having a reel or paddle suspended in them to provide agitation (much as a river boat is propelled by the movement of a paddle reel).

May 25, 1988

Page 2

Barbara Newman  
U.S. Environmental Protection Agency

Question 2. Submit all air monitoring reports you have of the air quality inside the facility.

Answer: We have only monitored the air in the wet processing area for the volatile organics found in the well on the Wildwood Conservation Corp. property. Air monitoring in other parts of the plant did not involve these compounds. Therefore, only the results of the air monitoring in the wet processing area is attached. The monitor used to collect the air sample for this analysis was purposely fixed to a paddle vat which received all of its water from the Wildwood well and was fixed to the paddle vat during a period of time when water was running into the paddle vat with the paddle reel running to agitate the water. We tried to maximize the exposure to get a worst case result. Since the analysis indicated a non-detectable level of the compounds of interest we performed no further tests. The attached notes on the exposure limits indicate that the detection levels of these chemicals are at least 150 times less than the allowable time weighted average exposure levels recommended by The American Conference of Governmental Industrial Hygienists.

Question 3. The flow rate and quantity of the water used at the facility. Please quantify only that water that is taken from the Aberjona River aquifer and that is exposed to the indoor environment, i.e., used for washing, not run through pipes.

Answer: As indicated in the answer to question No. 1, water is used for purposes other than washing in the making of the leather. None of the water is just "run through pipes" as for example in a cooling system. I am assuming that you're interested in the amount of water used from the well on the Wildwood Conservation Corp. property. We estimate

May 25, 1988

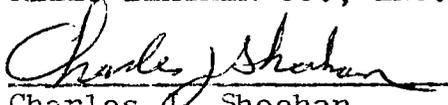
Page 3

Barbara Newman  
U.S. Environmental Protection Agency

that our consumption varies between  
250,000 and 350,000 gals/day. The  
flow varies throughout the day but  
most of the water is used between 2:00  
AM and 6:00 PM.

I hope that these answers will be helpful to you.

Very truly yours,  
RILEY LEATHER CO., INC.

  
Charles D. Sheehan

FROM: RICHARD N. JONES

✓ CC: CJS

RILEY LEATHER CO., INC.

228 SALEM STREET

WOBURN, MA 01801

Check Monitor Enclosed:

X 3510    3550    3600  
3600A    3750

To: Occupational Health &  
Safety Products Division/3M  
230-B 3M Center  
P.O. Box 33125  
St. Paul, MN 55133

Test location: Monitor placed over Paddle #22  
Exposed during the wash after hairburn drain  
and during time paddle was pulled: Total 3 hrs. 15 mins.

Organic Vapor Monitor No. 3510  
Analysis Service Request  
(Pre-paid for 3 compounds)

Monitor Number  
AD 5996

Customer Name (Print) RICHARD N. JONES	Date 1/16/86
Company RILEY LEATHER CO., INC.	
Address 228 SALEM STREET	
City-State-Zip WOBURN, MA 01801	Telephone 617-933-5900

Important — Please record all sampling information on outside of each exposed monitor package and return in mailer with this form.

Please circle up to three (3) compounds from the list below.

OVM Analysis Service

- |                      |  |   |
|----------------------|--|---|
| Acetone              | Diacetone Alcohol                                  | Methyl Butyl Ketone (MBK)                           |
| Acetonitrile         | o-Dichlorobenzene                                  | Methyl Cellosolve                                   |
| Acrylonitrile        | p-Dichlorobenzene                                  | Methyl Cellosolve Acetate                           |
| Allyl Alcohol        | Dichloromethane                                    | Methyl Chloroform                                   |
| Allyl Chloride       | (Methylene Chloride)                               | (1, 1, 1-Trichloroethane)                           |
| Amyl Acetate         | Diisobutyl Ketone (DIBK)                           | Methyl Ethyl Ketone (MEK)                           |
| iso-Amyl Acetate     | Dimethyl Formamide                                 | Methyl Isobutyl Ketone                              |
| n-Amyl Alcohol       | (DMF)  | (MIBK)  |
| sec-Amyl Alcohol     | Dioxane  | Methyl Methacrylate                                 |
| Benzene              | Enflurane (2-Chloro-1, 1,2-Trifluoroethyl)         | Methyl Propyl Ketone                                |
| Benzyl Chloride      | Diffuoroethyl Ether)                               | Naphthalene   |
| Bromoform            | Eipchlorohydrin                                    | n-Octane  |
| Butadiene            | Ethanol (Ethyl Alcohol)                            | Perchloroethylene                                   |
| Butyl Acetate        | Ethyl Acetate                                      | (Tetrachloroethylene)                               |
| iso-Butyl Acetate    | Ethyl Acrylate                                     | Phenyl Ether  |
| sec-Butyl Acetate    | Ethyl Alcohol                                      | Propyl Acetate                                      |
| tert-Butyl Acetate   | Ethyl Benzene                                      | Propylene Oxide (usa No. 3550 Monitor)              |
| Butyl Alcohol        | Ethyl Bromide                                      | Isopropyl Acetate                                   |
| iso-Butyl Alcohol    | Ethylene Chlorohydrin                              | Propyl Alcohol                                      |
| sec-Butyl Alcohol    | Ethylene Dibromide                                 | Isopropyl Alcohol                                   |
| tert-Butyl Alcohol   | (1,2-Dibromoethane)                                | Isopropyl Ether                                     |
| Butyl Cellosolve     | Ethylene Dichloride                                | Propylene Dichloride                                |
| p-tert-Butyl Toluene | (1,2-Dichloroethane)                               | Stoddard Solvent                                    |
| Camphor              | Ethyl Ether  | Styrene   |
| Carbon Tetrachloride | Furfural   | 1, 1,2,2-Tetrachloroethane                          |
| Cellosolve           | Halothane (2-Bromo-2-Chloro-1,1,1-Trifluoroethane) | Tetrahydrofuran (THF)                               |
| Cellosolve Acetate   | Heptane  | Toluene   |
| Chlorobenzene        | Hexane   | 1,1,2-Trichloroethane                               |
| Chlorobromomethane   | Isophorone   | (1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)) |
| Chloroform           | Mesityl Oxide                                      | Vinyl Chloride                                      |
| Gumene               | Mesitylene   | Xylene  |
| Cyclohexane          | Methyl Acetate                                     |   |
| Cyclohexanol         | Methyl Acrylate                                    |   |
| Cyclohexanone        |  |   |
| Cyclohexene          |  |   |

\*Because of their high vapor pressure (low boiling points) the starred compounds are best sampled initially at reduced sampling times. Refer to the 3500 Sampling Guide (R-355B) for details.

Form 23118-PWO

3M "Action" 200 Paper

Analytical Services  
Occupational Health and  
Safety Products Division/3M  
St. Paul, Minnesota 55144



3510

Organic  
Vapor Monitor

(Includes 3M analysis up to 3  
compounds)

Do not open inner pouch until ready  
to use. See instructions for  
recommended exposure time.

Monitor No. AD 5996

Date Exposed 1/16/86

Employee I.D. PADDLE #22

Vapor(s) 1) METHYL CHLOROFORM

to be Analyzed: 2) PERCHLOROETHYLENE

3) TRICHLOROETHYLENE

Temperature 68°F R.H. 50%

Sampled by R.N.J.

(See Instructions) 34-7014-2757-L

Made in the U.S.A. Additional Patents applied for

EXPOSURE TIME 3 HRS. 15 MINS

Analytical Service  
Occupational Health and Safety  
Products Division/3M

552-1E 3M Center  
St. Paul, Minnesota 55144  
Telephone: 800/243-4630



AMENDED REPORT

**3M Diffusional Monitor  
Analysis Report**

Form 23121-C-PWO

RILEY LEATHER CO., INC.  
228 SALEM STREET  
WOBURN MA 01801

ATTN: RICHARD N. JONES

Report Number	10-020-860 1 OF 1
No. of Monitors	1
Analysis Performed	01/23/86
Prepared By	A.L. WELLS

User Identification	Monitor Code	Sampling Date	Sampling Time	Weight	Concentration	
		Compounds(s)		Micrograms	$\frac{mg}{m^3}$	PPM
PADDLE #22	AD-5996	01/16/86	195 MIN.			
			TRICHLOROETHYLENE	<10.000	< 1.651	< 0.308 *1
			PERCHLOROETHYLENE	<10.000	< 1.724	< 0.254 *1
			METHYL CHLOROFORM	<10.000	< 1.613	< 0.296 *1

Comments  
\*1 10 MICROGRAMS IS MINIMUM DETECTABLE LIMIT

# ACGIH Threshold Limit Values (for 1987-88)

---

	<u>TWA</u>	<u>STEL</u>
Trichloroethylene	50 ppm	200 ppm
Perchloroethylene	50 "	200 "
Methyl Chloroform (1-1-1 Trichloroethane)	350 "	450 "

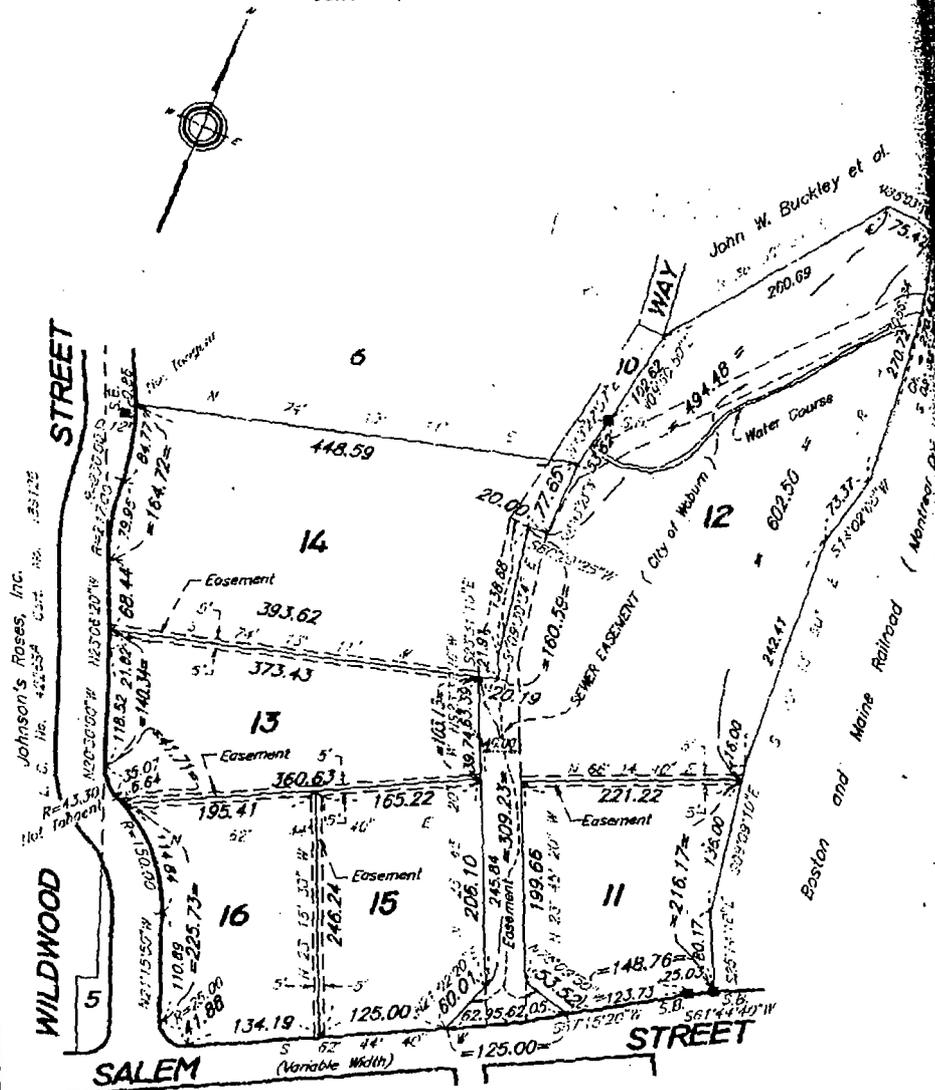
TWA = Time Weighted Average

STEL = Short Term Exposure Limit



SUBDIVISION PLAN OF LAND IN WOBURN  
 Eastern Land Survey Associates, Inc., Surveyors  
 June 14, 1994

22628-D



Subdivision of Lots 2 and 3, Lot 4 and Lot 9  
 Shown on Plan 22628-A sh. 1 and 2, 22628-B sh. 2 and 22628-C  
 Filed with Cert. of Title No. 73122, 173576 and 179683  
 South Registry District of Middlesex County

Separate certificates of title may be issued for land  
 shown hereon as Lots 11 through 16  
 By the Court.

*James M. Maloney*  
 Deputy Recorder

JULY 28, 1994

KEC-0020

MASSACHUSETTS South Registry District  
 FEB 11 1995

REC'D IN THE OFFICE OF THE  
 DEPUTY CLERK  
 PL. #20

Abutters are shown as  
 on an original decree plan.

Copy of part of plan  
 filed by  
 LAND REGISTRATION OFFICE  
 JULY 28, 1994  
 Scale of this plan 120 feet to an inch  
 Louis A. Moore, Engineer for Court

Figure 2

US EPA ARCHIVE DOCUMENT

PTU 31-0-1

PO 31-2-1

TAX MAP 37 OF WOBURN MASSACHUSETTS



- City Boundary
- Property Lines
- Zoning Lines
- Easement
- Right of Way
- Paper Street
- Water
- Buildings
- 12 Parcel Numbers
- Ⓢ Block Numbers
- 5,500 SF Acreage
- 100.00' Dimensions
- R-1 Zone



THIS MAP IS PREPARED FOR THE INVENTORY OF REAL ESTATE PROPERTY WITHIN THE CITY OF WOBURN AND IS COMPILED FROM THE RECORDS OF THE PLANNING DEPARTMENT. PUBLIC RECORDS AND OTHER INFORMATION AVAILABLE TO THE CITY OF WOBURN ARE USED IN THE COMPILING OF THIS MAP. THE CITY OF WOBURN DOES NOT WARRANT THE ACCURACY OF THE INFORMATION CONTAINED HEREON. THE CITY OF WOBURN ACCEPTS NO LIABILITY FOR THE INFORMATION CONTAINED HEREON.

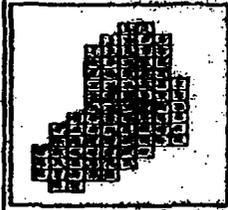
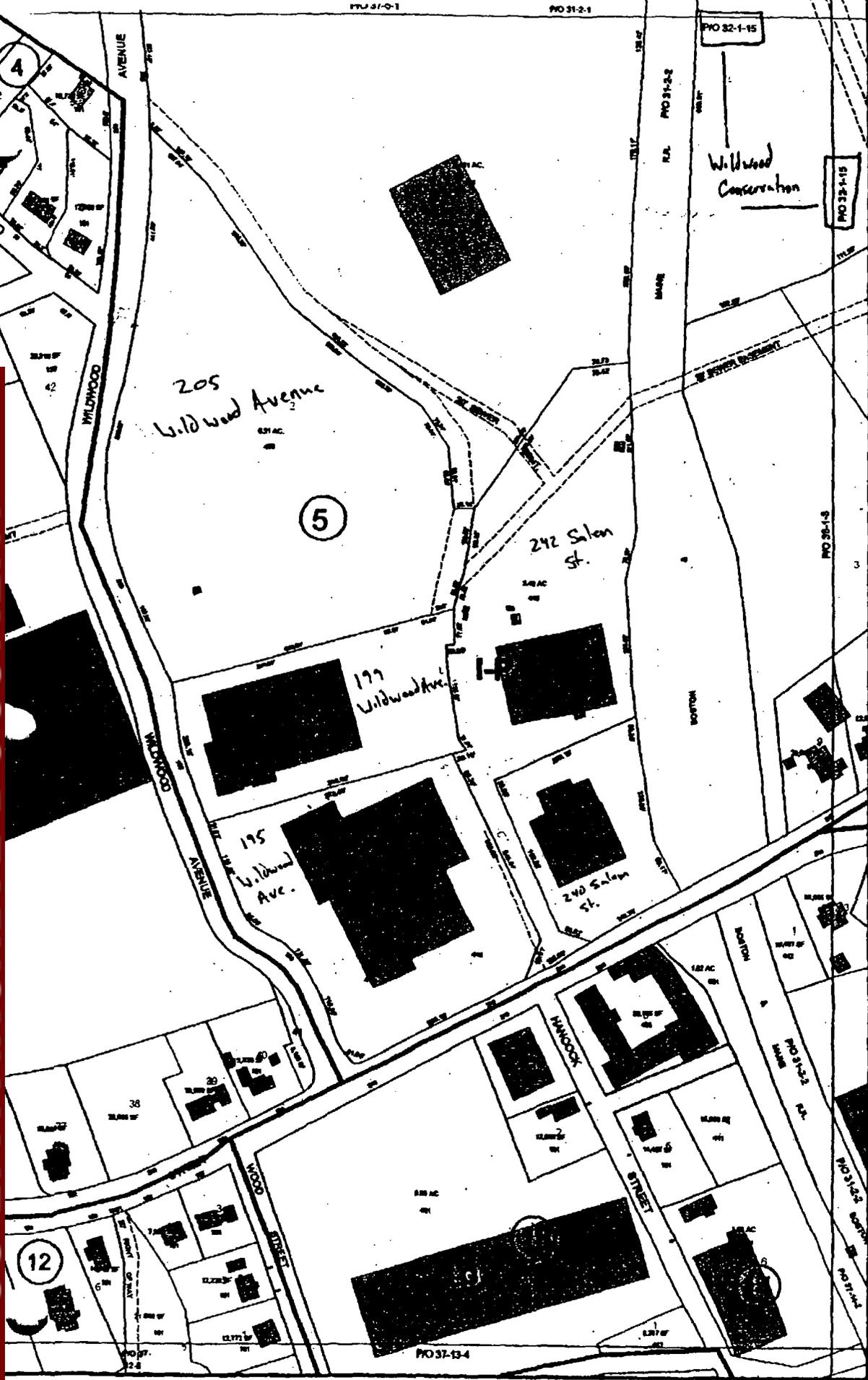


Figure 3

Scale 1 inch = 200 feet

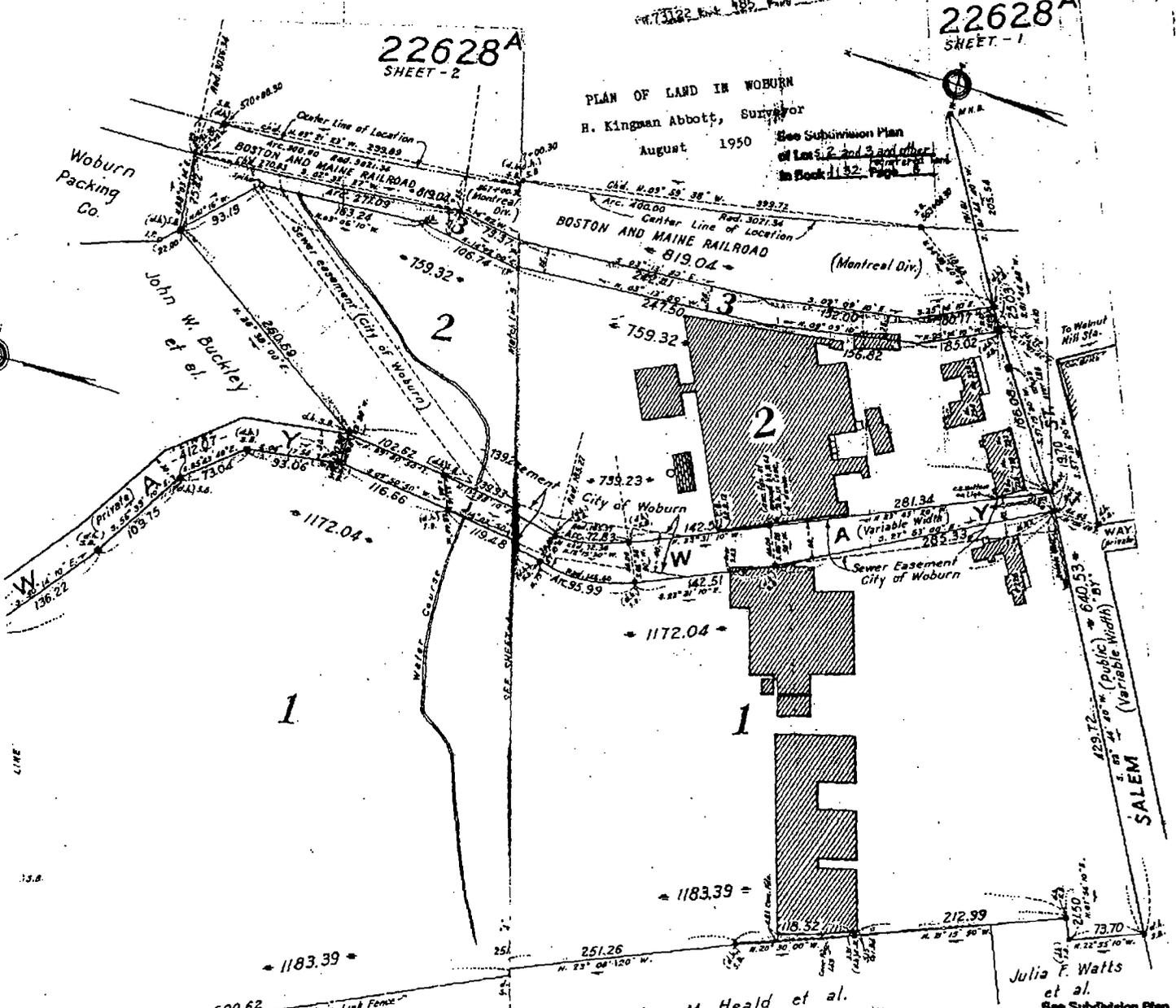
Revision Date: March 1, 2008

City of Woburn Engineering Department



PLAN OF LAND IN WOBURN  
H. Kingman Abbott, Surveyor  
August 1950

See Subdivision Plan  
of Lots 2 and 3 and other  
in Book 182 Page 8



Walter M. Heald et al.

Scale of this plan 80 feet to an inch.

Walter M. Heald et al.

Copy of part of plan  
filed in  
LAND REGISTRATION OFFICE  
OCT. 20 1950  
Scale of this plan 80 feet to an inch.  
W. T. Fairclough, Engineer for Court.

RECORDED FOR REGISTRATION  
JUN 20 1951  
TO RECORD

Julia F. Watts  
et al.  
See Subdivision Plan  
of Lot  
In Book 998 Page 26

Figure 4

RESPONSE TO REQUEST  
15(f)

Buffing Dust Area  
(after 1965)

Storage, Sorting,  
Grading, Trimming

Loading  
Dock

Pasting/Drying  
Area

Added  
1951

Buffing  
Room

Pasting and Drying  
Building  
(One Story Building)

Woburn City Sewer

3 Oil Storage  
Tanks

Added  
1950  
Boiler  
Room

Sodium  
Bichromate  
Tank

Catch  
Basin

Added  
1976

Storage of Lime,  
Sulphhydrate, Beam House Chemicals

Sulphuric  
Acid Tank

Moved  
1954

Added  
1954

Storage  
of  
Beam House Chemicals

Added  
1957

Added  
1953

Coloring  
(Storage of dyes,  
flour, extracts)

Beam Room

Buffing Dust  
Area (pre-1965)

Rock Salt  
Storage

Chrome  
Brine Storage.

Beam House  
(3 Story Building)

Tanning  
Room

Second Floor  
Finishing/Spraying and  
Shipping

Third Floor  
Dry (non-chemical)  
Storage

Sulphuric Acid  
Storage Tank

Added  
1958

Salem Street

Note: Map is not drawn to scale

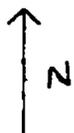


Figure 5

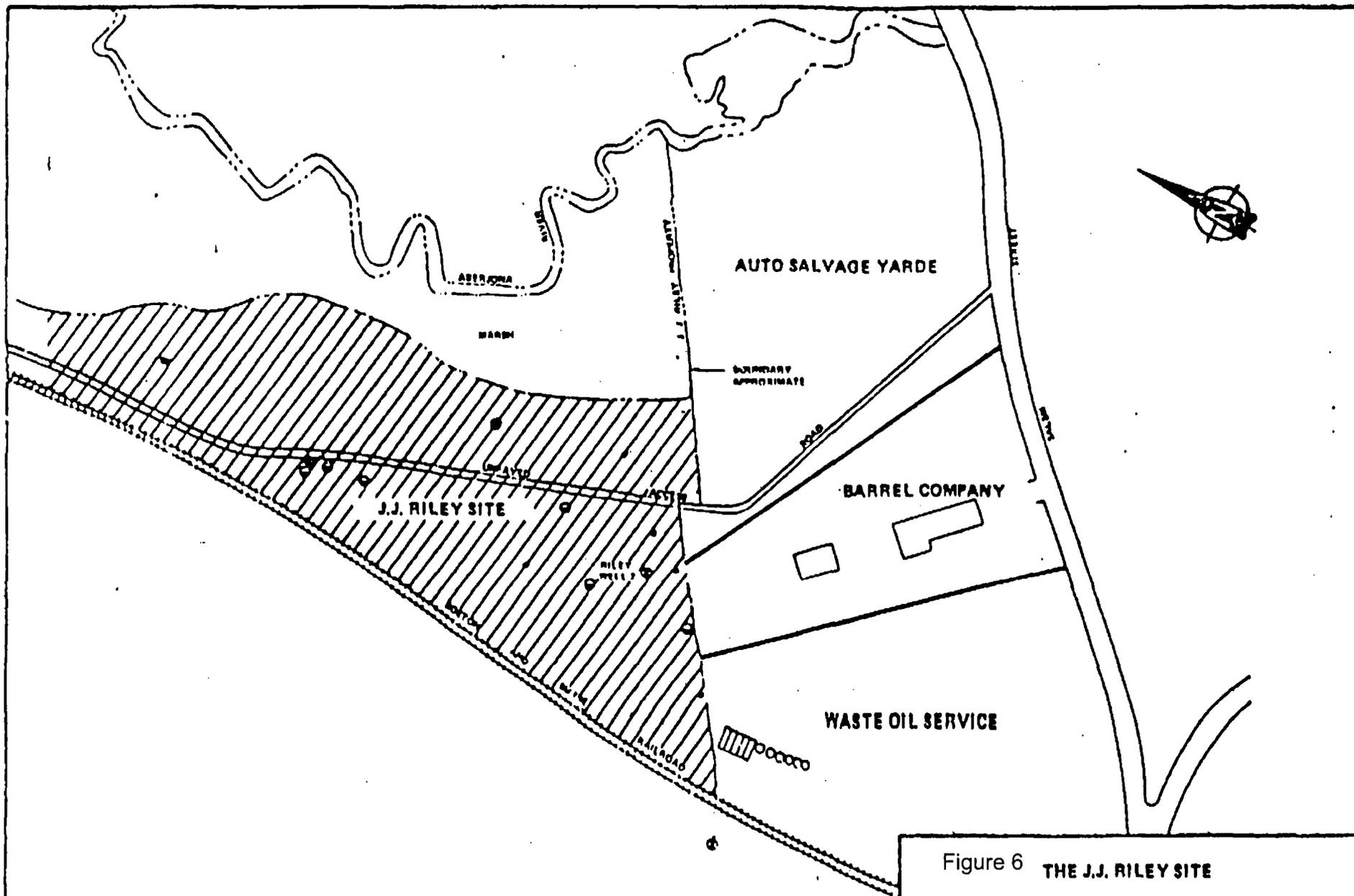
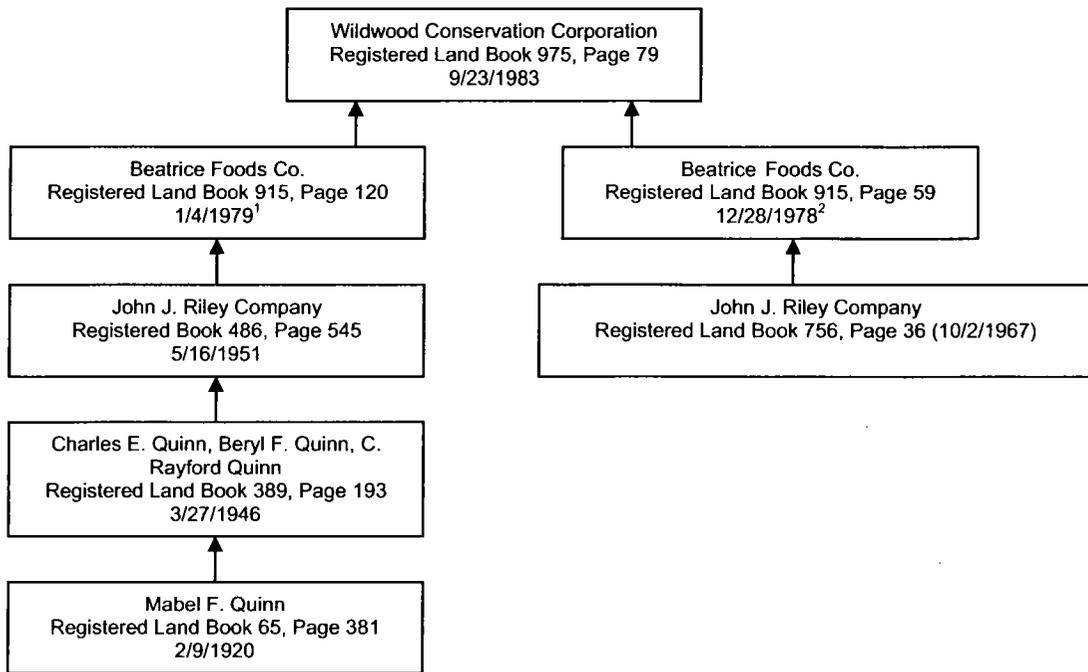


Figure 6 THE J.J. RILEY SITE

**WOODWARD-CLYDE CONSULTANTS**  
 CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS  
 WAYNE, NEW JERSEY

DR. BY: DNS	SCALE: 1 IN. = 200 FT	PROJ. NO: 87C2487
CHK'D BY: All	DATE: 12 JAN 1984	FIG. NO: 1

**Wildwood Conservation; Salem Street  
Title Tree Graphic  
Property Owned by Wildwood Conservation  
Corporation**



**Notes:**

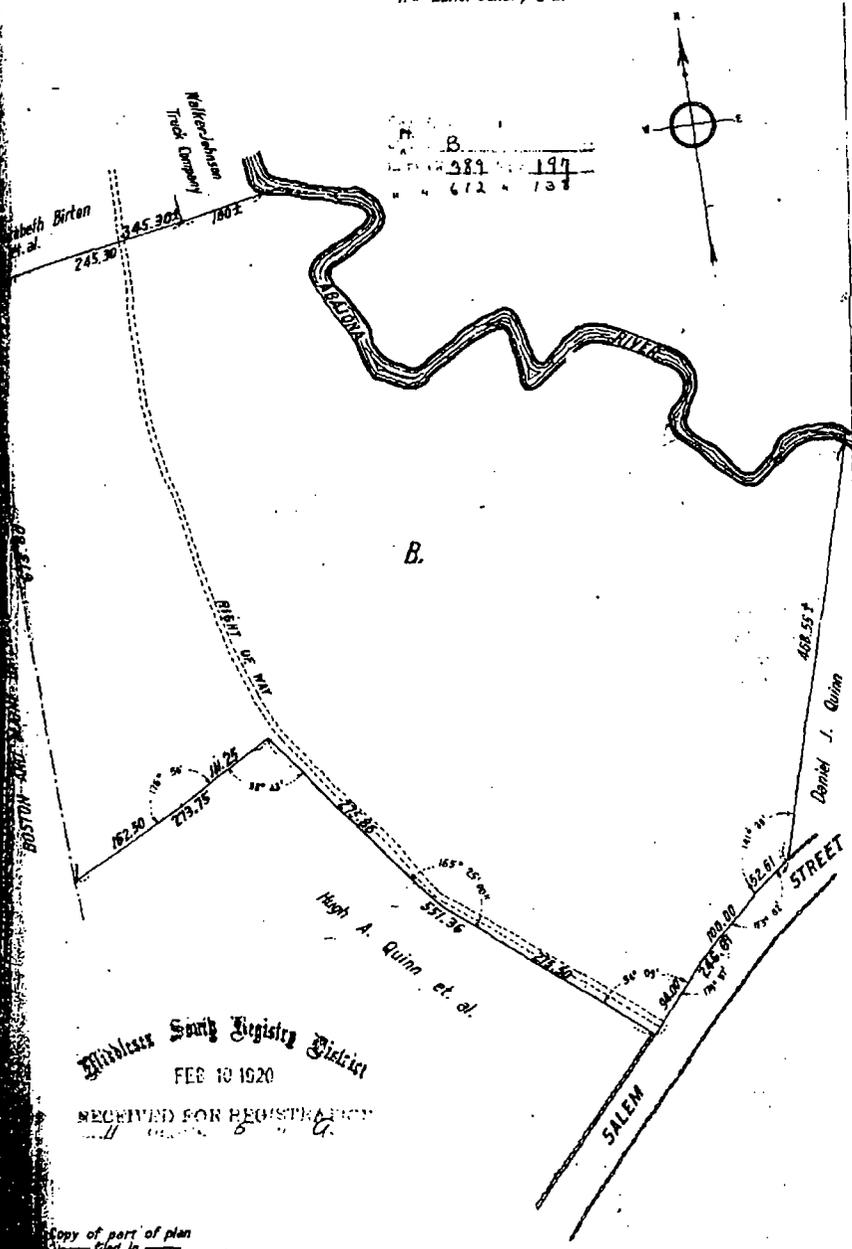
1. The property referenced in the conveyance from the John J. Riley Company to Beatrice Foods Co., dated January 4, 1979 represents the southern section of the Wildwood Conservation Property. This property is subject to a right of way in favor of land owned by Birton et al. This property is also subject to a taking by the Middlesex County Commissioners for the relocation of Salem Street and a taking by the City of Woburn for the construction of a sewer.
2. The property referenced in the conveyance from the John J. Riley Company to Beatrice Foods Co., dated December 28, 1978 represents the northern section of the Wildwood Conservation Property located between the Boston & Maine Railroad tracks and the Aberjona River and is subject to a MDC sewer easement. The deed for this property also includes the conveyance of the former tannery property and several other properties located on Sunset Avenue and Hinston Road in Woburn, MA. The properties located on Sunset Avenue and Hinston Road do not appear to be related to the tannery operation or the property currently known as the Wildwood Conservation Property.

Figure 7

C136846 Book 65 Page 207

3507A<sup>2</sup>

Plan of Land in Woburn  
Scale 60 feet to an inch.  
APR. 12, 1910.  
Wm. Butler Jones, C.E.



Middlesex South Registry District  
FEB 10 1920  
RECEIVED FOR REGISTRATION

Copy of part of plan  
filed in  
REGISTRATION OFFICE  
AUG. 30, 1911  
The plan 120 feet to an inch  
Humphrey, Surveyor for Court v

Figure 8

Form LCR-24, 24-11-6-67128

City 25184 Book 754 Page 26

3218

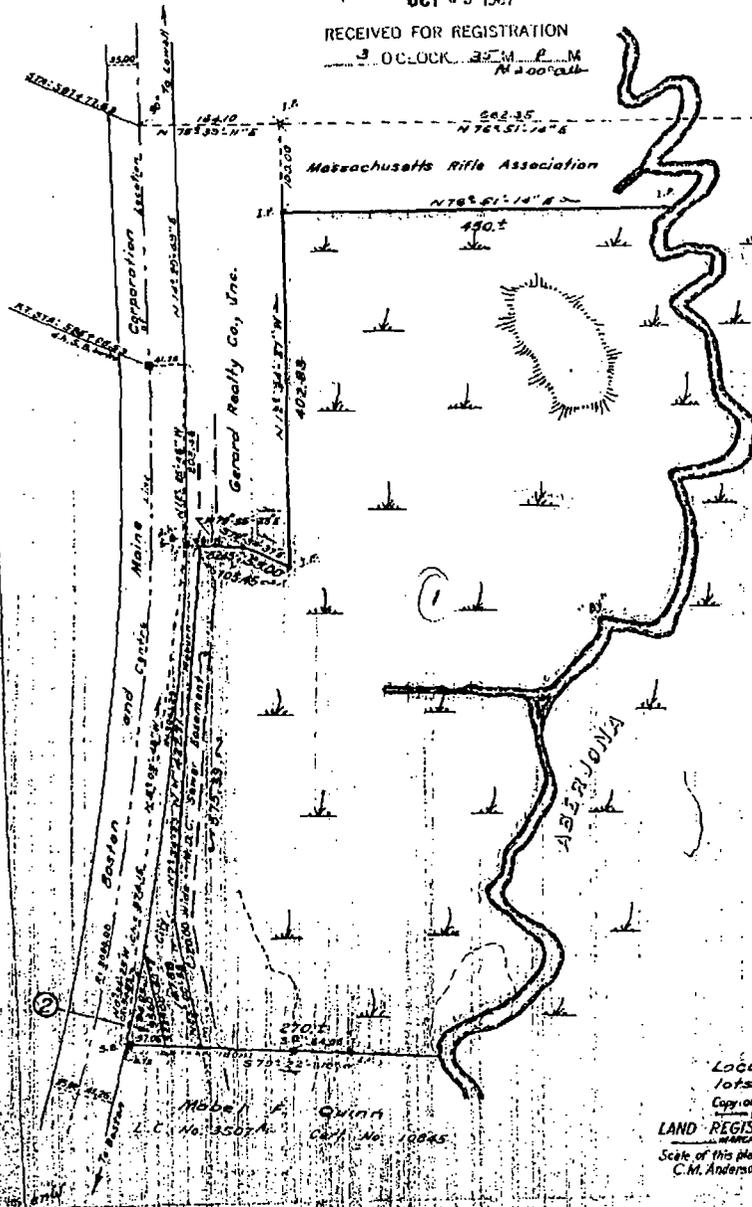
PLAN OF LAND IN WOBURN  
H. Kingman Abbott, Surveyor

January 8, 1962  
November 1966

Middlesex South Registry District  
OCT - 9 1967

RECEIVED FOR REGISTRATION  
3 O'CLOCK 32 M P M  
H 4000 alt

MEMORANDA OF ENCUMBRANCES ON THE LAND DESCRIBED IN THIS CERTIFICATE.



LOCUS 661  
lots 1-2  
Copy of plan of  
LAND REGISTRATION  
Scale of this plan 100 ft.  
C.M. Anderson, Engineer

Figure 9

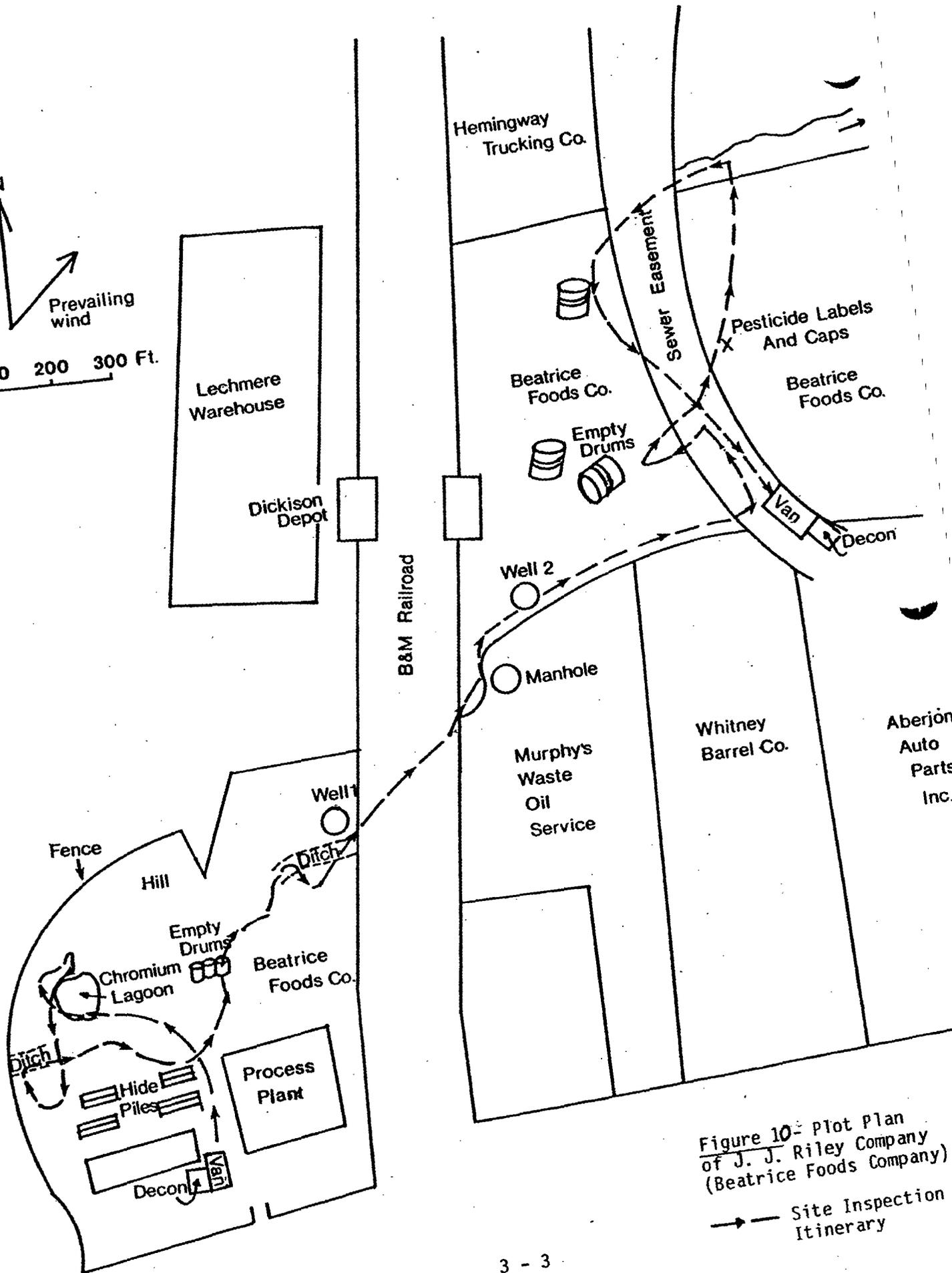
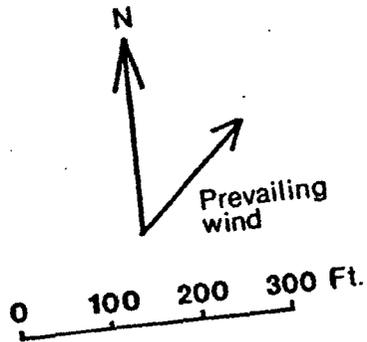


Figure 10 - Plot Plan of J. J. Riley Company (Beatrice Foods Company)

→ Site Inspection Itinerary

**NUS CORPORATION  
SUPERFUND DIVISION**

**DOCUMENT TRANSMITTAL**

TO:  Linda Ugifusa	DATE:  March 18, 1986
	REFERENCE NUMBER

SENDER:  
  
Joanne Morin

THE FOLLOWING DOCUMENT(S) IS TRANSMITTED TO YOU FOR  USE  RECORDS  INFORMATION

TITLE/ I D. NO.	REV. NO	NO OF COPIES	CONTROLLED NUMBERS	UNCONTROLLED NUMBERS
Site Inspection Report Of J.J. Riley Company		1		

NOTE:

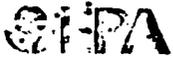
- ABOVE DOCUMENT(S) IS TO BE USED FOR WORK PLAN.
  - ABOVE DOCUMENT(S) IS RESTRICTED TO USE ONLY FOR WORK PLAN.
  - DESTROY PREVIOUS REVISION OF THE ABOVE DOCUMENT(S).
  - RETURN PREVIOUS REVISION OF THE ABOVE DOCUMENT(S) TO SENDER.
  - RETAIN PREVIOUS REVISION OF THE ABOVE DOCUMENT(S) FOR YOUR RECORDS.
  - THIS DOCUMENT IS PROPRIETARY INFORMATION.
  - THIS DOCUMENT IS CONFIDENTIAL.
- OTHER  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PLEASE ACKNOWLEDGE RECEIPT OF THE ABOVE DOCUMENT(S) BY SIGNING THIS TRANSMITTAL FORWARD PROMPTLY RETURNING IT TO THE ADDRESS NOTED BELOW. IF PREVIOUS REVISION OF THE DOCUMENT(S) IS TO BE DESTROYED, THE FOLLOWING SIGNATURE ALSO CERTIFIES THE DESTRUCTION OF THE DOCUMENT(S).

SIGNATURE:	DATE:
------------	-------

SIGNED COPY OF THIS TRANSMITTAL SHOULD BE RETURNED TO:  
**NUS Corporation**  
 19 Crosby Drive  
 Bedford, MA 01730

THE ABOVE PROPRIETARY DOCUMENT(S) REMAINS THE PROPERTY OF NUS AND MAY BE RECALLED AT ANY TIME.



POTENTIAL HAZARDOUS WASTE SITE  
SITE INSPECTION REPORT

REGION I SITE NUMBER (to be assigned by HQ)  
MA 10152

GENERAL INSTRUCTIONS: Complete Sections I and III through XV of this form as completely as possible. Then use the information on this form to develop a Tentative Disposition (Section II). File this form in its entirety in the regional Hazardous Waste Log File. Be sure to include all appropriate Supplemental Reports in the file. Submit a copy of the forms to: U.S. Environmental Protection Agency; Site Tracking System; Hazardous Waste Enforcement Task Force (EN-335); 401 M St., SW; Washington, DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME John J. Riley Tannery		B. STREET (or other identifier) 228 Salem Street	
C. CITY Woburn	D. STATE MA	E. ZIP CODE 01801	F. COUNTY NAME Middlesex
G. SITE OPERATOR INFORMATION		2. TELEPHONE NUMBER	
1. NAME John J. Riley		933-5900	
3. STREET 228 Salem Street	4. CITY Woburn	5. STATE MA	6. ZIP CODE 01801
H. REALTY OWNER INFORMATION (if different from operator of site)		2. TELEPHONE NUMBER	
1. NAME Beatrice Foods Company			
3. CITY Chicago	4. STATE IL	5. ZIP CODE	
I. SITE DESCRIPTION cowhide/chrome tannery, two large process buildings, one small office, large unused wetlands area with two wells			
J. TYPE OF OWNERSHIP			
<input type="checkbox"/> 1. FEDERAL <input type="checkbox"/> 2. STATE <input type="checkbox"/> 3. COUNTY <input type="checkbox"/> 4. MUNICIPAL <input checked="" type="checkbox"/> 5. PRIVATE			

II. TENTATIVE DISPOSITION (complete this section last)

A. ESTIMATE DATE OF TENTATIVE DISPOSITION (mo., day, & yr.)	B. APPARENT SERIOUSNESS OF PROBLEM		
	<input type="checkbox"/> 1. HIGH <input type="checkbox"/> 2. MEDIUM <input checked="" type="checkbox"/> 3. LOW <input type="checkbox"/> 4. NONE		
C. PREPARER INFORMATION			
1. NAME Lori Fucarile	2. TELEPHONE NUMBER 935-4009	3. DATE (mo., day, & yr.) 11/26/80	

III. INSPECTION INFORMATION

A. PRINCIPAL INSPECTOR INFORMATION			
1. NAME David K. Cook		2. TITLE Senior Geological Engineer	
3. ORGANIZATION Ecology and Environment, Inc.		4. TELEPHONE NO. (area code & no.) 935-4009	

B. INSPECTION PARTICIPANTS		
1. NAME	2. ORGANIZATION	3. TELEPHONE NO.
David Cook	Ecology and Environment, Inc.	935-4009
Robert Young	Ecology and Environment, Inc.	935-4009
Lori Fucarile	Ecology and Environment, Inc.	935-4009
Margret Hanley	Ecology and Environment, Inc.	935-4009
Paul Clay & Paul Exner	Ecology and Environment, Inc.	935-4009
Charles Bering	EPA Enforcement	223-1129

C. SITE REPRESENTATIVES INTERVIEWED (corporate officials, workers, residents)		
1. NAME	2. TITLE & TELEPHONE NO.	3. ADDRESS
John J. Riley	Past Owner, 935-5900	228 Salem Street, Woburn, MA
Joseph Radzius	312-641-2121 Beatrice Foods Atty.	Burditt and Calkins, 135 S. LaSalle St. Chicago, IL 60603
recycled paper		ecology and environment, inc.

III. INSPECTION INFORMATION (continued)

GENERATOR INFORMATION (Source of waste)

1. NAME	2. TELEPHONE NO.	3. ADDRESS	4. WASTE TYPE GENERATED
UNKNOWN			Possible Pesticides

TRANSPORTER/HAULER INFORMATION

1. NAME	2. TELEPHONE NO.	3. ADDRESS	4. WASTE TYPE TRANSPORTED
N/A			

IF WASTE IS PROCESSED ON SITE AND ALSO SHIPPED TO OTHER SITES, IDENTIFY OFF-SITE FACILITIES USED FOR DISPOSAL.

1. NAME	2. TELEPHONE NO.	3. ADDRESS
N/A		

5. DATE OF INSPECTION (mo., day, & yr.) 11/14/80	H. TIME OF INSPECTION 8:30 am	I. ACCESS GAINED BY: (credentials must be shown in all cases) <input checked="" type="checkbox"/> 1. PERMISSION <input type="checkbox"/> 2. WARRANT
--	----------------------------------	--

J. WEATHER (describe)

cloudy

IV. SAMPLING INFORMATION

A. Mark 'X' for the types of samples taken and indicate where they have been sent e.g., regional lab, other EPA lab, contractor, etc. and estimate when the results will be available.

1. SAMPLE TYPE	2. SAMPLE TAKEN (mark 'X')	3. SAMPLE SENT TO:	4. DATE RESULTS AVAILABLE
a. GROUNDWATER	X	EPA Lexington Laboratory, MA	End of December
b. SURFACE WATER	X	EPA Lexington Laboratory, MA	?
c. WASTE			
d. AIR			
e. RUNOFF			
f. SPILL			
g. SOIL	X	EPA Lexington Laboratory, MA	?
h. VEGETATION			
i. OTHER (specify)			

B. FIELD MEASUREMENTS TAKEN (e.g., radioactivity, explosivity, PH, etc.)

1. TYPE	2. LOCATION OF MEASUREMENTS	3. RESULTS
OVA	constant monitoring at all potential sample points	0 ppm or methane reading
Explosimeter	constant monitoring	no reading
O <sub>2</sub> Meter recycled paper	constant monitoring	20% O <sub>2</sub> reading Zecology and environment, inc.

IV. SAMPLING INFORMATION (continued)

C. PHOTOS  
 1. TYPE OF PHOTOS  
 a. GROUND     b. AERIAL  
 2. PHOTOS IN CUSTODY OF:  
 Ecology and Environment, Inc.  
 D. SITE MAPPED?  
 YES. SPECIFY LOCATION OF MAPS:  
 Ecology and Environment, Inc.  
 E. COORDINATES  
 1. LATITUDE (deg.-min.-sec.)  
 2. LONGITUDE (deg.-min.-sec.)

V. SITE INFORMATION

A. SITE STATUS  
 1. ACTIVE (Those industrial or municipal sites which are being used for waste treatment, storage, or disposal on a continuing basis, even if infrequently.)  
 2. INACTIVE (Those sites which no longer receive wastes.)  
 3. OTHER (specify):  
 (Those sites that include such incidents like "midnight dumping" where no regular or continuing use of the site for waste disposal has occurred.)  
 B. IS GENERATOR ON SITE?  
 1. NO     2. YES (specify generator's four-digit SIC Code): 3111  
 C. AREA OF SITE (in acres)  
 approx. 30  
 D. ARE THERE BUILDINGS ON THE SITE?  
 1. NO     2. YES (specify): 2 process plant buildings, 1 office

VI. CHARACTERIZATION OF SITE ACTIVITY

Indicate the major site activity(ies) and details relating to each activity by marking 'X' in the appropriate boxes.

<input checked="" type="checkbox"/>	A. TRANSPORTER	<input type="checkbox"/>	B. STORER	<input type="checkbox"/>	C. TREATER	<input checked="" type="checkbox"/>	D. DISPOSER
	1. RAIL		1. PILE		1. FILTRATION	<input checked="" type="checkbox"/>	1. LANDFILL
	2. SHIP		2. SURFACE IMPOUNDMENT		2. INCINERATION		2. LANDFARM
	3. BARGE	<input checked="" type="checkbox"/>	3. DRUMS		3. VOLUME REDUCTION	<input checked="" type="checkbox"/>	3. OPEN DUMP
	4. TRUCK		4. TANK, ABOVE GROUND		4. RECYCLING/RECOVERY	<input checked="" type="checkbox"/>	4. SURFACE IMPOUNDMENT
	5. PIPELINE		5. TANK, BELOW GROUND		5. CHEM./PHYS./TREATMENT		5. MIDNIGHT DUMPING
	6. OTHER (specify):		6. OTHER (specify):		6. BIOLOGICAL TREATMENT		6. INCINERATION
					7. WASTE OIL REPROCESSING		7. UNDERGROUND INJECTION
					8. SOLVENT RECOVERY	<input checked="" type="checkbox"/>	8. OTHER (specify):
			New drums of orthodichlorobenzene and hexavalent chromium		9. OTHER (specify):		disposing of tannery wastewater in the MDC sewer

E. SUPPLEMENTAL REPORTS: If the site falls within any of the categories listed below, Supplemental Reports must be completed. Indicate which Supplemental Reports you have filled out and attached to this for.

1. STORAGE     2. INCINERATION     3. LANDFILL     4. SURFACE IMPOUNDMENT     5. DEEP WELL  
 6. CHEM./BIO/PHYS TREATMENT     7. LANDFARM     8. OPEN DUMP     9. TRANSPORTER     10. RECYCLOR/RECLAIMER

VII. WASTE RELATED INFORMATION

A. WASTE TYPE  
 1. LIQUID     2. SOLID     3. SLUDGE     4. GAS  
 B. WASTE CHARACTERISTICS  
 1. CORROSIVE     2. IGNITABLE     3. RADIOACTIVE     4. HIGHLY VOLATILE  
 5. TOXIC     6. REACTIVE     7. INERT     8. FLAMMABLE  
 9. OTHER (specify):

C. WASTE CATEGORIES  
 1. Are records of wastes available? Specify items such as manifests, inventories, etc. below.

no

VII. WASTE RELATED INFORMATION (continued)

2. Estimate the amount (specify unit of measure) of waste by category; mark 'X' to indicate which wastes are present.

a. SLUDGE		b. OIL		c. SOLVENTS		d. CHEMICALS		e. SOLIDS		f. OTHER		
AMOUNT	UNIT OF MEASURE	AMOUNT	UNIT OF MEASURE	AMOUNT	UNIT OF MEASURE	AMOUNT	UNIT OF MEASURE	AMOUNT	UNIT OF MEASURE	AMOUNT	UNIT OF MEASURE	
UNK		UNK		UNK		UNK		UNK		UNK		
X (1) PAINT, PIGMENTS		X (1) OILY WASTES		X (1) HALOGENATED SOLVENTS see below		X (1) ACIDS		X (1) FLYASH		X (1) LABORATORY, PHARMACEUT.		
(2) METALS SLUDGES		X (2) OTHER(specify): animal grease		(2) NON-HALOGNTD. SOLVENTS		(2) PICKLING LIQUORS		(2) ASBESTOS		(2) HOSPITAL		
(3) POTW				(3) OTHER(specify):		(3) CAUSTICS		(3) MILLING/MINE TAILINGS		(3) RADIOACTIVE		
(4) ALUMINUM SLUDGE				orthodichloro- benzene a priority pollutant		(4) PESTICIDES		(4) FERROUS SMELTING WASTES		(4) MUNICIPAL		
X (5) OTHER(specify): tannery wastes						(5) DYES/INKS		(5) NON-FERROUS SMLTG. WASTES		X (5) OTHER(specify): possibility of pesticides		
						(6) CYANIDE		(6) OTHER(specify):				
					(7) PHENOLS							
				(8) HALOGENS								
				(9) PCB								
				(10) METALS chromium								
				(11) OTHER(specify)								

LIST SUBSTANCES OF GREATEST CONCERN WHICH ARE ON THE SITE (place in descending order of hazard)

1. SUBSTANCE	2. FORM (mark 'X')			3. TOXICITY (mark 'X')				4. CAS NUMBER	5. AMOUNT	6. UNIT
	a. SO-LID	b. LIQ.	c. VA-POR	a. HIGH	b. MED.	c. LOW	d. NONE			
orthodichlorobenzene		X		X					UNK	
chrome/tannery wastes		X				X			UNK	
greases/oils		X					X		UNK	
pesticides (possible)	X			X					UNK	

VIII. HAZARD DESCRIPTION

FIELD EVALUATION HAZARD DESCRIPTION: Place an 'X' in the box to indicate that the listed hazard exists. Describe the hazard in the space provided.

A. HUMAN HEALTH HAZARDS

Due to past and present disposal of tannery wastes which have included orthodichlorobenzene and benzidine dyes.

VIII. HAZARD DESCRIPTION (continued)

B. NON-WORKER INJURY/EXPOSURE

C. WORKER INJURY/EXPOSURE

D. CONTAMINATION OF WATER SUPPLY

possibility of pesticide dumping approximately ¼ mi. west Woburn wells G & H

E. CONTAMINATION OF FOOD CHAIN

F. CONTAMINATION OF GROUND WATER

Due to the possibility of pesticide dumping on the "unused" land; past disposing of tannery wastes in the chromium lagoons, and present nonsecure landfilling of tannery waste sludge, contamination of groundwater is a strong possibility. Also, exfiltration from MDC sewer.

G. CONTAMINATION OF SURFACE WATER

VIII. HAZARD DESCRIPTION (continued)

H. DAMAGE TO FLORA/FAUNA

I. FISH KILL

J. CONTAMINATION OF AIR

K. NOTICEABLE ODORS

Tannery Odors

L. CONTAMINATION OF SOIL

Possibility of pesticide dumping on unused land, past disposing of tannery wastes in the two chromium lagoons and present nonsecure landfilling of tannery waste sludge. Also exfiltration from MDC sewer.

M. PROPERTY DAMAGE

VIII. HAZARD DESCRIPTION (continued)

N. FIRE OR EXPLOSION

O. SPILLS/LEAKING CONTAINERS/RUNOFF/STANDING LIQUID

P. SEWER, STORM DRAIN PROBLEMS

Discharge of tannery wastes into the MDC sewer

Q. EROSION PROBLEMS

R. INADEQUATE SECURITY

S. INCOMPATIBLE WASTES

VIII. HAZARD DESCRIPTION (continued)

T. MIDNIGHT DUMPING

On unused property east of B&M railroad tracks

U. OTHER (specify):

IX. POPULATION DIRECTLY AFFECTED BY SITE

A. LOCATION OF POPULATION	B. APPROX. NO. OF PEOPLE AFFECTED	C. APPROX. NO. OF PEOPLE AFFECTED WITHIN UNIT AREA	D. APPROX. NO. OF BUILDINGS AFFECTED	E. DISTANCE TO SITE (specify units)
1. IN RESIDENTIAL AREAS	N/A			
2. IN COMMERCIAL OR INDUSTRIAL AREAS	N/A			
3. IN PUBLICLY TRAVELLED AREAS	N/A			
4. PUBLIC USE AREAS (parks, schools, etc.)	N/A			

X. WATER AND HYDROLOGICAL DATA

A. DEPTH TO GROUNDWATER (specify unit) < 20 feet	B. DIRECTION OF FLOW South	C. GROUNDWATER USE IN VICINITY drinking formally municipal water
D. POTENTIAL YIELD OF AQUIFER > 3 MGD	E. DISTANCE TO DRINKING WATER SUPPLY (specify unit of measure) 1.5 miles	F. DIRECTION TO DRINKING WATER SUPPLY SW
G. TYPE OF DRINKING WATER SUPPLY		
<input type="checkbox"/> 1. NON-COMMUNITY < 15 CONNECTIONS* <input checked="" type="checkbox"/> 2. COMMUNITY (specify town): <u>Woburn</u> > 15 CONNECTIONS		
<input type="checkbox"/> 3. SURFACE WATER <input checked="" type="checkbox"/> 4. WELL & MDC		

**X. WATER AND HYDROLOGICAL DATA (continued)**

H. LIST ALL DRINKING WATER WELLS WITHIN A 1/4 MILE RADIUS OF SITE

1. WELL	2. DEPTH (specify unit)	3. LOCATION (proximity to population/buildings)	4. NON-COMMUNITY (mark 'X')	5. COMMUNITY (mark 'X')
G	88 Feet	1/4 mile northeast from the unused land		X
H	89.3 Feet	1/4 mile northeast from the unused land		X
Both wells closed due to TCE contamination				

I. RECEIVING WATER

1. NAME \_\_\_\_\_  2. SEWERS  3. STREAMS/RIVERS  
 4. LAKES/RESERVOIRS  5. OTHER (specify): \_\_\_\_\_

6. SPECIFY USE AND CLASSIFICATION OF RECEIVING WATERS \_\_\_\_\_

**XI. SOIL AND VEGETATION DATA**

LOCATION OF SITE IS IN:

A. KNOWN FAULT ZONE  B. KARST ZONE  C. 100 YEAR FLOOD PLAIN  D. WETLAND  
 E. A REGULATED FLOODWAY  F. CRITICAL HABITAT  G. RECHARGE ZONE OR SOLE SOURCE AQUIFER

"unused" land is a

**XII. TYPE OF GEOLOGICAL MATERIAL OBSERVED**

Mark 'X' to indicate the type(s) of geological material observed and specify where necessary, the component parts.

'X'	A. COVERED	'X'	B. BEDROCK (specify below)	'X'	C. OTHER (specify below)
X	1. SAND				
X	2. CLAY				
X	3. GRAVEL				

**XIII. SOIL PERMEABILITY**

A. UNKNOWN  B. VERY HIGH (100,000 to 1000 cm/sec.)  C. HIGH (1000 to 10 cm/sec.)  
 D. MODERATE (10 to .1 cm/sec.)  E. LOW (.1 to .001 cm/sec.)  F. VERY LOW (.001 to .00001 cm/sec.)

G. RECHARGE AREA

1. YES  2. NO 3. COMMENTS: \_\_\_\_\_

H. DISCHARGE AREA

1. YES  2. NO 3. COMMENTS: \_\_\_\_\_

I. SLOPE

1. ESTIMATE % OF SLOPE \_\_\_\_\_ 2. SPECIFY DIRECTION OF SLOPE, CONDITION OF SLOPE, ETC. \_\_\_\_\_

J. OTHER GEOLOGICAL DATA

E. EXPIRATION DATE (mo., day, & yr.)	F. IN COMPLIANCE (mark 'X')		
	1. YES	2. NO	3. UNKNOWN

**TENTATIVE ACTIONS**

and found their tannery waste their permit standards.

the Tentative Disposition (Section II) information

APPENDIX C

Trip Report  
for  
Law Associates  
180 Mont Street  
Nashua, New Hampshire

Submitted by:

Lori Fucarile  
Ecology and Environment, Inc.  
Region I, FIT Team

Prepared by:

Lori Fucarile and Paul Exner  
Ecology and Environment, Inc.  
Region I, FIT Team

FINAL SITE INSPECTION PRIORITIZATION REPORT  
FOR  
JOHN J. RILEY  
WOBURN, MASSACHUSETTS

Prepared For:  
U.S. Environmental Protection Agency  
Region I  
Office of Site Remediation and Restoration  
John F. Kennedy Federal Building  
Boston, MA 02203-0001

CONTRACT NO. 68-W5-0009

CERCLIS NO. MAD001035872  
TDD NO. 98-05-0151  
PCS NO. 5099  
DC NO. S-137

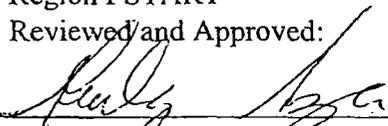
Prepared by:

Roy F. Weston, Inc. (WESTON®)  
Superfund Technical Assessment and Response Team (START)  
217 Middlesex Turnpike  
Burlington, MA 01803

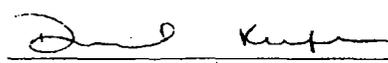
25 September 1998

Region I START

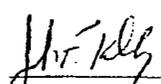
Reviewed and Approved:

  
\_\_\_\_\_  
Geoffrey Souza  
Site Leader

9/25/98  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Daniel Keefe  
Project Leader

9/25/98  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
QA Review

9/25/98  
\_\_\_\_\_  
Date

Work Order No. 11098-031-001-5099-70

## DISCLAIMER

This report was prepared solely for the use and benefit of the U.S. Environmental Protection Agency (EPA Region I), Office of Site Remediation and Restoration for the specific purposes set forth in the contract between the EPA Region I and the Roy F. Weston, Inc. (WESTON®), Superfund Technical Assessment and Response Team (START). Professional services performed and reports generated by START have been prepared for EPA Region I purposes as described in the START contract. The information, statements, and conclusions contained in the report were prepared in accordance with the statement of work, and contract terms and conditions. The report may be subject to differing interpretations or misinterpretation by third parties who did not participate in the planning, research or consultation processes. Any use of this document or the information contained herein by persons or entities other than the EPA Region I shall be at the sole risk and liability of said person or entity. START, therefore, expressly disclaims any liability to persons other than the EPA Region I who may use or rely upon this report in any way or for any purpose.

## TABLE OF CONTENTS

<u>Title</u>	<u>Page</u>
INTRODUCTION .....	1
SITE DESCRIPTION .....	1
OPERATIONAL AND REGULATORY HISTORY AND WASTE CHARACTERISTICS .....	4
WASTE/SOURCE SAMPLING .....	12
GROUNDWATER PATHWAY .....	12
SURFACE WATER PATHWAY .....	16
SOIL EXPOSURE PATHWAY .....	20
AIR PATHWAY .....	21
SUMMARY .....	23
REFERENCES	

## LIST OF FIGURES

<u>Figure No.</u>	<u>Title</u>	<u>Page</u>
1	Location Map .....	2
2	Site Sketch - Former Tannery .....	3
3	Site Sketch - Current Conditions .....	5
4	Surface Water Pathway Sketch .....	17

## LIST OF TABLES

<u>Table No.</u>	<u>Title</u>	<u>Page</u>
1	Current Ownership Information for the John J. Riley Co. ....	6
2	Source Evaluation for John J. Riley Co. ....	11
3	Hazardous Waste Quantity for John J. Riley Co. ....	11
4	Public Groundwater Supply Sources Within 4-Radial Miles of John J. Riley Co. ....	14
5	Estimated Drinking Water Populations Served by Groundwater Sources Within 4-Radial Miles of John J. Riley Co. ....	15
6	Surface Water Bodies Along the 15-Mile Downstream Pathway from John J. Riley Co. ....	18
7	Sensitive Environments Along the 15-Mile Downstream Pathway from John J. Riley Co. ....	19
8	Estimated Population Within 4-Radial Miles of John J. Riley Co. ....	21
9	Sensitive Environments Located Within 4-Radial Miles of John J. Riley Co. ....	22

Final Site Inspection Prioritization Report  
John J. Riley Co.  
Woburn, Massachusetts

CERCLIS No. MAD001035872  
TDD No. 98-05-0151  
Work Order No. 11098-031-001-5099-70

## INTRODUCTION

The Roy F. Weston, Inc. (WESTON) Superfund Technical Assessment and Response Team (START) was requested by the U.S. Environmental Protection Agency (EPA Region I), Office of Site Remediation and Restoration to perform a Site Inspection Prioritization (SIP) of the John J. Riley Co. (Riley Co.) property at 228 Salem Street in Woburn, Massachusetts. Tasks were conducted in accordance with the SIP scope of work and technical specifications provided by EPA Region I. On the basis of the information provided in the Preliminary Assessment (PA) Report and Site Inspection (SI) Report prepared by Ecology & Environment (E&E) under contract to EPA, the Riley Co. SIP was initiated.

Background information used in the generation of this report was obtained through file searches conducted at the EPA Region I and Massachusetts Department of Environmental Protection (MA DEP), telephone interviews with town officials, conversations with persons knowledgeable of the Riley Co. property, and conversations with other Federal, State, and local agencies.

This package follows the guidelines developed under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, commonly referred to as Superfund. However, these documents do not necessarily fulfill the requirements of other EPA Region I regulations such as those under the Resource Conservation and Recovery Act (RCRA) or other Federal, State, or local regulations. SIPs are intended to provide a preliminary screening of sites to facilitate EPA Region I's assignment of site priorities. They are limited efforts and are not intended to supersede more detailed investigations.

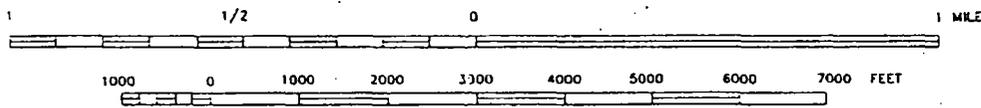
## SITE DESCRIPTION

The Riley Co. property is located at 228 Salem Street in Woburn, Middlesex County, Massachusetts. According to the 1977 Woburn Assessor's tax maps, the property occupies Block 16004, Lot No. 37 and Block 16004, Lot No. 96. The property is located at latitude 42° 29' 26.1" North and longitude 71° 7' 37.6" West. The property comprises 15.8 acres and is located approximately 2,500 feet (ft) west of the Aberjona River, 3,350 ft northeast of Woburn High School, and 2,700 ft northwest of Whittemore Pond (Figure 1). The property is bordered by greenhouses to the west, residences to the south, Boston & Maine (B&M) Railroad tracks to the east, and the properties occupied by BASF and Toxikon Laboratories to the north [3, p. 2; 43].

A wooded area, formerly owned by the Riley Co., is located across the B&M Railroad tracks, northeast of the Riley Co. This area is currently owned by the Wildwood Conservation Trust. An industrial supply production well (PW-02), which was formerly utilized for operations at Riley Co., exists in this area (Figure 2) [3, pp. 3-4]. The Wildwood Conservation parcel is also referred to as the Wildwood property. In addition, two of the City of Woburn's public drinking water supply



BASE MAP IS A PORTION OF THE FOLLOWING 7.5 X 15' U.S.G.S. QUADRANGLE(S):  
 BOSTON NORTH, MASS 1985; READING, MASS 1987.



QUADRANGLE LOCATION

LOCATION MAP

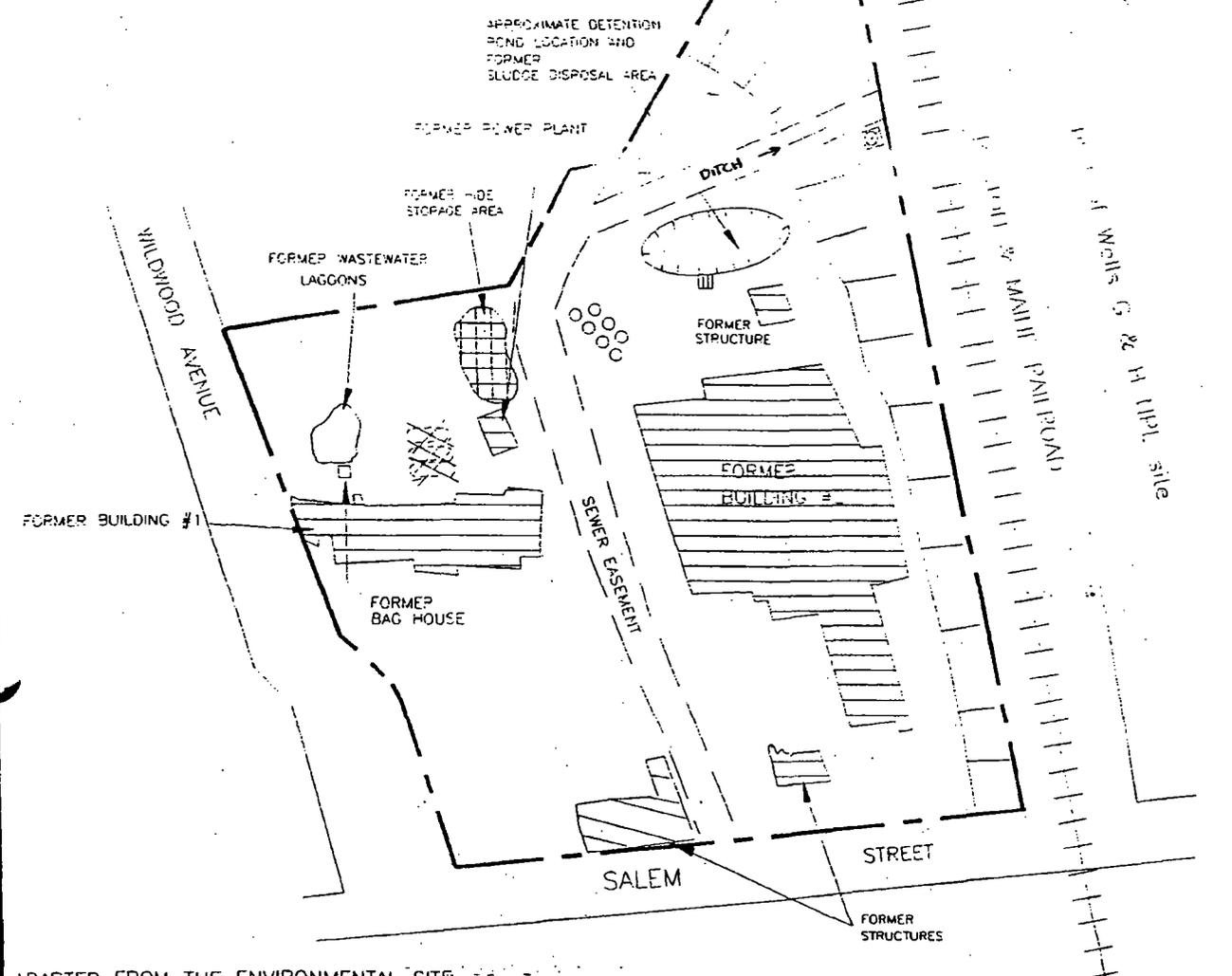
JOHN J. RILEY CO.  
 228 SALEM STREET  
 WOBURN, MASSACHUSETTS

# HWRIE

Civil-Environmental-Hydrologic-Structural-Environmental-Hazardous Waste Engineering  
 REGION 1 SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD # 98-05-0151	DRAWN BY: G. SOUZA	DATE 9/24/98
---------------------	-----------------------	-----------------

FILE NAME: HW-156\LOCATION	FIGURE 1
-------------------------------	----------



ADAPTED FROM THE ENVIRONMENTAL SITE ASSESSMENT PREPARED BY 21E, INC. DATED 8/10/93  
 NOT TO SCALE

- LEGEND**
- FORMER RILEY TANNERY STRUCTURE
  - PROPERTY BOUNDARY
  - CATCHBASIN
  - TREES/WOODED
  - PRODUCTION WELLS
  - FORMER UST LOCATION
  - FORMER DRUM STORAGE AREA
  - WETLANDS

SITE SKETCH - FORMER TANNERY

JOHN J. RILEY CO.  
 228 SALEM STREET  
 WOBURN, MASSACHUSETTS

**HWRE**  
 Civil\*Environmental\*Hydrologic\*Structural\*Hazardous Waste Engineering\*Surveying

REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD # 98-05-0151	DRAWN BY: P.H.S.	DATE 9/29/97
FILE NAME: HW-156/SITESKCH		FIGURE 2

wells, designated Wells G and H, are located approximately 2,000 ft northeast of the property. The Wildwood property is currently being remediated as a part of the Superfund Wells G & H National Priority List (NPL) site cleanup. At the direction of EPA Region I, the Wildwood property is not discussed as part of the Riley Co. SIP [43, p. 4].

On 18 September 1997, START personnel conducted an on-site reconnaissance of the Riley Co. property. During their visit, START personnel observed that three of the lots on the property had newly constructed buildings with paved parking lots. Due to the new construction, no evidence of the former tannery structures was visible on these lots. The subdivided lot Block No. 16004 Lot No. 12 remained as an undeveloped property [43, p. 2].

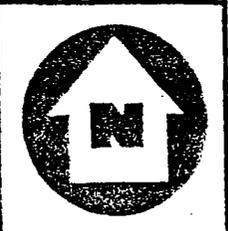
On Block No. 16004, Lot No. 12, START personnel did not observe any visible signs of contamination associated with the tannery. A detention pond (shown on Figure 3) was located on the northwest portion of the property and was empty and overgrown with trees and shrubs. However, START did not obtain any information in the available files on the past use of this detention pond. Construction debris, presumably associated with the Riley tannery, was noted in several locations on this lot. START personnel also observed and located one of the two catchbasins shown on Figure 3 and the production well house (PW-01) associated with the former tannery. The condition of the well house could not be determined as the area was inaccessible on a steep downward slope and was fenced. Furthermore, START personnel located two monitoring wells on the property. One of the monitoring wells was locked and appeared to be in good condition. The other well was not locked and its condition is unknown [43, p. 2-5].

START personnel located the ditch on the northwestern portion of the property shown on the site sketch prepared by 21E, Inc. in their 1990 and 1993 Environmental Site Assessment (ESA) Report. The ditch was partially filled with debris and was not flowing at the time of the on-site reconnaissance [43, p. 3]. START personnel observed five 55-gallon drums (containing toluene, xylene, benzene, motor oil, and Zep 11263, respectively) in the drum storage area of W.A. Kraft at 199 Wildwood Avenue. Zep 11263 contains sodium hydroxide, sodium carbonate, and sodium alkyl naphthalene sulfonate. The drums were located on a concrete floor with no floor drains. There was no evidence of leaks or spills in the area [43, p. 4].

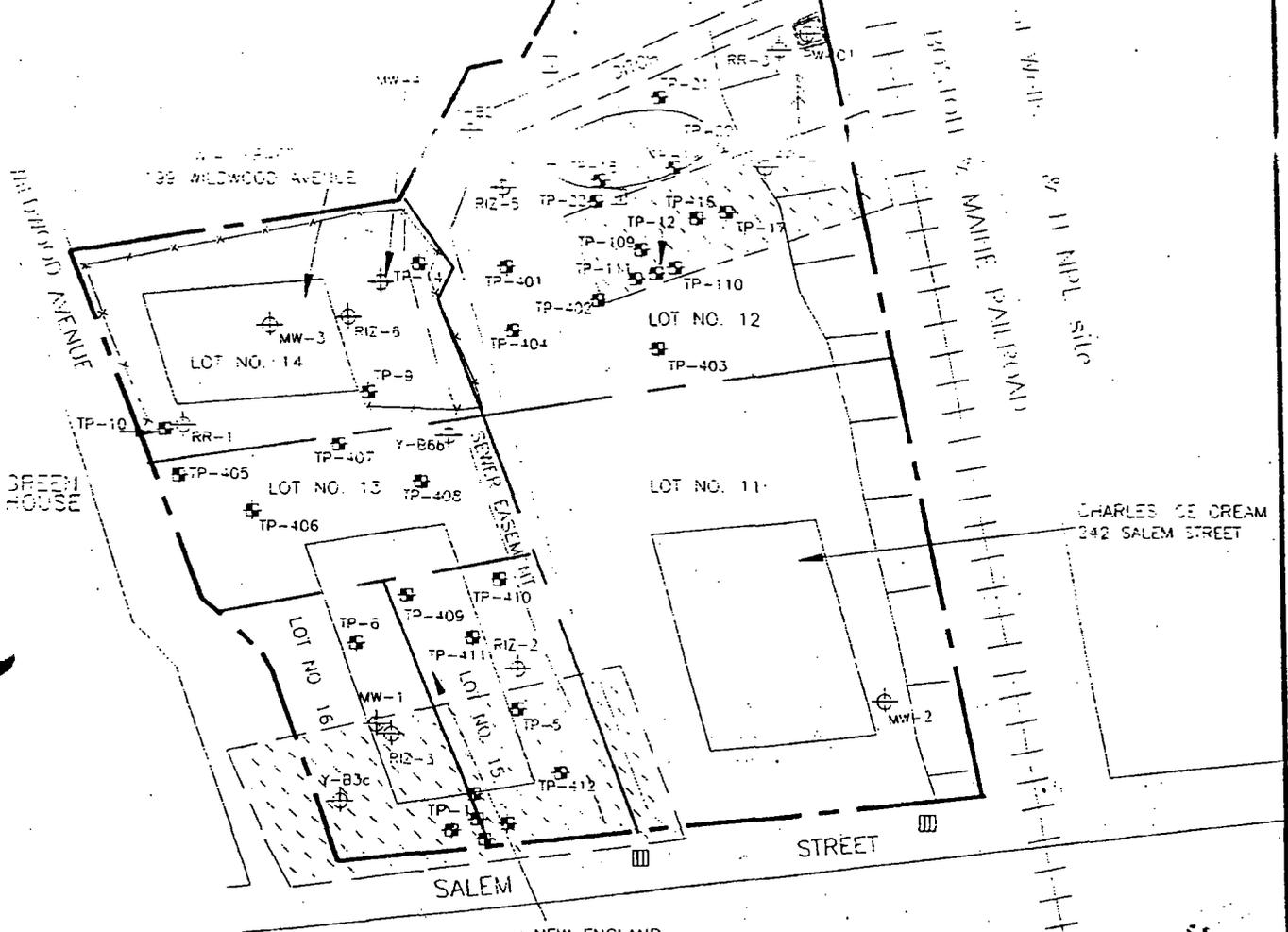
## **OPERATIONAL AND REGULATORY HISTORY AND WASTE CHARACTERISTICS**

The Riley Co., owned by Mr. John J. Riley, operated as a tannery on the property for approximately 74 years from 1915 until 1989. From December 1978 to January 1982, the company continued operations on site but was owned by Beatrice Foods, Inc. Mr. Riley, the president of the tanning company, reacquired the business from Beatrice Foods, Inc. in 1983. Tannery operations continued until 1989 at which time all the equipment was removed and operations ceased. In June 1994, the Maggiore Companies (property developers), subdivided the property into six lots and labeled them as Lot Nos. 11 through 16 (Figure 3) [1, p. 3-2; 3, p. 3; 5, p. 3; 15].

In August 1994, Charles Ice Cream Inc. purchased and developed Lot No. 11 and started their operations at 242 Salem Street. In October 1994, W.A. Kraft Corporation purchased and developed Lot No. 14 and started their operations at 199 Wildwood Avenue. New England Industrial Truck located on Lot Nos. 13, 15, and 16 at 195 Wildwood Avenue started their operations in 1997. Lot



GROUNDWATER FLOW DIRECTION  
 1989/90/91 DETENTION  
 POND LOCATION AND  
 FORMER  
 TMDL DEPOSAL AREA



SITE LAYOUT IS ADAPTED FROM 21E INC.  
 REPORT OF 4/12/1996 AND AS OBSERVED  
 BY START PERSONNEL ON 9/18/1997  
 NOT TO SCALE

- LEGEND**
- ⊕ MONITORING WELL
  - X—X—X FENCE
  - ▭ CONTAMINATED SOIL AREA
  - 🌳 TREES/WOODED
  - ☐ CATCHBASIN
  - ⊕ TEST PIT
  - — — — — SUBDIVIDED LOT LINES
  - — — — — PROPERTY BOUNDARY
  - ⚡ PRODUCTION WELLS
  - ⚡ WETLANDS

**SITE SKETCH - CURRENT CONDITIONS**

JOHN J. RILEY CO.  
 228 SALEM STREET  
 WOBURN, MASSACHUSETTS

**HWRE**  
Civil-Environmental-Hydrologic-Structural-Hazardous Waste Engineering-Surveying

REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TOD # 98-05-0151	DRAWN BY: P.H.S.	DATE 9/29/97
FILE NAME: HW-156/SITESKCH		FIGURE 3

No. 12, west of 242 Salem Street, is not developed and does not have a postal address. This lot is owned by Wedel Corporation, Seabrook, New Hampshire which is owned by Mr. John J. Riley (Figure 3) [15; 43, p. 2]. Table 1 indicates the current owners for each of the lots and current operations on the property.

**Table 1**  
**Current Ownership Information for the John J. Riley Co.**

Parcel	Company Name & Contact	Comments
Block No. 16004, Lot Nos. 13, 15, 16 195 Wildwood Avenue Woburn, MA 01801	New England Industrial Truck Mr. Mark Krueger (781) 935-9105	Commercial facility for distribution of fork-lift equipment. Redeveloped since use by Riley Co. (1997)
Block No. 16004, Lot No. 14 199 Wildwood Avenue Woburn, MA 01801	W.A. Kraft Corporation Mr. James Ritchie Tel: (781) 938-9100	Commercial facility for distribution of electrical generators. Redeveloped since use by Riley Co. (October 1994)
Block No. 16004, Lot No. 11 242 Salem Street Woburn, MA 01801	Charles Ice Cream Inc. Mr. Charles Rotondo Tel: (781) 935-6611	Commercial facility for manufacture of ice cream products. Redeveloped since use by Riley Co. (August 1994)
Block No. 16004, Lot No. 12 Woburn, MA 01801	Vacant Lot Wedel Corporation Mr. John J. Riley Tel: (603) 474-3969	Occupied by a detention basin and drainage swale. Not redeveloped since use by Riley Co.
Block No. 16005, Lot No. 42 Wildwood Conservation	Wildwood Conservation Trust Contact: EPA Region I Ms. Mary E. Garren Remedial Project Manager Tel: (617) 573-9613	Site access was not granted to EPA Region I. This property is being remediated as part of the Wells G & H NPL site cleanup and is no longer considered part of the Riley Co. property.

[14; 15]

The Riley Co., while in business, operated two production wells, PW-01 (located on the northeast portion of the property) and PW-02 (Figure 2). The production wells and Wells G and H were found by MA DEQE to be contaminated with volatile organic compounds (VOCs) in 1979. Wells G and H were subsequently listed on the EPA Superfund NPL as the Wells G & H site. Several environmental investigations have been performed on the Riley Co. and other industrial facilities located to the south and east of the property. In 1987, the Riley Co. was listed with the MA DEQE as a Location to be Investigated (LTBI) due to the contamination in the production wells and trace contamination discovered in soil borings on the property. However, the investigations concluded that the Riley Co. was not a probable source of the contamination detected in the four wells [4, p. 9].

According to MA DEP, the tanning operations on the property included primarily the "chrome" tanning of hides into shoe leather. The facility was considered by MA DEP as a medium-sized operation. The facility reportedly used hexavalent chromium as a raw material in the "chrome" tanning process. However, prior to the introduction into the tanning process, hexavalent chromium was converted to trivalent chromium [2; 3].

According to the Final ESA Report completed in 1993 by 21E, Inc., the following hazardous chemicals were also formerly used on the property: benzidine-based dyes, phenolic-based detergents for soaking hides, ortho-dichlorobenzene for disinfecting, butyl acetate as a solvent for cleaning lacquers and finishing products, and 1,1,1-trichloroethane (1,1,1-TCA) for cleaning an embossing plate prior to 1979. Several other substances, including butoxyethanol, diisobutyl ketone, methoxyethanol, and other VOCs were also used as solvents for cleaning lacquers and finishing products. A former power plant located on the property was fired by fuel oil [3, p. 4].

The tanning process utilized at the Riley Co. produced several waste products. Waste sludge was reportedly collected in two lagoons (former) located in the southwest portion of the property. The solids in the lagoon and downstream catchbasins were dredged periodically and disposed of in the former sludge disposal area on the property. However, extraction procedure (EP) toxicity tests for samples collected from the former sludge disposal area indicated that the levels of metals, including hexavalent chromium and total chromium, were within State-acceptable limits [3, p. 4]. Buffing dust, which primarily is composed of leather particles, was also produced during the tanning process and disposed of in the former lagoon on the property. EPA and the MA DEP did not consider buffing dust a hazardous material. In 1991, Mr. Riley indicated that the buffing dust had been removed from the property and shipped off-site; however, START personnel were unable to obtain any records documenting the removal [3].

Between November 1980 and March 1981, E&E, under contract to EPA, conducted a PA and a SI on the property. Groundwater samples were collected from production wells PW-01 and PW-02. The results revealed VOCs in samples from both wells. The source of the well contamination was not determined by E&E [3, p. 5]. START personnel could not obtain any other information from available files.

In 1983, Yankee Environmental Engineering and Research Services, Inc. (YE<sup>2</sup>ARS) conducted subsurface investigations on the property and excavated nine test pits on the 15.8-acre Riley Co. property. Six overburden monitoring wells were installed on the property (Y-B1 through Y-B6). Groundwater samples were collected and analyzed for chlorinated VOCs by EPA Method 601. YE<sup>2</sup>ARS noted that there was a substantial decrease in the concentrations of VOCs in PW-01 compared to those reported in the 1980/1981 E&E Investigations. The YE<sup>2</sup>ARS report also concluded that the Riley Co. tannery was not a probable source of the contamination documented in PW-02 and Woburn Wells G and H [3, p. 5].

In November 1989, the Woburn Fire Department witnessed the removal of three underground storage tanks (USTs) from the property by Clean Harbors, Inc. Two of these tanks were used for the storage of No. 6 fuel oil and the third for No. 2 fuel oil. Each of these tanks had a capacity of 15,000 gallons and was reportedly installed in 1981. Reportedly, no evidence of a release from these tanks was observed. One soil sample was collected from the tank bed and contained 110 parts per million

(ppm) total petroleum hydrocarbons (TPHs), which is below the Massachusetts Contingency Plan (MCP) action level of 500 ppm [4, p. 12-13; 3, p. 6].

In 1990, 21E, Inc. conducted an ESA of the Riley Co. property. During the ESA, it was noted that the wells installed by YE<sup>2</sup>ARS were no longer on the property. However, 21E, Inc. did note that three additional wells were located on the property. Mr. Riley informed 21E, Inc. that these wells, designated RR-1 through RR-3, were installed under authorization of Beatrice Foods, Inc. through instruction by their legal counsel, Hale & Dorr. These wells were reportedly installed in July 1989 by [redacted] [2, p. 5; 3, p. 6]. No other information was available regarding these wells.

In May 1990, 21E, Inc. installed four additional monitoring wells, designated MW-1 through MW-4, on the property. Soil samples from the four new soil borings, and seven groundwater samples from both existing (RR-1 through RR-3) and new wells were collected by 21E, Inc. The soil and groundwater samples were analyzed for RCRA-8 metals, VOCs, TPHs, semivolatile organic compounds (SVOCs), pesticides, and polychlorinated biphenyls (PCBs) [2; 3, pp. 6-7]. No VOCs, TPHs, SVOCs, or pesticides/PCBs were detected in any of the groundwater or soil samples. Metals were detected but not above the MA DEP Drinking Water Standards. Analytical results of groundwater and soil samples are discussed in detail in the Groundwater Pathway and Soil Exposure Pathway sections of this evaluation.

On 16 April 1993, 21E, Inc. conducted another ESA of the property. A dark, tar-like substance appeared to be advancing through the cracks in the pavement in the north central portion of the property. The advancement of the substance was attributed by 21E, Inc. to heavy rains and melting snow conditions, since the material was only observed on the visits during heavy rain periods. It was the opinion of 21E, Inc. personnel that the material was asphaltic in nature [3, p. 8].

In 1993, 21E, Inc. collected groundwater samples from the seven existing monitoring wells and analyzed the samples for VOCs, TPHs, RCRA-8 metals, and SVOCs [3, pp. 19-22]. No samples were collected from a well upgradient of the property to establish background concentrations. No VOCs, TPHs, SVOCs, or pesticides/PCBs were detected in any of the groundwater samples. Metals including arsenic, chromium, and lead were detected in sample from monitoring well MW-4. Analytical results of groundwater samples are discussed in detail in the Groundwater Pathway section of this evaluation.

Based on the sampling results, 21E, Inc. reported that there was no evidence of a release of oil or hazardous materials to the groundwater from the property located at 228 Salem Street in Woburn, Massachusetts (Riley Co. property). In addition, based on the data from this investigation and previous investigations, 21E, Inc. concluded that tannery operations at the property have not adversely affected the environmental integrity of the property [3, p. 25].

On 7 March 1994, 21E, Inc. submitted a Licensed Site Professional (LSP) Evaluation Opinion Statement (EOS) on behalf of Wedel Corporation (owned by John J. Riley), the potentially responsible party (PRP) and Maggiore Companies (property developers) to MA DEP for the 228 Salem Street property (which was listed as a LTBI site by MA DEP on 15 January 1987) pursuant to Massachusetts General Laws (MGL) 21E and 310 CMR 40.0000 [5].

On 29 September 1995, MA DEP issued a Notice of Audit (NOA) informing Mr. Paul Maggiore of Maggiore Companies. that MA DEP was conducting an audit of the 7 March 1994 LSP EOS submitted for the 228 Salem Street property [5].

On 4 January 1996, MA DEP issued a Notice of Noncompliance and NOA Findings to Wedel Corporation. MA DEP determined that the LSP EOS submittal was in noncompliance with one or more laws, regulations, orders, licenses, permits, or approvals enforced by MA DEP. In addition, the audit identified that inadequate information was available on the extent of release, vertical and horizontal extent of contamination, and risk characterization [5].

On 25 January 1996, 21E, Inc. on behalf of Wedel Corporation, submitted a Plan of Activities in response to the NOA findings to the MA DEP for approval. The Plan of Activities included: the excavation of test pits and the collection of soil samples across the undeveloped lots at the property; laboratory analysis of selected soil samples; and preparation of a site map which would include all potential source areas. The plan was subsequently approved by the MA DEP [12, pp. 1-2].

On 30 and 31 January 1996, during the MA DEP-approved soil sampling program conducted by 21E, Inc., 28 test pits (TP-1 through TP-28) were excavated across the undeveloped lots at the Riley Co. property (Lot Nos. 12, 13, 15, and 16). Surficial soil samples were collected from the test pits. All soil samples were screened in the field for VOCs with a photoionization detector (PID). Selected surficial soil samples were submitted for laboratory analysis for RCRA-8 metals. Soil samples from two areas in the southern and northwestern portions of the property were found to be contaminated with arsenic. The levels of arsenic in the soil samples collected from the vicinity of TP-1 triggered an imminent hazard condition [12].

Tannery wastes were encountered during the excavation of TP-16. However, none of the wastes consistent with those found in TP-16 were visible during the excavation of TP-17. On 31 January 1996, the excavation of TP-16 continued in an attempt to define the horizontal extent of the observed tannery wastes. A total of approximately 200 to 250 cubic yards of tannery wastes and associated soil were excavated from around TP-16, and stockpiled, and covered with polyethylene sheeting. Four distinct layers were observed in the TP-16 excavation. A grab sample from each layer was submitted for laboratory analysis for RCRA-8 metals and extractable organic compounds. No extractable organic compounds were detected in any of the samples above the detection limit. However, metals including chromium, lead, and arsenic were detected in the four layers [12].

On 12 February 1996, MA DEP received oral notification from Ms. Hebert of a release/threat of release of oil/hazardous material at the Riley Co. property. In a 8 March 1996 meeting with MA DEP, Ms. Hebert indicated that the extent of arsenic in the vicinity of TP-1 had not been completely defined and that 21E, Inc. was in the process of developing a plan for collection of additional samples. She also informed MA DEP that all visible tannery wastes would be removed and confirmatory soil samples collected or, if applicable (depending on the nature and extent of the wastes), an Activity Use Limitation (AUL) would be filed and the wastes left in place [8].

On 12 April 1996, an Immediate Response Action (IRA) Plan was submitted to MA DEP by 21E, Inc. on behalf of Wedel Corporation. The objective of the IRA was to mitigate the release of arsenic detected in the two areas (southern and northwestern portions as shown in Figure 3) on the property [9].

On 25 April 1996, 21E, Inc. submitted a status report entitled, "Report of Activities and Soil Excavation Plan - Tannery Waste and Soil Contamination" for the Riley Co. property and submitted to the MA DEP [12].

On 11 June 1996, 21E, Inc., submitted an IRA Status Report to MA DEP on behalf of Wedel Corporation. The report stated that the excavation of the contaminated soil was conducted on 29 and 30 May and 4 June 1996. The soil was excavated from the southern and northwestern area of the property using a backhoe, bulldozer, and small Bobcat excavator. The excavated soil, totaling approximately 850 cubic yards, was stockpiled and covered with polyethylene sheeting. Once the contaminated soil was excavated, confirmatory samples were collected from the excavation and analyzed for the presence of arsenic [9; 10]. Review of background levels of arsenic and confirmatory results for arsenic in soils which remain on-site indicated that there were at least two samples with concentrations of arsenic in soils greater than three times the background concentration. Analytical results of surficial soil samples are discussed in the Soil Exposure Pathway section of this evaluation.

On 4 June 1996, four additional test pits were excavated on Lot Nos. 12 and 13 respectively (TP-401 through TP-408) and four test pits were excavated on lot 15 (TP-409 through TP-412). The test pits were excavated to determine if the material observed in the original excavation was present in these test pits. None of the test pits had materials observed in the original excavation [12, pp. 3-7].

According to a Bill of Lading, dated 24 June 1996, 2,966.40 tons of soil excavated from the property were disposed of at New Hampshire Waste Management's lined landfill in Rochester, New Hampshire [12].

A Method I Risk Characterization was completed by 21E, Inc., in accordance with the guidelines of the MCP, 310 CMR 40.0000, to determine if a "Level of No Significant Risk" existed on the property. Method I was chosen to demonstrate that a "Level of No Significant Risk" existed since only soil contamination was reported on the property [12, p. 7]. The groundwater at the property was classified as GW-1 because the property is located within a Massachusetts Interim Wellhead Protection Area. The soil category was chosen as S-1 because the soil was considered accessible since the depth of soil samples collected was less than 1 ft below ground surface (bgs) [12, pp. 8-9].

According to 21E, Inc., exposure point concentration for arsenic was 9.99 ppm which was calculated by averaging the post removal sampling concentrations for arsenic. Background arsenic levels were evaluated by collecting and analyzing soil samples between the two areas of soil contamination. The average background levels for arsenic in soils was estimated to be 6.24 ppm [12, p. 10-11]. 21E, Inc., further stated that according to James Dragun's The Soil Chemistry of Hazardous Materials (1988), the typical range of arsenic concentrations in Woburn (native) soils is between 1.0 ppm and 40.0 ppm. Therefore, comparing the average exposure point concentration to background data from the property and to that reported in the literature, it was concluded by 21E, Inc. that the conditions

at the property did not pose any significant risk and hence a Permanent Solution had been achieved meeting the requirements of MCP regulations [12, p. 11].

Table 2 presents identified structures or areas on the Riley Co. property that are documented or potential sources of contamination, the containment factors associated with each source, and the relative location of each source.

**Table 2**  
**Source Evaluation for John J. Riley Co. Property**

Source Area	Containment Factors	Spatial Location
Contaminated Soil	None	Southern and northwestern portions of the property
Drums (containing VOCs)	Indoors, with concrete floor and no floor drains	199 Wildwood Avenue

[34, pp. 1-7]

Table 3 summarizes the types of potentially hazardous substances which have been disposed, used, or stored on the Riley Co. property.

**Table 3**  
**Hazardous Waste Quantity for John J. Riley Co. Property**

Substance	Quantity or Volume/Area	Years of Use/Storage	Years of Disposal	Source Area
Metals including arsenic; barium; cadmium; chromium (III); chromium (IV); lead; and silver.	15.8 acres	1915 to 1989	74 years	Contaminated Soil
VOCs including benzene, toluene, and xylene	Approximately 400 square foot	unknown	unknown	199 Wildwood Avenue

[1]

There are a number of other potential sources of contamination in the vicinity of the Riley Co. property. Approximately five State-listed sites are located within 0.5-radial miles of the property. Three Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) facilities are located within 0.5-radial miles of the property. Seven RCRA generators are located within 0.5-radial miles of the property. The Wells G & H Site, currently a NPL site, is located 2,000 ft northeast of the property.

## WASTE/SOURCE SAMPLING

In May 1990, 21E, Inc., advanced four borings and completed them as monitoring wells, designated MW-1 through MW-4, on the property. Soil samples from the four new soil borings were collected by 21E, Inc. The soil samples were analyzed for RCRA-8 metals, VOCs, TPHs, SVOCs, pesticides/PCBs. Analytical results did not reveal any VOCs, TPHs, SVOCs, or pesticides/PCBs in any of the soil samples collected. Five metals including arsenic, barium, cadmium, chromium, and lead were detected in the soil samples collected from the property. However, 21E Inc. concluded that all the metals detected were within the commonly expected range found in soils in the region [2; 3, pp. 6-7]

Surficial soil samples were collected by 21E, Inc. on 30 and 31 January 1996. The analytical results of these soil samples are discussed in detail in the Soil Exposure Pathway section of this evaluation.

## GROUNDWATER PATHWAY

Approximately 60% of the property is covered by asphalt paving or buildings. The mean annual precipitation for Reading, Massachusetts, measured approximately 3.5 miles northeast of the property, is 46.64 inches [21].

Bedrock beneath the property consists of diorite and gabbro subordinate metavolcanic rocks and intrusive granite and granodiorite. No bedrock outcrops were observed at or in the vicinity of the property [4; p. 15]. No bedrock formations mapped within 4-radial miles of the property exhibit karst characteristics.

Groundwater is approximately 10 ft beneath the property and flows easterly towards the Aberjona River [10]. The primary aquifer in the Aberjona River valley is the stratified drift deposits (outwash sand and gravel) that underlie the property and surrounding area. The primary recharge source for the aquifer is precipitation and surface water infiltration. The transmissivity of the primary aquifer has been mapped as > 4,000 square ft per day (ft<sup>2</sup>/day) with an estimated potential well yield of > 300 gallons per minute (gpm) [49, p. 48].

All or part of the following Massachusetts cities and towns are located within 4-radial miles of the Riley Co. property: Burlington (population 23,301), Medford (population 56,702), Reading (population 22,671), Stoneham (population 22,183), Winchester (population 20,405), Wilmington (population 18,488), and Woburn (population 36,407) [16-19; 29].

There are no active drinking water supply wells located in the vicinity of the property. The nearest documented groundwater source of drinking water are the Woburn Water Department Horn Pond wells located approximately 2.3 to 2.5 miles southwest of the property [19; 22]. Woburn Municipal Wells G & H are located approximately 2,000 ft northeast of the property, east of the Aberjona River. These two wells are not considered drinking water supplies because they were closed in 1979 due to VOC contamination (mainly trichloroethene (TCE), 1,1,1-TCA, and perchloroethylene) alleged to have originated from industrial properties in the area [49, p. 22]. However, according to MA DEP, the property is located in an interim wellhead protection area [12, pp. 8-9].

Two million gallons of water per day are supplied to the City of Woburn Water Department by the Massachusetts Water Resource Authority (MWRA) from the Quabbin Reservoir. The remaining water for Woburn is supplied by the six public supply wells located near Horn Pond. Since no single source in the system contributes more than 40% of the total supply, the 36,407 persons served by the system are apportioned evenly among the seven sources [26; 34].

Wilmington's public drinking water is supplied by eight groundwater wells located throughout the town. Five of the wells are within 4-radial miles of the property. Since no single source in the system contributes more than 40% of the total supply, the 18,488 persons served by the system are apportioned evenly among the eight sources [30; 35].

Medford and Stoneham's public drinking water is supplied 100% by the MWRA [33; 41]. Winchester's public drinking water is supplied by North Reservoir, Middle Reservoir, and South Reservoir, none of which are located downstream of the property [40].

Reading's public drinking water is supplied by nine groundwater wells, eight of which are located off of Strout Avenue and the other is located at the end of Beverly Road. All of the wells are located within 4-radial miles of the property. Since no single source in the system contributes more than 40% of the total supply, the 22,671 persons served by the system are apportioned evenly among the nine sources [32; 36]. Burlington's public drinking water is a blended system supplied by five groundwater wells and the Mill Pond Reservoir, none of which are located within 4-radial miles of the property [31]. Table 4 summarizes the populations which rely on public groundwater sources for drinking water within 4-radial miles of the property.

Table 4

Public Groundwater Supply Sources Within 4-Radial Miles of  
John J. Riley Co.

Distance/Direction From Site	Source Name	Location of Source <sup>a</sup>	Est. Pop. Served	Source Type <sup>b</sup>
2.2 miles Southwest	Horn Pond Wells A,B.&C	Woburn	5,005	Three overburden wells
2.3 miles Southwest	Horn Pond Well D	Woburn	5,201	One overburden well
2.5 miles Southwest	Horn Pond Well E & F	Woburn	10,402	Two overburden wells
2.6 miles Northwest	Chestnut St. Wells 1 & 2	Wilmington	4,622	Two overburden wells
2.9 miles Northwest	Main St. Well	Wilmington	2,311	One overburden well
3.0 miles North	Beverly Road Well	Reading	2,519	One overburden well
3.5 miles Northwest	Butters Row Wells 1 & 2	Wilmington	4,622	Two overburden wells
3.9 miles North	Strout Ave Wells 1 through 8	Reading	20,152	Eight overburden wells

<sup>a</sup> Indicates town in which well is located

<sup>b</sup> Overburden, Bedrock, or Unknown

[19; 23; 25; 27-29]

Private groundwater supplies located within 4-radial miles of the property were estimated using equal distribution calculations of U.S. Census CENTRACTS data identifying population, households, and private water wells for "Block Groups" which lie within or partially within individual radial distance rings measured from the Riley Co. property. The nearest private well is estimated to be located between 0.25- and 0.5-radial miles from the property, but has not been specifically identified due to lack of private well information for Woburn [11]. Table 5 summarizes the total population which relies on groundwater within 4-radial miles of the property.

Table 5

**Estimated Drinking Water Populations Served By Groundwater Sources  
Within 4-Radial Miles of John J. Riley Co.**

Radial Distance From Riley Co.	Estimated Population Served by Private Wells	Estimated Population Served by Public Wells	Total Estimated Population Served by Groundwater Sources Within the Ring
> 0.00 to 0.25	0	0	0
> 0.25 to 0.50	3	0	3
> 0.50 to 1.00	12	0	12
> 1.00 to 2.00	91	0	91
> 2.00 to 3.00	166	40,658	40,824
> 3.00 to 4.00	229	24,774	25,003
<b>TOTAL</b>	<b>501</b>	<b>65,432</b>	<b>65,933</b>

[11; 19; 23; 25; 27-29]

From November 1980 to March 1981, E&E, under contract to the EPA, conducted a SI and sampled groundwater from wells PW-01 and PW-02. The results revealed VOCs in both wells. Total VOCs in PW-02 ranged from 28 parts per billion (ppb) to 1,372 ppb and total VOCs ranged from 10 ppb to 53 ppb in PW-01. The source of contamination was not determined by E&E [3, p. 5].

In 1983, YE<sup>2</sup>ARS conducted subsurface investigations of the property and excavated nine test pits on the 15.8-acre Riley Co. property. Six overburden monitoring wells (which no longer exist on the property) were also installed on the property by YE<sup>2</sup>ARS in 1983 and designated Y-B1 through Y-B6. Groundwater samples were collected from monitoring wells Y-B1, Y-B2, and PW-01 and analyzed for chlorinated solvents by EPA Method 601. No chlorinated solvents above the instrument detection limit of 0.1 ppb were noted in monitoring well Y-B1. The sample from PW-01 was found to contain 0.4 ppb of trans-1,2-dichloroethene and 0.4 ppb of TCE. There was a substantial decrease in the concentrations of VOCs in PW-01 than those reported in 1980/1981 by E&E. The YE<sup>2</sup>ARS report concluded that the Riley Co. tannery was not a probable source of the contamination documented in PW-02 and Woburn Wells G and H [3, p. 5].

In July 1989, Geraghty & Miller, Inc installed three wells designated RR-1 through RR-3, under authorization of Beatrice Foods, Inc. In May 1990, 21E, Inc. installed four additional monitoring wells, designated MW-1 through MW-4, on the property, and collected groundwater samples from both existing (RR-1 through RR-3) and new wells. The groundwater samples were analyzed for RCRA-8 metals, VOCs, TPHs, SVOCs, pesticides, and PCBs. No VOCs, TPHs, SVOCs, pesticides/PCBs were detected in any of the seven groundwater samples. No metals were detected above MA DEP Drinking Water Standards [2; 3, pp. 6-7].

On 16 April 1993, 21E, Inc. collected groundwater samples from monitoring wells MW-1, MW-4, and RR-1 through RR-3 and analyzed the samples for VOCs by EPA Method 8240, for TPHs, for RCRA-8 metals, and for SVOCs by EPA Method 625. VOCs and TPHs were not detected above their respective detection limits in any of the samples collected. Metals, including arsenic at 0.16 ppm, chromium at 0.57 ppm, cadmium at 0.019 ppm, and lead at 0.11 ppm, were present in sample MW-4. RR-1 contained concentrations of arsenic at 0.021 ppm, chromium at 0.11 ppm, and lead at 0.02 ppm. RR-1 did not contain cadmium above the detection limit. However, the report did not include the value for the detection limit. START selected groundwater sample RR-1 as the reference sample to represent the background conditions as it contained the lowest concentrations of metals. RR-2 was reported to contain arsenic at 0.066 ppm, and chromium at 0.20 ppm. SVOCs, including butylbenzyl phthalate at 23 ppb and di-n-butyl phthalate at 30 ppb, were reported in RR-2. However, both of these compounds were detected in the laboratory blank samples as well [3, pp. 19-22].

START did not perform groundwater sampling as part of the Riley Co. SIP. Based on analytical results from previous groundwater samples collected by 21E, Inc. from the Riley Co. property, groundwater beneath the property has been impacted by a release of hazardous substances which appears to be attributable to on-site sources; however, due to the distance of active drinking water sources (i.e., greater than 2 miles) from the property and the presence of other industrial sites in the area, no drinking water sources are known or suspected to have been impacted by the release from on-site sources.

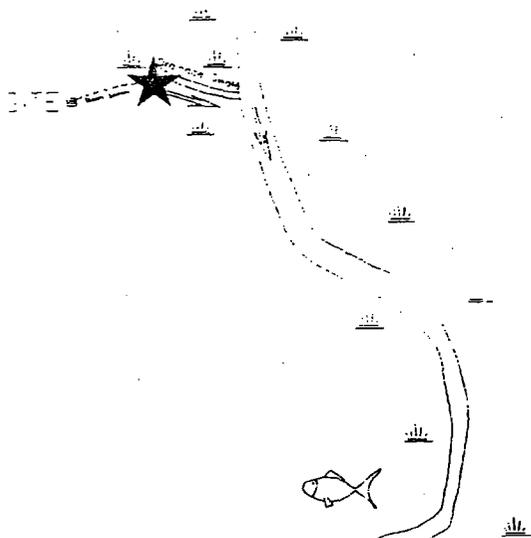
#### **SURFACE WATER PATHWAY**

START personnel located one of the two on-site catchbasins and the ditch shown on the site sketch prepared by 21E, Inc. in their 1990 and 1993 ESA Reports. However, based on conditions observed during the START on-site reconnaissance of the property, most of the runoff from the paved portions of the property flows toward catchbasins located on Salem Street [43, pp. 2-4].

Surface water runoff from the property flows via catchbasins and storm sewers located on Salem Street towards the wetlands associated with a drainage swale located approximately 1,500 ft east of the property. These wetland areas, which are contiguous with the Aberjona River, remain wet for most of the year (Figure 4). The swale is classified by the U.S. Geological Survey (USGS) as an intermittent stream and has a length of reach of approximately 1,000 ft. The swale eventually drains into the Aberjona River located approximately 2,500 ft east of the property [3, pp. 3-4]. The Aberjona River flows south for 5.9 miles and drains into the Mystic Lakes which in turn discharge into the Mystic River. For the purposes of this SIP, the Mystic Lakes are considered to be part of the Mystic River. The Mystic River continues for 6.5 miles and discharges into Boston Inner Harbor. The 15-mile downstream pathway terminus occurs as a 2.4-mile arc in the Boston Inner Harbor [16-19].



ABERJONA RIVER



LEGEND



FISHERY



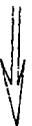
PROBABLE POINT OF ENTRY



DIRECTION OF FLOW

USGS GAUGING STATION  
28.9 CUBIC FEET/SECOND

UPPER MYSTIC LAKE



LOWER MYSTIC LAKE

15-MILE DOWNSTREAM  
TERMINUS (2.4-MILE ARC)

MYSTIC RIVER

BOSTON  
INNER  
HARBOR

Estimated Mean Annual  
Flow Rate 118.8 cfs

NOT TO SCALE

BASED ON USGS READING AND  
BOSTON NORTH, MA QUADRANGLE

SURFACE WATER PATHWAY SKETCH

JOHN J. RILEY CO.  
228 SALEM STREET  
WOBURN, MASSACHUSETTS

HWRE

Civil-Environmental-Hydrologic-Structural-Hazardous Waste Engineering-Surveying  
REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #  
97-06-0019

DRAWN BY:  
J.K.

DATE  
8-26-97

FILE NAME:  
HW156/SURFWATER

FIGURE 4

The wetlands have a mean annual flow rate of less than 10 cubic ft per second (cfs) at the probable point of entry (PPE) to the downstream surface water pathway. The Aberjona River at its confluence with the drainage swale has a mean annual flow rate of < 28.9 cfs. A USGS gauging station, located approximately 3.5 miles downstream of the PPE, has a recorded mean annual flow rate of 28.9 cfs. No additional USGS gauging stations are located on the Aberjona River [30]. The mean annual flow rate for the Mystic River was estimated to be 118.8 cfs by using the drainage basin area to calculate the flow rate [37]. Table 6 summarizes the characteristics of surface water bodies located within 15-downstream miles of the property.

**Table 6**

**Surface Water Bodies Along the 15-Mile Downstream Pathway from John J. Riley Co.**

Surface Water Body	Descriptor <sup>a</sup>	Length of Reach (miles)	Flow Characteristics (cfs) <sup>b</sup>	Length of Wetlands (miles)
Wetlands	Minimal stream	0.2	< 10 cfs	0.2
Aberjona River	Small to moderate stream	5.9	28.9	2.0
Mystic River	Moderate to large stream	6.5	118.8	0.7
Boston Inner Harbor	Coastal tidal waters	2.4-mile arc	NA	0.00

<sup>a</sup> Minimal stream < 10 cfs. Small to moderate stream 10-100 cfs. Moderate to large stream > 100-1,000 cfs. Coastal tidal waters (flow not applicable).

<sup>b</sup> Cubic ft per second.

[8; 22-25; 30; 36]

No surface water drinking water intakes are located along the 15-mile downstream pathway from the Riley Co. property [38]. The Aberjona and Mystic Rivers are designated as Class B waterways by MA DEP along their entire lengths. They are further noted as warm water fisheries along their entire lengths [42]. Approximately 2.9 miles of wetland frontage exists within 15-downstream miles of the property [22-25]. Habitats for seven State-threatened species, one State-endangered species, two Federal-candidate species, and two Federal-endangered species are located along the Aberjona and Mystic Rivers within 15-downstream miles of the property [39]. Table 7 summarizes the sensitive environments within 15-downstream miles of the property.

Table 7

Sensitive Environments Along the 15-Mile Downstream Pathway from  
John J. Riley Co.

Sensitive Environment Name	Sensitive Environment Type	Surface Water Body	Downstream Distance from PPE (miles)	Flow Rate at Environment (cfs)*
Wetlands	0.2 miles of Wetlands	Wetlands	0 to 0.2	28.9
Clean Water Act	Clean Water Act	Aberjona River	0.2	28.9
Aberjona River Wetlands	2.0 miles of Wetlands	Aberjona River	0.2 to 6.1	28.9
Vascular Plants Dicotyledoneae	State-threatened Species Habitat	Aberjona River	2.33	28.9
Invertebrates Insecta	State-threatened Species Habitat	Aberjona River	2.54	28.9
Vascular Plants Dicotyledoneae	State-threatened Species Habitat	Aberjona River	2.54	28.9
Vascular Plants Dicotyledoneae	State-threatened Species Habitat	Aberjona River	2.58	28.9
Vascular Plants Dicotyledoneae	State-threatened Species Habitat	Aberjona River	2.62	28.9
Vascular Plants Dicotyledoneae	State-threatened Species Habitat	Aberjona River	2.70	28.9
Mystic River Wetlands	0.7 miles of Wetlands	Mystic River	6.1 to 12.6	118.8
Vertebrates Aves	Federal-candidate Species Habitat	Mystic River	9.77	118.8
Vertebrates Aves	Federal-endangered Species Habitat	Mystic River	9.94	118.8
Vertebrates Aves	State-endangered Species Habitat	Mystic River	10.86	118.8
Vertebrates Aves	Federal-candidate Species Habitat	Mystic River	11.46	118.8
Vertebrates Aves	Federal-endangered Species Habitat	Mystic River	11.58	118.8
Migratory Pathway for Alewife	Anadromous Fish Migratory Pathway	Boston Inner Harbor	14.0	NA

\* Cubic ft per second  
CWA = Clean Water Act  
PPE = Probable Point of Entry

[22-25; 39]

No surface water sampling associated with the Riley Co. property has been conducted to date [12]. Given the distance from the property to the PPE, and the location of other industries between the property and the PPE, an observed release to surface water would be difficult to document. Thereby, no known release to the surface water pathway has been documented and no impacts to the Aberjona River are known or suspected.

## SOIL EXPOSURE PATHWAY

There are 50 full-time employees on the Riley Co. property who work for Charles Ice Cream, W. A. Kraft, and New England Trucking Co. [43]. There are no residents on the property; the nearest residence is located at 250 Salem Street approximately 200 ft south of the property [43, p. 5]. The nearest school to the property is the White School located approximately 3,200 ft southwest of the property [17]. No terrestrial sensitive environments are noted on the property [43]. An estimated 9,806 persons live within 1-radial mile of the property [20].

On 30 and 31 January 1996, during a MA DEP-approved soil sampling program, 28 test pits (TP-1 through TP-28) were excavated by 21E, Inc. at 228 Salem Street which was listed as LTBI by MA DEP. The majority of the test pits were excavated systematically in a 200-ft interval grid pattern in the northwestern and southern portions of the property. TP-9 was excavated in the vicinity of the former USTs; TP-10 was excavated in the vicinity of the former bag house; TP-14 was excavated in the former hide storage area; TP-19, TP-20, and TP-21 were excavated in the vicinity of the former sludge disposal area; and TP-18 and TP-22 were excavated in the vicinity of the former catchbasin. Soil samples were collected from the surface at each test pit location and at changes in lithology. All soil samples were screened in the field for VOCs using a PID. Selected soil samples were submitted for laboratory analysis for RCRA-8 metals [12, p. 2].

The analytical results indicated that the 0 to 1 ft sample from TP-1 contained arsenic at 95 ppm, and the 0 to 0.5 ft sample from TP-12 contained arsenic at 40 ppm triggering an Imminent Hazard condition [12, p. 3]. Three additional test pits, TP-109, TP-110, and TP-111, were excavated around TP-12 in an attempt to delineate the extent of surficial arsenic contamination. Soil samples collected from 0.5 to 1 ft from TP-109 contained elevated levels of chromium and arsenic, while the 0 to 0.5 ft soil samples contained lower levels of these compounds and did not present an Imminent Hazard condition [12, p. 2-3].

On 11 June 1996, 21E, Inc. submitted an IRA Status Report to MA DEP on behalf of Wedel Corporation. The report stated that the excavation of the contaminated soil was conducted on 29 and 30 May and 4 June 1996. Soil was excavated from the test pits to a depth of 1 ft bgs. The excavated soil, totaling approximately 850 cubic yards, was stockpiled and covered with 6 mm thick polyethylene sheeting. Once the contaminated soil was excavated, confirmatory samples were collected and analyzed for the presence of arsenic [9; 10]. Confirmatory samples collected 0 to 1 ft bgs indicated arsenic concentrations ranging from 3.9 ppm to 29 ppm. Soil samples from test pits around TP-1, collected 0 to 0.5 ft bgs, contained arsenic levels ranging from 13 ppm to 29 ppm [12, p. 9].

The sample collected from TP-208 contained the highest concentration of arsenic. Background levels of arsenic were determined on the property by collecting samples between the two areas of arsenic contamination and from locations surrounding the property. Sample TP-6 contained arsenic at 8.6 ppm and this is the highest level of background arsenic concentration in the property and surrounding soils.

Due to the availability of third party soil data, START personnel did not collect soil samples as part of the Riley Co. SIP. Based on soil sampling conducted by 21E, Inc. on 4 June 1996, a release of hazardous substances to surficial soils from an old oil well has been determined. However, based on site observations and conditions and the lack of public use of the property, no impacts to nearby residential populations is known or suspected.

### AIR PATHWAY

There are 56 full-time employees on the property who work for Charles Ice Cream, W.A. Kraft, and New England Trucking Co. [43]. There are no residents on the property; the nearest residence is located at 250 Salem Street approximately 200 ft south of the property [43, p. 5]. An estimated 147,048 persons live within 4-radial miles of the property [20]. Table 8 summarizes the estimated population within 4-radial miles of the property.

**Table 8**

**Estimated Populations Within 4-Radial Miles of John J. Riley Co.**

Radial Distance from the John J. Riley Co. (miles)	Estimated Population
On a Source	56
> 0.00 to 0.25	446
> 0.25 to 0.50	1,644
> 0.50 to 1.00	7,716
> 1.00 to 2.00	36,299
> 2.00 to 3.00	45,717
> 3.00 to 4.00	55,226
<b>TOTAL</b>	<b>147,048*</b>

\* excludes on-site workers

[20]

Approximately 2,000 acres of wetlands are located within 4-radial miles of the property. In addition, habitats for 11 State-threatened, and/or endangered species and two Federal-candidate species are located within 4-radial miles of the property [32]. Table 9 summarizes the sensitive environments located within 4-radial miles of the property.

Table 9

**Sensitive Environments Located Within 4-Radial Miles of John J. Riley Co.**

Radial Distance from John J. Riley Co. (miles)	Sensitive Environments/Species (status)
> 0.00 to 0.25	Water body protected by Clean Water Act
	23 acres wetlands
> 0.25 to 0.50	43 acres wetlands
> 0.50 to 1.00	62 acres wetlands
> 1.00 to 2.00	258 acres wetlands
> 2.00 to 3.00	Seven State-threatened species habitats
	One State-endangered species habitat
	592 acres wetlands
> 3.00 to 4.00	Two State-threatened species habitats
	One State-endangered species habitat
	Two Federal candidate species habitats
	1,022 acres wetlands

[22-25; 39; 50]

No air sampling has been conducted on the property to date [1-12; 43]. During the START on-site reconnaissance, ambient air was monitored using a PID. No readings above background were noted [43].

No laboratory qualitative air samples are known to have been collected from the Riley Co. property. Neither a release to the ambient air from on-site sources nor impacts to nearby residential populations or sensitive environments are known or suspected.

## SUMMARY

John J. Riley Co. (Riley Co.) property is located at 228 Salem Street in Woburn, Middlesex County, Massachusetts. The property comprises 15.8 acres and is located approximately 2,500 feet (ft) west of the Aberjona River, and 3,350 ft northeast of Woburn High School. The property is bordered by greenhouses to the south, residences to the east, Boston & Maine (B&M) Railroad tracks to the northeast, and the properties occupied by BASF and Toxikon Laboratories to the west.

The Riley Co., while in business, operated two production wells PW-01 (located on the northeast portion of the property) and PW-02. A wooded area, formerly owned by the Riley Co., is located across the B&M Railroad tracks, northeast of the Riley Co. This area is currently owned by the Wildwood Conservation Trust, and is the location of a former production well for the Riley Co. (PW-02). The two inactive City of Woburn public water supply wells (Wells G and H) are located approximately 2,000 ft northeast of the property. The production well, as well as Wells G and H, were found by Massachusetts Department of Environmental Quality and Engineering (MA DEQE) to be contaminated with volatile organic compounds (VOCs) in 1979. Wells G and H were subsequently listed on the Environmental Protection Agency (EPA) Superfund National Priority List (NPL) as the Wells G & H site.

The Riley Co., owned by Mr. John J. Riley, operated as a tannery on the property for approximately 74 years from 1915 until 1989. From December 1978 to January 1982, the company continued operations on site but was owned by Beatrice Foods, Inc. Mr. Riley, the president of the tanning company, reacquired the business from Beatrice Foods, Inc. in 1983. Tannery operations continued until 1989 at which time all the equipment was removed and operations ceased. In June 1994, the Maggiore Companies (property developers), subdivided the property into six lots and labeled them as Lot Nos. 11 through 16.

Several environmental investigations have been performed on the Riley Co. and other industrial facilities located to the south and east of the property. In 1987, the Riley Co. was listed with the MA DEQE as a Location to be Investigated (LTBI) due to the contamination in the production wells and trace contamination discovered in soil borings on the property. However, the investigations concluded that the Riley Co. tannery was not a probable source of contamination found in the four wells.

According to Massachusetts Department of Environmental Protection (MA DEP, formerly MA DEQE), the tanning operations on the property included primarily the "chrome" tanning of hides into shoe leather. The facility was considered by MA DEP as a medium-sized operation. The facility reportedly used hexavalent chromium as a raw material in the "chrome" tanning process. However, prior to the introduction into the tanning process, hexavalent chromium was converted to trivalent chromium.

Between November 1980 and March 1981, Ecology & Environment, Inc. (E&E), under contract to the EPA, conducted a Preliminary Assessment (PA) and a Site Inspection (SI) on the property. In 1983, Yankee Environmental Engineering and Research Services, Inc. (YE<sup>2</sup>ARS) conducted subsurface investigations of the property and excavated nine test pits on the 15.8-acre Riley Co.

property. Six overburden monitoring wells were installed on the property (Y-B1 through Y-B6). Groundwater samples were collected and analyzed for chlorinated VOCs by EPA Method 601. YE<sup>2</sup>ARS noted that there was a substantial decrease in the concentrations of VOCs in PW-01 compared to those reported in the 1980/1981 E&E Investigation. The YE<sup>2</sup>ARS report concluded that the Riley Co. tannery was not a probable source of the contamination documented in PW-02 and Woburn Wells G and H.

In 1990 and 1993, 21 E, Inc., conducted Environmental Site Assessments (ESAs) on the Riley Co. Property. Monitoring wells were installed and groundwater and soil samples were collected from the property. Based on the sampling results, 21E, Inc. reported that there was no evidence of a release of oil or hazardous materials to the groundwater from the Riley Co. property. In addition, based on the data from these investigations, 21E, Inc. concluded that tannery operations at the property have not adversely affected the environmental integrity of the property.

On 7 March 1994, Ms. Sandra M. Hebert, Licensed Site Professional (LSP) for 21E, Inc. submitted an LSP Evaluation Opinion Statement (EOS) on behalf of Wedel Corporation, the potentially responsible party (PRP) and Maggiore Companies (property developers) to MA DEP for the 228 Salem Street property (which was listed as a LTBI site by MA DEP on 15 January 1987) pursuant to Massachusetts General Laws (MGL) 21E and 310 CMR 40.0000.

On 4 January 1996, MA DEP issued a Notice of Noncompliance and Notice of Audit (NOA) Findings to Wedel Corporation. MA DEP determined that the LSP EOS submittal was in noncompliance with one or more laws, regulations, orders, licenses, permits, or approvals enforced by MA DEP. In addition, the audit identified that inadequate information was available on the extent of release, vertical and horizontal extent of contamination, and risk characterization.

On 30 and 31 January 1996, during the MA DEP-approved soil sampling program conducted by 21E, Inc., 28 test pits (TP-1 through TP-28) were excavated across the undeveloped lots at the Riley Co. property (Lot Nos. 12, 13, 15, and 16). Surficial soil samples were collected from the test pits. All soil samples were screened in the field for volatile organic compounds (VOCs) with a photoionization detector (PID). Selected surficial soil samples were submitted for laboratory analysis for RCRA-8 metals. Soil samples from two areas in the southern and northwestern portions of the property were found to be contaminated with arsenic. The levels of arsenic in the soil samples collected from the vicinity of TP-1 triggered an "imminent hazard condition".

On 11 June 1996, 21E, Inc., submitted an Immediate Response Action (IRA) Status Report to MA DEP on behalf of Wedel Corporation. The report stated that the excavation of the contaminated soil was conducted on 29 and 30 May and 4 June 1996. The soil was excavated from the southern and northwestern area of the property using a backhoe, bulldozer, and small Bobcat excavator. The excavated soil, totaling approximately 850 cubic yards, was stockpiled and covered with polyethylene sheeting. Once the contaminated soil was excavated, confirmatory samples were collected from the excavation and analyzed for the presence of arsenic.

A Method I Risk Characterization was completed by 21E, Inc., in accordance with the guidelines of the MCP, 310 CMR 40.0000, to determine if a "Level of No Significant Risk" existed on the property. Method I was chosen to demonstrate that a "Level of No Significant Risk" existed since only soil contamination was reported on the property.

According to 21E, Inc., exposure point concentration for arsenic was 9.99 ppm which was calculated by averaging the post removal sampling concentrations for arsenic. Background arsenic levels were evaluated by collecting and analyzing soil samples between the two areas of soil contamination. The average background levels for arsenic in soils was estimated to be 6.24 ppm. In addition, according to The Soil Chemistry of Hazardous Materials, the typical range of arsenic concentrations in Woburn (native) soils is between 1.0 parts per million (ppm) and 40.0 ppm. Therefore, comparing the average exposure point concentration to the background data from the property and to that reported in the literature, it was concluded by 21 E, Inc. that the conditions at the property did not pose any significant risk and hence a Permanent Solution had been achieved meeting the requirements of MCP regulations.

There are no active drinking water supply wells located in the vicinity of the property. The nearest documented groundwater source of drinking water is the Woburn Water Department's Horn Pond wells located approximately 2.2 miles southwest of the property. The nearest private water supply well is estimated to be located between 0.25 and 0.5-radial miles of the property. Approximately 65,933 persons rely on groundwater for drinking water within 4-radial miles of the property. Groundwater beneath the property is documented to be contaminated with metals such as arsenic, chromium, and lead.

The property lies within the Aberjona River Basin. Surface water runoff from the property flows via catchbasins and storm sewers located on Salem Street towards the wetland areas associated with a drainage swale located approximately 1,500 ft east of the property. No surface water drinking water intakes are located within the 15-mile downstream pathway from the Riley Co. property. Approximately 2.9 miles of wetland frontage exists within 15-downstream miles of the property. Habitats for eight State-threatened species, one State-endangered species, two Federal-candidate species, and two Federal-endangered species are located along the Aberjona and Mystic Rivers within 15-downstream miles of the property.

There are 56 full-time employees on the property who work for Charles Ice Cream, W.A. Kraft, and New England Trucking Co. There are no residents on the property; the nearest residence is located at 250 Salem Street approximately 200 ft northeast of the property. An estimated 9,806 persons and 147,048 persons live within 1-radial mile and 4-radial miles of the property, respectively.

JOHN J. RILEY CO.  
REFERENCES

- [1] E&E/FIT (Ecology & Environment, Inc./Field Investigation Team). 1980. Site Inspection Report of John J. Riley Company. TDD No. F1-8005-01E-03. 1 December.
- [2] 21E, Inc. 1990. Final Report Environmental Site Assessment for 228 Salem Street. 26 December.
- [3] 21E, Inc. 1993. Final Report Environmental Site Assessment for 228 Salem Street. 10 August.
- [4] Paragon Environmental Services, Inc., 1994. Comprehensive Site Assessment for Lot 14, Wildwood Avenue, Woburn, Massachusetts. 30 October.
- [5] MA DEP (Massachusetts Department of Environmental Protection). 1996. Letter to Maggiore Companies. "Notice of Noncompliance and Notice of Audit Findings". 4 January.
- [6] 21E, Inc. 1996. RE: Plan of Activities (Notice of Audit Findings). 26 January.
- [7] MA DEP (Massachusetts Department of Environmental Protection). 1996. Letter to Wedel Corporation. "Release Notification & Notice of Potential Responsibility". 26 February.
- [8] MA DEP (Massachusetts Department of Environmental Protection). 1996. Memo to file. Site Status - John J. Riley Tannery, 228 Salem Street, RTN 3-0482. 25 March.
- [9] 21E, Inc. 1996. Immediate Response Action Plan. 228 Salem Street, Woburn, MA. 12 April.
- [10] 21E, Inc. 1996. Immediate Response Action Status Report. 228 Salem Street, Woburn, MA. 11 June.
- [11] 21E, Inc. 1996. Response Action Outcome Statement. 228 Salem Street, Woburn, MA. 30 July.
- [12] 21E, Inc. 1996. Notice of Noncompliance & Audit Findings Completion Statement. 228 Salem Street, Woburn, MA. 14 August.
- [13] MA DEP (Massachusetts Department of Environmental Protection), 1996. Memo to file. Site Status - John J. Riley Tannery, 228 Salem Street, RTN 3-0482. 6 September.
- [14] Kamath, J. (START). 1997. Phone Conversation Record with City of Woburn Assessor's Office, RE: Ownership Information for John J. Riley Co. TDD No. 97-06-0019. 14 August.

**JOHN J. RILEY CO.**  
**REFERENCES (Continued)**

- [15] Kamath, J. (START). 1997. Phone Conversation Record with Mr. Paul Maggiore (The Maggiore Companies), RE: Ownership Information for John J. Riley Co. TDD No. 97-06-0019. 14 July.
- [16] USGS (U.S. Geological Survey). 1965; 1979 Photorevised. Wilmington Quadrangle, MA. (7.5-minute series topographic map).
- [17] USGS (U.S. Geological Survey). 1985. Boston North Quadrangle, MA. (7.5 × 15-minute series topographic map).
- [18] USGS (U.S. Geological Survey). 1971. Lexington Quadrangle, MA. (7.5-minute series topographic map).
- [19] USGS (U.S. Geological Survey). 1966; 1979 Photorevised. Reading Quadrangle, MA. (7.5-minute series topographic map).
- [20] Frost Associates. 1997. Project Note, John J. Riley Co., RE: Population and Private Well Users. TDD No. 97-06-0019. 9 August.
- [21] USGS (U.S. Geological Survey). 1983. Bedrock Geological Map of Massachusetts. Edited by E-an Zen.
- [22] FWS (U.S. Fish and Wildlife Service). undated. National Wetlands Inventory Map for Wilmington Quadrangle, MA.
- [23] FWS (U.S. Fish and Wildlife Service). undated. National Wetlands Inventory Map for Lexington Quadrangle, MA.
- [24] FWS (U.S. Fish and Wildlife Service). undated. National Wetlands Inventory Map for Reading Quadrangle, MA.
- [25] FWS (U.S. Fish and Wildlife Service). undated. National Wetlands Inventory Map for Boston North Quadrangle, MA.
- [26] Rose, S. (START). 1997. Phone Conversation Record with Mr. William Neeman, Woburn Water Department, RE: Public Water Supplies, Woburn, MA. 11 February. TDD No. 97-01-0034.
- [27] FEMA (Federal Emergency Management Agency). 1980. Flood Insurance Rate Map, Woburn, Middlesex County, Massachusetts, Community Panel No. 250229 0001 B. 2 July.

**JOHN J. RILEY CO.**  
**REFERENCES (Continued)**

- [28] NOAA (National Oceanic and Atmospheric Administration). 1961-1990. Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days. Published by the U.S. Department of Commerce.
- [29] Arrow Map, Inc. 1995. Street Atlas of Metro Boston and Eastern Massachusetts.
- [30] Amirault, S. (START). 1996. Phone Conversation Record with Mr. Rob Antico, Wilmington Water Department, RE: Public Water Supplies, Wilmington, MA. 23 February.
- [31] Rose, S. (START). 1997. Phone Conversation Record with Mr. Richard Dubbs, Burlington Water Department, RE: Public Water Supplies, Burlington, MA. TDD No. 97-01-0034. 20 February.
- [32] Rose, S. (START). 1997. Phone Conversation Record with Mr. Peter Tassi, Reading Water Department, RE: Public Water Supplies, Reading, MA. TDD No. 97-01-0034. 20 February.
- [33] Rose, S. (START). 1997. Phone Conversation Record with Ms. Marge Muir, Stoneham Water Department, RE: Public Water Supplies, Stoneham, MA. TDD No. 97-01-0034. 20 February.
- [34] Rose, S. (START). 1997. Project Note, RE: Woburn Water Department Apportionment Calculations. TDD No. 97-01-0034. 20 February.
- [35] Rose, S. (START). 1997. Project Note, RE: Wilmington Water Department Apportionment Calculations. TDD No. 97-01-0034. 20 February.
- [36] Rose, S. (START). 1997. Project Note, RE: Reading Water Department Apportionment Calculations. TDD No. 97-01-0034. 20 February.
- [37] Rose, S. (START). 1997. Phone Conversation Record with Mr. Tom Shepard, USGS (U.S. Geological Survey), RE: Mean Annual Flow Rate for Aberjona River. TDD No. 97-01-0034. 20 February.
- [38] Rose, S. (START). 1997. Interview with Ms. Carol Cogan, City of Woburn Conservation Commission, RE: Drinking Water Intakes/Fisheries Along Aberjona and Mystic Rivers. TDD No. 97-01-0034. 12 February.
- [39] Charest, G. (U.S. Environmental Protection Agency). 1997. Project Note, RE: Rare and Endangered Species Report, John J. Riley Co., Woburn, MA. TDD No. 97-06-0019.
- [40] Audet, M. (START). 1996. Phone Conversation Record with Mary Anne, Winchester Water Department, RE: Public Water Supplies, Winchester, MA. 23 February.

**JOHN J. RILEY CO.**  
**REFERENCES (Concluded)**

- [41] Audet, M. (START). 1996. Phone Conversation Record with Nancy, Medford Water Department, RE: Public Water Supplies, Medford, MA. 23 February.
- [42] MA DEP (Massachusetts Department of Environmental Protection). 1990. Massachusetts Surface Water Quality Standards. Division of Water Pollution Control. Publication No. 18.404-113-100-00-CR.
- [43] START. 1997. Field Logbook for John J. Riley Co. Site Inspection Prioritization. No. 00220-S. TDD No. 97-06-0019.
- [44] GIS Map (Geographic Information Systems). 1996. Wilmington, MA. (7.5-minute series GIS map).
- [45] GIS Map (Geographic Information Systems). 1996. Lexington, MA. (7.5-minute series GIS map).
- [46] GIS Map (Geographic Information Systems). 1996. Reading, MA. (7.5-minute series GIS map).
- [47] GIS Map (Geographic Information Systems). 1996. Boston North, MA. (7.5-minute series GIS map).
- [48] U.S. Fish & Wildlife Service. 1988. Atlantic Coast Ecological Inventory Map, Boston, Mass. - Conn. - ME - NH.
- [49] Woodward-Clyde Consultants. 1984. Geology and Groundwater Contamination, J.J. Riley Site, Woburn, Massachusetts. 31 January.
- [50] Kamath, J. (START). 1997. Project Note, RE: Area of Wetlands. TDD No. 97-06-0019. 9 August.
- [51] Kamath, J. (START). 1997. Phone conversation Record with Mitra Khadem, Massachusetts Department of Environmental Protection, Woburn. RE: J.J. Riley Property. 6 October.

UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF MASSACHUSETTS

ANNE ANDERSON, for herself, and as parent and next friend of CHARLES ANDERSON, and as Administratrix of the estate of JAMES ANDERSON; CHRISTINE ANDERSON; RICHARD AUFIERO, for himself, and as parent and next friend of ERIC AUFIERO, and as Administrator of the estate of JARROD AUFIERO; LAUREN AUFIERO; DIANE AUFIERO, for herself, and as parent and next friend of JESSICA AUFIERO; ROBERT AUFIERO; KATHRYN GAMACHE, for herself, and as parent and next friend of AMY GAMACHE; TODD L. GAMACHE; ROLAND GAMACHE; PATRICIA KANE, for herself, and as parent and next friend of MARGARET KANE; KATHLEEN KANE; TIMOTHY KANE and KEVIN KANE, JR.; KEVIN KANE; DONNA L. ROBBINS, for herself, and as parent and next friend of KEVIN ROBBINS, and as Administratrix of the estate of CARL L. ROBBINS, III; MARY J. TOOMEY, for herself and as next friend of MARY EILEEN TOOMEY, and as Administratrix of the estate of PATRICK TOOMEY; RICHARD J. TOOMEY; JOAN ZONA, for herself, and as Administratrix of the estate of MICHAEL ZONA; RONALD ZONA; ANN ZONA; JOHN ZONA; and PAT ZONA

vs

CRYOVAC, Division of W. R. Grace & Co.; W. R. GRACE & CO.; JOHN J. RILEY COMPANY, Division of Beatrice Foods Co.; BEATRICE FOODS CO.; and XYZ COMPANY (ies)

CIVIL ACTION  
No. 82-1672-S

Deposition of JOHN J. RILEY, JR., taken on behalf of the Plaintiffs, pursuant to the applicable provisions of the Federal Rules of Civil Procedure, before Valerie T. Wong, Notary Public within and for the Commonwealth of Massachusetts, at the offices of Schlichtmann, Conway & Crowley, 171 Milk Street, Boston, Massachusetts, commencing at 10:15 o'clock A.M. on Wednesday, April 3, 1985.

1  
2 **Appearances:**

3 Jan Richard Schlichtmann, Esq.  
4 Kevin P. Conway, Esq.  
5 Schlichtmann, Conway & Crowley  
6 171 Milk Street  
7 Boston, Massachusetts  
8 for the Plaintiffs.

9 Andrew S. Schwartz, Esq.  
10 Foley, Hoag & Eliot  
11 One Post Office Square  
12 Boston, Massachusetts  
13 for the Defendants Cryovac, Division of W. R.  
14 Grace & Co. and W. R. Grace & Co.

15 Neil H. Jacobs, Esq.  
16 Donald R. Frederico, Esq.  
17 Hale & Dorr  
18 60 State Street  
19 Boston, Massachusetts  
20 for the Defendant Beatrice Foods Co.

21 Mary K. Ryan, Esq.  
22 Nutter, McClennen & Fish  
23 600 Atlantic Avenue  
24 Boston, Massachusetts  
25 for the Deponent.

Roberta K. Schnoor, Esq.  
Goodwin, Procter & Hoar  
28 State Street  
Boston, Massachusetts  
for the Defendant Unifirst Corporation.

---

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25

MR. SCHLICHTMANN: Same stipulations as in the other depositions?

MS. RYAN: Could you state those for the record?

MR. SCHLICHTMANN: We will waive all objections, except as to form, and he will read and sign the deposition.

MR. JACOBS: Waive filing?

MR. SCHLICHTMANN: Right.

MR. JACOBS: And reserve all motions to strike?

MR. SCHLICHTMANN: Right.

MS. RYAN: All right.

MR. SCHLICHTMANN: Is that satisfactory?

MR. JACOBS: Agreed.

MS. RYAN: Yes.

MR. SCHLICHTMANN: I think it is appropriate if the attorneys identify who they are representing because we have several attorneys for John J. Riley.

MR. JACOBS: Hale & Dorr represents Beatrice Foods Company and Division John J. Riley Co.

MS. RYAN: I am with Nutter, McClennen &

1  
2 Fish. We represent John J. Riley, Jr. individually  
3 and John J. Riley, Inc. for the purpose of today's  
4 deposition.

5 MR. SCHLICHTMANN: But Hale & Dorr does not  
6 represent Mr. Riley individually?

7 MR. JACOBS: No, sir.

8 MR. SCHLICHTMANN: Only as in his  
9 association with Beatrice Foods?

10 MR. JACOBS: We represent Beatrice Foods  
11 Company and its division.

12 MR. SCHLICHTMANN: Okay.

13 MR. JACOBS: There is no independent legal  
14 existence. It is just the way you captioned your  
15 case.

16 MR. SCHLICHTMANN: Is Mr. Riley being  
17 designated as the person most knowledgeable? We  
18 made several deposition requests. Is Mr. Riley --

19 MS. RYAN: I have voluntarily acceded to  
20 provide Mr. Riley individually for his deposition,  
21 which I understand him to be testifying in.

22 MR. SCHLICHTMANN: His individual  
23 capacity?

24 MS. RYAN: Uh-huh.

25 MR. SCHLICHTMANN: We sent out a notice of

1  
2 deposition for persons most knowledgeable in areas  
3 of chemical use and waste disposal practices and  
4 environmental matters. I am wondering if any of  
5 those persons --

6 MR. JACOBS: He is no longer an employee  
7 of Beatrice Foods and we can't designate him.

8 MR. SCHLICHTMANN: How about for that  
9 period?

10 MR. JACOBS: He still can't testify about  
11 Beatrice Foods today. We can't designate --

12 MS. RYAN: I have no knowledge whatsoever  
13 of any of the pleadings you're referring to.

14 MR. SCHLICHTMANN: Okay.

15 MR. JACOBS: I understand Mr. Riley is here  
16 today to testify individually; that, as a factual  
17 matter, he is the person who knows the most about  
18 the operations of the Riley Tannery; and that you and  
19 I in our conversations - and I don't know if you had  
20 the same conversations with Mr. Frederico - but we  
21 never really dealt with the issue whether Beatrice  
22 could designate him as the person to testify on  
23 behalf of Beatrice. I have not made an exhaustive  
24 check. We have had some opportunity to discuss this  
25 with in-house counsel for Beatrice Foods, and I

1  
2 sincerely doubt anyone in the current employ of  
3 Beatrice Foods from the era of Riley Tannery when  
4 Beatrice owned the tannery who had any  
5 responsibility for --

6 MR. SCHLICHTMANN: Okay. I know what  
7 you're saying.

8  
9 JOHN J. RILEY, JR.,

10 a witness called by the Plaintiffs, first having been  
11 duly sworn, on oath deposes and says as follows:

12 Direct Examination

13  
14 Q (By Mr. Schlichtmann) Would you state your name,  
15 please?

16 A John J. Riley, Jr.

17 Q Where do you live?

18 A 9 Huntington Road, Lynnfield, Mass.

19 Q How long have you lived there?

20 A About 18 years.

21 Q Prior to that time where did you live?

22 A 94 Middle Street, Woburn, Mass.

23 Q How long did you live at Middle Street in Woburn,  
24 Mass.?

25 A About 17 years.

3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25

Q Have you ever conducted an investigation to determine what types of solvents have been used at the John J. Riley Company?

MS. RYAN: Objection. You may answer.

A No.

Q Have you ever participated in any investigation concerning solvent use at the John J. Riley Company?

MR. JACOBS: Objection.

MS. RYAN: Objection.

A Repeat the question.

Q Have you ever participated in any investigation concerning solvent use at the John J. Riley Company?

MS. RYAN: Objection.

A We don't use many solvents.

Q Mr. Riley, I am asking the question: Have you ever participated in an investigation which determined solvent use at John J. Riley Company.

A No.

MR. JACOBS: I want to note for the record after this lawsuit was filed, Michael Rodberg and myself, and perhaps others, did something with Mr. Riley which some people might

1  
2 consider investigation. Apparently Mr. Riley does  
3 not.

4 Q Other than Stahl Finish, who are the other  
5 suppliers of John J. Riley Company of leather  
6 finishing materials or products?

7 A Stahl is the biggest one. We buy a little from  
8 Rohm Haas, R-O-H-M, H-A-A-S.

9 Q How do you spell that again?

10 A R-O-H-M, H-A-A-S.

11 Q Where is he located?

12 A In Philadelphia.

13 Q How long have you been doing business with Rohm  
14 Haas?

15 A It is not a Mr. Haas.

16 Q Did I mispronounce the name?

17 MR. JACOBS: It is the name of the  
18 corporation.

19 A The name of the corporation.

20 Q What is the name of the corporation?

21 A Rohm Haas.

22 Q That is the name of the corporation?

23 A Yes.

24 Q Is there someone you deal with there?

25 A They never really had anyone call on us.

A 1983.

Q And another company took over John J. Riley Company in 1983?

A Yes.

Q What is that?

A John J. Riley Company, Inc.

Q Does John J. Riley Company, Inc. have shareholders?

A Yes.

Q How many shareholders does it have?

A Two.

Q Who are those two?

A My wife and I.

Q Your wife and you own 100 percent of the John J. Riley Company, Inc.?

A That is correct.

Q It says on the second paragraph: John J. Riley Company is located north of Salem Street in East Woburn on lots #37 and 96, and comprises approximately 15.66 acres of land.

Is that a true statement to your knowledge?

A More or less.

Q It goes on to say: The property is bordered by the Boston and Maine Railroad to the east,

1  
2 MS. RYAN: Objection.

3 A No.

4 Q What is done with the very little produced from the  
5 finishing process?

6 A Passed through the sedimentation tank to the sewer.

7 Q To the soil?

8 A To the sewer.

9 MR. JACOBS: Sewer.

10 Q Passed through the sedimentation tank to the sewer?

11 A Yes.

12 Q How does it pass through the sedimentation tank to  
13 the sewer?

14 A Sedimentation collects hair or cow shit or pieces  
15 of leather; that is all it does. The liquid  
16 passes on through to the sewer.

17 Q Whatever is produced by the finishing process would  
18 go in the sedimentation tank and pass through to  
19 the sewer?

20 A Correct.

21 Q And then this sedimentation material that you  
22 described as soupy would be scooped out of the  
23 sedimentation tank and put on the ground to the rear  
24 of the plant?

25 MS. RYAN: Objection.

2 MR. JACOBS: Objection.

3 A That is correct.

4 Q And that has been going on for the last 40 or 50  
5 years?

6 A That is correct.

7 Q Have you ever done an analysis of that soupy,  
8 sedimentation material?

9 MS. RYAN: Objection. I will instruct  
10 the witness not to answer in light of your  
11 allegation. I don't think you have a good faith  
12 basis for this line of inquiry. You have  
13 specifically stated in court and in papers you do  
14 not allege the tannery process is a source of  
15 contamination. I think you are entitled to  
16 discovery as to what was disposed, and I will permit  
17 discovery in that area.

18 Q My question to you is: Have you ever done an  
19 analysis or testing of that sedimentation tank  
20 material?

21 MS. RYAN: I instruct you not to answer  
22 the question.

23 MR. SCHLICHTMANN: Do you want to find out  
24 if he did so we don't have to go over to court for  
25 nothing?

1  
2 MS. RYAN: Can you answer the question  
3 yes or no?

4 A No.

5 Q You never have done a test?

6 A No.

7 MR. JACOBS: That takes the drama out of  
8 that.

9 MR. SCHLICHTMANN: I thought we had some-  
10 thing there, Mary.

11 MS. RYAN: Gosh.

12 Q It states in Paragraph 3.4.7. on Page 3-11:  
13 Mr. Riley stated that the sedimentation tank is  
14 cleaned approximately once a month and the tannery  
15 waste sludge is disposed of beside the chromium  
16 lagoons.

17 Is that a true statement?

18 MS. RYAN: Objection.

19 MR. JACOBS: Objection.

20 A No.

21 Q Did you ever make such a statement?

22 A No.

23 MR. JACOBS: Objection.

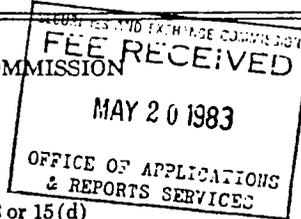
24 Q Did you ever indicate anything like that to the  
25 EPA?

ORIGINAL  
S 20-700 1

B264600



SECURITIES AND EXCHANGE COMMISSION  
Washington, D. C. 20549



### Form 10-K

Annual Report Pursuant to Section 13 or 15(d)  
of the Securities Exchange Act of 1934

Fiscal Year Ended February 28, 1983

Commission File No.: 1-831

## Beatrice Foods Co.

Delaware  
(State of Incorporation)

36-078-3330  
(I.R.S. Employer Id. No.)

Two North LaSalle Street, Chicago, Illinois  
(Address of Principal Executive Offices)

60602  
(Zip Code)

Registrant's telephone no., including area code: (312) 782-3820

Securities registered pursuant to Section 12(b) of the Securities Exchange Act of 1934:

Title of Class	Name of Each Exchange on Which Registered
7 7/8 % Sinking Fund Debentures Due 1994	New York Stock Exchange
8 1/2 % Sinking Fund Debentures Due 2008	New York Stock Exchange
10 7/8 % Sinking Fund Debentures Due 2010	New York Stock Exchange
\$4.00 Convertible Preference Stock, Second Series	New York Stock Exchange
Series A Cumulative Convertible Preference Stock	New York Stock Exchange
Common Stock	New York Stock Exchange Midwest Stock Exchange

No securities are registered pursuant to Section 12(g) of the Securities Exchange Act of 1934.

Indicate by check mark whether the Registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the Registrant was required to file such reports) and (2) has been subject to such filing requirements for the past 90 days. Yes  No

The aggregate market value of all voting stock held by non-affiliates of the Registrant computed by reference to the last reported price at which stock was sold on May 13, 1983 was approximately \$3,058 million.

As of May 13, 1983, a total of 99,113,662 shares of Common Stock were outstanding.

#### DOCUMENTS INCORPORATED BY REFERENCE

Parts I, II and IV incorporate by reference portions of Beatrice Foods Co. Annual Report to Stockholders for the fiscal year ended February 28, 1983 ("Beatrice's 1983 Annual Report"). Part III incorporates by reference portions of Beatrice Foods Co. Proxy Statement for the Annual Meeting of Stockholders dated May 5, 1983 ("Beatrice's Proxy Statement dated May 5, 1983").

TOTAL OF SEQUENTIALLY NUMBERED PAGES: 21  
CROSS-INDEX ON SEQUENTIALLY NUMBERED PAGES: 18

# Beatrice Food

FOR THE YEAR ENDED DECEMBER 31, 1957

Assets

**ON THE COVER:**

On the Kennedy Expressway, three miles north of Chicago's Loop, stands the Beatrice Foods Co. sign, one of the largest outdoor advertisements in the country. The recently renovated sign promotes Beatrice's products to more than 700,000 travelers daily and symbolizes the company's renewed commitment to marketing.

Additional examples of Beatrice marketing efforts can be found in the "Growth Through Marketing" section, pages 16-24, which features stories about, as well as stockholder coupons for, Beatrice products.

**THE BUSINESS OF BEATRICE**

Beatrice is one of the world's leading diversified food companies, marketing a wide range of goods and services worldwide. The company employs over 78,000 people at facilities in over 30 countries.

Though varied in scope, each of Beatrice's operations has a common characteristic of offering quality and value. The vast majority of Beatrice businesses are geared to consumer markets.

Operations are balanced strategically among five principal business categories. Four of these make up a solid base of food and food-related products and services. The fifth encompasses the fields of consumer, industrial and chemical products.

Throughout Beatrice's nearly 90-year history, it has benefited from the dedication and hard work of its employees. Their eagerness to respond quickly to changing market conditions has led to an impressive and consistent performance record.

To prepare for a more competitive and volatile economic climate, Beatrice has made the commitment to become a unified, directed marketing company. This focus on marketing, together with Beatrice's philosophy of decentralized management and strong financial controls, places the company in an excellent position to prosper in the future.

**ANNUAL MEETING**

The 86th annual meeting of Beatrice stockholders will be held in the Grand Ballroom of the Hyatt Regency Hotel, 151 East Wacker Drive, Chicago, IL, on Thursday, June 9, at 10:00 a.m. Central Time.

**CORPORATE OFFICES**

Two North LaSalle Street  
Chicago, IL 60602  
Telephone (312) 782-3820  
Cable Address: BEATRICO CHICAGO  
Telex: 254680

William L. DeHaven, president of Specialty Meats, was elected a corporate vice president.

Thomas P. Kemp, president of Soft Drinks and Bottled Water operations, was named a corporate vice president.

Mary D. Allen, previously assistant vice president in the legal department, became vice president and assistant general counsel.

Barbara M. Knuckles, formerly manager of community and consumer relations, was named vice president and director of corporate marketing research.

#### ACQUISITIONS AND DIVESTITURES

In addition to finding familiar faces in new positions, many new faces appeared around the company because of acquisitions completed during fiscal 1983. In December we acquired Termicold Corporation, a refrigerated warehouse company with headquarters in Portland, Oregon. Beatrice now operates 41 warehouses nationally.

In June we completed acquisitions of Coca-Cola Bottling Company of San Diego and Coca-Cola Bottling Company of San Bernardino. These acquisitions, along with a few smaller Coca-Cola franchise territories acquired this year, complement our profitable and promising beverage operations.

During the year Beatrice sold a number of companies, including Amarillo By-Products and John J. Riley from the agri-products operations; A-1 Tool, Acme Die Casting, and Accurate Threaded Fasteners from industrial operations; and Brookside Vineyard. Financial details of acquisitions and divestitures are found in note 2 of Notes to Consolidated Financial Statements.

#### COMMUNITY RESPONSIBILITY

Your company continues to invest time and resources to enhance the quality of life in the communities in which its employees live and work.

During fiscal 1983, the company contributed \$3 million in direct financial support to a variety of educational, cultural, civic and medical institutions. In addition, Beatrice maintained its leadership position in the national food bank program, providing nearly 2 million pounds of surplus food to the needy, and continued its financial support for Second Harvest, the national food bank network.

The company's gift-matching program received wide support from employees who contribute to many educational, cultural and health-related organizations.

#### PRODUCTIVITY/EXPORTS

Much of the credit for Beatrice's ability to grow during this difficult year must go to our employees. Through unselfish dedication and commitment to a strong work ethic, Beatrice showed a substantial increase in worker productivity even though there were fewer employees. For all operations, sales per

employee increased nearly 7 percent, while the work force was down almost 5 percent.

Productivity improvements during fiscal 1983 resulted in a savings of \$40 million, up about 60 percent from the \$25 million saved last year.

Beatrice continues to promote export activity throughout the company through its program "Expro." Overall, exports declined moderately in fiscal 1983 as a result of the world-wide recession and the strong U.S. dollar. We are positioned well to take advantage of world-wide export opportunities as conditions improve.

#### OUTLOOK FOR FISCAL 1984

Given our new marketing direction, the appointments of capable people to key positions, and the promising upturn many of our businesses experienced at the close of the fiscal year, we are optimistic about prospects for each of our five operating segments and for the company as a whole in fiscal 1984.

Beatrice is a company that plans not for a single year but for the long-term. Even though we are optimistic about next year, we are more concerned with providing a stable base of profitability for years to come.

The steps we've taken should enable Beatrice to make substantial progress toward meeting our long-term objectives of 5 percent real annual growth and 18 percent return on equity.

We wish to acknowledge the loyalty and support of our employees, as well as that of Beatrice stockholders, customers and suppliers throughout the world. It is with them that we share the past successes and the promise of the future.

Sincerely yours,



James L. Dutt  
Chairman  
Chief Executive Officer  
President

May 5, 1983



The Commonwealth of Massachusetts  
William Francis Galvin

Secretary of the Commonwealth  
One Ashburton Place, Boston, Massachusetts 02108-1512  
Telephone: (617) 727-9640

**JOHN J. RILEY COMPANY, INC. Summary Screen**



Help with this form

Request a Certificate

The exact name of the Domestic Profit Corporation: JOHN J. RILEY COMPANY, INC.

Entity Type: Domestic Profit Corporation

Identification Number: 042774931

Old Federal Employer Identification Number (Old FEIN): 000189156

Date of Organization in Massachusetts: 12/30/1982

Date of Voluntary Dissolution: 05/19/1986

Current Fiscal Month / Day: 12 / 31

Previous Fiscal Month / Day: 00 / 00

**The location of its principal office in Massachusetts:**

No. and Street: 228 SALEM ST.  
City or Town: WOBURN State: MA Zip: 01802 Country: USA

**If the business entity is organized wholly to do business outside Massachusetts, the location of that office:**

No. and Street:  
City or Town: State: Zip: Country:

**Name and address of the Registered Agent:**

Name:  
No. and Street:  
City or Town: State: Zip: Country:

**The officers and all of the directors of the corporation:**

<b>Title</b>	<b>Individual Name</b> First, Middle, Last, Suffix	<b>Address</b> (no PO Box) Address, City or Town, State, Zip Code	<b>Expiration of Term</b>
PRESIDENT	JOHN J. RILEY JR.	9 HUNTINGTON RD., LYNNFIELD, MA USA 9 HUNTINGTON RD., LYNNFIELD, MA USA	
TREASURER	JOHN J. RILEY JR.	9 HUNTINGTON RD., LYNNFIELD, MA USA 9 HUNTINGTON RD., LYNNFIELD, MA USA	
SECRETARY	RICHARD N. JONES	76 COUNTY RD., READING, MA 01867 USA 76 COUNTY RD., READING, MA 01867 USA	

business entity stock is publicly traded:

**The total number of shares and par value, if any, of each class of stock which the business entity is authorized to issue:**

Class of Stock	Par Value Per Share Enter 0 if no Par	Total Authorized by Articles of Organization or Amendments		Total Issued and Outstanding Num of Shares
		Num of Shares	Total Par Value	

No Stock Information available online. Prior to August 27, 2001, records can be obtained on microfilm.

Consent     Manufacturer     Confidential Data     Does Not Require Annual Report  
 Partnership     Resident Agent     For Profit     Merger Allowed

**Note: There is additional information located in the cardfile that is not available on the system.**

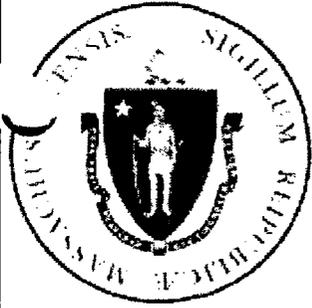
**Select a type of filing from below to view this business entity filings:**

- ALL FILINGS
- Administrative Dissolution
- Annual Report
- Application for Reinstatement
- Application For Revival

[View Filings](#)

[New Search](#)

**Comments**



The Commonwealth of Massachusetts  
William Francis Galvin

Secretary of the Commonwealth  
One Ashburton Place, Boston, Massachusetts 02108-1512  
Telephone: (617) 727-9640

JOHN J. RILEY COMPANY Summary Screen



Help with this form

Request a Certificate

The exact name of the Domestic Profit Corporation: JOHN J. RILEY COMPANY

Entity Type: Domestic Profit Corporation

Identification Number: 041774740

Date of Organization in Massachusetts: 08/11/1915

Date of Involuntary Dissolution: 07/07/1980

Current Fiscal Month / Day: 12 / 31

Previous Fiscal Month / Day: 00 / 00

The location of its principal office in Massachusetts:

No. and Street: 228 SALEM ST  
City or Town: WOBURN State: MA Zip: 01801 Country: USA

If the business entity is organized wholly to do business outside Massachusetts, the location of that office:

No. and Street:  
City or Town: State: Zip: Country:

Name and address of the Registered Agent:

Name:  
No. and Street:  
City or Town: State: Zip: Country:

**The officers and all of the directors of the corporation:**

<b>Title</b>	<b>Individual Name</b> First, Middle, Last, Suffix	<b>Address (no PO Box)</b> Address, City or Town, State, Zip Code	<b>Expiration of Term</b>
PRESIDENT	JOHN J. RILEY JR.	9 HUNTINGTON RD., LYNNFIELD, MA USA 9 HUNTINGTON RD., LYNNFIELD, MA USA	
TREASURER	JOHN J. RILEY JR.	9 HUNTINGTON RD., LYNNFIELD, MA USA 9 HUNTINGTON RD., LYNNFIELD, MA USA	
SECRETARY	RICHARD N. JONES	76 COUNTRY RD., READING, MA USA 76 COUNTRY RD., READING, MA USA	

business entity stock is publicly traded:

**The total number of shares and par value, if any, of each class of stock which the business entity is authorized to issue:**

Class of Stock	Par Value Per Share Enter 0 if no Par	Total Authorized by Articles of Organization or Amendments		Total Issued and Outstanding
		<i>Num of Shares</i>	<i>Total Par Value</i>	<i>Num of Shares</i>

No Stock Information available online. Prior to August 27, 2001, records can be obtained on microfilm.

- Consent   
  Manufacturer   
  Confidential Data   
  Does Not Require Annual Report  
 Partnership   
  Resident Agent   
 For Profit   
 Merger Allowed

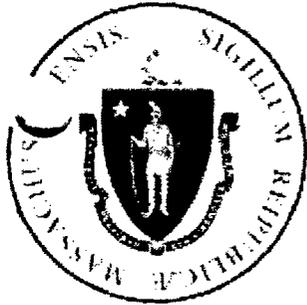
**Note: There is additional information located in the cardfile that is not available on the system.**

**Select a type of filing from below to view this business entity filings:**

- ALL FILINGS
- Administrative Dissolution
- Annual Report
- Application for Reinstatement
- Application For Revival

**Comments**



The Commonwealth of Massachusetts  
William Francis Galvin

Secretary of the Commonwealth  
One Ashburton Place, Boston, Massachusetts 02108-1512  
Telephone: (617) 727-9640

**RILEY LEATHER CO., INC. Summary Screen**



Help with this form

Request a Certificate

The exact name of the Domestic Profit Corporation: RILEY LEATHER CO., INC.

Entity Type: Domestic Profit Corporation

Identification Number: 042855195

Old Federal Employer Identification Number (Old FEIN): 000219897

Date of Organization in Massachusetts: 04/01/1985

Date of Involuntary Dissolution: 08/31/1998

Current Fiscal Month / Day: 12 / 31

Previous Fiscal Month / Day: 00 / 00

**The location of its principal office in Massachusetts:**

No. and Street: 228 SALEM ST.

City or Town: WOBURN

State: MA

Zip: 01801

Country: USA

**If the business entity is organized wholly to do business outside Massachusetts, the location of that office:**

No. and Street:

City or Town:

State:

Zip:

Country:

**Name and address of the Registered Agent:**

Name:

No. and Street:

City or Town:

State:

Zip:

Country:

**The officers and all of the directors of the corporation:**

<b>Title</b>	<b>Individual Name</b> First, Middle, Last, Suffix	<b>Address (no PO Box)</b> Address, City or Town, State, Zip Code	<b>Expiration of Term</b>
PRESIDENT	CHARLES J. SHEEHAN	3 OLD SCHOOL HOUSE RD., ANDOVER, MA 01810 USA 3 OLD SCHOOL HOUSE RD., ANDOVER, MA 01810 USA	
TREASURER	EDWARD J. FOLEY JR.	200 BEDFORD RD., WOBURN, MA 01801 USA 200 BEDFORD RD., WOBURN, MA 01801 USA	
SECRETARY	EDWARD J. FOLEY JR.	200 BEDFORD RD., WOBURN, MA 01801 USA 200 BEDFORD RD., WOBURN, MA 01801 USA	

business entity stock is publicly traded:

**The total number of shares and par value, if any, of each class of stock which the business entity is authorized to issue:**

Class of Stock	Par Value Per Share Enter 0 if no Par	Total Authorized by Articles of Organization or Amendments		Total Issued and Outstanding
		<i>Num of Shares</i>	<i>Total Par Value</i>	<i>Num of Shares</i>

No Stock Information available online. Prior to August 27, 2001, records can be obtained on microfilm.

Consent   
  Manufacturer   
  Confidential Data   
  Does Not Require Annual Report  
 Partnership   
  Resident Agent   
 For Profit   
 Merger Allowed

**Note: There is additional information located in the cardfile that is not available on the system.**

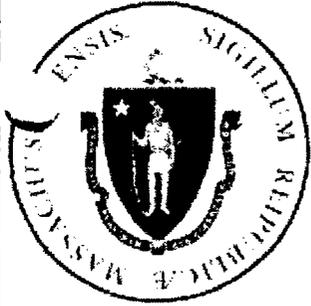
**Select a type of filing from below to view this business entity filings:**

- ALL FILINGS
- Administrative Dissolution
- Annual Report
- Application for Reinstatement
- Application For Revival

[View Filings](#)

[New Search](#)

**Comments**



The Commonwealth of Massachusetts  
William Francis Galvin

Secretary of the Commonwealth  
One Ashburton Place, Boston, Massachusetts 02108-1512  
Telephone: (617) 727-9640

**WEDEL CORPORATION Summary Screen**



Help with this form

Request a Certificate

The exact name of the Domestic Profit Corporation: WEDEL CORPORATION

Entity Type: Domestic Profit Corporation

Identification Number: 042865819

Old Federal Employer Identification Number (Old FEIN): 000221858

Date of Organization in Massachusetts: 05/09/1985

Date of Voluntary Dissolution: 12/15/1998

Current Fiscal Month / Day: 12 / 31

Previous Fiscal Month / Day: 00 / 00

**The location of its principal office in Massachusetts:**

No. and Street: 9 HUNTINGDON RD.  
City or Town: LYNNFIELD State: MA Zip: 01940 Country: USA

**If the business entity is organized wholly to do business outside Massachusetts, the location of that office:**

No. and Street:  
City or Town: State: Zip: Country:

**Name and address of the Registered Agent:**

Name:  
No. and Street:  
City or Town: State: Zip: Country:

**The officers and all of the directors of the corporation:**

<b>Title</b>	<b>Individual Name</b> First, Middle, Last, Suffix	<b>Address (no PO Box)</b> Address, City or Town, State, Zip Code	<b>Expiration of Term</b>
PRESIDENT	J. J. RILEY JR.	154 OCEAN BOULEVARD SEABROON, N.H 154 OCEAN BOULEVARD SEABROON, N.H	
TREASURER	DIANA W. RILEY	154 OCEAN BOULEVARD SEABROON, N.H 154 OCEAN BOULEVARD SEABROON, N.H	
SECRETARY	HELEN RILEY- NICHOLSON	123 WATER ST., BEVERLY, MA 01915 USA 123 WATER ST., BEVERLY, MA 01915 USA	

business entity stock is publicly traded:

**The total number of shares and par value, if any, of each class of stock which the business entity is authorized to issue:**

Class of Stock	Par Value Per Share Enter 0 if no Par	Total Authorized by Articles of Organization or Amendments		Total Issued and Outstanding
		<i>Num of Shares</i>	<i>Total Par Value</i>	<i>Num of Shares</i>

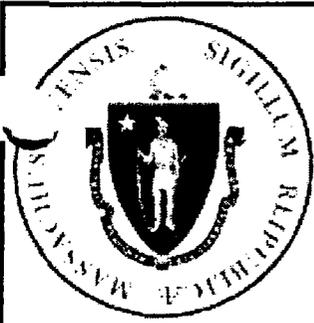
No Stock Information available online. Prior to August 27, 2001, records can be obtained on microfilm.

Consent   
  Manufacturer   
  Confidential Data   
  Does Not Require Annual Report  
 Partnership   
  Resident Agent   
 For Profit   
 Merger Allowed

**Note: There is additional information located in the cardfile that is not available on the system.**

**Select a type of filing from below to view this business entity filings:**

- ALL FILINGS  
 Administrative Dissolution  
 Annual Report  
 Application for Reinstatement  
 Application For Revival



The Commonwealth of Massachusetts  
William Francis Galvin

Secretary of the Commonwealth  
One Ashburton Place, Boston, Massachusetts 02108-1512  
Telephone: (617) 727-9640

**WILDWOOD CONSERVATION CORPORATION Summary Screen**



Help with this form

[Request a Certificate](#)

The exact name of the Nonprofit Corporation: WILDWOOD CONSERVATION CORPORATION

Entity Type: Nonprofit Corporation

Identification Number: 042904968

Old Federal Employer Identification Number (Old FEIN): 000107688

Date of Organization in Massachusetts: 01/01/1983

Current Fiscal Month / Day: 12 / 31

Previous Fiscal Month / Day: 00 / 00

**The location of its principal office in Massachusetts:**

No. and Street: 9 HUNTINGDON RD.  
City or Town: LYNNFIELD State: MA Zip: 01940 Country: USA

**If the business entity is organized wholly to do business outside Massachusetts, the location of that office:**

No. and Street:  
City or Town: State: Zip: Country:

**The name and address of the Resident Agent:**

Name:  
No. and Street:  
City or Town: State: Zip: Country:

**The officers and all of the directors of the corporation:**

Title	Individual Name First, Middle, Last, Suffix	Address (no PO Box) Address, City or Town, State, Zip Code	Expiration of Term
PRESIDENT	JOHN J. RILEY JR.	154 OCEAN BLVD., SEABROOK, NH USA 154 OCEAN BLVD., SEABROOK, NH USA	
TREASURER	JOHN J. RILEY JR.	154 OCEAN BLVD., SEABROOK, NH USA 154 OCEAN BLVD., SEABROOK, NH USA	
CLERK	HELEN D. RILEY	123 WATER ST., BEVERLY, MA USA 123 WATER ST., BEVERLY, MA USA	

Consent   
  Manufacturer   
  Confidential Data   
  Does Not Require Annual Report  
 Partnership   
  Resident Agent   
  For Profit   
  Merger Allowed

**Note: There is additional information located in the cardfile that is not available on the system.**

**Select a type of filing from below to view this business entity filings:**

- ALL FILINGS
- Annual Report
- Application For Revival
- Articles of Amendment
- Articles of Consolidation - Foreign and Domestic

[View Filings](#)

[New Search](#)

Comments

DF

042938994

The Commonwealth of Massachusetts

William Francis Galvin

Secretary of the Commonwealth

One Ashburton Place, Boston, Massachusetts 02108-1512

Annual Report for Domestic and Foreign Corporations

(General Laws Chapter 156D Section 16.22; 950 CMR 113.57)

Filing Fee: \$125.00  
Late Fee: \$25.00

060054909

FORM MUST BE TYPED

- (1) The exact name of the corporation: ORGANIX, INC.
- (2) Jurisdiction of incorporation: MASSACHUSETTS
- (3) The street address of the corporation's registered office in the commonwealth: 240 SALEM ST., WOBURN, MA 01801  
(number, street, city or town, state, zip code)
- (4) The name of the registered agent at the registered office: PETER C. MELTZER
- (5) The street address of the corporation's principal office: 240 SALEM STREET  
WOBURN MA 01801  
(number, street, city or town, state, zip code)

(6) Provide the name and business address of the corporation's board of directors and its president, treasurer and secretary, and if different, its chief executive officer and chief financial officer.

	NAME	ADDRESS
President:	<u>PETER C. MELTZER</u>	<u>8 RUMFORD RD, LEXINGTON, MA 02420</u>
Treasurer:	<u>PETER C. MELTZER</u>	<u>8 RUMFORD RD, LEXINGTON, MA 02420</u>
Secretary:	<u>HOWARD P. SARD</u>	<u>67 HILLSIDE AVE, ARLINGTON, MA 02476</u>
Chief Executive Officer:	<u>PETER C. MELTZER</u>	<u>8 RUMFORD RD, LEXINGTON, MA 02420</u>
Chief Financial Officer:	<u>PETER C. MELTZER</u>	<u>8 RUMFORD RD, LEXINGTON, MA 02420</u>
Directors:	<u>SEE ATTACHED</u>	

(7) Briefly describe the business of the corporation: R&D - ORGANIC AND MEDICAL CHEMISTRY

(8-9) The capital stock of each class and series:

CLASS OF STOCK	TOTAL AUTHORIZED BY ARTICLES OF ORGANIZATION OR AMENDMENTS Number of Shares	TOTAL ISSUED AND OUTSTANDING Number of Shares
COMMON	3,000,000.	2,400,000.
PREFERRED		

(10) Check if the stock of the corporation is publicly traded.

(11) Report is filed for fiscal year ending: DECEMBER 31 2005  
(month, day, year)

Signed by: Peter Melzer

Chairman of the board of directors  President  Other officer  Court appointed fiduciary  
on this 13th day of March, 2006

SEE ATTACHMENT SHEET

**The Commonwealth of Massachusetts**

**William Francis Galvin**

Secretary of the Commonwealth

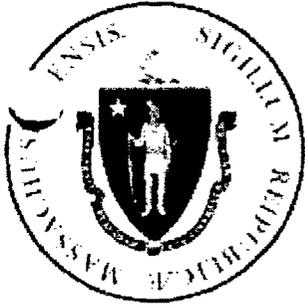
One Ashburton Place, Boston, Massachusetts 02108-1512

**Annual Report for Domestic  
and Foreign Corporations**

Attachment Sheet

DIRECTORS: PETER C. MELTZER  
8 RUMFORD RD, LEXINGTON, MA 02420  
HOWARD P. SARD  
67 HILLSIDE AVE, ARLINGTON, MA 02476  
RAJ K. RAZDAN  
34 SALT ISLAND RD, GLOUCESTER, MA 01930  
PAUL BLUNDELL  
26 SQUIRE RD, WINCHESTER, MA 01890

US EPA ARCHIVE DOCUMENT



The Commonwealth of Massachusetts  
William Francis Galvin

Secretary of the Commonwealth  
One Ashburton Place, Boston, Massachusetts 02108-1512  
Telephone: (617) 727-9640

**ORGANIX INCORPORATED** Summary Screen



Help with this form

Request a Certificate

The exact name of the Domestic Profit Corporation: ORGANIX INCORPORATED

Entity Type: Domestic Profit Corporation

Identification Number: 042938994

Old Federal Employer Identification Number (Old FEIN): 000246897

Date of Organization in Massachusetts: 11/20/1986

Current Fiscal Month / Day: 12 / 31

Previous Fiscal Month / Day: 00 / 00

**The location of its principal office in Massachusetts:**

No. and Street: 228-240 SALEM ST.  
City or Town: WOBURN State: MA Zip: 01801 Country: USA

**If the business entity is organized wholly to do business outside Massachusetts, the location of that office:**

No. and Street:  
City or Town: State: Zip: Country:

**Name and address of the Registered Agent:**

Name: PETER C. MELTZER  
No. and Street: 240 SALEM STREET  
City or Town: WOBURN State: MA Zip: 01801 Country: USA

**The officers and all of the directors of the corporation:**

<b>Title</b>	<b>Individual Name</b> First, Middle, Last, Suffix	<b>Address</b> (no PO Box) Address, City or Town, State, Zip Code	<b>Expiration of Term</b>
PRESIDENT	PETER C. MELTZER	8 RUMFORD RD., LEXINGTON, MA USA 8 RUMFORD RD., LEXINGTON, MA USA	
TREASURER	PETER C. MELTZER	8 RUMFORD RD., LEXINGTON, MA USA 8 RUMFORD RD., LEXINGTON, MA USA	
SECRETARY	HOWARD P. SARD	508 SUMER ST., ARLINGTON, MA USA 508 SUMER ST., ARLINGTON, MA USA	

business entity stock is publicly traded:

The total number of shares and par value, if any, of each class of stock which the business entity is authorized to issue:

Class of Stock	Par Value Per Share Enter 0 if no Par	Total Authorized by Articles of Organization or Amendments		Total Issued and Outstanding <i>Num of Shares</i>
		<i>Num of Shares</i>	<i>Total Par Value</i>	

No Stock Information available online. Prior to August 27, 2001, records can be obtained on microfilm.

Consent   
  Manufacturer   
  Confidential Data   
  Does Not Require Annual Report  
 Partnership   
  Resident Agent   
  For Profit   
  Merger Allowed

Select a type of filing from below to view this business entity filings:

- ALL FILINGS
- Administrative Dissolution
- Annual Report
- Application for Reinstatement
- Application For Revival

[View Filings](#)

[New Search](#)

Comments

RECEIVED

Filing Fee: \$500

DEC 08 2005

2100000025

661  
062

SECRETARY OF THE COMMONWEALTH  
CORPORATIONS DIVISION

Organix, L.L.C.

2005 Annual Report - November 8, 2005

Filing Date of Original Certificate of Organization: November 8, 1996

In accordance with Regulation Section 950 CMR 112.06, the following information is submitted by Organix, L.L.C.:

- A. Federal Identification Number: 04-3334911
- B. Name: Organix, LLC
- C. Address of LLC, its Managers, and Agents:  
240 Salem Street  
Woburn, MA 01801
- D. Nature of Business: The purpose of the LLC is to purchase, own, operate and develop real estate, own and operate scientific laboratory and any other lawful business, trade, purpose or activity which the members may determine to be beneficial to the company and/or permitted by the Act.
- E. Date of Dissolution: None
- F. Date of End of Last Fiscal Year: December 31, 2004
- G. Agent for Service of Process: Peter C. Meltzer, Pres.  
Organix, 240 Salem St., Woburn, MA 01801
- H. Managers: Peter C. Meltzer, Raj K. Razdan, and Howard P. Sard
- I. Individual Authorized to Execute Documents Pertaining to Real Property: + S.O.C.  
Peter C. Meltzer, Raj K. Razdan, and Howard P. Sard

PER  
S.S.D.

✓  
✓

Under the penalties of perjury, the undersigned hereby affirms that the facts stated in this certificate are true.

Peter Meltzer  
Signature

11/21/05  
Date

PETER MELTZER  
Print name



The Commonwealth of Massachusetts  
William Francis Galvin

Secretary of the Commonwealth  
One Ashburton Place, Boston, Massachusetts 02108-1512  
Telephone: (617) 727-9640

ORGANIX, L.L.C. Summary Screen



Help with this form

Request a Certificate

The exact name of the Domestic Limited Liability Company (LLC): ORGANIX, L.L.C.

Entity Type: Domestic Limited Liability Company (LLC)

Identification Number: 043334911

Date of Organization in Massachusetts: 11/08/1996

Last Date Certain: 7/24/2003

Location of its principal office:

No. and Street: 240 SALEM STREET  
City or Town: WOBURN State: MA Zip: 01801-0000 Country: USA

If the business entity is organized wholly to do business outside Massachusetts, the location of that office:

No. and Street:  
City or Town: State: Zip: Country:

The name and address of the Resident Agent:

Name: PETER C. MELTZER  
No. and Street: 240 SALEM STREET  
City or Town: WOBURN State: MA Zip: 01801-0000 Country: USA

**The name and business address of each manager:**

<b>Title</b>	<b>Individual Name</b> First, Middle, Last, Suffix	<b>Address</b> (no PO Box) Address, City or Town, State, Zip Code
MANAGER	RAJ K. RAZDAN	240 SALEM STREET WOBURN, MA 01801-0000 USA
MANAGER	HOWARD P. SARD	240 SALEM STREET WOBURN, MA 01801-0000 USA
MANAGER	PETER C. MELTZER	240 SALEM STREET WOBURN, MA 01801-0000 USA

**The name and business address of the person in addition to the manager, who is authorized to execute documents to be filed with the Corporations Division.**

<b>Title</b>	<b>Individual Name</b> First, Middle, Last, Suffix	<b>Address</b> (no PO Box) Address, City or Town, State, Zip Code
SOC SIGNATORY	RAJ K. RAZDAN	65 CUMMINGS PARK WOBURN, MA 01801-0000 USA
SOC SIGNATORY	HOWARD P. SARD	65 CUMMINGS PARK WOBURN, MA 01801-0000 USA
SOC SIGNATORY	PETER C. MELTZER	65 CUMMINGS PARK WOBURN, MA 01801-0000 USA

**The name and business address of the person(s) authorized to execute, acknowledge, deliver and record any recordable instrument purporting to affect an interest in real property**

<b>Title</b>	<b>Individual Name</b> First, Middle, Last, Suffix	<b>Address</b> (no PO Box) Address, City or Town, State, Zip Code
REAL PROPERTY	RAJ K. RAZDAN	65 CUMMINGS PARK WOBURN, MA 01801-0000 USA
REAL PROPERTY	PETER C. MELTZER	65 CUMMINGS PARK WOBURN, MA 01801-0000 USA
REAL PROPERTY	HOWARD P. SARD	65 CUMMINGS PARK WOBURN, MA 01801-0000 USA

- Consent   
  Manufacturer   
  Confidential Data   
  Does Not Require Annual Report  
 Partnership   
  Resident Agent   
  For Profit   
  Merger Allowed

Select a type of filing from below to view this business entity filings:

- ALL FILINGS
- Annual Report
- Articles of Entity Conversion
- Certificate of Amendment
- Certificate of Cancellation

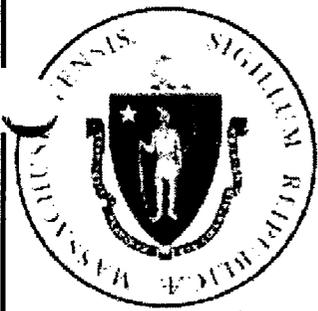
View Filings

New Search

Comments

© 2001 - 2006 Commonwealth of Massachusetts  
All Rights Reserved

  
[Help](#)



The Commonwealth of Massachusetts  
William Francis Galvin

Secretary of the Commonwealth  
One Ashburton Place, Boston, Massachusetts 02108-1512  
Telephone: (617) 727-9640

**BEATRICE FOODS CO. Summary Screen**



Help with this form

[Request a Certificate](#)

The exact name of the Foreign Corporation: BEATRICE FOODS CO.

Entity Type: Foreign Corporation

Identification Number: 363269490

Old Federal Employer Identification Number (Old FEIN): 000110575

Date of Registration in Massachusetts: 03/30/1984

Date of Withdrawal: 11/04/1997

The is organized under the laws of: State: DE Country: USA on: 01/11/1984

Current Fiscal Month / Day: 05 / 31

Previous Fiscal Month / Day: 02 / 28

**The location of its principal office:**

No. and Street: 2 NO. LASALLE ST.

City or Town: CHICAGO

State: IL

Zip: 60602

Country: USA

**The location of its Massachusetts office, if any:**

No. and Street:

City or Town:

State:

Zip:

Country:

**Name and address of the Registered Agent:**

Name: PRENTICE-HALL CORP SYS INC

No. and Street: 84 STATE ST.,

City or Town: BOSTON

State: MA

Zip: 02109

Country: USA

**The officers and all of the directors of the corporation:**

<b>Title</b>	<b>Individual Name</b> First, Middle, Last, Suffix	<b>Address (no PO Box)</b> Address, City or Town, State, Zip Code	<b>Expiration of Term</b>
PRESIDENT	DAVID T. PETERS	1 CONAGRA DR., OMAHA, NE 68102 USA 1 CONAGRA DR., OMAHA, NE 68102 USA	
TREASURER	JIM O'DONNELL	1 CONAGRA DR., OMAHA, NE 68102 USA 1 CONAGRA DR., OMAHA, NE 68102 USA	

business entity stock is publicly traded:

**The total number of shares and par value, if any, of each class of stock which the business entity is authorized to issue:**

Class of Stock	Par Value Per Share Enter 0 if no Par	Total Authorized by Articles of Organization or Amendments		Total Issued and Outstanding
		<i>Num of Shares</i>	<i>Total Par Value</i>	<i>Num of Shares</i>

No Stock Information available online. Prior to August 27, 2001, records can be obtained on microfilm.

Consent   
  Manufacturer   
  Confidential Data   
  Does Not Require Annual Report  
 Partnership   
  Resident Agent   
  For Profit   
  Merger Allowed

**Note: There is additional information located in the cardfile that is not available on the system.**

**Select a type of filing from below to view this business entity filings:**

- ALL FILINGS
- Amended Foreign Corporations Certificate
- Annual Report
- Annual Report - Professional
- Application for Reinstatement

Comments



The Commonwealth of Massachusetts  
William Francis Galvin

Secretary of the Commonwealth  
One Ashburton Place, Boston, Massachusetts 02108-1512  
Telephone: (617) 727-9640

**BEATRICE COMPANIES, INC. Summary Screen**



Help with this form

Request a Certificate

The exact name of the Foreign Corporation: BEATRICE COMPANIES, INC.

The name was changed from: BEATRICE FOODS CO. on 7/3/1984

Entity Type: Foreign Corporation

Identification Number: 360783330

Date of Registration in Massachusetts: 11/27/1936

Date of Involuntary Revocation: 11/14/1994

The is organized under the laws of: State: DE Country: USA on: 11/20/1924

Current Fiscal Month / Day: 02 / 28

Previous Fiscal Month / Day: 00 / 00

The location of its principal office:

No. and Street: 120 S LASALLE ST  
City or Town: CHICAGO State: IL Zip: 60603 Country: USA

The location of its Massachusetts office, if any:

No. and Street:  
City or Town: State: Zip: Country:

Name and address of the Registered Agent:

Name: PRENTICE-HALL CORP SYS INC  
No. and Street: 84 STATE ST.,  
City or Town: BOSTON State: MA Zip: 02109 Country: USA

**The officers and all of the directors of the corporation:**

<b>Title</b>	<b>Individual Name</b> First, Middle, Last, Suffix	<b>Address (no PO Box)</b> Address, City or Town, State, Zip Code	<b>Expiration of Term</b>
PRESIDENT	RUCHARD J. PIGOTT	TWO NORTH LASALLE ST., CHICAGO, IL USA TWO NORTH LASALLE ST., CHICAGO, IL USA	
TREASURER	CHANCE BAHADUR	TWO NORTH LASALLE ST., CHICAGO, IL USA TWO NORTH LASALLE ST., CHICAGO, IL USA	

**business entity stock is publicly traded:**

**The total number of shares and par value, if any, of each class of stock which the business entity is authorized to issue:**

Class of Stock	Par Value Per Share Enter 0 if no Par	Total Authorized by Articles of Organization or Amendments		Total Issued and Outstanding
		<i>Num of Shares</i>	<i>Total Par Value</i>	<i>Num of Shares</i>

No Stock Information available online. Prior to August 27, 2001, records can be obtained on microfilm.

Consent     Manufacturer     Confidential Data     Does Not Require Annual Report  
 Partnership     Resident Agent     For Profit     Merger Allowed

**Note: There is additional information located in the cardfile that is not available on the system.**

**Select a type of filing from below to view this business entity filings:**

- ALL FILINGS
- Amended Foreign Corporations Certificate
- Annual Report
- Annual Report - Professional
- Application for Reinstatement

Comments

SEARCH

Entries : Beatrice Foods Co.

## Beatrice Foods Co.

The Beatrice Creamery Co. was founded in Nebraska in the 1890s by partners George Everett Haskell and William W. Bosworth. By the time Beatrice moved its headquarters to Chicago in 1913 (settling in a large facility on South State Street in 1917), it was already a leading seller of dairy equipment and operator of dairies. By the early 1930s, its national network of 32 plants produced about 27 million gallons of milk and 9.5 million gallons of ice cream per year; its "Meadow Gold" brand of dairy products was particularly successful. In 1946, when the company became the Beatrice Foods Co., annual sales stood at about \$170 million; sales doubled over the next decade. Starting in the 1960s, the company expanded rapidly by purchasing other food firms, and annual sales jumped to \$12 billion by 1984. During the 1970s, Beatrice employed as many as 8,000 Chicago-area residents. After the company changed hands in 1986, however, it was dismantled with stunning speed. By 1990, the last of Beatrice was sold off, and the company that had once been one Chicago's largest was gone.

This entry is part of the Encyclopedia's Dictionary of Leading Chicago Businesses (1820-2000) that was prepared by Mark R. Wilson, with additional contributions from Steven R. Porter and Janice L. Reiff.

---

The Electronic Encyclopedia of Chicago © 2005 Chicago Historical Society.

The Encyclopedia of Chicago © 2004 The Newberry Library. All Rights Reserved. Portions are copyrighted by other institutions and individuals. Additional information on copyright and permissions.

# Beatrice Foods

## From Wikipedia, the free encyclopedia

The **Beatrice Foods Company** was a major American food processing company and household name, until it was taken over by Kohlberg Kravis Roberts & Co. in 1986 during the leveraged buyout raids of the 1980s. Its brands and assets were sold off, the bulk becoming part of ConAgra Foods, Inc. in 1990.

The **Beatrice Creamery Company** was founded in 1894 by George Everett Haskell and William W. Bosworth, by leasing the factory of a bankrupt firm of the same name located in Beatrice, Nebraska. At the time, they purchased butter, milk and eggs from local farmers and graded them for resale. They quickly began separating the butter themselves at their plant, making their own butter on site and packaging and distributing it under their own label. In order to further increase efficiency of the process, they began selling hand-separators to their vendor farmers on credit, selling some 50,000 separators over their first decade of business. By the turn of the century, they were shipping dairy products across the United States, and in 1910, they ran nine creameries and three ice cream plants across the Great Plains.

The company moved to Chicago in 1913 - at the time the centre of the American food processing industry. By the 1930s, it was already a major dairy company, producing some 30 million gallons (110 million litres) of milk and 10 million gallons (38 million litres) of ice cream annually. Its *Meadow Gold* brand was a household name in much of America by the beginning of World War II. In 1946, it changed its name to **Beatrice Foods** and doubled its sales between 1945 and 1955 as the post-war baby boom created vastly greater demand for milk products.

From the late 1950s until the early 1970s, the company expanded into Canada and purchased a number of other food firms, leveraging its distribution network to profit from a more diverse array of food and consumer products. It came to be the owner of brands like Avis Rent A Car, Playtex,

Shedd's, Tropicana, Good & Plenty and many others. Annual sales in 1984 were roughly \$12 billion. It was during this year that the corporation ended advertisements for its products with the catchphrase "We're Beatrice"; the red and white "Beatrice" logo would simultaneously appear in the bottom right hand corner (example). It was determined that the campaign alienated consumers, calling attention to the fact that it was a faceless and far-reaching multinational corporation, and the campaign was pulled off the air by autumn.

Through the 1980's, Beatrice was a defendant in a class-action lawsuit alleging that it had dumped toxic waste in the drinking water of Woburn, Massachusetts. The case became the subject of the popular book and film *A Civil Action*.

In 1986, Beatrice became the target of junk bond vendor and leveraged buyout specialists Kohlberg Kravis Roberts. They ultimately took over the firm for \$8.7 billion — at the time the largest leveraged buyout in history — and over the next four years sold it off, division by division. In 1990, the last of Beatrice's assets were sold to ConAgra Foods. Most of Beatrice's brand names still exist, but under various other owners, as trademarks and product lines were sold separately to the highest bidder.

Beatrice's Canadian subsidiary, Beatrice Foods Canada Ltd., was founded in 1969 and became legally separate from its parent firm in 1978. It was therefore unaffected by the buyout of its American counterpart.

## Former Beatrice brands

- Altoids
- Avis
- Butterball
- Good & Plenty
- Hunt's
- Jolly Rancher
- Krispy Kreme
- Meadow Gold
- Playtex

- [Samsonite](#)
- [Shedd's](#)
- [Swiss Miss](#)
- [Tropicana](#)
- [Wesson](#)

## External links

- [Parmalat Canada](#)
- [Beatrice Foods Company Memorial Home Page](#)
- [Beatrice Canada](#)

Retrieved from "[http://en.wikipedia.org/wiki/Beatrice\\_Foods](http://en.wikipedia.org/wiki/Beatrice_Foods)"

Category: [Defunct companies of the United States](#)

- 
- This page was last modified 01:02, 12 November 2006.
  - All text is available under the terms of the [GNU Free Documentation License](#). (See [Copyrights](#) for details.)
- Wikipedia® is a registered trademark of the Wikimedia Foundation, Inc.
- [Privacy policy](#)
  - [About Wikipedia](#)
  - [Disclaimers](#)




## About Us

### The Formative Years

The story of the formative years of what became Beatrice Foods Co. is truly the story of George Haskell and his vision.

That fabled decade of American history known as the "Gay '90's" was not so gay for Haskell. In its first years, he found himself jobless at the age of 29 when the Fremont, Nebraska, Butter & Egg Company for which he worked went bankrupt.

Assembling his assets, which consisted of six years' experience in the butter and egg business and a small "nest egg" he had managed to save, Haskell decided to build upon his experience with the Fremont Butter & Egg Company. Accordingly, in 1894, he formed a partnership with William W. Bosworth, who has been an employee of the Beatrice, Nebraska, branch.

Haskell & Bosworth purchased the Beatrice branch of the defunct Fremont Butter & Egg Company and also leased the plant of the Beatrice Creamery Company in Beatrice, Nebraska, which had gone out of business shortly after it was founded in 1882. In addition, they opened a branch in Lincoln, Nebraska.

Haskell & Bosworth began buying farm butter, eggs and poultry and grading and shipping them.

### Churning out Success

Late in 1894, Haskell and Bosworth purchased a small churn and began producing creamery butter from milk provided by local farmers. They devised special protective packages and distributed it to grocery stores and restaurants in their own wagons and through appointed jobbers. To overcome the shortage of cream, the partners established skimming stations to which farmers delivered their milk to have the cream, used to make butter, separated from the milk. This led to the introduction of their unique credit program of providing farmers with hand cream separators so that they could separate the milk on the farm and retain the skim milk for animal feeding. This enabled farmers to pay for the separators from the proceeds of their sales of cream. The program worked so well that the company sold more than 50,000 separators in Nebraska from 1895 to 1905.

### Spreading Across the Nation

The partners continued to operate Beatrice Creamery Company as a branch, churning butter and also dealing in eggs and other produce, shipping by the railroads to such distant markets as Boston, New York and San Francisco.

In 1896, this branch operation began to outgrow the parent business and the firm began to emerge into a semblance of its present identity. On Feb. 15th of that year, Beatrice Creamery Company officially was incorporated in Nebraska with a capital of \$100,000.

The next step was the decision to consolidate all churning operations in one new plant in Lincoln, where railhead facilities were more extensive, and to extend its procurement territory farther west to increase the cream supply.

### Keeping it Cool

The company continued to pioneer and grow steadily. Capitalization was increased to \$500,000 in 1902.

On March 1, 1905, the company was incorporated as the Beatrice Creamery Company of Iowa, with capital of \$1,000,000.

During the next two years, the company built creameries in Oklahoma City, OK, Chicago, IL, and Pueblo, CO, and by 1910, the company was operating nine creameries and three ice plants and had sales branches dotting the nation.

To keep pace with the growth of business in the East and the need for wider distribution, the general offices were moved to Chicago in 1913.

In 1919, G.E. Haskell, passed away, but his dream lived on.

### Diversity with Milk

On March 31, 1926, William Ferguson, president since G.E. Haskell's death, was elected chairman of the board of directors, a post he held until 1935; and Clinton H. Haskell, a nephew of G.E. Haskell, was elected president.

In 1929, the company had only four milk plants. By 1932, Beatrice had milk plants in 32 cities. In 1927, the company had sold less than one million gallons of milk. By 1932, volume had grown to 27 million gallons.

Sales of ice cream grew proportionately, rising from less than one-half million gallons in 1927 to 9.5 million gallons in 1931.

#### **Expanding Horizons**

New companies producing specialty foods or foods were added to the Beatrice family, thus continuing the policy of developing Beatrice into a truly representative foods firm. Emphasis consistently was in products of high quality in line with the long-established policy of the firm.

Beatrice Foods also broadened its horizons internationally with operations eventually spanning most parts of the globe.

#### **Taking on The Great White North**

The Beatrice Dairy Division originated in Canada in 1969 when Beatrice Companies of Chicago entered the Canadian dairy industry with the purchase of Brookside Dairy in Kingston.

In the period 1969 through 1989, the Division grew to over \$200 million, primarily through the acquisition of formerly independent dairies in cities outside of the major urban centres of Toronto and Ottawa.

In 1978, Beatrice Foods separated from its United States counterpart to become a Canadian dairy - Beatrice Foods Canada Ltd.

#### **Increasing Northern Exposure**

In August 1987, Beatrice Foods Inc. acquired Sunland Foods ("Sunland"), a Western Canada cookie manufacturer. The Division nearly doubled in size with the acquisition of Elett's Dairies (with facilities in Brampton and Northern Ontario) in 1989, and Palm Dairies (with facilities in Alberta, Saskatchewan and Northern Ontario) in 1990.

Immediately following the acquisition, Beatrice and Palm were amalgamated into a single corporation and continued operations under the name "Beatrice Foods Inc."

In November of 1993, the company acquired all the outstanding shares of Mont-St-Hilaire Dairy Ltd., a dairy producer based in St. Hyacinthe, Quebec.

In 1994, the Division formed a strategic alliance with Unilever, effectively divesting of the Ice Cream and Novelties business while retaining exclusive selling and distribution rights for the Good Humour Breyers line of Ice Cream products.

#### **Into The Future**

In March of 1997 Beatrice Foods Inc. was purchased by Parmalat Finanziaria S.p.A of Italy. In July of the same year, Parmalat purchased Aul Foods to form Parmalat Canada. In September of 1997, Parmalat purchased Astro Dairy Products. Combined, these 3 acquisitions make Parmalat Canada's largest dairy. Internationally, the Parmalat name is a trademark that denotes the world's largest dairy company, and operates in 23 countries on 5 continents.

Today, the Beatrice brand name is synonymous with high quality, fresh and wholesome dairy products, and enjoys high awareness in all of its major trading areas.

Beatrice Foods Inc. is a subsidiary of Parmalat Canada Inc. For more information, visit our website at <http://www.beatrice.ca>

## **The Beatrice odyssey - company profile**

Neil R. Gazel

At its peak, Beatrice was so large that almost every resident of the U.S. used, or was served by, at least one of its products every day. How-- and why--did this corporate giant all but disintegrate within a few years?

Editor's note.- History will remember mergermania as one of the dominant themes of American business in the '80s. And no company traveled the many trails of the merger/divestiture jungle more often than Beatrice.

Beatrice was a diversified corporation of a bygone period as it entered the 80s. It marketed more than 9,000 products in the United States and 100 countries around the world.

Over the course of 91 years, Beatrice had been developed conservatively into an international presence through a series of friendly acquisitions. Yet, after a \$6.2 billion leveraged buyout led by Kohlberg Kravis Roberts & Co. (KKR) the company was almost completely dismantled in just two years.

The Beatrice odyssey is expected to be concluded in August of this year with ConAgra's purchase of Beatrice Co. for \$1.34 billion.

In the following excerpts from the new book, *Beatrice: From Build Up Through Break Up*, author and former Beatrice public relations director Neil R. Gazel chronicles Beatrice's rise and fall . . .

Shortly after he became president of Beatrice in 1952, William Karnes received a visit from the treasurer of the company. "Our cash balance at the bank is under \$2 million," the concerned treasurer advised Karnes. "What shall we do about it?"

After he recovered from the shock, Karnes asked the treasurer to explain. "We always maintain a cash balance of \$2 million in the bank," was the reply.

"In 1952, that was big money for us," Karnes recalled. "However, we are not going to leave that much money in

the bank--we are going to put it to work!' I told him." Karnes was ultraconservative in cash management, but \$2 million was excessive even for him. Karnes also regarded debt as anathema.

Despite Beatrice's long-established policy of decentralization and its strict hands-off philosophy, it had a strong system of accounting controls. The keystone was a simplified system of financial reporting.

These financial polices were major reasons why Beatrice was able to increase quarterly profits against the comparable quarter of the preceding year for 120 consecutive quarters from March 1952 to Feb. 28, 1982.

Beatrice borrowed no money and had no debt from 1936 to 1969, not even short-term debt. Even with extensive expansion around the world, which produced \$1.2 billion in international sales by 1976, the company had a debt ratio of only 20% of its net worth.

This would change markedly over the next two decades.

Until the late 1970s, Beatrice enjoyed 48 years of almost continuous growth. There had been little dissension in the ranks when C.H. Haskell and Karnes were in charge of Beatrice.

Then management policy changes began to take a toll on the company. Contributing to the problems were the type and cost of acquisitions being made and personnel changes.

William Mitchell, who the board had named to succeed Karnes, wanted to consolidate the string of acquisitions that had been assembled by his predecessors. President and CEO Wallace Rasmussen believed that Beatrice should continue buying. By September 1977, just 15 months after Karnes and Grantham had retired, Mitchell was gone, ousted at a special meeting of the board of directors held in a secluded restaurant in a suburb of Chicago.

The wars of succession

Once he had won the showdown with Mitchell, Rasmussen quickly named his own team to key posts. Directors elected James Dutt as president and COO.

To Rasmussen's credit, he did not attempt to retool the Beatrice decentralized system of management to any major degree. But under Rasmussen, the company continued making acquisitions--on a grander scale. One was

Tropicana Inc. for \$490 million in the summer of 1978, which diluted the company's earnings by five cents a share in the 1979 fiscal year and three cents in 1980.

When Rasmussen was elected president and CEO, he was viewed by many as an interim boss serving in a caretaker role until he reached the mandatory retirement age of 65 in July 1979. However, after Mitchell was forced out, Rasmussen effected another stratagem to extend his stewardship. He persuaded the board to amend the retirement rule in December 1978.

But Mitchell's ouster and Rasmussen's policies had bothered some of the outside directors. This sparked what the Chicago Tribune described in an article on May 13, 1979, as a "bitter boardroom brawl" and eventually led to Rasmussen's resignation in July.

Following the annual meeting in Denver in June of 1979, the line of succession was in order. Dutt was in command with a favorable board.

Morale, which one Beatrice executive had described as "gone to hell," would be restored throughout the ranks.

Dutt, 55, was an amiable, soft-spoken man who had started with the company in 1947.

Dutt's office door was open, and he frequently went out for coffee and doughnuts with workers at mid-morning.

However, a series of subtle changes effected by Dutt led to a dramatic alteration of traditional policies in 1982, which accelerated in the next three years. In 1979, the company moved its headquarters to luxurious offices atop a steel and glass structure just completed on the site of the landmark LaSalle Hotel. The staff swelled to such a size that four and one-half floors were required.

Beginning in 1980, Dutt paid lip service to decentralized management as a keystone for future growth, while he was changing the strategies of management.

### Dutt's agenda

In 1982, Dutt's agenda, which had been hidden, surfaced. He embarked on fulfilling his vision of building Beatrice into the nation's largest diversified food company. One major phase was an asset redeployment program that had been initiated in 1979.

Essentially, this meant selling companies that didn't meet the financial goals he had set and acquiring those with greater potential. His objectives were to raise return on equity to 18% and boost revenues 5% in real dollars and profit growth to 16% per year. Among the first to go were most of the segments of Harman International, Airstream, Morgan Yachts, Southwestern Investment Company, and Dannon yogurt. Krispy Kreme Doughnuts and Buxton were divested in 1982.

### Big game hunting

Dutt was after bigger game. After a \$170 million stock-for-stock offer to Bob Evans Farms fell through, he set his sights on beverages. In January 1982, Dutt acquired the beverages segment of Northwest Industries for \$580 million, \$450 million of which was goodwill. The deal included the Coca-Cola Bottling Co. of Los Angeles and The Buckingham Corp., a major importer of wines and liquors such as Cutty Sark scotch. The purchase price was more than 15 times earnings.

The Royal Crown and other soft drink operations were sold for an after-tax gain of \$32.4 million. Subsequently, the Coca-Cola Bottling Co. of San Diego was acquired for three million shares. This was followed by the addition of the Coca-Cola Bottling Co. of San Bernardino and a number of Coca-Cola bottlers in the Midwest.

But even more important was the decline in morale, as Dutt became increasingly autocratic, arbitrary, and isolated from his managers.

### Financial meltdown

Then came the first sign of a crack in Beatrice's solid financial foundation. In the report for the first quarter of fiscal year 1983, the company reported that net earnings had plunged 35% to \$71.3 million from the prior year. Primary earnings per common share were down 36% to 68 cents from \$1.06. Sales were up 2% to \$2.3 billion.

The recession was blamed, but Beatrice had proved to be "recession proof" through six similar economic declines.

And there were resignations. From 1980 through July of 1985, 39 of 58 executives who had been with the company in 1980 had resigned, retired, or "been thrown overboard" as one newspaper phrased it.

In the 1983 annual report, Dutt announced a giant step toward changing the course of Beatrice. "During the year your company embarked on a new strategic course built around a total commitment to marketing," he wrote in the report.

For more than 80 years, Beatrice was regarded as a sleepy Midwest company that seldom made the headlines and then only in positive terms. The media started to focus increasing attention on the company after Dutt won out in the battle for the lead part in the Beatrice drama in 1979.

One newspaper report, for instance, criticized Dutt for trying to change Beatrice into a marketing giant like Procter & Gamble, and for discarding a longstanding strategy of decentralization and growth by acquisition.

"Beatrice acts like a company that's gotten mad at itself," one analyst was quoted as saying in a Wall Street Journal article.

This is Beatrice

In the 1984 annual meeting, the company was renamed Beatrice Companies and a new identity was designed. This symbol, the name Beatrice on a red stripe, was to be added to all packaging, signage, trucks, brand advertising, and promotions, to be backed by an extensive television and print media campaign. The number of advertising agencies representing various Beatrice operations was consolidated to 10 from more than 100, and the number of brokers serving various companies was reduced.

Sales rose only 2% to \$9.3 billion, but earnings rebounded sharply to \$433 million from \$43 million for 1983.

What was transpiring within the corporate cocoon was even more perturbing to most of those involved. In addition to the steady shift to centralization with the accompanying dampening of entrepreneurialism and the addition of a fourth echelon of management, the General Office was substantially expanded.

From a total of 161 people, almost half of whom were accountants and auditors in 1976, the staff had swelled to more than 750 in 1985. Such growth required more space in the high-rent headquarters and violated the long-held policy of keeping the General Office small and in close touch with the plant managers.

In the course of centralizing management, many consultants were retained to advise how to restructure the

company. The consultants' visits to Beatrice plants usually proved to be disruptive and had a bad effect on morale. The manner in which the plants were being consolidated resulted in the discontinued dismissal of certain people with little consideration for their many years of dedicated service to the company.

Dutt also reversed the policy of advertising the brands. The major stress now was on their association with Beatrice, and the objective was to create recognition of the company among consumers via the theme, "Beatrice. You've known us all along."

Then came the blockbuster move that turned out to be the beginning of the end of Dutt's career with Beatrice.

### The battle for Esmark

On March 1, 1984, the start of the 1985 fiscal year, Beatrice appeared to be on the road to recovery. Sales and earnings were rebounding. Jim Dutt had his plans well underway for repositioning Beatrice as a unified, market-driven company. Long-term debt was a manageable \$779 million.

As early as February 1984, there were rumbles on Wall Street that several major companies were considering making a tender offer for Beatrice. To counter a possible takeover as well as to strengthen Beatrice's position as a premier consumer products company, Dutt commissioned William Reidy, director of internal strategy, to prepare an acquisition plan.

The decision was to bid for the Chicago-based Esmark Inc. It was hardened when Dutt learned that Esmark had taken a position in Beatrice stock, as had several well-known raiders including Ivan Boesky.

One Beatrice executive reported that Dutt became "infuriated" at Esmark's move. By mid-March of 1984, Esmark had accumulated 1.4 million shares of Beatrice, according to a Securities and Exchange Commission filing. On March 14, Esmark sold that interest back to Beatrice for \$46.3 million, according to the filing, receiving a slight premium over market value.

### Burdened by debt

Esmark was still digesting the 1983 leveraged buyout of Norton Simon Inc. for \$1.1 billion, which increased Esmark's long-term debt to \$713 million. Among the companies Esmark acquired with Norton Simon Inc. were Hunt-Wesson Foods and Avis's car rental and leasing operations.

Esmark had assembled a highly successful conglomerate over the years under the leadership of Donald Kelly, chairman, president, and CEO, and Roger Briggs, vice chairman. Operations were decentralized as in the previous Beatrice system, with the management of each division granted considerable autonomy.

Among its best-known food brands were Wesson oil, Hunt's tomato products, Peter Pan peanut butter, Orville Redenbacher popcorn, Swift specialty meats, Reddi-Wip whipped cream, and Treasure Cave and Pauly cheeses.

For the six months ended April 28, 1984, Esmark's earnings soared 134% from the comparable period of the prior year to \$98.1 million, and revenues were up 86% to \$2.59 billion.

### Marketing magnet

Esmark's marketing capability was another magnet for Dutt in achieving his goal of developing Beatrice into the world's premier marketer of food and consumer products. Especially attractive was the Hunt-Wesson marketing team, which consisted of a 500-person sales force, 16 distribution centers nationwide, and a sophisticated research center with 150 people in Fullerton, Calif. This was augmented by Swift's sales force of 250 and its R&D facilities in Oak Brook, Ill.

Many analysts offered the opinion that Dutt was waiting for someone else to set a price for Esmark. That "someone" turned out to be Kohlberg Kravis Roberts & Co. heading a group of investors that included Kelly and Briggs. Early in May of 1984, KKR offered \$55 per common share and \$39.05 for each preferred share, equal to \$2.4 billion for Esmark. Its plan was to take Esmark private through a leveraged buyout.

Two weeks later, Dutt made his move. On May 22, the Beatrice board of directors unanimously approved a cash tender offer for all of the 42.3 million outstanding common and 2.6 million preferred shares of Esmark. The offer to purchase all of Esmark's common stock at a cash price of \$56 per share and Esmark's \$2.80 cumulative convertible series B preferred stock at \$39.70 per share equaled \$2.5 billion, topping KKR's bid by \$100 million. Two days later, Dutt trumped his high bid with an offer of \$60 per common share and \$42.60 for each preferred share tendered, boosting the price to \$2.7 billion.

May 24, the two companies announced that they had executed a definitive merger agreement for the acquisition of Esmark. According to a Wall Street Journal report Dutt indicated "that he would go to the mat"

Prepared Foods: The Beatrice odyssey - company profile  
to buy Esmark. "I don't lose," he said.

Dutt added that "if successful, he would keep both Esmark's Swift/Hunt Wesson food business and its international Playtex business and try to keep the top executives of both."

The Swift/Hunt-Wesson Foods operations were under the direction of Frederick Rentschler, and Joel Smilow was in charge of International Playtex.

Dutt was ecstatic about the purchase. "The combined new company truly will be a dynamic force in the marketplace," he wrote in a Mailgram to Beatrice personnel on May 24.

On June 25, Beatrice announced that Dutt had been elected chairman and CEO of Esmark. Kelly and Briggs agreed to serve Beatrice as consultants for six months. Kelly had achieved his objective of doing what was best for Esmark's shareholders. The purchase price was a 42% premium over what Esmark's common stock had been selling for in the prior year. Kelly also did well personally on his "golden parachute" and on his Esmark stock.

Beatrice now had Esmark, but it also had more than \$4.5 billion in long-term debt on which it was paying 12 to 14% interest. Dutt told analysts he expected to divest businesses representing sales of \$3.6 billion and assets of \$1.3 billion.

### Buying and selling

Then the pruning program began in earnest. Businesses ranging from chemicals to agri-products were sold for a total of more than \$1 billion.

Beatrice also was buying. The most notable acquisitions were Dr Pepper of Southern California; Rusty Jones, an undercoating service for vehicles; and Swissrose International, a cheese importing and distribution company in New York City.

In January, Beatrice launched a sales promotion campaign developed by Flair Communications of Chicago. The theme, "The United Tastes of Beatrice," had the objective identifying Beatrice to consumers as the only company offering product lines for breakfast, lunch, dinner, and snacks.

## Was it working?

Were all of Dutt's strategies working? For the fiscal year ended Feb. 28, 1985, the company reported that net sales rose 35% to \$12.6 billion, compared to \$9.3 billion for the previous year. Net earnings were up 11% to \$479 million from \$433 million.

However, the company reported that in 1985, excluding business realignment, earnings were down 22% from \$334 million.

Working capital decreased \$82 million to \$611 million at year-end, and the debt to equity ratio rose from 49% at the end of fiscal 1984 to 199% at the end of 1985. This had been reduced to 166% by March. Long-term debt was \$2.6 billion.

Receivables and inventories both had gone up substantially from the prior year, and net interest expense was up to \$404 million for the year.

## Militant management

Many analysts thought Dutt's grandiose plan was appropriate for the times. However, there was a counter-current in these tides of change that had an increasingly deleterious impact on the company's operations and employee morale. One reason was that Dutt was becoming more militant as the pressures mounted to turn his dreams into reality.

There was an acceleration in the number of departures of Beatrice veterans. A major loss was the March 1984 retirement of William Granger as vice chairman and a director. Granger had often had acted as a buffer between Dutt and operations personnel.

The executive corps was thinned further after the acquisition of Esmark. Both Rentschler, 47, and Smilow, 51, were regarded throughout the food and consumer products industry as superb managers with excellent people skills.

Rentschler had been head of Norton Simon's food operation when Esmark acquired it. He moved over to Esmark as president and CEO of the Swift/ Hunt-Wesson operations which accounted for \$1.7 billion of Esmark's sales in fiscal 1983.

At the end of June 1984, Rentschler resigned, reportedly by mutual agreement. "They made a crucial mistake. The one person they should not have lost was Rentschler," one analyst was quoted as saying at the time.

A man possessed?

To many, Dutt seemed to be a man possessed. For example, at a widely reported conference with food industry analysts in February, he became irritated at questions about the reality of his goals. He gestured toward executives seated behind him and warned that they would lose their jobs if his goals were not met.

Other actions caused further concern among members of the board of directors. Among them was Dutt's commitment of \$70 million over a five-year period to sponsor automobile racing in North America and Europe.

Another irritant was Dutt's frequent absences from the office, when he often used the company's Gulfstream III jet to inspect Beatrice facilities.

An editorial entitled "Jim Dutt's Sorry Record" in the April 1, 1985, issue of Crain's Chicago Business said in part, "Mr. Dutt, driven by a private vision and an unexplainable impatience, is on his way to ruining an important Chicago company." Beatrice's stock performance was lackluster, ranging from \$28 to \$31 in early 1985.

Dutt must go

Finally, the five top operating officers gave the board an ultimatum-Dutt must go.

At a full meeting of the board at the University Club in Chicago on Aug. 3, he resigned as chairman, CEO, and as a director of the company. The resignation was accepted by a unanimous vote of the board, and Dutt's six-year, turmoil-torn regime ended. He was retained as a consultant, and a severance agreement was worked out under which he received \$4.5 million.

Dutt then started a venture capital business, and friends noted that he again had become the friendly, outgoing person of earlier years. From buyout to sellout

The board of directors' first consideration after the resignation of James Dutt was to appoint a chairman. The

directors turned their attention to William Granger, who had worked closely with Dutt for the preceding five years. Granger had retired only 17 months earlier as vice chairman after 39 years with the company, but was working periodically with Dutt to consolidate the Esmark operation into Beatrice.

The Beatrice board's decision was to elect Granger chairman and CEO and Karnes chairman of the executive committee. Both would return to the board.

The market reaction was startling. Wall Street applauded by going on a buying spree.

### Earnings drop

Although Beatrice remained profitable, earnings were faring. Net earnings for the six months ended Aug. 31, 1985, were down 26% to \$128 million, and primary earnings per share dipped 38% to \$1.08 before adjustments for discontinued operations.

Granger and Karnes determined that the bottom line was the first priority. Another concern was the total of \$800 million projected for fiscal 1986 for marketing, promotion, and advertising programs. In terms of dollars, Beatrice was now the leading advertiser among U.S. food companies, including such giants as Procter & Gamble, General Foods and Kraft.

The commitment to the \$70 million auto-racing program was also immediately trimmed. Advertising budgets were reviewed and cut in many cases. The oversized staff in the General Office was pared by terminations. The 35% interest in Swift Independent Corp. was sold for \$43.8 million.

### Takeover speculation becomes a reality

There was considerable speculation that Beatrice was vulnerable to a takeover. However, some Beatrice officials believed that a takeover was unlikely because of the company's size and high debt structure.

But the speculation continued, and the stock continued to move up. It became obvious by mid-September that arbitrageurs were buying the stock in anticipation of a takeover or a restructuring of the company. Then Beatrice management people began receiving calls from their investors indicating that Kohlberg Kravis Roberts (KKR) was interested in acquiring Beatrice. Other calls advised of the interest of Donald Kelly and his management team. It became evident that former executives of Esmark had joined with KKR to try to acquire

Beatrice through a leveraged buyout by a newly formed company called BCI Holdings Inc. (BCI).

The rumors became reality on Oct. 16, when Kidder, Peabody & Co., representing KKR, advised Beatrice that KKR desired a meeting with Beatrice management to propose a leveraged buyout. KKR offered \$45 for each share of Beatrice common stock, consisting of \$40 in cash and \$5 in market value of preferred stock.

### Upping the stakes

Nine days later, KKR raised the ante with a written offer of \$47 per common share, consisting of \$40 in cash and \$7 in market value of preferred stock. At a special meeting convened on Oct. 31, the board was advised by Lazard and Salomon representatives that, from a financial point of view, it would be difficult to express an opinion that the revised offer was inadequate for the Beatrice common shareholders.

On Nov. 12, KKR again revised its offer, increasing the price to \$50 per share, consisting of \$43 in cash and preferred stock that would have a market value of \$7.

After a lengthy review of this amended offer and all possible alternatives, the Beatrice board accepted it at another special meeting on Nov. 13.

### Sold to the highest bidder

Ultimately, the board concluded that KKR's modified proposal was in the best interest of Beatrice and its shareholders and approved the offer. The new owners held a private company with sales of \$12.6 billion.

Donald Kelly and his staff and KKR systematically went about to reduce the debt burden rapidly by selling off assets of BCI Holdings to meet bank requirements to reduce borrowings used to finance the buyout.

In June 1986, the Coca-Cola and related soft drink operations were sold to Coca-Cola for \$1 billion. A year later, Perrier bought the bottled water units for \$400 million.

An investment group purchased 80% of International Playtex for \$1.25 billion in August 1986, and the Americold Cold Storage operations were purchased for \$480 million in a leveraged buyout by Kelso and Co., which included a management group.

Then, the "cash cow" upon which Beatrice had begun the budding of its empire was milked for the last time. In December 1986, the sale of the Dairy Division was completed for \$315 million in cash, approximately 15 times its book value, to one of Meadow Gold's long-time competitors, Borden Inc.

In June of 1987, Kelly and a number of associates formed E-II Holdings Inc. as an umbrella company to manage all of the remaining segments of Beatrice except U.S. Food.

Kelly was named chairman and CEO of E-II, but also continued as chairman of BCI Holdings. E-II's portfolio consisted of 15 companies, nine in consumer products and six in food specialties (Martha White, Beatrice Food Ingredients, Aunt Nellie's, Lowrey's, Pet Specialties, and Frozen Specialties). Total sales for the two segments for the fiscal year ended Feb. 28, 1987, were \$1.472 billion, and operating earnings were \$125 million.

E-II was sold to American Brands in January 1988 for \$1.14 billion. In turn, American Brands sold E-II to the Riklis Family Corp.

The dismantling continued with the sale of the international food operations to TLC (The Lewis Co.) in conjunction with Drexel Burnham Lambert for \$985 million on Dec. 1, 1987.

Then there was one

That left U.S. Food, now the Beatrice Co., still in the BCI Holdings fold under the direction of Frederick Rentschler. Its sales for fiscal 1987, ended Feb. 28, were \$4.8 billion, and pre-tax profits were \$448 million. Its operations included Hunt-Wesson, Tropicana, Swift-Eckrich, LaChoy, Fisher Nuts, Orville Redenbacher popcorn, and Beatrice cheese. It went on the block in September of 1987.

This continued shaking of the Beatrice "money tree," which many thought to be one of the most lucrative leveraged buyouts in history, apparently ran into problems late in the summer of 1988.

Reportedly, more than a 100 prospective buyers turned away from the remaining Beatrice assets, and in July 1988, Beatrice officials announced that the company was no longer for sale.

The U.S. Foods Division had been put up for sale at a high price. But the stock market crash of Oct. 19, 1987, plus the high price asked for this remaining division resulted in no buyers for the whole division.

On Oct. 1, 1988, Frederich Rentschler became chairman and CEO of Beatrice Co. It was announced at that time that Beatrice was not for sale and would continue to be operated into the future and might even acquire some small companies.

### Questions in hindsight

Hindsight raises several significant questions. Surely, if interest rates had gone up or if the stock market had gone down earlier, as it did in late 1987, or if the supply of money from banks and investment firms had dried up so they could not have sold the pieces of Beatrice for premium prices, KKR and its BCI Holding investors would have had serious financial problems.

But the interest rates slid down steeply and resulted in large annual savings of interest. The market moved up strongly at the right time, and the supply of money through junk bonds and other forms of leveraged financing remained readily available to many of the buyers as well as to KKR and BCI Holdings.

If the Beatrice board had not accepted the KKR offer, it would have had to restructure the company drastically to prevent the price of common stock from drifting back to the lower \$40 range or even into the \$30 range. The company then would have become a target for unfriendly raiders at a much lower price.

At least 40% of the shares, about 40 million, would have to have been called at a cash price of about \$50. This would have required additional borrowing of at least \$2 billion. Since the interest rate at that time was at least 11% or higher, this would have saddled the company with an additional interest charge of \$220 million a year or more. It was also doubtful if the company could have raised this much debt.

The board could not know in the spring of 1986 that interest rates would continue to decline, that the bull market would continue for another 18 months, or that money would have been available to buy back a substantial amount of stock to restructure the company.

If the board had taken the risky step of restructuring, what would have happened to the stock of the company, which would have been burdened by heavy debt, high interest obligations, and lower cash flow after Black Tuesday, Oct. 19, 1987? Undoubtedly, the market price of Beatrice common stock would have slipped substantially after the October crash.

Reducing the price of Beatrice common by 15% from \$50 would have lowered it to \$43.50 per share. Based on

the stock performance of other food companies during that time period, Beatrice could still be down more than 50%. to \$45 to \$46 per share. At best, the loss to shareholders in the period from Oct. 9, 1987 to June 3, 1988, would have been almost \$250 million, based on 62 million common shares outstanding after the assumed restructuring.

Editor's note. The Beatrice saga presumably will come to an end this year, following ComAgra's June announcement that it will buy the remaining parts of the company for \$1.34 billion in cash and stock. For Beatrice, the ConAgra acquisition may signal the first sign of stability in almost 15 years.

COPYRIGHT 1990 Business News Publishing Co.

COPYRIGHT 2004 Gale Group

SECRETARY OF

# The Commonwealth of Massachusetts

MICHAEL JOSEPH CONNOLLY

Secretary of State

ONE ASHBURTON PLACE, BOSTON, MASS. 02108

## ARTICLES OF ORGANIZATION

(Under G.L. Ch. 180)

Incorporators

### NAME

### RESIDENCE

Include given name in full in case of natural persons; in case of a corporation, give state of incorporation.

John J. Riley, Jr.

9 Huntingdon Road  
Lynnfield, MA 01940

The above-named incorporator(s) do hereby associate (themselves) with the intention of forming a corporation under the provisions of General Laws, Chapter 180 and hereby state(s):

1. The name by which the corporation shall be known is:

Wildwood Conservation Corporation

2. The purposes for which the corporation is formed is as follows:

To encourage the conservation and preservation of land in the Town of Woburn and elsewhere within the Commonwealth of Massachusetts and otherwise to improve the physical aspects of such land; to perform such other functions as may be incidental to the foregoing; and to carry on such other activities as may be permitted to a Corporation organized under Chapter 180 of the Massachusetts General Law.

C   
P   
M   
R.A.

Note: If the space provided under any article or item on this form is insufficient, additions shall be set forth on separate 8 1/2 x 11 sheets of paper leaving a left hand margin of at least 1 inch for binding. Additions to more than one article may be continued on a single sheet so long as each article requiring each such addition is clearly indicated.

3. If the corporation has more than one class of members, the designation of such classes, the manner of election or appointment, the duration of membership and the qualification and rights, including voting rights, of the members of each class, are as follows: -

Not Applicable

- \*4. Other lawful provisions, if any, for the conduct and regulation of the business and affairs of the corporation, for its voluntary dissolution, or for limiting, defining, or regulating the powers of the corporation, or of its directors or members, or of any class of members, are as follows:-

Continuation sheets 4A, 4B

\*If there are no provisions state "None".

4. (2) The corporation shall have the following powers in furtherance of its corporate purposes:

(1) The corporation shall have perpetual succession in its corporate name.

(2) The corporation may sue and be sued.

(3) The corporation may have a corporate seal which it may alter from time to time.

(4) The corporation may elect or appoint directors, officers, employees and other agents, fix their compensation and define their duties and obligations.

(5) The corporation may purchase, receive, take by grant, gift, devise, bequest or otherwise, lease, or otherwise acquire, own, hold, improve, employ, use and otherwise deal in and with real or personal property, or any interest therein, wherever situated, in an unlimited amount.

(6) The corporation may sell, convey, lease exchange, transfer or otherwise dispose of, or mortgage, pledge, encumber or create a security interest in, all or any of its property, or any interest therein, wherever situated.

(7) The corporation may purchase, take, receive, subscribe for, or otherwise acquire, own, hold, vote, employ, sell, lend, lease, exchange, transfer, or otherwise dispose of, mortgage, pledge, use and otherwise deal in and with, bonds and other obligations, shares, or other securities or interests issued by others, whether engaged in similar or different business, governmental, or other activities.

(8) The corporation may make contracts, give guarantees and incur liabilities, borrow money at such rates of interest as the corporation may determine, issue its notes, bonds and other obligations, and secure any of its obligations by mortgage, pledge or encumbrance of, or security interest in, all or any of its property or any interest therein, wherever situated.

(9) The corporation may lend money, invest and reinvest its funds, and take and hold real and personal property as security for the payment of funds so loaned or invested.

(10) The corporation may do business, carry on its operations, and have offices and exercise the powers granted by Massachusetts General Laws, Chapter 180, as now in force or as hereafter amended, in any jurisdiction within or without the United States, although the corporation shall not be operated for the primary purpose of carrying on for profit a trade or business unrelated to its tax exempt purposes.

(11) The corporation may pay pensions, establish and carry out pension, savings, thrift and other retirement, incentive and benefit plans, trusts and provisions for any or all of its directors, officers and employees.

(12) The corporation may be an incorporator of other corporations of any type of kind.

(13) The corporation may be a partner in any enterprise which it would have power to conduct by itself.

(14) The corporation may have and exercise all powers necessary or convenient to effect any or all of the purposes for which the corporation is formed; provided that no such power shall be exercised in a manner inconsistent with Massachusetts General Laws, Chapter 180 or any other chapter of the General Laws of the Commonwealth.

(b) The directors may make, amend or repeal the by-laws in whole or in part, except with respect to any provision thereof which by law or the by-laws requires action by the members.

(c) Meetings of the members may be held anywhere in the United States.

5. By-laws of the corporation have been duly adopted and the initial directors, president, treasurer and clerk or other presiding, financial or recording officers whose names are set out below, have been duly elected.
6. The effective date of organization of the corporation shall be the date of filing with the Secretary of the Commonwealth or if later date is desired, specify date. (not more than 30 days after date of filing).  

To be effective on January 1, 1983
7. The following information shall not for any purpose be treated as a permanent part of the Articles of Organization of the corporation.

a. The post office address of the initial principal office of the corporation in Massachusetts is:

9 Huntingdon Road, Lynnfield, MA 01940

b. The name, residence, and post office address of each of the initial directors and following officers of the corporation are as follows:

NAME	RESIDENCE	POST OFFICE ADDRESS
President: John J. Riley, Jr.	9 Huntingdon Road Lynnfield, MA 01940	9 Huntingdon Road Lynnfield, MA 01940
Treasurer: John J. Riley, Jr.	9 Huntingdon Road Lynnfield, MA 01940	9 Huntingdon Road Lynnfield, MA 01940
Clerk: Diana W. Riley	9 Huntingdon Road Lynnfield, MA 01940	9 Huntingdon Road Lynnfield, MA 01940

Directors: (or officers having the powers of directors)

John J. Riley, Jr.	9 Huntingdon Road Lynnfield, MA 01940	9 Huntingdon Road Lynnfield, MA 01940
Diana W. Riley	9 Huntingdon Road Lynnfield, MA 01940	9 Huntingdon Road Lynnfield, MA 01940

c. The date initially adopted on which the corporation's fiscal year ends is:

December 31

d. The date initially fixed in the by-laws for the annual meeting of members of the corporation is:

Second Tuesday in March

e. The name and business address of the resident agent, if any, of the corporation is:

N/A

IN WITNESS WHEREOF, and under the penalties of perjury the INCORPORATOR(S) sign(s) these Articles of Organization this 22 day of December, 1982

I, ~~we~~ the below signed INCORPORATORS do hereby certify under the pains and penalties of perjury that I ~~we~~ have not been convicted of any crimes relating to alcohol or gaming within the past ten years; I ~~we~~ do hereby further certify that to the best of my ~~our~~ knowledge the above named principal officers have not been similarly convicted. If so convicted, explain.

*John J. Riley, Jr.*

.....

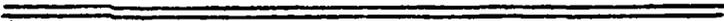
.....

.....

The signature of each incorporator which is not a natural person must be by an individual who shall show the capacity in which he acts and by signing shall represent under the penalties of perjury that he is duly authorized on its behalf to sign these Articles of Organization.

THE COMMONWEALTH OF MASSACHUSETTS

ARTICLES OF ORGANIZATION  
GENERAL LAWS, CHAPTER 180



I hereby certify that, upon an examination of the within-written articles of organization, duly submitted to me, it appears that the provisions of the General Laws relative to the organization of corporations have been complied with, and I hereby approve said articles; and the filing fee in the amount of \$30.00 having been paid, said articles are deemed to have been filed with me this                    day of                    19

Effective date

MICHAEL JOSEPH CONNOLLY  
Secretary of State

TO BE FILLED IN BY CORPORATION  
PHOTO COPY OF ARTICLES OF ORGANIZATION TO BE SENT

TO: Margaret A. Metzger, Esquire  
Nutter, McClennen & Fish  
.....Federal Reserve Plaza.....  
600 Atlantic Avenue  
.....Boston, MA 02210.....

Telephone..... (617) 973-9700.....

Filing Fee \$30.00

Copy Mailed

EXHIBIT "B"

BY-LAWS

OF

WILDWOOD CONSERVATION CORPORATION

---

SECTION 1. NAME, PURPOSES, LOCATION,  
CORPORATE SEAL AND FISCAL  
YEAR

1.1 Name and Purposes. The name and purposes of the corporation shall be as set forth in the Articles of Organization.

1.2 Location. The principal office of the corporation in the Commonwealth of Massachusetts shall initially be located at the place set forth in the Articles of Organization. The Directors may change the location of the principal office in the Commonwealth of Massachusetts effective upon filing a certificate with the Secretary of the Commonwealth.

1.3 Corporate Seal. The Directors may adopt and alter the seal of the corporation.

1.4 Fiscal Year. The fiscal year of the corporation shall, unless otherwise decided by the Directors, end on December 31 in each year.

SECTION 2. MEMBERS

2.1 Classes of Membership. There shall be the following classes of membership:

(a) Corporate Membership. Corporate members shall be the only members entitled to notice of or to vote at meetings of corporate members or to exercise or have such powers, rights and privileges as are conferred by law upon members of a corporation incorporated under Chapter 180 of the General Laws, and for the purpose of said General Laws shall be deemed to be the only members of the corporation.

(b) Other Classes of Membership. The corporate members may from time to time establish such other classes of membership as they shall in their sole discretion deem appropriate.

2.2 Corporate Members. Such persons as may be so designated by the Incorporator at the initial meeting of the corporation and thereafter by the then corporate members shall be corporate members without limit of time.

2.3 Other Members. Members other than corporate members may from time to time be designated by the corporate members pursuant to Section 2.1(b).

2.4 Powers and Rights. In addition to the right to elect Directors as provided in Section 3.1 and such other powers and rights as are vested in them by law, the Articles of Organization or these By-laws, the corporate members shall have such other powers and rights as the Directors may designate.

2.5 Suspension or Removal. A corporate member may be suspended or removed with or without cause by vote of a majority of the corporate members. A corporate member may be removed for cause only after reasonable notice and opportunity to be heard.

2.6 Resignation. A corporate member may resign by delivering a written resignation to the President, Treasurer or Clerk, to a meeting of the corporate members or Directors, or to the corporation at its principal office. The resignation shall be effective upon receipt (unless specified to be effective at some other time), and its acceptance shall not be necessary to make it effective unless it so states.

2.7 Annual Meetings. The annual meeting of the corporate members shall be held at nine o'clock A.M. on the second Tuesday of March in each year or if that date is a legal holiday in the place where the meeting is to be held, then at the same hour on the next succeeding day not a legal holiday. The annual meeting may be held at the principal office of the corporation or at such other place within the United States as the Directors shall determine. No change in the date fixed in these By-laws for the annual meeting shall be made within sixty days before the date stated herein. Notice of any change of the date fixed in these By-laws for the annual meeting shall be given to all corporate members at least twenty days before the new date fixed for such meeting.

If no annual meeting is held in accordance with the foregoing provisions, a special meeting may be held in place thereof, and any action taken at such meeting shall have the same effect as if taken at the annual meeting.

2.8 Regular Meetings. Regular meetings of the corporate members may be held at such places within the United States and at such times as the corporate members may determine.

2.9 Special Meetings. Special meetings of the corporate members may be held at any time and at any place within the United States. Special meetings of the corporate members may be called by the President or by the Directors, and shall be called by the Clerk, or in the case of the death, absence, incapacity or refusal of the Clerk, by any other officer, upon written application of three or more corporate members.

2.10 Call and Notices.

(a) All Meetings. Reasonable and sufficient notice of the time and place of all meetings of the corporate members shall

be given to each corporate member as provided below. Such notice, if the meeting is called otherwise than by the Clerk, may be a copy of the call of the meeting; and if the meeting is not otherwise called, such notice given by the Clerk shall constitute a call of the meeting. Notices of all meetings of corporate members shall state the purposes for which the meetings are called. No notice need be given to any corporate member if a written waiver of notice, executed before or after the meeting by the member, or his attorney thereunto authorized, is filed with the records of the meeting.

(b) Reasonable and Sufficient Notice. Except as otherwise expressly provided, it shall be reasonable and sufficient notice to a corporate member to send notice by mail at least forty-eight hours or by telegram at least twenty-four hours before the meeting addressed to the member at the member's usual or last known business or residence address or to give notice to the member in person or by telephone at least twenty-four hours before the meeting.

2.11 Quorum. At any meeting of the corporate members a majority of the corporate members (whether present in person or duly represented) shall constitute a quorum. Any meeting may be adjourned to such date or dates not more than 90 days after the first session of the meeting by a majority of the votes cast upon the question, whether or not a quorum is present, and the meeting may be held as adjourned without further notice.

2.12 Action by Vote. Each corporate member shall have one vote. When a quorum is present at any meeting, a majority of the votes properly cast by corporate members present in person or duly represented shall decide any question, including election to any office, unless otherwise provided by law, the Articles of Organization, or these By-laws.

2.13 Action by Writing. Any action required or permitted to be taken at any meeting of the corporate members may be taken without a meeting if all corporate members entitled to vote on the matter consent to the action in writing and the written consents are filed with the records of the meeting of the corporate members. Such consents shall be treated for all purposes as a vote at a meeting.

2.14 Proxies. Corporate members may vote either in person or by written proxy dated not more than six months before the meeting named therein, which proxies shall be filed before being voted with the Clerk or other person responsible for recording the proceedings of the meeting. Unless otherwise specifically limited by their terms, such proxies shall entitle the holders thereof to vote at any adjournment of the meeting but the proxy shall terminate after the final adjournment of such meeting.

2.15 Compensation. Corporate members shall not be precluded from serving the corporation in any other capacity and receiving compensation for any such services.

### SECTION 3. BOARD OF DIRECTORS

3.1 Number and Election. The corporate members annually at their annual meeting shall fix the number of Directors and shall elect the number of Directors so fixed. At any special or regular meeting the corporate members or Directors may increase the number of Directors and elect new Directors to complete the numbers so fixed; or they may decrease the number of Directors, but only to eliminate vacancies existing by reason of the death, resignation, removal or disqualification of one or more Directors. A Director may but need not be a corporate member.

3.2 Tenure. Each Director, including those elected to fill vacancies under Section 3.7, shall hold office until the next annual meeting of corporate members and until that Director's successor is elected and qualified, or until that Director sooner dies, resigns, is removed or becomes disqualified.

3.3 Powers. The affairs of the corporation shall be managed by the Directors who shall have and may exercise all the powers of the corporation, except those powers reserved to the corporate members by law, the Articles of Organization or these By-laws.

3.4 Committees. The Directors may elect or appoint one or more committees and may delegate to any such committee or committees any or all of their powers. Unless the Directors otherwise designate, committees shall conduct their affairs in the same manner as is provided in these By-laws for the Directors. The members of any committee shall remain in office at the pleasure of the Directors.

3.5 Suspension or Removal. A Director may be suspended or removed (a) with or without cause by vote of a majority of the corporate members or (b) with cause by vote of a majority of the Directors then in office. A Director may be removed with cause only after reasonable notice and opportunity to be heard.

3.6 Resignation. A Director may resign by delivering a written resignation to the President, Treasurer or Clerk, to a meeting of the corporate members or Directors, or to the corporation at its principal office. The resignation shall be effective upon receipt (unless specified to be effective at some other time) and its acceptance shall not be necessary to make it effective unless it so states.

3.7 Vacancies. Any vacancy in the Board of Directors, except a vacancy resulting from enlargement which must be filled in accordance with Section 3.1, may be filled by the corporate members or Directors. The Directors shall have and may exercise all their powers notwithstanding the existence of one or more vacancies in their number.

3.8 Regular Meetings. Regular meetings of the Directors may be held at such places and at such times as the Directors may determine.

3.9 Special Meetings. Special meetings of the Directors may be held at any time and at any place when called by the President, or by three or more Directors.

3.10 Call and Notice.

(a) All Meetings. Reasonable and sufficient notice of the time and place of all meetings of the Directors shall be given to each Director as provided below. Such notice may be a copy of the call of the meeting; and if the meeting is not otherwise called, such notice given by the Clerk shall constitute a call of the meeting. Notices of all meetings of Directors shall state the purposes for which the meetings are called. No notice need be given to any Director if a written waiver of notice, executed before or after the meeting by the Director, or of the Director's attorney thereunto authorized, is filed with the records of the meeting.

(b) Reasonable and Sufficient Notice. Except as otherwise expressly provided, it shall be reasonable and sufficient notice to a Director to send notice by mail at least forty-eight hours or by telegram at least twenty-four hours before the meeting addressed to the Director at the Director's usual or last known business or residence address or to give notice to the Director in person or by telephone at least twenty-four hours before the meeting.

3.11 Quorum. At any meeting of the Directors a majority of the Directors then in office shall constitute a quorum. Any meeting may be adjourned by a majority of the votes cast upon the question, whether or not a quorum is present, and the meeting may be held as adjourned without further notice.

3.12 Action by Vote. When a quorum is present at any meeting, a majority of the Directors present and voting shall decide any question, including election of officers, unless otherwise provided by law, the Articles of Organization, or these By-laws.

3.13 Action by Writing. Any action required or permitted to be taken at any meeting of the Directors may be taken without meeting if all the Directors consent to the action in writing and the written consents are filed with the records of the meetings of the Directors. Such consents shall be treated for all purposes as a vote at a meeting.

3.14 Compensation. Directors shall not be precluded from serving the corporation in any other capacity and receiving compensation for any such services.

SECTION 4. OFFICERS AND AGENTS

4.1 Number and Qualification. The officers of the corporation shall be a President, Treasurer, Clerk and such other officers, if any, as the Directors may determine. The officers of the corporation shall have the respective powers and duties provided by these By-laws and such other respective powers and duties as the Directors shall from time to time designate. The corporation may also have such agents, if any, as the Directors may appoint. An officer may but need not be a Director or corporate member. The Clerk shall be a resident of Massachusetts unless the corporation has a resident agent duly appointed for the purposes of service of process. A person may hold more than one office at the same time. If required by the Directors, any officer shall give the corporation a bond for the faithful performance of his duties in such amount and with such surety or sureties as shall be satisfactory to the Directors.

4.2 Election. The President, Treasurer and Clerk shall be elected annually by the Directors at their first meeting following the annual meeting of the corporate members. Other officers, if any, may be elected by the Directors at any time.

4.3 Tenure. The President, Treasurer and Clerk shall each hold office until the first meeting of the Directors following the next annual meeting of the corporate members and until the officer's successor is chosen and qualified, and each other officer shall hold office until such first meeting of the Directors following the next annual meeting of the corporate members unless a shorter period shall have been specified by the terms of the officer's election or appointment, or in each case until the officer sooner dies, resigns is removed or becomes disqualified. Each agent shall retain that agent's authority at the pleasure of the Directors.

4.4 President. The President shall be the chief executive officer of the corporation and, subject to the control of the Directors, shall have general charge and supervision of the affairs of the corporation. The President shall preside at all meetings of the corporate members and at all meetings of the Directors, except as the corporate members or Directors otherwise determine.

4.5 Treasurer. The Treasurer shall be the chief financial officer and the chief accounting officer of the corporation. The Treasurer shall be in charge of its financial affairs, funds, securities and valuable papers and shall keep full and accurate records thereof. The Treasurer shall also be in charge of its books of account and accounting records, and of its accounting procedures.

4.6 Clerk. The Clerk shall record and maintain records of all proceedings of the corporate members and Directors, which

records shall be kept within the Commonwealth at the principal office of the corporation or at an office of its Clerk or of its resident agent, and shall be open at all reasonable times to the inspection of any corporate member. Such records shall also include records of all meetings of the Incorporator and the original, or attested copies, of the Articles of Organization and By-laws and names of all corporate members and Directors and the address of each. If the Clerk is absent from any meeting of corporate members or Directors, a Temporary Clerk chosen at the meeting shall exercise the duties of the Clerk at the meeting.

4.7 Suspension or Removal. An officer may be suspended or removed with or without cause by vote of a majority of Directors then in office at any special meeting called for such purpose or at any regular meeting. An officer may be removed with cause only after reasonable notice and opportunity to be heard.

4.8 Resignation. An officer may resign by delivering a written resignation to the President, Treasurer or Clerk, to a meeting of the corporate members or Directors, or to the corporation at its principal office. The resignation shall be effective upon receipt (unless specified to be effective at some other time), and its acceptance shall not be necessary to make it effective unless it so states.

4.9 Vacancies. If the office of any officer becomes vacant, the Directors may elect a successor. Each such successor shall hold office for the unexpired term, and in the case of the President, Treasurer and Clerk until his or her successor is elected and qualified, or in each case until he or she sooner dies, resigns, is removed or becomes disqualified.

#### SECTION 5. EXECUTION OF PAPERS

Except as the Directors may generally or in particular cases authorize the execution thereof in some other manner, all deeds, leases, transfers, contracts, bonds, notes, checks, drafts and other obligations made, accepted or endorsed by the corporation shall be signed by the President or by the Treasurer.

#### SECTION 6. NO PERSONAL LIABILITY; INDEMNITY

6.1 No Personal Liability. The corporate members, Directors and officers of the corporation shall not be personally liable for any debt, liability or obligation of the corporation. All persons, corporations or other entities extending credit to, contracting with, or having any claim against, the corporation, may look only to the funds and property of the corporation for the payment of any debt, damages, judgment or decree, or of any money that may otherwise become due or payable to them from the corporation.

6.2 Indemnity. The corporation shall, to the extent legally permissible and only to the extent that the status of the corporation as an organization exempt under Section 501(c) (3) of the Internal Revenue Code is not affected thereby, indemnify each of its Directors, officers, employees and other agents (including persons who serve at its request as Directors, officers, employees or other agents of another organization in which it has an interest) against all liabilities and expenses, including amounts paid in satisfaction of judgments, in compromise or as fines and penalties, and counsel fees, reasonably incurred by such person in connection with the defense or disposition of any action, suit or other proceeding, whether civil or criminal, in which such person may be involved or with which such person may be threatened, while in office or thereafter, by reason of such person being or having been such a Director, officer, employee or agent, except with respect to any matter as to which such person shall have been adjudicated in any proceeding not to have acted in good faith in the reasonable belief that his or her action was in the best interests of the corporation; provided, however, that as to any matter disposed of by a compromise payment by such Director, officer, employee or agent, pursuant to a consent decree or otherwise, no indemnification either for said payment or for any other expenses shall be provided unless such compromise shall be approved as in the best interests of the corporation, after notice that it involves such indemnification; (a) by a disinterested majority of the Directors then in office; or (b) by a majority of the disinterested Directors then in office, provided that there has been obtained an opinion in writing of independent legal counsel to the effect that such Director, officer, employee or agent appears to have acted in good faith in the reasonable belief that his or her action was in the best interests of the corporation; or (c) by a majority of the disinterested members entitled to vote, voting as a single class. Expenses, including counsel fees, reasonably incurred by any such Director, officer, trustee, employee or agent in connection with the defense or disposition of any such action, suit or other proceeding may be paid from time to time by the corporation in advance of the final disposition thereof upon receipt of an undertaking by such individual to repay the amounts so paid to the corporation if such person shall be adjudicated to be not entitled to indemnification under Massachusetts General Laws, Chapter 180, Section 6. The right of indemnification hereby provided shall not be exclusive of or affect any other rights to which any Director, officer, employee or agent may be entitled. Nothing contained herein shall affect any rights to indemnification to which corporate personnel may be entitled by contract or otherwise under law. As used in this paragraph, the terms "Directors," "officer," "employee" and "agent" include their respective heirs, executors and administrators, and an "interested" Director is one against whom in such capacity the proceedings in question or another proceeding on the same or similar grounds is then pending.

6.3 Interested Parties. No person shall be disqualified from holding any office by reason of any interest. In the absence of fraud, any Director, officer, or member of this corporation

individually or any individual having any interest in any concern in which any such Directors, officers, members, or individuals have any interest, may be a party to, or may be pecuniarily or otherwise interested in, any contract, transaction, or other act of this corporation, and

- (a) such contract, transaction, or act shall not be in any way invalidated or otherwise affected by that fact;
- (b) no such Director, officer, member, or individual shall be liable to account to this corporation for any profit or benefit realized through any such contract, transaction, or act; and
- (c) any such Director of this corporation may be counted in determining the existence of a quorum at any meeting of the Directors or of any committee thereof which shall authorize any such contract, transaction, or act, and may vote to authorize the same.

As used herein, the term "interest" includes personal interest and interest as a Director, officer, stockholder, shareholder, trustee, member or beneficiary of any concern; and the term "concern" means any corporation, association, trust, partnership, firm, person, or other entity other than this corporation.

#### SECTION 7. AMENDMENTS

These By-laws may be altered, amended or repealed in whole or in part by vote of a majority of the Directors then in office, except with respect to any provision thereof which by law, the Articles of Organization or these By-laws requires action by the corporate members. Not later than the time of giving notice of the meeting of corporate members next following the making, amending, or repealing by the Directors of any By-laws, notice thereof stating the substance of such change shall be given to all corporate members. The corporate members may alter, amend or repeal any By-laws adopted by the Directors or otherwise or adopt, alter, amend or repeal any provision which by law, the Articles of Organization or these By-laws requires action by the corporate members.

EXHIBIT "C"

WILDWOOD CONSERVATION CORPORATION  
DIRECTOR ACTION BY WRITTEN CONSENT

The undersigned, John J. Riley, Jr. and Diana W. Riley, being all of the directors of Wildwood Conservation Corporation (the "Corporation"), hereby consent to the following action:

That the Asset Purchase Agreement effective January 1, 1983 by and among Beatrice Foods Co., the Corporation, John J. Riley Company, Inc., John J. Riley, Jr. and Diana W. Riley (the "Agreement") be, and the same hereby is, approved in substantially the form attached to this consent; that the transactions provided for therein be, and the same hereby are, approved, and that the President of the Corporation be, and he hereby is, authorized to execute and deliver in the name and on behalf of the Corporation such Agreement with such changes therein as he may approve, the execution of such Agreement by him to be conclusive evidence of the authorization thereof; that the officers of the Corporation acting singly be, and they hereby are, authorized and directed to execute such documents, to make such payments, to grant such security interests and to take such other actions as any one of them shall deem advisable or necessary to effect the transactions provided for in the Agreement.

\_\_\_\_\_  
John J. Riley, Jr.

\_\_\_\_\_  
Diana W. Riley

Dated: January , 1983

WILDWOOD CONSERVATION CORPORATION

Certificate Regarding Articles of Organization,  
By-Laws, Resolutions, and Incumbency

I, Diana W. Riley, do hereby certify that I am the duly elected and qualified Clerk of Wildwood Conservation Corporation, a Massachusetts corporation (the "Corporation"), acting as such, and that:

(a) No amendment to, or any other document affecting, the Articles of Organization, a true and complete copy of which is attached hereto as Exhibit A, has been filed with the Secretary of State of Massachusetts since January 1, 1983;

(b) A true and complete copy of the By-laws of the Corporation is attached hereto as Exhibit B and those By-laws have been in effect at all times from December 31, 1982, through the date hereof;

(c) Attached hereto as Exhibit C is a true and complete copy of a Consent of the Directors of the Corporation dated as of January 1, 1983 (the "Consent"), and the votes contained in the Consent were duly adopted, have not been amended or revoked, and are in full force and effect on the date hereof and are the only votes adopted by that Board of Directors relating to the subject matter thereof;

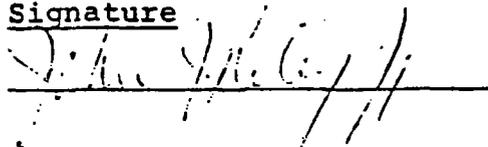
(d) The following individuals as of this date now hold offices set forth opposite the names:

President: John J. Riley, Jr.

Treasurer: John J. Riley, Jr.

Clerk: Diana W. Riley

(e) The person named below has been duly authorized to sign any documents relating to the Agreement referred to in the votes, including, without limitation, the Asset Purchase Agreement, and has been duly elected and duly qualified and, at all times since December 31, 1982, has held the office set forth opposite his name below, and the signature set opposite his name below is his genuine signature.

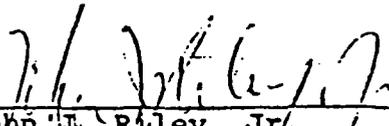
<u>Name</u>	<u>Title</u>	<u>Signature</u>
John J. Riley, Jr.	President	

(f) To the best of my knowledge, no dissolution proceedings with respect to the Corporation have been commenced or are contemplated.

IN WITNESS WHEREOF, I have affixed the seal of the Corporation hereunto this 6<sup>th</sup> day of January, 1983.

  
 Diana W. Riley, Clerk

The undersigned hereby certifies that Diana W. Riley, known to me, is a duly elected, qualified, and acting Clerk of Wildwood Conservation Corporation, and that the signature set forth above her name is her genuine signature.

  
 John J. Riley, Jr.  
 President

Dated: January 6, 1983

# TANNERY WASTES

## Pollution Sources and Methods of Treatment

*Prepared by*

JOSEPH W. MASSELLI, *Research Chemist*

NICHOLAS W. MASSELLI, *Assistant Supervisor*

and

M. GILBERT BURFORD, *Consultant-Supervisor*

of the

Industrial Waste Laboratory

Wesleyan University

Middletown, Connecticut

---

The New England Interstate Water Pollution Control Commission publishes this report in connection with its program of industrial waste surveys and research relating to pollution control of the waters in the New England Compact area.

The disposal of tannery wastes is a problem confronting the industries and the State water pollution control agencies throughout the area. Accordingly, this study was sponsored by the Commission as the first step toward the development of practical and economic methods for the treatment of tannery wastes. Further research is continuing on this subject and the results will be published by the Commission.

The Commission expresses its appreciation to Joseph W. Masselli, Nicholas W. Masselli and M. Gilbert Burford, who planned and directed this research project, and to the Connecticut Water Resources Commission for its cooperation and assistance.

This study and report was financed by a program grant to the Commission under the Federal Water Pollution Control Act of 1956.

---

June 1958

*Reprinted January, 1964*

73 TREMONT STREET



BOSTON 8, MASSACHUSETTS



## TABLE OF CONTENTS

	PAGE
CHAPTER I — INTRODUCTION .....	3
CHAPTER II — COMPOSITION OF CATTLESKIN .....	3
CHAPTER III — GENERAL DESCRIPTION OF PROCESSES USED BY TANNING INDUSTRY .....	5
CHAPTER IV — PIGSKIN TANNERY SURVEY .....	14
CHAPTER V — CATTLEHIDE TANNERY SURVEY .....	18
CHAPTER VI — PLANNING A TANNERY WASTE SURVEY .....	25
CHAPTER VII — TREATMENT OF TANNERY WASTES .....	27
CHAPTER VIII — SUMMARY, CONCLUSIONS AND RECOMMENDATIONS .....	35

## FIGURES

FIGURE I — PROCESS FLOW SHEET FOR PIGSKIN TANNERY .....	14
FIGURE II — PROCESS FLOW SHEET FOR CATTLESKIN TANNERY .....	19
FIGURE III — FLOW LINES FOR PROPOSED TREATMENT PLANT FOR TAN- NERY WITH MINIMUM LAND AREA .....	31
FIGURE IV — FLOW LINES FOR PROPOSED TREATMENT PLANT FOR TAN- NERY WITH LARGE LAND AREA .....	32

## TABLES

TABLE I — PIGSKIN TANNERY SURVEY — ANALYTICAL RESULTS .....	36
TABLE II — PIGSKIN TANNERY SURVEY — AVERAGE COMPOSITION AND CONTRIBUTION OF STRONG LIQUORS .....	37
TABLE III — CATTLEHIDE TANNERY SURVEY — ANALYTICAL RESULTS ..	37
TABLE IV — CATTLEHIDE TANNERY SURVEY — AVERAGE COMPOSITION AND CONTRIBUTION OF STRONG LIQUORS .....	38
TABLE V — ANNUAL CONSUMPTION OF PROCESS CHEMICALS IN CATTLE- SKIN TANNERY .....	39
TABLE VI — BIOCHEMICAL OXYGEN DEMAND OF TANNERY PROCESS CHEMICALS .....	40

## Chapter I

### INTRODUCTION

This report on tannery wastes is part of a long-range program of the New England Interstate Water Pollution Control Commission to aid industry and pollution abatement agencies in their efforts to reduce pollution. It is intended for industries, sanitary engineers, communities, and agencies which may now, or in the future, be confronted by such a waste problem.

The main effect of this report is to provide an insight into the processes and process chemicals used by the tanning industry and to determine the sources and nature of the major pollution loads from tannery wastes. The present state of the art of tannery waste treatment is discussed and methods of planning and facilitating a tannery waste survey are outlined.

In this report the usual abbreviations employed in pollution studies will be used. Concentrations (except for pH) will be usually expressed in parts per million (p.p.m.); one part per million equals 8.3 pounds

per million gallons, and 120 parts per million equals one pound in 1000 gallons. The term B.O.D. means biochemical oxygen demand and will be the usual five-day 20°C, B.O.D.

When process chemical usage is referred to, it may be expressed as a percentage based on the weight of the hide (O.W.H.). For example, 3% sodium sulfide O.W.H. means that 3 pounds of sodium sulfide are used for every 100 pounds of hide.

Most of the information on the composition of cattleskin and tannery processes was taken from books by Wilson (1, 2), McLaughlin and Theis (3) and O'Flaherty, Roddy and Lollar (4). These excellent treatises are recommended for readers interested in further information.

The trade names recorded in this report are not italicized or otherwise marked, following the practice in the trade literature.

## Chapter II

### COMPOSITION OF CATTLESKIN

Tanning is the act of converting animal skins into leather, and consequently any one interested in tanning wastes should know as much as possible about the composition and chemistry of the animal skin. This is necessary not only to learn why the tanner uses the processes he does, but also to help in tracing what contribution the materials from the skin substances make to the over-all pollution load.

Animal skin is made up of a number of distinct tissues and organs. The tissues may be divided into the following classes: epithelial, muscular, connective, nervous, glandular, fatty, and blood. The organs include voluntary and involuntary muscles, fat glands, sweat glands, nerves, and blood vessels.

The skin may be anatomically considered to be divided into three layers: flesh, derma or corium, and epidermis. Strictly speaking, the flesh is not a part of the skin proper. Varying amounts of the flesh may be attached to the skin, depending on the skill of the flayer who removes the skin from the carcass. The flesh is composed of fatty tissue, blood vessels, nerves, and voluntary muscles. It is attached to the skin by means of areolar connective tissue.

The derma, or corium, constitutes the leather-making portion of the skin, since both flesh and epidermis are removed before tanning. The upper portion contains

glands, muscles, and hair follicles and the lower portion (called reticular layer) is composed of interlacing fibers or fibrils. Both layers consist mainly of the protein collagen, and tanning is essentially the reaction of collagen with tannin or chromium with the resultant formation of leather.

The epidermis is the top layer of the skin and is composed mainly of the protein keratin. It is fortunate for the tanner that this reacts differently from collagen. When skin is limed, the epidermis is decomposed, thus enabling hair removal, while the collagen is not adversely affected. Animal hair is an epidermal regrowth.

The dry matter of the skin is made up preponderantly of proteins (90-95%). These are collagen, elastin, reticulin, keratin, glycoproteins, albumins, and globulins. As mentioned previously, collagen is the most important because it is present in the greatest amount and reacts to form leather. It constitutes 30-33% of the weight of the whole fresh skin, including water. On a dry basis it constitutes approximately 85% of the skin. It is insoluble in organic solvents, water, and dilute solutions of acids and alkalis at room temperature. One of its distinctive characteristics is that it swells greatly in aqueous acid and alkaline solutions in the absence of high salt concentra-

tions. In addition, prolonged action of hot water converts the collagen into gelatin, and hide scraps and trimmings from tanneries are in fact used to make gelatin commercially. Collagen is readily digested by the enzyme pepsin but not by trypsin.

Keratins are fibrous proteins which compose the outer layer of the skin and its appendages. The term covers a group ranging from hair, nails, and other horny structure to the proteins of the softer tissues of the lower epithelial layers. In the form of hair it swells very little over the entire pH range and resists the action of pepsin and trypsin. The chief characterizing feature of keratin is its relatively high content of the sulfur-containing amino acid cystine and its solubility in alkaline sulfide solutions.

Many of the cellular tissues of the body are surrounded and penetrated with a fine, filamentous network which is called reticular tissue. The protein composing these fibers is called reticulin, and its chemistry is not agreed upon by the various authorities working with it. On a weight basis, its percentage is very small.

Elastin, the protein of the yellow elastic tissue, also occurs in small amounts in the skin, being less than 1% on the dry basis. The elastin fibers form a fine network, mostly in the upper part of the skin. It is insoluble in organic and aqueous solvents and differs from collagen in being highly resistant to the action of boiling water. It is readily attacked by trypsin but slowly attacked by pepsin.

Albumins and globulins are also found in skin and may be readily removed by dilute sodium chloride solutions. Their total averages approximately 5% in calfskin and 1.5% in cow or steer skin on a dry basis. Both are coagulated by heat. They are both soluble in dilute solutions of neutral salts but the globulins are insoluble in pure water. The chief characteristic of these proteins is their great sensitivity to changes in physical and chemical environment, which is reflected not only in their heat coagulability, but also in their response to less drastic influences.

The total amount of lipid in the skin has been found to average from 0.13% to 0.76% of the fresh corium weight (5). Triglycerides composed approximately 80% of this amount and phospholipids (lecithin, cephalin and sphingomyelins), cholesterol, and free fatty acids composed the remainder.

Skin contains only small amounts of carbohydrates, most of it being present as blood sugar, glycogen, or bound as an integral part of a protein. Glycogen is a starch-like, polymerized form of glucose used by the body as a reserve store for food. Bound carbohydrate is found in collagen, albumins, globulins and the skin

mucoid. Collagen contains only 0.65% of a disaccharide composed of galactose and glucose but this accounts for the largest part of the skin carbohydrate because of the high proportion of collagen present in the skin.

The principal mineral elements present in the skin are sodium, potassium, calcium, magnesium, and phosphorus. The total mineral matter is approximately 1% on the dry basis. As with other body tissues, the skin is largely composed of water, normally amounting to 60 to 70%.

As can be seen from the foregoing discussion, the chemistry of skin is essentially the chemistry of proteins. Proteins are extremely complex molecules built up of many amino acids bound together through peptide ( $-\text{CONH}-$ ) linkages between the alpha-amino group of one and the alpha-carboxyl group of another. They are essentially extremely long polypeptide chains of very high molecular weight. Some of the amino acids composing the protein chain have extra carboxyl or amino groups and these unreacted groups give the protein ability to react with both acids and bases, as well as salts and heavy metals. The breakdown of protein into its constituent amino acids is called proteolysis. The very long protein chain is first broken into large-size fragments called proteoses, peptones, and finally into smaller fragments called peptides and amino acids. Not much is known about the susceptibility of the proteins and their many breakdown products to bacterial attack in the biochemical oxygen demand (B.O.D.) test used for pollution studies. It is conceivable that these products will not be readily attacked by the bacteria since the specialized enzymes necessary for their breakdown may not be present in sufficient concentration to cause proteolysis to the point where the bacteria may oxidize the product. This is analagous to the slow attack of cellulose by bacteria, despite the fact that the latter is composed of the readily oxidized glucose molecules.

In the following chapters it should be remembered that the processes used by the tanning industry are designed to prepare the hide (mainly collagen) in a manner so that all undesirable materials are removed, and so that the collagen is in a reactive state ready to combine with the tannin or chromium used for tanning. The hide may be thought of as an insoluble, porous sheet with a network of active foci where chemical reactions may take place. The tanner's job is to make these centers available for desired reactions for leather formation and to prevent undesirable breakdown of the leather-making substance. At the same time he must cause breakdown and removal of undesirable protein and fatty substance to open up the hide to allow penetration of tanning materials.

## Chapter III

### GENERAL DESCRIPTION OF PROCESSES USED BY TANNING INDUSTRY

#### Curing

Animal skin is covered with numerous bacteria, the kind and amount varying with the environment of the animal and with the amount and nature of the filth on the skin. While the animal is alive, these bacteria have little effect on the skin. As soon as the animal is slaughtered, however, the proteolytic bacteria quickly attack the skin and reduce its value and utility if left unchecked. To stop these damaging changes the skin must be cured. This is done by partially dehydrating the skin by treatment with salt, or by drying in air, or by a combination of both. The removal of free water by these methods reduces bacterial growth to levels which prevent damage of the skin. This curing must not be delayed and is usually started within two hours after the animal is slaughtered.

In large American slaughterhouses the hide is removed from the carcass and is dropped into a curing cellar which is maintained at approximately 13°C. The warm hide is allowed to stand for approximately two hours to lose its body heat. It is then spread out, flesh side up, on a layer of clean rock salt and is covered with more salt. Another hide, flesh side up also, is then laid on top and salted. This is continued until a "pack" is completed. Usually a pack is approximately 20 by 40 feet in area and 4 feet high. It is arranged so that the salt brine formed will drain away with the blood, lymph, and proteins which it dissolves. Minimum curing time in packs is three to four weeks. The hide loses part of its moisture and gains weight through the salt it absorbs. Usually 100 pounds of fresh hide will weigh about 80 pounds in the salted or cured state. The moisture content has been reduced from about 70% to 40% while about 30% salt has been added (6).

In Argentina, curing is done with salt brine instead of solid salt. The animal is washed first to remove most body filth. The flayed hide is again washed on both sides and the flesh side is vigorously swept with a broom. The washed hide is drained and cooled in saturated salt brine for 24 to 48 hours with occasional stirring. It is then removed, drained, and salted down in packs, as described above.

Many imported hides and skins are merely air-dried rather than salted. These are called flint or flint-dried and contain as little as 8% moisture. Drying heavy hides is a problem since slow drying will allow

bacterial growth and possible damage, while rapid drying will cause surface dehydration without removing water in the hide interior. This internal moisture will allow the bacteria to propagate, causing putrefaction and possible damage. The soaking of flint-dried hides must be done carefully and represents a problem to tanners.

Some skins are salted before drying and are termed dry-salted. In many countries where sodium chloride is not easily available, sodium sulfate may be used for curing. This salt has been reported to be unsatisfactory as a curing agent (7).

Sheepskins are usually de-wooled immediately after slaughtering and flaying and then pickled with acid and salt before shipping to the tannery. The curing process is not necessary when this is done. Most imported sheepskins are received in the pickled state.

Tests have shown that salt is absorbed by skin mainly from the flesh side. If considerable blood or fat covers the area, salt absorption will be slowed appreciably. Most of the absorption occurs in the first four hours if the area is clean. Bacterial growth will be hastened by the presence of blood, dung and other filth and will be slowed by the amount of sodium chloride absorbed.

#### Fleshing

Fleshing is the act of removing the areolar tissues from the flesh sides of hides or skins. Attached fat, connective tissue, blood vessels, nerves, voluntary muscle, and unremoved meat left as a result of poor flaying are also removed. The process is carried out on a fleshing machine which consists of two long rolls, one of corrugated metal and the other of rubber. These grip the skin with a pressure that can be regulated by a foot lever, and draw the flesh side across a revolving cylinder set with spiral blades. The spiral blades are kept sharpened by a travelling grinder. The fleshings are recovered and sold to plants for rendering or conversion to glue. Such recovery is indeed a necessity because of the great amounts of the highly concentrated and easily putrefied nature of the flesh. Fleshing may be done before or after soaking, unhairing, or re-liming. Flesh removal allows easier penetration and more effective action of the solutions used in the tannery. If done before or after soaking it is called green-fleshing. After unhairing or re-liming it is called lime-fleshing.

## Washing and Soaking

As indicated previously, the hides and skin are protected from damage by bacterial action mainly by dehydration. Brining and green-salt curing reduce the water content of raw hides from 70% to 40% and dry-salting and flint-drying reduce the water content to as low as 10%. During storage and shipment brined and salt-cured hides may lose another 15 to 20% of their moisture. The salt content of the hide averages approximately 10%, varying from 5% on the hair side to 13% on the flesh side. The salted skins shipped to the tannery contain dirt, salts, blood, manure, non-fibrous proteins and undissolved sodium chloride in addition to the dissolved salt.

The object of washing and soaking is to remove the ~~extraneous matter and to restore the moisture lost during preservation and storage.~~ The reasons for this are well outlined by Goetz (8), who states that moisture restoration is essential in order that the hides and skin will not be physically damaged by the action of washing under agitation and by flexing while being fleshed. Sufficient moisture within the hides is necessary for solution and elimination of salts and globular proteins contained within the fibrous hide structure. The replenished water serves as a diluent and as a vehicle for penetration into the fibrous structure of the chemicals used for unhairing and plumping. The *extraneous organic and inorganic matter are removed* so as to prevent damage by solids to both hide and machine during the fleshing and unhairing operations. Manure and urine are excellent bacterial foods and stimulate undesirable bacterial growth during soaking. These, along with certain salts in the soaks, can cause *irremovable stains and discoloration on the leather.* The cementing effect of globular proteins upon dried tanned fibers *reduces fiber motility which is necessary to produce a soft and a pleasing feel in the final leather.* Curing salts transferred to the lime liquors affect the alkaline plumping action, reduce the unhairing rate, and can cause contraction of the grain surface of the hides and skin. If extraneous matter is left in or on the skin it will represent a false and variable hide substance weight for the determination of amounts of materials required for the liming process.

In practice there is no standardized procedure for washing and soaking. Factors that require consideration are the type of raw material processed, the method of curing, the tannery's equipment, time and labor associated with the immediate and subsequent operations, and the tanner's personal conception of how the job should be done.

Goetz (9) has outlined several procedures widely used in industry. In the most common method lots

of 2500 to 4000 pounds of whole hides are floated with 200% cold tap water in a wash drum and then drum-washed for 25 to 30 minutes with water. After the hides are cut into sides they are green-fleshed, trimmed, and soaked overnight with 300 to 350% water in paddles used for both soaking and liming. After soaking overnight, they are paddled for a few minutes and the water drained. The paddle is then filled with water for the unhairing process which follows.

In a second method where sides are vat-limed, the drum-washed stock is reeled into soak vats containing approximately 350% water for overnight soaking. The soak liquor is dumped and the vats are refilled before the sides are reeled into the lime vats.

In a third method the sided stock is placed in paddles containing 300 to 350% water and allowed to soak for 45 to 60 minutes. The stock is then washed 60 to 90 minutes, until the effluent is clean. The water is turned off and the sides are allowed to soak overnight. If green-fleshing or liming in a separate paddle is to be done, the skins are removed after draining. If the skins are to be limed in the same paddle, the soak is drained, the paddle refilled, and lime added.

In another procedure a 6 to 8 hour soak at 75 to 85°F. with bactericide may be used. Bactericides most frequently used are chlorinated phenols, beta-naphthols, mercurials, and para-chloro-metacresol. Usually 0.5 to 1.5 pounds per 100 gallons of soak water (600 to 1800 p.p.m.) are used.

Water usage in the soaks varies from 300 to 500% for green-salted hides and from 600 to 800% for dry hides. If the green-salted hides contain 10% sodium chloride and this all dissolves in the soak water, the salt concentration is approximately 20,000 to 30,000 p.p.m. If a preliminary rinse is used before soaking, part of the salt would be removed. This salt concentration contributes to the removal of globular proteins during soaking. Some tanners may add enough salt to make 80,000 to 100,000 p.p.m. if softer leather is desired.

## Unhairing

Removal of hair and epidermis from hides and skins is one of the major purposes of the unhairing process. This is necessary so that the leather will have an attractive appearance when it is finished. The fiber structure of the hide must be "opened up" so that the fiber bundles are split up more finely and unwanted protein removed.

Hair may be removed by complete destruction or dissolution (pulping or burning off), or by loosening, followed by machine or manual pulling. The latter is practical when hair recovery is desired. A

majority of cattlehide tanneries practice hair recovery as do almost all calfskin tanneries. Hair from kidskin, goatskin and particularly sheepskin is a valuable by-product and recovery is standard practice when these skins are being processed.

< Lime has been used since ancient times for both hair loosening and hair destruction. In the older system of liming in still vats, hides were handled individually in and out of a series of vats. The first day for a new pack was started in an old or "mellow" bath. The pack was then advanced on successive days into strengthened limes and finally into fresh lime. In present day practice when still vats are used the hides in each pack are tied together and reeled mechanically from vat to vat. Such systems require four to seven days depending on the type and thickness of leather desired. With thick leather there is considerable loss of hide substance and because of this and the longer time necessary, unhairing by liming alone is seldom practiced.

Other alkalis also show unhairing possibilities. Wilson (10) unhaird hides in several minutes by immersing in 16% sodium hydroxide. The pieces were neutralized in 14% hydrochloric acid. The sodium chloride which formed was enough to prevent

acid swelling. The leather produced by this twenty-minute process was reported to be quite presentable. Ammonia (0.1 to 1.0%) is reported to loosen hair in several hours at a pH between 11 to 12. Higher concentrations and higher pH's by means of other alkalis lessened the loosening action (11). Cyanide salts have also been used successfully to a limited extent for unhairing.

Sodium sulfide is the most important and most widely used unhairing agent in the industry today. It is generally used with lime for hair loosening or pulping. Concentrations of 0.6 to 1.0% of 62% sodium sulfide and 7% lime (based on the weight of the hide) are used for loosening and concentrations of 1.75 to 5.0% sodium sulfide and 4 to 8% lime are used for hair pulping when recovery is not desired. Water-to-hide ratios of three or four to one are generally employed. Depending on the sulfide strength, caustic concentration, or temperature, the hair may be pulped in a few hours or a few days. Limitations of the process are the extent to which the fiber structure or grain layer may be affected. The caustic nature of sodium sulfide plumps hides rapidly. When the swelling of the grain layer occurs too rapidly in the initial stages, the inner fiber structures may be strained



UNLOADING UNHAIR PADDLES

to the breaking point, producing leather with a loose grain. The hair root may be retained within the follicle when the follicle swells about the hair shaft and the hair may be destroyed only above the grain surface. The short fine hairs are held tightly and are difficult to remove.

Sodium sulfhydrate may be used to minimize swelling because of its lower causticity but it is not strong enough for use in hair pulping. It may be used with sodium sulfide to control both the alkalinity and sulfide concentration of the unhairing liquor, thus regulating the rate of swelling in the hair-pulping process.

A typical hair-pulping and liming procedure for cattle hides is usually performed in paddles. Because of their caustic nature, pulping liquors dissolve much of the normal animal grease. Consequently, lumps of flesh and fat do not prevent penetration of the liquors, and the stock does not have to be fleshed previously. To save extra handling the stock is unhaird in the same paddle in which it was soaked.

The hides are usually soaked overnight, drained and washed 10-15 minutes at 64-70°F. and drained again. The paddle is filled with water and approximately 2.5% sodium sulfide and 7% hydrated lime are added for unhairing. Usually the lime and only half the sulfide are added to the paddles while paddling for 20 to 30 minutes. After a resting period the remainder of the sulfide is added and the stock paddled for an additional 15 or 20 minutes. After this, the stock is turned over for short periods during the day. The hair is pulped during the first few hours but some short hair still remains.

The hide remains in the liquor for a second day with paddling two or three times to change position of the hides and to redistribute the lime sludge. The following morning the stock is washed until excess alkali has been removed. The stock may then be fleshed, trimmed, and weighed (called white weight).

As usual there are many variations of the process. Some tanneries follow the two-day sulfiding process by re-liming in 4 to 8% lime; others sulfide only one day and re-lime. Some use increased sulfide and lower lime percentages and pulp the hair in four hours, adding all of the sulfide at once. Re-liming for two days usually follows.

Dimethylamine sulfate is used to a limited extent for unhairing purposes. It is reported to be milder in action than sodium sulfide and results in the recovery of better hair. Other advantages quoted are freedom from fine hair, better hide preservation, even from inferior stock, good grain smoothness, and freedom from staining of the hide. No harmful effects are obtained if it is used in excess (12). Lower B.O.D.'s in the

waste effluent are claimed when this product is substituted for sodium sulfide (13). The commercial product is marketed as a liquid containing 36.5% available dimethylamine. Suggested usage is 1.0 to 1.5% of the commercial product and 8 to 10% lime (O.W.H.). It may be used with sodium sulfide when faster action is desired.

Development work with compounds containing the sulfhydryl group (e.g., thioglycolates) indicates favorable unhairing possibilities in alkaline solution, but present costs are prohibitive for practical usage (14).

Hair loosening may also be accomplished by the action of heat, bacteria, enzymes and lyotropic agents such as urea and salt in high concentration (15).

Some tanners prefer the painting process for hair removal, particularly when recovery is required. In this process strong sodium sulfide pastes are used but they do not come in contact with the hair or the grain layer as they are applied on the flesh side. The paint is made by dissolving sulfide or sulfhydrate to the desired strength and adding this to hydrated lime to form a thin paste. The mixture is allowed to cool and is kept at approximately 70°F. The previously soaked and fleshed skins are spread out on a traveling belt conveyer, flesh side up, and are sprayed with the paste. They are then laid out on platforms, flesh to flesh, in small stacks for several hours. The hair is loosened by the sulfide which travels from the flesh surface to attack the hair roots. The skins are then unhaird and limed.

Excellent descriptions of the practice and the mechanisms of the reactions involved in unhairing are recorded by Morris (16) and Merrill (17) and should be consulted if further information is desired.

### Lime Splitting

After unhairing, the hide may be slit through the middle of its thickness to produce two distinct layers. The upper is called the grain layer and is the most valuable, and the lower layer, or the flesh-side, is called a split. Many tanneries completely process only the grain layer and sell the splits to other tanneries after pickling.

The technique of lime-splitting hides and skins requires skill in setting and maintaining the splitting machines for accurate performance. The stock must be properly conditioned so that it is not too slippery to handle. It should be plumped so that it is firm enough to be fed into and pass through the splitting machine smoothly in order to split off the grain layer to the desired thickness uniformly across the full length and width of the hide.

Slipperiness of the stock may be reduced by washing. As the alkali is washed away, the carbonate in

the water reacts with the lime diffusing from the hide, forming a calcium carbonate precipitate. This develops a slight chalky roughness on the grain and the stock may be handled more easily.

Since the grain layer is taken off at a uniform thickness, the under layer or split will vary in thickness over its width. The lighter portions, which are too thin to be used for leather making, are trimmed off and disposed of as glue stock. The trimmed splits are sorted for weight and size and may be processed further or sold to another tannery.

### Bating

When the hide has been soaked, unhaired, re-limed, and fleshed, it still remains in a highly swollen condition. Despite the fact that many impurities (salt, manure, flesh, hide protein, etc.) have been removed, it will weigh more than the original salted hide because of the water take-up. This increase in weight averages approximately 25%. The thickness of the hide is about twice that of the salted hide.

The highly alkaline and swollen state of the hide makes it unsuitable for most tanning processes which usually are performed in acid media. Bating is the term which applies to the process which prepares the hide for tanning. Its objectives are to regulate the pH (de-lime), to reduce the swelling (falling), to peptize the fibers, and to remove protein degradation products.

Long ago tanners employed fowl or pigeon dung when light bating action was required and dog dung (called puering) when stronger action was required. It was pointed out that the real action consisted of bacterial secretion of enzymes, and this brought about the use of enzyme extracts for bating (18). Since bacterial populations may double every twenty minutes, it can be seen that control of the older processes would be very difficult and it was possible for skins to be overbated, underbated, and even completely destroyed, depending on the enzymatic activity of the bating liquor.

It is possible to separate the de-liming and bating actions by the use of de-liming acids or salts as a first process. This is generally practiced in Europe but not in the United States. Any acid may be used but care must be exercised with the strong mineral acids. Lactic acid, buffered glycolic acid, lactic acid anhydride with molasses, and other organic compounds are also used (19).

Ammonium salts, particularly ammonium sulfate, are used almost universally. These are used in concentrations under 0.5% and provide proper pH regulation, de-liming action, and enzyme activation. Ammonium chloride, sodium bisulfite, sulfur dioxide, and carbon dioxide have also been used.

Most commercial enzymes are mixtures, the main source being from hog pancreas and, to a lesser degree, from sheep pancreas. In recent times preparations have been made from controlled cultures of bacteria, fungi, and molds. The most important constituents are proteolytic enzymes which hydrolyze protein compounds. Throughout the manufacturing process of these materials the manufacturer pays most attention to the preservation of the proteolytic enzyme systems. Other enzymes are either partially or totally destroyed.

Usually an extract is prepared from the minced glands and adsorbed on wood-flour or precipitated with organic solvents or high concentrations of certain salts such as ammonium salts. The main enzymes in the bates are trypsin and chymotrypsin, but others are usually present. They may be marketed as concentrated bates, containing no de-liming agent (40-50% active enzymes), or they may be mixed with de-liming agents as 2 to 10% active form. De-liming agents are usually ammonium sulfate, ammonium chloride, boric acid or combinations of these.

Bating may be done in drums or paddles. Paddles are preferred because it is easier to control the de-liming agent and to observe the extent of the enzyme action. The general procedure is to wash the hides for 10 to 30 minutes at 70°, then 10 to 30 minutes at 80 to 100°F. A de-liming acid or salt may be added and run for 10 to 30 minutes. The bate is added and the hides are paddled for 30 minutes to 5 hours. Bates containing de-liming salts are used from 0.75 to 2.0% O.W.H. and concentrated bates are used at 0.1 to 0.5% O.W.H. The pH of the mixture should be checked to see that it is within the range suggested by the manufacturer for maximum proteolytic activity. Water to hide ratios are maintained at three or four to one.

As a result of the de-liming, bating process, the grain becomes smoother, silky, and slippery; the skin looks fallen and is flaccid. The porosity of the skin is increased so that air may be readily squeezed through it and a thumb print impressed on the hide is retained for a longer time. The skins increase in width and the wrinkles are less pronounced. These changes have been brought about partially by de-liming but mainly through enzyme action on the hide proteins. It is probably true that most of the change has been brought about by physical and chemical changes of the skin proteins rather than their actual removal since less than 2% of the total skin proteins are removed during bating (20). Much of the improvement is caused by elimination of scud (epidermal matter, hair roots, fine hairs, pigments, fats, sebaceous and sweat glands, and decomposed cellular debris).

The bate digests portions of the epidermal matter, loosening it, and allowing its removal with its attached scud. Collapse of the collagenous fiber structure also expels scud from the interior of the skin and helps loosen the epidermal matter. This cleansing action on the skin is also another important function of the bating process.

### Pickling

Pickling is the term applied to the treatment of hides with salt and acid solutions. It is usually performed after unhairing and bating to prepare the skins for mineral tanning. This is necessary so that the skin will be acidic enough to prevent precipitation of insoluble chromium salts on the skin fibers. Pickling is occasionally done prior to vegetable tanning but normally such tanning may follow bating immediately. It is also done to preserve stock for considerable periods of time prior to tanning, as for example on de-wooled sheepskins and splits out of lime.

Stubbings (21) has an excellent extensive report on modern pickling based on questionnaires returned from fifty-five major tanneries. He states that all tanneries use sulfuric acid and salt, with a minority (10%) using a buffer salt or acid with their regular pickle system. All tanneries, except one, pickle at or near room temperature. The stock basis for calculation of pickle formulas is the white weight (after unhairing and fleshing) or the lime split weight. The majority use 1% to 2% sulfuric acid with 7 to 10% sodium chloride. The pickling time may vary from minutes to over twelve hours.

Although there are several different processes, these differ only in the type of equipment used and the time of the process; that is, whether the process is carried out to equilibrium or whether it is part of a pickle-tan process. Pickling may be done in paddles or drums. In paddle pickling the bated stock is immersed in 100% to 400% water, and about 10% salt is added. When the salt dissolves, about 1.5% sulfuric acid is added and paddling is done intermittently until the process is completed. This ranges from 45 minutes to 48 hours.

In drum pickling the bated stock is floated in about 100% water. Usually the same drum is used for bating, pickling, and tanning. About 7% salt is added and dissolved by several minutes drumming. Approximately 1.5% sulfuric acid is then added and drumming is continued until the end of the pickle cycle.

If pickling to equilibrium is done, the hides remain in the pickling solution about eight hours, the drum being revolved about 10% to 50% of this time. If a short pickle time is used, followed by tanning, the

hides are in the solution only one-half to four hours, with continuous drumming. A small number of tanneries employ a buffered pickle liquor, with formic or acetic acid, or calcium or sodium formate added to the sulfuric acid-sodium chloride solution.

Salt must always be added first in pickling since it prevents acid swelling which would slow penetration of chrome salts in the tanning process. Investigations show that approximately 0.5% of the hide substance is dissolved when 1.5% sulfuric acid is used for pickling (22). With a 1 to 1 water to hide ratio, the dissolved protein in the liquor would be approximately 5000 p.p.m.

The amount of acid taken up by the skin is 0.6% to 1.6% when 2.5% acid and 2.7% salt are used in pickling. This agrees fairly well with research investigations which showed that approximately 0.98 milliequivalents of acid is bound up by each gram of collagen (23).

### Degreasing

Natural grease, if not removed during the manufacture of light leather, may cause trouble in the finished product. Fatty spues, uneven dyeing and finishing, waxy patches and pink stains on chrome blues may be obtained with unremoved grease. Degreasing before tannage is safest since it prevents formation of permanent metallic soaps and will not require additional fatliquoring if grease removal is found necessary. The removal of grease from the interfibrillary spaces will also allow more even penetration and action of tanning liquors, fatliquors, and dyes.

Degreasing may be done by emulsification with an aqueous solution of a synthetic detergent, solvent extraction by organic solvents, or pressure degreasing in which the skin greases are squeezed out through the interfibrillary channels by mechanical action. Solvent extraction with kerosene or Stoddard solvent is most widely used.

In solvent degreasing about 50 gallons of kerosene is placed in a drum with 1000 pounds of pickled hide. Usually salt (or salt brine) and a penetrating agent are added. The mixture is heated to 85°F. with steam or hot water and the hides are drummed for approximately three hours. The excess solvent and brine are run off for recovery and the hides are drummed again with brine containing up to 5% salt for fifteen minutes. Three such washings are usually sufficient.

It should be pointed out that recovery is essential, not only from an economic standpoint, but also from a pollution standpoint since kerosene has a relatively high B.O.D. (53%). The 50 gallons of kerosene represents approximately 130 lbs. of B.O.D. from each

1000 lbs. of hides degreased. This is a very high pollution potential. The kerosene, as well as the grease, may be readily recovered by steam distillation in recovery stills. In some mills the brine is also recovered by gravity separation from the kerosene and re-used. Pankhurst (24) points out that the return from well-recovered grease can be substantial and could make the whole degreasing operation self-supporting. He points out that the color should be as light as possible, that the unsaponifiables should be less than 5%, and that the free fatty acid content should be as low as possible. He discusses some of the factors involved in obtaining a desirable product.

### Vegetable Tanning

Raw skin is readily putrescible in the wet state. Upon drying, the collagen fibers become glued together and the skin is very stiff. The dried skin will not putrefy but putrefaction will start quickly as soon as the skin becomes moist again. Thousands of years ago it was noted that the properties of the skin substance changed completely if the wet skin were brought into contact with the aqueous extract of certain forms of plant life. The active substance in these extracts was later found to be tannin. The combination of tannin

with skin substance is called vegetable tanning and the resultant product of the combination of skin protein with the tannin is leather. Under normal usage, the fibers of leather will not glue together on drying and will not putrefy even in the wet state. Leather articles have been found in archaeological diggings at least twelve thousand years old, so the art of leather manufacture is indeed an ancient one (25).

The materials that have assumed importance as commercial sources of tannin are barks, woods, leaves, twigs, fruits, pods, and roots. In American quebracho and chestnut-wood extract supply the bulk of the tannin used, and mangrove, myrobalans, wattle, valonia, spruce, oak bark, hemlock bark, gambier, cutch, and sumac are used in much smaller volumes.

The chemistry of tannin is too complex to discuss here and interested readers are referred to McLaughlin and Theis (26) for further information.

In practice the hides are tanned by immersion in tan solutions which increase in concentration from 0.3% to 6% tannin. This preliminary tanning is usually done in rocker vats in which the frame for holding the leather is equipped with a rocking device to prevent the hides from touching one another, thus preventing "kiss" spots. Wilson describes a tanning cycle for sole



LOADING TAN WHEELS

leather wherein this preliminary tan in the graded series takes twenty days. The leather is then thrown into layer vats where it remains for twenty-one more days in 6% tannin, the tannin concentration being kept up to this value by addition of concentrated stock liquor at the beginning of each seven days (27).

Years ago, some tanners took more than a year to tan heavy steer hides. Some modern tanners have reduced the cycle described above by drumming the leather from the rocker vats for 12 hours in 12% tannin solutions. The leather is removed, covered to prevent oxidation and drying, and allowed to stand 48 hours. It is then washed for removal and recovery of excess tannin and processed. This procedure eliminates the twenty-one days immersion in the layer vats.

In general, because of the high cost of the tan solutions, re-use and recovery is practiced in all tanneries. If any solution is discharged, it usually will contain less than 0.3% tannin.

The amount of tannin combined with the hide varies considerably and is dependent on the time of reaction. It may vary from 18% to 60% based on hide substance. In addition to tannin, other water-solubles are also combined, varying from 20 to 40% (28). It can be seen that the combination of the tannin and its water-solubles with the skin protein may increase the weight of the hide substance from 38 to 100% or more.

In addition to these natural products containing tannin, newer synthetically produced compounds (called syntans) have been found to have a tanning action on hide substance. The most important are phenolsulfonic acid—formaldehyde complexes and these are widely used for the production of white leather. In addition to its own tanning action, it has been found to increase the tannin penetration into the leather and is often used as an auxiliary tanning agent to reduce the tanning time. Other types of syntans are discussed by McLaughlin and Theis (29).

### Chrome Tanning

Although vegetable tanning has been known for thousands of years, chrome tanning has been developed only within the past one hundred years. The bulk of heavy leather is tanned by vegetable tanning but most light leather is chrome tanned. The great advantage of chrome tanning is the short time required (6 to 24 hours). It also produces leather with a greater resistance to heat and abrasion. Its main disadvantage is its lower yield of leather. In addition, vegetable tanning produces leathers which are fuller, plumper, more easily tooled and embossed, change less in area with relative humidity, and are less affected by perspiration.

A combination of the advantages of both processes is obtained by tanning hides by both methods. This is often practiced by the industry and is called chrome retan. Usually chrome tanning is followed by vegetable tanning.

Chrome tanning is essentially the reaction of the chromic ( $\text{Cr}^{+3}$ ) ion or its complex with the proteins in the hide substance. Initially a two-bath process using hexavalent chromium ( $\text{Cr}^{+6}$ ) from sodium chromate was used. The hide was first impregnated with the sodium chromate in one bath followed by immersion in a bath containing sodium thiosulfate and acid. The bulk of chrome tanning is now done by the one-bath method using proprietary mixtures of basic chromic sulfate. The amount of chromium combined with the hide substance is dependent on many factors and may vary from 3 to 26% chromic oxide ( $\text{Cr}_2\text{O}_3$ ) based on the leather. Generally chrome concentrations average 3 to 15% chromic oxide in the finished leather.

When chrome tanning is completed the leather must be washed free of excess chrome solution and then neutralized with mild alkali to remove all free acid. Neutralization usually follows splitting and shaving which renders the leather into a uniformly thick, smooth article.

There are several other materials which have a tanning action but they are not widely used. These are alum, iron, formaldehyde, Calgon, oil, tungsten, quinone and others. The processing procedures and properties of the resultant leather are described by Wilson (30).

### Shaving

Shaving is the act of removing leather from various parts of the hide in order to have uniform thickness throughout. It is done on shaving machines which act essentially on the same principle as the fleshing machine previously described, the chief difference being in the sharpness and arrangement of the blades. The shavings are a waste product of slight value and have been used for fertilizer because of their organic nitrogen content.

Shaving is usually done after tanning. The leather is weighed and recorded as shaved weight. The water content is usually 50 to 55%.

### Finishing Operation

The conversion of raw skin into leather does not as a rule make it suitable for its usual end-use, and considerable finishing work has to be done to make the final end product used in industry. Description of only wet processes which are widely used will be attempted here. These are mainly bleaching, stuffing and fatliquoring, and dyeing or coloring.

## BLEACHING

In vegetable tanning there is often a deposit of phlobaphenes or of ellagic acid (31) on the leather surface which produces irregularities in coloring. In addition, leather may become dark through oxidation and this may be irregular over its surface. Bleaching is designed to give the leather a lighter and more uniform color before it is dyed and fatliquored. This is usually done by immersion in a dilute sodium carbonate solution (for 10 or 15 minutes) followed by a dilute sulfuric acid bath. After this treatment a short tanning in clear tan liquor is done to replace the tannin lost from the leather surface. It should be noted that sodium bicarbonate is the bleaching agent and that the usual chemicals associated with bleaching (chlorine, sulfur dioxide, etc.) are not used.

## STUFFING AND FATLIQUORING

Tanned hides, if dried, will usually be very stiff and will crack if bent sharply. In order to lubricate the fibers to prevent this and to make the leather soft, pliable, strong, and resistant to tearing, oils and greases are incorporated into the leather. The amount of oil added varies greatly, depending on the end-use of the leather. Only 2% to 3% of sulfonated oil is used in sole leather where stiffness is desired and this may often be added along with the concentrated tan liquor. As much as 30% oil, waxes, and stearin may be added for waxed leather used for water-proofed shoes.

The direct application of oils and greases, either by hand or by drumming the molten greases is known as stuffing. This is used where it is desired to incorporate a large amount of grease into the leather. When small, uniformly distributed amounts are desired, the oil is applied in the form of an emulsion and the process is termed fatliquoring. Chrome leather is usually dry fatliquored at 130° to 140°F. for 30 to 60 minutes, and vegetable tanned leather is usually drummed at 115° to 122°F. The concentration of oil in the emulsion varies from 0.5 to 8%.

The principal substances used for fatliquoring in

oiling are soaps, sulfated oils, petroleum sulfonic acids, naphthene sulfonic acids, sulfonated alkylated aromatic hydrocarbons, sulfated fatty alcohols, phosphate oils, vegetable oils, synthetic resins, egg yoke, etc. (32).

## COLORING

Leather may be dyed either before or after the fatliquoring process. Natural dyestuffs are still employed for coloring but have been largely displaced by artificial products. Basic dyestuffs are usually used for vegetable tanned leather because they combine readily with tannin and give more intense shades than the acid dyestuffs. When so dyed, all free tannin must be washed off or else this will diffuse into the dye bath and form a precipitate with the dye. This would tend to cause spottiness and discoloration of the leather. Sometimes a short rinse in sodium carbonate is given to free the grain surface from precipitated tannin and to strip off any excess of fixed tannin. The leather is then drummed in a solution of titanium or antimony salt which serves the double purpose of acting as a mordant and precipitating any excess tannin which may diffuse into the dye bath. The leather is then thoroughly washed and drummed in a solution of the dyestuffs.

Chrome leather may be dyed in a manner similar to vegetable tanned leather if it is first given a light surface retan with a vegetable tanning material, such as gambier or sumac. Acid dyestuffs may be used directly, without this retan.

In addition to the wet finishing already described there are numerous mechanical operations used in making leathers. This includes the splitting and shaving previously mentioned, and also slicking, sammying, drying, staking, rolling, brushing, boarding, plating, glazing, and embossing. Since these processes contribute little or nothing from a pollution point of view, they will not be discussed further. Interested readers may consult Wilson (33) if more information is desired.

**Chapter IV**  
**PIGSKIN TANNERY SURVEY**

The pigskin tannery surveyed for this report tanned skins obtained from all over the world. Their main sources of skin were New York, France, Holland, Austria and Japan. They produced fine leather for shoes, pocketbooks, luggage and upholstery, most of it being 1¾ ounce leather (0.027 inches thick). This plant soaked its hides in paddles overnight and then removed 33% flesh in the fleshing machine. The hides were then unhaired (complete dissolving of all hair) by a three-day immersion in a lime (10-13% O.W.H.) and sodium sulfide (3% O.W.H.) solution. De-liming and bating, done in the same paddles, preceded pickling in drums. Approximately 40% of the weight of the pickled hides was then removed in a first levelling by shaving. The hides were then degreased with kerosene in drums and either vegetable tanned (33% of total production) or chrome tanned (66% of total production). A second levelling by shaving then removed 33% of the hide weight and the leather was colored and fatliquored (Fig. I).

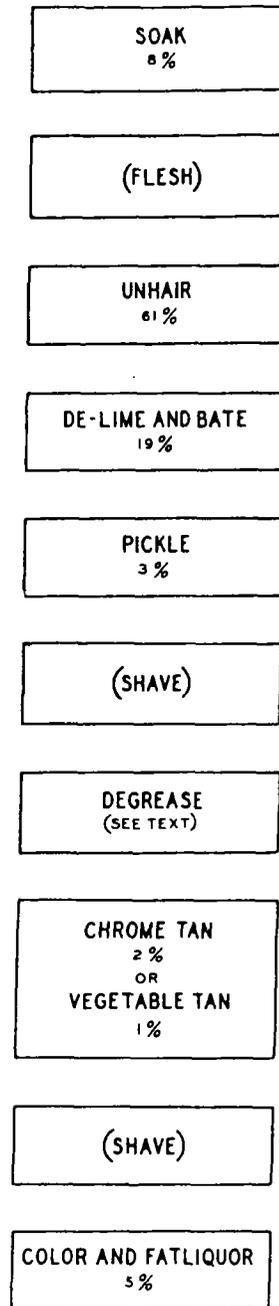
For purposes of this survey only the wet processes discharging appreciable pollution loads will be discussed. The analytical results are recorded in Table I and the contribution of the various processes are recorded in Table II.

**SOAKS**

In this plant 2000-3000 pounds of skins were soaked 24 hours in approximately 10,000 pounds of water. The B.O.D.'s of the soaks ranged from 1500 to 3000 p.p.m. and produced a B.O.D. load equal to 2% of the wet, salted weight. The total solids ranged from 17,000 to 43,000 p.p.m., more than 90% being contributed by sodium chloride. The volatile solids ranged from 1300 p.p.m. to 3300 p.p.m. (approximately equal to the B.O.D.) and indicated that approximately 1% of organic matter was extracted from the hides being soaked. Hide degradation, therefore, is not extensive in soaking, since a considerable amount of this organic matter may be assumed to be blood, manure, dirt, and other filth.

A sample taken after the hides had been soaking only one-half an hour indicated that approximately 60% of the extractable B.O.D. was removed in this time. It must be remembered that the hide structure is fairly dense and a considerable length of time is necessary for the solution to penetrate into the inner portions before the soluble material there may be extracted.

**PROCESS FLOW OUTLINE  
FOR  
PIGSKIN TANNERY**



NOTE -

Percentages indicate contribution to total plant B.O.D.  
Processes enclosed in parentheses do not produce liquid waste

FIGURE I

By the same reasoning, the hide will also retain solution when the bath is dumped. Since the soaked skin will contain approximately 70% water (actually a solution of approximately the same analysis as the soak water) every 1000 pounds of soaked hide will contain 700 pounds of the solution and will carry this into subsequent operations. Since the hide acts as a filter, however, the bulk of this solution will contain only the soluble matter of the discharged soak water. When the water volume used in subsequent operations is low, the solution carried over in the hide can be an appreciable factor in the make-up of the new volume of water after intermixing. For example, if 1000 lbs. of hide containing 700 pounds of solution is mixed with 3000 pounds of water, the total solution in the new bath is 3700 pounds. The solution carried over is thus diluted approximately five times and the new solution before anything is added will analyze as one-fifth of the carried-over solution, if sufficient time is allowed for water interchange and mixing. These carried-over solids will be superimposed on the solids added or extracted. For calculation purposes it will be assumed that two-thirds of the weight of the hide is water and approximately this weight will be added to the weight of water used to determine pollution loads.

#### *FLESHING*

In this plant the hides were fleshed after soaking. Approximately 30% of the hides was removed and recovered for sale to a rendering plant. The wet, greasy, sloppy mixture was stored in barrels for removal by the rendering company's truck. Recovery of the fleshings is an absolute necessity since the flesh has a high B.O.D. and will putrefy readily. It is readily attacked by bacteria and will settle to form sludge dumps of highly concentrated organic matter. Great care should be taken to prevent its discharge into sewers, streams, or treatment systems or the pollution load will be greatly intensified.

#### *UNHAIRING*

In unhairing 3000 to 4000 pounds of soaked and fleshed hide were mixed with approximately 15,000 pounds of water (approximately 4 to 1 ratio). Four hundred pounds of slaked lime and 100 pounds of sodium sulfide were added and the mixture was allowed to stand in paddles for three days with occasional paddling. The lime dosage (10-13%) is fairly high while the sodium sulfide dosage (3%) is normal for pulping. The three day contact time is long compared to unhairing practice for cattlehides but is necessary because the pig hair shafts, unlike those of cattle, actually penetrate the derma.

The first striking aspect of unhairing is the high

concentration of the process chemicals used. The slaked lime averages 24,000 p.p.m., even though the water to hide ratio is high, and the sodium sulfide averages 6000 p.p.m., when first added to the solution. The second striking aspect of unhairing is the use of sodium sulfide itself. In water pollution any sulfide concentration is a sign of definite anaerobic pollution and causes extremely offensive odors in natural waters or sewages of normal pH (6.5-7.5). The sulfide concentration in unhairing solutions is extremely high and is one of the most important reasons for the offensive nature of tannery wastes.

A third striking aspect of the unhair solution is its high sludge content. All of the solutions had approximately 10% greenish sludge, because of undissolved hair, lime, and presumably extracted skin substance. It will be recalled that lime is only slightly soluble in water and that the tanner uses a suspension containing approximately ten times more than the water can dissolve. From a theoretical standpoint this is a great waste of lime but on a practical basis it has been found to be necessary for proper conditioning of the hide. Undissolved lime is not a voluminous substance and it probably occupies less than 50% of the sludge volume. Undissolved hair residue and probably some extracted protein which has been denatured and precipitated are believed to contribute a good portion of the sludge.

The waste unhair solutions averaged 14,000 p.p.m. B.O.D. and discharged B.O.D. loads equal to 7.0% of the soaked, fleshed hide. In other words, for every 1000 pounds of such hide unhairing, 70 pounds of B.O.D. were discharged to waste. Expressed on a wet, salted basis, the B.O.D. load is 5.0%.

The sulfide ion in this waste averaged 1500 p.p.m. Since it has a 160% B.O.D. (Table VI), it will exert 2400 p.p.m. B.O.D., 17% of the total B.O.D. The remaining portion of the B.O.D. (83%) comes from the dissolved hide substance. The volatile solids concentrations averaged 12,000 p.p.m. and indicate that approximately 6% of the hide substance was extracted by the unhair solution. Most of this would be grease and hair. There were very few undissolved hair fibers in the pigskin unhair solution, unlike the cattlehide unhair solution to be discussed later. This is probably because of the longer immersion time used (three days compared to one in the cattlehide tannery).

The pH of the unhair solutions averaged 12, and the total hardness concentrations were approximately 34,000 p.p.m. because of the high lime content. Approximately 85% of the lime was insoluble and settled quickly as sludge and could be easily recovered. The sodium chloride concentration averaged 5700 p.p.m.

The amino and total nitrogen were approximately 280 p.p.m. and 2950 p.p.m. respectively. The approximate protein content may be calculated by multiplying the total nitrogen by 6.25 and can be seen to average 18,400 p.p.m., indicating that protein equal to approximately 9% of the hide was extracted. This appears to be high especially in view of the fact that the volatile solids averaged 12,000 p.p.m.

#### DE-LIMING AND BATING

De-liming and bating are done in the same paddle following soaking. Approximately 80 pounds of hydroxyacetic acid are added for de-liming while the hides are being paddled for 10 to 30 minutes. This is followed by the addition of approximately 90 pounds of bate (Oropon FS) and the mixture is paddled for one hour before it is dumped. While being paddled, the operator checks and regulates the pH to the optimum range for proteolysis (8.0-9.0). It must be recalled that the commercial bates usually consist of 95% ammonium sulfate and 5% active enzyme plus filler.

The analytical concentrations were approximately as follows: pH 8.4, 14,000 p.p.m. total solids, 7,400 p.p.m. volatile solids, 4400 p.p.m. B.O.D., 610 p.p.m. sodium chloride, 500 p.p.m. amino nitrogen and 750 p.p.m. total nitrogen. By assuming the amino nitrogen to be due to ammonium nitrogen from the Oropon, it may be calculated that the organic nitrogen is 250 p.p.m., amounting to approximately 1600 p.p.m. protein in the waste. Most of the nitrogen was contributed by the ammonium sulfate in the Oropon. The B.O.D. load was approximately 23 pounds per 1000 pounds of soaked, fleshed hide (2.3%).

If these wastes are to be compared with the cattle-hide wastes, it must be noted that a 4 to 1 water to hide ratio is used in the pigskin process and a 1 to 1 ratio in the cattlehide process.

#### PICKLING

Pickling was performed in drums with the addition of 400 pounds of salt, and 48 pounds of sulfuric acid to 1500 pounds of hide in approximately 345 gallons of water, including the water carried within the hide substance. The hides were drummed for 3 hours and the solution was dumped.

The analyses indicate that these wastes are fairly acidic, with pH's in the 1.7 to 2.7 range. The salt content, of course, is exceedingly high at 70,000 to 90,000 p.p.m. The volatile solid analyses may be high because of the presence of sulfuric acid. The B.O.D.'s are 4200 p.p.m., producing a pollution potential of 9 pounds per 1000 pounds of hide (0.9%).

#### LEVELLING

After pickling the skins are levelled by shaving with 40% of the previous weight being removed. These shavings were formerly used by a fertilizer manufacturer but presently are being carted to the town dump.

#### DEGREASING

After levelling the skins are degreased by solvent extraction. Six hundred or seven hundred pounds of pickled skins are drummed with 85 gallons of kerosene containing approximately 3 pounds of Triton 770. The drum is run continuously for an hour and then 100 gallons of water containing 100 pounds of sodium chloride are added. This mixture is drummed for 30 minutes and dumped to waste as the first dump.

The skins are then run for 45 minutes in 100 gallons of water containing 100 pounds of salt and approximately 3 pounds of Triton 770. This mixture is then dumped as the second dump. The skins are drained and rinsed.

The use of kerosene in this degreasing process is approximately 900 pounds per 1000 pounds of pickled skins. All of this is dumped to waste and since the kerosene has a high B.O.D. (53%), an extremely high pollution load of 477 pounds of B.O.D. per 1000 pounds of skins is produced from the kerosene alone. Any B.O.D. from extracted grease of hide substance will be added to this. Difficulties were encountered in analyzing the kerosene fraction and the brine fraction because kerosene is insoluble in water and evaporates at temperatures higher than 105°C. (used in determining the total solids and grease). Because of this, the volatile solids and B.O.D. recorded in the second brine dump could be from either the hide substance or from kerosene. The brine layer averaged 2600 p.p.m. B.O.D., producing a B.O.D. load of 7 pounds per 1000 pounds of pickled hide.

The B.O.D. load from kerosene itself is an excellent argument for recovery and indeed makes it a necessity from a pollution reduction point of view. It is also desirable and profitable from a kerosene and grease recovery point of view as previously mentioned. Fortunately, such dumping does not seem to be the practice in the tanning industry in general and the pigskin tannery is considering the purchase of a recovery still and use of Stoddard solvent for degreasing. Because of these factors, the B.O.D. load contributed by the kerosene is not included in the total B.O.D. in Table II. If it were, it would increase the total B.O.D. discharged from 771 pounds to 1981 pounds per day, almost three times as great. This indeed emphasizes the importance of a single process chemical in the total B.O.D. Note that it amounts to only 2% of the total volume of the strong liquors, but

it would contribute 61% of the total B.O.D. if not recovered.

#### VEGETABLE TAN

Vegetable tanning was done in paddles, with re-use of the liquors. For every new batch, tanning extracts equal to 25% of the hide weight was added. A typical feed would contain approximately 100 pounds each of Ortan, Purex, Chestnut and Minoso extracts. The hides were paddled occasionally until tanning was completed. The only solution discharged to waste was dragged out when the hides were being removed. This was estimated to be less than 10 gallons per 1000 pounds of hide.

As can be seen from the analyses, the tan solutions are extremely high in total solids (82,000 to 106,000 p.p.m.) and volatile solids (46,000 to 59,000 p.p.m.). The B.O.D.'s were also high at 23,000 to 26,000 p.p.m. Since only 10 gallons were discharged per 1000 pounds of leather, only 2 pounds of B.O.D. were discharged per 1000 pounds of hide (0.2%). This is a low B.O.D. potential. To produce 10% of the total B.O.D. (77 pounds) from this plant by this waste, 385 gallons per day would have to be dumped. This stresses the important fact that appreciable volumes of tan liquors will have to be dumped if vegetable tanning is to contribute a considerable part of the total B.O.D.

#### CHROME TAN

Chrome tanning was performed in drums at 95°F., using approximately 250 gallons of make-up water for every 1000 lbs. of skins. The following chemicals were added in portions at specified periods: 100 pounds of salt, 20 pounds of sodium formate, 100 pounds of Tanolin R (chromic sulfate), 201 lbs. of Tamol, 7.5 pounds of sodium acetate and 6 pounds of sodium bicarbonate. The over-all cycle took approximately 10 hours. The solution is dumped to waste and the hides are rinsed.

The waste discharges are slightly acidic (pH 4.5) and contain approximately 80,000 p.p.m. total solids with only 4600 p.p.m. being volatile. Solution of the hide substance is therefore negligible, most of the volatile substance being contributed by the sodium formate and acetate. The B.O.D. figures recorded are expected to be low because of the effect of chromium on the analysis and for calculations a figure of 2300 p.p.m. (50% of the volatile solids) should be used rather than the 840 p.p.m. figure obtained. On this basis 4.6 pounds of B.O.D. are expected to be discharged per 1000 pounds of degreased skin. This is also a low pollution potential.

The chromium content of the waste averaged 2500 p.p.m. chromium and indicates that approximately 5.2 pounds of chromic chromium is discharged for every

1000 pounds of degreased skins chrome tanned. Calculations indicate that approximately 40% of the chromium used is discharged to waste in this plant. This agrees well with results published by Wilson (34).

#### COLORING AND FATLIQUORING

For coloring and fatliquoring about 500 pounds of leather was placed in a drum and washed for 15 minutes. The leather was drummed with sodium bicarbonate and rinsed for 30 minutes at 130°F. The pollution load in this rinse was considered negligible and was not sampled. The hides were then drummed with varying amounts of Tanigan DLNA and 1% O.W.H. Tamol for 30 minutes. Small amounts of dye (5 to 15 pounds) were then added and drumming continued for 30 minutes. Varying amounts of formic acid were added and drumming continued for 30 minutes. The total volume of the mixture was approximately 150 gallons and a sample (called first dump) was taken at this point. The bath was dropped and the leather rinsed for 20 minutes.

Following this, approximately 28 pounds of a mixture of Tanoyl chemicals were added in about 150 gallons of water. This mixture was drummed for 45 minutes and the bath was dropped. A sample (called second dump) was taken at this point.

The first dumps averaged pH 3.9, 3950 p.p.m. total solids, 890 p.p.m. volatile solids and 490 p.p.m. B.O.D. The B.O.D. load was low at approximately 1 pound per 1000 pounds of leather (0.1%).

The second dumps averaged pH 4.3, 3980 p.p.m. total solids, 3030 p.p.m. volatile solids and 3950 p.p.m. B.O.D. The B.O.D. load was approximately 8 pounds per 1000 pounds of leather (0.8%).

#### Discussion

The average composition and contribution of the various process wastes are recorded in Table II. It must be stressed that these are for the strong liquors only and do not include any rinses whatsoever. For reasons previously discussed under degreasing, the kerosene was not included in the total B.O.D. load. It can be seen that the major wastes are the soak, the unhair and the de-lime and bate wastes which produce a total of 88% of the B.O.D. in 71% of the total strong liquor volume. The unhair waste produces 61% of the total B.O.D. and the sulfide ion in this waste produces 10% of the total plant B.O.D. Proteins (mainly hair) and grease from the hide substances therefore produce at least 50% of the total B.O.D. from this tannery. Total nitrogen determinations in the unhair solutions alone indicated that an amount of protein equal to 9% of the wet weight of the hide

was extracted. This is high indeed, since it would amount to 30% of the hide on a dry basis. (In cattle-hide unhairing, protein equal to 6% of the wet hide was extracted, but the hides were immersed in the unhair solution only one day whereas a three-day immersion was used in the pigskin process.)

If equalized, the strong liquors would produce 15,470 gallons of waste with a 6000 p.p.m. B.O.D. The pigskin tannery uses about 90,000 gallons of water per day and the strong liquors (16% of the total plant discharge) would thus produce a waste of approximately 1000 p.p.m. B.O.D. when diluted with these rinse waters. This diluted waste would contain approximately 70 p.p.m. sulfide ion, 1100 p.p.m. slaked lime (1500 p.p.m. total hardness as  $\text{CaCO}_3$ ), 17 p.p.m.

chromic chromium, 2400 p.p.m. sodium chloride and 900 p.p.m. proteins. This waste is discharged into settling lagoons with the production of approximately 5% sludge. When sludge fills the settling lagoon, it is removed and dumped into a large storage lagoon while an alternate settling lagoon is being filled.

The effluent from the settling lagoon is neutralized to pH 8.5 to 9.5 with sulfuric acid and pumped into a sedimentation basin. Attempts to treat the effluent from the basin on a trickling filter ended in failure because of clogging and ponding, evidently caused by scaling. The filter has been by-passed since and the neutralized effluent is discharged directly to the stream. The sludge from the sedimentation basin is pumped back to the settling lagoon.

## Chapter V

### CATTLEHIDE TANNERY SURVEY

Since the greatest volume of leather is produced from cattleskin, a more extensive study was made at a tannery which tanned such hides. Their product was used mainly for side upper leather in shoe manufacture. The sources of the wet, salted hides received by the tannery were mixed, including hides known in the trade as countrys, small packers, city butchers and dealers. Only the wet processes which contribute to the pollution load will be discussed fully. The analytical results are recorded in Tables III, and IV and V.

The hides received by the tannery were soaked, un-haired and re-limed in the same paddle. After fleshing and splitting, they were de-limed and bated, pickled and chrome tanned, all in the same drum. After tanning they were shaved, colored and fat-liquored. No vegetable tanning was done in this tannery (Fig. II).

#### SOAKS

Before soaking the hides, this plant used a preliminary rinse of 60 g.p.m. for 45 minutes (2700 gallons) to remove some of the salt and filth. One gallon of Sterizol and 4 pounds of sodium carbonate were then added to the paddles to reduce bacterial growth and prevent the liquor from becoming acid. The hides were then allowed to soak overnight. Approximately 5200 pounds were placed in each paddle in 1200 gallons of water.

In order to make an accurate determination of the amount of easily-extracted material, the tannery cooperated in a variation of their procedure by filling the paddle to 1200 gallons and paddling for 30 minutes, with no running rinse. These samples ranged

from 26,000 to 32,000 p.p.m. in total solids, 3100 to 9000 in volatile solids, 2350 to 2550 in B.O.D., 900 to 1100 in total hardness, 19,000 to 23,000 in sodium chloride, and 140 to 180 in amino nitrogen.

It must be remembered that the soaked hide contains approximately 70% water and would amount to 430 gallons in 5200 pounds if it could be squeezed out. The retained water is expected to contain essentially the same soluble constituents as the water surrounding the hide and would show essentially the same analysis as it, excepting for settleable material. If the water volume used to process the hide is low, the retained water should be added in for calculations or the results will be low. For example, 1200 gallons added will mix with 430 gallons in the hide to produce a total of 1630 gallons. This new total is 36% greater than the added 1200 gallons. If 2400 gallons were used instead of 1200 gallons as in some plants, the new total would be 18% greater. It should be pointed out that the water to hide ratio used in this plant is low at approximately 2 to 1. Ratios of 3 to 4 to 1 are supposed to be more representative.

For calculation purposes it will be assumed that 1600 gallons of solution are actually present when 1200 gallons are added to the hide. On this basis the average easily-extracted B.O.D. load is approximately 7 pounds of B.O.D. per 1000 pounds of wet, salted hides.

Samples of the 22 hour soak after use of the preliminary rinse averaged 42,000 p.p.m. total solids, 4800 p.p.m. volatile solids, 4800 p.p.m. B.O.D., 800 p.p.m. total hardness, 33,000 p.p.m. sodium chloride and 114 p.p.m. amino nitrogen and 520 p.p.m. total nitrogen. The B.O.D. analyses indicate that 80 pounds

at this stage and ease of penetration is in fact one of the major aims of beam-house processing so that tanning and finishing may be efficiently done. On this reasoning it is felt that the analyses are representative of approximately 900 gallons of solution and calculation will be made on this basis.

The average analyses of the bates are as follows: pH 8.8-9.8, 15,000 p.p.m. total solids, 8800 p.p.m. volatile solids, 6000 p.p.m. B.O.D., 4100 p.p.m. total hardness, less than 10 p.p.m. sodium chloride, 2000 p.p.m. amino and ammonium nitrogen and 2700 p.p.m. total nitrogen. The lactic acid and the Oropon produce an appreciable part of the volatile solids and B.O.D. since they are present in concentrations of 3000 and 6000 p.p.m. respectively. (The Oropon is composed of 95% ammonium sulfate and 5% bacterial enzyme plus filler.)

The total B.O.D. load is 10 pounds per 1000 pounds of re-limed and fleshed hide (1% O.W.H.) approximately 50% of this being contributed by the lactic acid and by the Oropon. The remainder (0.5% O.W.H.) was extracted from the hide substances.

Approximately 2.8 pounds of calcium (7 pounds of total hardness as  $\text{CaCO}_3$ ) were extracted from each 1000 pounds of hide by the de-liming action of the lactic acid in the first phase of the treatment. The organic nitrogen was estimated at 700 p.p.m. and indicated that approximately 7 pounds of protein was discharged for each 1000 pounds of hide (0.7% O.W.H.). Approximately 4 pounds of this protein is estimated to be from dissolved hide substance, the remainder being contributed by the enzyme.

#### PICKLING

After bating, 135 gallons of salt brine containing 270 pounds of salt (6% O.W.H.) is added and the hides are drummed 10 minutes. Then 95 pounds of sulfuric acid (2.1% O.W.H.) in 45 gallons are added and the hides are drummed 2.5 hours, allowed to lie overnight and drained well. Although only 180 gallons were added, 360 gallons of water were within the hide, producing a total of 540 gallons. For calculation purposes it will be assumed that there were 500 gallons of solution. The average analyses for the pickling solutions were as follows: pH 2.4 to 3.0, 79,000 p.p.m. total solids, 7,200 p.p.m. volatile solids, 2,900 p.p.m. B.O.D., 2,400 p.p.m. total hardness and 47,000 p.p.m. sodium chloride. The B.O.D. load is approximately 3 pounds per 1000 pounds of re-limed fleshed hide (0.3% O.W.H.).

#### CHROME TANNING

For chrome tanning, 270 pounds (6% O.W.H.) of Tanolin R (basic chromic sulfate), 270 pounds of

sodium chloride (6% O.W.H.), 113 pounds of Leukanol ND (syntan) and 40 pounds of sodium formate were added in two feeds in 135 gallons of water. The first run was for 30 minutes and the second for two hours. After this, 45 pounds of sodium carbonate and 4.5 pounds of Sterizol (bactericide) were added slowly in 90 gallons of water over 90 minutes. This was followed by the addition of 186 pounds of Tamol L in 90 gallons of water and the hides were drummed for 90 minutes, after which time the solution was dropped.

For this process, a total of 315 gallons were added producing 675 gallons when mixed with the 360 gallons within the hide structure. For calculation purposes, it will be assumed that 650 gallons were present. It should be noted that the weight of the chemicals (675 pounds) amounted to 14.6% of the weight of the hide, a very high proportion. If all these remained in solution in the 675 gallons, they would amount to approximately 112,000 p.p.m.

The analyses of the chrome tan discharges averaged as follows: pH 3.4 to 4.0, 93,000 p.p.m. total solids, 13,000 p.p.m. volatile solids, 1800 p.p.m. B.O.D., 1800 p.p.m. total hardness, 26,000 p.p.m. sodium chloride and 6000 p.p.m. chromium. As indicated previously it is felt that the B.O.D. values are low because of the presence of chromium and Sterizol and it is believed that a more reasonable B.O.D. would be 6500 p.p.m. (50% of the volatile solids). On this basis, the B.O.D. load is 8 pounds per 1000 pounds of hide (0.8% O.W.H.). It will be noted that the chromium content of the discharges are fairly high at 6,000 p.p.m. and calculations indicate that 75% of the chromium used is discharged to waste. This amounts to approximately 7 pounds per 1000 pounds of hide chrome tanned.

#### COLORING AND FATLIQUORING

Many different shades were used for coloring but most of the production was in white leather and only this will be described as it is considered typical of the others, excepting for color. Approximately 1000 pounds of tanned leather is placed in the color drum, flooded and washed for 10 minutes at 140°F. The drum is drained except for 110 gallons of water to which 44 pounds of Tamol L and 50 gallons of water are added. Occasionally some color and tanning extract was also added. The leather is drummed 1 hour, then flooded and rinsed for 30 minutes at 90°F. A sample was taken before the rinse (called first dump). The leather is then left in 110 gallons of water to which are added 16 pounds of Soyarich Flour, and 8 pounds of Titanox AWD, followed by a 10 minute drumming. Eight pounds of glue are then added and drumming

continues for 10 minutes. Following this, 60 pounds of Buckol No. 30, 16 pounds of No. 888, 20 pounds of Raw neats, 20 pounds of Texol, and 2 pounds of Soluble C are added in 50 gallons of hot water (140°F.). This mixture is drummed for 30 minutes and dumped (called second dump).

The tanner reported that approximately 90% of the syntans, dyes, extracts, fillers and oils used in this process are absorbed by the leather. The appearance of the wastes and the results of the analyses tended to verify this. This is indeed fortunate since the process chemical additions equalled 18% of the leather. The oils, particularly, would have caused a high pollution load since they are used at 8% OWH and have approximately an 80% B.O.D.

Because of an oversight only one sample was taken of the first dump. Since the volume of discharge and the total B.O.D. load was small compared to the other wastes, no further samples were taken. This contained 16,000 p.p.m. total solids, 8,000 p.p.m. volatile solids, and 2000 p.p.m. B.O.D. The B.O.D. load is approximately 3 pounds per 1000 pounds of leather (0.3%).

The second dump averaged pH 3.7, 9500 p.p.m. total solids, 4900 p.p.m. volatile solids, 2200 p.p.m. B.O.D., 56 p.p.m. chromium, 2600 p.p.m. total hardness and 250 p.p.m. sodium chloride. The B.O.D. load averaged approximately 3 pounds per 1000 pounds of leather.

### Discussion

The average composition and contribution of the strong liquors are recorded in Table V. It will be noted that 6687 pounds of B.O.D. were discharged in 173,600 gallons. This amounts to 76 pounds of B.O.D. per 1000 pounds of wet, salted hide (7.6% O.W.H.). The major contributors were the soak (20%), the unhair (52%) and the de-lime and bate (13%) wastes, which produced 85% of the total B.O.D. It will be recalled that the same three wastes in the pigskin survey (8%, 61% and 19% respectively) produced 88% of the total B.O.D. load.

If these strong liquors were equalized, the average composition would be 4,600 p.p.m. B.O.D., 16,000 p.p.m. sodium chloride, 8700 p.p.m. total hardness, 630 p.p.m. sulfide, 4800 p.p.m. protein and 300 p.p.m. chromium. Approximately 60% of the B.O.D. is produced by hide substance extracted by the processes. It is believed that most of it is caused by hair protein dissolved in the unhairing process. The sulfide ion produces 22% of the B.O.D. and the other process chemicals produce approximately 18%. The total B.O.D. produced by process chemicals alone, there-

fore, is estimated to amount to 40% of the total plant B.O.D.

These strong liquors are diluted to 900,000 gallons by the rinse waters used daily by the plant. The approximate concentrations in this diluted waste, if equalized, would be 0.19 times the concentrations listed above for equalized strong liquors. The equalized waste discharged from the plant would therefore contain 870 p.p.m. B.O.D., 3000 p.p.m. sodium chloride, 1600 p.p.m. total hardness, 120 p.p.m. sulfide, 910 p.p.m. protein and 57 p.p.m. chromium.

The concentrations calculated from the process chemical survey (Table V), based on the amount of chemicals used by the plant during the year, are as follows: 2900 p.p.m. sodium chloride, 1670 p.p.m. total hardness, 123 p.p.m. sulfide and 100 p.p.m. chromium. These are fairly good checks and indicate the usefulness of the process chemical survey in pinpointing the chemical composition of the waste and the average concentrations in it. It must be recalled that the inventory list is always available in manufacturing plants and that the process chemical survey, including the B.O.D.'s of the waste, may be easily done in one or two man-days of labor, but the analytical survey requires much more work.

The B.O.D. figures in Table V indicate that approximately 494,300 pounds of B.O.D. are produced per year by the process chemicals. The main sources are as follows: 392,000 pounds (80%) from sodium sulfide, 55,000 pounds (11%) from D-1 and other oils used in fatliquoring, 25,000 pounds (5%) from lactic acid used in delimiting, and 11,000 pounds (2%) from calcium formate used in chrome dyeing. The daily B.O.D. load produced by all the process chemicals is approximately 1800 pounds or 27% of the 6687 pounds calculated by the analytical survey. This is a poor check with the 40% calculated previously from the analytical survey alone but it must be remembered that many assumptions are involved. It is probably reasonable to conclude that in this plant process chemicals produce 30 to 40% of the total B.O.D. and that hide substance, blood, manure and filth produce 60 to 70% of the B.O.D. It must be remembered that this plant employs a one-day soak, dissolves all the hair off the hide using 4% sodium sulfide OWH and tans all its hide by the chrome process. Increasing the soak time may increase the B.O.D. but decreasing the sodium sulfide may decrease the B.O.D. Hair recovery, with minimum use of sodium sulfide, should decrease the B.O.D. load appreciably.

The total process chemicals (including curing salt already on the hide) used per year is an amazing 14,080,000 pounds or approximately 61% OWH. It is estimated that 10,000,000 pounds of these chemicals

(44% OWH) are discharged to waste annually. This means that for every thousand pounds of hide received by the tannery, 440 pounds of chemicals will be discharged to waste. As indicated in Table V these would produce a total concentration of 5353 p.p.m. in the equalized waste. The protein and other hide substance extracted in the processes would increase this by approximately 1000 p.p.m. to 6343 p.p.m. The total solids in a tannery waste may therefore be expected to be quite high, in the 6,000 to 10,000 p.p.m range.

The sodium chloride analyses indicate that tanneries use salt in prodigious quantities. Most of it is in the hide when received and amounted to 19% OWH in this tannery. This was extracted in the soaks (14% OWH), unhairs (4.7% OWH) and relimes (0.9% OWH). In addition, the plant used another 5% OWH for processing in pickling and chrome tanning. For every thousand pounds of hide received by the tannery, 250 pounds of salt will be discharged to waste. Fortunately, salt has no B.O.D., is not toxic and does not usually impair the efficiency of waste treatment plants if equalized.

Lime is also used in great quantities and amounted to 10.6% OWH in this tannery. Practically all of it is discharged in the unhair and re-lime wastes but small amounts are also extracted in the other processes. Although lime has no B.O.D., its alkalinity is toxic and must be neutralized to prevent its ruinous effect on biological treatment plants. Much of the lime is insoluble and produces sludge. In addition, the dissolved lime becomes insoluble when enough carbon dioxide is absorbed from the air and calcium carbonate scale forms in pipe-lines with consequent obstruction of flow. Even if neutralized, it will prevent proper operation of trickling filters by depositing on the stones, causing ponding. This apparently happened at the treatment plant to which this waste was discharged, even when it was diluted with an approximately equal volume of domestic sewage.

Sodium sulfide use was also high in this plant (4.3% OWH) since hair recovery was not practiced. Unfortunately the sulfide ion has a high B.O.D. (160%) and is toxic to fish in concentrations as low as 3.0 p.p.m. (35). Its most obnoxious feature is its characteristic "rotten egg" odor when hydrogen sulfide volatilizes and this is the main reason for the many complaints registered in communities where tannery wastes are discharged. The sulfide ion is soluble in alkaline solution and will cause no widespread odors when the pH is maintained in the 10 to 12 region characteristic of most tannery wastes. However, when the waste becomes neutralized the sulfide is volatilized as hydrogen sulfide and its obnoxious odor is noticeable over wide areas. In large communities

with diversified industry the discharge of strongly acid industrial wastes into sewage containing tannery wastes causes emanation of the "rotten egg" odor from every man-hole in the sewerage distribution system. The deluge of complaints when this occurs in highly populated centers can be easily imagined. The hydrogen sulfide gas is extremely toxic to man in low concentrations and descent into man-holes containing the gas should not be attempted, even with a gas mask.

Sulfide can be oxidized in biological treatment systems if its concentration does not fluctuate too greatly. Unfortunately, dump discharging is the rule in most tanneries and if equalization is not practiced, sulfide may impair the efficiency of treatment systems.

Chromium from the tannery has been seen to average 60 p.p.m. ( $\text{Cr}^{3+}$ ) in the equalized waste. This is a toxic metal and will affect biological treatment plants. It is insoluble at neutral and alkaline pH's and will settle out as sludge in sedimentation basins. Consequently its concentration in the sludge will be many times the concentration present in the waste and will affect treatment of the sludge in anaerobic digestion plants. The chromium hydroxide precipitate is voluminous in nature and will appreciably add to the sludge volume when it settles. Ingols (36) concludes that the chromic ion is more toxic than the chromate ion in aerobic systems.

The sludge volume in tannery waste is fairly high, amounting to 5 to 10%, and this must be considered when treatment is planned. Most of this sludge is constituted by undissolved lime, precipitated calcium carbonate, chromium hydroxide, pieces of scrap hide, undissolved hair, dirt and precipitated proteins. The sludge obtained from the sedimentation basin into which this tannery discharged its waste contained 22% lime, 1.3% chromium, 1.5% salt and 27% protein on a dry basis.

As mentioned previously dump discharging is the rule in most tanneries and this causes considerable trouble when the waste is to be treated either in a treatment system within the plant or in a municipal plant combined with sewage. Most tanneries dump their strong liquors in the soak, unhair, and re-lime processes early in the morning (3 A.M. to 7 A.M.) so the hides will be ready for the day laborer. For example, in this plant this means that 72% of the total B.O.D., practically all of the lime and all of the sulfide is dumped in a two-hour period and is pumped to the local sewage plant as a lime-sulfide slurry containing 6600 p.p.m. B.O.D., 17,000 p.p.m. lime, 13,000 p.p.m. salt, 8,000 p.p.m. protein and 1300 p.p.m. sulfide. In the remaining twenty-two hours of the day a fairly weak solution composed mainly of rinse waters from the eight-hour rinse following un-

hairing will be pumped. No biological treatment plant could possibly cope with such wild fluctuations and equalization should be practiced with all tannery waste discharges. It would be desirable to have a separate storage basin for these three strong liquors so that they may be equalized over 24 hours. Because of the sludge content, sludge collecting facilities would have to be included.

The only hope for pollution reduction through processing changes is in the unhairing process where sulfide is used. If the sulfide could be eliminated, the B.O.D. load would be reduced approximately 22%. If hair recovery, instead of hair solution or pulping, were practiced, the B.O.D. load could be reduced approximately 30 to 50%. The tanning industry should investigate thoroughly the possibility of using sodium or ammonium hydroxide for unhairing since it would not only eliminate the sulfide but the lime as well. If hair recovery could be practiced with such a method, the sulfide and lime would be eliminated and the dissolved protein would be considerably reduced.

### Summary

From the analytical and the process chemical surveys an excellent picture of the composition of tannery wastes has been gained. It has been seen that the equalized waste, including rinses, would be high in total solids (6,000 to 8,000 p.p.m.) and would contain approximately 900 p.p.m. B.O.D., 3000 p.p.m. sodium chloride, 1600 p.p.m. total hardness, 120 p.p.m. sulfide, 1000 p.p.m. protein and 30 to 70 p.p.m. chromium. The troublesome constituents are the high B.O.D., hardness, sulfide, chromium, and sludge content.

The results indicated that approximately 10 gallons of this waste are discharged for each pound of hide received by the tannery. A B.O.D. load of 76 pounds per 1000 pounds of wet, salted hide is produced, 52% being discharged in the unhair waste, 20% in the soaks and 13% in the de-lime and bate wastes. If the three strong liquors and the re-lime wastes are equalized, the resultant composite would contain 85% of the total B.O.D. and almost all of the lime and sulfide. If the sludge were collected from this equalized composite, 85% of the lime would be recovered in it and the resultant hardness of the equalized waste pumped to the sewage plant would be 240 p.p.m. instead of 1600 p.p.m.

Results of total nitrogen analyses indicate that an amount of protein equal to 5 to 10% of the weight of the wet, salted hide is extracted, during processing. Most of this is produced by the hair and other protein dissolved in unhairing and the dissolved protein, manure, sweat, blood and other filth removed from the hide during soaking. Estimates indicated that approximately 50 to 70% of the total B.O.D. would be produced by these dissolved proteins and other hide substances. The sulfide ion would be expected to produce 20 to 30% of the total B.O.D., if hair pulping is practiced. Other processing chemicals (oils, lactic acid, tannins used in coloring, calcium formate) produce the remainder of the B.O.D. (10 to 30%).

Approximately 440 pounds of process chemicals are discharged to waste for every 1000 pounds of hide received by the tannery. Salt, lime, sodium sulfide and chromic sulfate are the major contributors. The chemicals that cause difficulties in treatments are lime, sulfide, chromium and the resultant sludge produced. Lime forms sludge and also produces scale, clogging the pipe lines and trickling filters. Sulfide is toxic and odorous and causes a widespread "rotten egg" stench when volatilized. Both the lime and sodium sulfide are highly alkaline causing the pH to be approximately 11 to 12. The high alkalinity must be reduced to prevent effects on fish and biological treatment systems. Chromium is toxic and settles out as a voluminous sludge. Tannin reacts with iron to form a black, ink-like compound which will color streams for miles below the point of discharge. In addition to these compounds, hide scraps may also be discharged in the waste if screens are not installed in the plant. These form odorous sludge deposits and cause difficulty in sludge collecting devices if present in any quantity.

One of the main reasons why tannery wastes cause difficulties in combined treatment systems is the fact that there are wide fluctuations in the nature of the wastes due to intermittent dump discharges. Most plants dump the major part of the troublesome chemicals early in the morning over a short period of time, usually one to three hours. During the remainder of the day a comparatively weak waste composed mostly of rinse waters is discharged. Equalization, at least of the three major wastes (soak, unhair, de-lime and bate) should be practiced. Chromium wastes should be separated, recovered and re-used or carted to a dump to prevent its effect on treatment systems.

## Chapter VI

### PLANNING A TANNERY WASTE SURVEY

Determination of pollution loads from a tannery (or any industrial establishment) may and should be attacked in two ways. The first is the usual analytical survey wherein samples are collected from every dump or running rinse discharge and analyzed. Before this is started, the chemist should acquaint himself with the general theory of the processes involved and learn the reasons for their use. He should then arrange a conference with the plant management to discuss with them the purpose of the survey and the manner in which it is to be done. The plant management should be asked to designate some person in the plant to actively cooperate in the survey. This person may be contacted for information and help in getting samples which are discharged late at night or early in the morning. The processing procedures of the plant should be outlined, including dumps and running rinses and the exact place in the procedure when the sample is to be taken should be recorded. The processing chemicals added and the pounds of hide being processed in the paddle or drum being sampled should also be recorded. Accurate determinations of the volumes discharged should be made at the time when the sample is being collected, for every sample collected. Much of this information is readily available on processing slips which the foreman gives the operator for each batch of hides to be processed.

Wherever possible, strong liquors in standing or agitated baths should be collected to insure accuracy and save time. For example, many of the processes employ immersion in processing liquors for a given time, followed by overflow rinsing to remove the solution when the processing time is up. If the rinse is collected there may be variation in the rinse rate and the rinse time, and to insure accuracy, individual samples should be taken over specified periods of time and composited according to the rinse rate and the rinse time. This is a much longer and involved procedure. Collection of the strong liquor before the rinse starts is much more accurate and requires much less over-all work. When running rinses are being used, the sampler may request the management to substitute standing rinses of equivalent volume only for a batch on which sampling is being done. No variation in procedure should be requested without permission of the plant manager, since apparently harmless variations may in fact cause serious trouble in later processing.

In sampling of standing liquors, particularly soaks, unhairs and re-limes, the sampler should make sure to ask the operator to agitate the drum or paddle for five minutes to mix the solution well and bring the bottom deposits into suspension. If this is not done, only supernatant liquors without bottom sludges will be obtained. Help from plant personnel is usually necessary because many of the wastes are discharged from 3 to 7 A.M. to prepare work for the day laborers and agitation before sampling should be strongly stressed to them when they are requested to take samples.

Occasionally processes that are seldom used are being run on the sampling day chosen. These should not be taken into account if it is apparent that they do not constitute more than 1% of the total pollution load. This may be estimated by the chemicals being added and the approximate volume of the hides going through the process. Sampling of such processing may unduly increase the amount of work involved and increase the length of time of the survey. Such time would be more fruitfully expended on the important pollution sources in the over-all plant waste.

The second and equally important part of the survey is a process chemical inventory and B.O.D. survey. The process chemical inventory is readily available from the cost accountant and can provide a very accurate insight into the make-up of the waste discharge if applied intelligently. It also aids the chemist in deciding what analyses should be done to depict accurately the plant waste make-up. There are many chemicals used in small amounts in the tannery and here again time and effort should not be wasted on them. Generally it is advisable to get data only on chemicals used in amounts such that they would produce concentrations greater than 10 p.p.m. in the plant waste. This may be calculated by learning the approximate volume of water used or discharged per day. For example, suppose a tannery used 900,000 gallons per day. A concentration of 10 p.p.m. in such volume equals 75 pounds. For 260 working days, this equals 19,500 pounds per year. The cost accountant should then be asked for inventory data only for process chemicals used in amounts more than 20,000 pounds per year for this plant. This list should be critically inspected and samples (usually four ounces) should be obtained for B.O.D. analysis only for those chemicals that would be expected to have a B.O.D. This in-

cludes inorganic reducing compounds as well as all organic compounds. In order to do this the chemical composition of the process chemicals should be obtained, as such composition is seldom available from the process chemical name. It must be remembered that the full chemical name, including important letters or numbers, should be included. Information on the chemical composition of process chemicals may be obtained from the tanner or from the "Technical Manual and Year Book of the American Association of Textile Chemists and Colorists" (37).

When samples of chemicals suspected of having a B.O.D. are obtained, they may be analyzed for B.O.D. in the laboratory. Generally 1000 p.p.m. solutions are made up and these are diluted in the B.O.D. bottle to desired concentrations. In this laboratory concentrations of 3.3, 1.0, 30 and 100 p.p.m. are used in the B.O.D. bottle. B.O.D.'s of process chemicals seldom exceed 80% (phenol 200%, soap 150%) and these concentrations will usually suffice for most samples. At least three check determinations should be obtained. The B.O.D.'s of many process chemicals have been published (38) and these should be consulted to save time. Only process chemicals whose B.O.D. values are not known should be analyzed.

Calculation of the approximate B.O.D. contributions of each chemical may be made using the data obtained in the inventory and B.O.D. survey. For example, in the case cited above, it is known that each 20,000 pounds used per year equals 10 p.p.m.

in the waste, therefore  $\frac{\text{pounds per year}}{20,000} \times 10$  equals

the p.p.m. of chemical in the plant effluent. If we

multiply this by the  $\frac{\% \text{ B.O.D.}}{100}$ , the p.p.m. B.O.D. con-

tributed by the chemical in the equalized plant discharge will be obtained. This applies, of course, only to substances which are not absorbed, oxidized, volatilized or otherwise removed by the processing. For example, chromic chromium, tannin, fillers, oils, syntans and dyes are appreciably absorbed by the hides and will be present in reduced concentrations. The reaction of each should be studied in the processing and allowance must be made to calculate each chemical's concentration in the final, equalized plant effluent. Tentatively, it is believed that 90% or more of the tannins, fillers, oils, syntans and dyes are absorbed by the leather, while 40 to 80% of the chromium may be absorbed, depending on the final pH and length

of tan time. More accurate figures may be obtained by consulting the tanner or the chemical manufacturer or by actually determining the amounts in the analytical survey.

The process chemical survey gives an excellent insight into the chemical make-up of the plant wastes and aids in pinpointing the major contributions of B.O.D. and solids. It can be used to cross-check the analytical survey in this manner. Most of the information required is readily available or easily obtained and it should be used in conjunction with all analytical surveys. When enough information has been compiled in this manner, fairly accurate pollution loads will be obtainable through process chemical surveys alone.

In addition to the process chemical data, production figures should also be obtained. The pounds of wet, salted hides received should be recorded as well as the pounds of fleshings, trimmings and shavings recovered and sold. The type of leathers produced and its weight should also be recorded. In expressing pollution loads based on the hide weight, the state of the hide should be accurately recorded. The weight of the hide changes with processing and whether it is wet, salted, fleshed, pickled, shaved, tanned or trimmed makes quite a difference in the calculations. The literature is replete with many good analytical surveys but since accurate descriptions of the processes involved and methods of calculations have been omitted, their usefulness is considerably impaired. The exact amount of sodium sulfide used for unhairing (1-5%) is particularly important as well as the length of time used in soaking and unhairing. The amount of water used per bath and for final rinsing is particularly important if comparisons with other plants are to be made.

In many instances a process chemical survey has indicated methods whereby economies in processing may be effected. Its chief purpose, however, is to detect major process chemical offenders where pollution is concerned. Attempts to eliminate such chemicals by a substitution of a less offensive chemical or process may then be made. For example, the two major process chemical offenders in tannery wastes are sodium sulfide and lime, both used in unhairing. The literature indicates that sodium hydroxide or ammonium hydroxide may be used for unhairing. Neither of these produce sludge, putrid odors or scaling. If the cost of treating tannery wastes becomes too excessive, the tanning industry may try to perfect these processes to solve their problems.

## Chapter VII

### TREATMENT OF TANNERY WASTES

The treatment of tannery wastes has been a problem for many years and is receiving more and more attention because of increased demand by the public and regulatory agencies to reduce stream pollution. As indicated in the previous chapters, the problem is complicated by the extremely wide fluctuations in the composition of the waste caused by the intermittent dumping of strong liquors. Individual processes vary from tannery to tannery and these will cause further variations in the waste flow and composition.

Since most tanneries are located in urban communities, many of them have access to public sewer systems. If the volume of waste discharged to the system is small compared to the volume of municipal sewage received at the plant, it can be discharged with but little pretreatment to protect the sewers and the municipal treatment plant. However, in many cases, the volume of the waste and the quantity of pollution is so large that separate treatment facilities must be provided. As indicated in the surveys previously discussed, many of the processes involved in leather manufacture produce intermittent discharges of highly variable composition.

The volume of water used at vegetable tanneries varies from 300 to 1800 gallons per 100 pounds of hide processed per day. The average for most vegetable tanneries will be in the 600 to 800 gallon range (39, 40, 41, 42). Not as much information is available for the chrome tanneries, but water use at this type of plant is higher, varying from 800 to 2,000 gallons per 100 pounds of hides processed per day, with an average of 1200 gallons (39). The average B.O.D. of the composite waste from vegetable tanneries is about 1,200 p.p.m. and the suspended solids (S.S.) content is about 2,400 p.p.m. Sludge volume of the waste is about 10%, and the color averages about 3500 p.p.m. (40). Wastes from chrome tanneries are reported to be somewhat weaker than those from vegetable tanneries. The B.O.D. averages 600 p.p.m. and the suspended solids 1200 p.p.m. (40). Part of the apparent reduction in the B.O.D. may be caused by the toxic effect which chromium exerts on the B.O.D. tests (43).

Intermittent discharges, such as soaks, unhairs, warm water, spent vegetable tan and bleaches represent about 30% of the total waste volume but contain almost 90% of the total solids and 80% of the B.O.D. The spent tan liquor which is only 6% of the total

volume contains 50% of the total B.O.D. (40). These figures agree closely with surveys conducted in Great Britain (44). Thus it can be seen that the spent tan, which accounts for the bulk of the color, also accounts for a major portion of the pollution load. Evidence to be discussed later indicates that there is an excessive wastage of tan liquors which could be re-used when this is so.

Tannery wastes when discharged into a stream have a marked deoxygenating effect. Because of the large amounts of suspended solids, sludge banks form in the stream. This sludge eventually decomposes and causes obnoxious odors. The wastes contain organic matter and inorganic material, both in solution or in suspension, composed of flesh, lime, hair, proteins and their degradation products, soluble sulfides, fatty matter, chrome salts, and vegetable tans, in addition to other process chemicals used.

In a comprehensive survey by the Leather Chemists' Association on Stream Pollution (39), it was found that of 32 plants reporting, all used primary sedimentation but only five of the plants employed secondary sedimentation. Spent tans were lagooned and released at periods of high stream flow by only five of the plants. Only one plant each used chemical precipitation or applied its effluent to a filter bed. Other valuable information obtained from this survey is the number of pounds of hide processed per day, gallons of waste per day, and efficiency of the plant in terms of settleable solids, suspended solids, and B.O.D. The Public Health Service (45) after running an experimental plant for two years concluded that all the tannery wastes should be combined before treatment. Chemical precipitation, sedimentation, filtration through coke or cinders, and then through sand were all employed. The Ohio River Committee Report (40) indicates that the only treatment in general use is mixing of the wastes and sedimentation.

In an extensive laboratory study of the operation of two full scale experimental treatment plants by the Tannery Waste Disposal Committee of Pennsylvania (46), mixing of the wastes and sedimentation has been found to remove 85% of the suspended solids and 40% of the B.O.D. The committee recommends a general plan for treatment of tannery wastes, the first step of which consists in mixing all the wastes and settling for at least eight hours. The effluent should be equalized and discharged. The second step of the

plan calls for passage through a trickling filter and sedimentation. An intermediant step consists in adding coagulents to the filter effluent. The third step is a repetition of the second step. Using a fill and draw principle with earth lagoons and equalizing the flow discharge over a 24 hour period, Siebert reported approximately the same percentage reductions of 85% for S.S. and 40% for B.O.D. (42). By lagooning the spent tan liquors separately and treating the remaining waste in earth lagoons of large capacity, Reuning reports removals of 80% in S.S. and 70% in B.O.D. (47).

Where chemical precipitation has been practiced the coagulants that have been used are flue gas, lime, sulfuric acid, alum, and iron salts. The carbon dioxide will react with the lime to form calcium carbonate; this carries down some organic matter during the sedimentation period. Riffenburg and Allison recorded reductions of 90% in the B.O.D. by saturating with flue gas to pH 6.7, adding lime, settling, and then repeating the treatment on the supernatant (48). In an experimental investigation Maskey used flue gas and ferric chloride and obtained B.O.D. reductions of 85% (49). Experiments by Clark with flue gas led to the adoption of this method to remove lime and to prevent the formation of scale in sewer pipe at Peabody, Massachusetts (50).

Fales describes the use of alum and sulfuric acid to treat combined wastes from a tannery and wool-scouring plant (51). Reductions of approximately 90% were obtained for oxygen consumed, suspended solids, and grease content. Howalt and Cavett report experiments with sulfuric acid and coagulents such as alum, ferrous sulfate, and lime. Reductions of 70% in suspended solids and B.O.D. and 90% in color were obtained when 2,300 pounds of sulfuric acid and 2,700 pounds of alum per million gallons of waste were applied (52).

Because of the additional expense involved, tanneries have been reluctant to apply secondary treatment to their wastes. Sarber relates an experimental treatment of beamhouse wastes whereby after pH adjustment, aeration, coagulation, and sedimentation, the effluent is passed through a trickling filter (53). B.O.D. reductions of 80% were obtained on passage through the filter, and the final B.O.D. ranged from 30 to 85 p.p.m. depending on the rate of application. Mohlman in an early report stated that it was difficult to use biological treatments on tannery wastes unless the filter was first treated with soak liquors to build up an active biological film (54). He recommended screening and settling in a clarifier for preliminary treatment and then the treatment of the

settled waste mixed with large volumes of sewage at the municipal treatment plant.

Some tanneries discharge their waste directly to municipal sewage treatment plants. Provisions must be made to avoid deposition of scale in the sewer line and to remove hair and fleshings, usually by screening. Hartmann describes changes made at a treatment plant to handle combined sewage and tannery waste in a ratio of 6 to 1 (55). Reductions of 90% in B.O.D. and suspended solids were obtained after primary treatment and passing through filters. Haseltine reports reduction of 54% B.O.D. and 14% suspended solids with only primary treatments (56). Eddy and Fales describe an experimental activated sludge plant used to treat wool-scour and tannery wastes (57). It was reported that up to 40% tannery sludge could be digested with sewage sludge (58).

Loveland long ago reported that sand filters were easily clogged by tannery wastes (59) and Veitch stated that half the weight of the hide and the chemicals were lost in the effluent (60). Alsop demonstrated that ozone could be used to purify tannery wastes after solids removal (61). Chrome recovery by precipitation as chromic hydroxide from chrome leather wastes is described briefly (62). An early report from Gloversville, New York, noted that eight million pounds of chemicals were used for processing nine million pounds of hide (63).

A tannery waste treatment plant at Rockford, Mich., is described by Hubbel (64). The plant received 1.5 M.G.D. of combined sewage and waste. After plain sedimentation, the sludge is treated with lime and vacuum filtered. The filter cake is used on farms as a soil builder. The utilization of tannery wastes is discussed by van der Leeden who states that the wastes may be purified by irrigation while the recovery of chrome salts is profitable but not feasible (65). In a study of two plants at Holland, Michigan, Eldridge concludes that at one plant the segregation of the lime wastes materially reduces the carbon dioxide bulking of the sludge by two thirds (66). The concentrated wastes are segregated and treated separately by coagulation followed by 2 to 20 hours settling. Later he indicates that separation of clear waters from the concentrated wastes reduces the flow by one third (67). The clear waters are pumped into a lake, and the limes and unhairs are pumped to sludge drying beds. The tan liquors are stored to equalize their flow and then neutralized and coagulated by the alkaline beamhouse wastes. After going through three cycles of settling a 62% B.O.D. reduction and 96% suspended solids reduction is obtained (68). Eldridge also reports the results of an experimental plant used to treat sheepskin tannery wastes (68). Since no hair is removed

the waste has a pH of 6 to 7, and lime must be used for coagulation. Using a fill and draw sedimentation process after applying 14 pounds of lime per 1000 gallons, a 50% B.O.D. reduction and a 73% S.S. reduction is obtained. Wimmer found that the sludge from a mixture of 90% tannery waste and 10% domestic sewage would not digest, probably because of the high alkalinity (69). Correlation of production versus pollution load is given in a detailed report by Harnley and others (13). The tannery handles approximately 670,000 pounds of cattlehides per week and uses the chrome process. The beamhouse produces about 75% of the solids in the influent. Empirical equations are formulated for flow versus production and production versus amount of waste material in terms of suspended solids, B.O.D., nitrogen and alkalinity. Experiments indicated that high removals were obtained by the tannery settling tank and this would obviate further resettling of the influent to the municipal sewage treatment plant. Removals of 85% in S.S. and 50% in B.O.D. were obtained. Records indicated that the following amounts of materials in pounds were obtained per pack of 100 pounds of green salted hides: 57 lbs. T.S., 12 lbs. S.S., 1.3 lbs. of total nitrogen, and 5.3 lbs. of B.O.D. Sludge from the settling tanks was maintained at 4% solids and then discharged to sludge lagoons. It was noted that the B.O.D. of the waste was lower than expected; this was traced to the use of dimethylamine in place of sulfides in the unhairing solutions.

Reuning and Coltant discuss an effective waste treatment plant wherein all the wastes except the spent tans are collected (70). After flocculation, sedimentation, sludge collection, and then secondary sedimentation and equalization, a 96% removal of soluble solids, and 90% removal of B.O.D. is obtained. The B.O.D. removal includes the value of the spent tan liquor which is evaporated for recovery. Porter discusses the operating problems and changes made in treating a combined tannery waste and domestic sewage (71). Sulfide removal from unhairing wastes can be accomplished by aeration and then treating with copperas (72) or by treating with ferric chloride (73). Ball comments on the mechanical difficulties and shortcomings of a sewage treatment plant at Ballston Spa, New York, in the treatment of combined wastes (74).

Vrooman and Ehle advise sludge digestion to dispose of a sludge for Gloversville, New York, a city which has 21 glove leather tanneries (75). Under the proposed plan the settling tanks at the separate tanneries will be bypassed and the 2.0 MGD of industrial waste will be combined with 2.5 MGD of domestic sewage and be treated at the municipal treatment plant. Reuning discusses generally the acceptable design for

a treatment plant and the design of a plant under construction (76).

Nuisance conditions in a water supply for a town and a nearby military installation were created by the discharge of tannery waste to a pond (77). Wells had been sunk on the bank of the pond. It was decided to construct additional facilities at the municipal sewage treatment plant in order to treat the waste in admixture with the sewage. After settling, the effluent is passed through a standard rate trickling filter. After about five months operation the trickling filter showed signs of deposit of lime or calcium carbonate on the stones and no biological growth (78).

In laboratory studies conducted at the Lawrence Engineering Experiment Station, Rosenthal found that carbonation of tannery waste to pH 8.8 followed by two hours settling produced reductions of 20% in B.O.D., 59% in sulfide and 76% in hardness content (79). A series of Warburg tests indicated that maximum oxygen uptake occurred at this pH. Wastes treated in this manner were mixed with sewage in a 60 to 40 ratio and applied to a trickling filter. The results indicated that 88 to 89% B.O.D. removal could be obtained with loadings of 3500 to 4500 pounds of B.O.D. per acre-foot per day. The mixed influent averaged 600 p.p.m. B.O.D., 42 p.p.m. sulfide, and 125 p.p.m. hardness. No scale buildup occurred on the stones and all of the calcium passed through the filter. Essentially all of the sulfide was removed. Activated sludge experiments made with a similar mixture indicated that B.O.D. removal of 95% could be obtained with loadings up to 100 pounds of B.O.D. per 1000 cubic feet aeration capacity per day and 90% removal with loadings of 170 pounds (80).

McKee and Camp describe generally some of the problems encountered in the treatment of tannery wastes (81). They mention clogging of equipment, effects of high alkalinity, hardness and sulfides, deoxygenation and discoloration of receiving waters, and the dewatering of tannery sludge. Sutherland in an article discusses by-products, segregation, coagulation and sedimentation, and secondary treatment (82). Southgate notes briefly the status of tannery waste treatment in Great Britain (83). Many of the British tanneries discharge their wastes directly to tidal waters or to municipal treatment plants. The methods of disposal of wastes by tanneries is described by Harnley, who states that the industry discharges twenty billion gallons of waste per year, and that there are 443 tanneries in the United States, with approximately 60% of them located in the Northeast (84).

In an excellent article published recently, Haseltine offers up-to-date operating costs for treatment of combined tannery waste and sewage (85). The tannery

waste (0.2 MGD) is pumped separately to the municipal treatment tank where it enters a waste holding tank providing 3 to 4 days equalization and sedimentation. This is then mixed with the sewage (0.4 MGD), aerated, and then given primary sedimentation. The sludge is sent to sludge holding tanks, dewatered in vacuum filters, and incinerated. The sludge was first built up to 8% solids concentration and then coagulated with 17% lime and 4% ferric chloride. Reductions for the combined waste are 54% in B.O.D. and 14% in S.S.

It is very evident to the reader by this time that there are many conflicting statements in the literature concerning the pollution loads from the tanneries and the effectiveness of treatments. Much of this may be because the individual processes are not specifically described and probably differ in the plants surveyed. The causes for the differences in pollution loads usually lie in differences in the soak, unhair, and tanning processes.

Soaking may take from four to ninety-six hours. It is believed that longer times may increase the pollution load appreciably.

The largest discrepancies may be caused by differences in hair removal. If the hair is pulped, large amounts of sodium sulfide (2 to 4% OWH) are used and the time in the solution may be one to three days. In this method the B.O.D. load is increased not only by the higher sulfide use but also by greater solution of the hair and also the hide substance. If hair recovery is practiced, the sodium sulfide (0.7 to 1.5% OWH) and the immersion time (4 to 24 hours) are lower and the dissolved protein is considerably reduced. The net result is a considerable decrease in B.O.D. The reduction in B.O.D. reported to be obtained by use of dimethylamine sulfate is interesting and should be checked further. It will be noted in Table VI that the B.O.D. of dimethylamine sulfate (66%) is higher than the sodium sulfide B.O.D. (40%). If both are used in the suggested concentrations (1% OWH) for unhairing followed by hair recovery, the B.O.D. load in the dimethylamine process should be higher, if the amount of protein dissolved is the same. If the B.O.D. in the sulfide process is indeed higher it is apparently caused by greater protein dissolving by the sulfide. Care should be taken to make certain that a hair recovery process is not compared to a hair pulping process, since in the latter case all of the hair protein goes into solution and produces a considerable increase in B.O.D. Dimethylamine sulfate is never used alone except in hair loosening followed by hair recovery. Consequently, when it is used alone, there will be a distinct reduction in the dissolved protein content and B.O.D. of the waste

discharges, if it is compared with a hair pulping process.

The amount of B.O.D. produced by the tanning process is also dependent on several factors. It will be noted in Tables II and IV that the chrome tan process produced pollution loads of 5 to 8 pounds per 1000 pounds of hide, but the vegetable tan process produced only 2 pounds. Therefore if vegetable tanning were to be practiced a reduction in B.O.D. should be obtained, but this reduction would be small since pollution potential of the process is small compared to the potentials in the soak, unhair, and bate processes. This is the reverse of conclusions indicated in the literature (40, 44). It will be remembered that the only discharge to waste of the vegetable tanning solution in the pigskin tannery was caused by drag-out by the hides and amounted to 10 gallons per 1000 pounds of hide. The remaining solution was re-used, the tannin content being brought up by the addition of concentrated extracts. From reports in the literature it is obvious that as much as 500 gallons of vegetable tanning solution are discharged to waste for each 1000 pounds of hide processed. This represents a great waste of re-usable solution and should be eliminated, not only because of the cost but primarily because of the great increase in B.O.D. It should be noted that in order to produce 50% of the total plant B.O.D., the vegetable tanning B.O.D. must equal the B.O.D. discharged in the soak, unhair, and de-lime and bate processes. This amounts to approximately 60 to 120 pounds per 1000 pounds of hide, a very high pollution potential from one process.

Treatment of tannery wastes, as indicated in the reports previously cited, is limited in most cases to equalization and sedimentation. Pollution control authorities have been somewhat reluctant in the past to require plans for more complete treatment because of the expense involved. Many tanneries because of their location possess the advantage of being able to discharge their wastes directly into coastal waters without treatment or to a municipal sewage treatment plant. When treatment is required the strong liquors should be segregated and the dilute rinses discharged directly without treatment. This will usually reduce the volume of wastes by at least 50%. The wastes should be screened to prevent damage or clogging of pumps and pipelines. Holding or storage tanks should be used to provide equalization of at least one day's flow of waste. If equalization and regulated discharge of the wastes is the only treatment necessary, the accumulated sludge should be removed regularly. When sedimentation tanks or basins are used, mechanical sludge removal equipment should be installed. The sludge can be dewatered by centrifugation or vacuum

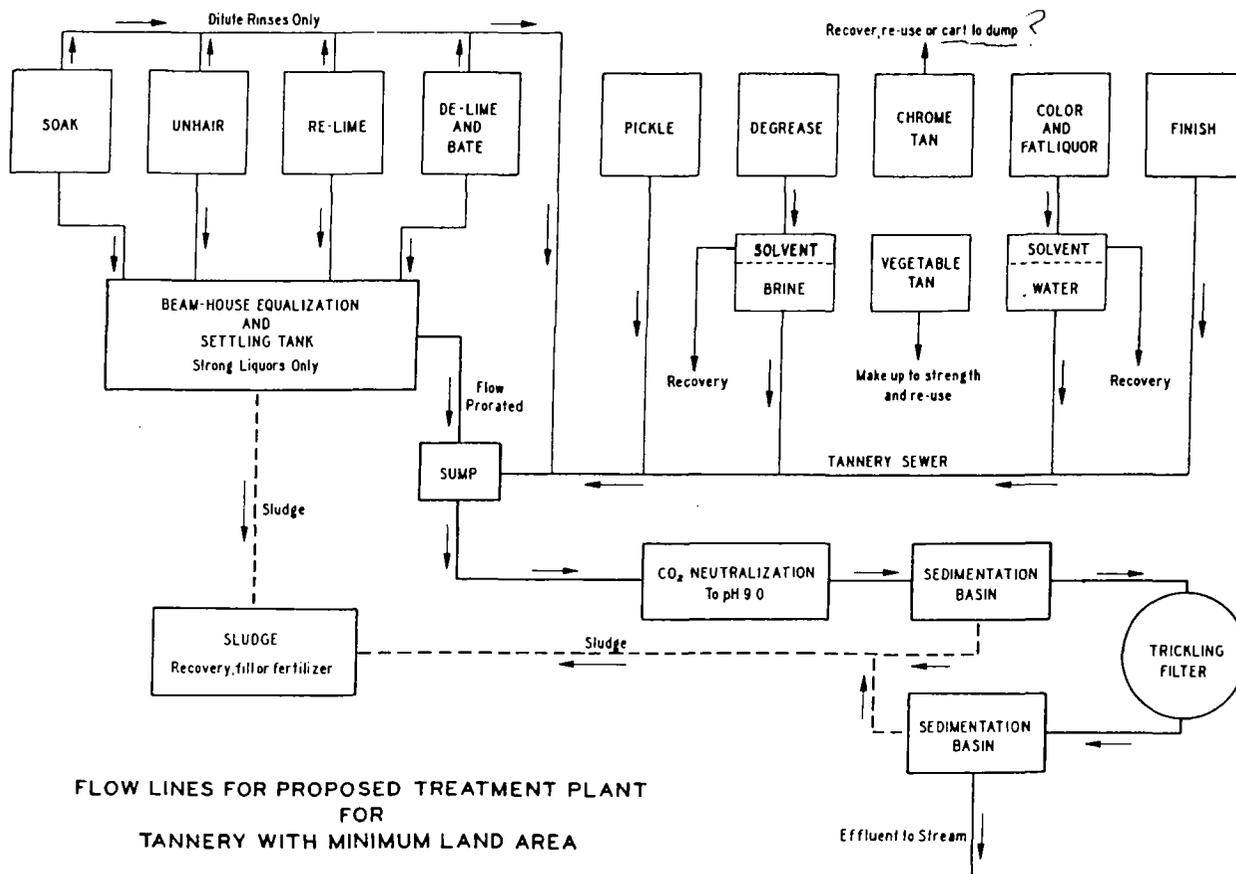
filtration, sent to lagoons or sand or cinder beds for drying, or used as fill if sufficient waste land area is available. This sludge may contain fine material which will seal the upper layers of the sand bed or clog the filter cloth. The sludge may be coagulated with lime and ferric chloride. Chemical precipitation, as noted above, is used at times either by the direct addition of chemicals or by mixing mutually precipitable acid and alkaline wastes. If iron salts are used as the coagulant, they may cause an increase in the color because of their reaction with tannins.

Laboratory studies or experimental pilot plant runs have shown that secondary treatment of tannery wastes is successful, but little has been done to apply these methods to actual practice. Filtration through sand, coke, cinders, or stone has been attempted and found successful if the waste is not too alkaline or if it does not deposit lime and cause ponding. When properly treated waste is used, high B.O.D. removals are shown by the activated sludge method.

Flow lines for proposed treatment plants for tan-

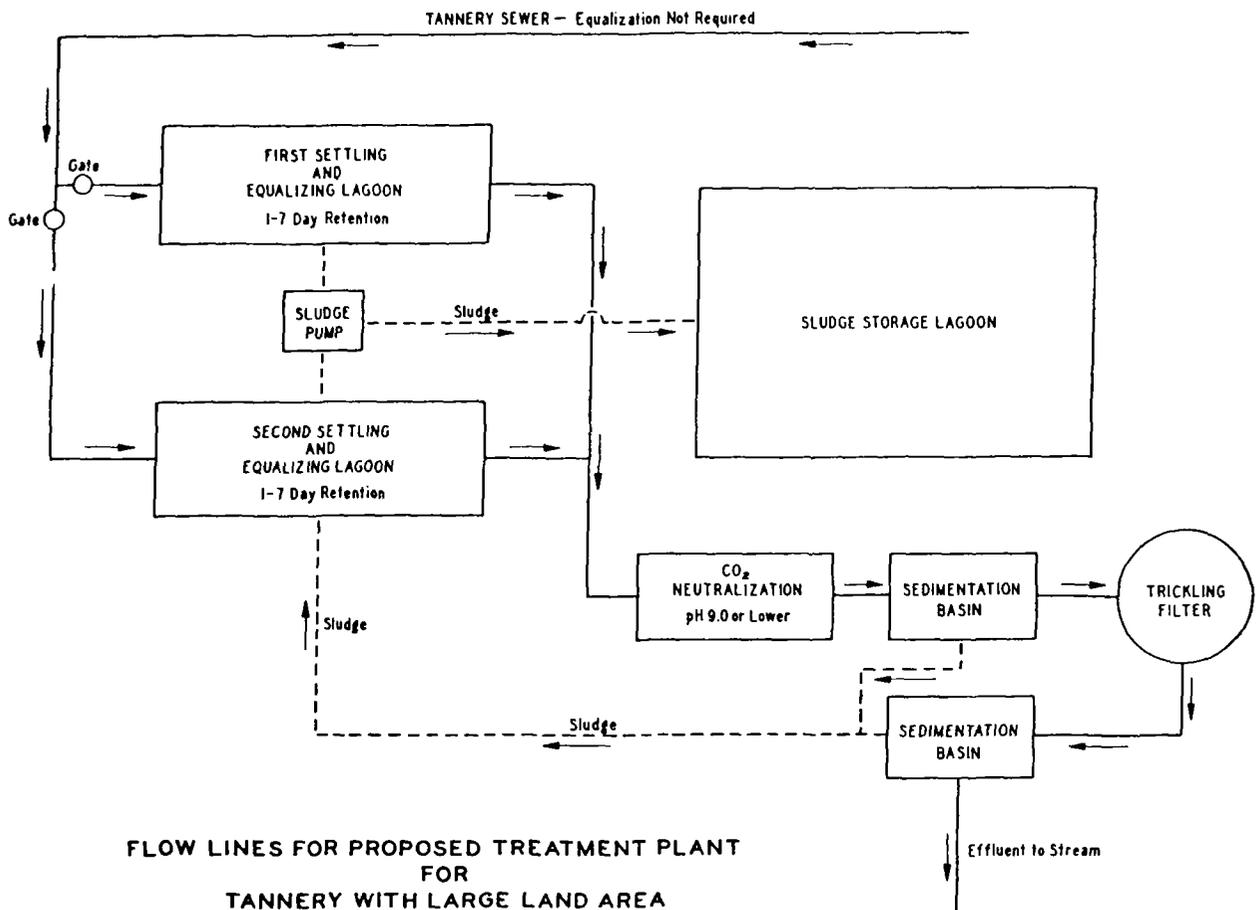
neries with minimum land area and large land area are outlined in Figures III and IV, respectively. When minimum space is available, the strong liquors from the soak, unhair, re-lime, and de-lime and bate processes should be equalized in a separate storage basin. Generally 2000 gallons of storage capacity should be provided for each 1000 pounds of hides started in the beamhouse per day. In this manner 80 to 90% of the B.O.D. will be segregated in 10 to 20% of the volume and can be prorated with the dilute wastes over the working day. Proration of the flow may be done mechanically by use of valves operated by floats. The storage capacity of the sump in such a plant should be 2 to 5% of the total flow in order to insure proper equalization. Sludge should be recovered from the beamhouse equalization tank if carbonation is to be done subsequently. In this manner 80 to 90% of the lime will be removed and carbon dioxide necessary for neutralization and lime precipitation will be reduced to a minimum.

If it has been found by analysis that the tan liquor



FLOW LINES FOR PROPOSED TREATMENT PLANT FOR TANNERY WITH MINIMUM LAND AREA

FIGURE III



FLOW LINES FOR PROPOSED TREATMENT PLANT FOR TANNERY WITH LARGE LAND AREA

FIGURE IV

discharge produces more than 10% of the total B.O.D. load, and recovery or re-use is not possible, these wastes should also be equalized. This may be done in a separate equalizing basin or preferably in the beamhouse equalization tank. Care should be taken to prevent excessive evolution of hydrogen sulfide when these two are mixed. The same reasoning will apply to any dump discharge which contributes an appreciable part (10-20%) of the pollution load.

When large land area is available, a system with two lagoons, each providing one to seven days detention, is satisfactory. Each lagoon may be used alternately to provide excellent equalization and thorough settling. In this method the strong liquors would not be segregated within the plant and may be dumped when desired. Sludge may be pumped to a large storage lagoon or filtered and used as fertilizer or fill. If fertilizer use is contemplated, chrome wastes should be segregated and recovered, re-used or carted away to a dump. If this is not done, it will be precipitated

and concentrated in the sludge. It is believed that it may affect plant growth and unless evidence to the contrary is presented, it should be eliminated.

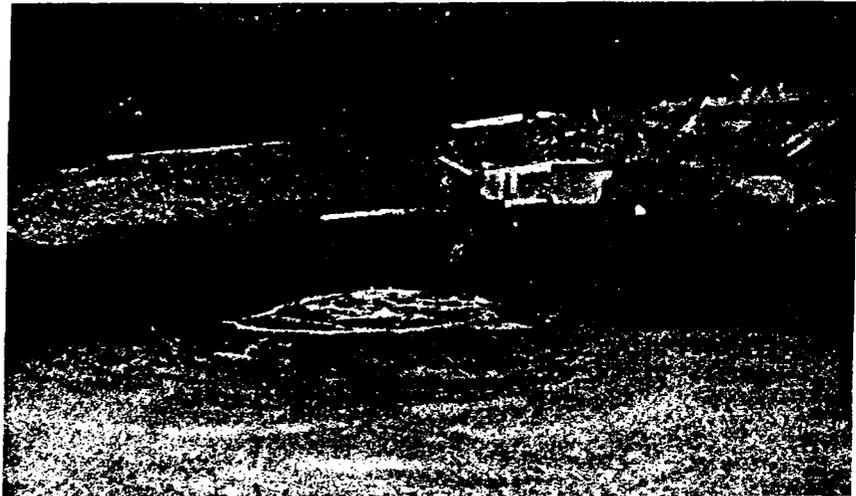
If secondary treatment is contemplated the equalized effluent should be neutralized to pH 9.0 or lower and the hardness should be reduced, probably to 200 p.p.m. or lower. This may be readily done by carbonation with flue gas, followed by settling. If carbonation with flue gas is not feasible or economical, sodium bicarbonate or sodium carbonate may be used to reduce the hardness. Laboratory experiments indicated that they will readily reduce the hardness to below 30 p.p.m. The settled effluent may then be neutralized with sulfuric acid. The main objection to the use of these two is that they require the use of more acid for neutralization.

Phosphoric acid may also be used to reduce the hardness below 50 p.p.m. but the resulting sludge increases the sludge problem considerably. It should only be considered if the sludge is being used for



SETTLING AND EQUALIZING  
LAGOON

DIVERSION BOX BETWEEN  
TWO SETTLING AND EQUAL-  
IZING LAGOONS



TREATMENT PLANT FOR ACID  
NEUTRALIZATION. THE IRON  
TANK HOLDS  $H_2SO_4$  AND  
WOODEN TANK IS FOR MIX-  
ING.

fertilizer, since the increased phosphate content will materially increase its value. Treatment of 3000 p.p.m. lime with phosphoric acid produced 50% sludge. Carbon dioxide and sodium bicarbonate produced only 3 to 5% sludge. It would appear that the presence of phosphate in tannery wastes could considerably increase the volume of sludge.

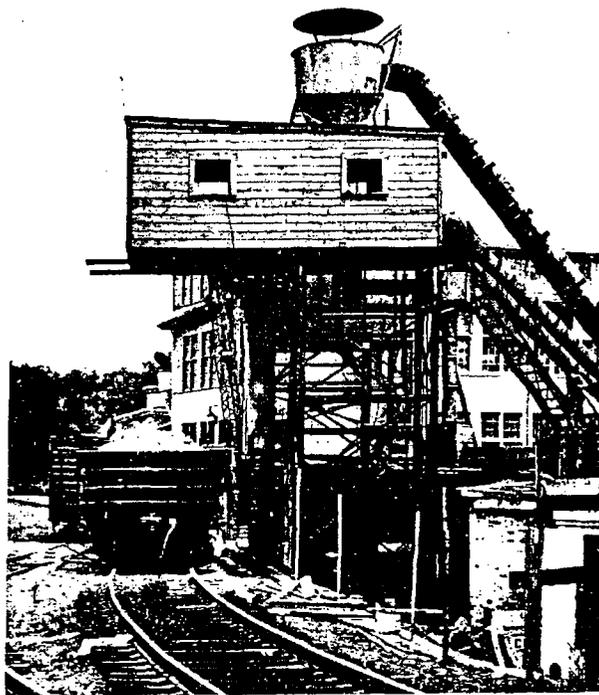
If domestic sewage is available, it should be used as a diluent to reduce the high concentrations of B.O.D., hardness, chloride, and sulfide usually present in the tannery waste. Trickling filters and activated sludge plants may be used to provide B.O.D. reductions of 85 to 95% and 100% sulfide reduction. It is believed that the addition of sewage is not necessary if the pH and hardness are reduced to the values cited above, since tannery waste, with its high protein and ammonium ion concentration, is an excellent bacteriological medium when neutralized.

It is recommended that further experimental work be done on the amount of B.O.D. and protein extracted in the unhairing process. Attempts should be made to determine the amount of protein dissolved from hair and the amounts dissolved from collagen. This should be done for hair pulping and for hair recovery processes in order to determine whether an appreciable reduction may be obtained in the recovery method. Attempts should be made to determine not only the types of proteins involved but also the extent of proteolysis which occurs during solution. It should be recognized that tannery wastes are essentially protein solutions and future investigations should be slanted in this direction. Treatment studies should be conducted along the lines developed by biochemists to precipitate proteins from solution. Studies of scale formation in trickling filters and pipe-lines should be made to determine permissible limits of total hardness concentrations.

Investigational work by the tanning industry should be done on the unhairing and hair recovery processes which use sodium hydroxide, ammonium hydroxide and other compounds since they eliminate the use of both lime and sulfide, the two major offenders in tannery wastes.

The economics and feasibility of recovery and re-use of lime and sulfide should be investigated. The economics of fertilizer production should be studied, particularly with phosphate and potassium fortification in mind.

It has been seen that the reduction of the pollution load is practiced to a certain extent by waste recovery. Fleshings and trimmings are recovered and sold to glue manufacturers. They may also be processed to obtain oil or grease. The cattlehide tannery surveyed for this report recovered 5,600,000 pounds of fleshings, 4,600,000 pounds of trimmings and 2,000,000 pounds of chrome shavings per year. More than 50% of the weight of the wet, salted hides received by the plant is recovered and shipped away to processing plants. Hair can be reclaimed and used in the rug or plaster industry. Lime may be disposed of locally to farmers as a fertilizer. Solvent recovery of greases will reduce the pollution load if the solvent is also recovered. The spent tan liquors can be re-used after build-up with concentrated extract or can be concentrated and sold as boiler conditioning compound. When the price of chromium is at a premium, chrome recovery is usually practiced.



RAILROAD CAR BEING AUTOMATICALLY LOADED WITH FLESHINGS, TRIMMINGS AND SHAVINGS.

## Chapter VIII

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Data has been presented from surveys of a pigskin tannery and a cattleskin tannery. Results from the pigskin tannery survey indicated that 90 to 100 pounds of B.O.D. are produced for each 1000 pounds of wet, salted hide processed by the tannery. The bulk of this pollution load (88%) is contributed by the soak (8%), unhair (61%) and the de-lime and bate (19%) processes. The cattleskin tannery survey indicated that 70 to 80 pounds of B.O.D. are produced from each 1000 pounds of wet, salted cattlehide. The bulk of this pollution load (85%) is produced by the same three processes: soak (20%), unhair (52%) and de-lime and bate (13%). Protein and other substances extracted from the hide are estimated to produce 50 to 70% of the total B.O.D. load and process chemicals are estimated to produce 30 to 50%. The sulfide ion used in unhairing produced 10% of the total B.O.D. from the pigskin tannery and 22% from the cattleskin tannery. Because of the high B.O.D. contribution of materials extracted from the hide substance itself, pollution reduction through process chemical changes does not offer much hope for success.

The discharge from a tannery should average 8,000 to 12,000 gallons per 1000 pounds of wet, salted hide processed. The composition of the equalized waste would be approximately as follows: 8,000 p.p.m. total solids, 1500 p.p.m. volatile solids, 1000 p.p.m. protein, 3,000 p.p.m. sodium chloride, 1600 p.p.m. total hardness, 100 p.p.m. sulfide, 40 p.p.m. chromium, 60 p.p.m. ammonium nitrogen and 1000 p.p.m. B.O.D. The waste would be highly alkaline (pH 11 to 12) because of its lime and sodium sulfide content and would produce approximately 5% to 10% sludge on sedimentation. Because of intermittent dumping of highly concentrated processing wastes within the tannery, the composition of the discharge will vary greatly unless it is equalized.

The constituents which cause most of the trouble in tannery wastes are lime, sulfide, chromium, tannin and the resultant sludge. The lime produces the bulk of the sludge and also causes scaling or depositing of calcium carbonate in pipe-lines and on trickling filters. Sulfide causes widespread "rotten egg" odor when it is

volatilized as hydrogen sulfide and can reduce the efficiency of biological treatment plants if its concentration fluctuates too widely. Chromium contributes to the sludge volume and is toxic to biological treatments in high enough concentrations. Tannin reacts with iron to form a black, ink-like color which is removed only slowly by natural purification processes. Sludge results in blockages and sludge dumps and increases requirements of sludge handling facilities.

A survey of the consumption and B.O.D. of the process chemicals used in the cattleskin tannery has been found to be very useful in pinpointing the chemical composition of the waste and in indicating the major B.O.D. sources in the plant effluents. It should be used in conjunction with all analytical surveys as a guide and as a cross-check.

Flow lines for proposed treatment plants for tanneries with large land area and for tanneries with minimum land area have been outlined and discussed. Equalization is necessary to minimize the wide fluctuations in the composition of the waste caused by intermittent dump discharges of strong liquors. Sedimentation is also a necessity because of the large volumes of sludge (5 to 10%) present in the waste. If secondary treatment is necessary, the pH should be lowered to pH 9.0 and the total hardness should be reduced to 200 p.p.m. or lower. This may be done by carbonation with flue gas. Sodium bicarbonate and settling followed by neutralization with sulfuric acid may also be used. Trickling filters and activated sludge systems may be used to reduce the B.O.D. by 85 to 95% and the sulfide by 100%.

When discharge to a community sewer is planned, the tannery should be asked to equalize its waste, settle and remove its sludge, and reduce the total hardness content so that its concentration in the mixture with the sewage is less than 200 to 300 p.p.m. In this manner the formation of scale in the pipe-lines and on trickling filters will be eliminated. If the town is highly industrialized and strong acid wastes are discharged by other manufacturing establishments in the area, the danger of hydrogen sulfide evolution should be carefully looked into.

# APPENDIX

## Table I PIGSKIN TANNERY SURVEY Analytical Results

pH	Acidity		Alkalinity			Solids			BOD	Total Hardness	Sodium Chloride	Nitrogen	
	MA	TA	OH	CO <sub>3</sub>	HCO <sub>3</sub>	TS	FS	VS				Amino	Total
<i>SOAKS</i>													
6.7	*—	—	0	0	175	32548	29518	3030	1740	—	29780	—	—
4.7	0	340	—	—	—	43084	39760	3324	2925	—	40300	—	—
5.8	—	—	0	0	135	24892	22766	2126	2600	—	—	—	—
6.1	—	—	0	0	95	17044	15716	1328	1500	—	—	—	—
* This sample only taken after initial 30 minutes of soaking.													
<i>UNHAIR</i>													
11.6	—	—	10000	5000	0	59532	44282	15250	17700	31800	—	—	—
11.6	—	—	7000	8000	0	52970	41522	11448	11700	55200	—	—	—
12.0	—	—	9500	6000	0	46754	33808	12946	13500	20500	6200	—	—
12.0	—	—	21000	15000	0	59070	47394	11676	12500	36200	5200	—	—
Sulfide averaged 1500 p.p.m. in these samples.													
<i>DELIME AND BATE</i>													
8.5	—	—	0	2500	1740	16618	7258	9360	5600	5400	—	546	840
8.4	—	—	0	760	3420	13412	6460	6952	4500	4000	538	434	705
8.4	—	—	0	700	2340	12130	6216	5914	3100	3150	750	504	712
Most of amino and total nitrogen contributed by ammonium sulfate in the Oropon.													
<i>PICKLE</i>													
2.7	3500	4900	—	—	—	88244	82232	6012	2190	—	70100	—	—
1.7	4300	5700	—	—	—	107162	89736	17426	6210	—	90260	—	—
<i>DEGREASE — Kerosene Layer</i>													
2.8	118	208	—	—	—	—	—	—	—	—	—	—	—
2.4	1080	1530	—	—	—	—	—	—	—	—	—	—	—
Not analyzed. Contains 50% kerosene. See text.													
<i>DEGREASE — Brine Layer</i>													
—	—	—	—	—	—	109694	107714	1980	2300	—	—	—	—
3.2	420	665	—	—	—	109902	107332	2570	2500	—	—	—	—
<i>VEGETABLE TAN LIQUORS*</i>													
4.1	1420	5440	—	—	—	105868	47344	58524	25500	—	—	—	—
4.2	0	4350	—	—	—	81898	35494	46404	24300	—	—	—	—
4.2	0	4700	—	—	—	89636	40926	48710	26100	—	—	—	—
4.2	0	4550	—	—	—	94518	46816	47702	23100	—	—	—	—
* Samples taken from tanning paddles.													
<i>CHROME TAN</i>													
4.5	0	2200	—	—	—	78542	74028	4514	840	—	49640	—	—
4.5	0	2600	—	—	—	82346	77618	4728	840	—	52500	—	—
The average chromium content of these samples was 2500 p.p.m. (Cr <sup>3+</sup> ).													
<i>COLOR AND FAT LIQUOR — First Dump</i>													
3.8	488	1730	—	—	—	4496	3586	810	580	—	680	—	—
4.1	70	750	—	—	—	3356	2380	976	400	—	140	—	—
<i>COLOR AND FAT LIQUOR — Second Dump</i>													
4.0	95	470	—	—	—	3444	1194	2250	2800	—	234	—	—
4.6	—	—	0	0	55	4518	702	3816	5100	—	< 50	—	—

**Table II**  
**PIGSKIN TANNERY SURVEY**  
**Average Composition and Contribution of Strong Liquors**

Process	Volume		B.O.D.			Pounds per 1000 lbs. hide	Sodium Chloride p.p.m.	Total Hardness p.p.m.	Protein p.p.m.	Total Solids p.p.m.	Volatile Solids p.p.m.
	Gallons per day	% of total	p.p.m.	Pounds per day	% of total						
Soaks	3000	19	2400	60	8	17 <sup>a</sup>	35000	—	—	28000	2300
Unhair	4000	26	14000	467	61	70 <sup>b</sup>	5700	38000	18400	55000	12900
De-lime and Bate	4000	26	4400	147	19	23 <sup>b</sup>	640	4200	1600	14000	7400
Pickling	700	5	4200	25	3	9 <sup>b</sup>	80000	—	—	98000	12000
Degreasing—											
Kerosene layer	340	2	—	(1210) <sup>c</sup>	—	435 + <sup>d</sup>	—	—	—	—	—
Brine layer	800	5	2600	17	2	7	100000	—	—	110000	2300
Vegetable Tan	30	—	24000	6	1	2 <sup>d</sup>	—	—	—	93000	25000
Chrome Tan	600	4	2300 <sup>f</sup>	12	2	5 <sup>d</sup>	51000	—	—	80000	4600
Color and Fatliquor											
First dump	1000	6	490	4	1	1 <sup>e</sup>	410	—	—	3950	890
Second dump	1000	6	3950	33	4	8 <sup>e</sup>	135	—	—	3980	3030
Total	15470	—	—	771	—	—	—	—	—	—	—

- <sup>a</sup> Based on wet, salted hide.  
<sup>b</sup> Based on fleshed hide after soaking (30% flesh removed).  
<sup>c</sup> Calculated from kerosene (53% B.O.D.) only. Not included in total.  
<sup>d</sup> Based on pickled hide.  
<sup>e</sup> Based on leather.  
<sup>f</sup> Estimated at 50% of volatile solids concentration.

**Table III**  
**CATTLEHIDE TANNERY SURVEY**  
**Analytical Results**

pH	Acidity		Alkalinity			Solids			BOD	Total Hardness	Sodium Chloride	Nitrogen		
	MA	TA	OH	CO <sub>3</sub>	HCO <sub>3</sub>	TS	FS	VS				Amino	Total	
<b>SOAKS</b>														
<i>Experimental one-half hour soak, before initial rinse.</i>														
6.8	0	0	0	0	510	25932	21690	4242	2400	976	18800	140	—	
6.6	—	—	0	0	630	32450	23464	8986	2300	1070	23050	179	—	
6.4	—	—	0	0	540	29320	26264	3056	2350	1120	23150	—	—	
6.3	—	—	0	0	500	27542	24478	3064	2550	920	20850	168	—	
<i>Regular 22 hour soak, after initial rinse.</i>														
7.3	—	—	0	0	900	42994	37740	5254	6400	860	39400	112	—	
7.0	—	—	0	0	680	40164	36050	4114	4300	660	35100	105	—	
7.2	—	—	0	0	860	43762	38824	4938	5100	740	36500	118	—	
7.1	—	—	0	0	780	43988	38218	5770	5600	780	38000	129	—	
7.3	—	—	0	0	800	42382	37818	4564	4560	—	35200	—	575	
7.0	—	—	0	0	900	37798	33920	3878	3900	960	23500	90	464	
7.0	—	—	0	0	1600	39344	35124	4220	3900	725	25200	126	520	
<b>UNHAIR</b>														
<i>Supernatant Samples</i>														
11.8	—	—	1900	13200	0	60356	39612	20744	12300	3920	25150	484	—	
11.5	—	—	13700	0	0	42670	31666	11004	11400	3160	13800	—	—	
<i>Well-Mixed Samples — Sludge Included</i>														
12.1	—	—	23600	17400	0	79326	56346	22980	10200	26600	17650	350	—	
12.1	—	—	19600	15600	0	81144	54548	26596	11700	22000	18900	529	—	
11.2	—	—	14800	14400	0	78692	61184	17508	18900	27000	14800	203	—	
11.1	—	—	13600	22400	0	84088	68030	16058	18900	26800	21500	205	—	
10.9	—	—	9600	18000	0	81256	63020	18236	> 20000	22400	21300	235	—	
11.0	—	—	12800	16400	0	76906	60686	16220	18000	23000	14900	246	—	
11.4	—	—	0	26200	1200	75290	58942	16348	18200	—	17500	199	4070	
11.9	—	—	22000	14000	0	71770	59864	11906	11450	30300	19500	154	2880	
11.9	—	—	21000	14000	0	69574	53268	16306	12350	22600	18100	164	3950	

The average sulfide concentration was 4000 p.p.m.

Table III (continued)

pH	Acidity		Alkalinity			Solids			BOD	Total Hardness	Sodium Chloride	Nitrogen	
	MA	TA	OH	CO <sub>3</sub>	HCO <sub>3</sub>	TS	FS	VS				Amino	Total
<i>RE-LIME</i>													
12.4	—	—	21400	1600	0	14226	11724	2502	450	24000	3750	—	—
12.4	—	—	21800	2000	0	18948	15826	3122	510	26000	3280	—	—
11.2	—	—	9200	13200	0	21672	21464	208	690	28000	176	—	—
11.2	—	—	10600	6800	0	23000	20930	2070	510	21250	234	—	—
11.2	—	—	—	—	—	23632	21138	2494	1080	28500	210	—	—
<i>DE-LIME and BATE</i>													
8.9	—	—	0	2900	0	14896	5616	9280	8400	3520	< 350	—	—
8.8	—	—	0	2260	0	12988	4806	8182	6600	3040	< 590	—	—
9.8	—	—	1600	2480	0	16774	6852	9922	6100	4500	< 10	2060*	2700*
9.8	—	—	1640	2720	0	15204	8390	6814	5525	4300	< 10	2060*	2860*
9.8	—	—	1680	2400	0	16282	6546	9738	4200	4250	< 10	1950*	2590*
9.8	—	—	1640	2560	0	11782	9136	2646	5225	4700	< 10	1950*	2710*
* Ammonium nitrogen from OROPON contributes most of this.													
<i>PICKLE</i>													
3.0	1200	2400	—	—	—	83854	75840	8014	2850	2400	49700	—	—
2.4	1460	2340	—	—	—	73204	66762	6442	2850	2480	44400	—	—
<i>CHROME TAN</i>													
3.4	840	10000	—	—	—	90226	75560	14666	1800	1880	30150	—	—
3.4	1020	11520	—	—	—	102046	88682	13364	—	1800	28650	—	—
4.0	300	7700	—	—	—	87582	77000	10582	—	1800	27350	—	—
The total chromium in these samples averaged 6,000 p.p.m.													
<i>COLOR AND FAT LIQUOR — First Dump</i>													
4.0	120	1120	—	—	—	16128	8180	7948	2000	—	1380	—	—
<i>COLOR AND FAT LIQUOR — Second Dump</i>													
3.8	140	620	—	—	—	7920	2846	5074	2600	—	281	—	—
4.1	50	310	—	—	—	17664	12324	5340	3000	—	7560	—	—
3.8	86	900	—	—	—	6092	3212	2880	1320	—	210	—	—
3.4	100	280	—	—	—	10434	3226	7208	3300	1680	257	—	—
3.4	200	590	—	—	—	8506	2724	5782	2100	3520	234	—	—
3.4	340	765	—	—	—	5706	2586	3120	1000	—	—	—	—
Second dump samples averaged approximately 56 p.p.m. chromium (Cr <sup>3+</sup> ).													
<i>MISCELLANEOUS</i>													
4.0	21	60	—	(Retan)	—	1224	660	564	220	—	—	—	—
4.1	75	1040	—	(Bleach)	—	15522	11886	3636	90	—	878	—	—

Table IV

CATTLESKIN TANNERY SURVEY

Average Composition and Contribution of Strong Liquors

Process	Volume		B.O.D.					Sodium Chloride p.p.m.	Total Hardness p.p.m.	Protein p.p.m.	Total Solids p.p.m.	Volatile Solids p.p.m.
	Gallons per day	% of total	p.p.m.	Pounds per day	% of total	Pounds per 1000 lbs. hide						
Soaks	73100	42	2200	1310	20	15 <sup>a</sup>	20000	670	1900	30000	3600	
Unhair	27200	16	15500	3510	52	40 <sup>a</sup>	18000	25000	22700	78000	18000	
Re-lime	27200	16	650	147	2	2 <sup>a</sup>	3500	25000	—	20300	2500	
De-lime and bate	17600	10	6000	880	13	10 <sup>b</sup>	< 10	4100	4300	15000	8800	
Pickle	9800	6	2900	237	4	3 <sup>b</sup>	47000	2400	—	79000	7200	
Chrome Tan	8500	5	6500 <sup>d</sup>	425	6	8 <sup>b</sup>	26000	1800	—	93000	13000	
Color and Fatliquor												
First dump	5100	3	2000	85	1	3 <sup>c</sup>	—	—	—	16000	8000	
Second dump	5100	3	2200	93	1	3 <sup>c</sup>	250	2600	—	9500	4900	
Total	173600	—	—	6687	—	—	—	—	—	—	—	

<sup>a</sup> Based on wet, salted hide.  
<sup>b</sup> Based on fleshed, split hide, after re-lime.  
<sup>c</sup> Based on chrome tanned leather.  
<sup>d</sup> Estimated at 50% of volatile solids concentration.

**Table V**  
**ANNUAL CONSUMPTION OF PROCESS CHEMICALS IN CATTLESKIN**  
**TANNERY**

	Pounds Used	% B.O.D.	Pounds B.O.D.	p.p.m. in waste
Sodium Chloride	1,368,000	0	0	684
Sodium Chloride (used in curing 19% O.W.H.)	4,408,000	0	0	2200
Lime	2,470,000	0	0	1235
Sodium sulfide (62% Na <sub>2</sub> S, 25% S=)	981,000	40	392,000	490
Sulfuric acid	350,000	0	0	175
Soda Ash	161,000	0	0	80
Oropon (95% (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub> )	144,000	5	7200	72
Calcium formate	88,000	12	11,000	44
Lactic Acid (30%)	77,000	32	25,000	38
Sodium formate	56,000	2	1100	28
Sterizol	42,000	—	—	20
Ammonium chloride	20,000	0	0	10
<i>Chemicals Absorbed by the Hide<sup>a</sup></i>				
Tanolin R (16% chromium)	1,670,000	0	0	626 <sup>b</sup>
Tamol L	729,000	0	0	36
D-1 Oil	37,000	83	3100	2
Other Oils (total of 12)	650,000	80	52,000	33
Quebracho	146,000	5	700	7
Soyarich flour	100,000	—	—	5
Tanbark H	88,000	11	1000	4
Titanium dioxide	88,000	0	0	4
Ade 11 Tan	38,000	—	—	2
Gambade	156,000	4	600	8
Maratan B	136,000	—	—	7
Methocel	20,000	6	120	1
Orotan TV	30,000	5	150	2
Semi-sol glue	37,000	—	—	2
Upper tan	28,000	—	—	1
Totals	14,080,000	—	494,300	5343

<sup>a</sup> Absorption estimated at 90%, only 10% discharged to waste. Pounds B.O.D. and p.p.m. in waste are based on 10% of the pounds used.

<sup>b</sup> Based on 75% discharged to waste.

## 9.15 Leather Tanning

### 9.15.1 General<sup>1-4</sup>

Leather tanning is the process of converting raw hides or skins into leather. Hides and skins have the ability to absorb tannic acid and other chemical substances that prevent them from decaying, make them resistant to wetting, and keep them supple and durable. The surface of hides and skins contains the hair and oil glands and is known as the grain side. The flesh side of the hide or skin is much thicker and softer. The three types of hides and skins most often used in leather manufacture are from cattle, sheep, and pigs.

Tanning is essentially the reaction of collagen fibers in the hide with tannins, chromium, alum, or other chemical agents. The most common tanning agents used in the U. S. are trivalent chromium and vegetable tannins extracted from specific tree barks. Alum, syntans (man-made chemicals), formaldehyde, glutaraldehyde, and heavy oils are other tanning agents.

There are approximately 111 leather tanning facilities in the United States. However, not every facility may perform the entire tanning or finishing process. Leather tanning and finishing facilities are most prevalent in the northeast and midwest states; Pennsylvania, Massachusetts, New York, and Wisconsin account for almost half of the facilities. The number of tanneries in the United States has significantly decreased in the last 40 years due to the development of synthetic substitutes for leather, increased leather imports, and environmental regulation.

### 9.15.2 Process Description<sup>1-2,5-6</sup>

Although the title of this section is "Leather Tanning", the entire leathermaking process is considered here, not just the actual tanning step. "Leather tanning" is a general term for the numerous processing steps involved in converting animal hides or skins into finished leather. Production of leather by both vegetable tanning and chrome tanning is described below. Chrome tanning accounts for approximately 90 percent of U. S. tanning production. Figure 9.15-1 presents a general flow diagram for the leather tanning and finishing process. Trimming, soaking, fleshing, and unhairing, the first steps of the process, are referred to as the beamhouse operations. Bating, pickling, tanning, wringing, and splitting are referred to as tanyard processes. Finishing processes include conditioning, staking, dry milling, buffing, spray finishing, and plating.

#### 9.15.2.1 Vegetable Tanning -

Heavy leathers and sole leathers are produced by the vegetable tanning process, the oldest of any process in use in the leather tanning industry. The hides are first trimmed and soaked to remove salt and other solids and to restore moisture lost during curing. Following the soaking, the hides are fleshed to remove the excess tissue, to impart uniform thickness, and to remove muscles or fat adhering to the hide. Hides are then dehaired to ensure that the grain is clean and the hair follicles are free of hair roots. Liming is the most common method of hair removal, but thermal, oxidative, and chemical methods also exist. The normal procedure for liming is to use a series of pits or drums containing lime liquors (calcium hydroxide) and sharpening agents. Following liming, the hides are dehaired by scraping or by machine. Deliming is then performed to make the skins receptive to the vegetable tanning. Bating, an enzymatic action for the removal of unwanted hide components after liming, is performed to impart softness, stretch, and flexibility to the leather. Bating and deliming are usually performed together by placing the hides in an aqueous solution of an ammonium salt and proteolytic

enzymes at 27° to 32°C (80° to 90°F). Pickling may also be performed by treating the hide with a brine solution and sulfuric acid to adjust the acidity for preservation or tanning.

In the vegetable tanning process, the concentration of the tanning materials starts out low and is gradually increased as the tanning proceeds. It usually takes 3 weeks for the tanning material to penetrate to the center of the hide. The skins or hides are then wrung and may be cropped or split; heavy hides may be retanned and scrubbed. For sole leather, the hides are commonly dipped in vats or drums containing sodium bicarbonate or sulfuric acid for bleaching and removal of surface tannins. Materials such as lignosulfate, corn sugar, oils, and specialty chemicals may be added to the leather. The leather is then set out to smooth and dry and may then undergo further finishing steps. However, a high percentage of vegetable-tanned leathers do not undergo retanning, coloring, fatliquoring, or finishing.

Leather may be dried by any of five common methods. Air drying is the simplest method. The leather is hung or placed on racks and dried by the natural circulation of air around it. A toggling unit consists of a number of screens placed in a dryer that has controlled temperature and humidity. In a pasting unit, leathers are pasted on large sheets of plate glass, porcelain, or metal and sent through a tunnel dryer with several controlled temperature and humidity zones. In vacuum drying, the leather is spread out, grain down, on a smooth surface to which heat is applied. A vacuum hood is placed over the surface, and a vacuum is applied to aid in drying the leather. High-frequency drying involves the use of a high frequency electromagnetic field to dry the leather.

#### 9.15.2.2 Chrome Tanning -

Chrome-tanned leather tends to be softer and more pliable than vegetable-tanned leather, has higher thermal stability, is very stable in water, and takes less time to produce than vegetable-tanned leather. Almost all leather made from lighter-weight cattle hides and from the skin of sheep, lambs, goats, and pigs is chrome tanned. The first steps of the process (soaking, fleshing, liming/dehairing, deliming, bating, and pickling) and the drying/finishing steps are essentially the same as in vegetable tanning. However, in chrome tanning, the additional processes of retanning, dyeing, and fatliquoring are usually performed to produce usable leathers and a preliminary degreasing step may be necessary when using animal skins, such as sheepskin.

Chrome tanning in the United States is performed using a one-bath process that is based on the reaction between the hide and a trivalent chromium salt, usually a basic chromium sulfate. In the typical one-bath process, the hides are in a pickled state at a pH of 3 or lower, the chrome tanning materials are introduced, and the pH is raised. Following tanning, the chrome tanned leather is piled down, wrung, and graded for the thickness and quality, split into flesh and grain layers, and shaved to the desired thickness. The grain leathers from the shaving machine are then separated for retanning, dyeing, and fatliquoring. Leather that is not subject to scuffs and scratches can be dyed on the surface only. For other types of leather (i. e., shoe leather) the dye must penetrate further into the leather. Typical dyestuffs are aniline-based compounds that combine with the skin to form an insoluble compound.

Fatliquoring is the process of introducing oil into the skin before the leather is dried to replace the natural oils lost in beamhouse and tanyard processes. Fatliquoring is usually performed in a drum using an oil emulsion at temperatures of about 60° to 66°C (140° to 150°F) for 30 to 40 minutes. After fatliquoring, the leather is wrung, set out, dried, and finished. The finishing process refers to all the steps that are carried out after drying.

### 9.15.2.3 Leather Finishing

Leathers may be finished in a variety of ways: buffed with fine abrasives to produce a suede finish; waxed, shellacked, or treated with pigments, dyes, and resins to achieve a smooth, polished surface and the desired color; or lacquered with urethane for a glossy patent leather. Water-based or solvent-based finishes may also be applied to the leather. Plating is then used to smooth the surface of the coating materials and bond them to the grain. Hides may also be embossed.

### 9.15.3 Emissions and Controls<sup>2, 4b</sup>

There are several potential sources of air emissions in the leather tanning and finishing industry. Emissions of VOC may occur during finishing processes, if organic solvents are used, and during other processes, such as fatliquoring and drying. If organic degreasing solvents are used during soaking in suede leather manufacture, these VOC may also evaporate to the atmosphere. Many tanneries are implementing water-based coatings to reduce VOC emissions. Control devices, such as thermal oxidizers, are used less frequently to reduce VOC emissions. Ammonia emissions may occur during some of the wet processing steps, such as delimiting and unhairing, or during drying if ammonia is used to aid dye penetration during coloring. Emissions of sulfides may occur during liming/unhairing and subsequent processes. Also, alkaline sulfides in tannery wastewater can be converted to hydrogen sulfide if the pH is less than 8.0, resulting in release of this gas. Particulate emissions may occur during shaving, drying, and buffing; they are controlled by dust collectors or scrubbers.

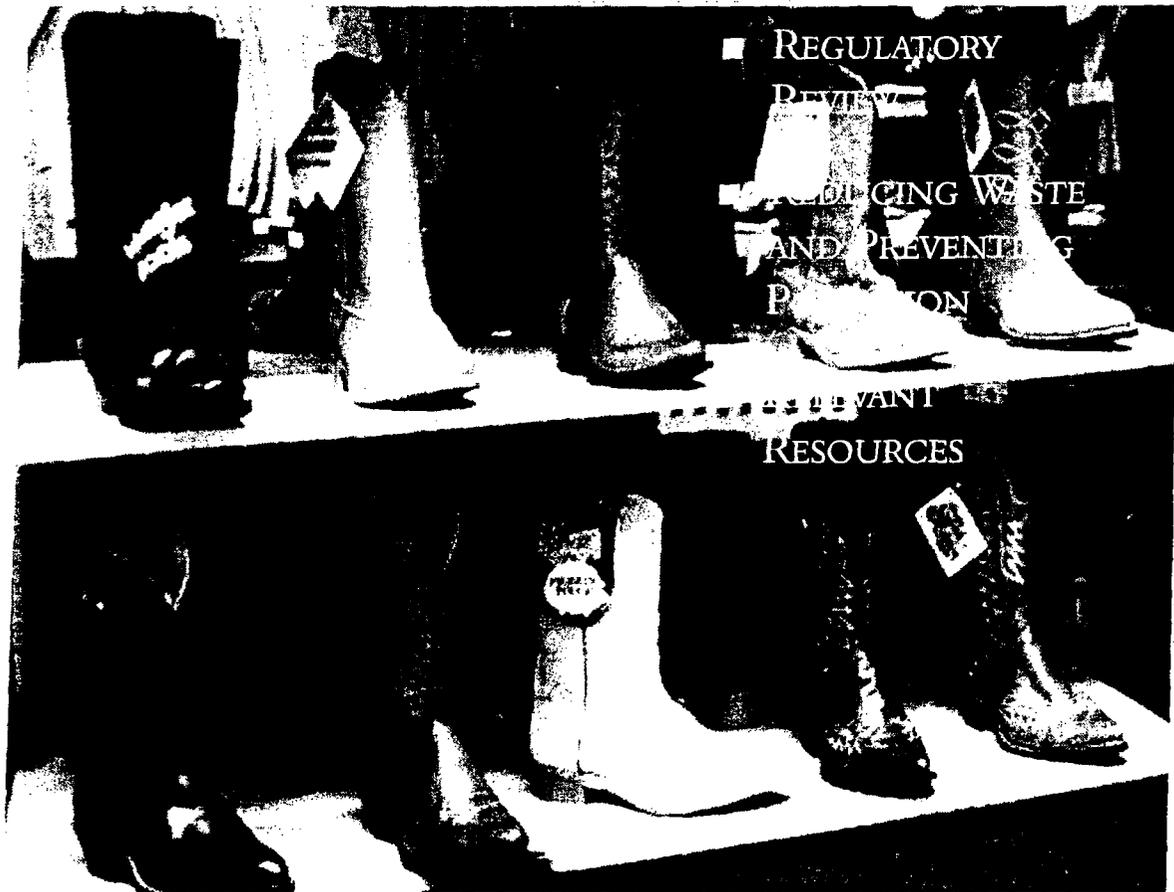
Chromium emissions may occur from chromate reduction, handling of basic chromic sulfate powder, and from the buffing process. No air emissions of chromium occur during soaking or drying. At plants that purchase chromic sulfate in powder form, dust containing trivalent chromium may be emitted during storage, handling, and mixing of the dry chromic sulfate. The buffing operation also releases particulates, which may contain chromium. Leather tanning facilities, however, have not been viewed as sources of chromium emissions by the States in which they are located.

### References for Section 9.15

1. K. Bienkiewicz, *Physical Chemistry Of Leathermaking*, Krieger Publishing Co., Malabar, FL, 1983.
2. *Development Document For Effluent Limitations Guidelines And Standards For The Leather Tanning And Finishing Point Source Category*, EPA-440/1-82-016, U. S. Environmental Protection Agency, Research Triangle Park, NC, November, 1982.
3. *1992 Census Of Manufactures*, U. S. Department of Commerce, Bureau of Census, Washington, DC, April 1995.
4. Telecon, A. Marshall, Midwest Research Institute, with F. Rutland, Environmental Consultant, Leather Industries of America, August 7, 1996.
5. *1996 Membership Directory*, Leather Industries of America Inc.
6. M. T. Roberts and D. Etherington, *Bookbinding And The Conservation Of Books, A Dictionary Of Descriptive Terminology*.
7. T. C. Thorstensen, *Practical Leather Technology*, 4th Ed., Krieger Publishing Co., Malabar, FL, 1993.

# INFOCUS

US EPA ARCHIVE DOCUMENT



## RCRA Hotline

U.S. Environmental Protection Agency  
800 424-9346 or TDD 800 553-7672.

In the Washington, DC, area: 703 412-9810  
or TDD 703 412-3323.

Foreword	2
Frequently Asked Questions About RCRA	3
The Life Cycle of a Typical Leather Manufacturing Waste	6
Requirements for Regulated Leather Manufacturers	8
Reduce or Minimize the Hazardous Wastes You Generate	10
Other Environmental Laws Affecting the Leather Manufacturing Industry	14
Contacts and Resources	16

ome processes conducted in your leather manufacturing facility probably generate hazardous waste. That means you are regulated by the U.S. Environmental Protection Agency (EPA) under a federal law called the Resource Conservation and Recovery Act (RCRA). Under RCRA, you are required to follow certain procedures when generating, storing, transporting, treating, or disposing of hazardous waste. *RCRA in Focus* provides an overview of the federal regulations you are required to follow and the wastes that are likely to be hazardous in your business. It also provides recycling and pollution prevention options to help you decrease the amount of hazardous waste you generate.

RCRA is a federal law that encourages environmentally sound methods for managing commercial and industrial waste as well as household and municipal waste. It regulates facilities that generate, transport, treat, store, or dispose of hazardous waste. The vast majority of leather manufacturing facilities are considered hazardous waste generators, rather than treatment, storage, and disposal facilities (TSDFs), which are subject to more rigorous regulations.

The term "RCRA" is often used interchangeably to refer to the law, the regulations, and EPA policy and guidance. The *law* describes the waste management program mandated by Congress that gave EPA authority to develop the RCRA program. EPA *regulations* carry out the Congressional intent by providing explicit, legally enforceable requirements for waste management. EPA *guidance documents* and *policy directives* clarify issues related to the implementation of the regulations.

All of the RCRA hazardous waste regulations can be found in the *Code of Federal Regulations* (CFR), Title 40, Parts 260 to 279. The CFR can be purchased through the U.S. Government Printing Office (GPO).

Any leather manufacturing facility that generates hazardous waste is potentially subject to RCRA. You must conduct tests required by the regulations or use your knowledge of and familiarity with the waste you generate to determine whether it is hazardous waste (as opposed to other types of waste). You might be subject to substantial civil and criminal penalties if you fail to properly or completely identify hazardous waste generated by your business.

To be considered hazardous waste, a material first must be classified as a solid waste. EPA defines solid waste as garbage, refuse, sludge, or other discarded material (including solids, semisolids, liquids, and contained gaseous materials). If your waste is considered solid waste, you must then determine if it is hazardous waste. Wastes are defined as hazardous by EPA if they are specifically named on one of four lists of hazardous wastes (listed wastes) or if they exhibit one of four characteristics (characteristic wastes). Each type of RCRA hazardous waste is given a unique hazardous waste code using the letters D, F, K, P, or U and three digits (e.g., D001, F005, P039). See pages 8 to 11 for additional information on leather manufacturing waste codes.

*Listed Wastes.* Wastes are listed as hazardous because they are known to be harmful to human health and the environment when not managed properly, regardless of their concentrations. The lists include the following three types of waste.

- **Non-Specific Source Wastes.** These are material-specific wastes, such as solvents, generated by several different industries. Waste codes range from F001 to F039. Examples include toluene, xylene or methyl ethyl ketones.
- **Specific Source Wastes.** These are wastes from specifically identified industries. Waste codes range from K001 to K161. Leather manufacturing facilities typically do not generate specific source wastes.
- **Discarded Commercial Chemical Products.** These are off-specification products, container residuals, spill residue, runoff, or active ingredients that have spilled or are unused and that have been, or are intended to be, discarded. Waste codes for acutely hazardous chemicals range from P001 to P205 and U001 to U411. An example is U220, unused toluene.

You may be regulated both by your state hazardous waste agency and EPA. RCRA allows states to receive legal permission, known as authorization, to implement the RCRA hazardous waste program. You must always contact your state authority to determine which state requirements apply to your business.

To operate a hazardous waste program, a state's regulations must be consistent with, and at least as stringent as, the federal program. Some states adopt more stringent requirements for facilities handling hazardous waste, which are considered part of the authorized program.

For all the RCRA Hotline at 800 424-9346 or TDD 800 553-7672 for additional information about RCRA rules and regulations. In the Washington, DC, area, call 703 412-7810 or TDD 703 412-5231.

CRA regulates the treatment, storage, and disposal of hazardous waste being generated now and in the future. Superfund was created to pay for the identification, inspection, investigation, ranking, and cleanup of abandoned or uncontrolled hazardous waste sites that people responsible for contamination are unable or unwilling to clean up. Call the RCRA Hotline for more information.

*Characteristic Wastes.* Even if your waste does not appear on one of the hazardous waste lists, it still might be regulated as hazardous waste if it exhibits one or more of the following characteristics:

- **Ignitability.** Ignitable wastes create fires under certain conditions or are spontaneously combustible, and have a flash point less than 60 °C (140 °F). An example is spent solvents from tanning and dyeing operations. The waste code for these materials is D001.
- **Corrosivity.** Corrosive wastes are acids or bases that are capable of corroding metal containers, such as storage tanks, drums, and barrels. Tanning waste is a good example. The waste code for these materials is D002.
- **Reactivity.** Reactive wastes are unstable under "normal" conditions. They can cause explosions, toxic fumes, gases, or vapors when mixed with water. Examples include lithium-sulfur batteries and explosives. The waste code for these materials is D003.
- **Toxicity.** Toxic wastes are harmful or fatal when ingested or absorbed. When toxic wastes are disposed of on land, contaminated liquid might drain (leach) from the waste and pollute ground water. Toxicity is defined through a laboratory procedure called the Toxicity Characteristic Leaching Procedure (TCLP). Certain chemical wastes and heavy metals generated from dyeing leathers are examples of potential toxic wastes. The waste codes for these materials range from D004 to D039.

If your leather manufacturing business generates hazardous waste, you must manage it according to regulations for your specific generator type. Hazardous waste generators are divided into three categories, according to how much they generate in a calendar month:

- **Large Quantity Generators (LQGs).** LQGs generate greater than or equal to 1,000 kg (approximately 2,200 lb) of hazardous waste per month or greater than 1 kg (approximately 2.2 lb) of acutely hazardous waste per month.
- **Small Quantity Generators (SQGs).** SQGs generate greater than 100 kg (approximately 220 lb) but less than 1,000 kg (approximately 2,200 lb) of hazardous waste per month.
- **Conditionally Exempt Small Quantity Generators (CESQGs).** CESQGs generate less than or equal to 100 kg (approximately 220 lb) of hazardous waste per month and less than or equal to 1 kg (approximately 2.2 lb) of acutely hazardous waste per month.

Some states do not recognize the CESQG class. Contact your state environmental agency to find out if the CESQG status is recognized. **To find your appropriate state contact, call the RCRA Hotline at 800 424-9346.**

Under the federal RCRA requirements, your generator status might change from one month to the next as the quantity of waste you generate changes. State requirements vary widely. You must comply with whichever standard is applicable for a given month. In many cases, small businesses that fall into different generator categories at different times choose to always satisfy the more stringent requirements (usually state requirements) to simplify compliance. Generators must "count" the amount of waste generated, which involves adding up the total weight of all quantities of characteristic and listed waste generated at a particular facility. Certain wastes, such as those that are reclaimed or recycled continuously on site, are not counted under the federal regulations.

**Y**ou've just completed some leather finishing and are left with solvent wastes that must be managed according to RCRA. This example details one typical leather manufacturing waste life cycle and illustrates a common scenario of activities you would conduct as an environmental manager. This example shows an LQG leather mill generating hazardous waste spent solvents and sending them offsite for treatment. Other waste life cycles could be different depending on the waste, the type of waste management units used, and the facility generator status.

#### **PREPARE BIENNIAL REPORT**

You must submit a biennial report of waste generation and management activities, as well as waste minimization activities, by March 1 of every even-numbered year.

#### **SEND WASTE OFF SITE FOR TREATMENT, STORAGE, OR DISPOSAL**

Using a registered hazardous waste transporter, send the waste to a RCRA hazardous waste TSDF accompanied by the appropriate manifest. You can choose from any permitted or interim status TSDF. Options for solvents include a hazardous waste incinerator that will landfill the incinerator ash, a hazardous waste fuel blender that will blend the solvents with other wastes and then burn them for energy recovery in a boiler or industrial furnace, or a facility that will recycle the solvents.

#### **IDENTIFY WASTE**

First identify whether your leather manufacturing waste is hazardous by running tests or using knowledge of the waste. Based on these analyses, determine if the appropriate RCRA hazardous waste codes for the spent solvents generated by your leather manufacturing process are D001 or F001 through F005.

#### **COUNT WASTE**

Next, determine how much spent solvents you have produced in a calendar month. You do not need to count wastes discharged in compliance with the Clean Water Act directly to a public sewer leading to a POTW or waste recycled only in an onsite process subject to regulation, without first being stored or accumulated.

#### **PREPARE APPROPRIATE NOTIFICATION AND CERTIFICATION**

Ensure that all hazardous waste sent off site for treatment, storage, and disposal is accompanied by appropriate notifications and certifications (initial shipments only).

#### **PREPARE HAZARDOUS WASTE MANIFEST**

Send a manifest along with all hazardous waste sent off site to a TSDF. Be sure to receive a completed copy of the manifest from the TSDF and keep a copy on site for 3 years. The manifest contains a certification stating that you have a program in place to reduce the volume and toxicity of waste generated to the degree economically practicable, and that you have selected a treatment, storage, and disposal method currently available that minimizes current and future threats from the waste.

### **DETERMINE GENERATOR STATUS**

Add together all hazardous wastes to determine your generator status. In this case, you have produced more than 1,000 kg (2,200 lb) in the past month, which means you are a LQG in this calendar month. If the amount of waste you generate fluctuates from month to month, you may wish to satisfy the more stringent requirements each month to simplify compliance.

### **FOLLOW U.S. DEPARTMENT OF TRANSPORTATION (DOT) PACKAGING STANDARDS**

Before shipping waste off site for treatment, storage, or disposal, package, label, and mark waste containers in accordance with all applicable DOT requirements. For more information, call the DOT Hotline at 800-467-4722.

### **OBTAIN EPA IDENTIFICATION NUMBER**

To identify your business as a hazardous waste generator, obtain an EPA identification number by submitting Form 8700-12 (*Notification of Regulated Waste Activity*), which is obtained from your state hazardous waste agency. Remember, your state requirements might be different.

### **CONTRACT WITH HAZARDOUS WASTE TRANSPORTER**

To send waste off site to a TSD, contract with a registered hazardous waste transporter. To locate a reliable transporter, contact a colleague to obtain a reference.

### **PLACE WASTE IN ACCUMULATION UNIT**

When the waste is generated, place it in an appropriate accumulation unit (e.g., a tank or container) that meets the *design and management* requirements for that type of unit. Mark accumulation containers with the date the waste was placed in the unit; mark accumulation tanks and containers with the words "Hazardous Waste." Do not accumulate wastes onsite for more than 90 days.

### **IMPLEMENT PERSONNEL TRAINING**

Train facility personnel in accordance with standards within 6 months of the applicability of the hazardous waste regulations. Training teaches personnel about hazardous waste management procedures and emergency response. You must undertake an annual review of initial training and keep records of personnel training until facility closure.

### **IMPLEMENT LQG EMERGENCY PROCEDURES REQUIREMENTS**

Check to be sure that emergency preparedness and prevention requirements are met. These include identifying an emergency response coordinator and notifying local emergency response authorities.

### **PREPARE CONTINGENCY PLAN**

Ensure that a contingency plan is prepared in accordance with standards, to minimize hazards from fire, explosions, and unplanned releases. Keep a copy of the contingency plan on site.

The following table presents an overview of the federal RCRA regulatory requirements for leather manufacturers that are either LQGs, SQGs, or CESQGs. As noted, your state might have different or more stringent requirements.

EPA Identification Number	✓	✓		<ul style="list-style-type: none"> <li>Obtain an EPA identification number for each facility within your company. EPA and states use this 12-character identification number to track hazardous waste activities.</li> <li>Obtain an EPA identification number by submitting Form 8700-12 (Notification of Regulated Waste Activity), which is provided by your state hazardous waste agency. This is a one-time notification. Contact your state regarding the need for renotification if circumstances at your facility change.</li> </ul>
Hazardous Waste Identification	✓	✓	✓	<ul style="list-style-type: none"> <li>Identify whether you generate hazardous waste to determine if you are subject to the RCRA hazardous waste regulations. Test procedures are described in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods SW-846" or tests can be performed by a local laboratory.</li> </ul>
Used Oil Standards	✓	✓	✓	<ul style="list-style-type: none"> <li>If you generate used oil, you are subject to a separate set of management standards from the hazardous waste management standards, if the used oil will be recycled. If the used oil is to be treated and disposed of, perform the hazardous waste identification step listed above.</li> </ul>
Waste Counting	✓	✓	✓	<ul style="list-style-type: none"> <li>Determine how much hazardous waste you generate to determine your generator status.</li> </ul>
Accumulation Area	✓	✓		<ul style="list-style-type: none"> <li>You can accumulate waste in a "satellite accumulation area" with minimal regulatory burden. This area must be at or near the point of generation and under the control of the operator of the process generating the waste.</li> <li>There is no time limit on accumulation in the satellite accumulation area for waste under 55 gallons.</li> <li>There is a 55-gallon accumulation limit in the satellite accumulation area. Excess waste beyond the 55-gallon limit must be moved from the satellite accumulation area within 3 days.</li> <li>You must accumulate the waste in containers.</li> <li>Waste containers must be marked with the words "Hazardous Waste" or other words that identify their contents.</li> <li>This waste is exempt from other accumulation provisions while in the satellite accumulation area.</li> </ul>
Other Accumulation Areas (Time and Quantity Limits)	✓	✓	✓	<ul style="list-style-type: none"> <li>If waste accumulation does not meet the requirements for satellite accumulation, it is subject to more stringent requirements. LQGs can accumulate waste on site for up to 90 days without a permit. SQGs can accumulate waste for 180 days, or 270 days if the SQG must transport the waste more than 200 miles to a destination facility.</li> <li>Begin counting accumulation time when waste is first placed in the accumulation unit.</li> <li>Waste must be put in an exempt unit, recycled, or sent off site within the proper time period stated above.</li> <li>If an LQG accumulates wastes beyond the allotted time period, the facility is fully subject to the requirements of a hazardous waste storage facility unless granted an exemption. SQGs cannot accumulate more than 6,000 kg of hazardous waste at any time.</li> <li>CESQGs cannot accumulate more than 1,000 kg of hazardous waste, more than 1 kg of acutely hazardous waste, or 100 kg of spill residue from acutely hazardous waste at any time.</li> </ul>
Storage Unit Requirements	✓	✓		<ul style="list-style-type: none"> <li>Accumulate waste only in units that are in good condition, remain closed except when adding or removing waste, are inspected at least weekly, are compatible with the types of waste, and meet special standards for ignitable waste and incompatible waste.</li> <li>LQGs can use accumulation tanks and containers that have been assessed for integrity, have a secondary containment system, and are inspected each operating day. SQGs can use certain accumulation tanks as well.</li> <li>LQGs can use containment buildings as well.</li> <li>For all units, the date that the accumulation period begins must be clearly marked and visible on each container. All containers and tanks must be clearly marked or labeled with the words "Hazardous Waste" and accumulation units must be shut down and closed permanently in accordance with standards at the end of the unit life.</li> <li>LQGs and SQGs can treat their waste without a RCRA storage permit in accumulation units that meet standards.</li> </ul>
Air Emissions	✓			<ul style="list-style-type: none"> <li>LQGs must comply with organic air emissions requirements.</li> </ul>
Preparedness and Prevention	✓	✓		<ul style="list-style-type: none"> <li>LQGs and SQGs must comply with preparedness and prevention requirements, including the following:                             <ul style="list-style-type: none"> <li>An adequate internal alarm or communications system.</li> <li>A device capable of summoning emergency personnel.</li> <li>Portable fire control equipment.</li> </ul> </li> </ul>

Contingency Plan	✓	✓	<ul style="list-style-type: none"> <li>- Adequate fire control equipment.</li> <li>- Adequate water pressure to operate fire control systems.</li> <li>- Adequate testing and maintenance of all emergency systems</li> <li>- Access to communication or alarm systems during waste handling activities</li> <li>- Adequate aisle space for emergency response.</li> <li>- An arrangement with local emergency response authorities</li> </ul> <ul style="list-style-type: none"> <li>• LQG facilities must prepare a facility contingency plan in accordance with regulations</li> <li>• The contingency plan must be designed to minimize hazards from fires, explosions, or any unplanned release of hazardous waste or constituents</li> <li>• A copy of the contingency plan must be kept on site and an additional copy must be submitted to all local emergency services providers.</li> <li>• LQGs and SQGs must have an emergency coordinator on site or on call at all times to respond to emergencies</li> <li>• Emergency response information must be posted next to the telephone.</li> <li>• In the event of a fire, explosion, or release that could threaten human health outside the facility, or when a spill has reached surface water, the emergency coordinator must notify the National Response Center at 800-424-8802</li> </ul>	
Personnel Training	✓	✓	<ul style="list-style-type: none"> <li>• LQGs must have a personnel training program in accordance with regulatory standards               <ul style="list-style-type: none"> <li>- Training must instruct facility personnel about hazardous waste management procedures and emergency response</li> <li>- Training must be completed within 6 months from the applicability of requirements</li> <li>- The facility must undertake an annual review of initial training.</li> </ul> </li> <li>• SQGs must ensure that all employees are thoroughly familiar with proper waste handling and emergency procedures relevant to their responsibilities.</li> </ul>	
DOT Packaging	✓	✓	✓	<ul style="list-style-type: none"> <li>• Before being transported, waste must be packaged, labeled, and marked in accordance with applicable DOT requirements. Call the DOT hazardous materials information line at 202-366-4488 for information.</li> </ul>
Offsite Management of Waste	✓	✓	✓	<ul style="list-style-type: none"> <li>• Hazardous waste sent off site for handling may only be sent to a hazardous waste TSDF or recycling facility unless otherwise exempt</li> <li>• CESQGs: See onsite management of waste below.</li> </ul>
Onsite Management of Waste			✓	<ul style="list-style-type: none"> <li>• CESQGs may either treat waste on site, if it qualifies as one of the following types of facilities, or ensure delivery of waste to one of the following types of facilities: permitted RCRA TSDF; interim status TSDF; state-authorized to handle hazardous waste; permitted, licensed, or registered by state to handle municipal solid waste according to standards; permitted, licensed, or registered by state to handle nonmunicipal waste; if managed after January 12, 1998, facility is permitted, licensed, or registered by state to handle hazardous waste in accordance with standards; facility beneficially uses or reuses, or legitimately recycles or reclaims its waste; facility treats its waste prior to beneficial use, reuse, or legitimate recycling or reclamation; or a universal waste handler in accordance with standards.</li> </ul>
Manifest	✓	✓		<ul style="list-style-type: none"> <li>• Hazardous waste sent off site must be accompanied by a manifest, a multipage form that documents the waste's progress through treatment, storage, and disposal. It can usually be obtained from your state agency.</li> <li>• The manifest must have enough copies to provide the generator, each transporter, and the destination facility with one copy for their records and a second copy to be returned to the generator after completion by the destination facility operator.</li> <li>• SQGs that have a contractual agreement with a waste reclaimer that specifies the types and frequencies of shipments do not need to manifest the wastes if they retain a copy of the agreement in their files</li> </ul>
Land Disposal Restrictions Notification	✓	✓		<ul style="list-style-type: none"> <li>• Waste must meet certain treatment standards under the Land Disposal Restrictions program when waste is land disposed. Waste must be treated to reduce the hazardous constituents to levels set by EPA or the waste must be treated using a specified technology. All waste sent off site for treatment, storage, and disposal must be accompanied by appropriate LDR program notifications and certifications. There are no required forms, but these papers must indicate whether or not wastes meet treatment standards or whether the waste is excluded from the definition of hazardous or solid waste, or is otherwise exempt.</li> </ul>
Hazardous Waste Minimization	✓	✓		<ul style="list-style-type: none"> <li>• To encourage generators to produce less hazardous waste, LQGs are required to have a program in place to reduce the volume and toxicity of waste generated to the degree economically practicable, and must select a currently available treatment, storage, or disposal method that minimizes present and future threats.</li> <li>• LQGs and SQGs must sign a certification of hazardous waste minimization on the manifest</li> <li>• SQGs must make a good faith effort to minimize waste generation and to select the best available waste management method that they can afford.</li> </ul>
Biennial Report	✓			<ul style="list-style-type: none"> <li>• LQGs must submit biennial reports of waste generation and management activity by March 1 of every even-numbered year. EPA, other agencies, and the public use this information to track trends in hazardous waste management.</li> </ul>
Recordkeeping	✓	✓		<ul style="list-style-type: none"> <li>• LQGs must maintain personnel training records until the facility closes.</li> <li>• LQGs must keep copies of each biennial report for 3 years.</li> <li>• LQGs and SQGs must keep a copy of each manifest for 3 years.</li> <li>• LQGs and SQGs must keep records of test results, waste analyses, and other hazardous waste determinations for 3 years.</li> </ul>

recycling and pollution prevention measures can significantly reduce your regulatory burden and may save your business considerable money. This section presents information on hazardous wastes typically generated by leather manufacturing facilities and provides suggestions for how to recycle them or implement pollution prevention activities. This list might not discuss all chemicals used or wastes produced by the leather manufacturing industry. Consult the hazardous waste lists and characteristics to determine if you generate other hazardous wastes.

Only the federal hazardous waste codes are provided here. Your state might have different codes for some waste streams. You should check with your state hazardous waste authority for additional waste codes and requirements.

<b>Wastes Generated</b>	High volume of wastewater and suspended solids.
<b>Possible RCRA Waste Codes</b>	D002 (wastewater).
<b>Potential Recycling, Treatment, and Disposal Methods</b>	<ul style="list-style-type: none"> <li>■ Filter rinsewater for reuse in process.</li> <li>■ Reuse suspended solids as ingredients in organic fertilizer.</li> <li>■ Treat wastewaters in a wastewater treatment unit regulated by the Clean Water Act.</li> <li>■ Collect hazardous waste and ship using a registered hazardous waste transporter to a hazardous waste TSDF.</li> </ul>
<b>Potential Pollution Prevention Methods</b>	<ul style="list-style-type: none"> <li>■ Use washwater from bating process as rinsewater during soaking to reduce water consumption.</li> <li>■ Use efficient washing procedures to reduce wastewater generation.</li> <li>■ Reuse filtered rinse water in soaking process.</li> <li>■ Reuse suspended solids as ingredient in organic fertilizers.</li> </ul>
<b>Wastes Generated</b>	Alkaline wastewater, ammonium sulfate, calcium hydroxide, hydrogen sulfide, suspended solids, and toxic sulfides.
<b>Possible RCRA Waste Codes</b>	D002 (alkaline wastewaters) and D003 (reactive sulfides).

<b>Potential Recycling, Treatment, and Disposal Methods</b>	<ul style="list-style-type: none"> <li>■ Reuse secondary washes in the soaking process.</li> <li>■ Settle out suspended solids for incorporation into fertilizer.</li> <li>■ Destroy sulfides in the lime-sulfide solution and washes by air oxidation with a manganese sulfate catalyst.</li> <li>■ After sulfide destruction, use the lime wastewaters to neutralize acid wastes.</li> <li>■ Collect hazardous waste and ship it using a registered hazardous waste transporter to a hazardous waste TSDF.</li> <li>■ Treat wastewaters in a wastewater treatment unit regulated by the Clean Water Act.</li> </ul>
<b>Potential Pollution Prevention Methods</b>	<ul style="list-style-type: none"> <li>■ Flesh hides before hair pulping and sell fleshings for rendering.</li> <li>■ Reuse secondary washes in the soaking process.</li> <li>■ Incorporate settled suspended solids into fertilizer.</li> </ul>
<b>Wastes Generated</b>	Chromium, acid and alkaline salts, and acids.
<b>Possible RCRA Waste Codes</b>	D002 (acid and alkaline salts and acids) and D007 (chromium).
<b>Potential Recycling, Treatment, and Disposal Methods</b>	<ul style="list-style-type: none"> <li>■ Reuse spent chromium as ingredient in pickle solution.</li> <li>■ Reprocess spent chromium for reuse in tanning process.</li> <li>■ Neutralize acid wastewaters with liming/unhairing/deliming liquors which have first been aerated to treat sulfide.</li> <li>■ Treat wastewaters in a wastewater treatment unit regulated by the Clean Water Act.</li> <li>■ Collect hazardous waste and ship it using a registered transporter to a hazardous waste TSDF for treatment and disposal.</li> </ul>
<b>Potential Pollution Prevention Methods</b>	<ul style="list-style-type: none"> <li>■ Reuse spent chromium as ingredient in pickle solution.</li> <li>■ Reprocess spent chromium for reuse in tanning process.</li> <li>■ Use tanning splits to maximize efficiency of chromium.</li> <li>■ Manage trivalent chromium to prevent oxidation into hexavalent chromium.</li> <li>■ Maximize equipment efficiency.</li> </ul>
<b>Wastes Generated</b>	Chromium, kerosene, solvent and dye overspray, solvent still bottoms, toluene, and toxic dyes.
<b>Possible RCRA Waste Codes</b>	D001 (kerosene, solvent and dye overspray, solvent still bottoms, and toluene), D007 (chromium), F001-F005 (solvent overspray, solvent still bottoms, and toluene).

**Possible RCRA  
Waste Codes**

- Reclaim solvents in an onsite distillation unit and reuse on site.
- Reclaim and reuse retanning solutions.
- Collect hazardous waste and ship using a registered transporter to a hazardous waste TSDF for treatment and disposal.

**Potential Recycling,  
Treatment, and  
Disposal Methods**

- Use less toxic dyes and coatings.
- Seal solvent to prevent product volatilization.
- Reduce air emissions by thermal drying in a controlled area with solvent recovery systems.
- Reclaim solvents in an onsite distillation unit and reuse on site.
- Reengineer processes to utilize less chemicals.
- Reclaim and reuse retanning solutions.

**Wastes Generated**

Alcohols (methanol, ethanol, propanol, butanol, diacetone alcohol), chromium in leather dust, esters (ethyl, propyl, and butyl acetates), glycol ethers (butoxyethanol and propoxyethanol), ketones (methyl isobutyl ketone, acetone, cyclohexanone, di-isobutyl ketone), methyl ethyl ketone, solvent overspray, solvent still bottoms, toluene, volatile organic air emissions and xylene.

**Possible RCRA  
Waste Codes**

D001 (methyl ethyl ketone, solvent overspray, solvent still bottoms, and toluene), D007 (chromium), D035 (methyl ethyl ketone), and F001- F005 (methyl ethyl ketone, solvent overspray, solvent still bottoms, toluene, and xylene).

**Potential Recycling,  
Treatment, and  
Disposal Methods**

- Capture, recover, and reuse solvent.
- Use trimmings and leather dust from buffing to make reconstituted leather.
- Collect hazardous waste and ship using a registered transporter to a hazardous waste TSDF for treatment and disposal.

**Potential Pollution  
Prevention Methods**

- Use water-based coatings and lacquer finishes to decrease volatile organic air emissions.
- Prepare smaller test batches of solvents and coatings.
- Install automated spray systems which adjust spray angle for each hide and reduce overspray.
- Cover containers used during spray coating operations to prevent solvent volatilization.
- Capture, recover, and reuse solvent.
- Store waste solvents separately to facilitate recycling.
- Use trimmings and leather dust from buffing to make reconstituted leather.

<b>Wastes Generated</b>	Chromium, kerosene, methyl ethyl ketone, trichloroethylene, and toluene.
<b>Possible RCRA Waste Codes</b>	D001 (kerosene, methyl ethyl ketone, trichloroethylene, and toluene), U159 (methyl ethyl ketone), U228 (trichloroethylene), and U220 (toluene).
<b>Potential Recycling, Treatment, and Disposal Methods</b>	Collect hazardous waste and ship using a registered transporter to a hazardous waste TSDf for treatment and disposal.
<b>Potential Pollution Prevention Methods</b>	<ul style="list-style-type: none"><li>■ Use a first in, first out policy in storage areas to prevent materials from expiring.</li><li>■ Computerize inventory control to prevent materials from expiring.</li></ul>

To review the RCRA regulations referred to in this document, consult the following citations in 40 CFR:

Part 260—Hazardous waste management system: general.

Part 261—Identification and listing of hazardous waste.

Part 262—Standards applicable to generators of hazardous waste.

Part 263—Standards applicable to transporters of hazardous waste.

Part 264—Standards for owners and operators of hazardous waste and specific types of hazardous waste management facilities.

Part 265—Interim status standards for owners and operators of TSDFs.

Part 266—Standards for the management of specific hazardous wastes and specific types of hazardous waste management facilities.

Continued

The Water Pollution Control Act, commonly known as the Clean Water Act (CWA), is the federal program designed to restore and maintain the integrity of the nation's surface waters. CWA controls direct discharges to surface waters (e.g., through a pipe) from industrial processes or storm-water systems associated with an industrial activity. It also regulates indirect discharges, or discharges to POTWs, through a public sewer system, by requiring industrial facilities to pretreat their waste before discharging to a public sewer. Industrial pollutants from the leather manufacturing industry that might be regulated by CWA include solvents, heavy metals, and alkaline wastes.

**CWA Resources:**

- 40 CFR Parts 100 to 129 and 400 to 503 (Leather manufacturers should pay particular attention to Part 425 which provides the effluent guidelines and standards for leather tanning and finishing.)
- Internet access: [www.epa.gov/CW/](http://www.epa.gov/CW/)
- EPA Office of Water: 202 260-5700
- Your state water authority, regional EPA office, and local POTW

The Clean Air Act (CAA) regulates air pollution. It includes national emission standards for new stationary sources within particular industrial categories. It also includes national emission standards, which are designed to control the emissions of particular hazardous air pollutants (HAPs). Leather facilities generate some HAPs such as volatile organic compounds in organic solvents. The CAA also seeks to prevent the accidental release of certain hazardous chemicals and to minimize the consequences of such releases.

**CAA Resources:**

- 40 CFR Parts 50 to 99
- Control Technology Center, Office of Air Quality, Planning and Standards, EPA, general information: 919 541-0800; publications: 919 541-2777
- Internet access: [www.epa.gov/ttn/catc](http://www.epa.gov/ttn/catc)

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, commonly known as Superfund, authorizes EPA to respond to releases, or threatened releases, of hazardous substances that might endanger public health, welfare, or the environment, that releases might come from any source. Superfund also grants EPA the authority to force parties responsible for environmental contamination to clean it up or to reimburse response costs incurred by EPA. The most important part of this act applicable to leather manufacturers is the hazardous substance release reporting requirement. The person in charge at your business must report to the National Response Center (phone: 800 424-8802) any release of a hazardous substance that exceeds a designated "reportable quantity" for that substance within a 24-hour period.

**Superfund Resource:**

- Internet access: [www.epa.gov/superfund](http://www.epa.gov/superfund)

The Superfund Amendments and Reauthorization Act (SARA) of 1986 created the Emergency Planning and Community Right-to-Know Act (EPCRA). This law was designed to improve community access to information about potential chemical hazards and to facilitate the development of chemical emergency response plans by state and local governments. The EPCRA regulations establish several types of reporting obligations for facilities that store or manage specified chemicals. If a leather facility uses or stores extremely hazardous substances, such as hydrogen sulfide, of certain quantities, certain notification requirements apply. Also, many of the chemicals used by leather manufacturers may be considered hazardous chemicals as defined by the Occupational Safety and Health Act (OSHA). Contact your local OSHA office if you have questions about whether the chemicals used in your leather manufacturing business are considered hazardous under OSHA. Certain facilities that generate benzene, toluene, and trichloroethylene have reporting requirements under the Toxic Chemical Release Inventory.

**EPCRA Resources:**

- 40 CFR Parts 350 to 372
- The State Emergency Response Commission (contact available from RCRA Hotline)
- Internet access: [www.epa.gov/opptintr/ri/index.htm](http://www.epa.gov/opptintr/ri/index.htm) and [www.epa.gov/swerecpp/](http://www.epa.gov/swerecpp/)

The Safe Drinking Water Act (SDWA) mandates that EPA establish regulations to protect human health from contaminants present in drinking water. Under the authority of SDWA, EPA developed national drinking water standards and created a joint federal-state system to ensure compliance with these standards. EPA also regulates underground injection of liquid wastes under the SDWA to protect underground sources of drinking water.

**SDWA Resources:**

- 40 CFR Parts 141 to 148
- SDWA Hotline: 800-426-4791
- Internet access: [www.epa.gov/ogwdw](http://www.epa.gov/ogwdw)

The Toxic Substances Control Act (TSCA) allows EPA to collect data on chemicals to evaluate, assess, mitigate, and control risks that might be posed by their manufacture, processing, and use. Leather manufacturing facilities may be affected by some of the TSCA requirements.

**TSCA Resources:**

- 40 CFR Parts 702 to 799
- TSCA Hotline: 202-554-1404
- Internet access: [www.epa.gov/internet/oppts/](http://www.epa.gov/internet/oppts/)

Part 268—Land disposal restrictions.

Part 270—EPA administered permit programs: the Hazardous Waste Permit Program.

Part 271—Requirements for authorization of state hazardous waste programs.

Part 272—Approved state hazardous waste management programs.

Part 273—Standards for universal waste management.

Part 279—Standards for the management of used oil.

For additional information on any of these laws, contact the RCRA Hotline at 800-424-9346 or 703-412-9810 in the Washington, DC, area. TDD (hearing impaired): 800-553-7672 or 703-412-3323 in the Washington, DC, area.

U.S. Environmental Protection Agency  
Phone: 800-424-9346  
or TDD 800-553-7672  
in the Washington, DC, area.  
703-412-9810, or TDD 703-412-3323  
Home page: [www.epa.gov/epaoswer/hotline](http://www.epa.gov/epaoswer/hotline)

Answers questions on matters related to RCRA solid waste, hazardous waste, and underground storage tanks, EPCRA, and CERCLA.

U.S. Environmental Protection Agency  
RCRA Information Center (5305W)  
401 M Street, SW  
Washington, DC 20460  
Phone: 703-603-9230  
Fax: 703-603-9234  
E-mail: [rcra-docket@epa.gov](mailto:rcra-docket@epa.gov)

Holds and provides public access to all regulatory materials on RCRA and distributes technical and nontechnical information on RCRA issues.

U.S. Environmental Protection Agency  
Small Business Ombudsman (2131)  
401 M Street, SW  
Washington, DC 20460  
Phone: 800-368-5888  
Fax: 703-305-6462  
Home page: [www.smallbiz-enviroweb.org](http://www.smallbiz-enviroweb.org)

Helps private citizens, small businesses, and smaller communities with questions on all program aspects within EPA.

U.S. Environmental Protection Agency  
Headquarters Library  
401 M Street, SW, Room 2904  
Washington, DC, 20460  
Phone: 202-260-5924 or 5922  
Fax: 202-260-6257  
E-mail: [library-HQ@epa.gov](mailto:library-HQ@epa.gov)  
Home page: [www.epa.gov/matlibra/liblists.html](http://www.epa.gov/matlibra/liblists.html)

Maintains environmental reference materials for EPA staff and the general public, including books, journals, abstracts, newsletters, and audiovisual materials generated by government agencies and the private sector. Also provides access to online computer service bulletin boards and CD-ROM systems.

U. S. Environmental Protection Agency  
Pollution Prevention Clearinghouse (PPIC)  
401 M Street, SW (7409)  
Washington, DC 20460  
Phone: 202-260-1023  
Fax: 202-260-4659  
E-mail: [ppic@epa.gov](mailto:ppic@epa.gov)

Hazardous Materials Information Center  
Phone: 800-467-4922

Provides information about DOT's hazardous materials regulations.

Superintendent of Documents  
P.O. Box 371954  
Pittsburgh, PA 15250-7954  
Phone: 202-512-1800  
Fax: 202-512-2250

Prints and distributes the *Code of Federal Regulations*, Title 40, Parts 260 to 299, containing most of the RCRA requirements.

Phone: 800-424-8802

In the event of a fire, explosion, or other release of hazardous waste that could threaten human health outside the facility, call the NRC to report the emergency. The NRC will evaluate the situation and help you make appropriate emergency decisions.

**EPA Home Page**  
[www.epa.gov](http://www.epa.gov)

**EPA RCRA Hazardous Waste Resources**  
[www.epa.gov/osw/topics.htm](http://www.epa.gov/osw/topics.htm)

**Code of Federal Regulations**  
[www.epa.gov/docs/epacrtr-02](http://www.epa.gov/docs/epacrtr-02)

**EnviroSense**  
[es.mcl.gov](http://es.mcl.gov)

Contains technical, policy, and general information on pollution prevention topics.

W GRANDIN ✓

NUTTER, McCLENNEN & FISH  
FEDERAL RESERVE PLAZA  
600 ATLANTIC AVENUE  
BOSTON, MASSACHUSETTS 02210

BOSTON OFFICE

AREA CODE 617 873-8700  
TELEX 84-0790  
CABLE ADDRESS "DUNTER"  
TELECOPIER 617 873-8748

December 7, 1983  
11230-58

WASHINGTON, D. C. OFFICE

FEDERAL BAF BUILDING WEST  
1818 H STREET, N. W.  
WASHINGTON, D. C. 20006  
(202) 898-3800

M D C  
SEWERAGE DIVISION

Jo Ann Shotwell  
Assistant Attorney General  
Commonwealth of Massachusetts  
One Ashburton Place  
Boston, Massachusetts 02108

83 DEC-8 8:03

Re: John J. Riley Company - Beatrice Foods -  
Metropolitan District Commission

Dear Jo Ann:

As we recently discussed, I enclose for your review copies of your redraft of the Complaint and Agreement for Judgment upon which I have indicated the remaining comments of the John J. Riley Company ("Riley"). I think your redraft accurately reflected the three major points which we recently resolved and, from an organizational standpoint, flowed much better than my prior draft.

I believe that my comments are self-explanatory. We can discuss them by telephone or in a meeting, depending upon your schedule.\*\*

I want to confirm for the record your oral advice to me on November 29, 1983 that, notwithstanding Wayne Grandin's letter of October 26, 1983, the existing Industrial User Discharge Permit is in effect as we complete the enclosed documentation with a present target date of mid-December.

In an attempt to resolve the questions of the MDC with respect to the nature and amount of any chlorinated hydrocarbons which are possibly being discharged in Riley's wastewater effluent into the MDC sewerage system, I asked Riley's engineering personnel to provide me with (1) the publicly available data with respect to the well water situation in East Woburn, (2) testing results of Riley's wastewater effluent, and (3) publicly available data on the health effects of chlorinated hydrocarbons. In addition,

\*The Complaint also reflects Neil's comments. You already have his general comments on the Agreement for Judgment which, I believe, are fully consistent with my own.

\*\*I agree with Neil that we should meet promptly to put this matter to bed.

I understand that Neil Jacobs is directly providing both to you and to me the preliminary results of further well water testing recently completed by Beatrice's consultant, Woodward Clyde.\* From my telephone conversation with him, Neil told me that this data indicates that none of the problem hydrocarbons are emanating from the Riley property and that, further, the entire aquifer in the relevant portion of Woburn is contaminated. Accordingly, all the industries which use this well water in their manufacturing processes may be discharging some hydrocarbons to the MDC system.

The enclosed data indicates that: (1) the MDC limit for chlorinated hydrocarbons seems without foundation and is not required to protect public health or ocean life; (2) Riley does not use chlorinated hydrocarbons in its manufacturing process. Any hydrocarbons present in its well water are either wholly or substantially burned off or volatilized in the manufacturing process. The amounts of hydrocarbon in the discharge are very low or non-detectable; and (3) the quality of the well water is an area wide problem which apparently affects all industries in this area of Woburn. The problem does not emanate from the Riley property. The use of municipal water is not a viable solution. To the extent that chlorinated hydrocarbons are a real problem for the MDC, the solution should be general and directed to all affected industries.

#### Background Data on Health Effects of Chlorinated Hydrocarbons

The MDC's National Pollutant Discharge Elimination System permit from the EPA does not include a limit on the discharge of chlorinated hydrocarbons. According to the EPA, Water Quality Criteria would be used in establishing such discharge limits. The Federal Register of November 28, 1980 "Water Quality Criteria" reports acute toxicity to aquatic life occurring at 2000 ppb (parts per billion) and 10,200 ppb for trichloroethylene and tetrachloroethylene, respectively. These toxicity levels presumably would be used by the EPA as starting points in negotiations with the MDC to arrive at discharge limits. Ultimate discharge limits are generally established at levels higher than those reported in Water Quality Criteria as allowances are made for dilution in receiving waters.

\*I now understand the report will be available just before Christmas if you want it.

In light of this EPA data on health effects, the MDC limit of zero seems without foundation. It is unreasonable, therefore, to require Riley to discharge its effluent with no more than 20 ppb chlorinated hydrocarbons (as has been proposed) when the MDC allowable discharge would in all likelihood be as much as one hundred times larger. In addition, EPA drinking water standards for some chlorinated hydrocarbons are as high as 100 ppb. Limiting Riley to 20 ppb chlorinated hydrocarbons in its discharge would in some circumstances prevent it from discharging drinking water.

The available municipal water supply does not have sufficient capacity to meet Riley's manufacturing needs except on a very temporary basis. The source of the City of Woburn's marginal water supply is the MDC. To force Riley to use municipal (MDC) water runs counter to the MDC's own water conservation programs.

Test Data on Chlorinated Hydrocarbons in Riley's  
Wastewater Discharge

As requested by the MDC, Riley has had analyses conducted on the well water it is using and the effluent it is discharging to the MDC by EPA methods #624 and 601 to determine the extent of chlorinated hydrocarbon contamination. Copies of two separate test results performed by Cambridge Analytical Associates, Inc. are attached.

The first series of tests completed September 15, 1983 showed the presence of three chlorinated hydrocarbons in the in-coming well water. In the out-going waste water sample to the MDC system, one of the three was non-detectable and a second dissipated substantially. The concentration of the third organic, tetrachloroethylene, unexplainably increased. Since Riley neither purchases nor uses chlorinated hydrocarbons in its formulations, this isolated result implied that tetrachloroethylene might be a component in some proprietary product Riley was using. Accordingly, suppliers of chemical products to Riley were contacted and questioned concerning the presence of this class of chemicals in their products. In all cases, the response was that none were present. There is no known possibility of chlorinated hydrocarbon generation

in the manufacturing process. Since this anomaly was unexplainable, a second series of tests was conducted in early October. In the more recent set of tests completed on October 23, 1983, several chlorinated hydrocarbons were detected in the well water. Significantly, none of these chlorinated hydrocarbons were detected in the wastewater discharge to the MDC system. This more recent result is consistent with the likely volatilization of such chemicals in Riley's manufacturing process. We also note that the levels in the well water itself, with one exception, were below those discussed above.

#### Background Data on the Well Situation

We are also enclosing available public information concerning the identity and quantity of chlorinated hydrocarbons found in wells which are fed by the East Woburn aquifer. I understand that Neil Jacobs is forwarding to you and me the most recent data on this subject generated for the EPA by Beatrice's consultant, Woodward Clyde. Attachment (Ecology and Environment, Inc., Interim Report on the Ground Water Quality of East & North Woburn, Ma." May 6, 1981) lists 42 organic priority pollutants in the groundwater of North and East Woburn. Trichloroethylene was found in 27 wells, dichloroethylene in 16 wells and tetrachloroethylene in 9 wells. Attachment (Ecology and Environment, Inc. "Evaluation of the Hydrogeology and Groundwater Quality of East and North Woburn, Massachusetts," June 25, 1982) again shows widespread chlorinated organic contamination in the East and North Woburn area. Attachment (Ecology and Environment, Inc. "Chlorinated Solvent Contamination of the Groundwater East Central Woburn, Massachusetts" March 8, 1982) shows concentrations of the three hydrocarbons in the affected area. The underlined numbers on the maps are concentrations at each well.

This data indicates quite conclusively that the underlying aquifer(s) are contaminated over a wide area, as is the Aberjona River. In short, the chlorinated hydrocarbons which showed in one of the tests in certain quantities in Riley's wastewater discharge do not represent an isolated problem, but a more general problem in this area of Woburn. I understand that Beatrice's most recent data indicates that none of the hydrocarbons emanate from the Riley property.

Given the minute levels of chlorinated hydrocarbons in Riley's wastewater discharge to the MDC System, the fact that Riley does not use such chemicals in its processes, and the widespread nature of the aquifer problem, the inclusion of limits on these substances in the Agreement for Judgment or discharge permit appears unwarranted. We therefore request that any mention of chlorinated hydrocarbons be deleted from the Agreement for Judgment.

I look forward to hearing from you at your earliest convenience in order that we may conclude this matter.

Very truly yours,

Robert A. Fishman

RAF/cac  
Enclosures

cc: Neil H. Jacobs, Esq.  
Mr. John J. Riley, Jr.

*no  
talk about  
when there is  
message  
problem in  
wells?*

We did not obtain a signed statement from Mr. Gordon as the information he supplied us was of no help.

We telephoned Mr. Tedesco from Mr. Gordon's office, spoke with him and he agreed to see us today.

Anthony Tedesco  
REDACTED - PERSONAL PRIVACY

Mr. Tedesco's telephone number is  
REDACTED - PERSONAL PRIVACY

His date of birth is

He worked for John J.

6/10/85

Riley Tannery in Woburn, MA from  
1940 to 1978. He first worked in

the Pits and soaked leather, then worked in the Mills, washing leather, then worked in the Buffing Room, buffing leather, then worked in the Shanking Room, where the machine takes out the wrinkles and his last job was that of a Wringer, where he worked for 20 years. Subject's work schedule the last 20 years was from 4:00 a.m. to 1:30 p.m.

Mr. Tedesco informed us that Bob Turner of REDACTED - PERSONAL PRIVACY still works at John J. Riley Company and has been there for 25-30 years. He works in the Finish Department where there are a lot of chemicals used. In fact, Bob Turner breaks out in red blotches every now and then due to the chemicals used. He went on to say that in the tanning process, due to the chemicals used and the strong odor from them, it made you sneeze and caused tears to run from your eyes.

Tony, himself, has Polymyolitis, which is a muscle disease. The doctor cannot say if the chemicals caused this, in fact, the doctor cannot say for or against, whether or not it was caused by chemicals. He mentioned Joe Palino of REDACTED - PERSONAL PRIVACY states that he used to mix chemicals and that he has lung cancer. He was there 10 years at John J. Riley and stopped working in either 1976 or 1977. Also, there was a Frank Valente who died in 1977 of lung cancer and he worked in the Wringing Machine Room and handled colored skins and the skin on his hands was always cracked. His widow, Judy Valente, of REDACTED - PERSONAL PRIVACY filed suit against John J. Riley for the chemicals used. Outcome of the suit not determined.

Mr. Tedesco believes that John J. Riley Company purchased chemicals from the Stahl Mann Company. Towards the end of his employment, he states that John J. Riley Company made their own chemicals, outside the building. They had stainless steel tanks and they made a tanning solution and they used chrome and other solvents to make the chemicals.

Mr. Tedesco went on to say that Jack Knowlty, a man in his late forties, of Woburn, MA, who lived on REDACTED - PERSONAL PRIVACY died about 2 years ago of stomach cancer. He worked in the Tan Room. Also, Maurice O'Connor, a man in his forties, of Billerica, MA, died about 15 years ago of cancer. He worked in the Color Room. His wife is Ann O'Connor. Also, two other former employees who are sti

alive are Edward Mele, who has a heart condition and lives in Londonderry, NH. He was in the Color Mills. He worked there from 1942 until he left, 2 years ago. Also, there was a Marco Pica of REDACTED - PERSONAL PRIVACY who retired one year ago and began working there in the forties. Other former employees who had heart attacks while working for John J. Riley Company were Nick Murray and Jim Feeney. Still employed with John J. Riley is a Mr. Jim Feeney who mixes chemicals and he lives in either Jamaica Plain or Woburn, MA. We learned that the Industrial Physicians for John J. Riley Tanning Company were, first, a Dr. Daniel Joyce, who died about 20 years ago. His office was on Main Street in Woburn, MA. At the present time the Industrial Physician is Dr. Barry Manual of Route 28, Stoneham, MA. The first time that Mr. Tedesco was treated by Dr. Manual was in either 1974 or 1975, he had skin cancer in his face, nose and eye area and had four operations.

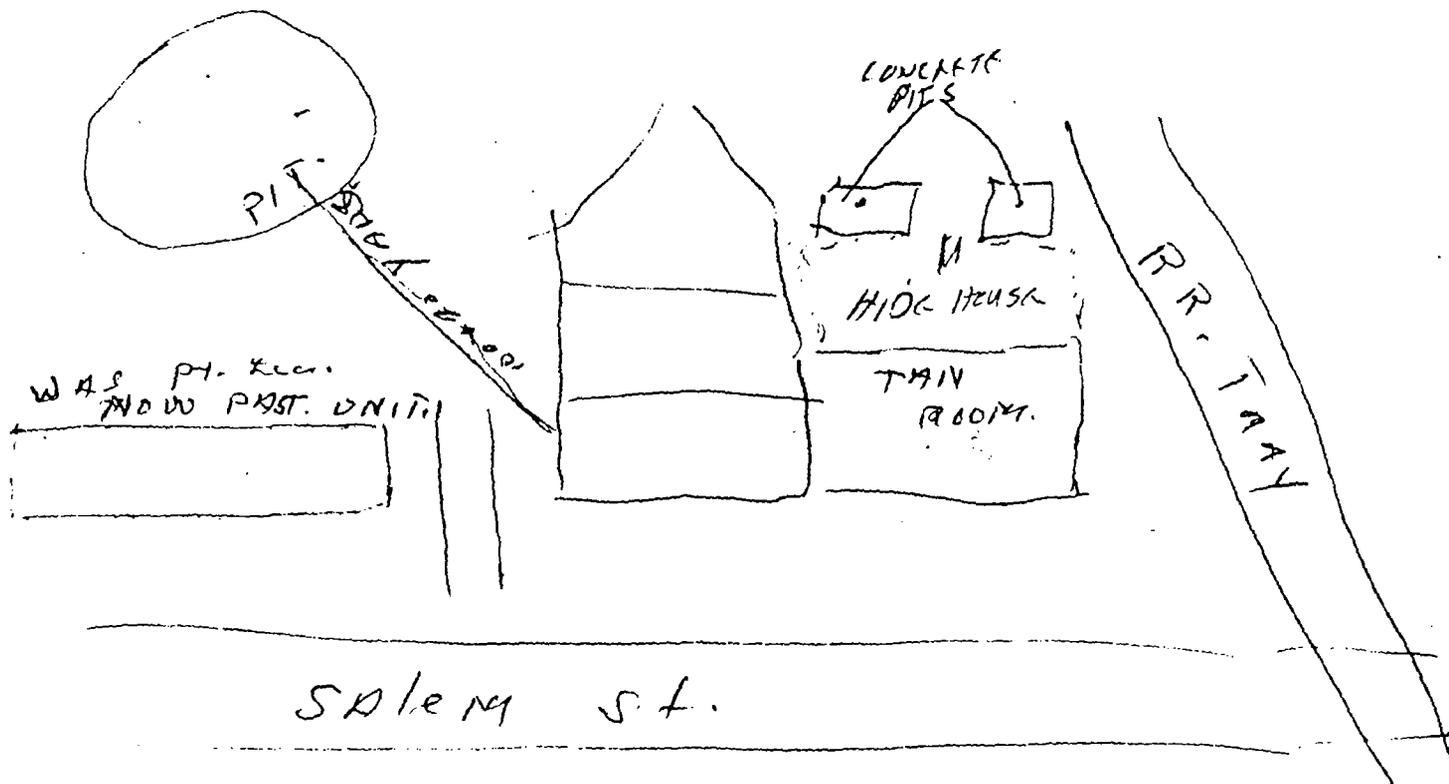
He went on to say that the chemical awareness at John J. Riley started after 1978. But before that, they would wash out the chemical drums and dump the residue into the drain. They had catch basins which would catch hair and other material. The John J. Riley Tanning Company had Pits which were used before 1940 and he does not remember when they stopped using the Pits. Back in the 50's, the drainage led to the open Pits where the liquid would seep into the ground and what was left was a greenish-blue matter. The liquid went into the ground and the residue was picked up by a hauler. The Company started using cement pits sometime in 1978. The cement pits were used the same as the other pits in that the liquid ran into the ground or sewerage and the solid matter stayed in the pit.

Mr. Tedesco worked on the Spray Machine in the Finish Department for about 3 months. He states that the leftover finish liquid was wrapped in plastic and put in a barrel and picked up by the Rafter Company, Woburn, MA. We learned that John J. Riley Company did do patent leather in the 20's and 30's and at one time, Woburn was the Patent Leather Capital of the world. Also, John J. Riley Company did do waterproofing of leather for the Government and that was in the late 40's or early 50's. They did quite a bit. We learned that there were tanks on the John J. Riley premises that held acid-type chemicals. We learned that Roy Brothers from Billerica used to pump into the tanks, 10-12,000 gallons at a time.

There were also what he called paste tanks where they sprayed leather and plastic to adhere the leather to the plastic. The chemical used came in paste form, where you would add water to it and boil it. When the operation was completed, the barrel was washed out and dumped into the drain. He believes that the drain led to the sewerage. In the same operation, the machine and the frames that held the leather were also washed and he believes that the contents went into the sewerage.

Mr. Tedesco drew us a diagram of the John J. Riley Tannery premises which included the old pit where there is a circle and also included the two concrete pits. See attached.

Tony Federico  
6/10/83



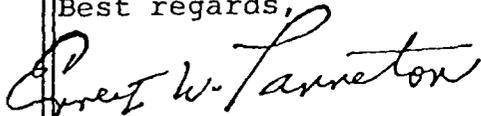
with him. He informed us that he left John J. Riley in 1968. He worked there for 6½ years, having worked in the Finish Department. He informed us that John J. Riley used Titekote which came in 55-gallon drums and was very toxic. This solvent was used as a liquid process on leather. He states that there was no waste of this solvent, that it evaporated. Mr. Sousa did not have any knowledge as to how the property across the tracks was used, had never gone over there and was of no help to us in that matter. Regarding former employees of John J. Riley, he mentioned that there was a Joe Franzesse of REDACTED - PERSONAL PRIVACY He left 3 or 4 years ago and worked there REDACTED - PERSONAL PRIVACY to 15 years. Also, there was a Joe Palino.

Please note that we failed to mention in our paragraph pertaining to our interview with Joe Ray that we questioned him thoroughly regarding the property across the tracks, the north side, and he had no knowledge as to the use of the property and had never gone over there and was of no help to us in that matter.

On 9/12/85 we conversed with Cathy of your office regarding our handling.

Jan, we will continue our handling and will keep you advised.

Best regards,



Ernest W. Panneton  
S & H Services, Inc.

EWP/de

10

**Schlichtmann,  
Conway & Crowley**

---

December 14, 1987

Barbara Newman  
U.S.E.P.A.  
Hazardous Waste Division  
HRS-CAN 2 - JFK Federal Building  
Boston, MA 02203

Lee Breckenridge, Attorney  
Attorney General's Office  
1 Ashburton Place-Room 1902  
Boston, MA 02108

Gretchen Muench, Attorney  
U.S.E.P.A.  
Regional Counsel Office  
JFK Federal Building - Room 2203  
Boston, MA 02203

Wayne Grandin  
Mass. Water Resources Authority  
100 First Avenue - Gate 4  
Charlestown, MA 02129

Rodene DeRice  
D.E.Q.E.  
5 Commonwealth Avenue  
Woburn, MA 01801

Re: Site Assessment of J.J. Riley Tannery Property,  
Woburn, Massachusetts

Dear Ms. Newman, Ms. Muench, Ms. DeRice, Ms. Breckenridge, and Mr. Grandin:

As you know, I represent eight families from East Woburn, Massachusetts who brought an action in federal court against W.R. Grace and Beatrice Foods corporations (Anderson v. W.R. Grace, U.S.D.C. Mass., Civil Action No. 82-1672-S), and in state court against UniFirst corporation (Anderson v. UniFirst, Mass. Middlesex Sup. Crt., Civil Action No. 85-2098) for personal injuries arising out of the contamination of Woburn municipal wells G and H. The lawsuit against UniFirst was settled prior to trial in September, 1985 and was settled against Grace in September, 1986 after a five month liability trial resulted in a verdict against that company.

Barbara Newman, et al.

December 14, 1987

Page 2

In the action against Beatrice which was tried in conjunction with the Grace case the trial judge entered judgment for Beatrice after a jury verdict in favor of that company. The verdict came after a series of rulings by the judge which dismissed most of the families' claims and evidence against Beatrice. The trial judge's rulings are presently on appeal in the United States First Circuit Court of Appeals (Anderson v. Beatrice Foods, U.S. 1st. Cir. Ct. of Appls., Civil Action No. 87-1405). A copy of the parties' appellate briefs are enclosed.

The families' investigation and the resulting litigation have paralleled the federal and state investigation of the contamination of Wells G and H which were discovered to be polluted by industrial solvents in May, 1979. During the course of these investigations and litigation the families have provided to the agencies and obtained from them extensive information and data regarding the sources of solvent pollution to the wells.

As you also know, the case against Beatrice arose out of its ownership of the John J. Riley tannery on Salem Street and associated property. The tannery and associated property are located several hundred feet to the west and southwest of wells G and H. Beatrice purchased the tannery and associated property from Mr. John J. Riley in December, 1978. Beatrice merged with the tannery accepting all of the tannery's assets and liabilities including its environmental liabilities by explicit agreement. See Plaintiffs' Appeal Brief, Statement of the Case.

At the time of the purchase in December, 1978 and also when the families' suit was filed in May, 1982 the Beatrice property consisted of the tannery buildings and surrounding land (referred to here as the "tannery property") as well as a fifteen acre tract of land (referred to here as the "fifteen acres" or "fifteen acre site") located immediately adjacent to and northeast of the tannery property separated only by a railroad track. The fifteen acres is the site of a production well commonly referred to as Riley well #2 which was and is used to provide process water to the tannery. Riley well #2 replaced the tannery's previous production well, commonly referred to as Riley well #1, in 1958. Riley well #1 is located on the tannery property some 400' southwest of Riley well #2. See map, Addendum A accompanying the families' appeal's brief.

In January, 1983, several months after the families' suit was filed, Beatrice sold the tannery and associated property back to Mr. Riley. The tannery was purchased by John J. Riley Company, owned by Mr. Riley and the fifteen acres was purchased by the Wildwood Conservation Trust, Mr. Riley as trustee. In May, 1985 Mr. Riley sold the tannery business to several former employees but retained ownership of the tannery property. Despite these maneuvers Beatrice continued and continues to remain liable by law and contract for all damages and responsibilities arising out of the contamination of wells G and H. See Plaintiffs' Submission Regarding Due Diligence, Tab D accompanying this letter.

Pursuant to EPA order issued in April, 1983, Beatrice undertook a site investigation conducted by Woodward-Clyde Associates of the fifteen acre site. The site investigation of the 15 acres was ordered presumably because of the high levels of solvent contamination detected at Riley production wells #1 and #2 and the widespread industrial and chemical waste observed at the fifteen acre site by investigators for the EPA and the DEQE. Although the Woodward-Clyde investigation was intended to determine the sources of contamination to the fifteen acres no site investigation was ever ordered of the tannery property.

During the discovery phase of the families' litigation concerning Beatrice's role in the contamination of the city wells the families' engineers were restricted to the fifteen acre site and no access to the tannery was allowed because of Beatrice's assertions to the court that the tannery was not a source of contamination and there was no evidence that the tannery played any role in the contamination detected at the fifteen acre site. See, Plaintiffs' Appeal's Brief, Statement of the Case, page 12 and Argument section IIIC page 47; Motion For Vacation of Judgment; and Plaintiffs' Submission Regarding Due Diligence Tabs I, L, and M, accompanying this letter.

In September of this year, it came to our attention that in December, 1986 Mr. Riley had produced, in response to an official EPA request in November, 1986, under the federal environmental laws, reports and data concerning the tannery property. In particular, this information revealed that in 1983 Mr. Riley had engaged the now defunct firm Yankee Environmental Engineering and Research Services, Inc. of Woburn, Massachusetts (Yankee Engineering) to conduct a site assessment of the tannery which was undertaken in the summer and fall of that year.

The report by Yankee Engineering of its 1983 investigation of the tannery states that because of the suggestion by the EPA (contained in that agency's 1981 report of its investigation of the aquifer serving wells G and H) that the source of contamination of Riley production wells #1 and #2 "may be located on the John J. Riley property" (the tannery property), the objective of the investigation was to "determine if groundwater contamination, if present, on the Riley property (the tannery property) is contributing to the contamination of Production Wells #1 and #2." See 1983 Yankee Engineering Report page 1-1 (a copy of the report is at Plaintiffs' Motion For Vacation of Judgment, Tab 1). The investigation included the installation and sampling of six monitoring wells on the tannery property, the digging of several test pits, and the conducting of a pump test of Riley well #2 to determine if its cone of influence reached the tannery. See 1983 Yankee Engineering Report pages 2-1, 2-6, 3-5.

The 1983 Yankee investigation did detect solvent contamination at the tannery property in a one-time sampling of four of the six monitoring wells that it had drilled on the property. It also determined that Riley production well #1 was within the cone of influence of Riley production well #2. See 1983 Yankee Engineering Report page 3-1, 3-5. The report states that based on the limited investigation and sampling conducted, the data suggests that the tannery is the source of at least one of the solvents detected at the tannery and that solvent contamination at production well #1 could be contributing to the contamination at Riley production well #2. See 1983 Yankee Engineering Report page 3-5, 3-6, and 4-1, 4-2.

Dr. George Pinder, a professor of engineering at Princeton University, and Mr. John Drobinski, a geologist with Weston Geophysical Company, experts who conducted the families' investigation and analysis of the East Woburn aquifer and the contamination of wells G and H, have examined the report by Yankee Engineering. In affidavits submitted to the United States District Court, Dr. Pinder and Mr. Drobinski both conclude that the data obtained by Yankee was of great significance in evaluating the role of the Beatrice property in the contamination of the city wells. In particular, Dr. Pinder states that the six monitoring wells installed by Yankee should have been sampled and monitored during the re-activation of wells G and H in December, 1985-January, 1986. According to Dr. Pinder, "These measurements would have determined the full extent of the cone of depression created by the pumping of Wells G and H and more accurately demonstrated that contaminated water was drawn from the Beatrice property by Wells G and H." Affidavit of George Pinder, page 5 accompanying this letter.

Mr. Drobinski states that knowledge of the existence of the six monitoring wells would have provided an opportunity to collect additional information concerning the influence of Riley well 2 and Wells G and H on groundwater flow in the area. In particular he states, "This information in conjunction with the field data obtained during Yankee's 1983 investigation and the information already known ... concerning the aquifer would have allowed for a much more accurate determination of the dimensions and extent of the cone of influence of Wells G and H regarding the tannery and southernmost portion of the Beatrice site (fifteen acres)." Affidavit of John Drobinski, page 4.

Mr. Drobinski also states that the information and data obtained by the 1983 report concerning historical waste disposal practices at the tannery would have provided a substantial basis upon which to connect the waste sampled by Mr. Drobinski and Woodward-Clyde at the southern boundary of the fifteen acres with disposal practices at the tannery. For instance, Mr. Drobinski points out that the 1983 report describes the tannery sludge landfilled onsite as a "dark" "peaty" material. This agrees with the samples and chemical analysis obtained during Mr. Drobinski's investigation of the fifteen acres. See Plaintiffs' Motion For Vacation of Judgment, pages 5-8 and Tab 4. The 1983 report also identifies a sludge disposal area on the tannery property on the slope of the hill behind the catch basin upgradient of Riley production well 1. See Figure 1 entitled, "Site Plan" and Figure 3 entitled, "Contaminants Historically Found On Riley Property" at Affidavit of John Drobinski, Tab 2. As Mr. Drobinski states, "the fact that the 1983 study, which conducted only one round of sampling, detected contamination (.7 ppb of 1,2 trans dichloroethylene) at the upgradient monitoring well number 2 (on the tannery property) is particularly significant because that monitoring well due to its location was least likely to detect contamination since the most probable source of contamination to the groundwater was the tannery sludge pile downgradient of the well." Affidavit of John Drobinski, page 4-5. Mr. Drobinski concludes that the data and information revealed by the 1983 Yankee investigation warrants further site investigation of the tannery to determine the full extent of tannery contribution to the contamination of wells G and H:

In light of the high levels of solvents that we detected in the tannery waste samples taken on the Beatrice site (fifteen acres) south of the sludge pile on the tannery site, the fact that the 1983 investigation concluded that the Riley tannery was a source of solvent contamination of

the groundwater based on limited sampling of wells upgradient of the tannery sludge pile, and since relatively high levels of solvents were detected in Riley well 1 downgradient of the tannery sludge pile, examination and testing of the tannery sludge pile and the placement of additional monitoring wells at and below the tannery sludge pile would have been warranted in the face of the 1983 investigation. The additional data thus obtained would have determined the extent tannery waste disposal practices contaminated the aquifer underlying the Beatrice site and serving Wells G and H.

Affidavit of John Drobinski at page 5.

Despite the obvious importance of the data and information obtained by Yankee Engineering to the determination of the tannery's role in the contamination of the aquifer serving wells G and H, and the legal obligation under state and federal law on the part of Beatrice and Mr. Riley, their agents and attorneys, to have disclosed it, neither the fact of this investigation nor its data and conclusions were ever previously disclosed to the families or to any of the state or federal agencies investigating the contamination of the city wells and the disposal practices of the tannery. These agencies included the EPA, the Massachusetts Department of Environmental Quality Engineering (DEQE), the Massachusetts Metropolitan District Commission (MDC), and the Massachusetts Attorney General's office.

Subsequent to the families' discovery of the EPA's receipt of the 1983 Yankee Engineering Report, the families moved to vacate the judgment entered against Beatrice. That motion is presently pending before Judge Walter Jay Skinner. A decision is expected the first week of January, 1988. If Judge Skinner denies the motion it will be consolidated with the appeal scheduled to be heard by the First Circuit in February, 1988. A copy of the transcript of the three day hearing before Judge Skinner and the response of Beatrice and Mr. Riley to the Motion for Vacation of Judgment accompanies this letter.

As I have indicated in an affidavit submitted to the trial court as part of the motion to vacate, the 1983 Report and its data and test results were not revealed to the families and the state and federal agencies due to a concerted effort by Beatrice, Mr. Riley and their attorneys to improperly obstruct and prevent the lawful investigation of the tannery's role in the contamination of the aquifer serving wells G and H. See Affidavit of Jan Richard Schlichtmann accompanying this letter.

Although Beatrice had an obligation to disclose the findings of the 1983 Yankee investigation to the EPA as part of Beatrice's responsibilities in evaluating the role of its property in the contamination of the aquifer, the 1983 Yankee Engineering Report was kept from the EPA until its forced disclosure on December 26, 1986. None of the data, tests, or information obtained by Yankee Environmental Engineering appeared in the 1984 Woodward-Clyde report of the investigation of the fifteen acres nor was the Yankee investigation or report referenced or discussed although both the Woodward-Clyde and 1983 Yankee Engineering investigations were conducted during the same period of time, involved the same parties, were on contiguous properties, and involved elaborate and complicated engineering activities such as well drilling, field sampling, and the conduction of pump tests of Riley production well #2. See the January, 1984 Woodward-Clyde Report and the 1983 Yankee Environmental Engineering Report (a copy of the relevant sections of the report are at Affidavit of Jan Richard Schlichtmann, Tab F and Plaintiffs' Motion For Vacation of Judgment at Tab 1).

In point of fact, Woodward-Clyde not only did not mention the 1983 Yankee Engineering investigation or test results but affirmatively attempted to mislead the EPA concerning the cone of influence of Riley well #2. It stated that the cone of influence of Riley well #2 did not propagate beyond the railroad tracks and therefore did not include the tannery property. Woodward-Clyde, which did not test Riley well #1 during its pump test, made this statement in the face of the Yankee Engineering investigation which had conducted a pump test of Riley Well #2 just six weeks before Woodward-Clyde's test, had measured Riley well #1 during the pump test, and had determined that the cone of influence did include the tannery. See January, 1984 Woodward-Clyde Report pages 15-16 and Figure 10 (a copy of the relevant pages of the report are at Plaintiffs' Submission Regarding Due Diligence, Tab F(1) and 1983 Yankee Engineering Report, pages 3-5 and 5-1. Moreover, Woodward-Clyde, which was required by the EPA to redo the pump test of Riley well #2 stated in its second report that there was in fact an "aquifer barrier" at the railroad tracks acting as an "impermeable boundary" to the cone of influence of Riley well #2. See November, 1984 Woodward-Clyde Report, page 11 (a copy of the relevant pages from the report are at Plaintiffs' Submission Regarding Due Diligence, Tab F(2)). Further, although Beatrice was a participant in the pump test of Wells G and H, it did not reveal the existence of the monitoring wells to the EPA nor take any steps to monitor them during that test. As a matter of fact, although Beatrice had an obligation to monitor the flow data of Riley well #2 during the pump test

and to operate Riley well #2 only at its normal operating demand, Beatrice, Mr. Riley and their engineers not only failed to monitor Riley Well #2 during the pump test as required but analysis of water levels taken during the pump test of surrounding wells indicates that Riley well #2 was operated night and day at full capacity at least six days a week throughout the pump test. This conduct, in conjunction with the failure to disclose the six monitoring wells, was a direct attempt to obscure and interfere with the pump test and skew the results.

Although the sampling of the monitoring wells on the tannery property revealed contamination, no notification of the results of the tests were given to the DEQE. This is contrary to the notification requirements of Massachusetts General Laws Chapter 21E, section 7; Statutes 1983, Chapter 7, section 5 approved March 24, 1983. The report and its test results have yet to be given to the DEQE by either Beatrice or Mr. Riley. The only notification to the DEQE that has taken place so far has been done by the families.

In an effort to induce the Massachusetts Attorney General to settle its action against the John J. Riley Company concerning its waste disposal into the Metropolitan District Commission sewer system of process water contaminated with solvents, the attorneys for Beatrice and John J. Riley in 1983 attempted to convince the Attorney General that, "none of the problem hydrocarbons (were) emanating from the Riley property," and that the quality of the process well water from Riley production well #2 stemmed from, "an area-wide problem." See Affidavit of Jan Richard Schlichtmann, Tab C pages 2 and 4. In order to convince the Attorney General that this was the case, the Attorney General was informed that organic solvents "have never been used at" the tannery (see Affidavit of Jan Richard Schlichtmann, Tab A page 3) when they were in fact used (see Test. of J. J. Riley at trial of Anderson v. Grace, Tr. Vol. 21:28-29, 138, 140-45, 22:70 and Tr. Vol. 23:38).

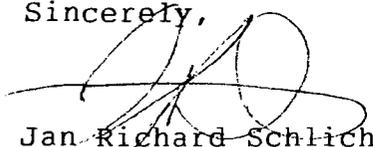
The Attorney General was also told that the 1983 Woodward-Clyde investigation dealt with the role of the tannery in the pollution of the fifteen acres and had concluded that, "none of the hydrocarbons emanate from the Riley property," (see Affidavit of Jan Richard Schlichtmann, Tab C, pages 2 and 4; see also Tab B, page 1) when the Woodward-Clyde investigation did not examine the tannery or its role in the contamination of the 15 acre site and could not have concluded that the tannery was not a source (See Affidavit of Jan Richard Schlichtmann, Tab F, pages 1-2). The 1983 Yankee Engineering study and report were not disclosed to the Attorney General although the

study had been conducted during the same period of time as the discussions with the Attorney General and the investigation by Woodward-Clyde, specifically dealt with whether the tannery was a source of solvent pollution to the groundwater, and concluded that the tannery was a source of pollution and a probable contributor to the contamination of Riley production well #2. See the 1983 Yankee Engineering Report, pages 1-1, 1-4, 3-5, 3-6, 4-1, and 4-2.

The EPA and the DEQE have the authority to order an immediate, complete, and professional assessment of the extent of contamination at the tannery and its role in the pollution of the aquifer serving wells G and H. In light of the results of the 1983 Yankee Engineering investigation and the concerted and improper attempt, spanning more than three years, to conceal and suppress this information, it is incumbent on the state and federal agencies to ensure that such an assessment is done on an expedited and mandatory basis and under circumstances assuring the integrity of the results. Under the circumstances, agency inaction would be a clear condonation of the concealment of the 1983 Yankee Engineering investigation and would subject the state and federal investigation of the pollution of wells G and H to justified public suspicion and ridicule.

For these reasons, the families request that your agency take immediate steps to investigate the conduct concerning the concealment of this report and its data and to ensure that the appropriate investigation and assessment of the Riley tannery is accomplished. The families will, of course, cooperate in providing any information they may have concerning this matter. Please let me know at your earliest convenience the intention of your agency concerning this request.

Sincerely,



Jan Richard Schlichtmann

JRS:kab

Enclosures

THU JUL 26 1956

NOTES RELATIVE TO: WOBURN - The Sludge Disposal  
At John J. Riley Company

BY: A. C. Bolde

DATE: July 12, 1956

On the above date the writer called at the office of the local Board of Health but Mr. Ryan, the Agent, was away on vacation. At the Riley Tannery the writer made an examination of the existing sludge lagoon accompanied by Mr. Thomas F. Brady, Superintendent of the plant. This lagoon, which is located north of the tannery, is used for the disposal of sludge pumped once a week from the existing settling tank. It is understood that this lagoon was not cleaned for the past four years and is said to contain several feet of sludge. A rather unpleasant tannery odor and also some H<sub>2</sub>S odor were present near the northerly end of the lagoon. Recent complaints in regard to odor from this source were made by residents of new houses located about 400 to 500 feet away on Hinston Road. A southerly wind would cause the odors to be felt in that vicinity.

This tannery at present is shut down for two weeks vacation; there was some activity going on in the beam house. It is understood that in addition to lime, some sulphite is also being used in beaming the hides. The writer then conferred with Mr. J. J. Riley as to possible methods for remedying the situation. Immediate as well as long-ranged steps were discussed. Among the immediate steps, it was suggested that the low area in the lagoon, which contains the objectionable liquid wastes should be filled in with clean material. The present area of the lagoon which covers almost half an acre should be reduced in size and a smaller area be diked off near the inlet pipe and used for disposal of sludge.

As a long-range program, it was pointed out that consideration should be given to the concentration of the sludge in a special tank built for this purpose and located at such an elevation as to allow the supernatant liquor to be returned to the settling tank.

#### Deposits of Old Excavated Sludge Near the Aberjona River.

During an examination of the Aberjona Valley Sewer, made together with Mr. Long, Superintendent of the Woburn Sewer Department, it was observed that large quantities of old sludge containing hair and some fleshings were deposited above Salem Street between the Access Road and the Aberjona River for

a length of 500 to 600 feet. Some of these deposits were within a few inches of the water in the adjacent swamp. It was subsequently ascertained that this material was deposited recently by the J. J. Riley Company, while excavating a pit adjacent to the old hide house to be used for disposal of buffings. Mr. Riley stated that his company owns the land upon which the materials were deposited. The writer pointed out to him that regardless of ownership the placing of such materials which may result in polluting the river is in violation of existing state laws. Mr. Ryan reluctantly agreed to have the deposits removed. It was advised to dispose of them at some other location where no pollution of any surface water or other nuisance would result.

Notes Relative To:

Subject: Woburn, Hemingway Transportation  
Company, John Riley Tannery Corp.

By: Brian Kelleher

Date: August 20, 1980

On the above date the writer inspected the properties of the Hemingway Transportation Company and the John Riley Tannery Company located off Olympia Avenue and Salem Street in Woburn, MA. The purpose of the inspection was to respond to a complaint that 55 gallon drums of chemical wastes had been disposed of on these sites. The complaint was made by the Woburn City Engineer and was received by letter on August 18, 1980.

The location of the properties are shown on the figure attached. The sites consists of portions of two adjacent lots located on a stretch of land between the Boston and Main Railroad and the Aberjona River going south from Olympia Avenue.

Findings

Hemingway Transportation property:

There is a pile of about a dozen 55 gallon drums located in the southwest corner of the property. Some of the drums are empty and others contain a solid grease like chemical waste. These drums appear to have been there a long time.

Close by the pile there is a tar like oil residue on the ground.

There is presently no motor vehicle access to this area.

John Riley Tannery Company property

There are piles of 55 gallon drums in several location. Most of these drums are at least partially filled with a variety of materials including, greases, oils, solids, and domestic and industrial refuse. These piles of drums appear to have been there a long time.

There are other drums scattered about the site. Some of these drums are at least partially filled. It was observed that one such drum had recently ruptured and had discharged its oily liquid contents onto the ground. Some of these drums appear to have been placed their much more recently then those in the piles.

There are visible indications that other chemical wastes (liquids and solids) had been dumped on the ground. Chemical residues can be observed

P- 521A

and barrel lids litter some sections. A small pile of oily residue containing numerous lids from small pesticide containers was observed.

In the section of the area nearby the new Train Depot, it was observed that there had been some recent excavation and filling. It is probably that this work was related to the placement of new drainage culverts. Some of the topsoil in the fill appear to contain chemical contaminants.

A MDC sewer line runs along side the dirt road. Manholes are easily accessible and on one the cover is replaced with a concrete slab.

Two municipal wells are located very close by (within 800 ft) of the site on the opposite side of the Aberjona River. These wells were closed last year because of findings organic chemical contaminants.

The John Riley Tannery Co. operates a private artesian well on the southwest corner of the site.

The site is located fairly close by the residential area where it has been alleged that there is a high rate of leukemia.

Abutting the site on the north side are the Whitney Barrel Company, a junk yard, the Murphy Waste oil tank Farm, and the John T. Riley Co. Factory.

There is open access to the site via the entrance to the dirt road on Salem Street.

#### Conclusions

1. Drums of chemical wastes, including greases and oily solids are presently stored on the site. This constitutes a violation of Section 57 and 58 of Chapter 27 of the General Laws.
2. In certain areas there is visible chemical contamination of top soils which has resulted from the past disposal of industrial waste pesticides; and oil. This constitutes a direct source of pollution to the waters of the commonwealth.
3. The site is located in close proximity to municipal wells which were recently closed due to chemical contamination. The wastes disposed of on this site are prime suspects as sources of the contamination.
4. Large amounts of municipal refuse, demolition debris, scrap iron, and misc debris litter the site. This constitutes a violation of Chapter 111 Section 150A of the General Laws.

5. The private artesian well on the site which is activity used by the John T. Riely Tannery Corp. is probably contaminated and offers a potential public health menace due to the possibility of cross connection to potable water supplies.
6. The open access to the site invites continued illegal waste disposal activities.
7. Exposed chemical waste on the site constitute a public health menace due to the possibility of inadvertant, direct, physical contact.

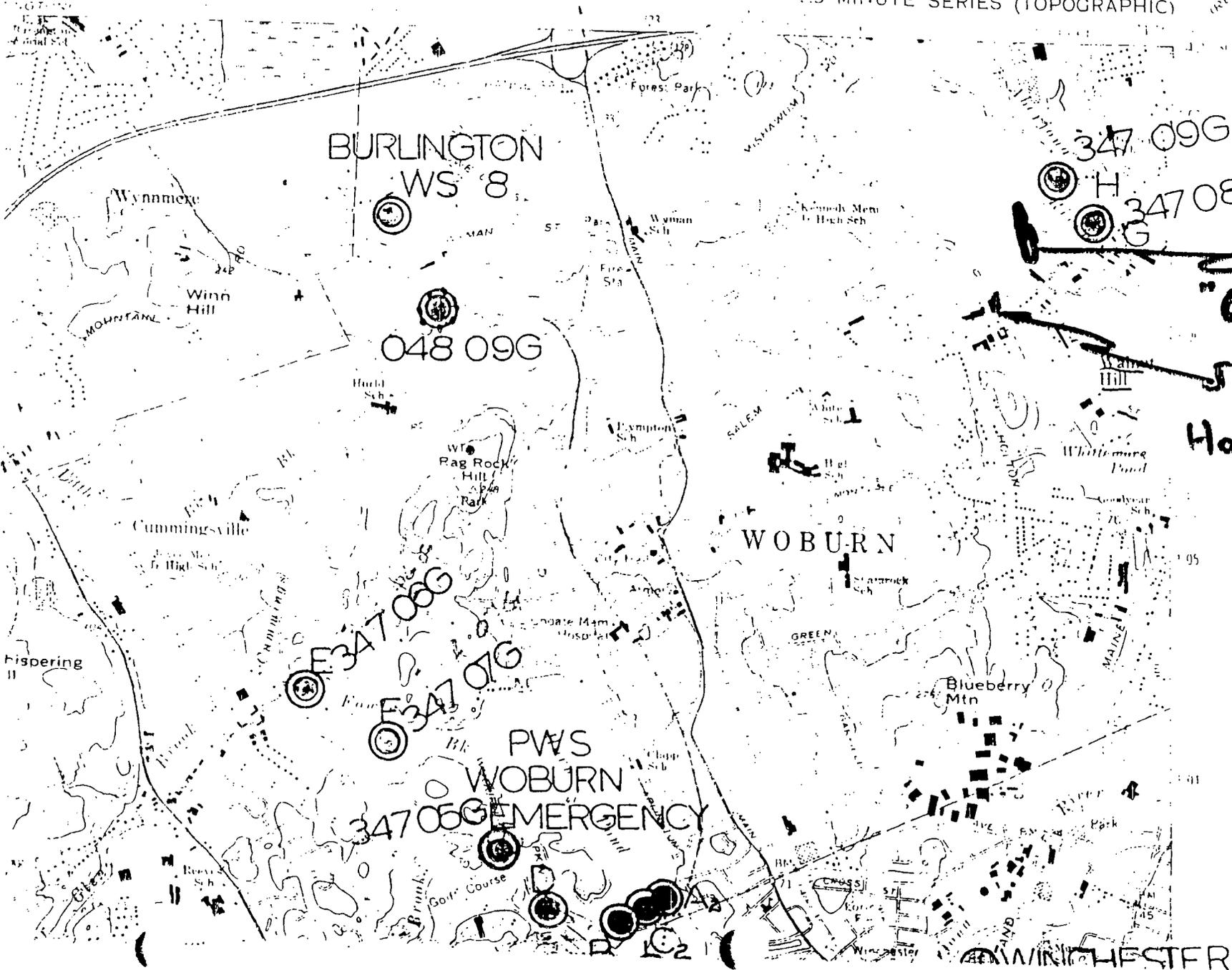
#### Recommendations

1. The DEQE should require the Hemingway Transportation Company to retain a licensed Hazardous Waste Contractor to removal all drums of chemical wastes.
2. The DEQE should require the John T. Riley Tannery Company to retain a licensed hazardous waste contractor to removal all drums of chemicals stored on their property.
3. The DEQE should order the John T. Riley Tannery Company to removal all demolition debris, refuse, empty drums, and scrap iron disposed of on their property.
4. The DEQE, DWS should sample the John T. Riley Tannery private wells and perform an inspection of the facility to check for cross connections to potable water supplies.
5. The DEQE should require the John T. Riley Company to retain a professional engineering consultant to perform a detailed site evaluation. The evaluation should consist of the following elements and be submitted to the DEQE in the form of a report.
  1. Hydrogeological description of the area including groundwater, and surface water movements (to determine potential impact on nearby wells).
  2. Representative groundwater and surface water sampling and analysis.
  3. Preparation of plan indicating the location of all contaminated soils.
  4. Representative sampling and analysis of contaminated soils.
  5. Formulation of conclusions.
  6. Recommendation on a course for further action.

OF MASSACHUSETTS  
- PUBLIC WORKS

LEXINGTON QUADRANGLE  
MASSACHUSETTS - MIDDLESEX CO.  
7.5 MINUTE SERIES (TOPOGRAPHIC)

UNCLASSIFIED  
(WHERE APPLICABLE)



DOUBLE CHECK VALVES

OWNER *John J. Riley Co. LEATHER* CITY *Woburn*  
TOWN *Woburn*  
Secondary Supply *Process* No. of Sets *3*  
Set No. *3*  
Location *Beam House - Color Room* Room  
Size of Connection *2"* Service Protected *Hose bibs, Ceiling, MAKEUP*  
Pit  
Outside Gate *Not easy* Inside Gate *Not easy*  
Make of Check Valves *Beeco FRP II* Body *Bronze* Year *1950*  
Owner's Representative to Contract  
When Can Check Valves Be Opened *Any Time*  
Remarks

DOUBLE CHECK VALVES

OWNER John J. Riley Co. LEATHER CITY TOWN Webster

Secondary Supply Reciv City Water

No. of Sets 3

Set No. 2

Location Boiler Room

Room  
Pit

Size of Connection 2"

Service Protected B.F.

Outside Gate HOT CITY

Inside Gate HOT CITY

Make of Check Valves Beeco FRP II

Body BRONZE

Year 1980

Owner's Representative to Contract

When Can Check Valves Be Opened ANY TIME

Remarks

NOTES RELATIVE TO

1 P 715 FILE  
BOSTON DEQE

SUBJECT: John J. Riley Company, 228 Salem Street  
Woburn, Mass.

BY: Robert Cleary RC

DATE: July 7, 1981

On July 1, 1981 the writer accompanied Mr. Richard Leighton of the EPA and Ms. Susan Titus, an Image Analyst, working with the EPA Environmental Photo Interpretation Center, on a tour of Woburn in order to verify from the ground their interpretation of aerial photographs of East and North Woburn. During this trip we walked the Boston and Maine Railroad tracks near the Riley Company tannery on Salem Street. Two observations of possible environmental concern were noted. First, on the slope leading down from the tannery to the railroad tracks we observed yellow and gray colored material that appeared to be dumped down the embankment. Drainage from this embankment enters a culvert at the railroad tracks, crosses under the tracks and empties into the drainage ditch on the east side of the tracks. This ditch flows south to the wetlands north of Whittemore Pond. In a section of the ditch from the outfall of the culvert down as far as Salem Street there was a whitish material covering the rocks.

The second observation concerns a manhole on the east side of the rail tracks. It is located 10-15 feet north of the dike around Murphy Waste Oil's storage tanks. The manhole was surrounded by fresh sand and gravel. The material was discolored blue and had small pieces of blue material intermixed with it. It is the writer's opinion that the blue material was scraps of tanned "blue sides" leather. The writer has no explanation for the placement of this fill around the manhole except that it was used to cover or absorb material spilled near the manhole-or flowing out the manhole, or that the manhole had been raised recently.

RC/lmm

006029 0 1

N  
|

Arrows indicate drainage

Note: tank farm & manhole may be further north than shown

MDC & Woburn Trunk sewers

Colvent

manhole

well

Discolored Area

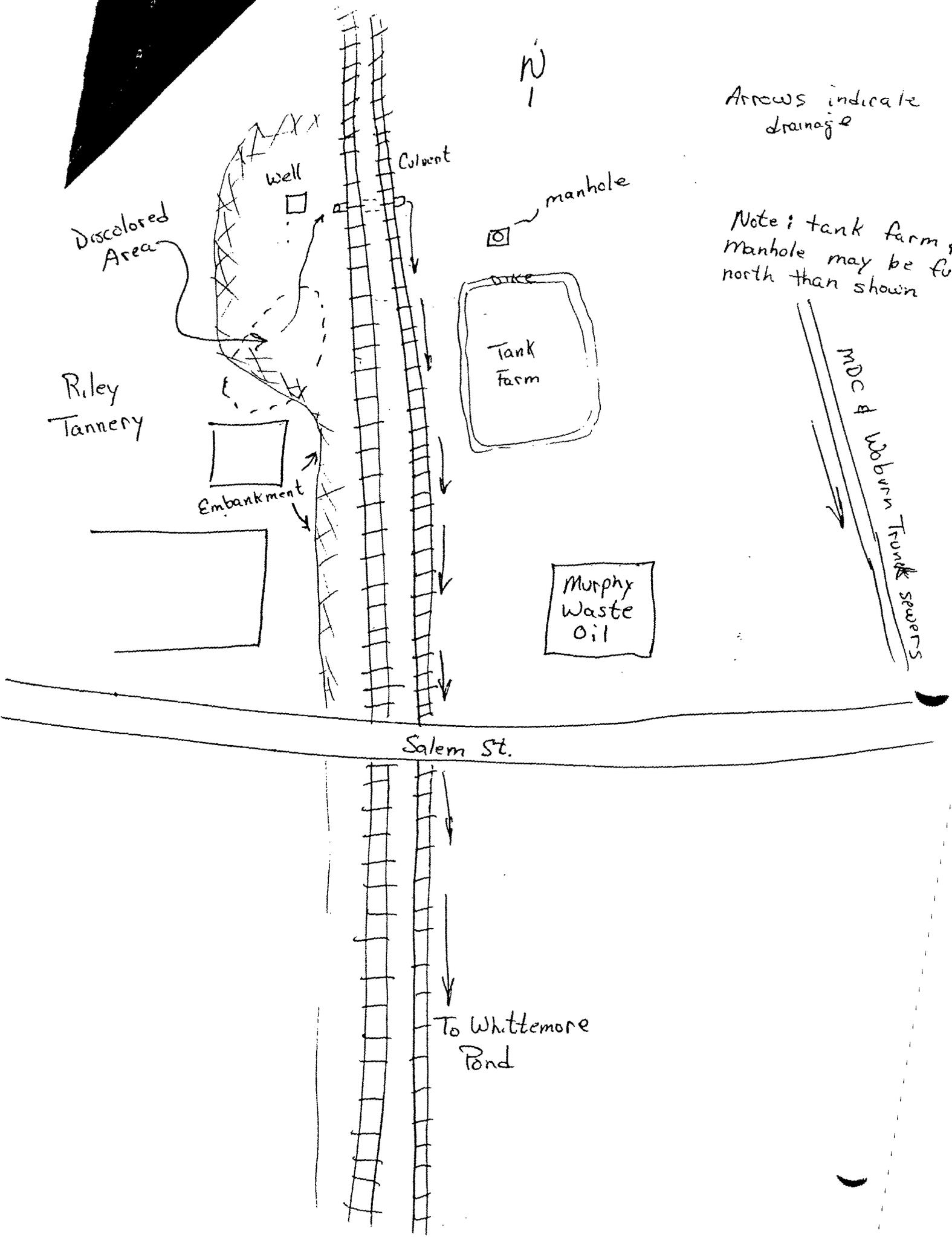
Riley Tannery

Embankment



Salem St.

To Whittemore Pond





COMMONWEALTH OF MASSACHUSETTS  
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
METROPOLITAN BOSTON - NORTHEAST REGIONAL OFFICE

424856

WILLIAM F. WELD  
Governor

ARGEO PAUL CELLUCCI  
Lt. Governor

TRUDY COXE  
Secretary

DAVID B. STRUHS  
Commissioner

JAN 04 1996

**THIS IS AN IMPORTANT NOTICE. FAILURE TO TAKE ADEQUATE ACTION IN RESPONSE TO THIS NOTICE COULD RESULT IN SERIOUS LEGAL CONSEQUENCES.**

Maggiore Companies  
13 Wheeling Avenue  
Woburn MA, 01801

RE: WOBURN  
John J. Riley Co./Beatrice  
228 Salem Street  
RTN # 3-0482  
**Noncompliance** with  
M.G.L. c. 21E and 310  
CMR 40.0000 et seq.  
(MASSACHUSETTS  
CONTINGENCY PLAN, MCP)  
NON-NE-96-A001

ATTN: Mr. Paul Maggiore

---

**NOTICE OF NONCOMPLIANCE  
NOTICE OF AUDIT FINDINGS**

---

Dear Mr. Maggiore:

On September 29, 1995 the Massachusetts Department of Environmental Protection (the Department) issued a Notice of Audit informing you that the Department was conducting an audit of the Licensed Site Professional (LSP) Evaluation Opinion Statement submitted for the above-referenced disposal site pursuant to 310 CMR 40.1000. The audit is now complete.

The purpose of this notice is to inform you that, as a result of the audit, the Department has determined that the LSP Evaluation Opinion submittal is in noncompliance with one or more laws, regulations, orders, licenses, permits, or approvals enforced by the Department. The specific areas of noncompliance and the measures the Department wants you to take to come into compliance are described in the attached Notice of Noncompliance.

In addition, the audit identified certain violations in the response actions conducted at the subject site. The violations and

measures you should take to address them are also described in this Notice.

### AUDIT ACTIVITIES

The audit consisted of the following activities:

- A review of information in the Department's files, including:
  - "Hydrogeologic Investigation of the John J. Riley Tanning Company Inc., 228 Salem Street, Woburn, Massachusetts" prepared by YE<sup>2</sup>ARS in 1983;
  - "21E Assessment of J. J. Riley Property, 228 Salem Street, Woburn, Massachusetts", prepared by Geotechnical Engineers, Inc. (GEI), and dated October 23, 1984;
  - "Final Report Environmental Assessment, 228 Salem Street, Woburn, MA", prepared by 21E, Inc., and dated December 26, 1990;
  - "Environmental Site Assessment Final Report, 228 Salem Street, Woburn, Massachusetts", prepared by 21E, Inc., and dated August 10, 1993;
  - Licensed Site Professional (LSP) Evaluation Opinion Transmittal Form and support documentation, prepared by Sandra M. Hebert, the LSP, and dated March 7, 1994.
- A Notice of Audit, dated September 29, 1995;
- A site visit conducted on October 11, 1995;

### SITE SUMMARY

#### Site Description/Site History

The subject site is located in an industrial/commercial section of Woburn. The property is approximately 10 acres and is bounded to the south by Salem Street, to the west by Wildwood Avenue, to the east by Boston and Maine Railroad, and to the north by BASF and Toxicon Laboratories. The property is located in an area which has been the subject of many groundwater contamination investigations. In May 1979, two Woburn water supply wells, known as "Wells G&H" were found to be contaminated with several organic chemicals including trichloroethylene (TCE) and were closed. The site is located in the Interim Wellhead Protection Area of the Wells G&H.

**Notice of Noncomplince**  
**Notice of Audit Findings**  
**Woburn - RTN 3-0482**  
**Page 3**

Reportedly, the tannery had operated on the property from approximately 1915 to 1989. Between December 1978 and January 1982, the company was owned by Beatrice Foods Inc. Mr. John J. Riley, the president of the tanning company, acquired the business from Beatrice Food in January 1983.

Initially, J.J. Riley Co. occupied 15.8 acres of land. The northwest part of the property has been subdivided and is now under different ownership. The tannery used a chromium tanning method to process cattle hides into finished leather. During the tanning process, many chemicals including the following were used: hexavalent chromium, diisobutyl ketone, 1,1,1 trichloroethane, benzidine dyes, o-dichlorobenzene, and phenol-based detergents.

The tanning process generated several types of waste. One of these products was sludge collected in a lagoon located in the northwest portion of the site. Reportedly, sludge was dredged periodically from the lagoon and disposed on the property. Buffing dust, which is primarily composed of leather particles, was disposed of in another lagoon on-site.

Two production wells, PW#1 and PW#2, were used by the tannery. Production well PW#1 is located in the northeast portion of the property and PW#2 is located in Wildwood Conversation Land (previously owned by Beatrice Food Company), 400 feet northeast of the subject site. Significant levels of chlorinated solvents, including TCE were detected in samples collected from these wells.

Between 1983 and 1993 a series of studies were conducted at the site. A detailed summary of each study is provided in the Site Assessment section.

The property was listed as a Location To Be Investigated (LTBI) on January 15, 1987.

In June 1994, the Maggiore Companies subdivided the property into 6 lots, labeled 11 - 16. Lot 11 was purchased and developed by Charles Ice Cream Specialty in August 1994 and lot 14, was purchased and developed by Kraft Company in October 1994. Presently, the other lots are undeveloped.

#### **Summary Of Site Assessments**

In November 1980, Ecology and Environmental, Inc. (E&E), on behalf of the US Environmental Protection Agency (EPA), initiated an investigation to determine the extent of groundwater contamination in north and east Woburn. As a part of this investigation, production wells PW#1 and PW#2 were sampled. The results revealed levels of volatile organic compounds (VOCs) in

Notice of Noncomplinace  
Notice of Audit Findings  
Woburn - RTN 3-0482  
Page 4

both samples. Specifically, TCE was detected at concentrations of 53 ug/l and 1372 ug/l in PW#1 and PW#2, respectively.

In 1983, the J.J. Riley Co. commissioned Yankee Environmental Engineering and Research Services (YE<sup>2</sup>ARS) to investigate groundwater conditions at the site. During this study, nine test pits were excavated on the 15.8 acre property. No soil samples were collected for chemical analyses during test pit excavation.

From the six monitoring wells which were installed during this investigation, four were located on the subject site. Groundwater samples from selected monitoring wells and PW#1 were analyzed for VOCs. A few chlorinated compounds were detected at low levels.

In addition, samples of sludge were analyzed by EP Toxicity, a test used to determine the leaching potential of RCRA Metals. Reportedly, metals leaching was minimal and these samples passed the EP Toxicity test.

In 1984, Geotechnical Engineers Inc. (GEI) conducted a site study which was limited to the evaluation and summarization of site related studies and information. GEI recommended that additional groundwater and sludge samples be collected and analyzed for chlorinated VOCs, butyl acetate, benzidine, and hexavalent chromium.

In November of 1989, three No. 2 and 6 fuel oil underground storage tanks (USTs) were removed from the site by Clean Harbors. Reportedly, the excavation was free of product and no holes were noted in any of the USTs. The excavation was backfilled with on-site fill. The only soil sample that was analyzed contained 110 mg/kg of total petroleum hydrocarbons (TPH).

In the Spring of 1990, 21E Inc. initiated a Phase I study for the subject property. During this investigation, four monitoring wells were installed (MW-1 to MW-4). Three soil samples from the borings of monitoring wells MW-1, MW-2, and MW-3, were collected from a depth of 34.0'-35.5' feet and analyzed for the RCRA Metals. None of the metals were detected above the MCP Method 1, GW-1/S-1, S-2, or S-3 Standards.

Reportedly the wells that were installed during the YE<sup>2</sup>ARS study do not exist anymore. However, 21E Inc. refers to three monitoring wells (RR-1, RR-2, and RR-3), which were installed by Beatrice (the boring logs and construction information of these wells are not available). Groundwater samples from the newly installed monitoring wells and three previously installed wells were collected for selected laboratory analyses. The specific analyses chosen for each well was based on the location of the well

Notice of Noncomplince  
Notice of Audit Findings  
Woburn - RTN 3-0482  
Page 5

and suspected nearby sources. These analyses did not detect significant levels of any compounds. 21E Inc. concluded that, based on the data collected during the course of this investigation, there is no evidence of a release or threat of release of oil or hazardous materials on the subject property.

In the Spring of 1993, 21E Inc. resampled seven on-site monitoring wells for the following analyses:

Six monitoring wells MW-1, MW-3, MW-4, RR-1, RR-2, and RR-3 were sampled for VOCs. No levels of VOCs were detected in these samples above method detection limits.

Four groundwater samples from monitoring wells MW-1, MW-3, MW-4, and RR-2 were analyzed for TPH. No levels of TPH were detected in these samples above method detection limits.

Four groundwater samples from monitoring wells MW-1, MW-4, RR-1, and RR-2 were analyzed for Priority Pollutant Metals. Some metals were detected above the applicable Method 1 standards. 21E Inc. attributed these levels to turbidity and suspended soil particles in these samples. Subsequently, monitoring wells MW-4, and RR-2 were resampled again and were analyzed for metals after they were filtered. None of the priority pollutant metals were detected above the method detection limit in sample MW-4. Zinc was the only metal detected above the method detection limits in sample RR-2 at 53 ug/l which is below the applicable MCP Method 1 Standard.

Three groundwater samples, MW-3, MW-4, and RR-2, were analyzed for semi-VOCs. The results indicate the detection of butyl benzyl phthalate in the three samples ranging from 15 to 23 ug/l. Di-n-butyl phthalate was reported in both MW-3 and MW-4 at a concentration of 28 ug/l and in RR-2 at a concentration of 30 ug/l. 21E Inc. indicated that both of these compounds were also detected in the laboratory blanks as well. No other semi-VOCs were detected above the method detection limits.

### NOTICE OF NONCOMPLIANCE

The following is a description of (1) each item identified during the audit which is in noncompliance, (2) the requirements violated, (3) the action the Department now wants Maggiore Companies (hereafter referred to as "you/your") 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.

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.

#### DESCRIPTION OF NONCOMPLIANCE

According to the LSP Evaluation Opinion Transmittal Form, Section D, a reportable release or threat of release as described by 310 CMR 40.0300 has occurred or may have occurred at the location but response actions completed prior to the dated of this opinion meet the requirement of a Response Action Outcome (RAO) pursuant to 310 CMR 40.1000.

310 CMR 40.1004(1)(a), cites that an RAO shall be supported by assessments and evaluations conducted pursuant to 310 CMR 40.0000 which are of sufficient scope, detail, and level of effort to characterize the risk of harm to health, safety, public welfare and the environment posed by the site or disposal site pursuant to 310 CMR 40.0900.

Pursuant to 310 CMR 40.0904, Site Information Required for Risk Characterization, "an adequate characterization of the disposal site is a prerequisite to the characterization of risk of harm to health, safety, public welfare and the environment, although the appropriate type and amount of information required to complete a Risk Characterization will depend on the unique characteristic of a release and/or disposal site".

Site investigations conducted to date and the LSP Evaluation Opinion and its supporting documentation do not appear to address the following:

#### VIOLATIONS:

- 1) The response actions conducted do not adequately characterize the site, particularly for the following assessment parameters:

#### 310 CMR 40.0904 (2), Extent of Release:

- a) **Source Evaluation:** The site investigations conducted to date do not adequately evaluate the potential existence of any sources at the site. Source evaluation is a major component of this investigation, considering both the nature of the tanning process, which involves the storing

and handling of many different chemicals, and waste processing at the site.

- b) **Vertical and Horizontal Extent of the Contamination:** The number and location of the installed monitoring wells do not provide a clear description of groundwater conditions at the site. All of the four installed wells are relatively deep, and except for MW-1, the screened portion of each well exceeds 25' feet (MW-2, is 45' feet, MW-3, is 25' feet, and MW-4, is 40' feet).

Also the number and location of the collected soil samples do not adequately characterize the soil conditions at the site. The available soil data is primarily limited to three soil samples, collected from the borings of monitoring wells MW-1, MW-2, and MW-3, from a depth of 34.0'-35.5' feet which were analyzed for the RCRA Metals. Apparently, no surficial soil sample was collected. In addition, the detection limits of some of the groundwater samples analyzed for VOCs and Semi-VOCs in the spring of 1993 study are above the GW-1 Standards.

- 2) The risk characterization was not documented and subsequently the requirements of 310 CMR 40.0921 through 310 CMR 40.0933 were not met.
- 3) Based on the above, the Performance Standards for Response Action Outcomes as defined by 310 CMR 40.1004(1)(a)(c) and (d) have not been achieved.

**DESCRIPTION OF THE ACTION TO BE TAKEN NOW, AND THE DEADLINE FOR TAKING SUCH ACTION:**

As a result of the violations identified above, the Department has determined that the following is required to demonstrate or achieve compliance with M.G.L. c. 21E, 310 CMR 40.0000 and/or any applicable requirements:

- (1) Prepare a plan which will address the violations identified in this Notice. The plan must be submitted to the Department **within twenty-one (21) days** of the receipt of this Notice. Elements of the plan should include, but are not limited to, the following:
  - (a) A site map which accurately identifies the former and current locations of all potential sources of contamination. The map should include any areas of the

site where sludges from the on-site lagoon were disposed.

- (b) A plan for gathering additional groundwater data by installation of additional groundwater monitoring wells in strategic locations on-site. Also a plan for evaluating soil conditions at the site by collecting soil samples at both surficial locations and at depths consistent with the depths of the respective source areas. The sampling schemes should be of sufficient scope and detail to adequately characterize contamination present in all potentially impacted areas of the site pursuant to 310 CMR 40.0904(2)
  - (c) A description of all proposed laboratory analysis methodologies to be used to characterize all potential contaminants on-site; analytical methodologies should be proposed in consideration of all materials that may have been disposed on-site.
  - (d) A description and documentation of any soil removal/disposal activities during the development of lots Nos. 11 and 14.
  - (e) The objective and proposed implementation schedule for each element of the plan.
  - (f) The name and registration number of the LSP who will prepare the plan.
  - (g) A statement which acknowledges that future response actions conducted at the site will be based upon the results of the follow-up site investigation and will be performed in compliance with the requirements of the MCP.
  - (h) The signed certification set forth in 310 CMR 40.0009 and included in Attachment 1.
- (2) Conduct a risk characterization based on the outcome of the additional response actions.
  - (3) Submit a revised LSP Evaluation Opinion to the Department by July 1, 1996.

A copy of this notice has been sent to Sandra Hebert, the identified LSP for your disposal site. You may consult with Ms. Hebert when preparing a response to this notice. Note, however, that you, not your LSP, are obligated to respond to this Notice and remedy the violations.

### CONCLUSION

You are advised to respond to the Notice of Noncompliance within the timeframes outlined above to avoid additional enforcement action by the Department.

This audit focused primarily on compliance with certain requirements of M.G.L. c. 21E and the MCP and, to a limited extent, other applicable requirements.

This audit does not preclude future audits of past, current, or future response actions or activities at the site or inspections to confirm compliance with applicable requirements of other laws or regulations enforced by the Department.

These findings do not in any way constitute a release from liability under M.G.L. c. 21E, the MCP, or any other law, regulation, or requirement.

No portion of this Notice shall be construed to relieve any person from an obligation for Response Action Costs or damages related to a site or disposal site for which that person is liable under M.G.L. c. 21E or from any obligation for any administrative, civil or criminal penalty, fine, settlement, or other damages.

No portion of this Notice shall be construed to limit the Department's authority to take or arrange, or to require any Responsible Party or Potentially Responsible Party to perform, any response action authorized by M.G.L. c. 21E which the Department deems necessary to protect health, safety, public welfare or the environment.

Notice of Noncomplince  
Notice of Audit Findings  
Woburn - RTN 3-0482  
Page 10

If you have any questions regarding this notice or any of the requirements contained in it, please contact Mitra Khadem at the letterhead address or telephone (617) 932-7600. Please reference NON number **NON-NE- 96- A001** and Release Tracking Number 3-0482 in any correspondence regarding the site.

Very truly yours,



Richard J. Chalpin  
Regional Engineer for the  
Bureau of Waste Site Cleanup

Enc: Attachment 1 - Certification Statement

cc:

DEP/BWSC/NERO, Data Entry/Files  
DEP/BWSC/NERO, John Fitzgerald, Deputy Regional Engineer  
DEP/BWSC/Boston, c/o Madeline Snow  
DEP/BWSC/Boston, Steve Winslow  
DEP/Office of Enforcement/Boston  
21E Inc., 350 Boston Post Road, Suite 4, Billerica  
MA, 01862, Attn: Sandra Hebert  
Woburn BOH  
Woburn Mayor's Office



COMMONWEALTH OF MASSACHUSETTS  
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
METROPOLITAN BOSTON - NORTHEAST REGIONAL OFFICE

424053

WILLIAM F. WELD  
Governor

ARGEO PAUL CELLUCCI  
Lt. Governor

TRUDY COXE  
Secretary

DAVID B. STRUHS  
Commissioner

**MEMORANDUM**

**TO:** File

**THROUGH:** Jack Duggan, Environmental Engineer *JD*  
Patricia Donahue, Section Chief

**FROM:** Mitra Khadem, Environmental Analyst *MK*

**DATE:** MAR 25 1996

**SUBJECT:** WOBURN - J. J. Riley Tannery  
228 Salem Street, RTN 3-0482

---

On Friday, March 8, 1996 at 10:30 a.m. a meeting was held at the Department's Northeast Regional Office to discuss the results of the most recent assessment activities at the site. The meeting was attended by the following personnel:

Jack Duggan, Environmental Engineer  
Mitra Khadem, Environmental Analyst  
Sandra Hebert, LSP, 21E Inc.  
Ned Abelson, Attorney, Goulston & Storrs

**SITE STATUS**

In January 1996, during the excavation of a number of test pits at the site, tannery wastes and arsenic contamination in surficial soils were encountered. The levels of arsenic in the samples collected from the vicinity of TP-1 triggered an Imminent Hazard condition and resulted in the assignment of a new release tracking number (RTN) for the site.

The first topic of discussion dealt with the Imminent Hazard condition. Ms. Hebert indicated that the extent of arsenic in the vicinity of TP-1 has not been determined yet and she is in the process of developing a plan for collection of additional samples. Jack Duggan recommended that the LSP examine the

Meeting Memo  
J. J. Riley RTN- 3-0482  
Page 2

application of a field screening method for delineating the arsenic exposure point(s) near TP-1.

Ms. Hebert continued that upon determination of the extent of arsenic contamination, the locations that exceed the Upper Concentration Limits (UCLs) may be treated as a hot spot and may be removed, while, the rest of the impacted area may be covered to eliminate direct contact.

The second major issue was the handling of the tannery wastes. Ms. Hebert mentioned that so far she does not have a definite plan but is considering the following options:

- 1) Excavation of any visible wastes and collection of confirmatory soil samples;
- 2) If applicable, filing an AUL and leaving the waste in place upon the evaluation of the nature and extent of the wastes.

M. Khadem indicated that if the second option is selected any discrete layer of the tannery wastes should be sampled separately and the vertical and horizontal extent of the wastes should be defined before an AUL could be filed.

330 Boston Road  
Suite 4  
Woburn, MA 01882  
(508) 671-9501  
Fax (508) 671-0139

Hazardous Waste Soil Testing  
Environmental Site Assessment

21E INC.



3-0482 (1994)

Woburn

228 Salem Street

August 14, 1996

Department of Environmental Protection  
Northeast Regional Office  
Bureau of Waste Site Cleanup  
10 Commerce Way  
Woburn, MA 01801

ATTN: Ms. Mitra Khadem

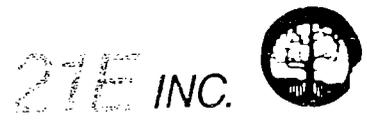
**RE: Notice of Noncompliance & Audit Findings Completion Statement**  
228 Salem Street  
Woburn, MA  
DEP RTN: 3-0482  
NON-NE-96-A001

Dear Ms. Khadem:

The following report provides information pertaining to the investigations that were undertaken at the above referenced property (herein referred to as the "Site") in response to the Notice of Noncompliance and Notice of Audit Findings dated January 4, 1996, a copy of which is provided as Attachment A. This Completion Statement is being submitted on behalf of Wedel Corporation, the Potentially Responsible Party (PRP). The contact, Mr. John J. Riley, may be reached by mail at 154 Ocean Boulevard in Seabrook, NH 03874.

#### BACKGROUND INFORMATION

A Licensed Site Professional (LSP) Evaluation Opinion Transmittal Form and supporting documentation were completed for the Site on March 7, 1994 and submitted to the Department of Environmental Protection (DEP). On September 29, 1995, the DEP issued a Notice of Audit of the LSP Evaluation Opinion to the PRP. On January 4, 1996, the DEP issued a Notice of Audit Findings (NOAF) and a Notice of Noncompliance to the PRP. In response to the NOAF, and following a meeting with DEP representatives on January 24, 1996, 21E Inc. prepared a "Plan of Activities (NOA Findings)" on January 25, 1996, and submitted it to the DEP for approval.



The Plan of Activities included: the excavation of test pits and the collection of soil samples across the undeveloped lots at the Site; laboratory analysis of selected soil samples; and the preparation of a Site map which included all potential source areas. This plan was approved by the DEP prior to the initiation of the sampling program on January 30 and 31, 1996.

#### TEST PIT EXCAVATIONS

On January 30, 1996, 28 test pits (TP-1 to TP-28) were excavated across the undeveloped lots at the Site (see Figure 1 for test pit locations). The majority of the test pits were excavated systematically in a 200 foot interval grid pattern. The following test pits were excavated in biased locations: TP-9 was excavated in the vicinity of the former underground storage tanks; TP-10 was excavated in the vicinity of the former bag house; TP-14 was excavated in the vicinity of the former hide storage area; TP-18, TP-19, TP-20, and TP-21 were excavated in the vicinity of the former sludge disposal area; and TP-18 and TP-22 were excavated in the vicinity of the former catch basin. Samples were collected from the surface at each test pit location and at changes in lithology. All soil samples were screened in the field for volatiles with an HNu model PI-101 photoionization detector (PID) equipped with 10.2 eV lamp. With the exception of soils from TP-16, PID levels ranged from none detected to 7.8 parts per million (ppm).

Laboratory analysis of selected soil samples was conducted (see Table 1 for complete results). The laboratory reported that the 0-1 foot sample from TP-1 contained arsenic at 95 ppm, and the 0-6 inch sample from TP-12 contained arsenic at 40 ppm. Both of these results indicated the potential presence of an imminent hazard at the Site. However, after the surficial sample was collected from TP-12 and the test pit was backfilled, clean soil from the excavation of TP-16 was placed on top of TP-12, preventing access to the surficial arsenic contamination. It was determined that if and when the arsenic contaminated soil became accessible, appropriate actions would be taken to prevent potential imminent hazard conditions.

Three test pits, TP-109, TP-110, and TP-111, were excavated around TP-12 in an attempt to delineate the extent of the surficial arsenic contamination. Surficial soil samples from 0-0.5 feet BGS and 0.5-1 foot BGS from TP-109 and TP-111 were submitted for laboratory analysis of RCRA 8 metals. The laboratory reported that the 0.5-1 foot BGS sample from TP-109 contained elevated levels of chromium and arsenic, while the 0-0.5 foot samples contained lower levels of these compounds and



did not present an imminent hazard condition. Excavation of the near surface chromium and arsenic contaminated soil in TP-109 was undertaken in conjunction with the soil excavation around TP-16 (see **FURTHER EXCAVATION ACTIVITIES**).

#### **EXCAVATION OF SURFICIAL ARSENIC CONTAMINATION**

The surficial arsenic contamination in the southern portion of the L.T.B.I. and the potential imminent hazard condition at TP-1 was addressed separately under Release Tracking Number 3-13444. An Immediate Response Action Plan and Imminent Hazard Evaluation were submitted to the DEP on April 12, 1996 and a Response Action Outcome Statement was submitted to the DEP on August 13, 1996. In summary, arsenic was detected in the surficial loam in the southern portion of the L.T.B.I. at concentrations above applicable reportable concentrations to a depth of approximately 1 foot below ground surface (BGS). A fence was erected around this area to prevent access to the soil. The arsenic contaminated soil was excavated and transported off-Site for disposal. A portion of the soil was recycled at Environmental Soil Management, Inc. in Loudon, NH and the majority of the soil was landfilled at Waste Management of New Hampshire's Rochester, NH facility. A total of 1,110.75 tons of arsenic contaminated soil were disposed. For a more detailed account of the excavations, refer to the Response Action Outcome Statement provided as Attachment B.

#### **DELINEATION AND INITIAL EXCAVATION OF MATERIAL IN TP-16**

During the excavation of TP-16 on January 30 (see Figure 1), several layers of a material, consistent with the appearance and characteristics of tannery waste, were observed from a depth of 6 feet below ground surface (BGS) to about 12 feet (BGS). Samples of the material were field screened with a PID and levels up to 110 ppm were detected. The material and associated soil were excavated from TP-16 and stockpiled on and covered with 6 millimeter polyethylene sheeting. The material had a distinct organic odor. TP-17 was excavated northeast of TP-16 in an effort to determine the extent of the material and associated soil. None of the material observed in TP-16 was visible in this test pit.

After completing the last test pit for the preapproved sampling plan on January 30, 1996, the excavation of TP-16 continued in an effort to find the extent of the material and associated soils. DEP approval to continue exploration of the observed material and subsequent stockpiling of excavated test pit material was granted by the on-Site DEP representative. Approximately 150+/- cubic yards were excavated and stockpiled on and covered with 6



millimeter (mm) polyethylene sheeting and, due to the late hour, excavations were ceased. The area was secured for the evening.

On January 31, the excavation of TP-16 was continued in an attempt to define the horizontal extent of the observed material and associated soils. It appeared that the material had been deposited on a slope, and as excavations continued towards the south, the top and bottom limits of the material were observed at shallower depths and the thickness of the material decreased to about 3 feet. Once the southern, southeastern and southwestern extents of the material were visually determined, test pits were excavated around TP-16 (see Figure 2). An additional 50+/- cubic yards of the observed material and associated soils were excavated on this day. The confirmatory test pits, A through F, were excavated west, north, and east of TP-16. Based on visual and olfactory observations, it appeared that none of the material or associated soil observed in TP-16 were present in these test pits. Soil samples collected from TP-B, TP-D, TP-F, and the southwest corner and the southern wall of TP-16 were analyzed for trace metals. A confirmatory sample from the bottom of TP-16 was analyzed for trace metals and extractable organic compounds. The laboratory reported that no extractable organic compounds were detected in the bottom sample and samples from the test pits contained only low levels of metals with the exception of a sample from the southern wall of TP-D, which contained a concentration of chromium at 2,800 ppm (see Table 1 for analytical results). Laboratory reports are provided as Attachment C.

As of January 31, 1996, a total of approximately 200-250 cubic yards of the observed material and associated soil were excavated from this area and stockpiled on and covered with 6 mm polyethylene sheeting. Based on the observations made from the test pits excavated around TP-16 and confirmatory laboratory data, the estimated extent of the observed material and associated soils was determined (see Area of Excavation, Figure 2) and the volume of soil remaining in the ground was estimated at 200-250 cubic yards.

The following four distinct layers of the observed material were identified in the TP-16 excavation (see Figure 3 for a cross sectional diagram): a blue layer, which comprised less than 1% of the material; an orange/brown layer, which comprised +/-30% of the material; a pink layer, which comprised +/-25% of the material; and a black layer, which comprised +/-45% of the material. A grab sample of each layer was submitted for laboratory analysis of RCRA 8 metals and extractable organic compounds. No extractable organic compounds, including benzidine, were detected in any of the samples above the detection limit.



The blue layer was reported to contain chromium at 82,500 ppm; the orange/brown layer was reported to contain chromium at 13,500 ppm and lead at 314 ppm; the pink layer was reported to contain arsenic at 77 ppm, chromium at 1,100 ppm, and lead at 317 ppm; and the black layer was reported to contain arsenic at 61 ppm, chromium at 3,250 ppm, and lead at 409 ppm. While the chromium concentration in the blue layer is elevated, this material represented less than one percent of the total amount of the material that was present at the Site.

A status report titled "Report of Activities and Soil Excavation Plan - Tannery Waste and Soil Contamination" was completed by 21E Inc. for the Site on April 25, 1996 and submitted to the DEP. This report included information pertaining to the above referenced test pit excavations, the initial excavation and stockpiling of soil from TP-16, the analysis of confirmatory samples from the southern boundary of the TP-16 excavation and test pits TP-B, TP-D, and TP-F, and the characterization of the individual layers of material observed and excavated from TP-16. The remainder of this NON-NOAF Completion Statement presents the subsequent activities at the Site including further soil excavations, soil disposal, and confirmatory analysis.

#### **FURTHER EXCAVATION ACTIVITIES**

Excavation activities began again at the Site on May 29, 1996 and continued through May 31, June 12, 13, 14, and 17. Excavations at the Site were coincided with excavations of arsenic contaminated soil located in the southern portion of the L.T.B.I. and addressed under an IRA Plan submitted to the DEP on April 12, 1996. It was initially estimated that 200-250 cubic yards of material remained at the Site. However, as excavations continued, the thickness of the material did not decrease as initially calculated and additional pockets of the material and associated soils were observed in the northeast and northwest corners of the excavation and subsequently removed. In excavating these additional areas, the amount of additional material removed from the Site totaled approximately 1,900 cubic yards. The extent of the excavation is shown on Figure 4.

As a means of further characterizing the Site, on June 4, four test pits were excavated on lots 12 and 13 respectively (TP-401 through TP-408), and five test pits were excavated on lot 15 (TP-409 through TP-412). All test pits were excavated to determine if the material observed in the original excavation was present in these test pits (see Figure 1 for test pit locations). Additionally surficial samples collected from TP-407 and TP-411 were submitted for arsenic analysis and the laboratory reported concentrations of arsenic at 11.8 ppm and 3.4 ppm respectively.

21E INC.



None of the material observed in the original excavation was observed in any of these test pits. However, during the excavation of TP-402, a clay pipe located approximately 4 feet below ground surface was broken by the excavator. The pipe was observed to contain blue and black material similar to that removed from the original excavation. The pipe ran in a north/south direction and was pitched downgradient from south to north. It is believed that this pipe carried residual tannery material from the interior of the former tannery to a catch basin located in the northern portion of the Site near the current detention pond.

Since the clay pipe contained material consistent with the material removed from the excavation, it was determined that the pipe would be excavated and disposed of with the remainder of the material from the Site, and through excavation of the pipe, the beginning and end point of the pipe would be investigated. The pipe excavation occurred on June 18 and 19, 1996. The pipe was initially traced to the south. It was revealed that the pipe originated in an enclosed, cement, 6 foot by 8 foot, vault which appeared to have been located in the floor of the former tannery. The vault was free of the material observed in the pipe and was in good condition. Excavation of the pipe continued toward the north and the end point of the pipe was determined to be a closed catch basin in the vicinity of TP-22. The catch basin did not contain any of the material observed in the pipe, and was completely enclosed. It appeared as though the catch basin and the end of the pipe had been cleaned out some time ago as both locations were free of the material. According to Mr. Riley, the catch basins were periodically cleaned out of any material which had deposited there. Test pits TP-18, TP-19, and TP-22 were previously excavated near the former catch basins and none of the material observed in the pipe was observed in these test pits.

#### Remediation Waste

Waste Management of New Hampshire was consulted as a potential disposal facility and samples of the excavated material were submitted to Waste Management for analysis of RCRA and facility disposal parameters. Based on the results of these analyses, Waste Management determined that the material was suitable for recycling by thermal processing at Environmental Soil Management, Inc. (ESMI) in Loudon, NH.

On May 29, 30, and 31, 1996, a total of 711 tons of excavated material were removed from the Site and transported to ESMI. 312.01 tons of this material had been recycled as of the afternoon of May 30, when operations at ESMI were ceased by the New Hampshire Department of Environmental Services, due to



concerns over emissions from the facility during the processing of material from the Site. Supplemental analyses conducted on the material delivered to ESMI from the Site revealed that the results were consistent with those previously reported and provided to ESMI. However, ESMI was forced to refuse acceptance of any additional material from the Site.

During the week of June 3, 1996, arrangements were made to dispose of the material at Waste Management of New Hampshire's (WMNH) Rochester, NH lined landfill. On June 10 and 11, material which remained unprocessed at ESMI was transported to WMNH. The remainder of the material excavated from the Site, 1,987.65 tons, was transported to WMNH on the following dates: June 12, 13, 14, 17, 18. A total of 2,287.66 tons of material excavated from the northern portion of the Site was disposed. Including the 1,110.75 tons of material excavated from the southern portion of the Site, a total of 3,398.41 tons of material were excavated from the Site and disposed. See Table 2 for a breakdown of disposal amounts.

#### Permits

According to 310 CMR 30.125 (4), the material is not subject to 310 CMR 30.000, and is therefore not considered a hazardous waste (provided TCLP limits are not exceeded) solely due to elevated chromium. In this regard, a special permit is not required for disposal. All excavated material was removed under a Bill of Lading. The original Bills of Lading were received at DEP on July 17, 1996 and copies are provided as Attachment D.

#### RISK CHARACTERIZATION

A Method 1 Risk Characterization was conducted in accordance with the guidelines of the Massachusetts Contingency Plan, 310 CMR 40.0000 to determine if a Level of No Significant Risk exists or has been achieved at the Site which is identified as 228 Salem Street in Woburn, MA (see Figure 1). Method 1 was chosen to demonstrate that a Level of No Significant Risk exists because only soil contamination has been reported at the Site.

#### Current and Foreseeable Land Use

The Site is currently undeveloped. The Site was part of the John J. Riley Tannery which was in operation at this location from 1915 to 1989. It is understood that the Site will be commercially developed and occupancy is not expected to change in the foreseeable future.



### Identification of Soil and Groundwater Categories

The groundwater at the Site has been classified as groundwater category GW-1 because the groundwater, although not encountered during the course of this investigation, is located within an Interim Wellhead Protection Area. The groundwater at the Site is also classified as category GW-3 groundwater because all groundwater in the Commonwealth is classified as GW-3 due to its potential to discharge to surface water. Although the Site is expected to be developed, groundwater is greater than 30 feet below ground surface, therefore groundwater at the Site is not considered GW-2.

The soil at the Site has been classified as soil category S-1 and S-2. On-Site soils have been categorized based on: 1) the type of receptor present; 2) frequency of Site use by the receptors; 3) intensity of use by the receptors; and 4) accessibility of the Site soil to the receptors.

Although there are no current occupants of the Site, future commercial development would result in the presence of adults as workers or visitors, and children as visitors. Therefore, both adults and children have been included as potential receptors.

Frequency of use (either high or low) indicates how often a receptor uses or has access to the Site and surrounding area. Based on potential exposure conditions, adult's frequency of use is considered high and children's frequency of use is considered low.

Intensity of use (either high or low) describes the nature of Site activities and uses which could result in exposure to the soil. Currently, the Site is unoccupied and primarily dirt covered land. It is believed that future development activities will create soil derived dust for a short period of time. Additionally, disturbances to the on-Site soil for the purposes of installing utility lines and/or landscaping would also create soil derived dust. Although, once construction activities are completed and soil derived dust is minimized, continued landscaping maintenance would result in periods of high intensity use of soil. Therefore, to be conservative, the intensity of use for the Site, for use in determining the soil category, would be considered high.

Accessibility of the soil is described as either "accessible", "potentially accessible", or "isolated". Soil samples collected during soil excavation were obtained from depths ranging from 1 to 14 feet below ground surface and are classified as both



"accessible" (0-3 feet BGS) and "potentially accessible" (3-14 feet BGS).

Given the depth of impacted soils, potential receptors, and most conservative frequency and intensity of use of soils, the impacted soils have been classified as categories S-1 and S-2. Therefore, the applicable Method 1 Risk Characterization Standards for soils on-Site are S-1/GW-1, S-1/GW-3, S-2/GW-1, and S-2/GW-3.

#### IRA Site - Southwest corner of L.T.B.I

As reported in the RAO for the IRA Site, all confirmatory samples were reported at concentrations below the Method 1 standard for arsenic, 30 ppm. The average exposure point concentration was calculated to be 9.99 ppm, which was determined to be comparable to IRA Site background concentrations for arsenic calculated to be 6.24 ppm and other literature background levels. Therefore, a Class A-1 RAO was completed for the IRA Site. See Attachment B for complete RAO report.

#### **Confirmatory Analysis**

Soil samples were collected from the excavation at various stages and submitted for rush analysis to aid in determining whether the boundaries of the contamination had been reached. The material of concern is visibly discernible due to its distinct color and texture, so select confirmatory samples were chosen for analysis of metals and/or polynuclear aromatic hydrocarbons, including aniline and benzidine. All confirmatory soil samples were submitted to Matrix Analytical in Hopkinton, MA for analysis.

Following excavations on January 31, confirmatory samples from TP-B, TP-F, the southwest corner of the excavation, the southern wall of the excavation, and the bottom of the excavation were collected. All samples were analyzed for total metals and the bottom sample was also analyzed for extractable organic compounds including aniline and benzidine. Metals were detected in these samples but no extractable organics were detected. Benzidine and aniline were not detected above the laboratory's detection limits of 1,00 ppb and 500 ppb, respectively. For results of all confirmatory analyses, see Table 3.

On June 4, confirmatory samples were collected from the northeast corner of the excavation just south of monitoring well RIZ-4, and from the southwest corner of the excavation along the western wall in the location of former TP-12, TP-109, TP-110, and TP-111. These samples were submitted for laboratory analysis of RCRA 8



US EPA ARCHIVE DOCUMENT

metals.

On June 17, a confirmatory sample was collected from the northeast corner of the excavation along the north wall. This sample was collected following the excavation of a pocket of material which appeared to have characteristics consistent with buffing dust located north of RIZ-4 at a depth of 3 to 5 feet below ground surface. A sample was also collected from the northwest corner along the north wall. This sample was collected following the excavation of a pocket of material consistent in appearance to the blue layer observed in the original excavation. These two samples were submitted for RCRA 8 metals analysis. Following the excavation of blue material, an ash like material was observed at varying depths in the northwest corner and surrounding the excavated drain pipe. Six samples of this material were collected on June 18, one of which was submitted for analysis of priority pollutant metals and base neutral compounds. The five remaining samples of the ash like materials were submitted for priority pollutant metals analysis on July 29, 1996. Please refer to Table 3 for analytical results.

TP-16/bottom, was analyzed for metals and PAH including aniline and benzidine and the laboratory reported that no PAHs were detected. All other samples were analyzed for only metals. In Table 3, the reported metals concentrations and average exposure point concentrations have been compared to applicable S-1/GW-1, S-1/GW-3, S-2/GW-1, and S-2/GW-3 Method 1 standards and all concentrations are below the Method 1 standards.

#### Identification of Background

Background data was obtained from previous reports completed for the Site and analysis of soil samples collected from the recent test pit excavations. Refer to Table 3 for Background data. A comparison of the arithmetic means of the background concentrations and the exposure point concentrations is made in Table 3.

The mean exposure point concentrations for arsenic, barium, beryllium, copper, lead, mercury, nickel, and zinc are consistent with background concentrations, however, the mean exposure point concentration for chromium is above the background concentration.

It has been determined that it is not feasible to reduce on-Site concentrations of chromium to the background concentration for the following reasons. The chromium detected in the soil on-Site is trivalent chromium which was utilized in the tanning process which formerly took place at the Site. According to 310 CMR 30.125 (3) and (4), trivalent chromium from tannery processes is not considered hazardous and therefore less of a risk. There is

215 INC.



no proven field screening method for chromium, therefore, laboratory analysis would have to be conducted on individual samples and the cost for additional analysis, excavation, and disposal of soils from the Site do not justify the minimal benefit.

Therefore, based on the information provided herein, and in the RAO previously submitted to the DEP and provided as Attachment B to this report, conditions at the Site pose a Level of No Significant Risk, an Activity and Use Limitation is not required to maintain a level of No Significant Risk, a Permanent Solution has been achieved, and conditions meet the requirements of a Class A-2 RAO. As referenced in 310 CMR 40.1036(2), Class A-2 Response Action Outcomes shall apply to disposal sites where a Permanent Solution has been achieved, the level of hazardous material in the environment has not been reduced to background, and one or more Activity and Use Limitations are not required to maintain a level of No Significant Risk. Additionally, since the visibly discernible apparent tannery material has been excavated and removed from the Site and no other tannery material has been identified at the Site through the extensive test pit excavations which have been conducted at the Site, the source of contamination has been eliminated.

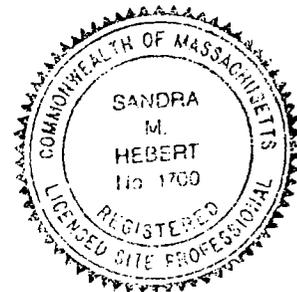
If you have any questions regarding this submittal, please do not hesitate to contact this office. This report serves as a revised LSP Evaluation Opinion as required by the DEP.

Sincerely,

Heidi Porter  
Geologist

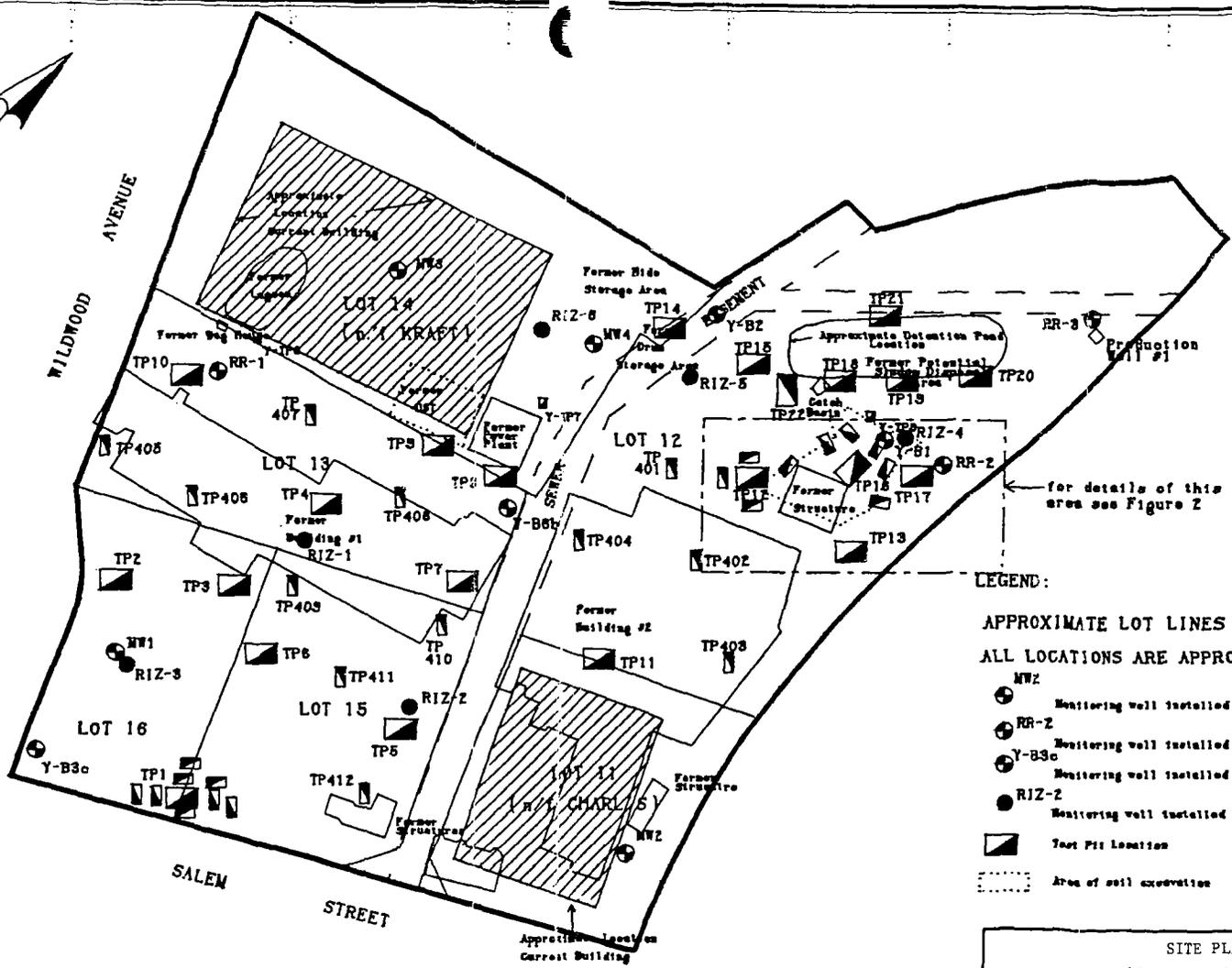
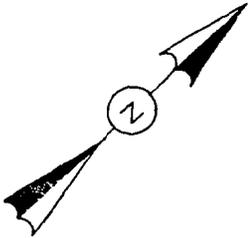
Sandra M. Hebert, LSP  
Operations Manager

Seal:



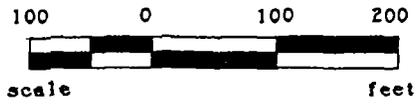
cc: Mitra Khadem, DEP, NERO-BWSC  
John J. Riley, Wedel Corp.  
George Hailer, Gadsby & Hannah  
Paul Maggiore, The Maggiore Companies

FIGURE 1



LEGEND:

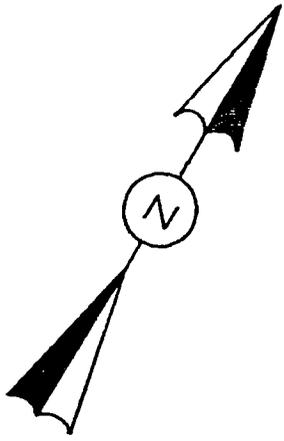
- APPROXIMATE LOT LINES
- ALL LOCATIONS ARE APPROXIMATE
- NW2  
Monitoring well installed by ETE Inc.
- RR-2  
Monitoring well installed for Hale & Derr
- Y-B3c  
Monitoring well installed by TEARS
- RIZ-2  
Monitoring well installed by Eisco
- TP #  
Test Pit Location
- Area of soil excavation



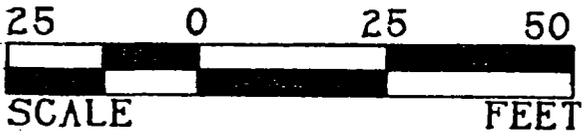
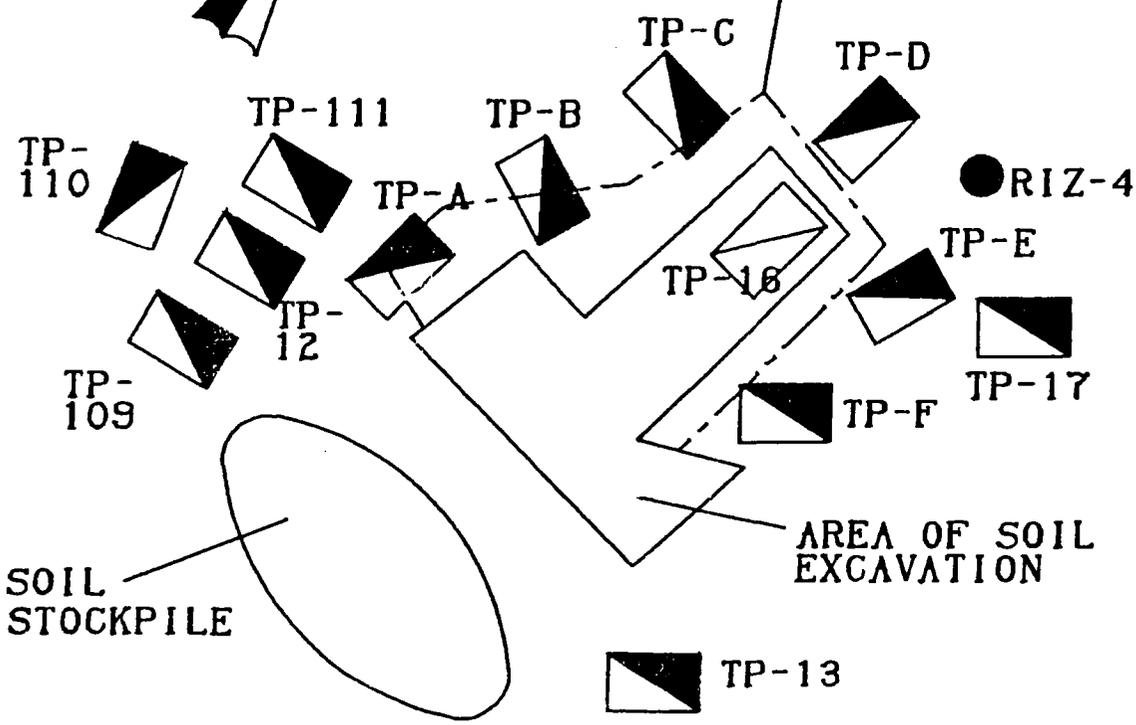
SITE PLAN 228 Salem Street Woburn, MA	
Scale: As shown	Prepared by: <b>21E INC.</b> Consulting Geologists, Hydrogeologists, Environmental Chemists
Date: 08/14/96	
Project Number: 90-0503	
Drafted by: HLP	

**KEY**

 TEST PIT



ESTIMATED  
AREA OF REMAINING  
CONTAMINATION



AREA OF INITIAL EXCAVATION 228 Salem Street Woburn, MA	
Scale: As shown	<b>Prepared by:</b> <b>21E INC.</b> Consulting Geologists, Hydrogeologists, Environmental Chemists
Date: 08/14/96	
Project Number: 90-0505	
Drafted by: HLP	



TECHNICAL REPORT PREPARED FOR JOHN J. RILEY COMPANY

SKINNER & SHERMAN LABORATORIES INC.

November 4, 1980

**S**cientific  
Services  
since 1922

CHEMICAL • PHYSICAL  
ELECTRICAL • BACTERIOLOGICAL

**TECHNICAL REPORT**  
prepared for

JOHN J. RILEY COMPANY

CASE NO. 13677

---

**skinner & sherman laboratories inc.**  
New England Laboratories

300 SECOND AVENUE WALTHAM MASSACHUSETTS 02254 • 617-890-7200

*B&U COPY*

04 November 1980

Page 1 of 3

CLIENT: John J. Riley Company  
228 Salem Street  
Woburn, MA 01801

Attention: Mr. Charles J. Sheehan

CASE NO: 13677

REFERENCE: Letter of 10/1/80

PROJECT DESCRIPTION:

Analysis of five (5) water samples and two (2) sludge samples.

SAMPLE IDENTIFICATION:

Samples received from client 9/26/80:

- 1 of 2 - Beamhouse water (well), sampled 9/26/80.
- 2 of 2 - Color Dept. water (well), sampled 9/26/80.

Additional samples received from client 10/1/80:

- 1 of 5 - Paste unit - water.
- 2 of 5 - Color room - water.
- 3 of 5 - Buffing sludge.
- 4 of 5 - Hair sludge.
- 5 of 5 - Buffing liquor.

METHODS OF TESTS:

PCB and Purgeable Halocarbons - EPA Procedures, "Guidelines Establishing Test Procedures for the Analysis of Pollutants, Proposed Regulations" - Federal Register, Volume 44, No. 233, Monday, December 3, 1979 - water samples.

EP Toxicity Test Procedure - EPA-SW-846, "Test Methods for Evaluating Solid Waste" - May 1980, Section 7 - sludge samples.

Metals were determined by atomic absorption spectroscopy.

This report is rendered upon all of the following conditions: This report is not to be reproduced wholly or in part without special permission in writing. Total liability is limited to the invoiced amount. Skinner & Sherman, Inc., Skinner & Sherman Laboratories, Inc., and/or New England Laboratories name and/or logos may not be used in conjunction with the contents of this report in any advertising media. The results listed refer only to tested samples and applicable parameters. Product endorsement is neither inferred nor implied. Samples are held for thirty days following issuance of report. Samples will be stored at client's expense, if authorized in writing.

04 November 1980

Page 2 of 3

CLIENT: John J. Riley Company

CASE NO: 13677

RESULTS:

Beamhouse Water (Well) And Color Dept. Water (Well) - Samples 1 and 2

No PCB's were detected in these samples. The sensitivity limit for PCB's was 10 parts per billion by volume.

	Micrograms per liter (parts per billion)			
	<u>Trans-1,2 Dichloroethylene</u>	<u>Chloroform</u>	<u>1,1,1-tri- chloroethane</u>	<u>Trichloro- ethylene</u>
Paste Unit Water	<1	4	2	<1
Color Room Water	150	15	260	720
Buffing Sludge EP Extract	*NR	*NR	*NR	*NR
Hair Sludge EP Extract	*NR	*NR	*NR	*NR
Buffing Liquor	*NR	*NR	*NR	*NR

This report is rendered upon all of the following conditions. This report is not to be reproduced wholly or in part without special permission in writing. Total liability is limited to the invoiced amount. Skinner & Sherman, Inc., Skinner & Sherman Laboratories, Inc., and/or New England Laboratories name and/or logos may not be used in conjunction with the contents of this report in any advertising media. The results listed refer only to tested samples and applicable parameters. Product endorsement is neither inferred nor implied. Samples are held for thirty days following issuance of report. Samples will be stored at client's expense, if authorized in writing.

04 November 1980

Page 3 of 3

CLIENT: John J. Riley Company

CASE NO: 13677

Milligrams per liter (parts per million)

	<u>Cadmium</u>	<u>Chromium</u>	<u>Lead</u>
Paste Unit Water	<0.01	<0.05	<0.05
Color Room Water	<0.01	<0.05	<0.05
Buffing Sludge EP Extract	0.011	1.8	0.48
Hair Sludge EP Extract	0.036	4.4	0.15
Buffing Liquor	*NR	136 (solids) <u>1.9 (filtrate)</u>	*NR
		138 total	

\*NR = Not Requested

Note: The maximum allowable concentrations of cadmium, chromium and lead in EP extracts are 1.0, 5.0 and 5.0 parts per million, respectively.

Respectfully submitted,

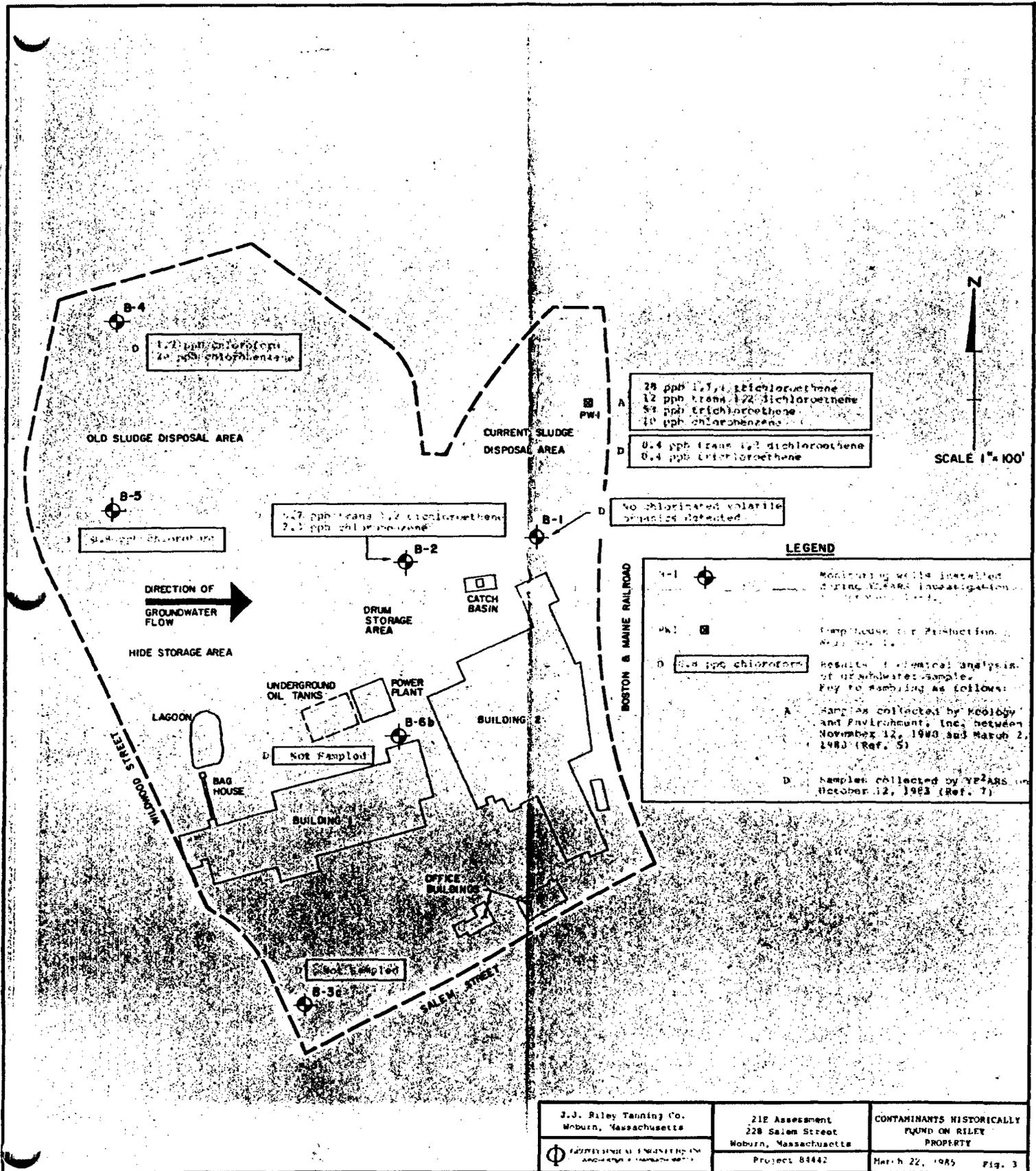
SKINNER & SHERMAN LABORATORIES, INC.

*Haldean Dalzell*

Haldean Dalzell, Ph.D.  
Laboratory Manager

HD/lis

This report is rendered upon all of the following conditions. This report is not to be reproduced wholly or in part without special permission in writing. Total liability is limited to the invoiced amount. Skinner & Sherman, Inc., Skinner & Sherman Laboratories, Inc., and/or New England Laboratories name and/or logos may not be used in conjunction with the contents of this report in any advertising media. The results listed refer only to tested samples and applicable parameters. Product endorsement is neither inferred nor implied. Samples are held for thirty days following issuance of report. Samples will be stored at client's expense, if authorized in writing.



J.J. Riley Tanning Co. Woburn, Massachusetts	21E Assessment 228 Salem Street Woburn, Massachusetts	CONTAMINANTS HISTORICALLY FOUND ON RILEY PROPERTY
 ENVIRONMENTAL ENGINEERING AND CONSTRUCTION ASSOCIATES, INC.	Project 84442	March 22, 1985 Fig. 3

# JOHN J. RILEY COMPANY

LEATHER MANUFACTURERS

EST. 1910

228 SALEM STREET  
P.O. BOX 318  
WOBURN, MA 01801

TEL (617) 933-5900

February 1, 1984

Mr. Wayne T. Grandin  
Metropolitan District Commission  
20 Somerset Street,  
Boston, Ma. 02108

Dear Wayne:

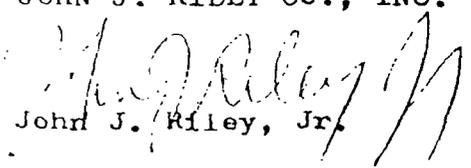
Pursuant to attachment B, entitled "Reporting Requirements", of our Industrial User Discharge Permit No. 43-000-602-2, we are enclosing our first discharge report.

The 24 hour flow record and grab sampling for volatile organic and extractable organic analyses were taken January 10, 1984. The laboratory analytical results were just received today.

It is our intention to do our second sampling sometime next week.

Sincerely yours,

JOHN J. RILEY CO., INC.

  
John J. Riley, Jr.

JJR:nd

000455



# Cambridge Analytical Associates

222 Arsenal Street / Watertown, Massachusetts 02172 / (617)923-9376

## FORMAL REPORT OF ANALYSIS

PREPARED FOR: John J. Riley  
228 Salem Street  
Woburn, MA 01801  
Attn: Dick Jones

CUSTOMER ORDER NUMBER: J-226

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

REPORT NUMBER: 84-026

DATE PREPARED: January 31, 1984

000456



Cambridge Analytical Associates

TABLE OF CONTENTS

1. INTRODUCTION
2. ANALYTICAL METHODS
3. RESULTS
4. QUALITY ASSURANCE DOCUMENTATION  
Certification

000457

## 1. INTRODUCTION

This report summarizes results of chemical analyses performed on samples received by CAA on January 11, 1984. Analytical methods employed for these analyses are described in Section 2 and results are presented in Section 3. The last section contains certifications supporting the analytical results.

## 2. ANALYTICAL METHODS

Analytical methods utilized for sample analysis are summarized in Table 1.

## 3. RESULTS

Results of analyses are presented in Tables 2 and 3. The composite sample contained a light petroleum distillate such as No. 2 fuel oil in addition to the semivolatile compounds reported in Table 3.

Table 1

## SUMMARY OF ANALYTICAL METHODS

Constituent	Method Reference	Method Description
Volatile Organic Compounds	Method 624 (1)	Purge and trap, gas chromatography/mass spectrometry
Semivolatile Organics - Acid Extractables	Method 625 (1)	Solvent extraction, gas chromatography/mass spectrometry
Semivolatile Organics - Base/Neutral Extractables	Method 625 (i)	Solvent extraction, gas chromatography/mass spectrometry

(1)U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

Table 2. Concentrations of Volatile Organic Compounds (Method 624<sup>1</sup>)

Client: John J. Riley Project No.: 84-026  
 Date Samples Received: January 11, 1984 Reported by: EL  
 Date Analysis Completed: January 30, 1984 Checked by: ~~OFF~~

Compound	Sample ID: CAA 13	Concentration (ug/l) <sup>2</sup>
		Wastewater: Midday 1/11/84 8400096
(2v) acetone		
(7v) acrylonitrile		
(41) benzene		
(5v) carbon tetrachloride		
(7v) chlorobenzene		
(10v) 1,2-dichloroethane		
(11v) 1,1,1-trichloroethane		
(13v) 1,1-dichloroethane		
(14v) 1,1,2-trichloroethane		
(15v) 1,1,2,2-tetrachloroethane		
(16v) chloroethane		
(19v) 2-chloroethylvinyl ether		
(23v) chloroform		
(29v) 1,1-dichloroethylene		
(30v) trans-1,2-dichloroethylene		
(32v) 1,2-dichloropropane		
(33v) trans-1,3-dichloropropene		
cis-1,3-dichloropropene		
(34v) ethylbenzene		
(44v) methylene chloride		
(45v) chloromethane		
(46v) bromomethane		
(47v) bromoform		
(48v) bromodichloromethane		
(49v) fluorotrichloromethane		
(50v) dichlorodifluoromethane		
(51v) chlorodibromomethane		
(85v) tetrachloroethylene		170
(86v) toluene		
(87v) trichloroethylene		TR(20)
(88v) vinyl chloride		
xylenes		TR(70)
Detection Limit		10

<sup>1</sup> U.S. EPA, 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

<sup>2</sup> Concentrations less than the detection limit are left blank. Concentrations between 1 and 10 times the detection limit are listed as trace levels (TR).

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Table 3. Concentration of Acid/Base/Neutral Extractables (Method 625<sup>1</sup>)

Client: John J. Riley

Report No.: 84-026

Date Samples Received: January 11, 1984

Reported by: AS

Date Analysis Completed: January 25, 1984

Checked by: *BT*

Compound	Sample ID: CAA ID:	Concentration - ug/l (ppb) <sup>2</sup>	Wastewater: Composite 1/11/84 J400096
----------	-----------------------	---	--

ACID COMPOUNDS

(21A) 2,4,6-trichlorophenol			
(22A) p-chloro-m-cresol			
(24A) 2-chlorophenol			
(31A) 2,4-dichlorophenol			
(34A) 2,4-dimethylphenol			
(57A) 2-nitrophenol			
(58A) 4-nitrophenol			
(59A) 2,4-dinitrophenol			
(60A) 4,6-dinitro-2-methylphenol			
(64A) pentachlorophenol			
(65A) phenol		2100	
Detection Limit		20	

BASE/NEUTRAL COMPOUNDS

(18) naphthalene			
(5B) benzidine			
(49) 1,2,4-trichlorobenzene			
(9B) hexachlorobenzene			
(12K) hexachloroethane			
(16S) bis (2-chloroethyl) ether			
(20B) 2-chloronaphthalene			
(25B) 1,2-dichlorobenzene		106	
(26B) 1,3-dichlorobenzene			
(27B) 1,4-dichlorobenzene			
(28B) 3,3'-dichlorobenzidine			
(35B) 2,4-dinitrotoluene			
(36B) 2,6-dinitrotoluene			
(37B) 1,2-diphenylhydrazine			
(39B) fluoranthene			
(40B) 4-chlorophenyl phenyl ether			
(41B) 4-bromophenyl phenyl ether			

000461

4. QUALITY ASSURANCE DOCUMENTATION

Certification

This work has been checked for accuracy by the following staff personnel:

Director, Organic  
Chemistry Laboratory

David L. Fiest

David L. Fiest

000463

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Table 3 (cont'd). Concentration of Acid/Base/Neutral Extractables (Method 625<sup>1</sup>)

Client: John J. Riley

Report No.: 84-026

Date Samples Received: January 11, 1984

Reported by: AS

Date Analysis Completed: January 25, 1984

Checked by: *DOT*

Compound	Sample ID: CAA ID:	Concentration - ug/l (ppb) <sup>2</sup>
		Wastewater: Composite 1/11/84 8400096
<b>BASIC NEUTRAL COMPOUNDS (cont'd)</b>		
(42B) bis (2-chloroisopropyl) ether		
(43B) bis (2-chloroethoxy) methane		
(52B) hexachlorocyclopentadiene		
(53B) hexachlorocyclopentadiene		
(54B) isophorone		
(55B) naphthalene		37
(56B) nitrobenzene		
(62B) N-nitrosodiphenylamine		
(63B) N-nitrosodipropylamine		
(66B) bis (2-ethylhexyl) phthalate		260
(67B) benzyl butyl phthalate		79
(68B) di-n-butyl phthalate		33
(69B) di-n-octyl phthalate		
(70B) diethyl phthalate		
(71B) dimethyl phthalate		
(72B) benzo(a)anthracene		
(73B) benzo(a)pyrene		
(74B) benzo(b)fluoranthene		
(75B) benzo(k)fluoranthene		
(76B) chrysene		
(77B) acenaphthylene		
(78B) anthracene		
(79B) benzo(ghi)perylene		
(80B) fluorene		
(81B) phenanthrene		
(82B) dibenzo(a,h)anthracene		
(83B) indeno(1,2,3-cd)pyrene		
(84B) pyrene		
2-methyl naphthalene		27
Detection Limit		20

<sup>1</sup>U.S. EPA, 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

<sup>2</sup>Concentrations less than the detection limit are left blank. Concentrations between 1 and 10 times the limit of detection are listed as trace levels (TR).

000462

US EPA ARCHIVE DOCUMENT

# JOHN J. RILEY COMPANY

LEATHER MANUFACTURERS

EST. 1910

228 SALEM STREET  
P.O. BOX 316  
WOBURN, MA 01801

TEL. (617) 933-5900

March 7, 1984

Mr. Wayne T. Grandin  
Metropolitan District Commission  
20 Somerset Street,  
Boston, Ma. 02108

Dear Wayne:

Pursuant to attachment B, entitled "Reporting Requirements", of our Industrial User Discharge Permit No. 43-000-602-2, we are enclosing our second discharge report.

The 24 hour flow record and grab sampling for volatile organic and extractable organic analyses were taken February 7, 1984. The laboratory analytical results were just received today.

It is our intention to do our third sampling sometime this week.

Sincerely yours,

JOHN J. RILEY CO., INC.

John J. Riley, Jr.

JJR:nd

000464

JOHN J. RILEY CO., INC.  
EFFLUENT FLOW MEASUREMENT AND ANALYTICAL SAMPLING RECORD  
(In Conformance With Industrial User Discharge Permit 43000602-2)

FLOW MEASUREMENT

<u>DATE</u>	<u>LOCATION</u>	<u>METHOD</u>	<u>TIME</u>	<u>CHART FULL-SCALE FLOWRATE *</u>	<u>OPERATOR</u>
1/10/84	Catch Basin	ISCO Model #1870 Flowmeter	12:00 <sup>A</sup> - 11:59 <sup>P</sup>	5.00 GPS	<i>Ruf</i>
2/7/84	"	" " "	12:00 <sup>A</sup> - 11:59 <sup>P</sup>	2.00 GPS	

\* per increment of 10,  
on 50 + 20, respectively.

ANALYTICAL SAMPLING

<u>DATE</u>	<u>LOCATION</u>	<u>METHOD</u>	<u>TIME</u>	<u>SAMPLED BY</u>	<u>ANALYSIS DATE</u>	<u>ANALYZED BY</u>	<u>PARAMETER</u>	<u>METHOD</u>
1/10/84	Catch Basin	Grab	11:30 <sup>A</sup>	<i>Ruf</i>	1/31/84	Cambridge Analytical	Volatile Organics	EPA #624
		Composite of 3	7:00 <sup>A</sup> 11:30 <sup>A</sup>	<i>Ruf</i> <i>Ruf</i>	1/31/84	Cambridge Analytical	Extractable Organics	EPA #625
		Grabs	2:50 <sup>P</sup>	<i>Ruf</i>				
2/7/84	"	Grab	11:05 <sup>A</sup>	<i>Ruf</i>	3/5/84	Cambridge Analytical	Volatile Organics	EPA #624
		Composite of 3	7:00 <sup>A</sup> 11:05 <sup>A</sup>	<i>Ruf</i> <i>Ruf</i>	3/5/84	Cambridge Analytical	Extractable Organics	EPA #625
		Grabs	2:40 <sup>P</sup>	<i>Ruf</i>				

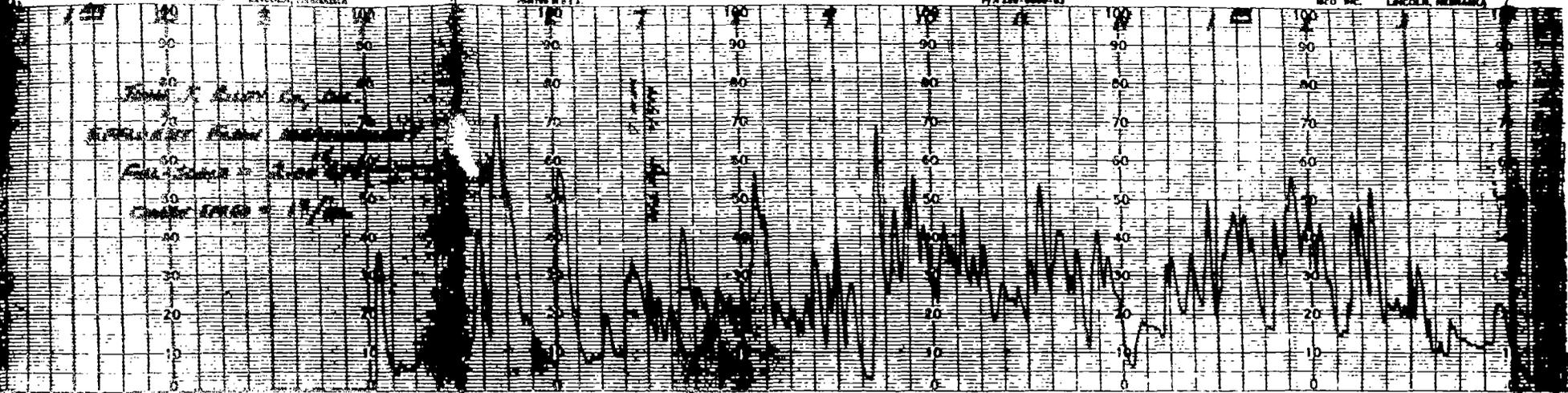
000465

REC'D P.C. LINCOLN, NEBRASKA

PHOTO 1011

4/2/55-000-03

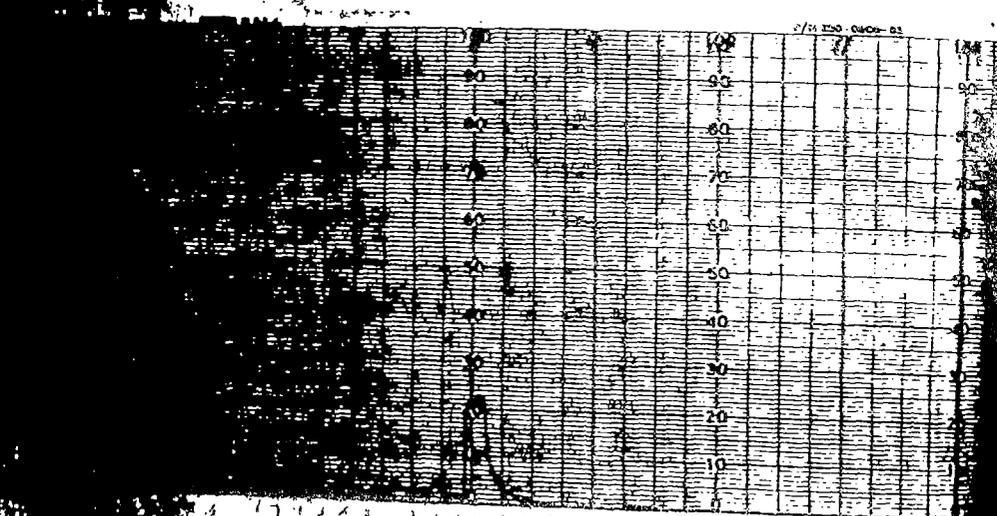
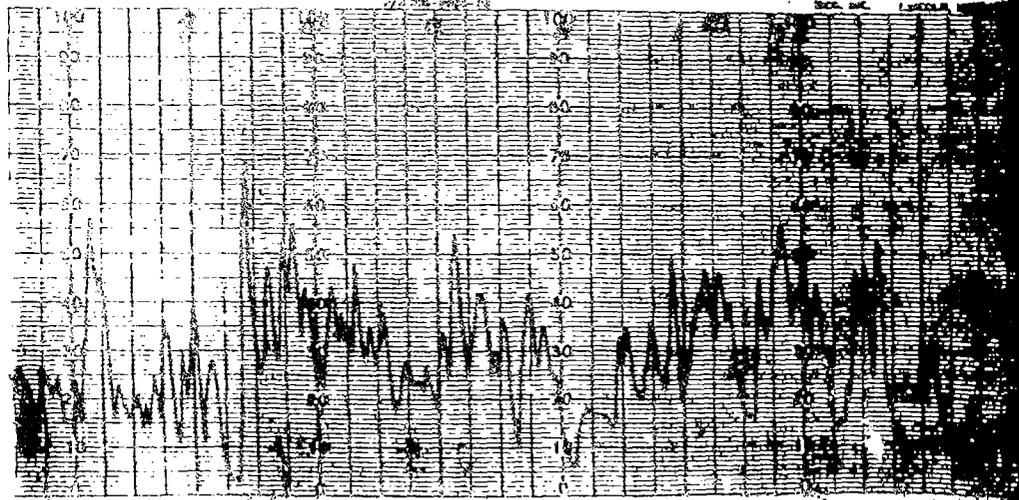
REC'D P.C. LINCOLN, NEBRASKA



38 P

220

000466



000000



# Cambridge Analytical Associates

222 Arsenal Street / Watertown, Massachusetts 02172 / (617)923-9376

## FORMAL REPORT OF ANALYSIS

PREPARED FOR: John J. Riley Co., Inc.  
228 Salem Street  
Woburn, MA 01801  
Attn: Dick Jones

CUSTOMER ORDER NUMBER: J-231

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

REPORT NUMBER: 84-154

DATE PREPARED: March 5, 1984

PREPARED BY: David L. Fiest

000468



Cambridge Analytical Associates

TABLE OF CONTENTS

1. INTRODUCTION
  
2. ANALYTICAL METHODS
  
3. RESULTS
  
4. QUALITY ASSURANCE DOCUMENTATION  
Certification

000469

## 1. INTRODUCTION

This report summarizes results of chemical analyses performed on samples received by CAA on February 8, 1983. Analytical methods employed for these analyses are described in Section 2 and results are presented in Section 3. The last section contains quality control data and certifications supporting the analytical results.

## 2. ANALYTICAL METHODS

Analytical methods utilized for sample analysis are summarized in Table 1.

## 3. RESULTS

Results of analyses are presented in Tables 2 and 3.

000470

Table 1

## Summary of Analytical Methods

Constituent	Method Reference	Method Description
Volatile Organic Compounds	Method 624 (1)	Purge and trap, gas chromatography/mass spectrometry
Semivolatile Organics-Acid Extractables	Method 625 (1)	Solvent extraction, gas chromatography/mass spectrometry
Semivolatile Organics-Base/Neutral Extractables	Method 625 (1)	Solvent extraction, gas chromatography/mass spectrometry

(1) U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

Table 2. Concentrations of Volatile Organic Compounds (Method 624<sup>1</sup>)

Client: John J. Riley, Co., Inc.

Project No.: 84-154

Date Samples Received: February 8, 1984

Reported by: EL

Date Analysis Completed: March 1, 1984

Checked by: SJE

Compound	Sample ID: CAA ID:	Concentration (ug/l) <sup>2</sup>
		Wastewater - midday 8400631
(2v) acrolein		
(3v) acrylonitrile		
(4v) benzene		
(6v) carbon tetrachloride		
(7v) chlorobenzene		
(10v) 1,2-dichloroethane		
(11v) 1,1,1-trichloroethane		TR (3)
(13v) 1,1-dichloroethane		
(14v) 1,1,2-trichloroethane		
(15v) 1,1,2,2-tetrachloroethane		
(16v) chloroethane		
(19v) 2-chloroethylvinyl ether		
(23v) chloroform		
(29v) 1,1-dichloroethylene		
(30v) trans-1,2-dichloroethylene		TR (9)
(32v) 1,2-dichloropropane		
(33v) trans-1,3-dichloropropene		
cis-1,3-dichloropropene		
(38v) ethylbenzene		TR (2)
(44v) methylene chloride		
(45v) chloromethane		
(46v) bromomethane		
(47v) bromoform		
(48v) bromodichloromethane		
(49v) fluorotrichloromethane		
(50v) dichlorodifluoromethane		
(51v) chlorodibromomethane		
(85v) tetrachloroethylene		58
(86v) toluene		
(87v) trichloroethylene		33
(88v) vinyl chloride		
xylenes		11
Detection Limit		1.0

<sup>1</sup>U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/ERSL, Cincinnati, Ohio.

<sup>2</sup>Concentrations less than the detection limit are left blank. Concentrations between 1 and 10 times the detection limit are listed as trace levels (TR).

Table 3 (cont'd). Concentration of Acid/Base/Neutral Extractables (Method 625<sup>1</sup>)

Client: Jonn J. Riley, Co., Inc.

Report No.: 84-154

Date Samples received: February 8, 1984

Reported by: *FD*

Date Analysis Completed: March 5, 1984

Checked by: *OFF*

Compound	Sample ID: CAA ID:	Concentration - ug/l (ppb) <sup>2</sup>
		Wastewater composite (2/7/84) 8400632
<b>BASE NEUTRAL COMPOUNDS (cont'd)</b>		
(428) bis (2-chloroisopropyl) ether		
(438) bis (2-chloroethoxy) methane		
(528) hexachlorobutadiene		
(538) hexachlorocyclopentadiene		
(548) isophorone		
(558) naphthalene		
(568) nitrobenzene		
(628) N-nitrosodiphenylamine		
(638) N-nitrosodipropylamine		
(668) bis (2-ethylhexyl) phthalate		8
(678) benzyl butyl phthalate		
(688) di-n-butyl phthalate		4
(698) di-n-octyl phthalate		
(708) diethyl phthalate		3
(718) dimethyl phthalate		
(728) benzo(a)anthracene		
(738) benzo(a)pyrene		
(748) benzo(b)fluoroanthene		
(758) benzo(k)fluoroanthene		
(768) chrysene		
(778) acenaphthylene		
(788) anthracene		
(798) benzo(ghi)perylene		
(808) fluorene		
(818) phenanthrene		
(828) dibenzo(a,h)anthracene		
(838) ideno(1,2,3-cd)pyrene		
(848) pyrene		
Detection Limit		2

<sup>1</sup>U.S. EPA, 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 800/4-82-057. EPA/ERSL, Cincinnati, Ohio.

<sup>2</sup>Concentrations less than the detection limit are left blank. Concentrations between 1 and 10 times the limit of detection are listed as trace levels (TR).

Table 3. Concentration of Acid/Base/Neutral Extractables (Method 625<sup>1</sup>)

Client: John J. Riley, Co., Inc.

Report No.: 84-154

Date Samples Received: February 8, 1984

Reported by: *FD*

Date Analysis Completed: March 5, 1984

Checked by: *DF*

Compound	Sample ID: CAA ID:	Concentration - ug/l (ppb) <sup>2</sup>
		Wastewater composite (2/7/84) 8400632
<u>ACID COMPOUNDS</u>		
(21A) 2,4,6-trichlorophenol		
(22A) p-chloro-m-cresol		
(24A) 2-chlorophenol		
(31A) 2,4-dichlorophenol		
(34A) 2,4-dimethylphenol		
(57A) 2-nitrophenol		
(58A) 4-nitrophenol		
(59A) 2,4-dinitrophenol		
(60A) 4,6-dinitro-2-methylphenol		
(64A) pentachlorophenol		
(65A) phenol		
Detection Limit		2

BASE/NEUTRAL COMPOUNDS

(18) acenaphthene		
(58) benzidine		
(88) 1,2,4-trichlorobenzene		
(98) hexachlorobenzene		
(128) hexachloroethane		
(188) bis (2-chloroethyl) ether		
(208) 2-chloronaphthalene		
(258) 1,2-dichlorobenzene		
(268) 1,3-dichlorobenzene		
(278) 1,4-dichlorobenzene		
(288) 3,3'-dichlorobenzidine		
(358) 2,4-dinitrotoluene		
(368) 2,6-dinitrotoluene		
(378) 1,2-diphenylhydrazine		
(398) fluoranthene		
(408) 4-chlorophenyl phenyl ether		
(418) 4-bromophenyl phenyl ether		

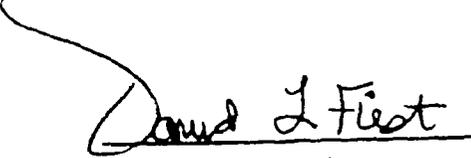
000473

4. QUALITY ASSURANCE DOCUMENTATION

Certification

This work has been checked for accuracy by the following staff personnel:

Director, Organic  
Chemistry Laboratory

  
David L. Fiest

000475

JOHN J. RILEY COMPANY

228 SALEM STREET

WOBURN, MASSACHUSETTS 01801

ORDER No. J-231

REQUISITION

Order From: Cambridge Analytical Associates, Inc.

Date: 2/8/84

Address: Attn: D. Fiest / E. Lawler

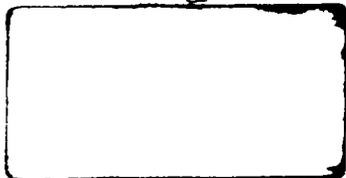
AMOUNT	UNITS	MATERIAL	ON HAND
1	(Two 40ml Bottles)	Wastewater Sample - Middle of Day 2/7/84 Determine Purgables (EPA #624)	
1	(One 1.0L Bottle)	Composite of Beginning, Middle, + End of Day 2/7/84 Wastewater Sample - Determine Base/Neutrals & Acid Extractables (EPA #625)	

Shipping Date: \_\_\_\_\_

Signature: [Signature]

Ordered By: Delivered by Ruf

Date: 2/8/84



No. 87-1405

---

---

United States Court of Appeals  
For the First Circuit

---

ANNE ANDERSON, ET AL.,  
PLAINTIFFS-APPELLANTS,

v.

BEATRICE FOODS CO.,  
DEFENDANT-APPELLEE.

---

ON APPEAL FROM A JUDGMENT OF THE UNITED STATES  
DISTRICT COURT FOR THE DISTRICT OF MASSACHUSETTS

---

BRIEF OF DEFENDANT-APPELLEE,  
BEATRICE FOODS CO.

---

JEROME P. FACHER  
NEIL JACOBS  
DONALD R. FREDERICO  
HALE AND DORR  
60 State Street  
Boston, MA 02109  
(617) 742-9100  
*Attorneys for Defendant-Appellee  
Beatrice Foods Co.*

WELLS GAN  
10-10

attempt to retry issues of fact which the jury and judge have already decided against the plaintiffs. Accordingly, under Fed. R. App. P. 28(b), Beatrice sets forth its Statement of Facts and also points out many of the deficiencies and improprieties in the plaintiffs' statement.

*Location and Characteristics of the 15 Acres and the Tannery—*

Between December 1978 and January 1983 (Tr. 18-60, 61), Beatrice owned 15 acres of unused property in Woburn bounded by the Boston & Maine railroad tracks and manufacturing businesses on the west, the 15-foot wide Aberjona River on the east (Tr. 5-24), a trucking company on the north (Tr. 10-17) and three "junk" businesses on the south: a used auto parts business (Aberjona Auto Parts), a barrel refurbishing business (Whitney Barrel Co.), and a waste oil business (Murphy Waste Oil) (Ex. P-678, p. 2 & fig. 2).

During the same period, Beatrice also owned a tannery on a parcel of land southwest of, and entirely separate from, the 15 acres (Tr. 19-13 to 15; 20-36 to 39; Ex. B-395). The tannery had conducted its operations in the same location for 70 years (Tr. 22-58, 59).

The tannery and the 15 acres are located in the Aberjona Valley which, in the north, has been populated by heavy industry and dumps. Many of these industries discharged their waste into the Aberjona River (Tr. 63-47 to 128) which flows and overflows along the eastern border of the 15 acres.

In 1964 the City of Woburn and the Commonwealth of Massachusetts approved the location of municipal wells G and H in the Aberjona Valley upstream northeast of the 15 acres (Exs. B-4, 5, 7, 8). Both wells are on the other side of the Aberjona River from the 15 acres (Tr. 4-13, 14).

The 15 acres is almost entirely flat (Tr. 49-31) and much of it is swampy (Tr. 20-74). There is no public road to the property (Tr. 19-41; 20-36 to 39), and the tannery has no legal access (Tr. 21-132, 133; 22-80; Ex. P-466). There was a narrow dirt road on the land portion of the property (Tr. 19-34, 35; 22-78). The Metropolitan District Commission (MDC) and the City of Woburn have sewer lines which travel the entire length of the

15 acres (Tr. 18-90; 19-51, 52; 22-27, 28). The City of Woburn owns a twenty foot wide strip of the 15 acres on which a section of its sewer line is located (Tr. 19-11, 12; Ex. B-391). The city and the MDC each have easements for access to and maintenance of their sewer lines (Tr. 19-51, 52; 22-80).

The tannery was not located on the 15 acres (Tr. 20-36 to 39). There was no manmade or other "drainage ditch" behind the tannery (Tr. 6-150, 151), and no drainage ditch connecting the 15 acres to the tannery (Tr. 18-85). A natural swale or gully existed which sometimes became part of a stream which started well north of the tannery, and continued in the rear of the tannery land through the property of the southern neighbors of the 15 acres and into the Aberjona River (Tr. 18-159, 160; 20-72). Neither the swale nor the stream were on or crossed the 15 acres (Tr. 18-85; 20-72). During the relevant period, the land portion of the 15 acres was densely overgrown with trees, bushes and forest growth (Tr. 18-90; 19-35, 36) and the dirt road was considerably narrower and less negotiable (Tr. 19-35; 22-78).

*History and Non-Use of the 15 Acres—*The 15 acres was purchased from the City of Woburn by the tannery in 1951 (Tr. 19-9) solely for the purpose of placing a well there (Tr. 19-12, 38, 39; 20-17). (The tannery already had a production well on tannery land—Tr. 18-155). The city had foreclosed on the unusable property for failure to pay taxes (Tr. 19-9, 10; 22-66). In 1958 the tannery installed a production well in the southwestern portion of the 15 acres (Tr. 20-18). The 15 acres served no purpose except as a location for this production well. Nothing else of value or interest to the tannery was on the 15 acres and no commercial or other activity was carried on there (Tr. 19-38, 39; 20-17). The tannery never disposed of chemicals on the property or permitted others to do so (Tr. 18-97, 122; 20-17, 42). The tannery never conducted any dumping activities, never operated a dump or disposal site (Tr. 18-97; 20-15, 17, 18), and never permitted anyone else to dump there (Tr. 19-39, 95; 20-17; 22-49, 50). The 15 acres was not leased to anyone and no one had permission to use it for any purpose (Tr. 19-38, 39).

*Tannery Operations and Lack of Use or Disposal of Complaint Chemicals*—The tannery never used trichloroethylene, the major complaint chemical, 1,2 trans-dichloroethylene or chloroform (which was ultimately dropped from the case) (Tr. 10-48, 128 to 130; 22-12, 13; 41-98). Tetrachloroethylene (also known as perchloroethylene) was used in minimal amounts for waterproofing army boots from June 1968 to early 1970 in a closed system from which there was no waste (Tr. 18-150, 151) and 1,1,1 trichloroethane was used in inconsequential amounts on a wiping rag.<sup>2</sup>

The tannery never disposed of any complaint chemicals on the property (Tr. 21-28, 29), and tannery waste or sludge did not contain complaint chemicals (Tr. 18-148 to 154; 19-48, 49, 73, 74, 84 to 87; 22-12, 13). Barrels or debris which may have been on the 15 acres in the period before August 1968 were not shown to have contained complaint chemicals (Tr. 8-33; 9-140; see also fn. 36 *infra*). During the pre-August 1968 period, or at any other time prior to the closing of the wells, the tannery was not aware of any allegedly dangerous chemical condition on its property (Tr. 20-17, 42 to 46, 74; 21-77, 78).

Tannery operations produced solid and liquid wastes which were not disposed of on the 15 acres (Tr. 19-143, 144; 21-29). There were no dangerous chemicals in tannery waste (Tr. 22-82). Tannery operations produced a grayish powder known as buffing dust, a harmless leather dust resulting from sanding natural leather (Tr. 18-158; 19-107, 108; 22-84 to 87). This dust might sometimes reach the swale or gully in the rear of the tannery (Tr. 22-84 to 87), and depending on the season and weather, be carried in a stream (Tr. 16-70, 71, 112, 113).

No object, material or anything else found on the 15 acres in 1985 was tannery waste or came from the tannery (Tr. 18-111 to 113; 21-28, 29). The EPA did not consider tannery waste hazardous (Tr. 13-57).

<sup>2</sup> Tetrachloroethylene was mixed with silicone in a curtain coater. Any of the mixture not absorbed by the leather would drop into a trough and be returned to the original container and continually reused (Tr. 19-73, 74, 77, 78, 87). The tannery also had one 5-gallon pail of 1,1,1 trichloroethane (Tr. 21-28, 29) which was used on a rag to wipe off embossing plates used at the tannery (Tr. 18-151, 152; 19-128 to 130). There was no waste from this process (Tr. 18-151 to 153).

*Lack of Knowledge and Foreseeability of Risk in the Relevant Period*—The tannery had no knowledge, nor could it foresee that any disposal of chemicals or any alleged chemical conditions on the 15 acres could affect wells G and H across the river or create any risk for users of water from those wells (Tr. 18-162, 163; 19-59; 22-67 to 69). The tannery was not aware of any such conditions and had never observed them (Tr. 18-97; 19-95; 20-17).

The normal flow of groundwater on the 15 acres was to the south, southeast, away from wells G and H (Tr. 59-16; Ex. P-678, p. 4) and continued south off the property. The normal groundwater flow did not cross the Aberjona River or reach the wells (Tr. 42-92 to 94; 59-16). The tannery was not aware of groundwater movement and direction on the 15 acres (Tr. 18-162, 163; 19-59; 22-67 to 69), and such groundwater movement and direction is not a matter of lay knowledge (Tr. 44-37).

The tannery had no knowledge, nor could it foresee, whether normal groundwater direction and movement could be radically altered by the pumping effect of wells G and H and the two tannery wells. The effect of these four wells, when pumping, on groundwater direction and movement on the 15 acres, as well as the existence of a river between wells G and H and the 15 acres, created a complex hydrogeological system on which not even experts could agree (Tr. 42-16). In order to determine groundwater direction and flow in such a system, a vast amount of testing and expert knowledge was required (Tr. 41-110, 111; 44-32 to 37; 45-60, 61; 75-57, 58).

The tannery had no special (or even lay) knowledge about groundwater flow or about contaminant travel through soil and groundwater (Tr. 19-59; 22-67 to 69). The tannery did not even know whether its wells drew from the same aquifer as wells G and H (Tr. 20-3 to 5, 106, 107). The importance of water to tanning operations or the existence of a well on the 15 acres did not give the tannery any such knowledge. Tannery personnel only rarely visited the 15 acres (Tr. 18-90 to 97; 19-89 to 95; 20-35 to 45, 74, 117, 118) and did not maintain, repair, test or frequently visit the well there (Tr. 20-96).

The existence of laws or regulations about public health in general or pollution of surface waters did not provide the tannery with knowledge of groundwater direction and movement on the 15 acres (Tr. 22-57, 58, 67, 68). There was no land taking of any part of the 15 acres (Tr. 20-78 to 84; 22-2 to 7), and correspondence in 1956 (eight years before wells G and H were even in existence) about tannery sludge did not discuss or refer to groundwater direction and flow or to the disposal of chemicals on the 15 acres (Ex. P-652; Tr. 22-21).

In August 1968, D. L. Maher Co., the company which installed and tested the tannery well (Tr. 20-88, 89, 96, 97; 22-67, 68), wrote the tannery that both the city wells and the tannery wells were "affecting" the static water table in the southern part of the 15 acres (Ex. P-454). This letter had no particular significance to the tannery (Tr. 22-67, 68). The letter did not mention or relate to direction of groundwater flow (Ex. P-454). Depth of static water table is entirely different from groundwater flow or direction (Tr. 59-11, 12; 68-77, 78).

*No Foreseeability by City and State Officials*—Before the locations of wells G and H were approved near the 15 acres, public and private engineers from Woburn and the Commonwealth conducted sanitary surveys and pump tests, analyzed the water and concluded there were no immediate sources of pollution in the general area (Exs. B-4, 5, 7, 8). These officials, who were aware that the 15 acres and the tannery were nearby, recommended the wells' location in the area (Exs. B-4, 5, 7).

The Woburn City Engineer whose duties included protecting the public water supply, visited the 15 acres during the 1970's and observed no contamination which might affect the wells (Tr. 57-105, 107, 108). He also believed that the river constituted a natural barrier into which both the surface water and groundwater flowed (Tr. 57-104).

The 15 acres was also inspected during the early 1970's by engineers specifically assigned to find direct and potential sources of pollution of the Aberjona River (Tr. 63-4 to 14, 22 to 24, 42 to

44; 64-4, 5, 7, 108). They saw no evidence of disposal which caused them to believe there was any danger to the wells from the 15 acres (Tr. 64-5, 7, 13, 95, 108 to 110). They identified 114 different sources of pollution but neither the tannery nor the 15 acres was included (Exs. B-790, G-258; Tr. 64-13).

In 1978, less than a year before wells G and H were closed, the City of Woburn received approval of its request to install another well between wells G and H (Tr. 57-94). A private engineering firm had conducted pump tests and analyzed the chemical quality of the water and the capacity of the area around wells G and H (Tr. 57-94 to 101, 113-116; Exs. B-58, 780). The firm recommended that another well be installed between wells G and H (Ex. B-58). The Massachusetts Department of Environmental Quality Engineering (DEQE) also inspected the area surrounding the new well site for sources of pollution and determined that there were none (Tr. 57-94 to 97).

The city and Commonwealth approved the new well site in the same area near the 15 acres where wells G and H were already located (Tr. 57-113 to 116; Exs. B-64, 776, 780). These officials did not foresee that anything on the 15 acres would or could affect wells G and H or the newly proposed well I. They would not have recommended the location of the new well I had the 15 acres posed any threat to the wells (Tr. 46-78, 79).

For economic reasons, the city ultimately decided not to proceed with the approved new well I (Tr. 57-100).

*No Ability of Technology To Detect Complaint Chemicals*—In the period before August 27, 1968, neither private parties nor public agencies could detect, know or be aware whether any complaint chemicals were in the soil or groundwater. State agencies, which regularly tested the wells, were unable to detect these chemicals because no technology was available to do so before 1979 (Tr. 55-28 to 35; 57-111 to 113; 63-60 to 65; Ex. B-31). The EPA guidelines for tests for the complaint chemicals were not published until December, 1979 (Tr. 55-35).



## SCS ENGINEERS, INC.

11800 Sunrise Valley Drive  
Reston, Virginia 22091  
Telephone: (703) 620-3677

ROBERT P. STEARNS, PE  
E. T. CONRAD, PE  
CURTIS J. SCHMIDT, PE

September 23, 1975  
File No. 6175

Mr. John Riley  
John J. Riley  
228 Salem Street  
Woburn, Massachusetts 01801

Subject: Assessment of Industrial Hazardous Waste Practices of  
the Leather Tanning and Finishing Industry, EPA  
Contract No. 68-01-3261

Dear Mr. Riley:

Enclosed is a copy of the plant visit data collection form which we completed during our visit on September 11, 1975. To insure that our interpretation of the information you furnished us with is correct, I would appreciate it if you could find the time to review the comment on this enclosure.

In a letter from EPA, dated August 18, 1975, we were informed by the Hazardous Waste Management Division of EPA that the Freedom of Information Act requires that any information contained in trip reports (such as this one) must be made available to the public upon request unless one of the following criteria is applicable:

1. This information is not routinely disclosed by the plant.
2. Disclosure would effect the plants competitive advantage.
3. Based upon contractors assessment whether disclosure might impede EPA's ability to acquire such data in the future.

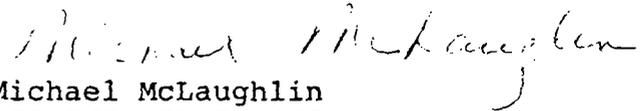
As a result, we would like you to make a note on the enclosed form of information which meets any one of these criteria and which you would prefer not to have made public.

We greatly appreciate your cooperation in this project. I think

Mr. John Riley  
September 23, 1975  
Page 2

we all learned a great deal during our visit with you that will help to do the best job possible on the project as a whole. If you have questions, don't hesitate to give us a call.

Very truly yours,

  
Michael McLaughlin  
SCS ENGINEERS, INC.

cc: Allen Pearce

MM:rd

**S**cientific  
Services  
since 1922

CHEMICAL • PHYSICAL  
ELECTRICAL • BACTERIOLOGICAL

**TECHNICAL REPORT**  
prepared for

JOHN J. RILEY COMPANY

CASE NO. 12121

---

**skinner & sherman laboratories inc.**

New England Laboratories

000445

TECHNICAL REPORT

25 September 1979

Page 1 of 2

CLIENT: John J. Riley Company  
228 Salem Street  
Woburn, MA 01801

Attention: Mr. Charles J. Sheehan

CASE NO: 12121

REFERENCE: Purchase Order No. 944

PROJECT DESCRIPTION:

To analyze one (1) sample of water.

SAMPLE IDENTIFICATION:

Unmarked polyethylene bottle. (#2 well from hose e\*1 color well)

METHODS OF TESTS:

1. Standard Methods for the Examination of Water and Wastewater, 14th Edition, 1975.
2. Atomic Absorption Spectroscopy.
3. Gas Chromatography-Mass Spectroscopy Analysis.

RESULTS OF ANALYSIS:

	<u>Parts per million</u>
Total solids	416.0
Hardness - CaCO <sub>3</sub>	122.0
Arsenic	<0.01
Chromium	<0.01
Lead	<0.025

	<u>Parts per billion</u>
Trichloroethylene (by volume)	175

Also detected:

Dichloromethane	600
Dichloroethylene	40
Trichloroethane	225

This report is rendered upon all of the following conditions. This report is not to be reproduced wholly or in part without special permission in writing. Total liability is limited to the invoiced amount. Skinner & Sherman, Inc., Skinner & Sherman Laboratories, Inc., and/or New England Laboratories name and/or logos may not be used in conjunction with the contents of this report in any advertising media. The results listed refer only to tested samples and applicable parameters. Product endorsement is neither inferred nor implied. Samples are held for thirty days following issuance of report. Samples will be stored at client's expense, if authorized in writing.

25 September 1979

Page 2 of 2

CLIENT: John J. Riley Company

CASE NO: 12121

Note: The sensitivity limit for trichloroethylene and other chemical contaminants is one part per billion by volume.

Respectfully submitted,

SKINNER & SHERMAN LABORATORIES, INC.

*Sidonie Herzfeld*

Sidonie Herzfeld, Ph.D.  
Chemist

SH/lis

*11/20 label from Dr Herzfeld to JS  
57806 Cl-organics total might be  
available drinking water, but not this water  
at 104-806.*

This report is rendered upon all of the following conditions: This report is not to be reproduced wholly or in part without special permission in writing. Total liability is limited to the invoiced amount. Skinner & Sherman, Inc., Skinner & Sherman Laboratories, Inc., and/or New England Laboratories name and/or logos may not be used in conjunction with the contents of this report in any advertising media. The results listed refer only to tested samples and applicable parameters. Product endorsement is neither inferred nor implied. Samples are held for thirty days following issuance of report. Samples will be stored at client's expense, if authorized in writing.

US EPA ARCHIVE DOCUMENT

To: Mr. Jim Mee Elroy  
Shinner and Shinner  
332-8300

Sept 13, 1979

Thank you for picking up the sample I  
am sorry I am not here to meet you.

As we discussed please analyze the water  
sample for:

Verbal report 9/28 pH

TS 460 ppm turb.

122.0

hardness (temporary and permanent)

<0.01 ppm

Arsenic

<0.025 ppm

Lead

dichloromethane 600 ppb

<0.01 ppm

Chromium

dichloroethylene 40 ppb

by vol. 175 ppb

trichloroethylene

trichloroethane 225

Thank you If you have any questions, please call.

Charles Shinner

No. 2 Well from house at #1 Cole street

000448

## Well Water & Sludge Samples Drawn 5/27/82

- ① Well Water Sample #1  
From #1 Well. Well was run for a period exceeding 7 hours on 5/25/82 & 5/26/82 to purge. Then run 30' or so just prior to sampling from pipe coming out of back side of well house
- ② Well Water Sample #2  
From #2 Well. Sampled at the well
- ③ Sludge Sample #1  
A 50/50 composite from old lagoons area:
  - (a) low area, from 30" hole
  - (b) Higher area, nearer street, from 12" hole
- ④ Sludge Sample #2  
A 50/50 composite from in back of catch basin:
  - (a) From middle of area, halfway down hill, from 24" hole
  - (b) From area near bottom of hill, near well house, from 24" hole
- ⑤ Sludge Sample #3  
near Riley/Whitney line, SW of Well house #2, from 24" hole
- ⑥ Sludge Sample #4  
near Riley/Whitney line, S of Well house #2, from 18" hole

Samples placed under refrigeration until delivered to Skinner & Sherman later in the day by Ruf. Report will take 10 days to analyze.

Requested they check for 6 volatiles\* in items ① ② ③ ④, and all volatiles on items ⑤, ⑥.

\* 6 volatiles:  
Trichloroethylene  
Tetrachloroethylene  
1-2 trans Dichloroethylene  
1,1,1 Trichloroethane  
Benzene  
Chloroform

Notes: When taking item ⑤, Sledge sample #3, noted definite below ground water movement from S → N.

5/24/82

Well Water Analyzes  
Sherman + Sherman  
890 - 7200

---

Dr. Hardean Oatwell not there.

his Sontheimer will call back re sampling procedure necessary on inactive (#1) well.

Later - need to know well pipe diameter, depth, + approx GPM. Advised them it was 10" d, 40' deep, + ca. 350 GPM. Will call back re purge time.

Walter Sorenson sent to get 6 "Septum" Sampling Vials O.K. to use any clean wide mouth bottles for sludge samples; do not put plastic over top under lid.

Sampling Procedure (per his Sontheimer)

- ① Purge well for 30 mins
- ② Rinse bottle out in water to be sampled
- ③ Fill to very top, do not agitate
- ④ Keep refrigerated until delivered.

J.G. to purge well on 5/25/82. Will sample in J.G.'s presence on 5/26/82. Also take sludge samples at that time, checking for 6 H<sub>2</sub>O + Cr, Cd, Pb



# ecology and environment, inc.

30 EAST CUMMINGS PARK, WOBURN, MASSACHUSETTS 01801, TEL. 617-935-0228

International Specialists in the Environmental Sciences

May 20, 1982

Mr. John J. Riley  
228 Salem Street  
Woburn, Massachusetts 01801

Dear Mr. Riley:

Attached are the analyses you requested during our phone conversation earlier today.

Sincerely,

David K. Cook

Enclosures

DKC/ja

— RECAP —

12/23/80

Well Water Analysis  
Mead Technology Laboratory

Well 439  
Sample 3072  
Depth 24 (10/23/80)  
Bedwell #1

Well 6  
Sample 3073  
Depth 24 (10/23/80)  
Non Well (#2)

1,1,1-Trichloroethane	28	ug/l (ppb)	133	ug/l (ppb)
1,2-Dichloroethane	12		110	
Trichloroethylene	53		1372	
Tetrachloroethylene	0		28	
Chlorobenzene	< 10		0	

Acme

LABORATORY NAME MEAD TECHNOLOGY LABORATORY

J. I. Riley - ~~W. J. Well~~  
W. J. Well

SAMPLE ID NO. 2072

REPORT NO. 24

DEC 23 1980 W 439

COMPOUND	ug/l
acrolin	ND
acrylonitrile	ND
benzene	ND
carbon tetrachloride	ND
cyclohexane	*
1,2-dichloroethane	ND
1,1,1-trichloroethane	23
1,1-dichloroethane	ND
1,1,2-trichloroethane	ND
1,1,2,2-tetrachloroethane	ND
chloroethane	ND
chloroacetylene vinyl ether	ND
chloroform	ND
1,1-dichloroethylene	ND
1,2-trans-dichloroethylene	42
1,2-dichloropropane	ND
1,3-dichloropropylene	ND
ethylbenzene	ND
ethylene chloride	ND
methyl chloride	ND
methyl bromide	ND
bromoform	ND
dichlorobromomethane	ND
dichlorofluoromethane	ND
dichlorodifluoromethane	ND
chlorodibromomethane	ND
tetrachloroethylene	ND
styrene	ND
1,1-difluoroethylene	53
vinyl chloride	ND

PESTICIDES	ug/l
89P aldrin	ND
90P dieldrin	ND
91P chlordane	ND
92P 4,4'-DDT	ND
93P 4,4'-DDE	ND
94P 4,4'-DDD	ND
95P $\alpha$ -endosulfan	ND
96P $\beta$ -endosulfan	ND
97P endosulfan sulfate	ND
98P endrin	ND
99P andrin aldehyde	ND
100P heptachlor	ND
101P heptachlor epoxide	ND
102P $\alpha$ -BHC	ND
103P $\beta$ -BHC	ND
104P $\gamma$ -BHC	ND
105P $\delta$ -BHC	ND
106P PCB-1242	ND
107P PCB-1254	ND
108P PCB-1271	ND
109P PCB-1232	ND
110P PCB-1248	ND
111P PCB-1260	ND
112P PCB-1016	ND
113P toxaphene	ND

DIOXINS

129B 2,3,7,8-tetrachlorodibenzo-p-dioxin

\*Less than 10 ug/l  
(pesticides less than 10 ug/l)

US EPA ARCHIVE DOCUMENT

Sample Number  
A 0130

ORGANICS ANALYSIS DATA SHEET - Page 2

LABORATORY NAME ENERGY RESOURCES CO. INC.  
 LAB SAMPLE ID NO. 25-055  
 QC REPORT NO. ERCO #3

* VOLATILES		ug/l	PESTICIDES		ug/l
2V	acrolein	ND	89P	aldrin	ND
3V	acrylonitrile	ND	90P	dieldrin	ND
4V	benzene		91P	chlordane	ND
5V	carbon tetrachloride		92P	4,4'-DDT	ND
7V	chlorobenzene		93P	4,4'-DDE	ND
10V	1,1-dichloroethane		94P	4,4'-DDD	ND
11V	1,1,1-trichloroethane		95P	α-endosulfan	ND
13V	1,1-dichloroethane		96P	β-endosulfan	ND
14V	1,1,2-trichloroethane		97P	endosulfan sulfate	ND
13V	1,1,2,2-tetrachloroethane		98P	endrin	ND
15V	chloroethane		99P	endrin aldehyde	ND
19V	2-chloroethylvinyl ether		100P	heptachlor	NE
23V	chloroform		101P	heptachlor epoxide	ND
29V	1,1-dichloroethylene		102P	β-BHC	ND
30V	1,2-trans-dichloroethylene		103P	γ-BHC	ND
35V	1,2-dichloropropane		104P	δ-BHC	ND
37V	1,3-dichloropropane		105P	γ-BHC	ND
38V	ethylbenzene		106P	PCB-1242	ND
43V	methylene chloride		107P	PCB-1254	ND
33V	methyl chloride		108P	PCB-1221	ND
44V	methyl bromide		109P	PCB-1232	ND
47V	bromoform		110P	PCB-1248	ND
48V	dichlorobromomethane		111P	PCB-1260	ND
49V	trichlorofluoromethane		112P	PCB-1016	ND
50V	dichlorodifluoromethane		113P	toxaphene	ND
51V	chlorodibromomethane				
53V	tetrachloroethylene				
56V	toluene				
57V	trichloroethylene				
52V	vinyl chloride				

DIOXINS

125B 2,3,7,8-tetrachlorodibenzo-  
e-dioxin ND

\*Less than 10 ug/l  
(pesticides less than 0.1 ug/l)

\* All volatiles except for acrolein & acrylonitrile are not applicable.

recycled paper

NEI & Not detrimental and environment, Inc.

Sample Number

A 0130

ORGANICS ANALYSIS DATA SHEET

LABORATORY NAME: ENERGY RESOURCES CO. INC. W 439

LAB SAMPLE ID NO. 25-055

QC REPORT NO. ERCO #3

ACID COMPOUNDS		ug/l	BASE/NEUTRAL COMPOUNDS		ug/l
21A	2,4,6-trichlorophenol	ND	41B	4-bromophenyl phenyl ether	ND
22A	p-chloro-m-cresol	ND	42B	bis(2-chloroisopropyl) ether	ND
23A	2-chlorophenol	ND	43B	bis(2-chloroethoxy) methane	ND
31A	2,4-dichlorophenol	ND	52B	hexachlorobutadiene	ND
32A	2,4-dimethylphenol	ND	53B	hexachlorocyclopentadiene	ND
37A	2-nitrophenol	ND	54B	isophorone	ND
38A	4-nitrophenol	ND	55B	naphthalene	ND
39A	2,4-dinitrophenol	ND	56B	nitrobenzene	ND
45A	4,6-dinitro-o-cresol	ND	61B	N-nitrosodimethylamine	ND
46A	pentachlorophenol	ND	62B	N-nitrosodiphenylamine	ND
47A	phenol	ND	63B	N-nitrosodi-n-propylamine	ND
BASE/NEUTRAL COMPOUNDS			66B	bis(2-ethylhexyl) phthalate	*
1B	acenaphthene	ND	67B	butyl benzyl phthalate	ND
2B	benzidine	ND	68B	di-n-butyl phthalate	*
3B	1,2,4-trichlorobenzene	ND	69B	di-n-octyl phthalate	ND
8B	hexachlorobenzene	ND	70B	diethyl phthalate	ND
12B	hexachloroethane	ND	71B	dimethyl phthalate	ND
18B	bis(2-chloroethyl) ether	ND	72B	benzo(a)anthracene	ND
20B	2-chloronaphthalene	ND	73B	benzo(a)pyrene	ND
25B	1,2-dichlorobenzene	ND	74B	3,4-benzofluoranthene	ND
26B	1,3-dichlorobenzene	ND	75B	benzo(k)fluoranthene	ND
27B	1,4-dichlorobenzene	ND	76B	chrysene	ND
28B	3,3'-dichlorobenzidine	ND	77B	acenaphthylene	ND
35B	2,4-dinitrotoluene	ND	78B	anthracene	ND
36B	2,6-dinitrotoluene	ND	79B	benzo(g,h,i)perylene	ND
37B	1,2-diphenylhydrazine (as azobenzene)	ND	80B	fluorene	ND
39B	fluoranthene	ND	81B	phenanthrene	ND
40B	4-chlorophenyl phenyl ether	ND	82B	diBenzo(a,h)anthracene	ND
			83B	indeno(1,2,3-cd)pyrene	ND
			84B	pyrene	ND

INORGANICS ANALYSIS DATA SHEET

585- 76

LABORATORY NAME Versar Inc. SAMPLE NO. MA 8023  
LAB SAMPLE ID NO. 7679 QC REPORT NO. \_\_\_\_\_

TASK 1 (Elements to be identified and measured)

1. Aluminum	<u>450.</u>	ug/l	10. Nickel	<u>&lt;20.</u>	ug/l
2. Chromium	<u>410.</u>		11. Manganese	<u>1,200.</u>	
3. Barium	<u>83.</u>		12. Zinc	<u>43.</u>	
4. Beryllium	<u>42.</u>		13. Boron	<u>108.</u>	
5. Cadmium	<u>45.</u>		14. Vanadium	<u>410.</u>	
6. Cobalt	<u>410.</u>		15. Calcium	<u>69,700.</u>	
7. Copper	<u>420.</u>		16. Magnesium	<u>9,900.</u>	
8. Iron	<u>134.</u>		17. Sodium	<u>220,000.</u>	
9. Lead	<u>440.</u>				

TASK 2 (Elements to be identified and measured)

1. Arsenic	<u>&lt;10.</u>	ug/l	5. Mercury	<u>&lt;1.</u>	ug/l
2. Antimony	<u>&lt;20.</u>		6. Tin	<u>&lt;20.</u>	
3. Selenium	<u>&lt;10.</u>		7. Silver	<u>&lt;20.</u>	
4. Thallium	<u>&lt;10.</u>				

TASK 3 (Elements to be identified and measured)

1. Ammonia	<u>mg/l</u>	4. Cyanide	<u>mg/l</u>
2. Fluoride	<u>mg/l</u>	5. pH	<u>Units</u>
3. Sulfide	<u>mg/l</u>	6. TOC	<u>mg/l</u>

COMMENTS:

- with a detection limit of
- with a detection limit of
- with a detection limit of
- analyzed on a sample aliquot preserved with HCl
- average of two replicate determinations

LABORATORY NAME MEAD TECHNOLOGY LABORATORY

J.S. Riley - ~~XXXXXXXXXX~~  
New Well  
C 27  
W-6

SAMPLE ID NO. 3073

REPORT NO. 24

COMPOUNDS	ug/l
acetylene	ND
acrylonitrile	ND
benzene	ND
carbon tetrachloride	ND
chlorobenzene	ND
1,1-dichloroethane	ND
1,1,1-trichloroethane	133
1,1-dichloroethane	ND
1,1,2-trichloroethane	ND
1,1,2,2-tetrachloroethane	ND
chloroethane	ND
2-chloroethyl vinyl ether	ND
chloroform	ND
1,1-dichloroethylene	ND
1,2-trans-dichloroethylene	116
1,2-dichloropropane	ND
1,3-dichloropropylene	ND
cyclohexane	ND
methylene chloride	ND
methyl chloride	ND
methyl bromide	ND
bromoform	ND
dichlorobromomethane	ND
trichlorofluoromethane	ND
dichlorodifluoromethane	ND
chlorodibromomethane	ND
tetrachloroethylene	28
toluene	ND
1,1-dichloroethylene	1372
vinyl chloride	ND

PESTICIDES	ug/l
89P aldrin	ND
90P dieldrin	ND
91P chlordane	ND
92P 4,4'-DDT	ND
93P 4,4'-DDE	ND
94P 4,4'-DDD	ND
95P $\alpha$ -endosulfan	ND
96P $\beta$ -endosulfan	ND
97P endosulfan sulfate	ND
98P endrin	ND
99P endrin aldehyde	ND
100P heptachlor	ND
101P heptachlor epoxide	ND
102P $\alpha$ -BHC	ND
103P $\beta$ -BHC	ND
104P $\gamma$ -BHC	ND
105P $\delta$ -BHC	ND
106P PCB-1242	ND
107P PCB-1254	ND
108P PCB-1221	ND
109P PCB-1232	ND
110P PCB-1248	ND
111P PCB-1260	ND
112P PCB-1016	ND
113P toxaphene	ND

DIOXINS

129B 2,3,7,8-tetrachlorodibenzo-p-dioxin

\*Less than 10 ug/l  
(pesticides less than 1 ug/l)

## ORGANICS ANALYSIS DATA SHEET - Page 2

LABORATORY NAME ENERGY RESOURCES CO., INC.

LAB SAMPLE ID NO. 25-056

QC REPORT NO. ERCO #3

* VOLATILES		ug/l	PESTICIDES		ug/l
2V	acrolein	ND	89P	aldrin	ND
3V	acrylonitrile	ND	90P	dieldrin	ND
4V	benzene		91P	chlordane	ND
4V	carbon tetrachloride		92P	4,4'-DDT	ND
7V	chlorobenzene		93P	4,4'-DDE	ND
10V	1,2-dichloroethane		94P	4,4'-DDD	ND
11V	1,1,1-trichloroethane		95P	$\alpha$ -endosulfan	ND
13V	1,1-dichloroethane		96P	$\beta$ -endosulfan	ND
14V	1,1,2-trichloroethane		97P	endosulfan sulfate	ND
13V	1,1,2,2-tetrachloroethane		98P	endrin	ND
15V	chloroethane		99P	endrin aldehyde	ND
16V	2-chloroethylvinyl ether		100P	heptachlor	ND
23V	chloroform		101P	heptachlor epoxide	ND
29V	1,1-dichloroethylene		102P	$\delta$ -BHC	ND
30V	1,2-trans-dichloroethylene		103P	$\epsilon$ -BHC	ND
32V	1,2-dichloropropane		104P	$\zeta$ -BHC	ND
33V	1,3-dichloropropane		105P	$\eta$ -BHC	ND
34V	ethylbenzene		106P	PCB-1252	ND
34V	methylene chloride		107P	PCB-1254	ND
35V	methyl chloride		108P	PCB-1221	ND
36V	methyl bromide		109P	PCB-1232	ND
47V	bromoform		110P	PCB-1258	ND
63V	dichlorobromomethane		111P	PCB-1260	ND
69V	trichlorofluoromethane		112P	PCB-1016	ND
30V	dichlorodifluoromethane		113P	toxaphene	ND
31V	chlorodibromomethane				
33V	tetrachloroethylene				
36V	toluene				
47V	trichloroethylene				
11V	vinyl chloride				
			DIOXINS		
			125B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND

\* Less than 10 ug/l  
(pesticides less than 0.1 ug/l)

ND = Not detected  
ecology and environment, inc.

\* All volatiles except for acrolein & acrylonitrile are not applicable.

recycled paper

Sample Number  
 A 0131

ORGANICS ANALYSIS DATA SHEET

LABORATORY NAME ENERGY RESOURCES CO. INC.

Well 6

LAB SAMPLE ID NO. 25-056

QC REPORT NO. ERCO #3

ACID COMPOUNDS

ug/l

BASE/NEUTRAL COMPOUNDS

ug/l

21A	2,4,6-trichlorophenol	ND
22A	p-chloro-m-cresol	ND
23A	2-chlorophenol	ND
31A	2,4-dichlorophenol	ND
32A	2,4-dimethylphenol	ND
57A	2-nitrophenol	ND
58A	4-nitrophenol	ND
60A	2,4-dinitrophenol	ND
60A	4,6-dinitro-o-cresol	ND
64A	pentachlorophenol	ND
65A	phenol	ND

41B	4-bromophenyl phenyl ether	ND
42B	bis(2-chloroisopropyl) ether	ND
43B	bis(2-chloroethoxy) methane	ND
52B	hexachlorobutadiene	ND
53B	hexachlorocyclooctadiene	ND
54B	isophorone	ND
55B	naphthalene	ND
56B	nitrobenzene	ND
61B	N-nitrosodimethylamine	ND
62B	N-nitrosodiphenylamine	ND
63B	N-nitrosodi-n-propylamine	ND
66B	bis(2-ethylhexyl) phthalate	ND
67B	butyl benzyl phthalate	ND
68B	di-n-butyl phthalate	ND
69B	di-n-octyl phthalate	ND
70B	diethyl phthalate	ND
71B	dimethyl phthalate	ND
72B	benzo(a)anthracene	ND
73B	benzo(a)pyrene	ND
74B	3,4-benzofluoranthene	ND
75B	benzo(k)fluoranthene	ND
76B	chrysene	ND
77B	acenaophthylene	ND
78B	anthracene	ND
79B	benzo(ghi)perylene	ND
80B	fluorene	ND
81B	phenanthrene	ND
82B	dibenzo(a,h)anthracene	ND
83B	indeno(1,2,3-cd)pyrene	ND
84B	pyrene	ND

BASE/NEUTRAL COMPOUNDS

10	acenaophthene	ND
9	benzidine	ND
88	1,2,4-trichlorobenzene	ND
99	hexachlorobenzene	ND
120	hexachloroethane	ND
138	bis(2-chloroethyl) ether	ND
208	2-chloronaphthalene	ND
258	1,2-dichlorobenzene	ND
268	1,3-dichlorobenzene	ND
278	1,4-dichlorobenzene	ND
288	3,3'-dichlorobenzidine	ND
358	2,4-dinitrotoluene	ND
368	2,6-dinitrotoluene	ND
378	1,2-diphenylhydrazine (as azobenzene)	ND
398	fluoranthene	ND
408	4-chlorophenyl phenyl ether	ND

INORGANICS ANALYSIS DATA SHEET

585- 76

LABORATORY NAME Versar Inc.

SAMPLE NO. MA 8024

LAB SAMPLE ID NO. 7680

QC REPORT NO. \_\_\_\_\_

TASK 1 (Elements to be identified and measured)

		ug/l			ug/l
1.	Aluminum	< 50.	10.	Nickel	< 20
2.	Chromium	< 10.	11.	Manganese	410.
3.	Barium	19.	12.	Zinc	< 10.
4.	Beryllium	< 7.	13.	Boron	85.
5.	Cadmium	< 5.	14.	Vanadium	< 10.
6.	Cobalt	< 10.	15.	Calcium	32,600.
7.	Copper	< 20.	16.	Magnesium	6,800.
8.	Iron	490.	17.	Sodium	71,500.
9.	Lead	< 40.			

TASK 2 (Elements to be identified and measured)

		ug/l			ug
1.	Arsenic	< 10.	5.	Mercury	< 1.
2.	Antimony	< 20.	6.	Tin	< 20.
3.	Selenium	< 10.	7.	Silver	< 20.
4.	Thallium	< 10.			

TASK 3 (Elements to be identified and measured)

1.	Ammonia	mg/l	4.	Cyanide	
2.	Fluoride	mg/l	5.	pH	
3.	Sulfide	mg/l	6.	TOC	

COMMENTS:

- a) with a detection limit of
- b) with a detection limit of
- c) with a detection limit of
- d) analyzed on a sample aliquot preserved with HCl
- e) average of two replicate determinations



Cambridge Analytical Associates

222 Arsenal Street / Watertown, Massachusetts 02172 / (617)923-9376

March 30, 1983

Mr. Richard Jones  
John J. Riley Co.  
228 Salem Street  
Woburn, Mass. 01801

Dear Mr. Jones:

On March 22, 1983, Cambridge Analytical Associates Inc. received 3 samples for volatile organics analysis by EPA method 624 (GC/MS). These analyses were completed on March 24, 1983. The results of these tests are listed in the enclosed table.

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

Sincerely,

A handwritten signature in cursive script that reads "Edward A. Lawler". The signature is written in black ink and is positioned above the typed name.

Edward A. Lawler  
Senior Analytical Chemist

Table 1: Concentrations of Volatile Organic Compounds (Method 624<sup>1</sup>)

Client: John J. Riley Co., Inc.  
 Date Samples Received: 3/22/83  
 Date Samples Completed: 3/24/83

Project No.: 83-208

Reported by: 

Checked by: 

Compound	Sample :	Concentration (ug/l) <sup>2</sup>		
		W-1	W-2	AR
(2V) Acrolein				
(3v) Acrylonitrile				
(4v) Benzene				
(6v) Carbon Tetrachloride				
(7v) Chlorobenzene				
(10v) 1,2-Dichloroethane				
(11v) 1,1,1-Trichloroethane			13	TR
(13v) 1,1-Dichloroethane				
(14v) 1,1,2-Trichloroethane				
(15v) 1,1,2,2-Tetrachloroethane				
(16v) Chloroethane				
(19v) 2-Chloroethylvinyl ether				
(23v) Chloroform				
(29v) 1,1-Dichloroethylene			TR	
(30v) Trans-1,2-Dichloroethylene			27	
(32v) 1,2-Dichloropropane				
(33v) Trans-1,3-Dichloropropene				
Cis-1,3-Dichloropropene				
(38v) Ethylbenzene				
(44v) Methylene Chloride				
(45v) Chloromethane				
(46v) Bromomethane				
(47v) Bromoform				
(48v) Bromodichloromethane				
(49v) Fluorotrichloromethane				
(50v) Dichlorodifluoromethane				
(51v) Chlorodibromomethane				
(85v) Tetrachloroethylene			TR	
(86v) Toluene				
(87v) Trichloroethylene			140	TR
(88v) Vinyl Chloride				
1,1,2-Trichloro-1,2,2-Trifluoroethane			TR	
Xylenes				

<sup>1</sup>EPA 1982 Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL Cincinnati, Ohio.

<sup>2</sup>Concentrations less than 1 ug/l are not detected and are left blank. Concentrations between 1 and 9 ug/l are listed as trace levels (TR).



## Cambridge Analytical Associates

222 Arsenal Street, Watertown, Massachusetts 02172 / (617) 923-9376

August 29, 1983

Mr. Dick Jones  
John J. Riley, Co.  
228 Salem Street  
Woburn, MA 01801

Dear Mr. Jones:

On August 9, 1983 Cambridge Analytical Associates, Inc. received 4 samples for volatile organics analysis by EPA method 601. These analyses were completed on August 23, 1983. The attached data are the results of these tests.

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Edward A. Lawler', written in a cursive style.

Edward A. Lawler  
Senior Analytical Chemist

## CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Table 1. Concentrations of Volatile Organic Compounds (Method 601<sup>1</sup>)

Client: J.J. Riley, Co. Report No.: 83-658  
 Date Samples Received: August 9, 1983 Reported by: *EZ*  
 Date Analysis Completed: August 23, 1983 Checked by: *ST*

Compound	Concentration ug/l (ppb) <sup>2</sup>			
	Sample ID: 1-0hrs CAA ID: 8307153	2-0.5hrs 8307154	3-3hrs 8307155	4-24hrs 8307156
chloromethane				
dichlorodifluoromethane				
vinyl chloride				
chloroethane				
methylene chloride				
trichlorofluoromethane				
1,1-dichloroethene				
1,1-dichloroethane				
trans-1,2-dichloroethene	15	22	25	25
chloroform	2.9	3.7	3.0	2.9
1,2-dichloroethane	4.4	7.8	7.7	7.7
1,1,1-trichloroethane	6.6	9.4	6.9	7.2
carbon tetrachloride				
bromodichloromethane				
1,2-dichloropropane				
trans-1,3-dichloropropane				
trichloroethene	490	540	393	358
dibromochloromethane				
1,1,2-trichloroethane				
cis-1,3-dichloropropene				
2-chloroethylvinyl ether				
bromoform				
1,1,2,2-tetrachloroethane				
tetrachloroethene	3.1	4.6	5.9	6.8
chlorobenzene				

<sup>1</sup>U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

<sup>2</sup>Concentrations less than the detection limit are left blank.

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Table 1. Concentrations of Volatile Organic Compounds (Method 601<sup>1</sup>)

Client: J.J. Riley, Co.

Report No.: 83-658

Date Samples Received: August 9, 1983

Reported by: *EC*

Date Analysis Completed: August 23, 1983

Checked by: *SD*

Compound	Concentration <sup>µg/l ppb</sup> <sub>mg/l ppm<sup>2</sup></sub>			
	Sample ID: 1-0hrs CAA ID: 8307153	2-0.5hrs 8307154	3-3hrs 8307155	4-24hrs 8307156
chloromethane				
dichlorodifluoromethane				
vinyl chloride				
chloroethane				
methylene chloride				
trichlorofluoromethane				
1,1-dichloroethene				
1,1-dichloroethane				
trans-1,2-dichloroethene	15	22	25	25
chloroform	2.8	3.7	3.0	2.9
1,2-dichloroethane	4.4	7.8	7.7	7.7
1,1,1-trichloroethane	6.6	9.4	6.9	7.2
carbon tetrachloride				
bromodichloromethane				
1,2-dichloropropane				
trans-1,3-dichloropropane				
trichloroethene	490	540	393	358
dibromochloromethane				
1,1,2-trichloroethane				
cis-1,3 dichloropropene				
2-chloroethylvinyl ether				
bromoform				
1,1,2,2-tetrachloroethane				
tetrachloroethene	3.1	4.6	5.9	6.8
chlorobenzene				

<sup>1</sup>U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

<sup>2</sup>Concentrations less than the detection limit are left blank.



# Cambridge Analytical Associates

225 Federal Street, Woburn, Massachusetts 02172 / (617)923-9376

## FORMAL REPORT OF ANALYSIS

PREPARED FOR: John J. Riley Co., Inc.  
228 Salem Street  
Woburn, MA 01801  
Attn: Mr. Dick Jones

CUSTOMER ORDER NUMBER: J-206

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

REPORT NUMBER: 83-797

DATE PREPARED: September 19, 1983

## 1. INTRODUCTION

This report summarizes results of chemical analyses performed on samples received by CAA on August 30, 1983. Analytical methods employed for these analyses are described in Section 2 and results are presented in Section 3. The last section contains quality control data and certifications supporting the analytical results.

## 2. ANALYTICAL METHODS

The analytical method used for these analyses is EPA method 624. This method is sensitive to a large number of halogenated and non-halogenated volatile organic chemicals. The well water sample was a composite of equal portions of 2 sub-samples. The effluent sample was a composite of equal portions of 6 sub-samples.

## 3. RESULTS

Results of analyses are presented in Table 1.

## CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Table 1. Concentrations of Volatile Organic Compounds (Method 624<sup>1</sup>)

Client: John J. Riley Project No.: 83-797  
 Date Samples Received: August 30, 1983 Reported by: *EL*  
 Date Analysis Completed: September 15, 1983 Checked by: *BJF*

Compound	Sample ID. CXA ID:	Concentration (ug/l) <sup>2</sup>	
		Well Water Composite #308152	Effluent Composite #308153
(2v) acrolein			
(3v) acrylonitrile			
(4v) benzene			
(6v) carbon tetrachloride			
(7v) chlorobenzene			
(10v) 1,2-dichloroethane			
(11v) 1,1,1-trichloroethane			
(13v) 1,1-dichloroethane			
(14v) 1,1,2-trichloroethane			
(15v) 1,1,2,2-tetrachloroethane			
(16v) chloroethane			
(19v) 2-chloroethylvinyl ether			
(23v) chloroform			
(29v) 1,1-dichloroethylene			
(30v) trans-1,2-dichloroethylene		39	
(32v) 1,2-dichloropropane			
(33v) trans-1,3-dichloropropene			
cis-1,3-dichloropropene			
(38v) ethylbenzene			
(44v) methylene chloride			
(45v) chloromethane			
(46v) bromomethane			
(47v) bromoform			
(48v) bromodichloromethane			
(49v) fluorotrichloroethane			
(50v) dichlorodifluoromethane			
(51v) chlorodibromomethane			
(85v) tetrachloroethylene		TR(7.)	145
(86v) toluene			
(d/v) trichloroethylene		275	40
(88v) vinyl chloride			

<sup>1</sup>U.S. EPA, 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

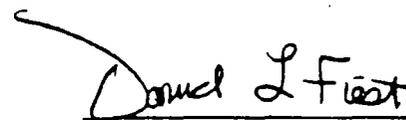
<sup>2</sup>Concentrations less than 1 ug/l are not detected and are left blank. Concentrations between 1 and 9.1 ug/l are listed as trace levels (TR).

4. QUALITY ASSURANCE DOCUMENTATION

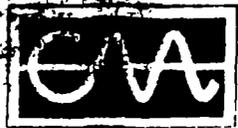
Certification

This work has been checked for accuracy by the following staff personnel:

Director, Organic  
Chemistry Laboratory

A handwritten signature in black ink that reads "David L. Fiest". The signature is written in a cursive style with a long, sweeping underline that extends to the left.

David L. Fiest



## Cambridge Analytical Associates

222 Arsenal Street, Watertown, Massachusetts 02172 / (617)923-9376

October 20, 1983

Mr. Dick Jones  
John J. Riley Company, Inc.  
228 Salem Street  
Woburn, MA

Dear Dick:

On September 21, 1983 Cambridge Analytical Associates, Inc. received 3 samples for volatile organics analysis by EPA method 601. These analyses were completed on October 9, 1983. The attached data are the results of these tests.

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

Sincerely,

Edward A. Lawler  
Senior Analytical Chemist

## CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Table 1. Concentrations of Volatile Organic Compounds (Method 601<sup>1</sup>)

Client: John J. Riley, Co.

Report No.: 83-826

Date Samples Received: September 21, 1983

Reported by: *EC*

Date Analysis Completed: October 9, 1983

Checked by: *DF*

Compound	Sample ID: CAA ID:	Concentration ug/l (ppb) <sup>2</sup>		
		Well 1 8308292	Well 3 8308293	Well 4 8308294
chloromethane				
dichlorodifluoromethane				
vinyl chloride				
chloroethane				
methylene chloride				
trichlorofluoromethane				
1,1-dichloroethene				
1,1-dichloroethane			9.9	
trans-1,2-dichloroethene		780	35	
chloroform				
1,2-dichloroethane				
1,1,1-trichloroethane				
carbon tetrachloride				
bromodichloromethane				
1,2-dichloropropane				
trans-1,3-dichloropropane				
trichloroethene		230	94	4.5
dibromochloromethane				
1,1,2-trichloroethane				
cis-1,3 dichloropropene				
2-chloroethylvinyl ether				
bromoform				
1,1,2,2-tetrachloroethane				
tetrachloroethene			1.8	
chlorobenzene				

<sup>1</sup>U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

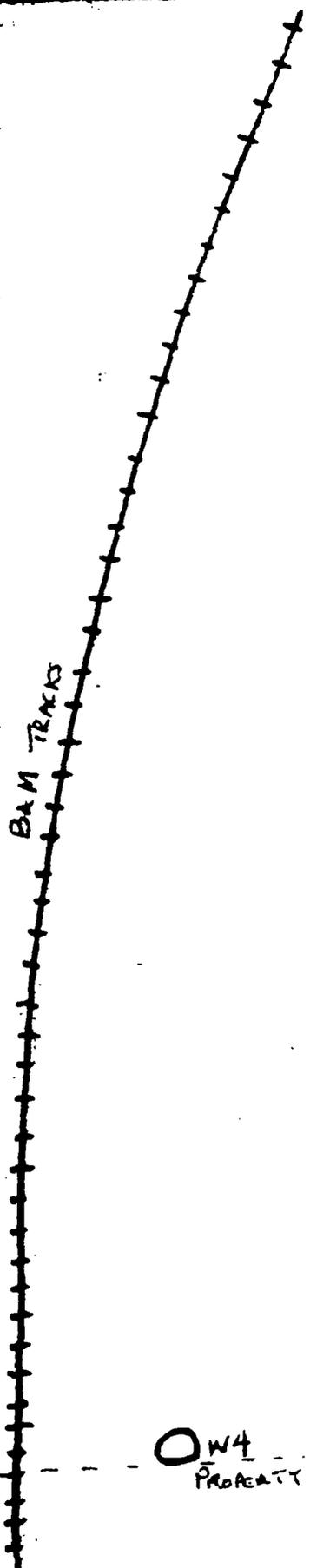
<sup>2</sup>Concentrations less than 0.1 ug/l (ppb) are not detected and are left blank.

**WOODS CONSERVATION**  
 approximate location Beatrice wells + borings

○ W1  
 ○ SW1

**LEGEND**

- Beatrice Well
- X Beatrice Boring
- JJR Well #2



ROAD

X B2

X B4

X B3

X B1

X B7

○ W5

X B6

○ W2

FENCE

□ 2

○ SW2

○ W4

PROPERTY LINE

○ W3

10/15/83  
 Ray



Cambridge Analytical Associates

222 Arsenal Street / Watertown, Massachusetts 02172 / (617)923-9376

October 25, 1983

Ms. M. Margaret Hanley  
Yankee Environmental Engineering  
and Research Services, Inc.  
27 Salem Street  
Woburn, MA 01801

Dear Margaret:

On October 12, 1983 Cambridge Analytical Associates received 5 samples for volatile organics analysis by EPA Method 601. These analyses were completed on October 17, 1983. The attached data are the results of these tests.

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

Sincerely,

Edward A. Lawler  
Senior Analytical Chemist

H00970

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Table 1 (con't). Concentrations of Volatile Organic Compounds (Method 601<sup>1</sup>)

Client: Yankee Report No.: 83-887  
 Date Samples Received: October 12, 1983 Reported by: *[Signature]*  
 Date Analysis Completed: October 17, 1983 Checked by: *[Signature]*

Compound	Concentration ug/l (ppb) <sup>2</sup>	
	Sample ID: CAA ID:	JJR-4 8308585
chloromethane		
dichlorodifluoromethane		
vinyl chloride		
chloroethane		
methylene chloride		
trichlorofluoromethane		
1,1-dichloroethene		
1,1-dichloroethane		
trans-1,2-dichloroethene		
chloroform	1.7	0.8
1,2-dichloroethane		
1,1,1-trichloroethane		
carbon tetrachloride		
bromodichloromethane		
1,2-dichloropropane		
trans-1,3-dichloropropane		
trichloroethene		
dibromochloromethane		
1,1,2-trichloroethane		
cis-1,3 dichloropropene		
2-chloroethylvinyl ether		
bromoform		
1,1,2,2-tetrachloroethane		
tetrachloroethene		
chlorobenzene	20	

<sup>1</sup>U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

<sup>2</sup>Concentrations less than 0.1 ug/l (ppb) are not detected and are left blank.

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Table 1. Concentrations of Volatile Organic Compounds (Method 601<sup>1</sup>)

Client: Yankee Report No.: 83-887  
 Date Samples Received: October 12, 1983 Reported by: *EL*  
 Date Analysis Completed: October 17, 1983 Checked by: *AF*

Compound	Sample ID: CAA ID:	Concentration ug/l (ppb) <sup>2</sup>		
		JJR #1 8308582	JJR B-2 8308583	Prod. Well 1 8308584
chloromethane				
dichlorodifluoromethane				
vinyl chloride				
chloroethane				
methylene chloride				
trichlorofluoromethane				
1,1-dichloroethene				
1,1-dichloroethane				
trans-1,2-dichloroethene			0.7	0.4
chloroform				
1,2-dichloroethane				
1,1,1-trichloroethane				
carbon tetrachloride				
bromodichloromethane				
1,2-dichloropropane				
trans-1,3-dichloropropane				
trichloroethene				0.4
dibromochloromethane				
1,1,2-trichloroethane				
cis-1,3 dichloropropene				
2-chloroethylvinyl ether				
bromoform				
1,1,2,2-tetrachloroethane				
tetrachloroethene				
chlorobenzene			2.3	

<sup>1</sup>U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

<sup>2</sup>Concentrations less than 0.1 ug/l are not detected and are left blank.



Cambridge Analytical Associates

222 Arsenal Street / Watertown, Massachusetts 02172 / (617) 923-9376

WELL, COLOR ROOM EFFLUENT, & TOTAL EFFLUENT  
ANALYSES FOR CHLORINATED HYDROCARBONS

November 4, 1983

Mr. Dick Jones  
John J. Riley Co., Inc.  
228 Salem Street  
Woburn, MA 01801

Dear Dick:

On October 3, 1983 Cambridge Analytical Associates, Inc. received 3 samples for volatile organics analysis by EPA Method 601. These analyses were completed on October 23, 1983. The attached data are the results of these tests.

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

Sincerely,

A handwritten signature in cursive script, appearing to read 'Ed Lawler'.

Edward A. Lawler  
Senior Analytical Chemist

US EPA ARCHIVE DOCUMENT

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Table 1. Concentrations of Volatile Organic Compounds (Method 601<sup>1</sup>)

Client: John J. Riley Co.

Report No.: 83-861

Date Samples Received: October 3, 1983

Reported by: *EC*

Date Analysis Completed: October 23, 1983

Checked by: *EC*

Compound	Concentration ug/l (ppb) <sup>2</sup>		
	Sample ID: CAA 10:	Well 2 Comp. 8308446	Total Effluent Comp. 8308447
chloromethane			
dichlorodifluoromethane			
vinyl chloride			
chloroethane			
methylene chloride			
trichlorofluoromethane			
1,1-dichloroethene	0.9		0.5
1,1-dichloroethane	3.5		4.4
trans-1,2-dichloroethene	13		17
chloroform	2.0		7.7
1,2-dichloroethane	8.6		4.4
1,1,1-trichloroethane	5.2		7.2
carbon tetrachloride			
bromodichloromethane			
1,2-dichloropropane			
trans-1,3-dichloropropane			
trichloroethene	127		338
dibromochloromethane			
1,1,2-trichloroethane			
cis-1,3 dichloropropene			
2-chloroethylvinyl ether			
bromoform			
1,1,2,2-tetrachloroethane			
tetrachloroethene			
chlorobenzene			

<sup>1</sup>U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/ERL, Cincinnati, Ohio.

<sup>2</sup>Concentrations less than 0.1 ug/l (ppb) are not detected and are left blank.

\*No compounds were detected; however, matrix effects, possibly due to non-chlorinated compounds, may have masked the measurement of the chlorinated volatiles.

JJR

10/25/83

Well Water + Effluent Sample Analyses  
 Samples Taken 10/3/83

Report of Cambridge Analytical  
 VOLATILE ORGANICS (PURGEABLES)

— ppb —

Pollutant	Well #2	Color Room	TOTAL EFFLUENT
acrolein			*
acrylonitrile			
benzene			
carbon tetrachloride			
chlorobenzene			
1,2-dichloroethane	8.6	4.4	
1,1,1-trichloroethane	5.2	7.2	
1,1-dichloroethane	3.5	4.4	
1,1,2-trichloroethane			
1,1,2,2-tetrachloroethane			
chloroethane			
chloroform	2	7	
1,1-dichloroethylene	0.9	0.5	
trans-1,2-dichloroethylene	33	37	
1,2-dichloropropane			
ethylbenzene			
methylene chloride			
chloromethane			
bromomethane			
bromoform			
trichlorofluoromethane			
dichlorodifluoromethane			
bromodichloromethane			
toluene			
trichloroethylene	327	338	
vinyl chloride			
bromochloromethane (IS)			
bis-chloromethyl ether			
trans-1,2-dichloropropane			
dibromochloromethane			
cis-1,3-dichloropropane			
2-chloroethylvinyl ether			
2-bromo-1-chloropropane			
1,1,2,2-tetrachloroethene			
1,4-dichlorobutane (IS)			

11/2/83 - Report of Cambridge Analytical  
 Got no detectable amounts of 26 volatile hydrocarbons. Sample effluent  
 to waste water. Significant amount of 1,1,1-trichloroethane  
 will send report.

Well #2 sampled in Color Room near #1 mill.  
 Total effluent sampled before catch basin.

\* Must repeat analyses - first time through GC  
 it foamed up too much - didn't get good results.  
 Expect repeat to be completed 10/27/83.

2

## REQUISITION

Order From: Cambridge Analytical Associates Inc Date: 10/3/83  
222 Arsenal Street  
 Address: Watertown, MA 02172  
 Attn: Edward Hamler & David Fiest

AMOUNT	UNITS	MATERIAL	O HA.
2	Well Water	Samples (7:45/9:15 AM)	
4	Color Room	Samples (7:00/7:45/8:30/9:15 AM)	
4	Total Effluent	Samples ( " " " " )	

Instructions: Composite each group of samples to make  
 three samples. Test each for chlorinated  
 hydrocarbons, as per EPA Method #601

Shipping Date: \_\_\_\_\_

Signature: Ry JonesOrdered By: Delivered to Cambridge by RufDate: 10/3/83



# Cambridge Analytical Associates

222 Arsenal Street / Watertown, Massachusetts 02172 / (617)923-9376

## FORMAL REPORT OF ANALYSIS

PREPARED FOR:                    John J. Reilly  
    228 Salem Street  
    Woburn, MA 01801  
    Attn: Mr. Dick Jones

CUSTOMER ORDER NUMBER:

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

REPORT NUMBER:                    83-934

DATE PREPARED:                    December 7, 1983



Cambridge Analytical Associates

TABLE OF CONTENTS

1. INTRODUCTION
  
2. ANALYTICAL METHODS
  
3. RESULTS
  
4. QUALITY ASSURANCE CERTIFICATION

## 1. INTRODUCTION

This report summarizes results of chemical analyses performed on samples received by CAA on October 26, 1983. Analytical methods employed for these analyses are described in Section 2 and results are presented in Section 3.

## 2. ANALYTICAL METHODS

Analytical methods utilized for sample analysis are summarized in Table 1.

## 3. RESULTS

Results of analyses are presented in Table 2.

Table 1

## SUMMARY OF ANALYTICAL METHODS

Constituent	Method Reference	Method Description
Semivolatile Organics - Pesticides	Method 608 (1)	Solvent extraction, gas chromatography/electron capture detection

(1) U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Table 2. Concentration of Pesticides and PCB's (Method 608<sup>1</sup>)

Client: John J. Reilly Report No.: 83-934  
 Date Samples Received: October 26, 1983 Reported by: JFD  
 Date Analysis Completed: November 28, 1983 Checked by: JFD

Compound	Sample ID: CAA ID:	Concentration - ug/l (ppb) <sup>2</sup>
		Well Water 8308840
<u>PESTICIDES AND PCB's</u>		
(87P) aldrin		
(90P) Dieldrin		
(91P) chlordane		
(92P) 4,4'-DDT		
(93P) 4,4'-DDE		
(94P) 4,4'-DDD		
(95P) endosulfan-alpha		
(95P) endosulfan-beta		
(97P) endosulfan sulfate		
(99P) endrin		
(99P) endrin aldehyde		
(100P) heptachlor		
(101P) heptachlor epoxide		
(102P) BHC-alpha		
(103P) BHC-beta		
(104P) BHC-delta		
(105P) BHC-gamma (lindane)		
(106P) PCB - 1242		
(107P) PCB - 1254		
(108P) PCB - 1221		
(109P) PCB - 1232		
(110P) PCB - 1248		
(111P) PCB - 1260		
(112P) PCB - 1016		
(113P) toxaphene		
Detection Limit		1.0

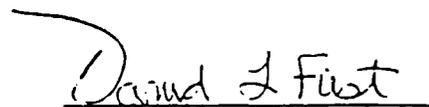
<sup>1</sup> U.S. EPA, 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

<sup>2</sup> Concentrations less than the detection limit are left blank. Concentrations between 1 and 10 times detection limit are listed as trace levels (TR).

4. QUALITY ASSURANCE CERTIFICATION

This work has been checked for accuracy by the following staff personnel:

Director, Organic  
Chemistry Laboratory

  
David L. Fiest

RECEIVED

P N M

# JOHN J. RILEY COMPANY

LEATHER MANUFACTURERS

EST. 1910

228 SALEM STREET  
P.O. BOX 318  
WOBURN, MA 01801

TEL. (617) 933-5900

April 11, 1984

Mr. Wayne T. Grandin  
Metropolitan District Commission  
20 Somerset Street  
Boston, Ma. 02108

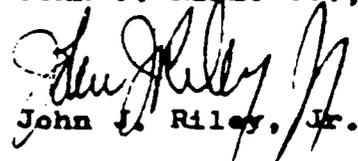
Dear Wayne:

Pursuant to attachment B, entitled "Reporting Requirements", of our Industrial User Discharge Permit No. 43-000-602-2, we are enclosing our third discharge report.

The 24 hour flow record and grab sampling for volatile organic and extractable organic analyses were taken March 7, 1984. The laboratory analytical results were just received today.

Sincerely yours,

JOHN J. RILEY CO., INC.



John J. Riley, Jr.

JJR:nd

000477

JOHN J. RILEY CO., INC.  
EFFLUENT FLOW MEASUREMENT AND ANALYTICAL SAMPLING RECORD  
 (In Conformance With Industrial User Discharge Permit 43000602-2)

FLOW MEASUREMENT

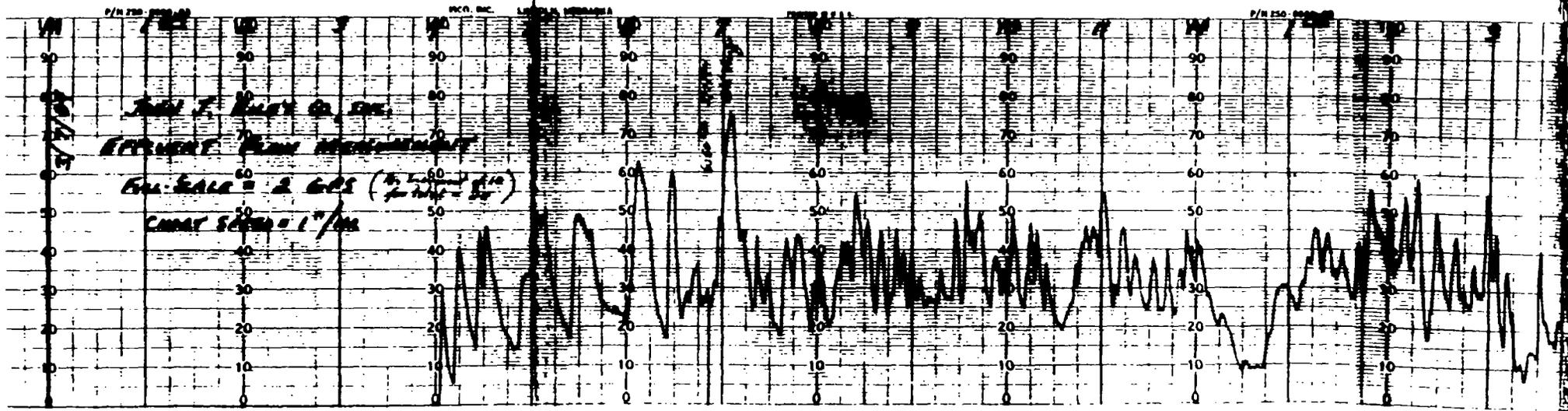
<u>DATE</u>	<u>LOCATION</u>	<u>METHOD</u>	<u>TIME</u>	<u>CHART FULL-SCALE FLOWRATE *</u>	<u>OPERATOR</u>
1/10/84	Catch Basin	ISCO Model #1870 Flowmeter	12:00 <sup>A</sup> - 11:59 <sup>P</sup>	5.00 GPS	Riley
2/7/84	"	" " "	12:00 <sup>A</sup> - 11:59 <sup>P</sup>	2.00 GPS	Riley
3/7/84	"	" " "	12:00 <sup>A</sup> - 11:59 <sup>P</sup>	2.00 GPS	Riley

\* per increment of 10,  
 or 50, 20, 22 respectively

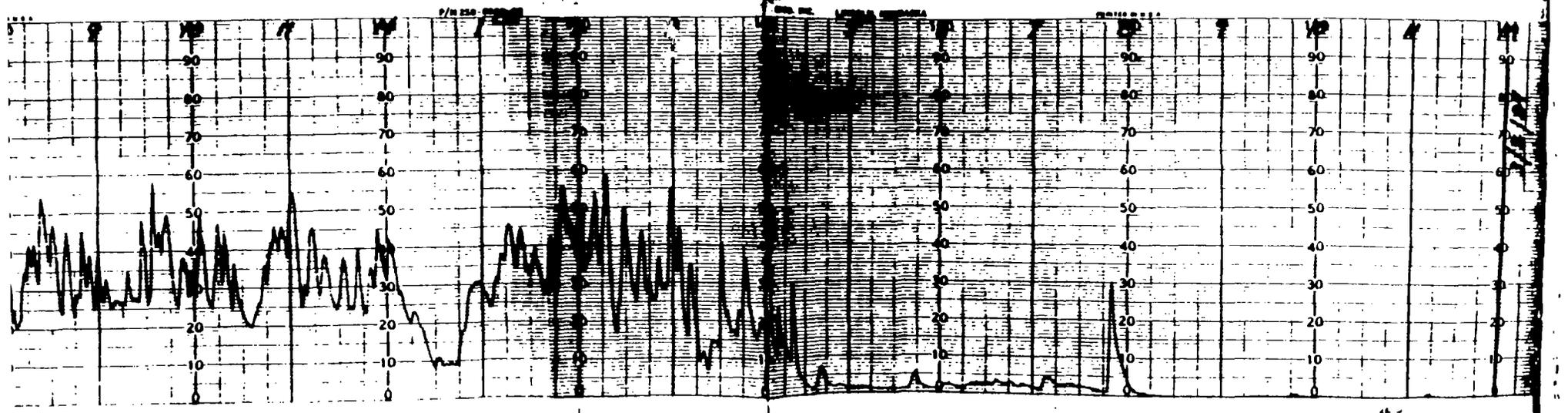
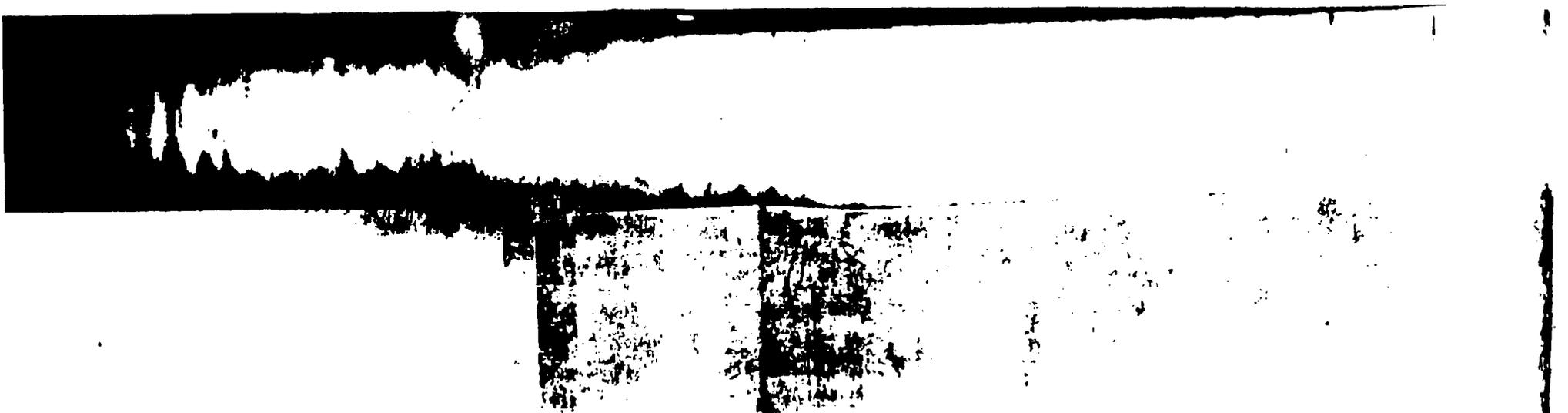
ANALYTICAL SAMPLING

<u>DATE</u>	<u>LOCATION</u>	<u>METHOD</u>	<u>TIME</u>	<u>SAMPLED BY</u>	<u>ANALYSIS DATE</u>	<u>ANALYZED BY</u>	<u>PARAMETER</u>	<u>METHOD</u>
1/10/84	Catch Basin	Grab	11:30 <sup>A</sup>	Riley	1/31/84	Cambridge Analytical	Volatile Organics	EPA #624
		Composite of 3 Grabs	{ 7:00 <sup>A</sup> 11:30 <sup>A</sup> 2:50 <sup>P</sup>	{ Riley Riley Riley }	1/31/84	Cambridge Analytical	Extractable Organics	EPA #625
2/7/84	"	Grab	11:05 <sup>A</sup>	Riley	3/5/84	Cambridge Analytical	Volatile Organics	EPA #624
		Composite of 3 Grabs	{ 7:00 <sup>A</sup> 11:05 <sup>A</sup> 2:40 <sup>P</sup>	{ Riley Riley Riley }	3/5/84	Cambridge Analytical	Extractable Organics	EPA #625
3/7/84	"	Grab	12:00 <sup>P</sup>	Riley	4/9/84	Cambridge Analytical	Volatile Organics	EPA #624
		Composite of 3 Grabs	{ 6:50 <sup>A</sup> 12:00 <sup>P</sup> 2:45 <sup>P</sup>	{ Riley Riley Riley }	4/9/84	Cambridge Analytical	Extractable Organics	EPA #625

862000



150-1000-00



000480



# Cambridge Analytical Associates

222 Arsenal Street / Watertown, Massachusetts 02172 / (617)923-9376

## FORMAL REPORT OF ANALYSIS

PREPARED FOR: John J. Riley Co., Inc.  
228 Salem Street  
Woburn, MA 01801  
Attn: Dick Jones

CUSTOMER ORDER NUMBER: J-240

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

REPORT NUMBER: 84-251

DATE PREPARED: April 9, 1984

PREPARED BY: David L. Fiest

000481



Cambridge Analytical Associates

TABLE OF CONTENTS

1. INTRODUCTION
  
2. ANALYTICAL METHODS
  
3. RESULTS
  
4. QUALITY ASSURANCE DOCUMENTATION  
Certification

## 1. INTRODUCTION

This report summarizes results of chemical analyses performed on samples received by CAA on March 8, 1984. Analytical methods employed for these analyses are described in Section 2 and results are presented in Section 3. The last section contains certifications supporting the analytical results.

## 2. ANALYTICAL METHODS

Analytical methods utilized for sample analysis are summarized in Table 1.

## 3. RESULTS

Results of analyses are presented in Tables 2 and 3.

Table 1

## Summary of Analytical Methods

Constituent	Method Reference	Method Description
Volatile Organic Compounds	Method 624 (1)	Purge and trap, gas chromatography/mass spectrometry
Semivolatile Organics-Acid Extractables	Method 625 (1)	Solvent extraction, gas chromatography/mass spectrometry
Semivolatile Organics-Base/Neutral Extractables	Method 625 (1)	Solvent extraction, gas chromatography/mass spectrometry

(1)U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

Table 2. Concentrations of Volatile Organic Compounds, Method 624<sup>1</sup>.

Client: John J. Riley, Co., Inc.

Project No. 34-231

Date Samples Received: March 8, 1984

Reported by: E.L.

Date Analysis Completed: April 6, 1984

Checked by: *OTC*

Compound	Sample ID:	Wastewater - midday 3/7/84
	CAA ID:	8401108
(2v) acrolein		
(3v) acrylonitrile		
(4v) benzene		
(6v) carbon tetrachloride		
(7v) chlorobenzene		
(10v) 1,2-dichloroethane		
(11v) 1,1,1-trichloroethane		
(13v) 1,1-dichloroethane		
(14v) 1,1,2-trichloroethane		
(15v) 1,1,2,2-tetrachloroethane		
(16v) chloroethane		
(19v) 2-chloroethylvinyl ether		
(23v) chloroform		
(29v) 1,1-dichloroethylene		
(30v) trans-1,2-dichloroethylene		10
(32v) 1,2-dichloropropane		
(33v) trans-1,3-dichloropropene		
cis-1,3-dichloropropene		
(38v) ethylbenzene		TR (J)
(44v) methylene chloride		
(45v) chloromethane		
(46v) bromomethane		
(47v) bromoform		
(48v) monochloromethane		
(49v) fluorotrichloromethane		
(50v) dichlorodifluoromethane		
(51v) chlorodibromomethane		
(85v) tetrachloroethylene		20
(86v) toluene		TR (3)
(87v) trichloroethylene		30
(88v) vinyl chloride		
xylene		33
Detection Limit		1

<sup>1</sup>U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/ENSL, Cincinnati, Ohio.

<sup>2</sup>Concentrations less than the detection limit are left blank. Concentrations between 1 and 10 times the detection limit are listed as trace levels (TR). Acrolein and acrylonitrile are 100 and 10 times the detection limit respectively.

000485

Table J. Concentration of Acid/Base/Neutral Extractables (Method 525.1)

Client: John J. Riley, Co., Inc.

Report No.: 84-251

Date Samples Received: March 8, 1984

Reported by: JPS

Date Analysis Completed: March 20, 1984

Checked by: *CS*

Compound	Sample ID: CAA ID:	Concentration - ug/l (ppb) <sup>2</sup>
		Wastewater composite (3/7/84) 8401108
<u>ACID COMPOUNDS</u>		
(21A) 2,4,6-trichlorophenol		
(22A) p-chloro-m-cresol		
(24A) 2-chlorophenol		
(31A) 2,4-dichlorophenol		
(34A) 2,4-dimethylphenol		
(57A) 2-nitrophenol		
(58A) 4-nitrophenol		
(59A) 2,4-dinitrophenol		
(60A) 4,6-dinitro-2-methylphenol		
(64A) pentachlorophenol		
(65A) phenol		3
4-methyl phenol		71
benzoic acid		110
Detection Limit		2

BASE/NEUTRAL COMPOUNDS

(18) acenaphthene		
(58) benzidine		
(88) 1,2,4-trichlorobenzene		
(98) hexachlorobenzene		
(128) hexachloroethane		
(188) bis (2-chloroeth.) ether		
(208) 2-chloronaphthalene		
(258) 1,2-dichlorobenzene		13
(268) 1,3-dichlorobenzene		
(278) 1,4-dichlorobenzene		
(288) 3,3'-dichlorobenzidine		
(358) 2,4-dinitrotoluene		
(368) 2,6-dinitrotoluene		
(378) 1,2-diphenylhydrazine		
(398) fluoranthene		
(408) 4-chlorophenyl phenyl ether		
(418) 4-bromophenyl phenyl ether		

000486

Table 3 (cont'd). Concentration of Acid/Base/Neutral Extractables, Method 525<sup>1</sup>

Client: John J. Riley, Co., Inc.

Report No.: 44-251

Date Samples Received: March 8, 1984

Reported by: JH

Date Analysis Completed: March 20, 1984

Checked by: *ET*

Compound	Sample ID: CAA ID:	Concentration = ug/l (ppb) <sup>2</sup>
		Wastewater composite (3/7/84) 8401108
<b>BASE NEUTRAL COMPOUNDS (cont'd)</b>		
(42B) bis (2-chloroisopropyl) ether		
(43B) bis (2-chloroethoxy) methane		
(52B) hexachlorobutadiene		
(53B) hexachlorocyclopentadiene		
(54B) isophorone		
(55B) naphthalene		6
(56B) nitrobenzene		
(62B) N-nitrosodiphenylamine		
(63B) N-nitrosodipropylamine		
(66B) bis (2-ethylhexyl) phthalate		
(67B) benzyl butyl phthalate		7
(68B) di-n-butyl phthalate		
(69B) di-n-octyl phthalate		
(70B) diethyl phthalate		
(71B) dimethyl phthalate		
(72B) benzo(a)anthracene		
(73B) benzo(a)pyrene		
(74B) benzo(b)fluoranthene		
(75B) benzo(k)fluoranthene		
(76B) chrysene		
(77B) acenaphthylene		
(78B) anthracene		
(79B) benzo(ghi)perylene		
(80B) fluorene		
(81B) phenanthrene		
(82B) dibenzo(a,h)anthracene		
(83B) indeno(1,2,3-cd)pyrene		
(84B) pyrene		
2-methyl naphthalene		2
Detection Limit		2

<sup>1</sup>U.S. EPA, 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 800/4-82-057. EPA/ENSL, Cincinnati, Ohio.

<sup>2</sup>Concentrations less than the detection limit are left blank. Concentrations between 1 and 10 times the limit of detection are listed as trace levels (TR).

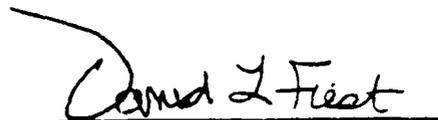
000487

4. QUALITY ASSURANCE DOCUMENTATION

Certification

This work has been checked for accuracy by the following staff personnel:

Director, Organic  
Chemistry Laboratory

  
\_\_\_\_\_  
David L. Fiest

# REQUISITION

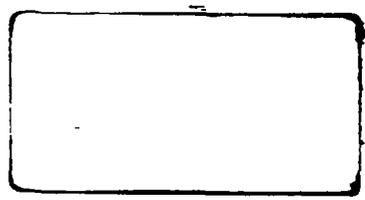
Order From: Cambridge Analytical Associates Inc. Date: 3/8/84

Address: Attn: D. Fiest / E. Lawler

AMOUNT	UNITS	MATERIAL	ON HAND
1	(Two 40ml Bottles)	Wastewater Sample - Middle of Day 3/7/84 Determine Purgables (EPA #624)	
1	(One 1 liter Bottle)	Composite of Beginning, Middle, + Wastewater Sample - End of Day 3/7/84 Determine Iron/Nickel & Acid Extractables (EPA #625)	

Shipping Date: \_\_\_\_\_  
Ordered By: Revised by Ruf  
Date: 3/8/84

Signature: [Handwritten Signature]



UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF  
MASSACHUSETTS

WELLS G&H  
10-10

(u)

ANNE ANDERSON et al., )  
 )  
 Plaintiffs, )  
 )  
 v. ) C. A. NO. 82-1672-S  
 )  
 BEATRICE FOODS CO., )  
 )  
 Defendant, )  
 )

PLAINTIFFS' MOTION  
FOR VACATION OF JUDGMENT ENTERED FOR BEATRICE  
BASED ON NEWLY DISCOVERED EVIDENCE

The plaintiffs hereby move pursuant to Rule 60(b) of the Federal Rules of Civil Procedure, for an order vacating judgment entered for Beatrice and the granting of a new trial based on newly discovered evidence. The evidence at issue was suppressed either intentionally or as a result of gross neglect by counsel for defendant and/or defendant's associated counsel. The newly discovered evidence is a 1983 site investigation report regarding the tannery sludge disposal site which plaintiffs had alleged and defendant had denied was a source of groundwater contamination of the fifteen acre Beatrice site which contamination, in turn, polluted public drinking Wells G and H.

The 1983 report concludes, contrary to defendant's assertions at trial and on appeal, that the sludge disposal site on the tannery was a source of chlorinated solvent contamination

successor entities to the tannery and fifteen acre site has worked closely with the attorneys for the Defendant-Appellee, Beatrice Foods Co., Jerome Facher, Neil Jacobs, and Donald Frederico of the firm Hale and Dorr throughout this litigation including discovery and trial. Attorney Ryan also appeared at numerous pre-trial proceedings on issues regarding discovery of facts relating to the tannery and the fifteen acre site.

II. THE INFORMATION AND CONCLUSIONS CONTAINED IN THE REPORT  
WOULD HAVE MATERIALLY AFFECTED THE PROSECUTION OF  
PLAINTIFFS' CLAIMS

Had the report been disclosed to plaintiffs its use would have materially affected the prosecution of plaintiffs' claims against Beatrice. The condition and use of the area at the tannery which is the subject of the report was of critical significance during discovery and trial. One of the bases of plaintiffs' claims was that the tannery contributed to the contamination of the aquifer serving Wells G and H through the disposal of solvent contaminated tannery waste on tannery property which flowed onto the fifteen acre site. See Plaintiffs'-Appellants' Brief at 6. The evidentiary basis of the claim was the testimony of a witness, Walter Day that tannery sludge in the early to the mid-sixties was disposed of behind the tannery near the "catch basin" or "sedimentation

tank" which flowed down a stream onto the fifteen acre site. Also, dark encrusted peaty material with an orange interior sampled by engineers for Beatrice, Woodward Clyde, and engineers for plaintiffs, Weston Geophysical, at the bottom of the hill from where the sludge flowed down, at the southern border of the fifteen acre wetland site, contained chrome, oil and grease, and solvents. Testimony at trial established that this waste contributed to the contamination of the aquifer. See Plaintiffs'-Appellants' Brief at Section IIID. The defendant at trial and in its Appellate Brief disputed that this waste was from the tannery and that the only waste that flowed down the hill was "grey", harmless "buffing dust." See Defendant-Appellee's Brief at 8. This court prevented plaintiffs from going onto the tannery waste disposal area or testing the sludge on the tannery property, and at the close of plaintiffs' evidence directed out plaintiffs' strict liability and negligence claims regarding tannery waste contamination of the fifteen acres. See Plaintiffs'-Appellants' Brief at 12, 16-18, 47-49.

According to the report, the objective of the investigation was to, "determine if groundwater contamination, if present, on the Riley property is contributing to the contamination of Production wells #1 and #2." Report at Tab 1, page 1-1. Production wells #1 and #2 were also referred to at trial as

"Riley wells 1 and 2." Production well 1 was near the bottom of the hill on the tannery side of the railroad tracks dividing the tannery from the fifteen acre site. That well originally served the water needs of the tannery until it was replaced by production well #2 located at the southern boundary of the fifteen acre wetland site. See Plaintiffs'-Appellants' Brief at 14 and map of area accompanying Plaintiffs'-Appellants' Brief at Addendum 1 also attached at Tab 3. This area was referred to in Plaintiffs'-Appellants' Brief as the Beatrice fifteen acre wetland site.

The 1983 report described the tannery sludge disposal area as containing waste described as, "a black, sludge resembling peat." See Tab 1 at page 3-1. This is consistent with the description given by Woodward Clyde, engineers for Beatrice, of Sample Z, "brown peaty material" sampled in 1983 at the southern boundary of the fifteen acre site which was at the bottom of the hill from the tannery waste disposal site described in the 1983 report. It is also similar to the sample Z material taken in 1985 by Mr. Drobinski, geologist for plaintiffs, labeled WBAR Z' and sample BC-4 also taken by Mr. Drobinski 60 feet north of the sample Z site. Sample BC-4 was described as a "black" encrusted material with a yellowish-orange interior. These samples had a strong leather-like odor. Laboratory analysis of the samples showed

them to contain chrome, oil and grease, and solvents. Mr. Drobinski identified the samples as tannery waste which contributed to the solvent contamination found at the fifteen acre site. See Special Appendix Note 81 in Plaintiffs'-Appellants' Brief; also see Tab 4 containing selections from the transcript and exhibits at trial including photographs of the samples in question.

The report states that, "[a] total of four chlorinated organic compounds were identified in samples collected," on the Riley property. See Tab 1 at 3-5. Three of these were chemicals which contaminated Wells G and H, Trichloroethylene, trans 1,2 dichloroethylene, and chloroform. See Tab 1 at 3-5. The report states that, "the Riley (Tannery) property is the probable source of (trans 1,2 dichloroethylene) contamination at (Production Well) #1." See Tab 1 at 3-6. It admits that trichloroethylene was also a contaminant of production well #1. See Tab 1 at 3-6. It denies that the property is a contributor of that contamination. See Tab 1 at 3-6. However, it concludes that based on water level measurements taken during a pump test of the two wells, Production Well #1 was in the cone of influence of Production Well #2 and therefore chlorinated volatile organic compounds present at Production Well #1 could have contributed to the contamination of Production Well #2. The report therefore would have supported

plaintiffs' assertion during trial that water level measurements in a monitoring well which drop during a pump test indicate the cone of influence of a pumping well and that within the cone of influence water and contaminants move toward the pumping well. The existence of the monitoring wells on the tannery property if they had been disclosed would have also provided the opportunity to obtain greater information about the extent of the cone of influence of well G and H during the pump test that took place in November, 1985 to January, 1986. See Plaintiffs'-Appellants' brief at Section IIIC. And most importantly, the 1983 report stands for the proposition that the tannery was a source (albeit not the principle source) of contamination at the fifteen acre wetland site. The report states as follows;

Groundwater flow at the Riley site under normal pumping conditions has been shown to flow west to east. Water level measurements taken at (Production Well) #1 during pumping and nonpumping conditions indicate that (Production Well) #1 is within the pumping of influence of (Production Well) #2. Chlorinated volatile organic compounds present at (Production Well) #1 could therefore, contribute to the contamination at (Production Well) #2 under pumping conditions. Levels of (trichloroethylene) and trans 1,2 (dichloroethylene) detected at (Production Well) 1 are however significantly less than those detected at (Production Well) #2. If chlorinated contaminants at (Production Well) #2 were the result of contamination at the Riley site, a significant concentration of those substances would be expected at (Production Well) #1, which is the most downgradient well on the Riley site and most proximate to (Production Well) #2.

The absence of significant concentrations of any of the

compounds contaminating (Production Well) #2 in groundwater from (Production Well) #1 or from any other well on the Riley site indicates that the Riley site is not the principal source of contaminants detected at (Production Well) #2.

Tab 1 at 3-6 to 4-1 (Emphasis in the original).

In light of the conclusions of the 1983 report, had that report been disclosed to plaintiffs, it would have provided significant support for plaintiffs' claims that the tannery waste disposal site was a source of solvent contamination of the fifteen acre site and the aquifer serving municipal wells G and H.

III. THE REPORT SHOULD HAVE BEEN DISCLOSED TO PLAINTIFFS

The existence of this report and the studies and tests upon which it was based should have been disclosed to plaintiffs during discovery and at trial. Pursuant to a deposition notice for the person most knowledgeable concerning chemical use, waste disposal practices, and environmental matters, Ms. Ryan and Mr. Jacobs produced Mr. Riley. Ms. Ryan stated that she represented Mr. Riley personally and Mr. Jacobs while stating he could not designate Mr. Riley because Mr. Riley no longer worked for Beatrice, nevertheless stated that Mr. Riley was the most knowledgeable person concerning the operations of the tannery. See excerpts from Deposition of John J. Riley, Jr. April 3, 1985 at Tab 5 at 4-7.



state, and private parties investigating the contamination of Wells G and H and the East Woburn Aquifer. It also included the review and analysis of the publicly available information concerning the area, as well as information and data obtained from the defendant and others through legal process.

2. During our investigation I formed several opinions concerning the sources, historical origin, and extent of the contamination found at the Beatrice site as well as that found in the aquifer serving Wells G and H. I concluded among other things that the Beatrice site was contaminated by activities which occurred primarily in the 1960's. The chemical waste contributing in part to the solvent contamination of the groundwater at the site included sludge which because of its chemical characteristics, quality and smell I associated as tannery waste. In addition, I acted as the field coordinator and investigator for Dr. George Pinder's examination of the East Woburn aquifer and the relationship between the Beatrice site and the contamination of Wells G and H.

3. In October, 1987 I reviewed for the first time the 1983 report entitled, "Hydrogeologic Investigation of the John J. Riley Tanning Company Inc. 228 Salem Street Woburn, Massachusetts," by Yankee Environmental Engineering and Research Services, Inc.. Prior to that date I had not known of the existence of the 1983 investigation or the field data obtained by it.

4. The 1983 investigation and report by Yankee Environmental Engineering provided significant and important field data and information. This data and information supported my opinion that tannery waste was in part contributing to the contamination of the groundwater at the Beatrice site. In addition, the information contained in the report would have greatly assisted our understanding of the sources of contamination and the history of contaminating activities influencing the Beatrice site. Further, the data and information would have provided significant opportunities during our field investigation to obtain additional information and data regarding the hydrogeological and chemical characteristics of the aquifer underlying and influencing the Beatrice site. This information and data would have allowed us to more accurately determine the extent to which tannery waste disposal practices contributed to the contamination of the tannery groundwater and the Beatrice site and the influence of Riley production well 2 on the cone of influence of Wells G and H. Plates accompanying the 1983 report illustrating the results of the 1983 hydrogeologic investigation are attached at Tabs 1 and 2.

5. Knowledge of the existence of the six monitoring wells installed on the tannery property by Yankee Environmental Engineering during its 1983 investigation would have provided our team with an opportunity to provide Dr. Pinder in 1985 with additional information concerning the chemical quality of the

groundwater in the area. Knowledge of the wells also would have provided an opportunity to collect additional information concerning the influence of Riley well 2 and Wells G and H on groundwater flow in the area. This information in conjunction with the field data obtained during Yankee's 1983 investigation and the information already known by us concerning the aquifer would have allowed for a much more accurate determination of the dimensions and extent of the cone of influence of Wells G and H regarding the tannery and southernmost portion of the Beatrice site.

6. Further, the information and data obtained by the 1983 report concerning historical waste disposal practices at the tannery would have provided a substantial basis upon which to connect the tannery waste sampled at the southern boundary of the Beatrice site with disposal practices at the tannery. For instance, the 1983 report describes the tannery sludge landfilled onsite as a "dark" "peaty" material. This agrees with the samples and chemical analysis of the tannery waste samples obtained during our investigation of the Beatrice site. The report also identifies a sludge disposal area on the slope of the hill behind the catch basin upgradient of Riley production well 1. See Figure 1 entitled, "Site Plan" and Figure 3 entitled, "Contaminants Historically Found On Riley Property" at Tab 2. The fact that the 1983 study, which conducted only one round of sampling, detected contamination (.7

ppb of 1,2 trans dichloroethylene) at the upgradient monitoring well number 2 is particularly significant because that monitoring well due to its location was least likely to detect contamination since the most probable source of contamination to the groundwater was the tannery sludge pile downgradient of the well. In light of the high levels of solvents that we detected in the tannery waste samples taken on the Beatrice site south of the sludge pile on the tannery site, the fact that the 1983 investigation concluded that the Riley tannery was a source of solvent contamination of the groundwater based on limited sampling of wells upgradient of the tannery sludge pile, and since relatively high levels of solvents were detected in Riley well 1 downgradient of the tannery sludge pile, examination and testing of the tannery sludge pile and the placement of additional monitoring wells at and below the tannery sludge pile would have been warranted in the face of the 1983 investigation. The additional data thus obtained would have determined the extent tannery waste disposal practices contaminated the aquifer underlying the Beatrice site and serving Wells G and H.

7. For these reasons, had the 1983 Yankee Environmental Engineering Report been made available to me during our

investigation of the Beatrice site, I could have used the data and information obtained by the investigation to substantiate and support the findings and conclusions, I made as a result of our work and review of available data, concerning the sources, extent, and historical activities leading to the contamination of the Beatrice site and the aquifer serving wells G and H, in particular the role of tannery waste disposal in the contamination of the aquifer. Furthermore, the data and information contained in the report would have provided a significant and unique opportunity to collect additional and important well monitoring data during the 1985-1986 reactivation of Wells G and H, and to conduct a very focused and cost effective investigation on the tannery property concerning the sludge disposal site identified in the report.

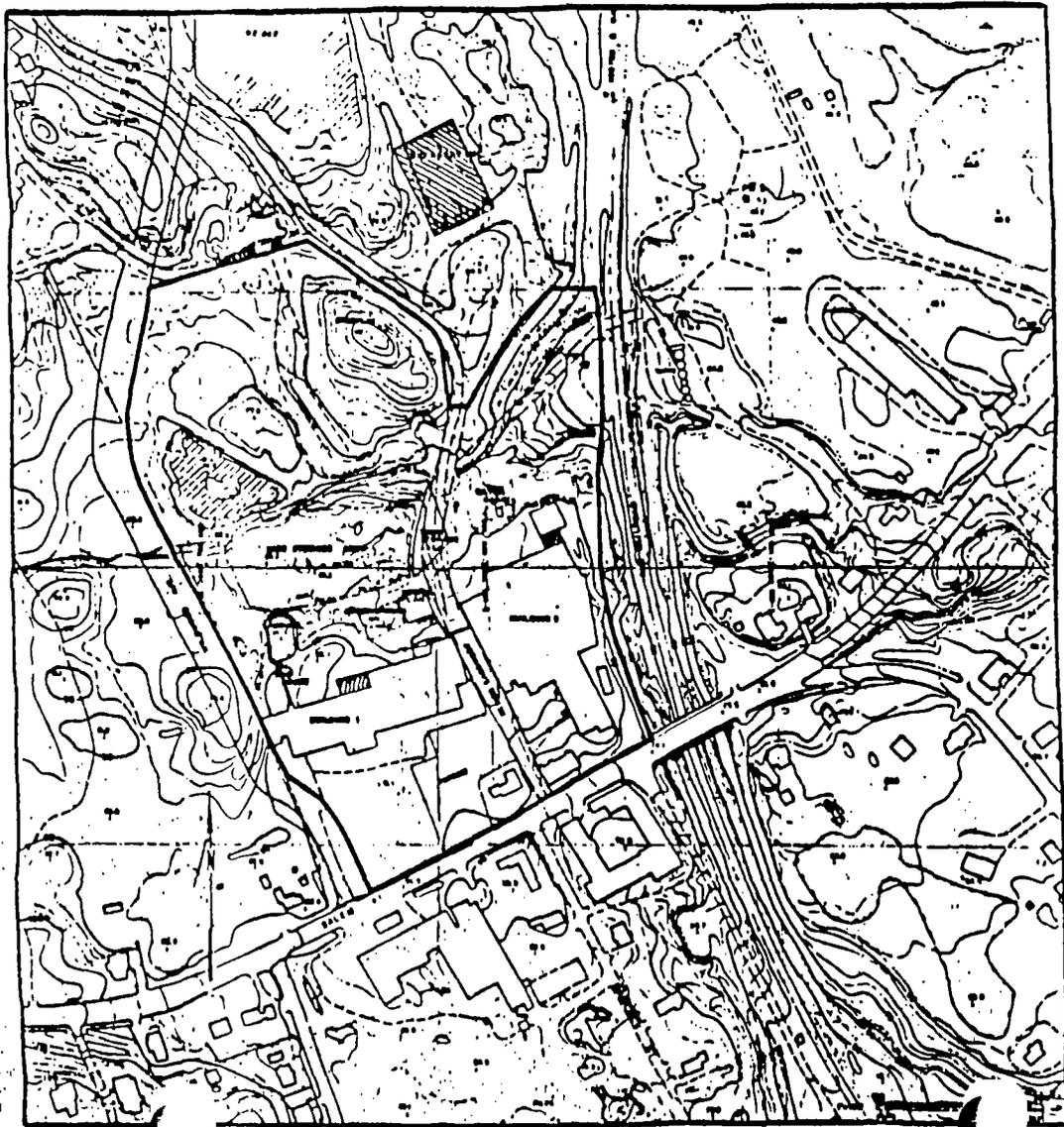
Dated: October 15, 1987

  
\_\_\_\_\_  
John Drobinski

Sworn to before me this 15 day of October, 1987.

  
\_\_\_\_\_  
Notary

My commission expires: March 27, 1990

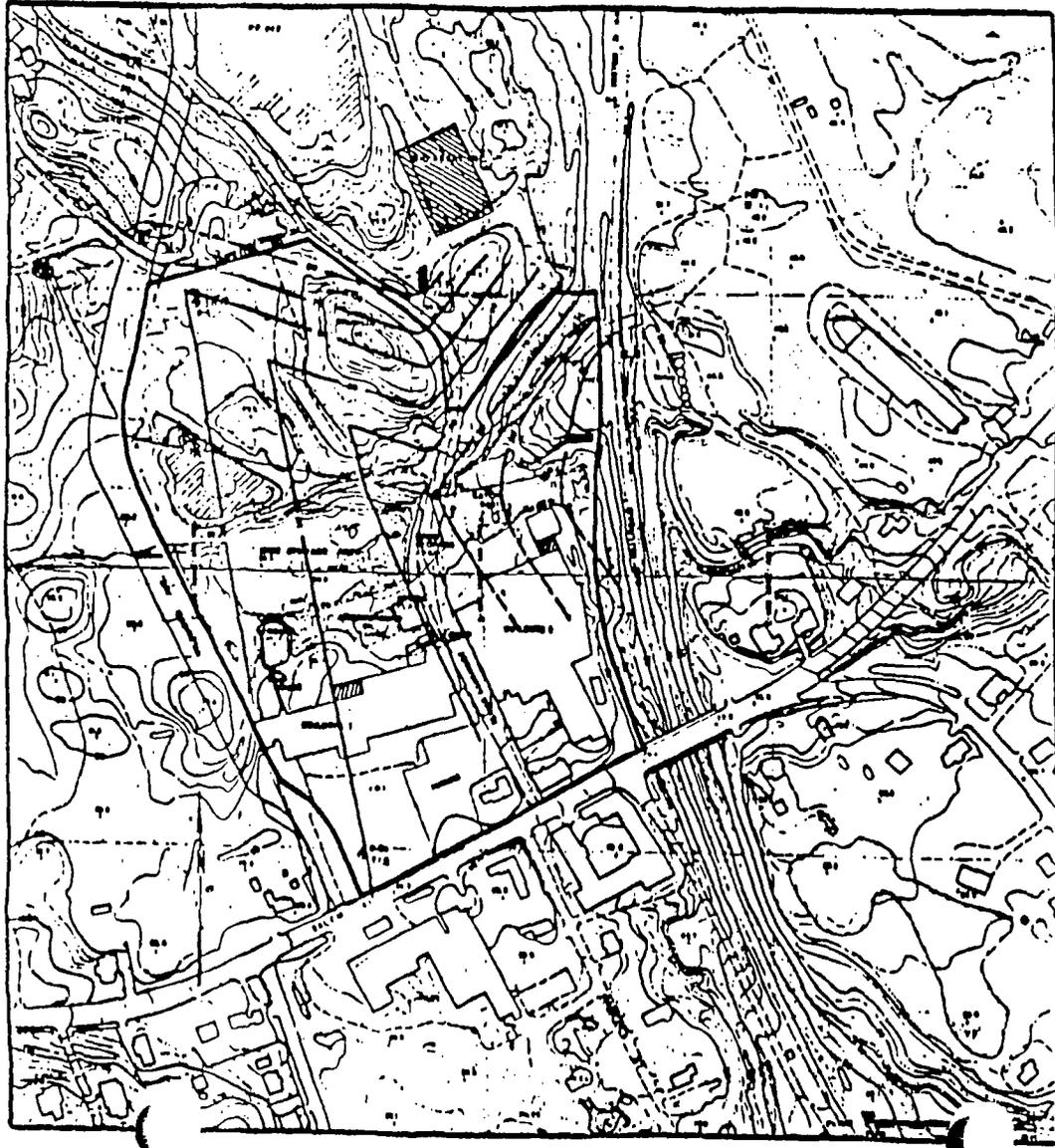


### LEGEND

-  BOUNDARY OF MAP AREA
-  BOUNDARY OF SHEET
-  CONTOUR OF ELEVATION
-  ROAD
-  RAILWAY
-  BUILDING

Scale 1:50,000	
Vertical Datum	Mean Sea Level
Horizontal Datum	
Projection	
Map Sheet No.	
Scale of Denominator	
Scale of Numerator	



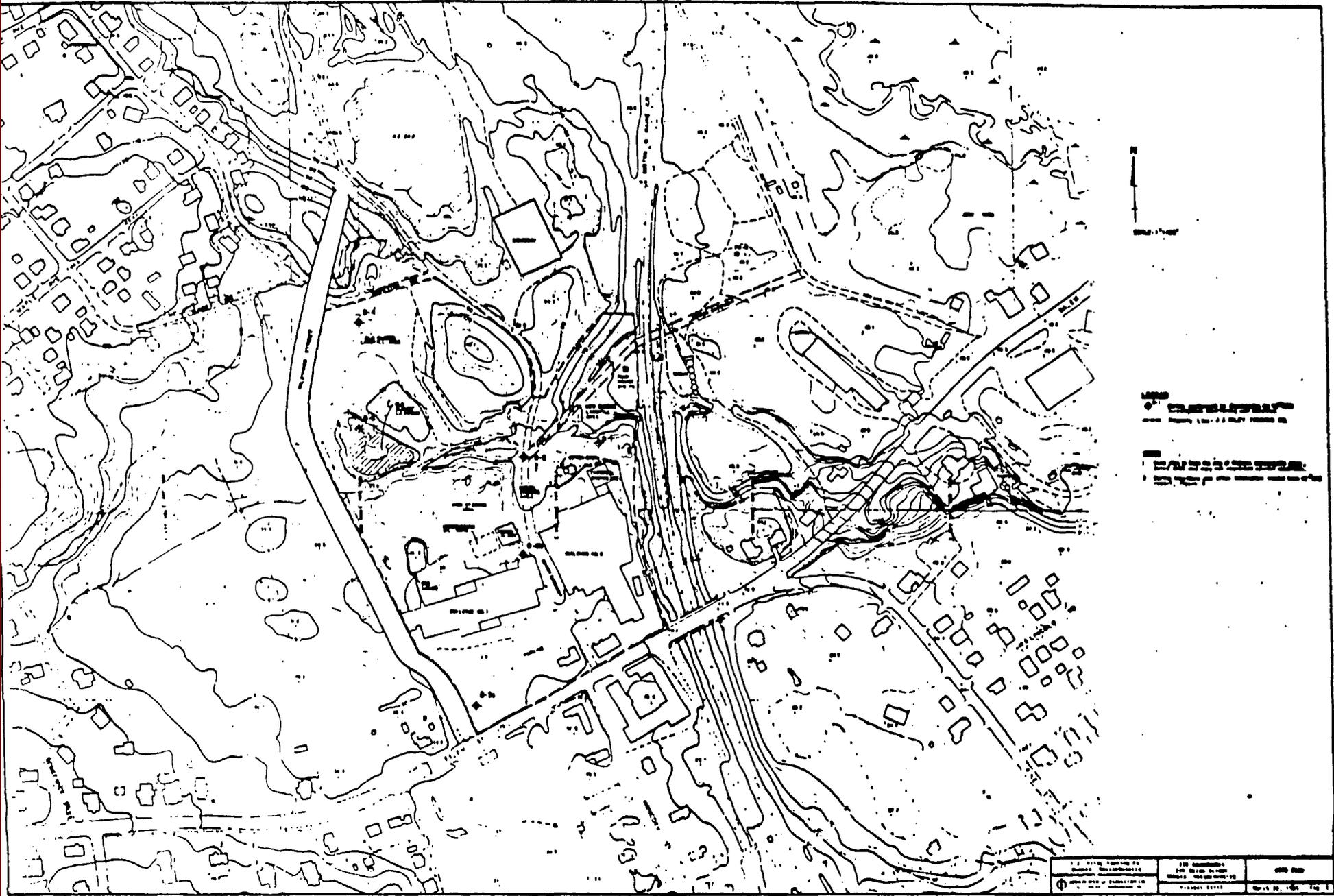


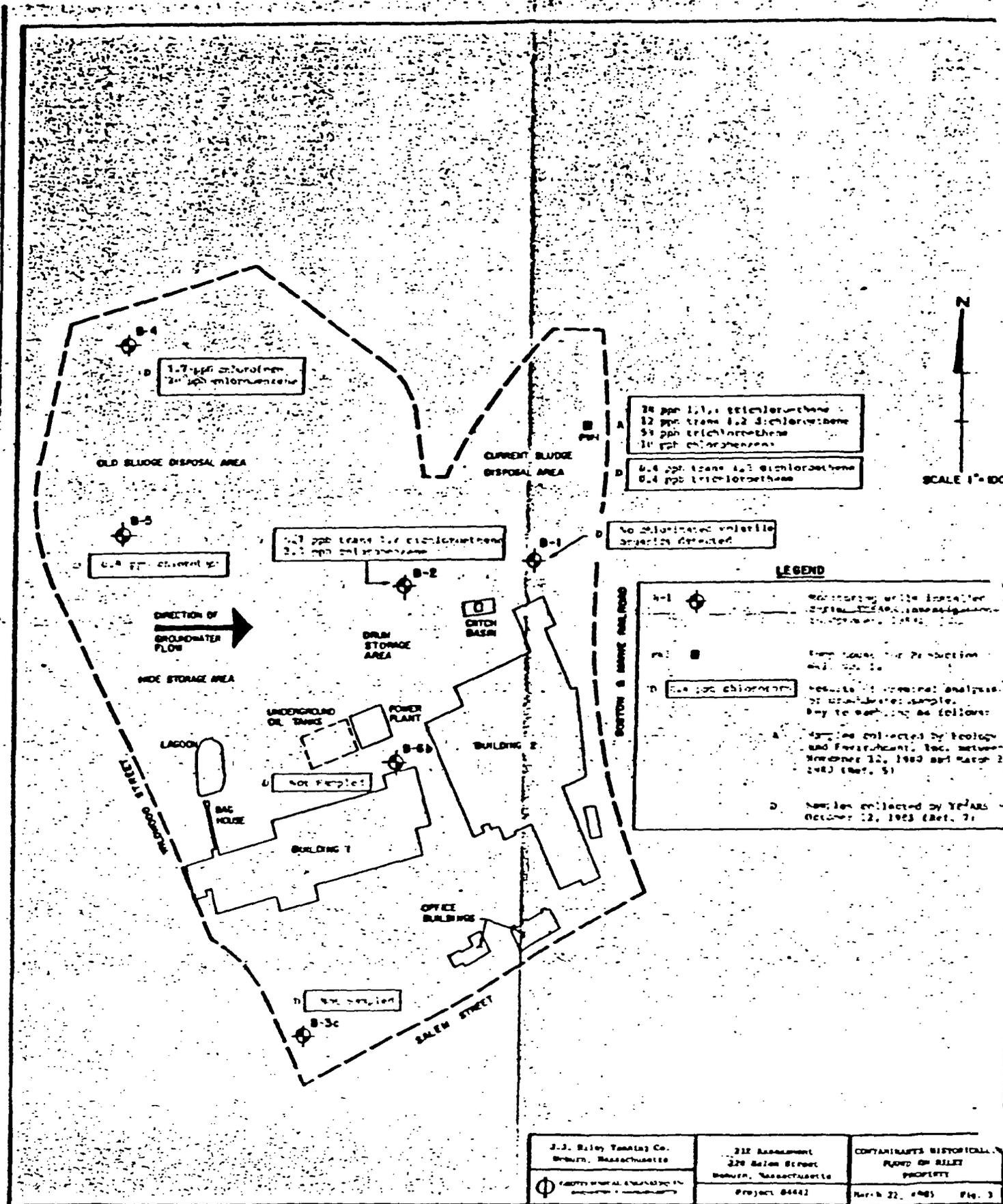
LEGEND

- Symbol: Dashed line
- Symbol: Solid line
- Symbol: Shaded area
- Symbol: Circle with dot
- Symbol: Square with dot
- Symbol: Triangle with dot
- Symbol: Circle with cross
- Symbol: Square with cross
- Symbol: Triangle with cross
- Symbol: Circle with star
- Symbol: Square with star
- Symbol: Triangle with star
- Symbol: Circle with dot and cross
- Symbol: Square with dot and cross
- Symbol: Triangle with dot and cross
- Symbol: Circle with star and cross
- Symbol: Square with star and cross
- Symbol: Triangle with star and cross

Title: [illegible]	
Scale: [illegible]	
Date: [illegible]	
Author: [illegible]	
Project: [illegible]	







B-4  
D  
1.7 ppm chloroform  
2.0 ppm chlorobenzene

B-5  
D  
6.8 ppm chloroform

B-2  
D  
1.7 ppm trans 1,2-dichloroethene  
2.0 ppm chlorobenzene

B-1  
A  
24 ppm 1,1,1-trichloroethene  
12 ppm trans 1,2-dichloroethene  
59 ppm trichloroethene  
11 ppm chlorobenzene

B-1  
D  
6.4 ppm trans 1,2-dichloroethene  
0.4 ppm trichloroethene

B-1  
D  
No chlorinated volatile organics detected

B-5a  
U  
Not Sampled

B-3c  
D  
9.0 ppm chloroform

**LEGEND**

- B-1 (diamond symbol) Monitoring well installed by Ecology and Forestland, Inc. on 10/22/83
- B-2 (square symbol) Same as B-1
- B-3 (diamond symbol) Results of chemical analysis by Ecology and Forestland, Inc. on 10/22/83 as follows:
  - A Samples collected by Ecology and Forestland, Inc. between November 12, 1983 and March 2, 1983 (Ref. 5)
  - D Samples collected by Ecology and Forestland, Inc. on October 22, 1983 (Ref. 7)

J.J. Riley Tanking Co. Brewster, Massachusetts	212 Assessment 229 Salem Street Brewster, Massachusetts	CONTAMINANTS HISTORICALLY FOUND ON RILEY PROPERTY
ENVIRONMENTAL ANALYSIS INCORPORATED	Project 84442	March 22, 1985 Page 3

1 UNITED STATES DISTRICT COURT  
2 DISTRICT OF MASSACHUSETTS

3 Civil Action  
4 No. 82-1672-S

SKINNER, D. J.  
and a Jury

5 ANNE ANDERSON, ET AL

6 V.

7 W. R. GRACE & CO., ET AL

8 Eighth Day of Trial

9 APPEARANCES:

10 Schlichtmann, Conway & Crowley (by Jan Richard Schlichtmann,  
11 Esq., Kevin P. Conway, Esq., and William J. Crowley, III,  
Esq.) on behalf of the Plaintiffs.

12 Charles R. Nesson, Esquire, on behalf of the Plaintiffs.

13 Herlihy & O'Brien (by Thomas M. Kiley, Esq.) on behalf of  
14 the Plaintiffs..

15 Hale & Dorr (by Jerome P. Facher, Esq., Neil Jacobs, Esq.,  
Donald R. Frederico, Esq., and Deborah P. Fawcett, Esq.)  
16 on behalf of Beatrice Foods.

17 Foley, Hoag & Eliot (by Michael B. Keating, Esq., Sandra  
Lynch, Esq., William Cheeseman, Esq., and Marc K. Temin,  
18 Esq.) on behalf of W. R. Grace & Co.

19 Courtroom No. 6  
Federal Building  
20 Boston, MA 02109  
9:00 a.m., Wednesday  
21 March 19, 1986

22 Marie L. Cloonan  
Court Reporter  
23 1690 U.S.P.O. & Courthouse  
24 Boston, MA 02109  
25

1 I will permit it. We had the foundation on voir dire, but that  
2 is all right.

3 A Those particular markings on the 55-gallon drum are required  
4 by the federal code. They indicate the gauge of steel, the  
5 gallons of the steel drum, and the month and date the drum was  
6 manufactured.

7 Q And would you be able to point out to the jury those  
8 numbers and what they mean on that photograph?

9 A Okay. The first number is the number 18 which would  
10 indicate it is 18-gauge steel. The second number is 55, which  
11 indicates it's a 55-gallon drum. The third number, 60, which  
12 would indicate the year of manufacture, 1960. The following  
13 number is the number 3, which would indicate the month  
14 of manufacture.

15 Q Now, Mr. Drobinski, you also examined other debris piles,  
16 is that correct?

17 A That's correct, sir.

18 Q Now, Mr. Drobinski, do you have an opinion -- you said  
19 before that you had an opinion as to the type of activities  
20 that contaminated the Beatrice site. Do you remember that?

21 A Yes, sir.

22 Q Do you have an opinion as to the period of time that the  
23 activities took place which resulted in the contamination of  
24 the Beatrice site with the five chemicals that you previously  
25 testified to?

1 A Yes, I do, sir.

2 Q What is that opinion?

3 MR. FACHER: May it please the Court, I object  
4 to that opinion.

5 THE COURT: May I have that back, please?

6 (Question, Page 8-116, Lines 22 to 25, read  
7 by the Reporter.)

8 THE COURT: The objection is overruled.

9 Q Do you have such an opinion, Mr. Drobinski?

10 A Yes, I do, sir.

11 Q What is that opinion?

12 A That opinion is that during the 1960's -- mid-1960's --  
13 and up to the early 1970's that the contamination found at the  
14 Beatrice site -- that is the period of time the contamination  
15 found at the Beatrice site was introduced to the Beatrice site.

16 Q And, Mr. Drobinski, what is the basis of your opinion?

17 A The basis for our opinion is the site assessment that  
18 we had done at the Beatrice site; that site assessment incorporates  
19 the analysis of a sequential history of area photographs,  
20 it incorporates the sampling of soil and water and surface  
21 materials at the Beatrice site, it incorporates a sampling of  
22 subsurface soil and water at the Beatrice site, and it  
23 encompasses analysis of the debris piles on the Beatrice  
24 site, digging through those particular debris piles on the  
25 Beatrice site and finding date-marked materials, and also

# NUTTER, McCLENNEN & FISH

FEDERAL RESERVE PLAZA  
600 ATLANTIC AVENUE  
BOSTON, MASSACHUSETTS 02210

(617) 973-9700

TELEX 940790  
TELECOPIER (617) 973-9748

COUNSEL  
LONDON  
PARIS  
TOKYO

HYANNIS  
WASHINGTON  
SAN FRANCISCO  
PALO ALTO  
AMSTERDAM

October 14, 1986  
2346-47

Barbara Newman, Project Manager  
United States Environmental  
Protection Agency  
Region 1  
J.F.K. Bldg.  
Boston, MA 02203

Re: Request for 21E Report on J.J. Riley Property,  
228 Salem Street, Woburn, MA

Dear Ms. Newman:

You have requested that Mr. John J. Riley, Jr. voluntarily provide you with a copy of a so-called "21E" report concerning his property at 228 Salem Street, Woburn, MA. Mr. Riley declines to do so. The report in question was prepared at the request of this office in anticipation of litigation and is therefore privileged work product. In addition, it appears that your request exceeds the statutory authority of EPA under the relevant provisions of CERCLA and RCRA. Finally, on a practical level, I have agreed to provide you with a copy of a report of the chemical analysis of eight soil samples taken on the property in July 1986, previously provided to the City of Woburn Board of Health (enclosed). This should provide you with current information so as to inform yourself about the property at 228 Salem Street.

I trust the enclosed report will be satisfactory. Please let me know if I can be of further assistance.

Very truly yours,

Mary K. Ryan

TEST PIT EXPLORATIONS  
VACANT PARCEL OFF WILDWOOD STREET  
WOBURN, MASSACHUSETTS

PREPARED FOR:

MR. PETER DELOREY  
CONDYNE, INC.  
101 ACCORD PARK DRIVE  
NORWELL, MA. 02061

AUGUST 4, 1986

**KURZ ASSOCIATES, INC.**

P.O. Box 430  
West Bridgewater, MA 02379

# KURZ ASSOCIATES, INC.

P.O. Box 430  
West Bridgewater, MA 02379  
(617) 588-4614

August 4, 1986  
Project No. 860611665

Mr. Peter Delorey  
Condyne, Inc.  
101 Accord Park Drive  
Norwell, MA 02061

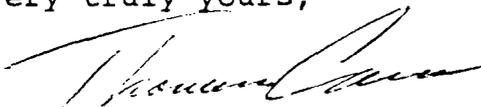
RE: Test Pit Explorations  
Vacant Parcel off Wildwood Street  
Woburn, Massachusetts

Dear Mr. Delorey;

Pursuant to your request, Kurz Associates, Inc. conducted an exploratory test pit survey of the vacant parcel of land located behind the Riley Tannery on Wildwood Street in Woburn, Massachusetts. The purpose of this investigation was to satisfy requirements of the Woburn Board of Health concerning the potential presence of hazardous waste materials on the site.

Attached is Kurz Associates' report detailing field observations, sample collection, and chemical analyses of soils obtained. Contents therein may be submitted to the Woburn Board of Health for their review and approval. If there are any questions, please contact the undersigned.

Very truly yours,

  
Thomas Carson  
Geologist

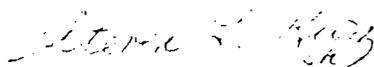
  
Steven L. Kurz Ph.D.  
President

TABLE OF CONTENTS

I.	Introduction and Scope of Work . . . . .	1
II.	Site Location and Description . . . . .	1
III.	Field Examination . . . . .	2
	A. Test Pits . . . . .	3
	B. Field Sampling . . . . .	4
IV.	Chemical Analyses . . . . .	5
V.	Summary and Discussion . . . . .	6

TABLES AND FIGURES

Table 1	Summary of Analytical Results
Figure 1	Site Locus Plan
Figure 2	Site Plot Plan

APPENDICES

Appendix A	Test Pit Reports
Appendix B	Original Data, Methods, References, and Chain of Custody Form

August 4, 1986  
Page 1

I. Introduction and Scope of Work

At the request of Mr. Peter Delorey of Condyne, Inc., Kurz Associates, Inc. undertook an exploratory test pit survey at a vacant property located immediately behind the Riley Tannery and off Wildwood Street in Woburn, Massachusetts. The purpose of this investigation was to "attempt to identify the presence of hazardous waste contamination on the site" as required by the Woburn Board of Health. As verbally contracted, all work was to be performed in consultation with and under the direction of a representative of the Woburn Board of Health.

Accordingly, Mr. Frank Ryan, acting Health Agent, was contacted regarding the specific scope of work required. Mr. Ryan related that the Board of Health anticipated the need for six to eight test pits in the area of a proposed structure on the site with more detailed coverage in proposed building footprint areas proximal to the Riley Tannery. Mr. Ryan further stated that the test pits would be excavated to a maximum depth of ten feet and that representative samples of soil would be collected at a horizon corresponding to six feet below existing grade. Representative groundwater samples were also requested should the water table be encountered.

Mr. Ryan was specifically questioned as to the exact nature of chemical testing required. He replied that the Board of Health only wanted to know if the test pit excavations encountered hazardous waste materials. As such, it was subsequently agreed that chemical testing would be limited to analysis of samples obtained for the four hazardous waste criteria; ignitability, corrosivity, reactivity, and EP Toxicity; specified in the Resource Conservation and Recovery Act (PL 94-580), 40 CFR Part 261.

II. Site Location and Description

The subject site is located immediately behind or to the north of the Riley Tannery on Wildwood Street in Woburn, Massachusetts. Access to the site is gained via the Riley Tannery property at 228 Salem Street or via a gate through chain link fencing off Wildwood Street. A site locus plan is presented in Figure 1.

August 4, 1986  
Page 2

Approximately 6.2 acres in total area, the site is presently undeveloped and partially overgrown with weeds and small shrubs. The basic configuration of the site is shown in Figure 2. Topography on the triangular shaped site can be characterized as gently rolling and is, generally, controlled by bedrock. Overall slope is down to the southwest and south-southwest. Bedrock outcrops locally in the northeastern and central portions of the site. Remaining areas appear to have been mechanically graded and filled as a result of previous gravel mining operations on the site as well as the installation of a storm sewer line and detention pond along the southern boundary of the site. Hence, organic topsoils or loam are scarce on the site and surface soils predominantly consist of coarse gravels and exposed glacial tills.

A 114,000 square foot building has been proposed for the site. The structure will cover approximately 42% of the total site area and will be situated in the southeast corner of the lot with various parking lots in remaining areas. The proposed building location is shown in Figure 2.

### III. Field Investigation

The subject site was visited on July 2, 1986 by Thomas Carson of Kurz Associates, Inc. for the purpose of conducting the scope of work detailed above. The weather on this occasion was overcast and breezy. Heavy rains fell throughout the day. Temperatures ranged in the low 60's.

Upon arriving at the site, Mr. Carson met with Mr. Peter Delorey, Mr. John Riley, the property owner, and later with the Health Agent, Mr. Frank Ryan. A detailed discussion of the project objectives ensued. A general agreement regarding the proposed scope of work was reached and all parties moved into the field. Mr. Ryan subsequently pointed out approximate locations where he wanted test pits to be placed and excavations were begun.

August 4, 1986

Page 3

A. Test Pits

A total of eight test pits were excavated on the site using a Case 580 backhoe provided by Mr. John Riley. Test pits were excavated adjacent to surveyor's stakes representing the four corners of the proposed building, in the approximate center of the proposed building footprint, and along the southern boundary of the site adjacent to the Riley Tannery property. Approximate locations of the test pit excavations are plotted in Figure 2. Complete test pit report logs are presented for reference in Appendix A.

As a result of considerable grading and filling of the site, test pit stratigraphies were, for the most part, dissimilar. Test pit TP-1 located at the northwest corner of the proposed building revealed approximately 1.7 feet of clean sand fill with occasional cobbles overlying dark grey, fine to coarse stratified sand with local clay accumulations. This material was observed to total depth of 10.0 feet. No evidence of unusual or suspicious fill materials was observed.

Test pit TP-2 located at the northwest corner of the proposed building revealed dark brown gravelly sand fill consisting of fine sand, silty fines, and medium gravel. Gravels were similar in petrologic character to local bedrock. Occasional tree roots, branches, and bark were also observed. This material was encountered to total depth of 10.0 feet.

Test pits TP-3 and TP-4 were located in the approximate center of the proposed building footprint. Gravelly sand fill similar to that observed in TP-2 was found to total depths of 3.8 and 5.0 feet, respectively. Continued excavation was refused in each of these test pits due to the presence of bedrock ledge. No unusual or suspicious constituents of the fill were observed.

Test pit TP-5 located at the southwest corner of the proposed building footprint revealed gravelly sand fill similar to that observed in TP-2, 3, and 4 to a depth of 4.8 feet. Medium to coarse sand fill with little gravel was then observed to total depth of 10.0 feet. This material generally displayed gradational layers very dark grey to black in color and grading to a rich black color at 9.0 feet. Bits of hair and metallic odors were noted for soils exposed in this lower portion of the excavation.

August 4, 1986

Page 4

Test pit TP-6 located at the southeast corner of the proposed building exposed a quantity of reddish brown, clayey sand fill composed of fine to medium sand with abundant tree stumps, roots, and plastic debris. The base of this material varied from 3.0 at the southern end of the excavation to 6.3 feet at the northern end. Gravelly sand fill similar to that observed in TP-2, 3, 4, and 5 was then encountered to total depth of 10.0 feet. No unusual or suspicious materials were observed in either of the fill units observed.

Test pit TP-7 was located approximately equidistant from the southeast and southwest corners of the proposed building along the southern boundary of the site. Dark brown to black gravelly sand fill with abundant small cobbles was observed to total depth of 6.8 feet. Abundant small roots and twigs were found in this unit and a slight organic odor reminiscent of decaying vegetable matter was noted. Continued excavation was refused due to the presence of bedrock ledge

Test pit TP-8 was located approximately 60 feet southeast of the southwest corner of the proposed building. Medium brown, gravelly sand fill similar to that exposed in TP-2, 3, 4, 5, and 6 was observed to a depth of 1.8 feet whereupon a color change to dull purple was encountered. No marked change in lithology was observed, however, until a clean, medium brown, fine to medium sand was encountered at 4.0 feet. Clean sand was continuous to total depth of 10.0 feet. No suspicious materials were noted as constituents of either the gravelly sand fill or the clean sand though a metallic odor was discerned. No obvious reason for the purple color change was observed.

Groundwater was not observed in any of the test pits. However, heavy rainfall experienced throughout the day precluded a definitive examination for slow seepage of water into the excavations. According to Mr. Ryan and Mr. Riley, the depth to the water table in this area is considerable.

#### B. Field Sampling

As per discussions with Mr. Frank Ryan, samples of soil were collected from each of the test pits at a depth of six feet below existing grade where possible. Soil samples were collected at 3.0 feet and 5.0 feet in test pits TP-3 and 4, respectively, as bedrock refusal was encountered

August 4, 1986

Page 5

prior to the requested 6.0 feet sampling depth. All samples were initially placed in 500 milliliter glass jars with teflon lids and kept on ice as per E.P.A. protocol. Individual samples were obtained by using the lid of each sample jar to scoop small quantities of soil into the jar from a number of locations on the specific test pit sidewall at the requested depth of six feet. When the sample jar was approximately three quarters full, the lid was placed on the jar and the jar was vigorously shaken to mix the soil within.

Following completion of the excavations and sampling procedures, Small quantities of soil were removed from each of the jars and placed in 40 milliliter glass vials specially designed for the analysis of volatile organic compounds. Both the jars and associated vials were tightly sealed, returned to the cooler, and promptly transported to Clean Harbors of Natick, Inc., a state certified laboratory for analysis.

#### IV. Chemical Analyses

As per prior agreement with Mr. Ryan, soil samples collected at the site were analyzed for the four hazardous waste criteria; ignitability, corrosivity, reactivity, and EP Toxicity; specified in the Resource Recovery and Conservation Act, 40 CFR Part 261. As such, laboratory analyses of soils collected included tests for the following:

- 1) A flashpoint less than 140 F (60 C),
- 2) A pH less than 2.0 or greater than 12.5,
- 3) Total cyanide and sulfide concentrations greater than 250 mg/kg and 500 mg/kg wet weight, respectively (EPA interim criteria, 40 CFR Part 261.23(a)(5)),
- 4) The EP Toxicity test for the eight primary pollutant metals; arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver.

Additional tests specifically requested by Kurz Associates, Inc. included the EP Toxicity test for hexavalent chromium and analyses for E.P.A. Method 624 volatile organic

August 4, 1986

Page 6

compounds. Results of these analyses are summarized in Table 1. Formal analytical results including test methods, references, and the Chain of Custody Form are provided in Appendix B.

In summary, all soil samples had flashpoints greater than 200 F, pH determinations greater than 2.0 and less than 12.5, and total cyanide and sulfide concentrations less than 250 mg/kg and 500 mg/kg wet weight, respectively. Results of the EP Toxicity test indicate eight metals including hexavalent chromium are not present in leachable concentrations (under specific laboratory conditions) greater than the maximum contaminant levels specified in 40 CFR 261.24. E.P.A. Method 624 volatile organic compounds were not detected in any of the samples collected.

#### V. Summary and Discussion

Subsurface soils at the vacant parcel immediately north of the Riley Tannery off Wildwood Street in Woburn, Massachusetts were sampled at eight locations and analyzed for the presence of hazardous waste materials as defined by the Resource Recovery and Conservation Act, 40 CFR Part 261. All work was performed under the direction and supervision of the acting Woburn Health Agent, Mr. Frank Ryan.

Field inspection of test pit excavations performed on July 2, 1986 did not result in the visual identification of potentially hazardous substances. A considerable area of the site has been disturbed as a result of previous site usage. Only limited naturally occurring soil material was observed on the site. Much of the soil material observed in the excavations was determined to be fill. Bits of hair, discolored soils, and metallic odors were observed in test pits TP-5 and 8 located near the southwest corner of the proposed building. These materials were interpreted to represent trimmings, shavings, or buffing debris deposited as a result of leather tanning and finishing processes which have taken place for many years at the adjacent Riley Tannery.

August 4, 1986  
Page 7

These materials are specifically categorized as non-hazardous materials in 40 CFR Part 261 provided they do not fail the tests for the characteristics of hazardous material. Laboratory analyses of soils collected at these locations indicate that this is, indeed, the case. Similarly, laboratory analyses of soils collected at other locations on the site did not result in the identification of hazardous waste materials in terms of ignitability, corrosivity, reactivity, EP Toxicity, or the presence of E.P.A. Method 624 volatile organic compounds.

TABLES  
AND  
FIGURES

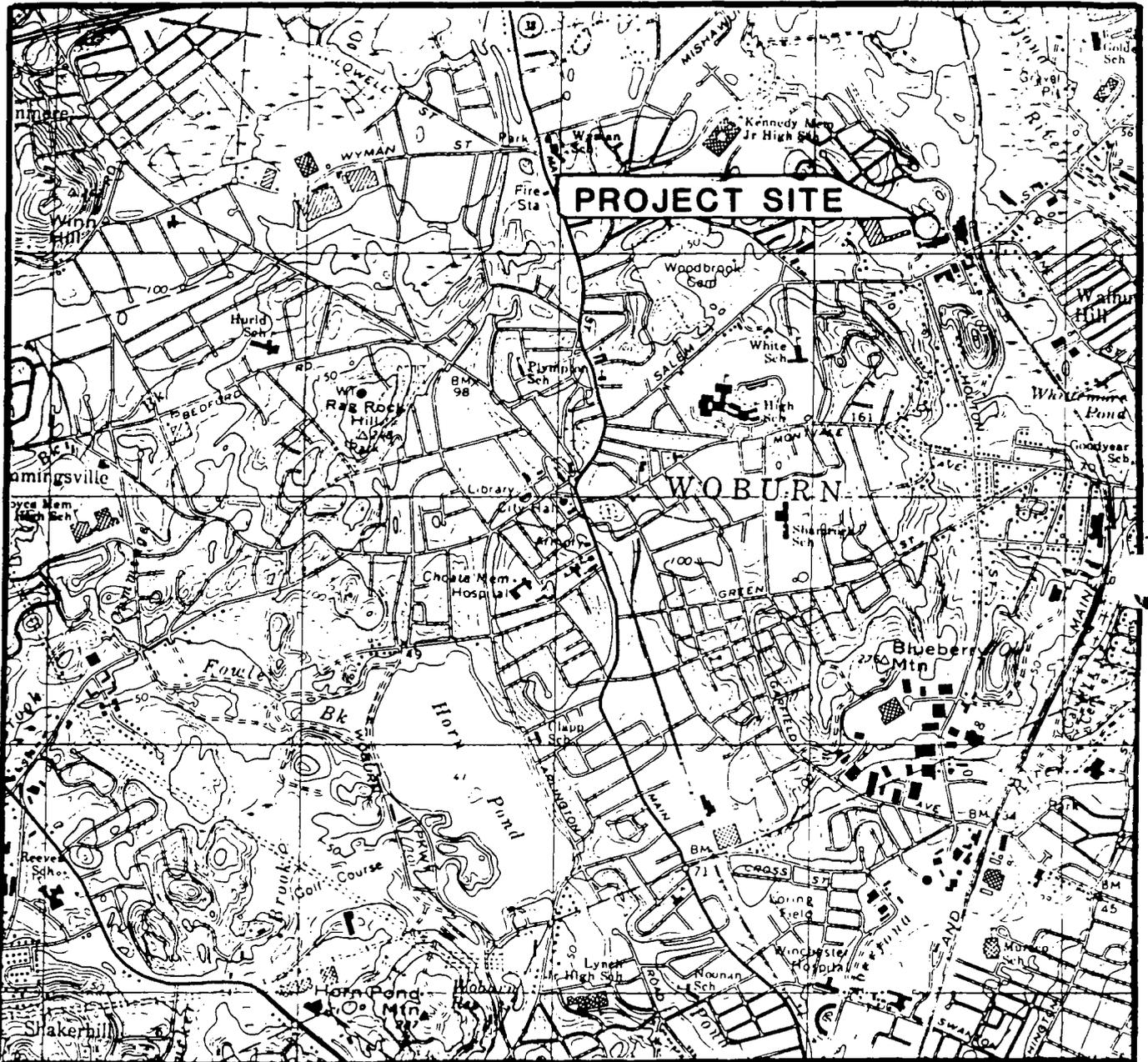
## Summary of Analytical Results

	TP-1	TP-2	TP-3	TP-4	TP-5	TP-6	TP-7	TP-8
<u>Ignitability ( F)</u>								
Flashpoint	>200	>200	>200	>200	>200	>200	>200	>200
<u>Reactivity*</u>								
Cyanide	ND**	ND	0.44	ND	ND	2.8	ND	ND
Sulfide	ND	ND	ND	ND	ND	ND	ND	ND
<u>Corrosivity</u>								
pH	7.0	6.2	7.3	4.9	4.9	6.7	5.5	7.9
<u>EP Toxicity***</u>								
Arsenic	ND	0.004	ND	ND	0.003	ND	0.003	ND
Barium	ND	ND	0.3	ND	ND	0.2	ND	0.2
Cadmium	ND	ND	ND	ND	ND	ND	ND	ND
Chromium: Trivalent	ND	ND	ND	ND	ND	ND	ND	ND
Hexavalent	ND	ND	ND	ND	ND	ND	ND	ND
Lead	ND	ND	ND	ND	ND	0.2	ND	0.2
Mercury	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	ND	ND	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND	ND	ND
<u>Volatile Organic Compounds</u>	ND	ND	ND	ND	ND	ND	ND	ND

\* mg/kg wet weight

\*\* ND = Not Detected

\*\*\* mg/L

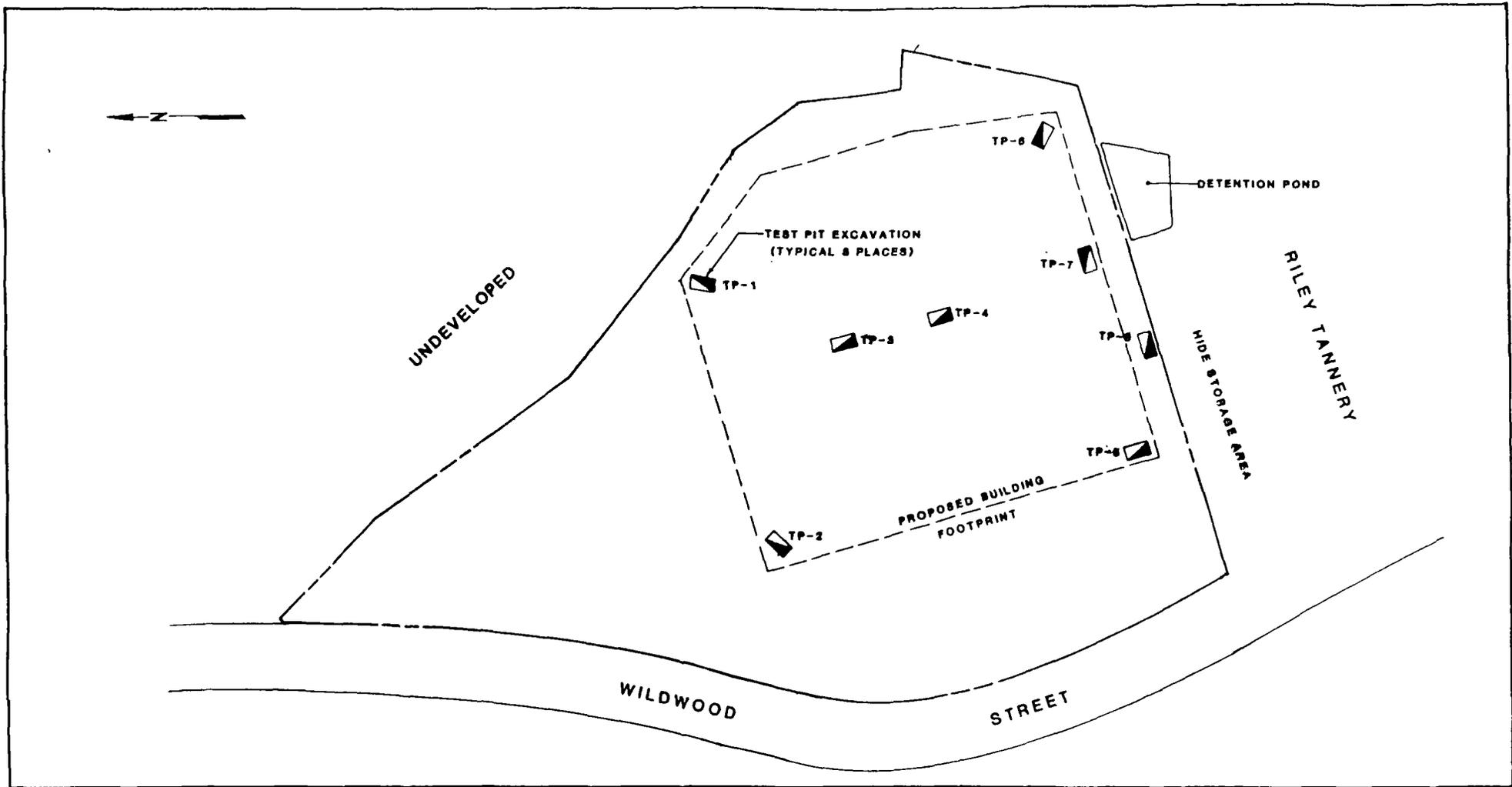


U.S.G.S. LEXINGTON QUAD

SCALE 1 : 25,000

SITE LOCUS PLAN  
VACANT PARCEL OFF WILDWOOD STREET  
WOBURN, MASSACHUSETTS

FIGURE 1



 **KURZ ASSOCIATES, INC.**

JULY 30, 1986

NOT TO SCALE

DRAWN BY D.D.

APPROVED BY T.C.

PROJECT NO. 880611665

**SITE PLOT PLAN  
VACANT PARCEL OFF WILDWOOD STREET  
WOBURN, MASSACHUSETTS**

FIGURE 2

KURZ ASSOCIATES, INC.

APPENDIX A

TEST PIT REPORTS

PROJECT: Vacant Parcel TEST PIT NO. TP-1  
 LOCATION: Off Wildwood Street, Woburn, MA SHEET 1 OF 1  
 EXCAVATOR: Riley Tannery DATE: 7/2/86  
 EQUIPMENT: Case 580E Backhoe PROJECT NO. 860611665  
 INSPECTOR: T. Carson ELEVATION: N.D.

DEPTH (FT)	STRATA CHANGE	DESCRIPTION OF MATERIALS & REMARKS	SAMPLE NUMBER	DEPTH RANGE
0.0		<u>FILL: SAND; fine to medium sand, 15-20% silt and clay fines, occasional cobble to 6" diameter, loose, light brown, dry, (SP).</u>		
1.65'				
2.0		<u>FILL: STRATIFIED SAND; fine to coarse sand (mostly medium), 10-25% fine to medium gravel (mostly fine), 5-10% silty fines, occasional clay nodules, occasional boulder, high angle scour and fill cross stratification, loose, dark gray, dry, (SP).</u>		
4.0			TP-1	6.0'
6.0				
8.0				
10.0				
		Total Depth/10.0'		

GROUNDWATER OBSERVATION  
 NOT ENCOUNTERED X  
 AT      FT AFTER      HOURS

EXCAVATION  

$$\frac{12.0'}{(L)} \times \frac{5.5'}{(W)} \times \frac{10.0'}{(D)} = \frac{660.0'}{(CU FT)}$$

PROJECT: Vacant Parcel TEST PIT NO. TP-2  
 LOCATION: Off Wildwood Street, Woburn, MA SHEET 1 OF 1  
 EXCAVATOR: Riley Tannery DATE: 7/2/86  
 EQUIPMENT: Case 580E Backhoe PROJECT NO. 860611665  
 INSPECTOR: T. Carson ELEVATION: N.D.

DEPTH (FT)	STRATA CHANGE	DESCRIPTION OF MATERIALS & REMARKS	SAMPLE NUMBER	DEPTH RANGE
0.0		<p><u>FILL</u>: GRAVELLY SAND; fine to coarse sand (mostly fine), 10-20% medium gravel, angular bedrock frags, 20-30% silty fines, occasional cobbles to 4" diameter, occasional roots, branches, bark, loose, medium brown, dry, (SW).</p>	TP-2	6.0'
2.0				
4.0				
6.0				
8.0				
10.0				
		Total Depth/10.0'		

GROUNDWATER OBSERVATION  
 NOT ENCOUNTERED X  
 AT     FT AFTER     HOURS

EXCAVATION

$$\frac{14.0'}{(L)} \times \frac{3.5'}{(W)} \times \frac{10.0'}{(D)} = \frac{490'}{(CU. FT.)}$$

PROJECT: Vacant Parcel TEST PIT NO TP-3  
 LOCATION: Off Wildwood Street, Woburn, MA SHEET 1 OF 1  
 EXCAVATOR: Riley Tannery DATE: 7/2/86  
 EQUIPMENT: Case 580E Backhoe PROJECT NO. 860611665  
 INSPECTOR: T. Carson ELEVATION: N.D.

DEPTH (FT)	STRATA CHANGE	DESCRIPTION OF MATERIALS & REMARKS	SAMPLE NUMBER	DEPTH RANGE
0.0 0.5 1.0 1.5 2.0 2.5 3.0		FILL: GRAVELLY SAND; fine to coarse sand (mostly fine), 10-20% medium gravel (angular bedrock frags), occasional cobble to 6" diameter, 20-30% silty fines, little clay, occasional roots, coarse hair, medium to dark brown, dry, (SW).	TP-3	3.0'
3.8'	3.8'	Total Depth/3.8' Bedrock Refusal		
4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0				

GROUNDWATER OBSERVATION  
 NOT ENCOUNTERED X  
 AT     FT AFTER     HOURS

EXCAVATION  

$$\frac{8.0'}{(L)} \times \frac{2.5'}{(W)} \times \frac{3.8'}{(D)} = \frac{76.0'}{(CU FT)}$$

PROJECT: Vacant Parcel TEST PIT NO. TP-4  
 LOCATION: Off Wildwood Street, Woburn, MA SHEET 1 OF 1  
 EXCAVATOR: Riley Tannery DATE: 7/2/86  
 EQUIPMENT: Case 580E Backhoe PROJECT NO. 860611665  
 INSPECTOR: T. Carson ELEVATION: N.D.

DEPTH (FT)	STRATA CHANGE	DESCRIPTION OF MATERIALS & REMARKS	SAMPLE NUMBER	DEPTH RANGE
0.0	0.2'	TOPSOIL: SILTY SAND; fine sand moderately organic, abundant roots, weeds, moist, black, (SP).		
2.0		FILL: GRAVELLY SAND; fine to coarse sand (mostly medium), 10-20% fine to coarse gravel (mostly fine) (angular bedrock frags), occasional cobble, 5-10% silty fines, occasional roots, light brown to tan, dry, (SW).		
4.0			TP-4	5.0'
6.0	5.5'	Total Depth/5.5' Bedrock Refusal		
8.0				
10.0				

GROUNDWATER OBSERVATION  
 NOT ENCOUNTERED X  
 AT      FT AFTER      HOURS

EXCAVATION  

$$\frac{10.0'}{(L)} \times \frac{3.0'}{(W)} \times \frac{5.5'}{(D)} = \frac{165.0'}{(CU FT)}$$

PROJECT: Vacant Parcel TEST PIT NO TP-5  
 LOCATION: Off Wildwood Street, Woburn, MA SHEET 1 OF 1  
 EXCAVATOR: Riley Tannery DATE: 7/2/86  
 EQUIPMENT: Case 580E Backhoe PROJECT NO. 860611665  
 INSPECTOR: T. Carson ELEVATION: N.D.

DEPTH (FT)	STRATA CHANGE	DESCRIPTION OF MATERIALS & REMARKS	SAMPLE NUMBER	DEPTH RANGE
0.0		FILL: GRAVELLY SAND; fine to coarse sand (mostly fine), 10-20% fine to medium gravel (angular bedrock frags), occasional cobble, 5-10% silty fines, occasional roots, loose, medium brown, dry, (SW).		
2.0				
4.0		FILL: SAND; medium to coarse sand, 5-10% fine gravel, occasional cobble to 6" diameter, coarse hair, layered medium to dark gray, loose, dry, (SP), metallic odors.		
4.8'				
6.0			TP-6	6.0'
8.0		Color change to rich black		
9.0'				
10.0		Total Depth/10.0'		

GROUNDWATER OBSERVATION  
 NOT ENCOUNTERED X  
 AT      FT AFTER      HOURS

EXCAVATION  

$$\frac{14.0'}{(L)} \times \frac{4.0'}{(W)} \times \frac{10.0'}{(D)} = \frac{560.0'}{(CU FT)}$$

PROJECT: Vacant Parcel TEST PIT NO TP-6  
 LOCATION: Off Wildwood Street, Woburn, MA SHEET 1 OF 1  
 EXCAVATOR: Riley Tannery DATE: 7/2/86  
 EQUIPMENT: Case 580E Backhoe PROJECT NO. 860611665  
 INSPECTOR: T. Carson ELEVATION: N.D.

DEPTH (FT)	STRATA CHANGE	DESCRIPTION OF MATERIALS & REMARKS	SAMPLE NUMBER	DEPTH RANGE
0.0		<p>FILL: CLAYEY SAND; fine to medium sand, 20-30% clayey fines, occasional cobbles to 9" diameter, abundant roots and stumps, loose, reddish brown, (SC), variable thickness.</p>		
2.0				
3.0		<p>FILL: GRAVELLY SAND; fine to coarse sand (mostly fine), 10-20% fine to medium gravel (angular bedrock frags), 5-10% silty fines, occasional roots, light gray, dry, loose, (SW).</p>		
4.0				
6.0	6.0'			
8.0				
10.0		Total Depth/10.0'		

GROUNDWATER OBSERVATION  
 NOT ENCOUNTERED X  
 AT      FT AFTER      HOURS

EXCAVATION  

$$\frac{18.0'}{(L)} \times \frac{6.0'}{(W)} \times \frac{10.0'}{(D)} = \frac{1,080.0'}{(CU FT)}$$

PROJECT: Vacant Parcel TEST PIT NO TP-7  
 LOCATION: Off Wildwood Street, Woburn, MA SHEET 1 OF 1  
 EXCAVATOR: Riley Tannery DATE: 7/2/86  
 EQUIPMENT: Case 580E Backhoe PROJECT NO. 860611665  
 INSPECTOR: T. Carson ELEVATION: N.D.

DEPTH (FT)	STRATA CHANGE	DESCRIPTION OF MATERIALS & REMARKS	SAMPLE NUMBER	DEPTH RANGE
0.0				
0.8'		TOPSOIL: SILTY SAND; highly organic, dark brown, moist		
2.0		FILL: GRAVELLY SAND; fine to coarse sand (mostly fine), 10-20% fine to medium gravel (variable petrologies), 5-10% silt and clay fines, abundant roots, abundant small rounded cobbles, dark brown to black, dry, loose, (SW) organic odors		
6.0			TP-7	6.0'
8.0		Total Depth/6.8' Bedrock Refusal		
10.0				

GROUNDWATER OBSERVATION  
 NOT ENCOUNTERED x  
 AT      FT AFTER      HOURS

EXCAVATION  

$$\frac{13.0'}{(L)} \times \frac{3.0'}{(W)} \times \frac{6.8'}{(D)} = \frac{265.2'}{(CU FT)}$$

PROJECT: Vacant Parcel TEST PIT NO TP-8  
 LOCATION: Off Wildwood Street, Woburn, MA SHEET 1 OF 1  
 EXCAVATOR: Riley Tannery DATE: 7/2/86  
 EQUIPMENT: Case 580E Backhoe PROJECT NO. 860611665  
 INSPECTOR: T. Carson ELEVATION: N.D.

DEPTH (FT)	STRATA CHANGE	DESCRIPTION OF MATERIALS & REMARKS	SAMPLE NUMBER	DEPTH RANGE
0.0		<u>FILL: GRAVELLY SAND; fine to coarse sand (mostly fine), 10-15% fine to medium gravel, angular bedrock frags, 5-10% silty fines, little clay, dry, medium brown, (SW).</u>		
2.0	1.8'	Color change to dull purple with metallic odor		
4.0	4.0'	<u>SAND; fine to medium sand (mostly medium), 10-15% silty fines, medium brown, dry, loose, clean, (SP).</u>		
6.0			TP-8	6.0'
8.0				
10.0		Total Depth/10.0'		

GROUNDWATER OBSERVATION  
 NOT ENCOUNTERED   x    
 AT    FT AFTER    HOURS

EXCAVATION  
 $\frac{12.0'}{(L)} \times \frac{3.5'}{(W)} \times \frac{10.0'}{(D)} = \frac{420.0'}{(CU FT)}$

APPENDIX B

ORIGINAL LABORATORY DATA, METHODS,  
AND CHAIN-OF-CUSTODY FORM



ENVIRONMENTAL SERVICE COMPANIES  
 325 WOOD ROAD, BRAINTREE, MA 02184  
 (617) 849-1800

REPORT OF ANALYSIS

Sample Identification: \_\_\_\_\_

Kurz Associates  
 P.O. Box 430  
 West Bridgewater, 02379

Woburn Soil TP-1

Date Received: 7/2/86

Attn: Mr. Tom Carson

CHN Lab #: 20340

P.O. #: 809421

The sample delivered to our laboratory had the following results:

<u>Parameter</u>	<u>MDL*</u>	<u>EP Toxicity Concentration*(1)</u>	<u>Analysis Date</u>	<u>Method Number</u>
Arsenic	0.002	ND	7/15/86	7060
Barium	0.2	ND	7/15/86	3010/7080
Cadmium	0.01	ND	7/15/86	3010/7130
Chromium	0.05	ND	7/15/86	3010/7190
Chromium-Hexavalent	0.005	ND	7/15/86	7197
Lead	0.1	ND	7/15/86	3010/7420
Mercury	0.0002	ND	7/15/86	7470
Selenium	0.002	ND	7/15/86	7740
Silver	0.01	ND	7/15/86	3010/7760

<u>Parameter</u>	<u>MDL</u>	<u>Result</u>	<u>Analysis Date</u>	<u>Method Number</u>
Cyanide-Total**	0.45 mg/kg	ND	7/14/86	9010
Flash Point	-	>200°F	7/11/86	DL310-84
pH	-	7.0	7/11/86	Modified 150.1
Sulfide-Total**	1.0 mg/kg	ND	7/9/86	9030

This laboratory follows quality assurance/quality control procedures outlined in EPA Publication EPA 600/4-79-019 "Handbook for Analytical Quality Control in Water and Wastewater Laboratories" March 1979 and specific QA/QC requirements of the procedures listed.

The information contained in this report is to the best of my knowledge, accurate and complete.

Notes: \*mg/L

ND= Below minimum detectable limit (MDL)

\*\*Based on sample weight as received

Per/Date: David E. Newton 7/25/86  
 David E. Newton  
 Laboratory Manager



Client: Kurz Associates

Sample Station: Woburn Soil Samples

Date Received: 7/2/86

CHN Lab: 20341 and 20342

Sample Identification: Soil TP-2

<u>Parameter</u>	<u>MDL*</u>	<u>EP Toxicity Concentration*(1)</u>	<u>Analysis Date</u>	<u>Method Number</u>
Arsenic	0.002	0.004	7/15/86	7060
Barium	0.2	ND	7/15/86	3010/7080
Cadmium	0.01	ND	7/15/86	3010/7130
Chromium	0.05	ND	7/15/86	3010/7190
Chromium-Hexavalent	0.005	ND	7/15/86	7197
Lead	0.1	ND	7/15/86	3010/7420
Mercury	0.0002	ND	7/15/86	7470
Selenium	0.002	ND	7/15/86	7740
Silver	0.01	ND	7/15/86	3010/7760

<u>Parameter</u>	<u>MDL</u>	<u>Result</u>	<u>Analysis Date</u>	<u>Method Number</u>
Cyanide-Total**	0.43 mg/kg	ND	7/14/86	9010
Flash Point	-	>200°F	7/11/86	D1310-84
pH	-	6.2	7/11/86	Modified 150.1
Sulfide-Total**	1.0 mg/kg	ND	7/9/86	9030

Sample Identification: Soil TP-3

<u>Parameter</u>	<u>MDL*</u>	<u>EP Toxicity Concentration*(1)</u>	<u>Analysis Date</u>	<u>Method Number</u>
Arsenic	0.002	ND	7/15/86	7060
Barium	0.2	0.3	7/15/86	3010/7080
Cadmium	0.01	ND	7/15/86	3010/7130
Chromium	0.05	ND	7/15/86	3010/7190
Chromium-Hexavalent	0.005	ND	7/15/86	7197
Lead	0.1	ND	7/15/86	3010/7420
Mercury	0.0002	ND	7/15/86	7470
Selenium	0.002	ND	7/15/86	7740
Silver	0.01	ND	7/15/86	3010/7760

<u>Parameter</u>	<u>MDL</u>	<u>Result</u>	<u>Analysis Date</u>	<u>Method Number</u>
Cyanide-Total**	0.44 mg/kg	0.44 mg/kg	7/14/86	9010
Flash Point	-	>200°F	7/11/86	D1310-84
pH	-	7.3	7/11/86	Modified 150.1
Sulfide-Total**	1.0 mg/kg	ND	7/9/86	9030

Notes: \*mg/L

ND = Below minimum detectable level (MDL)

\*\* Based on sample weight as received



Client: Kurz Associates

Sample Station: Woburn Soil Samples

Date Received: 7/2/86

CHN Lab: 20343 and 20344

Sample Identification: Soil TP-4

<u>Parameter</u>	<u>MDL*</u>	<u>EP Toxicity Concentration*(1)</u>	<u>Analysis Date</u>	<u>Method Number</u>
Arsenic	0.002	ND	7/15/86	7060
Barium	0.2	ND	7/15/86	3010/7080
Cadmium	0.01	ND	7/15/86	3010/7130
Chromium	0.05	ND	7/15/86	3010/7190
Chromium-Hexavalent	0.005	ND	7/15/86	7197
Lead	0.1	ND	7/15/86	3010/7420
Mercury	0.0002	ND	7/15/86	7470
Selenium	0.002	ND	7/15/86	7740
Silver	0.01	ND	7/15/86	3010/7760

<u>Parameter</u>	<u>MDL</u>	<u>Result</u>	<u>Analysis Date</u>	<u>Method Number</u>
Cyanide-Total**	0.42 mg/kg	ND	7/14/86	9010
Flash Point	-	>200°F	7/11/86	D1310-84
pH	-	4.9	7/11/86	Modified 150.1
Sulfide-Total**	1.0 mg/kg	ND	7/9/86	9030

Sample Identification: Soil TP-5

<u>Parameter</u>	<u>MDL*</u>	<u>EP Toxicity Concentration*(1)</u>	<u>Analysis Date</u>	<u>Method Number</u>
Arsenic	0.002	0.003	7/15/86	7060
Barium	0.2	ND	7/15/86	3010/7080
Cadmium	0.01	ND	7/15/86	3010/7130
Chromium	0.05	ND	7/15/86	3010/7190
Chromium-Hexavalent	0.005	ND	7/15/86	7197
Lead	0.1	ND	7/15/86	3010/7420
Mercury	0.0002	ND	7/15/86	7470
Selenium	0.002	ND	7/15/86	7740
Silver	0.01	ND	7/15/86	3010/7760

<u>Parameter</u>	<u>MDL</u>	<u>Result</u>	<u>Analysis Date</u>	<u>Method Number</u>
Cyanide-Total**	0.45 mg/kg	ND	7/14/86	9010
Flash Point	-	>200°F	7/14/86	D1310-84
pH	-	4.9	7/11/86	Modified 150.1
Sulfide-Total**	1.0 mg/kg	ND	7/9/86	9030

Notes: \*mg/L

ND = Below minimum detectable level (MDL)

\*\* Based on sample weight as received



Client: Kurz Associates

Sample Station: Woburn Soil Samples

Date Received: 7/2/86

CHN Lab: 20345 and 20346

Sample Identification: Soil TP-6

<u>Parameter</u>	<u>MDL*</u>	<u>EP Toxicity Concentration*(1)</u>	<u>Analysis Date</u>	<u>Method Number</u>
Arsenic	0.002	ND	7/15/86	7060
Barium	0.2	0.2	7/15/86	3010/7080
Cadmium	0.01	ND	7/15/86	3010/7130
Chromium	0.05	ND	7/15/86	3010/7190
Chromium-Hexavalent	0.005	ND	7/15/86	7197
Lead	0.1	0.2	7/15/86	3010/7420
Mercury	0.0002	ND	7/15/86	7470
Selenium	0.002	ND	7/15/86	7740
Silver	0.01	ND	7/15/86	3010/7760

<u>Parameter</u>	<u>MDL</u>	<u>Result</u>	<u>Analysis Date</u>	<u>Method Number</u>
Cyanide-Total**	0.46 mg/kg	2.8 mg/kg	7/16/86	9010
Flash Point	-	>200°F	7/14/86	D1310-84
pH	-	6.7	7/11/86	Modified 150.1
Sulfide-Total**	1.0 mg/kg	ND	7/9/86	9030

Sample Identification: Soil TP-7

<u>Parameter</u>	<u>MDL*</u>	<u>EP Toxicity Concentration*(1)</u>	<u>Analysis Date</u>	<u>Method Number</u>
Arsenic	0.002	0.003	7/15/86	7060
Barium	0.2	ND	7/15/86	3010/7080
Cadmium	0.01	ND	7/15/86	3010/7130
Chromium	0.05	ND	7/15/86	3010/7190
Chromium-Hexavalent	0.005	ND	7/15/86	7197
Lead	0.1	ND	7/15/86	3010/7420
Mercury	0.0002	ND	7/15/86	7470
Selenium	0.002	ND	7/15/86	7740
Silver	0.01	ND	7/15/86	3010/7760

<u>Parameter</u>	<u>MDL</u>	<u>Result</u>	<u>Analysis Date</u>	<u>Method Number</u>
Cyanide-Total**	0.45 mg/kg	ND	7/15/86	9010
Flash Point	-	>200°F	7/15/86	D1310-84
pH	-	5.5	7/11/86	Modified 150.1
Sulfide-Total**	1.0 mg/kg	ND	7/9/86	9030

Notes: \*mg/L

ND = Below minimum detectable level (MDL)

\*\* Based on sample weight as received



Client: Kurz Associates

Sample Station: Woburn Soil Sample  
TP-8

Date Received: 7/2/86

CHN Lab: 20347

<u>Parameter</u>	<u>MDL*</u>	<u>EP Toxicity Concentration*(1)</u>	<u>Analysis Date</u>	<u>Method Number</u>
Arsenic	0.002	ND	7/15/86	7060
Barium	0.2	0.2	7/15/86	3010/7080
Cadmium	0.01	ND	7/15/86	3010/7130
Chromium	0.05	ND	7/15/86	3010/7190
Chromium-Hexavalent	0.005	ND	7/15/86	7197
Lead	0.1	0.2	7/15/86	3010/7420
Mercury	0.0002	ND	7/15/86	7470
Selenium	0.002	ND	7/15/86	7740
Silver	0.01	ND	7/15/86	3010/7760

<u>Parameter</u>	<u>MDL</u>	<u>Result</u>	<u>Analysis Date</u>	<u>Method Number</u>
Cyanide-Total**	0.42 mg/kg	ND	7/15/86	9010
Flash Point	-	>200°F	7/15/86	D1310-84
pH	-	7.9	7/11/86	Modified 150.1
Sulfide-Total**	1.0 mg/kg	ND	7/9/86	9030

(1) The sample was evaluated by the EPA's EP Toxicity Method as described in "Test Methods for Evaluating Solid Waste; Physical/Chemical Methods", Office of Solid Waste, U. S. EPA, Washington, D.C. SW-846, 1982.

Notes: \*mg/l

ND = Below minimum detectable level (MDL)

\*\*Based on sample weight as received



Client: Kurz Associates

Sample Station: Woburn Soil  
TP-1

Date Received: 7/2/86

CHNA Lab #: 20340

Volatile Organic Analysis  
by EPA Method 8240

Analysis Date: 7/7/86

<u>Compound</u>	<u>MDL*</u>	<u>Concentration*</u>
Chloromethane	25	ND
Bromomethane	25	ND
Vinyl Chloride	25	ND
Chloroethane	25	ND
Methylene Chloride	10	ND
Trichlorofluoromethane	10	ND
1,1-Dichloroethene	10	ND
1,1-Dichloroethane	10	ND
trans-1,2-Dichloroethene	10	ND
Chloroform	10	ND
1,2-Dichloroethane	10	ND
1,1,1-Trichloroethane	10	ND
Carbon Tetrachloride	10	ND
Bromodichloromethane	10	ND
1,2-Dichloropropane	10	ND
cis-1,3-Dichloropropene	10	ND
Trichloroethene	10	ND
Benzene	10	ND
Dibromochloromethane	10	ND
1,1,2-Trichloroethane	10	ND
trans-1,3-Dichloropropene	10	ND
2-Chloroethylvinyl Ether	25	ND
Bromoform	10	ND
1,1,2,2-Tetrachloroethane	10	ND
Tetrachloroethene	10	ND
Toluene	10	ND
Chlorobenzene	10	ND
Ethylbenzene	10	ND
Total Xylenes	10	ND

QA/QC Surrogate Recoveries

1,2-Dichloroethane= 93%

D-8 Toluene= 99%

p-BFB= 103%

Notes

ND = Below minimum detectable level (MDL)

\* = ug/kg based on sample wet weight



Client: Kurz Associates

Sample Station: Woburn Soil  
TP-2

Date Received: 7/2/86

CHNA Lab #: 20341

Volatile Organic Analysis  
by EPA Method 8240

Analysis Date: 7/7/86

<u>Compound</u>	<u>MDL*</u>	<u>Concentration*</u>
Chloromethane	25	ND
Bromomethane	25	ND
Vinyl Chloride	25	ND
Chloroethane	25	ND
Methylene Chloride	10	ND
Trichlorofluoromethane	10	ND
1,1-Dichloroethene	10	ND
1,1-Dichloroethane	10	ND
trans-1,2-Dichloroethene	10	ND
Chloroform	10	ND
1,2-Dichloroethane	10	ND
1,1,1-Trichloroethane	10	ND
Carbon Tetrachloride	10	ND
Bromodichloromethane	10	ND
1,2-Dichloropropane	10	ND
cis-1,3-Dichloropropene	10	ND
Trichloroethene	10	ND
Benzene	10	ND
Dibromochloromethane	10	ND
1,1,2-Trichloroethane	10	ND
trans-1,3-Dichloropropene	10	ND
2-Chloroethylvinyl Ether	25	ND
Bromoform	10	ND
1,1,2,2-Tetrachloroethane	10	ND
Tetrachloroethene	10	ND
Toluene	10	ND
Chlorobenzene	10	ND
Ethylbenzene	10	ND
Total Xylenes	10	ND

QA/QC Surrogate Recoveries

1,2-Dichloroethane= 96%

D-8 Toluene= 97%

p-BFB= 104%

Notes

ND = Below minimum detectable level (MDL)

\* = ug/kg based on sample wet weight



Client: Kurz Associates

Sample Station: Woburn Soil

Date Received: 7/2/86

TP-3

CHNA Lab #: 20342

Volatile Organic Analysis  
by EPA Method 8240

Analysis Date: 7/7/86

<u>Compound</u>	<u>MDL*</u>	<u>Concentration*</u>
Chloromethane	25	ND
Bromomethane	25	ND
Vinyl Chloride	25	ND
Chloroethane	25	ND
Methylene Chloride	10	ND
Trichlorofluoromethane	10	ND
1,1-Dichloroethene	10	ND
1,1-Dichloroethane	10	ND
trans-1,2-Dichloroethene	10	ND
Chloroform	10	ND
1,2-Dichloroethane	10	ND
1,1,1-Trichloroethane	10	ND
Carbon Tetrachloride	10	ND
Bromodichloromethane	10	ND
1,2-Dichloropropane	10	ND
cis-1,3-Dichloropropene	10	ND
Trichloroethene	10	ND
Benzene	10	ND
Dibromochloromethane	10	ND
1,1,2-Trichloroethane	10	ND
trans-1,3-Dichloropropene	10	ND
2-Chloroethylvinyl Ether	25	ND
Bromoform	10	ND
1,1,2,2-Tetrachloroethane	10	ND
Tetrachloroethene	10	ND
Toluene	10	ND
Chlorobenzene	10	ND
Ethylbenzene	10	ND
Total Xylenes	10	ND

QA/QC Surrogate Recoveries

1,2-Dichloroethane= 97%

D-8 Toluene= 100%

p-BFB= 101%

Notes

ND = Below minimum detectable level (MDL)

\* = ug/kg based on sample wet weight



Client: Kurz Associates

Sample Station: Woburn Soil  
TP-4

Date Received: 7/2/86

CHNA Lab #: 20343

Volatile Organic Analysis  
by EPA Method 8240

Analysis Date: 7/7/86

<u>Compound</u>	<u>MDL*</u>	<u>Concentration*</u>
Chloromethane	25	ND
Bromomethane	25	ND
Vinyl Chloride	25	ND
Chloroethane	25	ND
Methylene Chloride	10	ND
Trichlorofluoromethane	10	ND
1,1-Dichloroethene	10	ND
1,1-Dichloroethane	10	ND
trans-1,2-Dichloroethene	10	ND
Chloroform	10	ND
1,2-Dichloroethane	10	ND
1,1,1-Trichloroethane	10	ND
Carbon Tetrachloride	10	ND
Bromodichloromethane	10	ND
1,2-Dichloropropane	10	ND
cis-1,3-Dichloropropene	10	ND
Trichloroethene	10	ND
Benzene	10	ND
Dibromochloromethane	10	ND
1,1,2-Trichloroethane	10	ND
trans-1,3-Dichloropropene	10	ND
2-Chloroethylvinyl Ether	25	ND
Bromoform	10	ND
1,1,2,2-Tetrachloroethane	10	ND
Tetrachloroethene	10	ND
Toluene	10	ND
Chlorobenzene	10	ND
Ethylbenzene	10	ND
Total Xylenes	10	ND

QA/QC Surrogate Recoveries

1,2-Dichloroethane= 99%  
D-8 Toluene= 98%  
p-BFB= 103%

Notes

ND = Below minimum detectable level (MDL)

\* = ug/kg based on sample wet weight



Client: Kurz Associates

Sample Station: Woburn Soil  
TP-6

Date Received: 7/2/86

CHNA Lab #: 20345

Volatile Organic Analysis  
by EPA Method 8240

Analysis Date: 7/7/86

<u>Compound</u>	<u>MDL*</u>	<u>Concentration*</u>
Chloromethane	25	ND
Bromomethane	25	ND
Vinyl Chloride	25	ND
Chloroethane	25	ND
Methylene Chloride	10	ND
Trichlorofluoromethane	10	ND
1,1-Dichloroethene	10	ND
1,1-Dichloroethane	10	ND
trans-1,2-Dichloroethene	10	ND
Chloroform	10	ND
1,2-Dichloroethane	10	ND
1,1,1-Trichloroethane	10	ND
Carbon Tetrachloride	10	ND
Bromodichloromethane	10	ND
1,2-Dichloropropane	10	ND
cis-1,3-Dichloropropene	10	ND
Trichloroethene	10	ND
Benzene	10	ND
Dibromochloromethane	10	ND
1,1,2-Trichloroethane	10	ND
trans-1,3-Dichloropropene	10	ND
2-Chloroethylvinyl Ether	25	ND
Bromoform	10	ND
1,1,2,2-Tetrachloroethane	10	ND
Tetrachloroethene	10	ND
Toluene	10	ND
Chlorobenzene	10	ND
Ethylbenzene	10	ND
Total Xylenes	10	ND

QA/QC Surrogate Recoveries

1,2-Dichloroethane= 100%  
D-8 Toluene= 101%  
p-BFB= 102%

Notes

ND = Below minimum detectable level (MDL)  
\* = ug/kg based on sample wet weight  
Freon present in sample



Client: Kurz Associates

Sample Station: Woburn Soil  
TP-7

Date Received: 7/2/86

CHNA Lab #: 20346

Volatile Organic Analysis  
by EPA Method 8240

Analysis Date: 7/7/86

<u>Compound</u>	<u>MDL*</u>	<u>Concentration*</u>
Chloromethane	25	ND
Bromomethane	25	ND
Vinyl Chloride	25	ND
Chloroethane	25	ND
Methylene Chloride	10	ND
Trichlorofluoromethane	10	ND
1,1-Dichloroethene	10	ND
1,1-Dichloroethane	10	ND
trans-1,2-Dichloroethene	10	ND
Chloroform	10	ND
1,2-Dichloroethane	10	ND
1,1,1-Trichloroethane	10	ND
Carbon Tetrachloride	10	ND
Bromodichloromethane	10	ND
1,2-Dichloropropane	10	ND
cis-1,3-Dichloropropene	10	ND
Trichloroethene	10	ND
Benzene	10	ND
Dibromochloromethane	10	ND
1,1,2-Trichloroethane	10	ND
trans-1,3-Dichloropropene	10	ND
2-Chloroethylvinyl Ether	25	ND
Bromoform	10	ND
1,1,2,2-Tetrachloroethane	10	ND
Tetrachloroethene	10	ND
Toluene	10	ND
Chlorobenzene	10	ND
Ethylbenzene	10	ND
Total Xylenes	10	ND

QA/QC Surrogate Recoveries

1,2-Dichloroethane= 97%  
D-8 Toluene= 87%  
p-BFB= 105%

Notes

ND = Below minimum detectable level (MDL)

\* = ug/kg based on sample wet weight



Client: Kurz Associates

Sample Station: Woburn Soil  
TP-8

Date Received: 7/2/86

CHNA Lab #: 20347

Volatile Organic Analysis  
by EPA Method 8240

Analysis Date: 7/7/86

<u>Compound</u>	<u>MDL*</u>	<u>Concentration*</u>
Chloromethane	25	ND
Bromomethane	25	ND
Vinyl Chloride	25	ND
Chloroethane	25	ND
Methylene Chloride	10	ND
Trichlorofluoromethane	10	ND
1,1-Dichloroethene	10	ND
1,1-Dichloroethane	10	ND
trans-1,2-Dichloroethene	10	ND
Chloroform	10	ND
1,2-Dichloroethane	10	ND
1,1,1-Trichloroethane	10	ND
Carbon Tetrachloride	10	ND
Bromodichloromethane	10	ND
1,2-Dichloropropane	10	ND
cis-1,3-Dichloropropene	10	ND
Trichloroethene	10	ND
Benzene	10	ND
Dibromochloromethane	10	ND
1,1,2-Trichloroethane	10	ND
trans-1,3-Dichloropropene	10	ND
2-Chloroethylvinyl Ether	25	ND
Bromoform	10	ND
1,1,2,2-Tetrachloroethane	10	ND
Tetrachloroethene	10	ND
Toluene	10	ND
Chlorobenzene	10	ND
Ethylbenzene	10	ND
Total Xylenes	10	ND

QA/QC Surrogate Recoveries

1,2-Dichloroethane= 97%

D-8 Toluene= 101%

p-BFB= 101%

Notes

ND = Below minimum detectable level (MDL)

\* = ug/kg based on sample wet weight

KURZ ASSOCIATES, INC.

CHAIN OF CUSTODY RECORD

P.O. # 09421  
TURN-AROUND-DATE

PROJECT NAME \_\_\_\_\_

PROJECT NUMBER ~~860611665~~ 860611665

8240 ON FILE 1/18/88

LEGEND: Original: Return to Sample Traffic Control Center Copies: Ship with Samples

SAMPLE NUMBER	DATE	TIME	SAMPLE LOCATION	SAMPLE TYPE	ANALYSES						NUMBER OF CONTAINERS	LOG BOOK P/L NO.	REMARKS	
					PEST./PC	VOC	VOC-601-602	TRACE METALS	OIL + GREASE	EST. PEST.				TRACE METALS
TP-1	7/2/86	1320		Soil			X		X	X	X	1	1548	
				VCA	X									
TP-2	"	"					X		X	X	X			
				VCA	X									
TP-3	"	"					X		X	X	X			
				VCA	X									
TP-4	"	"					X		X	X	X			
				VCA	X									
TP-5	"	"					X		X	X	X			
				VCA	X									
TP-6	"	"					X		X	X	X			
				VCA	X									
TP-7	"	"					X		X	X	X			
				VCA	X									
TP-8	"	"					X		X	X	X			
				VCA	X									

SAMPLED BY (SIGN)

T. CARSON

RELINQUISHED BY (SIGN)

① \_\_\_\_\_  
DATE/TIME ( / / )

RELINQUISHED BY (SIGN)

② \_\_\_\_\_  
DATE/TIME ( / / )

REMARKS

CLEAN HARBORS

RECEIVED BY (SIGN)

① \_\_\_\_\_  
DATE/TIME ( / / )

RECEIVED BY (SIGN)

② \_\_\_\_\_  
DATE/TIME ( / / )

METHOD OF SHIPMENT

SHIPPED BY (SIGN)

RECEIVED FOR LABORATORY BY (SIGN)

DATE/TIME

\_\_\_\_\_

**United States Court of Appeals  
for the First Circuit.**

No. 87-1405.

ANNE ANDERSON, ET AL.,  
PLAINTIFFS-APPELLANTS,

v.

BEATRICE FOODS CO.,  
DEFENDANT-APPELLEE.

ON APPEAL FROM A JUDGMENT OF THE UNITED STATES  
DISTRICT COURT FOR THE DISTRICT  
OF MASSACHUSETTS.

**Brief for the Plaintiffs-Appellants.**

**Statement of the Case**

**I. NATURE OF THE CASE.**

The plaintiffs sued W.R. Grace Co. and Beatrice Foods Co. in this diversity tort action, because the defendants contaminated the water supply of East Woburn, Massachusetts with toxic industrial solvents resulting in disease and death to the plaintiff families. The action was based in negligence, nuisance, and strict liability.

## II. COURSE OF PROCEEDINGS.

The plaintiffs originally filed their action in the Middlesex Superior Court, Commonwealth of Massachusetts, on May 12, 1982, against the defendants, Beatrice Foods, Inc. (an Illinois corporation); the John J. Riley Company, Inc., W.R. Grace Company, Inc. (a New York corporation) and its Cyrovac, Division, and companies unnamed. Beatrice, which had acquired the John J. Riley Co. by merger in 1978 and made it a division within Beatrice Foods, answered for the Riley Co. Beatrice, by explicit agreement as part of the merger, had assumed all of the Riley Co.'s environmental liabilities (S.A. 12).<sup>\*</sup> Pursuant to a joint motion by defendants Beatrice and Grace, the case against these two defendants and their divisions was removed to the U.S. District Court for Massachusetts on June 24, 1982. The plaintiffs filed a related action against the Unifirst Corporation (a Massachusetts corporation) in Middlesex Superior Court on April 9, 1985. The plaintiffs settled that action prior to trial of the federal action.

The case against Beatrice and Grace was tried before a jury, Skinner, D.J. presiding, from March, 1986 to July, 1986. At the conclusion of the evidence, the trial judge submitted special interrogatories to the jury. Because the trial judge believed there were ambiguities in the jury's answers pertinent to Grace, he ordered a new trial with respect to Grace. Grace subsequently settled with the plaintiffs. As to Beatrice, the trial court entered judgment in Beatrice's favor.

The plaintiffs filed a timely notice of appeal from this judgment and the case was entered in this court on May 13, 1987.

## III. STATEMENT OF FACTS.

### A. *Background.*

Between 1971 and 1982 children in East Woburn who were served by water pumped from Woburn Wells G and H de-

---

<sup>\*</sup>This Brief is being filed prior to the printing of the Joint Appendix. "S.A." references are to a Special Appendix, attached to this Brief, which gives full record citations. References to the Special Appendix will be replaced in the final submission of this Brief by page references to the Joint Appendix, and the Special Appendix attached hereto will be eliminated.

veloped leukemia at an unusually high rate.<sup>1</sup> In May, 1979 public health officials discovered that Wells G and H were heavily contaminated with highly toxic industrial solvents: Trichloroethylene (TCE), Tetrachloroethylene (PCE), 1,2 Transdichloroethylene (1,2 Trans), and Trichloroethane (TCA) (S.A. 2).<sup>2</sup> These toxic solvents (hereafter the "toxic solvents") are all listed by the Environmental Protection Agency (EPA) as priority pollutants (S.A. 3). The EPA has determined that TCE and PCE are probable human carcinogens and recommend a maximum allowable level of "zero" for TCE in drinking water.<sup>3</sup>

Upon discovering the contamination, state public health authorities immediately closed Wells G and H, and the search for the source of the contamination began (S.A. 5). By March, 1982 the EPA identified three contaminated areas as potential sources of the well contamination (S.A. 6). In these areas were: the Beatrice site, a 15 acre parcel of vacant wetland long used as a waste disposal site (300 feet southwest of the wells); the W.R. Grace plant, which manufactured machines for wrapping products with plastic film (2300 feet northeast of the wells); and Unifirst Co., a uniform rental and cleaning company (2100 feet north of the wells) (S.A. 7). (See Map, Addendum A, attached.) Of these three sites, the Beatrice site was by far the most heavily contaminated; concentrations of TCE (the predominant pollutant in Wells G and H) in the groundwater at the Beatrice site were some 40 times higher

---

<sup>1</sup>Cutler, et al., "Childhood Leukemia in Woburn, MA", *Public Health Reports*, Vol. 101, No. 2, at 201-05 (March-April 1986); Legakos, Wessen & Zelen, "An Analysis of Contaminated Well Water and Health Effects in Woburn, MA", *American Statistical Association*, Vol. 81, No. 395, at 583-96 (Sept. 1986); DiPerna, *Cluster Mystery: Epidemic and the Children of Woburn, MA*, (Moseby 1985); *Anderson v. W.R. Grace Co.*, 628 F. Supp. 1219 (D.C. Mass. 1986) (Order and Memorandum on Defendants' Joint Motion for Summary Judgment, February 21, 1986).

<sup>2</sup>Maximum contaminant levels detected within the first year of the closing of the wells for Well G: TCE-400-ppb; PCE-43 ppb; TCA-28 ppb; 1,2 Trans -11 ppb; Well H: TCE-188 ppb; PCE-26 ppb, TCA-2 ppb; 1,2 Trans-Not Detected. See Field Investigations of Uncontrolled Hazardous Waste Sites, FIT Project Task Report to EPA, Chlorinated Solvent Contamination of Groundwater, East Central Woburn, Mass., March 8, 1982 (S.A. 2).

<sup>3</sup>National Primary Drinking Water Regulations; Volatile Synthetic Organic Chemicals, EPA, 40 CFR, Parts 141 and 142, Nov. 1985.

than at W.R. Grace.<sup>4</sup> Because of the severe contamination, the EPA eventually ordered that the Beatrice site be completely fenced with chain-link and placed under 24-hour guard (S.A. 9).

Eight of the East Woburn families<sup>5</sup> stricken by leukemia sued Unifirst, Grace, and Beatrice (Riley), for contaminating Wells G and H and causing them injury (S.A. 11). In each family, one member had been stricken by leukemia, eight in all, seven children and one adult. The seven plaintiff children stricken by leukemia had all been exposed to the contaminated water *in utero*. Five of the children died of leukemia prior to the trial; the two remaining children with leukemia are in remission; the adult plaintiff with leukemia died of his disease during trial.<sup>6</sup> All of the plaintiff families' members drank, bathed, and showered in the contaminated well water over an extended period (showering being particularly dangerous because the volatile solvents in the water vaporize and are inhaled). They alleged (and prevailed against two motions for summary judgment challenging the substance of their allegations<sup>7</sup>) that this chronic exposure to the toxic solvents in their water had injured their nervous systems, immune systems, and blood-forming organs, and had caused neurological disorders, cardiac problems, infections, and leukemias (S.A. 14).

---

<sup>4</sup>The maximum concentration of TCE detected in the groundwater at the Beatrice site was 400,000 ppb, at Grace, 9690 ppb (S.A. 8).

<sup>5</sup>The families of Anne Anderson, Richard and Lauren Aufiero, Robert and Diane Aufiero, Roland and Kathryn Gamache, Kevin and Patricia Kane, Donna Robbins, Richard and Mary Toomey, and Pasquale and Joan Zona.

<sup>6</sup> <u>Name</u>	<u>Date of Birth</u>	<u>Date of Diagnosis</u>	<u>Date of Death</u>
James Anderson	7/16/68	1/31/72	1/18/81
Jarrold Aufiero	3/25/79	6/24/82	9/20/82
Jessica Aufiero	4/19/76	3/23/81	—
Roland Gamache	2/7/47	8/6/80	4/12/86
Kevin Kane Jr.	10/22/70	6/23/73	—
Carl Robbins	3/15/72	10/13/76	8/10/81
Patrick Toomey	6/29/69	8/16/79	3/25/81
Michael Zona	6/28/65	7/10/71	2/23/79

(S.A. 13).

<sup>7</sup>*Anderson v. W.R. Grace Co.*, 628 F. Supp. 1219 (February 21, 1986).

This appeal involves only Beatrice. Plaintiffs appeal from the judgment for Beatrice (S.A. 17) because the trial judge at the close of the plaintiffs' evidence made a series of directed verdict rulings which decimated the plaintiffs' case against Beatrice: first, the judge struck the bulk of the plaintiffs' evidence of dumping activity at the Beatrice site; second, he ruled that Beatrice (Riley) had no duty to abate the dangerous condition on its land by, among other things, warning public officials; and, third, he refused to apply strict liability standards for the damage Beatrice (Riley) caused by using and allowing others to use its property as a dumpsite for industrial waste (S.A. 18). These directed verdict rulings are the main subject of this appeal.

#### *B. Plaintiffs' Case Against Beatrice.*

In a pretrial order the judge ordered the trial of the case to proceed in phases. The first phase (here at issue) was to determine whether Beatrice and Grace were responsible for contaminating the wells. Left to subsequent phases were the questions whether the contaminants in the well-water caused plaintiffs' leukemias and other health problems, and the assessment of damages (S.A. 19).

Plaintiffs' case against Beatrice focused on the 15-acre parcel of vacant wetland which the EPA identified as a potential source of the contamination polluting Wells G and H. The property, which is marshy and irregularly shaped, is bordered on the west by a railroad embankment and tracks, and on the east by the Aberjona River. At its northern border the land abuts the property of the Hemingway Trucking Co. On its southern border the land abuts a used auto parts business (Aberjona Auto Parts), a barrel refurbishing business (Whitney Barrel Co.), and a waste oil business (Murphy Waste Oil). Adjacent to the 15 acres, to the southwest across the railroad track, is the Beatrice/Riley leather tanning plant. A drainage ditch runs from the back of the tannery plant through a culvert under the railroad tracks along the southern boundary of the 15 acres and into the marsh. The 15 acres does not border on any public

way. Vehicular access to the property was limited to a dirt road along a sewer easement through the property of Aberjona Auto Parts (S.A. 20) (see Map, Addendum A, attached).

Plaintiffs introduced evidence showing that the 15 acres had been heavily contaminated with the toxic solvents for many years before Wells G and H were closed in May, 1979. This contamination occurred in two ways.

First, in the early to mid-1960's, the defendant itself used the 15 acre wetland site as a dump, discharging wastes containing toxic solvents from its tannery operation into the ditch behind the tannery which drained onto the 15 acres (see Statement of the Case Sec. III.D. *infra*).

Second, the defendant, as landowner in possession and control of the 15 acres, allowed others to use the 15 acres as a dumpsite for industrial waste. During the 1960's, businesses adjacent to the 15 acres, particularly Whitney Barrel, disposed of large quantities of chemical wastes, heavily contaminating the land with the toxic solvents. The defendant failed to stop the chemical waste-dumping on its land, failed to warn public health authorities (or anyone else) of the threat that this dumping posed to the water table and to the municipal wells, and failed to clean it up (see Statement of the Case Sec. III.C. *infra*).

Toxic solvents dumped on the 15 acres sank into the ground and contaminated the subsurface soil and groundwater (S.A. 23). These chemicals, once in the soil, persist for decades or more and are continually infused into the underground water table by the action of rainwater (S.A. 24). As a result, from the early 1960's to the present, the contamination at the Beatrice site constituted a continuing source of pollution to the underlying groundwater (S.A. 25).

The solvents in the groundwater did not stay within the boundaries of the 15-acre site. During pumping, Wells G and H drew groundwater within the underground area around their well-base known as their "zone of influence," an area which included the 15 acre Beatrice site. Thus, by the action of their pumps the municipal wells drew the contaminated groundwater from beneath the 15 acres and delivered it to the residents of East Woburn (S.A. 26).

*C. Evidence That the Beatrice Site had been Contaminated by the Toxic Solvents Prior to the Closing of Wells G and H in May, 1979.*

The plaintiffs' evidence showed that the 15 acres had been contaminated by the mid-1960's. Physical evidence gathered on the site between 1980 and 1986 indicated extensive past chemical dumping on the land. The site was examined by engineers for the EPA (S.A. 27), Beatrice (under EPA order (S.A. 28)), and the plaintiff families (S.A. 29). Weston Geophysical Company, on behalf of the families, examined the site in minute detail between August 1985 and January 1986, mapping the ground, cataloguing and testing indicia of disposal activity, sampling surface materials, digging auger holes into the ground to sample and test subsurface soil, and drilling wells into the ground to sample groundwater and monitor the level of the water table (S.A. 30). In addition, Weston Geophysical participated with the EPA and the U.S. Geological Survey in tests that determined that Wells G and H pumped water from beneath the 15-acre Beatrice site. This was accomplished by reactivating Wells G and H during the months of November and December, 1985, and January, 1986 (the "pump test") and monitoring the effect of the reactivated wells on the water table in the surrounding area (S.A. 31).

Weston Geophysical's examination of the 15 acre site documented widespread toxic solvent disposal and contamination on the site (S.A. 32). Current indications of past dumping included: the presence of rusted-out steel 55 gallon drums, decayed corrugated cardboard drums, drum lids, bung caps, pesticide caps, sealing rings, long handled brushes, buckets, gloves, boots and sludges, including tannery waste (S.A. 33). The drums, some intact and others corroded, contained residues with high levels of the toxic solvents (S.A. 34). Much of the waste debris on the land was in piles (S.A. 35), and soil samples taken adjacent to debris piles showed high levels of the toxic solvents, as did groundwater samples taken beneath the piles (S.A. 36). The rusted and decayed condition of waste items, particularly the steel and cardboard drums, indicated

that they had been on the site for years (S.A. 37). Some of the drums had dates stamped on them showing that they had been used in the sixties (S.A. 38). Other items buried in the waste piles along with the chemical waste made the piles datable: a prescription bottle (S.A. 39), a newspaper clipping (S.A. 40), a political flyer (S.A. 41), and beer cans were all dated in the sixties (S.A. 42). None of the dumped material showed later dates or appeared to be more recent. A tree growing from the top of one of the debris piles was cut down and its growth rings counted, showing that it was between 17 and 18 years old (S.A. 43).

Aerial photos of the site showed graphically when and how the land had been contaminated. Photos taken in 1956, 1966, 1969, 1974, 1978, and 1981 documented and chronicled the open and obvious pollution of the site (S.A. 44). The site was contaminated between the late-fifties and the mid-sixties. Between 1956 and 1966, part of the land was cleared and used by Whitney Barrel to store and refurbish second-hand drums and large fuel tanks (S.A. 45). The 1966 photo shows a network of circular trails created by axle traffic extending from the barrel and waste oil companies onto the site; the 1966 photo actually shows two vehicles on the trails (A. 46). The dirt access road into the property was being heavily used in 1966; debris and cleared areas are apparent in the photo on both sides of the road (S.A. 46). Soil and water subsurface samples taken recently in the area of these trails and from beside the access road show extremely high levels of the toxic solvents in the ground, with TCE levels among the highest anywhere on the Beatrice site (S.A. 47). One of the debris piles (Debris Pile E), which Weston Geophysical examined in 1985 and which was a significant source of the toxic solvents at the site, also clearly appears in the 1966 photo (S.A. 48). (See Map, Addendum A.)

By 1969, the truck trails were fading and becoming overgrown, but use of the land for storing barrels and tanks continued (S.A. 49). By 1974 most of the tanks and barrels were gone, the trails completely overgrown, and the access road much less used (S.A. 50). By 1978 there was little or no apparent use of the land (S.A. 51). The photo in 1981 showed no change (S.A. 52).

Eye witnesses confirmed the photographic evidence that the land was used in the sixties by the businesses adjacent to it, particularly by Whitney Barrel, for storing, cleaning and dumping. One witness testified that, between 1956 and 1965, he saw residues, sludges, barrels, and other obvious indicia of dumping activity on the land. He described barrels on the land, some new, some old even at that time, leaking liquids and sludgy material onto the ground (S.A. 53). He recalled a large pile of barrels and wooden beams at the location currently designated Debris Pile E (S.A. 54).

An employee of Whitney Barrel who worked for that company in 1967-68 testified that Whitney obtained used barrels for reconditioning from a chemical company, and that the barrels often contained liquid residues of chemicals (S.A. 55). It was part of the witness's job to dump these residues on the 15 acres. Whitney Barrel then used TCE (as a cleaning solvent) and long-handled brushes to clean the barrels. The witness identified photos of long-handled brushes found in debris piles on the 15 acres as of the type which had been used for cleaning the barrels (S.A. 56). These brushes were found in sludge piles that tested very high for TCE (S.A. 57).

In addition to the physical, circumstantial and testimonial evidence described above, there was expert opinion that the contamination on the Beatrice site dated from the 1960's. John Drobinski, the geologist from Weston Geophysical who supervised the extensive testing of the site and interpreted the aerial photographs, testified that the site was contaminated with the toxic solvents by the mid-1960's (S.A. 58). Woodward-Clyde Associates, environmental consultants for Beatrice, reached essentially the same conclusion (S.A. 59).<sup>8</sup> Dr. George Pinder, Professor of Hydrology at Princeton University, who traced the underground flow of the toxic solvents from the Beatrice site to Wells G and H, also testified that the contamination at

---

<sup>8</sup> Woodward-Clyde Associates were beyond the territorial subpoena power of the court and plaintiffs were unable to summons a representative to court. Beatrice did not produce any witness from Woodward-Clyde but plaintiffs introduced Woodward-Clyde's Report to the EPA (S.A. 6).

the Beatrice 15-acre site pre-dated the closing of the municipal wells in May, 1979 (S.A. 60).

In addition to affirmative evidence that the toxic dumping occurred in the sixties, the plaintiffs' evidence negated the possibility that the presence of the toxic solvents on the site could somehow be explained by hypothetical dumping activity after the municipal wells had already been closed. There was no evidence of any post-1979 activity on the land which was in any way suggestive of chemical dumping.<sup>9</sup> (S.A. 61.) Access to the 15 acres was never open to the public; the access road was an easement through the land of the Aberjona Auto Parts Company (S.A. 62). The 1978 photo shows that access to the site via the unpaved access road was completely cut off, and the trails previously visible in aerial photos overgrown and unused (S.A. 63). In September, 1979, just a few months after Wells G and H were shut down, Beatrice itself did tests which showed that its site had already been contaminated with toxic solvents: Beatrice, which owned and operated a well on the 15 acres to supply industrial process water to its tanning operation (S.A. 64) (Riley Well #2, see Map, Addendum A) tested its well (S.A. 65). The well was contaminated with toxic solvents (S.A. 66) which had come from past dumping on the 15 acres (S.A. 67). In August, 1980, an investigator from the Massachusetts Department of Environmental Quality Engineering (DEQE) inspected the site and reported the same indicia of long-standing past dumping that Weston Geophysical observed and catalogued in 1985.<sup>10</sup> The tests done by Beatrice and the observations of the DEQE inspector effectively fore-

---

<sup>9</sup>The evidence points to the period after the closing of the wells, when the whole aquifer including the 15 acre site became the subject of the EPA's investigation, as the least likely period for disposal activity (S.A. 2).

<sup>10</sup>The investigator noted:

There are piles of 55 gallon drums in several locations. Most of these drums are at least partially filled with a variety of materials including greases, oils, solids, and domestic and industrial refuse. These piles of drums appear to have been there a long time.

Kelleher Memo., 10/20/80 (S.A. 68).

close the possibility that the presence of toxic solvents on the site could somehow be explained by post-1979 dumping.

Moreover, the variety of chemical type, the high concentrations in surface samples, and the widespread and varied mixes of chemicals negated the possibility that floodwater from the Aberjona River carried the contamination onto the site from some other place (S.A. 69). The Aberjona River itself showed only minute traces of the solvents (S.A. 70). Nor did the polluted groundwater beneath the Beatrice site come underground from another place. Monitoring wells north of the Beatrice site, upstream in the natural direction of groundwater flow, were essentially clean, showing that contamination in the groundwater beneath the site came from the ground surface (S.A. 71). There was, simply, no explanation for the massive contamination of the site other than the extensive dumping in the 1960's (S.A. 72).

*D. Evidence That Tannery Waste Contaminated  
Wells G and H.*

The Beatrice/Riley tannery was connected to the wetland by a drainage ditch running from the back of the tannery, down a steep hill, through a culvert beneath railroad tracks, along the southern border of the 15 acres and into the marsh (S.A. 73). (See Map, Addendum A.) The tannery produced finished leather: animal hides were washed and tanned with chromium solutions, buffed, and then finished with oils, dyes and paints (S.A. 74). The buffing dust from sanding finished leather would take on the color of the finish, including tan or orange (S.A. 75). The tannery used up to 25 drums of solvents per week in processing and coloring the leather (S.A. 76). These solvents came in 55 gallon drums of plastic, steel and cardboard (S.A. 77). In the early 1960's, waste from the tannery, which contained oil, grease, chrome oxides, animal residues, finish residues, buffing dust, and solvents, was dumped on the ground behind the tannery (S.A. 78), and run-off from the waste flowed down the drainage ditch through the culvert and onto the 15 acres (S.A. 79). This ditch was known locally

as "Death Valley" because the waste coated the ground and killed the vegetation (S.A. 80). Samples of tannery waste (dark crusted sludge with an orange interior, containing chromium, oil, grease, and smelling of leather) taken from the overflow area of the ditch on the 15 acres, contained high levels of the toxic solvents (S.A. 81). No soil samples were taken in the area of the waste piles behind the tannery or from the upper portion of the drainage ditch near the tannery building because the trial judge denied the plaintiffs' request for inspection and testing of these areas.<sup>11</sup>

At trial, the tannery managers persistently claimed not to know the chemical contents of the waste they disposed. Although the tannery had a trained leather chemist on its staff beginning in 1958, they claimed they could not identify the particular organic solvents they used prior to 1979 in their degreasing, processing, and finishing operations (and thus present in the waste) because the tannery purchased products under proprietary names which did not reveal their chemical constituents (S.A. 83), and because, for reasons unknown and unexplained, the tannery had destroyed all its pre-1979 records of solvent purchases (S.A. 84). Nonetheless, the tannery managers claimed that the tannery had never used TCE (S.A. 85),

---

<sup>11</sup> At first the parties attempted to accomplish their inspection and testing by agreement without court order. Defendant subsequently barred the plaintiffs from either the tannery or the 15-acre property after the plaintiffs began their inspection program on the 15 acres in July and August of 1985. Plaintiffs' Motion and Memorandum for an Order Compelling Beatrice to Allow Plaintiffs to Complete Inspection and Testing, September 3, 1985 (A. ); Hearing Sept. 4, 1985 (A. ). The plaintiffs obtained an order allowing them access to the 15 acres for inspection, well drilling, and soil sampling during September and October, and the monitoring of wells on the 15 acres during the pump test in November, December, and January 1985-1986. The parties agreed that sampling would be accomplished at the conclusion of the pump test. At the conclusion of the pump test, the defendant refused to allow the plaintiffs to perform their testing program of sludge, debris or tannery waste as previously agreed. The plaintiffs again moved to compel inspection and testing of the tannery. Plaintiffs' Motion to Compel Beatrice to allow Plaintiffs to Complete their Testing of the Beatrice Site, dated January 14, 1986 (A. ); Hearing Jan. 14, 1986 at pp. 55-65 (A. ). The court restricted the sampling of debris and surface samples from plaintiffs' requested one day, to 4½ hours on the 15 acres, and refused to allow the plaintiffs to inspect or take samples on tannery property in the drainage ditch and in the locations behind the tannery where the waste was disposed. *Id.* at 64-65 (A. ).

and that although they had used PCE in the 1960's and TCA, none of these solvents went into the waste pile (S.A. 86).

E. *Evidence Bearing on Whether the Likelihood of Harm From Chemical Dumping on the 15-Acre Wetland Parcel Was "Unforeseeable" or "Highly Extraordinary."*

Carried by rainwater, solvents disposed of on the surface of the 15 acres soaked down through the soil into the groundwater (S.A. 87). Wells G and H each pumped from a depth of 80 feet beneath the surface and drew groundwater from an area which easily encompassed the 15 acres (S.A. 88). The 15-acre wetland parcel is a few hundred feet from Wells G and H across a marsh (S.A. 89). The wells are separated from the 15 acres only by the Aberjona River, a narrow and shallow stream (S.A. 90). Once the toxic solvents were in the groundwater the pumping action of Wells G and H drew the polluted groundwater toward and into the wells (S.A. 91). This is a scientifically common and straight-forward chain of events (S.A. 92).

In addition to common sense, which suggests that dumping toxic chemicals in a wetland within a few hundred feet of public drinking wells will pollute the wells (S.A. 93), the dumping was a specific violation of state and local health laws. (See Argument Sec. I.A. *infra*.) The tannery's chief executive admitted that his company bought the 15-acre site because of its location over the water table (S.A. 94). He knew of Woburn's installation of Well G in 1964 near his land, and he knew that the well was to be used for drinking purposes (S.A. 95). In 1956, even before Well G was installed, the tannery received notice that it was illegal to allow the disposal of industrial waste on the 15 acres because it would pollute the groundwater (S.A. 96). The Department of Public Health, by letter dated July 17, 1956, had cited the tannery for dumping waste on the 15 acres, and required the tannery to remove its wastes "in such a manner as not to cause a public nuisance or result in pollution of surface or ground waters." (S.A. 97.) Moreover, when the chief executive officer of the tannery pro-

tested to the public health inspector that the 15 acres belonged to the tannery, apparently thinking that ownership of the land entitled the tannery to dump on it, the inspector responded that placing polluting materials on the land violated state law "regardless of ownership." (S.A. 98.)

The plaintiffs also presented evidence to show that the defendant was on notice not only that chemical waste dumped on the ground would percolate into the groundwater but also would endanger the municipal wells. In 1965, Woburn notified the tannery that it proposed to take part of the 15-acre parcel by eminent domain to protect Well G. Although Woburn never completed this taking, the notice of taking surely brought to the tannery's attention the possibility that contamination of the 15 acres would endanger the well.<sup>12</sup>

In addition, the tannery had its own reasons to be aware of the connection between its property and the municipal wells. *The tannery and Woburn were potential competitors for the water, both drawing from the same underground supply* (S.A. 100). The tannery used three hundred thousand gallons of water per day in its own operation (S.A. 101); industrial process water, as the tannery's chief executive said, was the tannery's "life blood." (S.A. 102.) Indeed, the tannery had purchased the 15-acre wetland parcel in 1951 specifically as a water supply area and had installed a well (Riley Well #2, see Map, Addendum A) on it in 1958 (S.A. 103). The tannery knew from tests done by its engineering firm (D. H. Maher) during the installation of the well in 1958 that the aquifer was highly transmissive (S.A. 104), meaning that groundwater flowed easily through the underground sand and gravel. Well G was far more powerful than the tannery's well, with a capacity of nearly a million gallons per day (S.A. 105). When Woburn installed a second well in the area, Well H in 1967, with a pumping capacity similar to Well G (S.A. 106), the tannery had its engineering firm check the continuing ability of the tannery wells to deliver the water needed by the tannery. D.H. Maher made measurements and reported by letter dated August

---

<sup>12</sup> Plaintiffs were not allowed to introduce the 1965 Notice of Taking (S.A. 99).

27, 1968 that the pumping of Wells G and H had indeed lowered the water table beneath the 15 acres, and made recommendations to maintain the maximum pumping capacity of the tannery wells (S.A. 107). (This seemingly innocuous letter was to become the linchpin of the trial judge's directed verdict rulings against the plaintiffs (S.A. 108).)

John Riley, the chief executive of the tannery, admitted to being aware of the rules and regulations of the Board of Health (S.A. 109); he knew that the public health laws were to protect the public water supply (S.A. 110); he knew that chemical waste disposed of on the 15 acres would pollute the water table (S.A. 111); he knew that the 15 acres was unsuitable as a waste dump (S.A. 112) and he understood that both his wells and the Woburn wells drew from the same source of supply (S.A. 113). His defense was not that he was unable to foresee that dumping on his land would pollute the Woburn wells, but that he was ignorant of any disposal activity on the 15 acres (S.A. 114). He said that, had he known of the disposal activity on the 15 acres, he would have "done something about it." (S.A. 115.) Contrary to Mr. Riley's assertions, evidence was presented that both he and other tannery personnel made frequent inspections of the property and examinations of the tannery well, and that they knew that drums, tanks, and industrial debris were being disposed on the land by Whitney and others throughout the 1960's and into the 1970's (S.A. 116).

*F. The Trial Court's Rulings Which Are  
the Subject of Appeal.*

After the plaintiffs had completed the presentation of their (Phase One) evidence, the trial judge made a series of directed verdict rulings against them. These rulings, which the judge implemented by striking previously admitted evidence, prevented the jury from considering most of the plaintiffs' evidence of chemical dumping at the Beatrice site and the tannery's knowledge that such activity posed a threat to the municipal water supply, and left but a remnant of the plaintiffs' case to go to the jury. (See Order, 6/9/86, Addendum B(1), attached.) These directed verdict rulings are the focus of this appeal (S.A. 117).

WELLS G & H  
10-9

BEATRICE FOODS CO.'S RESPONSES TO  
PLAINTIFFS' FIRST SET OF INTERROGATORIES

IN THE UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF MASSACHUSETTS

ANNE ANDERSON, et al.,	)	
	)	
Plaintiffs,	)	
	)	Civil Action No.
v.	)	
	)	82-1072-S
CRYOVAC, INC., et al.,	)	
	)	
Defendants.	)	

Beatrice Foods Co.'s Responses to  
Plaintiffs' First Set of Interrogatories

OBJECTIONS TO GENERAL INSTRUCTIONS

The defendant objects to paragraphs a-g of the general instructions to the plaintiffs' interrogatories on the grounds that they request attorneys' work product and do not request information discoverable under Fed. R. Civ. P. 26. The defendant also objects to the plaintiffs' description of the defendant's obligation to supplement its answers to interrogatories because it exceeds the scope of the obligation as defined by Fed. R. Civ. P. 26(e).

INTERROGATORY NO. 1

What is the date of purchase by the Beatrice Foods Co. of the John J. Riley Tannery (hereafter Riley Tannery) on Salem Street in Woburn, Massachusetts?

ANSWER

On December 28, 1978 Beatrice acquired the John J. Riley Company through a merger.

INTERROGATORY NO. 2

Describe the terms of the agreement between Beatrice Foods Co. and the John J. Riley Company.

ANSWER

The John J. Riley Company, Inc. was merged into Beatrice Foods Co. by an exchange of stock.

INTERROGATORY NO 3.

For what purpose did the Beatrice Foods Co. purchase the John J. Riley Tannery?

ANSWER

Beatrice Foods acquired the John J. Riley Company for business purposes.

INTERROGATORY NO. 4

Did or does the Beatrice Foods Co. have any plans to convert the Riley Tannery property to other uses? If so, describe the plans.

ANSWER

No.

INTERROGATORY NO. 5

Describe and give dates of any improvements or physical changes to the Riley Tannery and/or its site since Beatrice Foods Co. assumed ownership. Include the names of any contractors or other parties involved in each improvement or change in the answer.

ANSWER

The defendant objects to Interrogatory No. 5 on the ground that it is vague and overly broad. Without waiving the foregoing objection, the defendant answers further that there have been no additions to any buildings at the Riley Tannery.

INTERROGATORY NO. 6

Describe and indicate dates of any changes in the management and/or operation of the Riley Tannery since the Beatrice Foods Co. assumed ownership.

ANSWER

There have been no changes in management. The business went from that of a contract tannery to a merchandise tannery.

INTERROGATORY NO. 7

Were the Riley Tannery and its site visited by a representative of the Beatrice Foods Co. prior to the purchase of that property?

ANSWER

Yes.

INTERROGATORY NO. 8

Was any officer of the Beatrice Foods Co. or any representative aware of the Riley Tannery waste disposal practices prior to purchase of that property? Specifically, was a Beatrice Foods Co. representative aware that:

- a. liquid waste from the Riley Tannery was entering the sewer?
- b. solid wastes, liquid wastes and/or sludge, including chromium wastes were being deposited on the property of the Riley Tannery?

ANSWER

Beatrice Foods Company was aware that the Riley Tannery was connected to the Metropolitan District Commission sewer system and that water entered the sewer system. Beatrice was not aware of any solid wastes, liquids, sludge or chromium wastes being deposited on the property which is the subject of this lawsuit. Beatrice is also uncertain as to what the term "liquid wastes" means as used in this interrogatory.

INTERROGATORY NO. 9

Had the wells on the Riley Tannery property been tested for chemical contamination at any time prior to the purchase of the property by the Beatrice Foods Co.? If so, give the dates of the tests, the test results and the name(s) of the party(s) conducting the tests.

ANSWER

No.

INTERROGATORY NO. 10

Was any representative or officer of the Beatrice Foods Co. aware of well water contamination on the Riley Tannery property prior to the purchase of that property?

ANSWER

No.

INTERROGATORY NO. 11

Has any representative of the Beatrice Foods Co. made or recommended any changes in the purchasing practices or use of any chemicals in the operations of the Riley Tannery? If so, describe each previous practice and each subsequent change. Include brand and generic names of chemicals and quantities and concentrations purchased and used, and the dates of each change.

ANSWER

No.

INTERROGATORY NO. 12

Has any representative of the Beatrice Foods Co. made or recommended any changes in the waste disposal practices of any aspect of the Riley Tannery operations? If so, describe each previous practice and each subsequent change. Describe the waste involved, whether liquid or solid, the content of the waste, the previous and subsequent disposal sites, and name any other parties involved in the disposal arrangements. Include the dates of each change.

ANSWER

No.

INTERROGATORY NO. 13

Identify and name each and every Beatrice Foods Co. officer or employee that is or has been responsible for supervising and/or overseeing the operations of the Riley Tannery.

ANSWER

John J. Riley, Jr.  
228 Salem Street  
Woburn, Massachusetts 01801

Richard Walrack  
Beatrice Foods Co.  
2 N. LaSalle Street  
Chicago, Illinois 60602

Donald Stephens  
Pfister & Vogel Tanning Co.  
1531 N. Water Street  
Milwaukee, Wisconsin 53202

John D. Connors  
Beatrice Foods Co.  
2 N. LaSalle Street  
Chicago, Illinois 60602

INTERROGATORY NO. 14

Identify and name each and every Beatrice Foods Co. officer or employee that is or has been responsible for supervising and/or overseeing the purchasing, inventory and storage of all chemicals or chemical products used at the Riley Tannery.

ANSWER

John J. Riley, Jr.

INTERROGATORY NO. 15

Identify and name each and every Beatrice Foods Co. officer or employee that is or has been responsible for supervising each waste treatment, storage and waste disposal practice at the Riley Tannery.

ANSWER

John J. Riley, Jr.

INTERROGATORY NO. 16

Provide the name of the Beatrice Foods Co. officer or employee who was responsible for negotiating the purchase of the Riley Tannery and the Riley property northeast of the Riley Tannery, east of the Boston and Maine Railroad and south of Hemingway Trucking Company (hereafter referred to as the Riley Land).

ANSWER

John D. Connors negotiated for the acquisition of John J. Riley Company.

INTERROGATORY NO. 17

Identify and name each and every Beatrice Foods Co. officer or employee who inspected the premises at the Riley Tannery and/or the Riley Land prior to or at the time of purchase.

ANSWER

John D. Connors  
Beatrice Foods Co.  
2 N. LaSalle Street  
Chicago, Illinois 60602

Donald Stephens  
Pfister & Vogel Tanning Co.  
1531 N. Water Street  
Milwaukee, Wisconsin 53202

John Justin  
Beatrice Foods Co.  
2 N. LaSalle Street  
Chicago, Illinois 60602

INTERROGATORY NO. 18

Indicate the date of purchase by the Beatrice Foods Co. of the Riley Land.

ANSWER

See answer to Interrogatory No. 19.

INTERROGATORY NO. 19

Describe the terms of the agreement between Beatrice Foods Co. and the John J. Riley Company (or Mr. John J. Riley) with regard to the Riley Land.

**ANSWER**

The land was one of the assets acquired by the merger of the John J. Riley Company, Inc. into Beatrice through the exchange of stock of the two companies on December 28, 1978.

**INTERROGATORY NO. 20**

For what purpose did the Beatrice Foods Co. purchase the Riley Land?

**ANSWER**

At the time Beatrice acquired John J. Riley Company, the land was in use as a source of water for tanning operations.

**INTERROGATORY NO. 21**

Describe and indicate dates of any improvements or physical changes to the Riley Land property since the Beatrice Foods Co. assumed ownership. Indicate the names of any contractors or other parties involved in each improvement or change.

**ANSWER**

See Answer to Interrogatory No. 22(e).

**INTERROGATORY NO. 22**

Have there been any efforts to secure the Riley Land property from trespassers since the Beatrice Foods Co. assumed ownership?

a. Is the property fenced? If so, was it fenced prior to the purchase by Beatrice Foods Co.?

b. Have there been any improvements or changes to the fence since Beatrice Foods Co. purchased the property?

c. Is there a gate with a lock at the access points to the property?

d. Since the purchase of the land by the Beatrice Foods Co., has the gate been kept locked when the property is unattended?

e. Since the purchase of the property by the Beatrice Foods Co., have any other efforts to maintain the security of the property been undertaken? If so, please describe.

ANSWER

Yes.

a. No.

b. No.

c. No.

d. Not applicable.

e. Yes. The road was bulldozed at the entrance to the property.

INTERROGATORY NO. 23

Was the Riley Land visited by a representative(s) of the Beatrice Foods Co. prior to the purchase of the property?

ANSWER

Yes.

INTERROGATORY NO. 24

What did the representative(s) observe and what, if anything, did the representative(s) report to the Beatrice Foods Co. or any of its officers or employees?

ANSWER

The representatives observed wells and reported that they observed wells.

INTERROGATORY NO. 25

At any time prior to or subsequent to the time of purchase of the Riley Land, was any representative of the Beatrice Foods Co. aware of any activities of the Riley Company or the John J. Riley family involving the depositing of waste products or materials on the Riley Land? If so:

a. name the parties involved;

b. indicate dates of such activities;

c. describe materials dumped, including names and concentrations of any chemicals, the quantities and containers;

d. describe the exact location of the dumping activities; and

e. indicate whether the material was placed on the ground, in the water or buried.

ANSWER

No.

INTERROGATORY NO. 26

At any time prior to or subsequent to the purchase of the Riley Land, was any representative of the Beatrice Foods Co. aware of any activities of any other party involving the depositing of waste products or materials on the Riley Land? If so:

a. name the parties involved;

b. indicate dates of such activities;

c. describe materials dumped, including names and concentrations of any chemicals, the quantities and containers;

d. describe the exact location of the dumping activities; and

e. indicate whether the material was placed on the ground, in the water or buried.

ANSWER

Yes.

a. Whitney Barrel Co. and persons unknown.

b. Such activities occurred for years; the exact dates are unknown.

c. Empty barrels and debris.

d. The southern boundary of the property and off of the dirt road on the property.

e. The barrels and debris were placed on the ground.

INTERROGATORY NO. 27

At any time since the purchase of the Riley Land, has any representative of the Beatrice Foods Co. entered into any agreement, formal or informal, involving the access to, use or enjoyment of the Riley Land by any other party? If so:

- a. name the party(s) involved;
- b. indicate the dates of the agreement(s);
- c. describe the terms of the agreement(s); and
- d. indicate the purpose of the use of the land by the party(s) involved.

ANSWER

No.

INTERROGATORY NO. 28

Had the well(s) on the Riley Land been tested for organic chemical contamination prior to the purchase of the property by the Beatrice Foods Co.? If so, give the date(s) of the test(s), and include the test results and the name(s) of the party(s) conducting the tests.

ANSWER

No.

INTERROGATORY NO. 29

Was a representative of the Beatrice Foods Co. aware of well water contamination on the Riley Land prior to the purchase of the property?

ANSWER

No.

INTERROGATORY NO. 30

Indicate the dates and describe the results of any tests of water quality conducted on the water from the Riley Land since the purchase of the property by Beatrice Foods Co. Include the name of the party(s) conducting the tests in your answer.

**ANSWER**

The defendant objects to Interrogatory No. 30 insofar as it seeks the results of water quality tests for materials other than the chemicals which are the subject matter of this lawsuit. See Attachment A.

**INTERROGATORY NO. 31**

At any time since the purchase of the Riley Land by the Beatrice Foods Co., have any waste materials been removed from the Riley Land? If so:

- a. indicate the dates of such removals;
- b. describe the materials removed, naming chemicals and describing containers;
- c. indicate how long the material had been on the property prior to removal;
- d. identify the party(s) who moved the material; and
- e. identify the subsequent site of disposal of the material.

**ANSWER**

No.

**INTERROGATORY NO. 32**

At any time since the purchase of the Riley Land and/or the Riley Tannery by the Beatrice Foods Co., has any notice been given by a representative of the Beatrice Foods Co. to the City of Woburn, the State of Massachusetts or the United States Environmental Protection Agency of the presence of hazardous material on the Riley Land or the Riley Tannery property? If so, indicate the dates and describe the contents of each notice.

**ANSWER**

August, 1980.

EPA Form 8700-12.

Notification of Hazardous Waste Activity.

INTERROGATORY NO. 33

What were the results of the tests conducted on the soil sample taken by Beatrice Foods Co. lawyer, Mr. Joseph Radzius, from the Riley Land near the pesticide caps (EPA site inspection station 004) November 14, 1980?

- a. name the party that conducted the tests;
- b. indicate dates of tests; and
- c. describe the test results in detail.

ANSWER

There were no tests conducted.

INTERROGATORY NO. 34

What were the results of tests conducted on the sediment sample taken by the Beatrice Foods Co. lawyer opposite the Lechmere garage #35 on the Riley Land (EPA site inspection station 005), on November 14, 1980?

ANSWER

There were no tests conducted.

INTERROGATORY NO. 35

What were the results of tests conducted on the water sample taken by the Beatrice Foods Co. lawyer from the faucet of the new well located inside the Riley Tannery process plant next to the paddle drums and defleshing machinery (EPA site inspection station 001) on November 14, 1980?

- a. name the party that conducted the tests;
- b. indicate the dates of the tests; and
- c. describe the test results in detail.

ANSWER

There were no tests conducted.

INTERROGATORY NO. 36

What were the results of tests conducted on the water sample taken by the Beatrice Foods Co. lawyer from the faucet of the old

well located near the dye drums in the Riley Tannery (EPA site inspection station 002) on November 14, 1980?

- a. name the party that conducted the tests;
- b. indicate dates of the tests; and
- c. describe the test results in detail.

ANSWER

There were no tests conducted.

INTERROGATORY NO. 37

What other samples of water, soil, air or ground water were taken by Beatrice Foods Co. representatives on November 14, 1980? For each such sample was a test conducted of the sample? If so:

- a. name the party that conducted the tests;
- b. indicate the dates of the tests;
- c. describe the test results in detail; and
- d. describe the exact location each sample was taken from.

ANSWER

None.

INTERROGATORY NO. 38

When did the Beatrice Foods Co. first seek legal advice regarding its possible liability for wastes disposed of on the Riley Land, at the Riley Tannery or for waste disposal practices by the John J. Riley Company?

ANSWER

The defendant objects to Interrogatory No. 38 on the grounds that the information requested is irrelevant and not reasonably calculated to lead to the discovery of admissible evidence. The defendant further objects to this interrogatory insofar as it seeks to discover material protected from discovery by the attorney-client privilege.

INTERROGATORY NO. 39

When did the Beatrice Foods Co. first seek technical advice regarding its possible liability for wastes disposed of on the Riley Land, at the Riley Tannery or for waste disposal practices by the John J. Riley Company?

ANSWER

The defendant objects to Interrogatory No. 39 on the grounds that the information requested is irrelevant and not reasonably calculated to lead to the discovery of admissible evidence. The defendant further objects to this interrogatory insofar as it seeks to discover material protected from discovery by the attorney-client privilege.

INTERROGATORY NO. 40

Identify each and every document in possession of any officer of employee of the Beatrice Foods Co. that relates to the past or present storage treatment and/or disposal of wastes from the Riley Tannery and/or the Riley Land and other related activities and include the following:

- a. the nature, title, and date of each document;
- b. the location and present possessor of each document; and
- c. whether the document has been provided to any federal or state agency(s).

ANSWER

The defendant objects to Interrogatory No. 40 on the grounds that it is vague, overly broad and unduly burdensome and seeks information that is irrelevant and not reasonably calculated to lead to the discovery of admissible evidence. The defendant further objects to this interrogatory insofar as it seeks to discover materials protected by the work product doctrine or by the attorney-client privilege.

INTERROGATORY NO. 41

Identify each and every document in the possession of any officer or employee of Beatrice Foods Co. that relates to the past or present purchase, storage and use of all chemicals and products for the Riley Company, and include the following:

- a. the nature, title, and date of each document;
- b. the location and present possessor of each document; and
- c. whether the document has been provided to any federal or state agency(s).

ANSWER

The defendant objects to Interrogatory No. 41 on the grounds that it is vague, overly broad and unduly burdensome and requests information that is irrelevant and not reasonably calculated to lead to the discovery of admissible evidence. The defendant further objects to this interrogatory insofar as it seeks to discover materials protected by the work product doctrine or by the attorney-client privilege.

INTERROGATORY NO. 42

Identify each and every document in the possession of any officer or employee of Beatrice Foods Co. that relates to any past or present attempts to identify and/or detect the presence of any waste materials, whether liquid or solid, or any contaminants on the property of the Riley Tannery or the Riley Land, and include the following:

- a. the nature, title, and date of each document;
- b. the location and present possessor of each document; and
- c. whether the document has been provided to any federal or state agency(s).



BEATRICE JOBS CO.  
 THIRD-PARTY COVERAGES  
 MARCH 1, 1982/MARCH 1, 1983

<u>Carrier</u>	<u>Policy</u>	<u>Coverage</u>	<u>Limits</u>	<u>Term</u>
1. Transport	GL-647	Primary	\$500,000 Combined Single Limit	Until Cancelled
2. Allianz Underwriters, Inc.	AUL-5100505	Umbrella	\$25,000,000 Excess of Transport on G.L. and A.L. and on Products excess of BF Co. \$500,000 SIR per occurrence.	March 1, 1981/ March 1, 1984
3. Northbrook	63008525	Umbrella	\$12,500,000 P/O \$25,000,000 excess of Allianz	March 1, 1982/ March 1, 1983
4. Transit	SCU956169	Umbrella	\$12,500,000 P/O \$25,000,000 excess of Allianz	March 1, 1982/ March 1, 1983
5. Lloyd's	LI-1172	Umbrella	\$25,000,000 excess of \$50,000,000	March 1, 1982/ March 1, 1983
6. Fireman's Fund	XLX1439567	Umbrella	\$25,000,000 excess of \$75,000,000	March 1, 1982/ March 1, 1983
7. Columbia Casualty	RDX9176106	Umbrella	\$10,000,000 P/O \$25,000,000 excess of \$100,000,000	March 1, 1982/ March 1, 1983
8. First State	932479	Umbrella	\$10,000,000 P/O \$25,000,000 excess of \$100,000,000	March 1, 1982/ March 1, 1983
9. California Union	ZCX006181	Umbrella	\$5,000,000 P/O \$25,000,000 excess of \$100,000,000	March 1, 1982/ March 1, 1983
10. Lloyd's	LI-1173	Umbrella	\$25,000,000 excess of \$125,000,000	March 1, 1982/ March 1, 1983

BEATRICE FOODS CO.  
THIRD-PARTY COVERAGES  
MARCH 1, 1981/MARCH 1, 1982

<u>Carrier</u>	<u>Policy</u>	<u>Coverage</u>	<u>Limits</u>	<u>Term</u>
1. Transport	GL-647	Primary	\$500,000 Combined Single Limit	Until Cancelled
2. Allianz Underwriters, Inc.	AUL-5100505	Umbrella	\$25,000,000 Excess of Transport on G.L. and A.L. and on Products excess of BF Co. \$500,000 SIR per occurrence.	March 1, 1981/ March 1, 1984
3. Northbrook	63007743	Umbrella	\$12,500,000 P/O \$25,000,000 excess of Allianz	March 1, 1981/ March 1, 1982
4. Transit	SCU955847	Umbrella	\$12,500,000 P/O \$25,000,000 excess of Allianz	March 1, 1981/ March 1, 1982
5. Lloyd's	LI-1131	Umbrella	\$25,000,000 excess of \$50,000,000	March 1, 1981/ March 1, 1982
6. Fireman's Fund	XLX1301545	Umbrella	\$25,000,000 excess of \$75,000,000	March 1, 1981/ March 1, 1982
7. Columbia Casualty	RDX4170188	Umbrella	\$10,000,000 P/O \$25,000,000 excess of \$100,000,000	March 1, 1981/ March 1, 1982
8. First State	931535	Umbrella	\$10,000,000 P/O \$25,000,000 excess of \$100,000,000	March 1, 1981/ March 1, 1982
9. California Union	ZCX006181	Umbrella	\$5,000,000 P/O \$25,000,000 excess of \$100,000,000	March 1, 1981/ March 1, 1982
10. Lloyd's	LI-1132	Umbrella	\$25,000,000 excess of \$125,000,000	March 1, 1981/ March 1, 1982

BEATRICE MODS CO.  
THIRD-PARTY COVERAGES  
MARCH 1, 1980/MARCH 1, 1981

<u>Carrier</u>	<u>Policy</u>	<u>Coverage</u>	<u>Limits</u>	<u>Term</u>
1. Transport	GL-647	Primary	\$500,000 Combined Single Limit	Until Cancelled
2. Cal-Union	ZCX003538	Buffer	\$500,000 Combined Single Limit excess of Transport on G.L. and A.L. and on Products excess of BF Co. \$500,000 SIR per occurrence.	March 1, 1979/ March 1, 1982
3. Northbrook	63005471	Umbrella	\$5,000,000 excess of Cal-Union	March 1, 1979/ March 1, 1982
4. Northbrook	63006455	Umbrella	\$20,000,000 excess of Northbrook	March 1, 1980/ March 1, 1981
5. Lloyd's and Companies	LI1098	Umbrella	\$30,000,000 of Northbrook	March 1, 1980/ March 1, 1981
6. Lloyd's	LI1099	Umbrella	\$22,500,000 part of \$45,000,000 excess of \$55,000,000	March 1, 1980/ March 1, 1981
7. Transit	SCU955445	Umbrella	\$10,000,000 P/O \$22,500,000 P/O \$45,000,000	March 1, 1980/ March 1, 1981
8. Columbia Casualty	RDX4169939	Umbrella	\$8,000,000 P/O \$22,500,000 P/O \$45,000,000	March 1, 1980/ March 1, 1981
9. California Union	ZCX003983	Umbrella	\$4,500,000 P/O \$22,500,000 P/O \$45,000,000 excess of \$55,000,000	March 1, 1980/ March 1, 1981

BEATRICE FOODS CO.  
 THIRD-PARTY COVERAGES  
 MARCH 1, 1979/MARCH 1, 1980

<u>Carrier</u>	<u>Policy</u>	<u>Coverage</u>	<u>Limits</u>	<u>Term</u>
Transport	GL-647	Primary	\$500,000 Combined Single Limit	Until Cancelled
Cal-Union	ZCX003538	Buffer	\$500,000 Combined Single Limit excess of Transport on G.L. and A.L. and on Products excess of BF Co. \$500,000 SIR per occurrence.	March 1, 1979/ March 1, 1980
Northbrook	63005471	Umbrella	\$5,000,000 excess of Cal-Union	March 1, 1979/ March 1, 1982
Northbrook	63005495	Umbrella	\$20,000,000 excess of Northbrook	March 1, 1979/ March 1, 1980
Lloyd's and Companies	LI1069	Umbrella	\$30,000,000 excess of Northbrook	March 1, 1979/ March 1, 1980
Lloyd's and Domestic Companies	Various	Umbrella	\$45,000,000 excess of Lloyd's	March 1, 1979/ March 1, 1980
CNA	RDX416-95-57		\$5,000,000 P/O \$45,000,000	
Pinetop Ins.	MLP10-09-57		\$2,500,000 P/O \$45,000,000	
Transit Casualty	SCU955-090		\$10,000,000 P/O \$45,000,000	
Cal-Union	ZCX003445		\$4,500,000 P/O \$45,000,000	
Lloyd's	LI1070		8.15% P/O 50% of 100%	
Lloyd's	SL3636		22.60% P/O 50% of 100%	\$22,500,000 P/O \$45,000,000
Lloyd's	SLC5636		19.25% P/O 50% of 100%	

BEATRICE JDS CO.  
 THIRD-PARTY COVERAGES  
 MARCH 1, 1977/MARCH 1, 1979

<u>Carrier</u>	<u>Policy</u>	<u>Coverage</u>	<u>Limits</u>	<u>Term</u>
Transport	GL-647	Primary	\$500,000 Combined Single Limit	Until Cancelled
Cal-Union	ZCX001598	Buffer	* \$500,000 Combined Single Limit excess of Transport on G.L. and A.L. and on Products excess of BF Co. \$500,000 SIR per occurrence and \$700,000 annual aggregate	March 1, 1977/ March 1, 1979
Northbrook	63001632	Umbrella	\$19,000,000 excess of Cal-Union	March 1, 1977/ March 1, 1978
Columbia Casualty	3652013	Umbrella	\$5,000,000 excess of Northbrook	March 1, 1977/ March 1, 1978
	<u>As of March 1, 1978</u>			
Northbrook	63001632	Umbrella	\$20,000,000 excess of Cal-Union	March 1, 1978/ March 1, 1979
Lloyd's and Companies	SLC5337 LI 1045 SL 3315	Umbrella	\$30,000,000 excess of Northbrook	March 1, 1978/ March 1, 1979

\*See 77/78 coverage, this was rolled over.

BEATRICE FOODS CO.  
THIRD-PARTY COVERAGES  
MARCH 1, 1977/MARCH 1, 1978

<u>Carrier</u>	<u>Policy</u>	<u>Coverage</u>	<u>Limits</u>	<u>Term</u>
Transport Insurance Co. California Union	GL-647 *ZCX001598	Primary Buffer	\$500,000 S.C.L. B.I. and P.D.	3-1-77/3-1-78 3-1-77/3-1-79
Northbrook	63001632	Umbrella	\$19,000,000 Excess Buffer	3-28-76/3-1-79
Columbia Casulaty	RDX3652013	Umbrella	\$5,000,000 Excess \$19,000,000	3-1-77/3-1-78

Loss Reporting:

Cal-Union      Mr. Jack Rush  
Philadelphia, Pennsylvania 19101

Northbrook      Mr. Fred Pearson  
Columbia      AVRECO, Inc.  
200 West Monroe Street  
Chicago, Illinois 60606

\*Limits on Cal-Union: \$500,000 xs \$500,000 transport front except PL which carried a \$700,000 SIR in addition to \$500,000 in PL cov. was for \$500,000 xs 1.2M.