New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-7010

John P. Cahill
Commissioner

MEMORANDUM

TO: [redacted] Investigation Section
Remedial Bureau (Cl.2 only)
R. Brazell — Regional Hazardous Waste Remediation Engineer
G. Rider, — O&M Section (as needed)
A. Grant, — DEE
A. Carlson, — DOH, Bureau of Environmental Exposure Investigation

FROM: Dennis Farrar, Acting Chief, Site Control Section, BHSC, DER

SUBJECT: Review of Classification Package for Site # 734020
McKesson Envirosystems

DATE: February 21, 2001

The attached new "Registry Site Investigation Information Form" with supporting documentation is attached for your review and approval.

If acceptable, sign at the bottom of the form (Box #17) and return within 30 calendar days.

If unacceptable, please return with an explanation of your position in a separate memo or letter.

An important part of your review should include modifying, if necessary, the statement in Block 11 (Conclusion) for Classification Decision of the Investigation Form so that it can be used in all appropriate notification documentation (i.e., ENB, owner and adjacent property owner notification letter, and newspaper legal notice.

Please keep the supporting documentation for your records.

Attachment(s)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS WASTE REMEDIATION

SITE INVESTIGATION INFORMATION

1. SITE NAME	2. SITE NUMBER	3. TOWN/CITY/VILLAGE	4. COUNTY
McKesson Envirosystems	734020	City of Syracuse	Onondaga

5. REGION	6. CLASSIFICATION
7	CURRENT 2 PROPOSED 4 MODIFY

7. LOCATION OF SITE (Attach U.S.G.S. Topographic Map showing site location)

a. Quadrangle Syracuse West

b. Site Latitude _43_° _06_' 09_" Site Longitude _77_° _42_' _28_"

c. Tax Map Numbers 115.-03-07.0 / 116.-01-09.0

d. Site Street Address 800 / 801 Van Rensselaer Street

8. BRIEFLY DESCRIBE THE SITE (Attach site plan showing disposal/sampling locations)

The site is located in the City of Syracuse to the south of Onondaga Lake, adjacent to the west bank of the New York State Barge Canal Terminal channel. The site was formerly used for bulk storage of petroleum products and in later years, as storage for a variety of chemical waste streams. The site is divided into two parcels by Van Rensselaer Street. The parcel north of Van Rensselaer Street is within 150 feet of the Barge Canal. The largest of the former aboveground storage tanks (Tank 7) was located on this portion of the site. The majority of previous material storage and handling took place in the area south of Van Rensselaer Street, where ten former aboveground storage tanks were located. The site is within one-quarter mile of Onondaga Lake, which is a major surface water body in the greater Syracuse area. Land use in the surrounding area is characterized as industrial/light industrial. The site has been divided into two Operable Units. Operable Unit No. 1 (OU-1) refers to the unsaturated soils and OU-2 refers to the saturated soils and groundwater. Remedial programs were initiated in the Spring of 1994 and Summer of 1997 for OU-1 and OU-2, respectively.

a. Area _8.62_ acres b. EPA ID Number _NYD075806836_

c. Completed ( )Phase I ( )Phase II ( ) PSA (X)RI/FS ( )PA/SI (X)Other - RCRA Tank Closure

9. Hazardous Waste Disposed (Include EPA Hazardous Waste Numbers)

The primary contaminants detected at this site are those associated with past storage activities. These include various volatile and semi-volatile compounds. The investigations have identified that the contaminants of concern at this site are: methylene chloride, trichloroethene, benzene, toluene, ethyl benzene, xylene, N,N-dimethylaniline, aniline, methanol and acetone. These contaminants were detected in both soil and groundwater.

10. ANALYTICAL DATA AVAILABLE

a. ( )Air (x)Groundwater (x)Surface Water ( )Sediment (x)Soil ( )Waste ( )Leachate (X) EPTox ( )TCLP

Confirmatory analysis of soil samples collected during the OU-1 remedial program demonstrated that the unsaturated soils achieved the ROD-specified cleanup objectives. The contaminants listed below were detected during the 1999 groundwater monitoring program. This contamination is being addressed by the ongoing OU-2 remedy.

b. Contravention of Standards or Guidance Values: Exceedence of Class GA Groundwater Standards

MEDIA	CLASS	CONTAMINANT	SCG (ppb)	CONCENTRATION RANGE (1999)
Groundwater	VOCs	Benzene	1	ND-37
		Toluene	5	ND-240(J)
		Ethylbenzene	5	ND-58(J)
		Xylene	5	ND-220(J)
		Trichloroethylene	5	ND-11,000(J)
		Methylene Chloride	5	ND-450,000(D)
		Methanol	NA	ND-17,000
		Acetone	50	ND-630
	SVOCs	Aniline	5	ND-100,000(D)
		N,N-dimethylaniline	5	ND-77,000

11. **CONCLUSION**

The site's two Operable Units have been subject to remedial programs. The OU-1 remedial program, in-situ aerobic bioremediation of unsaturated soils, was successfully completed in 1995 treating an estimated 20,000 cubic yards of contaminated soil. The remedial program for OU-2, in-situ anaerobic bioremediation of saturated soils and groundwater, was constructed in 1997-1998. The system has been operating since July of 1998. Data supports that conditions within the shallow hydrogeologic unit are conducive to microbial degradation of the COCs. To date, the concentrations of COCs in groundwater have shown limited improvement. Data supports the continued operation, maintenance and monitoring of the system. Final Remedial Reports for OU-1 and OU-2 have been submitted and approved (excerpts attached). A Site O&M Pian (OU-1 and OU-2) was approved in February 2000 and O&M is underway.

a. Institutional Controls (IC) Required? ( )Y (X)N b. If yes, identify: c. Are these ICs in place and verified? ( ) Y ( )N

12. SITE IMPACT DATA

a. Nearest Surface Water: Distance __ 150 ft.__	Direction __Northeast__	Classification _D___	
b. Nearest Groundwater: Depth __7 __ft.	Flow Direction __Northeast__	( )Sole Source ( )Primary ( )Principal	
c. Nearest Water Supply: Distance __ 5 mi.__	Direction _Southeast__	Active (X)Yes ( )No	
d. Nearest Building: Distance __ 0__ ft.	Direction __Onsite__	Use __O&M_____	
e. In State Economic Development Zone?	( )Y (x)N	l. Controlled Site Access?	(X)Y ( )N
f. Crops or livestock on site?	( )Y (x)N	j. Exposed hazardous waste?	( )Y (X)N
g. Documented fish or wildlife mortality?	( )Y (x)N	k. HRS Score __ __	
h. Impact on special status fish or wildlife resource?	( )Y (x)N	l. For Class 2: Priority __NA__	

13. SITE OWNER'S NAME	14. ADDRESS	15. TELEPHONE NUMBER
McKesson Corporation	One Post Street, San Francisco, CA 94104	415-983-8450

16. PREPARER	17. APPROVED
Signature Date	Signature Date
Michael J. Ryan, EE2, DER / BWRA	
Name, Title, Organization	Name, Title, Organization

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS WASTE REMEDIATION

SITE INVESTIGATION INFORMATION

1. SITE NAME	2. SITE NUMBER	3. TOWN/CITY/VILLAGE	4. COUNTY
McKesson Envirosystems	734020	City of Syracuse	Onondaga

5. REGION	6. CLASSIFICATION
7	CURRENT 2 PROPOSED 4 MODIFY

7. LOCATION OF SITE (Attach U.S.G.S. Topographic Map showing site location)

a. Quadrangle Syracuse West

b. Site Latitude _43_° _06_' 09_" Site Longitude _77_° _42_' _28_"

c. Tax Map Numbers 115.-03-07.0 / 116.-01-09.0

d. Site Street Address 800 / 801 Van Rensselaer Street

8. BRIEFLY DESCRIBE THE SITE (Attach site plan showing disposal/sampling locations)

The site is located in the City of Syracuse to the south of Onondaga Lake, adjacent to the west bank of the New York State Barge Canal Terminal channel. The site was formerly used for bulk storage of petroleum products and in later years, as storage for a variety of chemical waste streams. The site is divided into two parcels by Van Rensselaer Street. The parcel north of Van Rensselaer Street is within 150 feet of the Barge Canal. The largest of the former aboveground storage tanks (Tank 7) was located on this portion of the site. The majority of previous material storage and handling took place in the area south of Van Rensselaer Street, where ten former aboveground storage tanks were located. The site is within one-quarter mile of Onondaga Lake, which is a major surface water body in the greater Syracuse area. Land use in the surrounding area is characterized as industrial/light industrial. The site has been divided into two Operable Units. Operable Unit No. 1 (OU-1) refers to the unsaturated soils and OU-2 refers to the saturated soils and groundwater. Remedial programs were initiated in the Spring of 1994 and Summer of 1997 for OU-1 and OU-2, respectively.

a. Area _8.62_ acres b. EPA ID Number _NYD075806836_

c. Completed ( )Phase I ( )Phase II ( ) PSA (X)RI/FS ( )PA/SI (X)Other - RCRA Tank Closure

9. Hazardous Waste Disposed (Include EPA Hazardous Waste Numbers)

The primary contaminants detected at this site are those associated with past storage activities. These include various volatile and semi-volatile compounds. The investigations have identified that the contaminants of concern at this site are: methylene chloride, trichloroethene, benzene, toluene, ethyl benzene, xylene, N,N-dimethylaniline, aniline, methanol and acetone. These contaminants were detected in both soil and groundwater.

10. ANALYTICAL DATA AVAILABLE

a. ( )Air (x)Groundwater (x)Surface Water ( )Sediment (x)Soil ( )Waste ( )Leachate (X) EPTox ( )TCLP

Confirmatory analysis of soil samples collected during the OU-1 remedial program demonstrated that the unsaturated soils achieved the ROD-specified cleanup objectives. The contaminants listed below were detected during the 1999 groundwater monitoring program. This contamination is being addressed by the ongoing OU-2 remedy.

b. Contravention of Standards or Guidance Values: Exceedence of Class GA Groundwater Standards

MEDIA	CLASS	CONTAMINANT	SCG (ppb)	CONCENTRATION RANGE (1999)
Groundwater	VOCs	Benzene	1	ND-37
		Toluene	5	ND-240(J)
		Ethylbenzene	5	ND-58(J)
		Xylene	5	ND-220(J)
		Trichloroethylene	5	ND-11,000(J)
		Methylene Chloride	5	ND-450,000(D)
		Methanol	NA	ND-17,000
		Acetone	50	ND-630
	SVOCs	Aniline	5	ND-100,000(D)
		N,N-dimethylaniline	5	ND-77,000

11. **CONCLUSION**

The site's two Operable Units have been subject to remedial programs. The OU-1 remedial program, in-situ aerobic bioremediation of unsaturated soils, was successfully completed in 1995 treating an estimated 20,000 cubic yards of contaminated soil. The remedial program for OU-2, in-situ anaerobic bioremediation of saturated soils and groundwater, was constructed in 1997-1998. The system has been operating since July of 1998. Data supports that conditions within the shallow hydrogeologic unit are conducive to microbial degradation of the COCs. To date, the concentrations of COCs in groundwater have shown limited improvement. Data supports the continued operation, maintenance and monitoring of the system. Final Remedial Reports for OU-1 and OU-2 have been submitted and approved (excerpts attached). A Site O&M Plan (OU-1 and OU-2) was approved in February 2000 and O&M is underway.

a. Institutional Controls (IC) Required? ( )Y (X)N b. If yes, identify: c. Are these ICs in place and verified? ( ) Y ( )N

12. SITE IMPACT DATA

a. Nearest Surface Water: Distance __ 150 ft.__	Direction __Northeast__		Classification _D___		
b. Nearest Groundwater: Depth __7 __ft.	Flow Direction __Northeast__		( )Sole Source ( )Primary ( )Principal		
c. Nearest Water Supply: Distance __ 5 mi.__	Direction _Southeast__		Active (X)Yes ( )No		
d. Nearest Building: Distance __ 0__ ft.	Direction __Onsite__		Use __O&M_____		
e. In State Economic Development Zone?	( )Y	(x)N	l. Controlled Site Access?	(X)Y	( )N
f. Crops or livestock on site?	( )Y	(x)N	j. Exposed hazardous waste?	( )Y	(X)N
g. Documented fish or wildlife mortality?	( )Y	(x)N	k. HRS Score __ __		
h. Impact on special status fish or wildlife resource?	( )Y	(x)N	l. For Class 2: Priority __NA__		

13. SITE OWNER'S NAME	14. ADDRESS	15. TELEPHONE NUMBER
McKesson Corporation	One Post Street, San Francisco, CA 94104	415-983-8450

16. PREPARER	17. APPROVED
Signature Date	Signature Date
Michael J. Ryan, EE2, DER / BWRA	Chief - WIS - B/HSC
Name, Title, Organization	Name, Title, Organization

Thomas A. Reamon 6/21/01

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS WASTE REMEDIATION

SITE INVESTIGATION INFORMATION

1. SITE NAME	2. SITE NUMBER	3. TOWN/CITY/VILLAGE	4. COUNTY
McKesson Envirosystems	734020	City of Syracuse	Onondaga

5. REGION	6. CLASSIFICATION
7	CURRENT 2 PROPOSED 4 MODIFY

7. LOCATION OF SITE (Attach U.S.G.S. Topographic Map showing site location)

a. Quadrangle Syracuse West

b. Site Latitude _43_° _06_' 09_" Site Longitude _77_° _42_' _28_"

c. Tax Map Numbers 115.-03-07.0 / 116.-01-09.0

d. Site Street Address 800 / 801 Van Rensselaer Street

8. BRIEFLY DESCRIBE THE SITE (Attach site plan showing disposal/sampling locations)

The site is located in the City of Syracuse to the south of Onondaga Lake, adjacent to the west bank of the New York State Barge Canal Terminal channel. The site was formerly used for bulk storage of petroleum products and in later years, as storage for a variety of chemical waste streams. The site is divided into two parcels by Van Rensselaer Street. The parcel north of Van Rensselaer Street is within 150 feet of the Barge Canal. The largest of the former aboveground storage tanks (Tank 7) was located on this portion of the site. The majority of previous material storage and handling took place in the area south of Van Rensselaer Street, where ten former aboveground storage tanks were located. The site is within one-quarter mile of Onondaga Lake, which is a major surface water body in the greater Syracuse area. Land use in the surrounding area is characterized as industrial/light industrial. The site has been divided into two Operable Units. Operable Unit No. 1 (OU-1) refers to the unsaturated soils and OU-2 refers to the saturated soils and groundwater. Remedial programs were initiated in the Spring of 1994 and Summer of 1997 for OU-1 and OU-2, respectively.

a. Area _8.62_ acres b. EPA ID Number _NYD075806836_

c. Completed ( )Phase I ( )Phase II ( ) PSA (X)RI/FS ( )PA/SI (X)Other - RCRA Tank Closure

9. Hazardous Waste Disposed (Include EPA Hazardous Waste Numbers)

The primary contaminants detected at this site are those associated with past storage activities. These include various volatile and semi-volatile compounds. The investigations have identified that the contaminants of concern at this site are: methylene chloride, trichloroethene, benzene, toluene, ethyl benzene, xylene, N,N-dimethylaniline, aniline, methanol and acetone. These contaminants were detected in both soil and groundwater.

10. ANALYTICAL DATA AVAILABLE

a. ( )Air (x)Groundwater (x)Surface Water ( )Sediment (x)Soil ( )Waste ( )Leachate (X) EPTox ( )TCLP

Confirmatory analysis of soil samples collected during the OU-1 remedial program demonstrated that the unsaturated soils achieved the ROD-specified cleanup objectives. The contaminants listed below were detected during the 1999 groundwater monitoring program. This contamination is being addressed by the ongoing OU-2 remedy.

b. Contravention of Standards or Guidance Values: Exceedence of Class GA Groundwater Standards

MEDIA	CLASS	CONTAMINANT	SCG (ppb)	CONCENTRATION RANGE (1999)
Groundwater	VOCs	Benzene	1	ND-37
		Toluene	5	ND-240(J)
		Ethylbenzene	5	ND-58(J)
		Xylene	5	ND-220(J)
		Trichloroethylene	5	ND-11,000(J)
		Methylene Chloride	5	ND-450,000(D)
		Methanol	NA	ND-17,000
		Acetone	50	ND-630
	SVOCs	Aniline	5	ND-100,000(D)
		N,N-dimethylaniline	5	ND-77,000

11. **CONCLUSION**

The site's two Operable Units have been subject to remedial programs. The OU-1 remedial program, in-situ aerobic bioremediation of unsaturated soils, was successfully completed in 1995 treating an estimated 20,000 cubic yards of contaminated soil. The remedial program for OU-2, in-situ anaerobic bioremediation of saturated soils and groundwater, was constructed in 1997-1998. The system has been operating since July of 1998. Data supports that conditions within the shallow hydrogeologic unit are conducive to microbial degradation of the COCs. To date, the concentrations of COCs in groundwater have shown limited improvement. Data supports the continued operation, maintenance and monitoring of the system. Final Remedial Reports for OU-1 and OU-2 have been submitted and approved (excerpts attached). A Site O&M Plan (OU-1 and OU-2) was approved in February 2000 and O&M is underway.

a. Institutional Controls (IC) Required? (X)Y ( )N b. If yes, identify: Con't monitoring, groundwater use restrictions c. Are these ICs in place and verified? ( ) Y (X)N

12. SITE IMPACT DATA

a. Nearest Surface Water: Distance __ 150 ft.__	Direction __Northeast__		Classification _D___		
b. Nearest Groundwater: Depth __7 __ft.	Flow Direction __Northeast__		( )Sole Source ( )Primary ( )Principal		
c. Nearest Water Supply: Distance __ 5 mi.__	Direction _Southeast__		Active (X)Yes ( )No		
d. Nearest Building: Distance __ 0__ ft.	Direction __Onsite__		Use __O&M_____		
e. In State Economic Development Zone?	( )Y	(x)N	l. Controlled Site Access?	(X)Y	( )N
f. Crops or livestock on site?	( )Y	(x)N	j. Exposed hazardous waste?	( )Y	(X)N
g. Documented fish or wildlife mortality?	( )Y	(x)N	k. HRS Score __ __		
h. Impact on special status fish or wildlife resource?	( )Y	(x)N	l. For Class 2: Priority __NA__		

13. SITE OWNER'S NAME	14. ADDRESS	15. TELEPHONE NUMBER
McKesson Corporation	One Post Street, San Francisco, CA 94104	415-983-8450

16. PREPARER	17. APPROVED
Signature Date 11/21/00	X Signature Date
Michael J. Ryan, EE2, DER / BWRA	
Name, Title, Organization	Name, Title, Organization

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS WASTE REMEDIATION

SITE INVESTIGATION INFORMATION

1. SITE NAME	2. SITE NUMBER	3. TOWN/CITY/VILLAGE	4. COUNTY
McKesson Envirosystems	734020	City of Syracuse	Onondaga

5. REGION	6. CLASSIFICATION
7	CURRENT 2 PROPOSED 4 MODIFY

7. LOCATION OF SITE (Attach U.S.G.S. Topographic Map showing site location)

a. Quadrangle Syracuse West

b. Site Latitude _43_° _06_' 09_" Site Longitude _77_° _42_' _28_"

c. Tax Map Numbers 115.-03-07.0 / 116.-01-09.0

d. Site Street Address 800 / 801 Van Rensselaer Street

8. BRIEFLY DESCRIBE THE SITE (Attach site plan showing disposal/sampling locations)

The site is located in the City of Syracuse to the south of Onondaga Lake, adjacent to the west bank of the New York State Barge Canal Terminal channel. The site was formerly used for bulk storage of petroleum products and in later years, as storage for a variety of chemical waste streams. The site is divided into two parcels by Van Rensselaer Street. The parcel north of Van Rensselaer Street is within 150 feet of the Barge Canal. The largest of the former aboveground storage tanks (Tank 7) was located on this portion of the site. The majority of previous material storage and handling took place in the area south of Van Rensselaer Street, where ten former aboveground storage tanks were located. The site is within one-quarter mile of Onondaga Lake, which is a major surface water body in the greater Syracuse area. Land use in the surrounding area is characterized as industrial/light industrial. The site has been divided into two Operable Units. Operable Unit No. 1 (OU-1) refers to the unsaturated soils and OU-2 refers to the saturated soils and groundwater. Remedial programs were initiated in the Spring of 1994 and Summer of 1997 for OU-1 and OU-2, respectively.

a. Area _8.62_ acres b. EPA ID Number _NYD075806836_

c. Completed ( )Phase I ( )Phase II ( ) PSA (X)RI/FS ( )PA/SI (X)Other - RCRA Tank Closure

9. Hazardous Waste Disposed (Include EPA Hazardous Waste Numbers)

The primary contaminants detected at this site are those associated with past storage activities. These include various volatile and semi-volatile compounds. The investigations have identified that the contaminants of concern at this site are: methylene chloride, trichloroethene, benzene, toluene, ethyl benzene, xylene, N,N-dimethylaniline, aniline, methanol and acetone. These contaminants were detected in both soil and groundwater.

10. ANALYTICAL DATA AVAILABLE

a. ( )Air (x)Groundwate ( )Sediment (x)Soil ( )Waste ( )Leachate (X) EPTox ( )TCLP

Confirmatory analysis of soil d that the unsaturated soils achieved the ROD-specified cleanup objectives.

The contaminants listed belo n. This contamination is being addressed by the ongoing OU-2 remedy.

b. Contravention of Stand tandards

MEDIA CL N RANGE (1999)

Groundwater VO

Dennis -

Per our discussion, as there are no ROD-required ICs and the site will remain class 4 for the duration of remedial activities (O+M), attached is a revised Site Investigation Form

Mike R 2/21/07

)

)
)0(J)
)00(D)
)0

S\ )00(D)
)0

11. **CONCLUSION**

The site's two Operable unsaturated soils, was OU-2, in-situ anaerobic July of 1998. Data supp the concentrations of C monitoring of the syste (OU-1 and OU-2) was a

-1 remedial program, in-situ aerobic bioremediation of ,000 cubic yards of contaminated soil. The remedial program for constructed in 1997-1998. The system has been operating since nit are conducive to microbial degradation of the COCs. To date, Data supports the continued operation, maintenance and submitted and approved (excerpts attached). A Site O&M Plan

a. Institutional Controls (IC) Required? ( )Y (X)N b. If yes, identify: c. Are these ICs in place and verified? ( ) Y ( )N

12. SITE IMPACT DATA

a. Nearest Surface Water: Distance __ 150 ft.__	Direction __Northeast__	Classification _D___			
b. Nearest Groundwater: Depth __7 __ft.	Flow Direction __Northeast__	( )Sole Source ( )Primary ( )Principal			
c. Nearest Water Supply: Distance __ 5 mi.__	Direction _Southeast__	Active (X)Yes ( )No			
d. Nearest Building: Distance __ 0__ ft.	Direction __Onsite__	Use __O&M_____			
e. In State Economic Development Zone?	( )Y	(x)N	i. Controlled Site Access?	(X)Y	( )N
f. Crops or livestock on site?	( )Y	(x)N	j. Exposed hazardous waste?	( )Y	(X)N
g. Documented fish or wildlife mortality?	( )Y	(x)N	k. HRS Score __ __		
h. Impact on special status fish or wildlife resource?	( )Y	(x)N	l. For Class 2: Priority __NA__		

13. SITE OWNER'S NAME	14. ADDRESS	15. TELEPHONE NUMBER
McKesson Corporation	One Post Street, San Francisco, CA 94104	415-983-8450

16. PREPARER	17. APPROVED
Signature Date	Signature Date
Michael J. Ryan, EE2, DER / BWRA	
Name, Title, Organization	Name, Title, Organization

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS WASTE REMEDIATION

SITE INVESTIGATION INFORMATION

1. SITE NAME	2. SITE NUMBER	3. TOWN/CITY/VILLAGE	4. COUNTY
McKesson Envirosystems	734020	City of Syracuse	Onondaga

5. REGION	6. CLASSIFICATION
7	CURRENT 2 PROPOSED 4 MODIFY

7. LOCATION OF SITE (Attach U.S.G.S. Topographic Map showing site location)

a. Quadrangle Syracuse West

b. Site Latitude _43_° _06_' 09_" Site Longitude _77_° _42_' _28_"

c. Tax Map Numbers 115.-03-07.0 / 116.-01-09.0

d. Site Street Address 800 / 801 Van Rensselaer Street

8. BRIEFLY DESCRIBE THE SITE (Attach site plan showing disposal/sampling locations)

The site is located in the City of Syracuse to the south of Onondaga Lake, adjacent to the west bank of the New York State Barge Canal Terminal channel. The site was formerly used for bulk storage of petroleum products and in later years, as storage for a variety of chemical waste streams. The site is divided into two parcels by Van Rensselaer Street. The parcel north of Van Rensselaer Street is within 150 feet of the Barge Canal. The largest of the former aboveground storage tanks (Tank 7) was located on this portion of the site. The majority of previous material storage and handling took place in the area south of Van Rensselaer Street, where ten former aboveground storage tanks were located. The site is within one-quarter mile of Onondaga Lake, which is a major surface water body in the greater Syracuse area. Land use in the surrounding area is characterized as industrial/light industrial. The site has been divided into two Operable Units. Operable Unit No. 1 (OU-1) refers to the unsaturated soils and OU-2 refers to the saturated soils and groundwater. Remedial programs were initiated in the Spring of 1994 and Summer of 1997 for OU-1 and OU-2, respectively.

a. Area _8.62_ acres b. EPA ID Number _NYD075806836_

c. Completed ( )Phase I ( )Phase II ( ) PSA (X)RI/FS ( )PA/SI (X)Other - RCRA Tank Closure

9. Hazardous Waste Disposed (Include EPA Hazardous Waste Numbers)

The primary contaminants detected at this site are those associated with past storage activities. These include various volatile and semi-volatile compounds. The investigations have identified that the contaminants of concern at this site are: methylene chloride, trichloroethene, benzene, toluene, ethyl benzene, xylene, N,N-dimethylaniline, aniline, methanol and acetone. These contaminants were detected in both soil and groundwater.

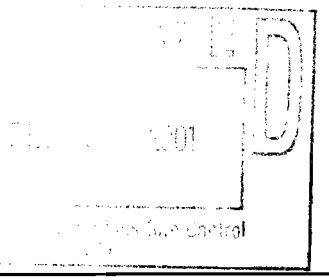
10. ANALYTICAL DATA AVAILABLE

a. ( )Air (x)Groundwater (x)Surface Water ( )Sediment (x)Soil ( )Waste ( )Leachate (X) EPTox ( )TCLP

Confirmatory analysis of soil samples collected during the OU-1 remedial program demonstrated that the unsaturated soils achieved the ROD-specified cleanup objectives. The contaminants listed below were detected during the 1999 groundwater monitoring program. This contamination is being addressed by the ongoing OU-2 remedy.

b. Contravention of Standards or Guidance Values: Exceedence of Class GA Groundwater Standards

MEDIA	CLASS	CONTAMINANT	SCG (ppb)	CONCENTRATION RANGE (1999)
Groundwater	VOCs	Benzene	1	ND-37
		Toluene	5	ND-240(J)
		Ethylbenzene	5	ND-58(J)
		Xylene	5	ND-220(J)
		Trichloroethylene	5	ND-11,000(J)
		Methylene Chloride	5	ND-450,000(D)
		Methanol	NA	ND-17,000
		Acetone	50	ND-630
	SVOCs	Aniline	5	ND-100,000(D)
		N,N-dimethylaniline	5	ND-77,000



11. CONCLUSION

The site's two Operable Units have been subject to remedial programs. The OU-1 remedial program, in-situ aerobic bioremediation of unsaturated soils, was successfully completed in 1995 treating an estimated 20,000 cubic yards of contaminated soil. The remedial program for OU-2, in-situ anaerobic bioremediation of saturated soils and groundwater, was constructed in 1997-1998. The system has been operating since July of 1998. Data supports that conditions within the shallow hydrogeologic unit are conducive to microbial degradation of the COCs. To date, the concentrations of COCs in groundwater have shown limited improvement. Data supports the continued operation, maintenance and monitoring of the system. Final Remedial Reports for OU-1 and OU-2 have been submitted and approved (excerpts attached). A Site O&M Plan (OU-1 and OU-2) was approved in February 2000 and O&M is underway.

a. Institutional Controls (IC) Required? ( )Y (X)N b. If yes, identify: c. Are these ICs in place and verified? ( ) Y ( )N

12. SITE IMPACT DATA

a. Nearest Surface Water: Distance __ 150 ft.__	Direction __Northeast__	Classification _D___	
b. Nearest Groundwater: Depth __7 __ft.	Flow Direction __Northeast__	( )Sole Source ( )Primary ( )Principal	
c. Nearest Water Supply: Distance __ 5 mi.__	Direction _Southeast__	Active (X)Yes ( )No	
d. Nearest Building: Distance __ 0__ ft.	Direction __Onsite__	Use __O&M_____	
e. In State Economic Development Zone?	( )Y (x)N	l. Controlled Site Access?	(X)Y ( )N
f. Crops or livestock on site?	( )Y (x)N	j. Exposed hazardous waste?	( )Y (X)N
g. Documented fish or wildlife mortality?	( )Y (x)N	k. HRS Score __ __	
h. Impact on special status fish or wildlife resource?	( )Y (x)N	l. For Class 2: Priority __NA__	

13. SITE OWNER'S NAME	14. ADDRESS	15. TELEPHONE NUMBER
McKesson Corporation	One Post Street, San Francisco, CA 94104	415-983-8450

16. PREPARER	17. APPROVED
Signature Date	Signature Date 2/28/01
Michael J. Ryan, EE2, DER / BWRA	AE Cook, Chief, BTS, DEE
Name, Title, Organization	Name, Title, Organization

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS WASTE REMEDIATION

SITE INVESTIGATION INFORMATION

1. SITE NAME	2. SITE NUMBER	3. TOWN/CITY/VILLAGE	4. COUNTY
McKesson Envirosystems	734020	City of Syracuse	Onondaga

5. REGION	6. CLASSIFICATION
7	CURRENT 2 PROPOSED 4 MODIFY

7. LOCATION OF SITE (Attach U.S.G.S. Topographic Map showing site location)

a. Quadrangle Syracuse West

b. Site Latitude _43_° _06_' 09_" Site Longitude _77_° _42_' _28_"

c. Tax Map Numbers 115.-03-07.0 / 116.-01-09.0

d. Site Street Address 800 / 801 Van Rensselaer Street

8. BRIEFLY DESCRIBE THE SITE (Attach site plan showing disposal/sampling locations)

The site is located in the City of Syracuse to the south of Onondaga Lake, adjacent to the west bank of the New York State Barge Canal Terminal channel. The site was formerly used for bulk storage of petroleum products and in later years, as storage for a variety of chemical waste streams. The site is divided into two parcels by Van Rensselaer Street. The parcel north of Van Rensselaer Street is within 150 feet of the Barge Canal. The largest of the former aboveground storage tanks (Tank 1) was located on this portion of the site. The majority of previous material storage and handling took place in the area south of Van Rensselaer Street, where ten former aboveground storage tanks were located. The site is within one-quarter mile of Onondaga Lake, which is a major surface water body in the greater Syracuse area. Land use in the surrounding area is characterized as industrial/light industrial. The site has been divided into two Operable Units. Operable Unit No. 1 (OU-1) refers to the unsaturated soils and OU-2 refers to the saturated soils and groundwater. Remedial programs were initiated in the Spring of 1994 and Summer of 1997 for OU-1 and OU-2, respectively.

a. Area _8.62_ acres b. EPA ID Number _NYD075806836_

c. Completed ( )Phase I ( )Phase II ( ) PSA (X)RI/FS ( )PA/SI (X)Other - RCRA Tank Closure

9. Hazardous Waste Disposed (Include EPA Hazardous Waste Numbers)

The primary contaminants detected at this site are those associated with past storage activities. These include various volatile and semi-volatile compounds. The investigations have identified that the contaminants of concern at this site are: methylene chloride, trichloroethene, benzene, toluene, ethyl benzene, xylene, N,N-dimethylaniline, aniline, methanol and acetone. These contaminants were detected in both soil and groundwater.

10. ANALYTICAL DATA AVAILABLE

a. ( )Air (x)Groundwater (x)Surface Water ( )Sediment (x)Soil ( )Waste ( )Leachate (X) EPTox ( )TCLP

Confirmatory analysis of soil samples collected during the OU-1 remedial program demonstrated that the unsaturated soils achieved the ROD-specified cleanup objectives. The contaminants listed below were detected during the 1999 groundwater monitoring program. This contamination is being addressed by the ongoing OU-2 remedy.

b. Contravention of Standards or Guidance Values: Exceedence of Class GA Groundwater Standards

MEDIA	CLASS	CONTAMINANT	SCG (ppb)	CONCENTRATION RANGE (1999)
Groundwater	VOCs	Benzene	1	ND-37
		Toluene	5	ND-240(J)
		Ethylbenzene	5	ND-58(J)
		Xylene	5	ND-220(J)
		Trichloroethylene	5	ND-11,000(J)
		Methylene Chloride	5	ND-450,000(D)
		Methanol	NA	ND-17,000
		Acetone	50	ND-630
	SVOCs	Aniline	5	ND-100,000(D)
		N,N-dimethylaniline	5	ND-77,000

11. CONCLUSION

The site's two Operable Units have been subject to remedial programs. The OU-1 remedial program, in-situ aerobic bioremediation of unsaturated soils, was successfully completed in 1995 treating an estimated 20,000 cubic yards of contaminated soil. The remedial program for OU-2, in-situ anaerobic bioremediation of saturated soils and groundwater, was constructed in 1997-1998. The system has been operating since July of 1998. Data supports that conditions within the shallow hydrogeologic unit are conducive to microbial degradation of the COCs. Since operation commenced, the concentrations of COCs in groundwater have shown improvement. Data supports the continued operation, maintenance and monitoring of the system. Final Remedial Reports for OU-1 and OU-2 have been submitted and approved (excerpts attached). A Site O&M Plan (OU-1 and OU-2) was approved in February 2000 and O&M is underway.

a. Institutional Controls (IC) Required? ( )Y (X)N b. If yes, identify: c. Are these ICs in place and verified? ( )Y ( )N

12. SITE IMPACT DATA

a. Nearest Surface Water: Distance __ 150 ft.__	Direction __Northeast__	Classification _D___			
b. Nearest Groundwater: Depth __7 __ft.	Flow Direction __Northeast__	( )Sole Source ( )Primary ( )Principal			
c. Nearest Water Supply: Distance __ 5 mi.__	Direction _Southeast__	Active (X)Yes ( )No			
d. Nearest Building: Distance __ 0__ ft.	Direction __Onsite__	Use _O&M_____			
e. In State Economic Development Zone?	( )Y	(x)N	i. Controlled Site Access?	(X)Y	( )N
f. Crops or livestock on site?	( )Y	(x)N	j. Exposed hazardous waste?	( )Y	(X)N
g. Documented fish or wildlife mortality?	( )Y	(x)N	k. HRS Score __ __		
h. Impact on special status fish or wildlife resource?	( )Y	(x)N	l. For Class 2: Priority __NA__		

13. SITE OWNER'S NAME	14. ADDRESS	15. TELEPHONE NUMBER
McKesson Corporation	One Post Street, San Francisco, CA 94104	415-983-8450

16. PREPARER	17. APPROVED
Signature Date	Signature 3/15/01 Date
Michael J. Ryan, EE2, DER / BWRA	Director, BEE, DER
Name, Title, Organization	Name, Title, Organization

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS WASTE REMEDIATION

SITE INVESTIGATION INFORMATION

1. SITE NAME	2. SITE NUMBER	3. TOWN/CITY/VILLAGE	4. COUNTY
McKesson Envirosystems	734020	City of Syracuse	Onondaga

5. REGION	6. CLASSIFICATION
7	CURRENT 2 PROPOSED 4 MODIFY

7. LOCATION OF SITE (Attach U.S.G.S. Topographic Map showing site location)

a. Quadrangle Syracuse West

b. Site Latitude _43_° _06_' 09_" Site Longitude _77_° _42_' _28_"

c. Tax Map Numbers 115.-03-07.0 / 116.-01-09.0

d. Site Street Address 800 / 801 Van Rensselaer Street

8. BRIEFLY DESCRIBE THE SITE (Attach site plan showing disposal/sampling locations)

The site is located in the City of Syracuse to the south of Onondaga Lake, adjacent to the west bank of the New York State Barge Canal Terminal channel. The site was formerly used for bulk storage of petroleum products and in later years, as storage for a variety of chemical waste streams. The site is divided into two parcels by Van Rensselaer Street. The parcel north of Van Rensselaer Street is within 150 feet of the Barge Canal. The largest of the former aboveground storage tanks (Tank 7) was located on this portion of the site. The majority of previous material storage and handling took place in the area south of Van Rensselaer Street, where ten former aboveground storage tanks were located. The site is within one-quarter mile of Onondaga Lake, which is a major surface water body in the greater Syracuse area. Land use in the surrounding area is characterized as industrial/light industrial. The site has been divided into two Operable Units. Operable Unit No. 1 (OU-1) refers to the unsaturated soils and OU-2 refers to the saturated soils and groundwater. Remedial programs were initiated in the Spring of 1994 and Summer of 1997 for OU-1 and OU-2, respectively.

a. Area _8.62_ acres b. EPA ID Number _NYD075806836_

c. Completed ( )Phase I ( )Phase II ( ) PSA (X)RI/FS ( )PA/SI (X)Other - RCRA Tank Closure

9. Hazardous Waste Disposed (Include EPA Hazardous Waste Numbers)

The primary contaminants detected at this site are those associated with past storage activities. These include various volatile and semi-volatile compounds. The investigations have identified that the contaminants of concern at this site are: methylene chloride, trichloroethene, benzene, toluene, ethyl benzene, xylene, N,N-dimethylaniline, aniline, methanol and acetone. These contaminants were detected in both soil and groundwater.

10. ANALYTICAL DATA AVAILABLE

a. ( )Air (x)Groundwater (x)Surface Water ( )Sediment (x)Soil ( )Waste ( )Leachate (X) EPTox ( )TCLP

Confirmatory analysis of soil samples collected during the OU-1 remedial program demonstrated that the unsaturated soils achieved the ROD-specified cleanup objectives. The contaminants listed below were detected during the 1999 groundwater monitoring program. This contamination is being addressed by the ongoing OU-2 remedy.

b. Contravention of Standards or Guidance Values: Exceedence of Class GA Groundwater Standards

MEDIA	CLASS	CONTAMINANT	SCG (ppb)	CONCENTRATION RANGE (1999)
Groundwater	VOCs	Benzene	1	ND-37
		Toluene	5	ND-240(J)
		Ethylbenzene	5	ND-58(J)
		Xylene	5	ND-220(J)
		Trichloroethylene	5	ND-11,000(J)
		Methylene Chloride	5	ND-450,000(D)
		Methanol	NA	ND-17,000
		Acetone	50	ND-630
	SVOCs	Aniline	5	ND-100,000(D)
		N,N-dimethylaniline	5	ND-77,000

11. **CONCLUSION**

The site's two Operable Units have been subject to remedial programs. The OU-1 remedial program, in-situ aerobic bioremediation of unsaturated soils, was successfully completed in 1995 treating an estimated 20,000 cubic yards of contaminated soil. The remedial program for OU-2, in-situ anaerobic bioremediation of saturated soils and groundwater, was constructed in 1997-1998. The system has been operating since July of 1998. Data supports that conditions within the shallow hydrogeologic unit are conducive to microbial degradation of the COCs. To date, the concentrations of COCs in groundwater have shown limited improvement. Data supports the continued operation, maintenance and monitoring of the system. Final Remedial Reports for OU-1 and OU-2 have been submitted and approved (excerpts attached). A Site O&M Plan (OU-1 and OU-2) was approved in February 2000 and O&M is underway.

12. SITE IMPACT DATA

a. Nearest Surface Water: Distance __ 150 ft.__	Direction __Northeast__	Classification _D___		
b. Nearest Groundwater: Depth __7 __ft.	Flow Direction __Northeast__	( )Sole Source ( )Primary ( )Principal		
c. Nearest Water Supply: Distance __ 5 mi.__	Direction _Southeast__	Active (X)Yes ( )No		
d. Nearest Building: Distance __ 0__ ft.	Direction __Onsite__	Use __O&M_____		
e. In State Economic Development Zone?	( )Y (x)N	l. Controlled Site Access?	(X)Y	( )N
f. Crops or livestock on site?	( )Y (x)N	j. Exposed hazardous waste?	( )Y	(X)N
g. Documented fish or wildlife mortality?	( )Y (x)N	k. HRS Score __ __		
h. Impact on special status fish or wildlife resource?	( )Y (x)N	l. For Class 2: Priority NA		

13. SITE OWNER'S NAME	14. ADDRESS	15. TELEPHONE NUMBER
McKesson Corporation	One Post Street, San Francisco, CA 94104	415-983-8450

16. PREPARER	17. APPROVED
Michael J. Ryan 2/18/00	x Gerald J. Rider Jr. 11/17/00
Signature Date	Signature Date
Michael J. Ryan, EE2, DER / BWRA	GERALD J. Rider Jr. Chief Otm BHSC
Name, Title, Organization	Name, Title, Organization

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Environmental Remediation

Inactive Hazardous Waste Disposal Report

Site Name:	**McKesson Envirosystems (Inland Site)**			**Site Code:**	**734020**
Class Code:	2 4	Region: **7**	County: **Onondaga**	EPA Id:	**NYD075806836**
Address:	**400 Bear Street West**		City: **Syracuse**	Zip:	**13204**
Latitude:	**43 3' 40"**	Longitude:	**76 10' 19"**		
Site Type:	**Structure**		Estimated Size: **8.62** Acres		

Site Owner / Operator Information:

Current Owner(s) Name:	**W.D. Gabbard , McKesson Co.**			
Current Owner(s) Address:	**127 West Berry St.**	**Fort Wayne**	**IN**	**46802**
Owner(s) during disposal:	**Multi-owner**			
Operator(s) during disposal:	**McKesson Envirosystems**			
Stated Operator(s) Address:	**127 W. Berry St.**	**Ft. Wayne**	**IN**	**46802**

Hazardous Waste Disposal Period: From **1973** To **1984**

Site Description:
This facility was used since the 1930s as a bulk petroleum distribution terminal for products such as gasoline, diesel fuel, heating oil, etc. In 1973, the facility was converted to a chemical distribution terminal. The storage tanks were used for temporary staging of spent solvents that were acquired for recycling, for recycled solvents that were returned by customers, and also for storing mixtures and by-products. The staging was associated with solvent recycling operations through-out the northeast. During the time the facility was in operation, liquids were spilled on the ground and the tanks leaked. Evidence of contaminated soil from spilled liquids was noted by DEC personnel during site inspections. Soil samples taken in September of 1984 revealed the presence of hazardous waste contaminants. Additional soil sampling done by the Company also revealed contamination. Groundwater contamination has also been documented, and contaminant levels are in excess of Part 703 standards. A Consent Order (CO) was negotiated with the Company by the DEC for the soil and groundwater remediation. The old storage tanks on the property have been cleaned and removed. The distribution lines were removed in 1988. A PRP Remedial Investigation/Feasibility Study (RI/FS) was completed in 1993. A successful field trial of bioremediation was conducted in 1993. A Record of Decision (ROD) was issued on March 18, 1994, and called for bioremediation of the unsaturated soils in the area referred to as Operable Unit-1 (OU-1). The bioremediation successfully treated an estimated 20,000 cubic yards of contaminated soil. The saturated soils and groundwater at the site have been designated as OU-2. A PRP funded Feasibility Study was completed in 1996. A Record of Decision (ROD) was signed on March 15, 1997. Design and construction of the anaerobic bioremediation system was completed in early 1998. This system ~~will be in operation for several years and is expected to aid in site remediation.~~ has been in operation since that time and is subject to routine monitoring of chemical and biological parameters. A long-term O&M Plan has been submitted and approved.

Confirmed Hazardous Waste Disposal:
Spent solvents (including BTX compounds)
Base/neutrals

Quantity:
20,000 cubic yards of contaminated soil

Analytical Data Available for: **Groundwater Soil**
Applicable Standards Exceeded in: **Groundwater**

Geotechnical Information:
Soil/Rock Type: **Fill over sand and gravel**
Depth to Groundwater: **Approximately 2 to 6 feet.**

Legal Action: Type: **State Consent Order -RI/FS** Status: **Order Signed**
Remedial Action: **Complete** Nature of action: **Bioremediation**

Assessment of Environmental Problems:
Groundwater contamination and soil contamination have been confirmed.

Assessment of Health Problems:
The site is located in an industrial area. The area is served by public water. Surface soils were bioremediated in 1994 and covered with a minimum layer of one foot of clean soil.

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-7010

John P. Cahill
Commissioner

MEMORANDUM

TO:	T. Reamon	Investigation Section Remedial Bureau (Cl.2 only)
	R. Brazell	Regional Hazardous Waste Remediation Engineer
	G. Rider,	O&M Section (as needed)
	A. Grant,	DEE
	A. Carlson,	DOH, Bureau of Environmental Exposure Investigation

FROM: Dennis Farrar, Acting Chief, Site Control Section, BHSC, DER

SUBJECT: Review of Classification Package for Site # 734020
McKesson Envirosystems

DATE: February 21, 2001

The attached new "Registry Site Investigation Information Form" with supporting documentation is attached for your review and approval.

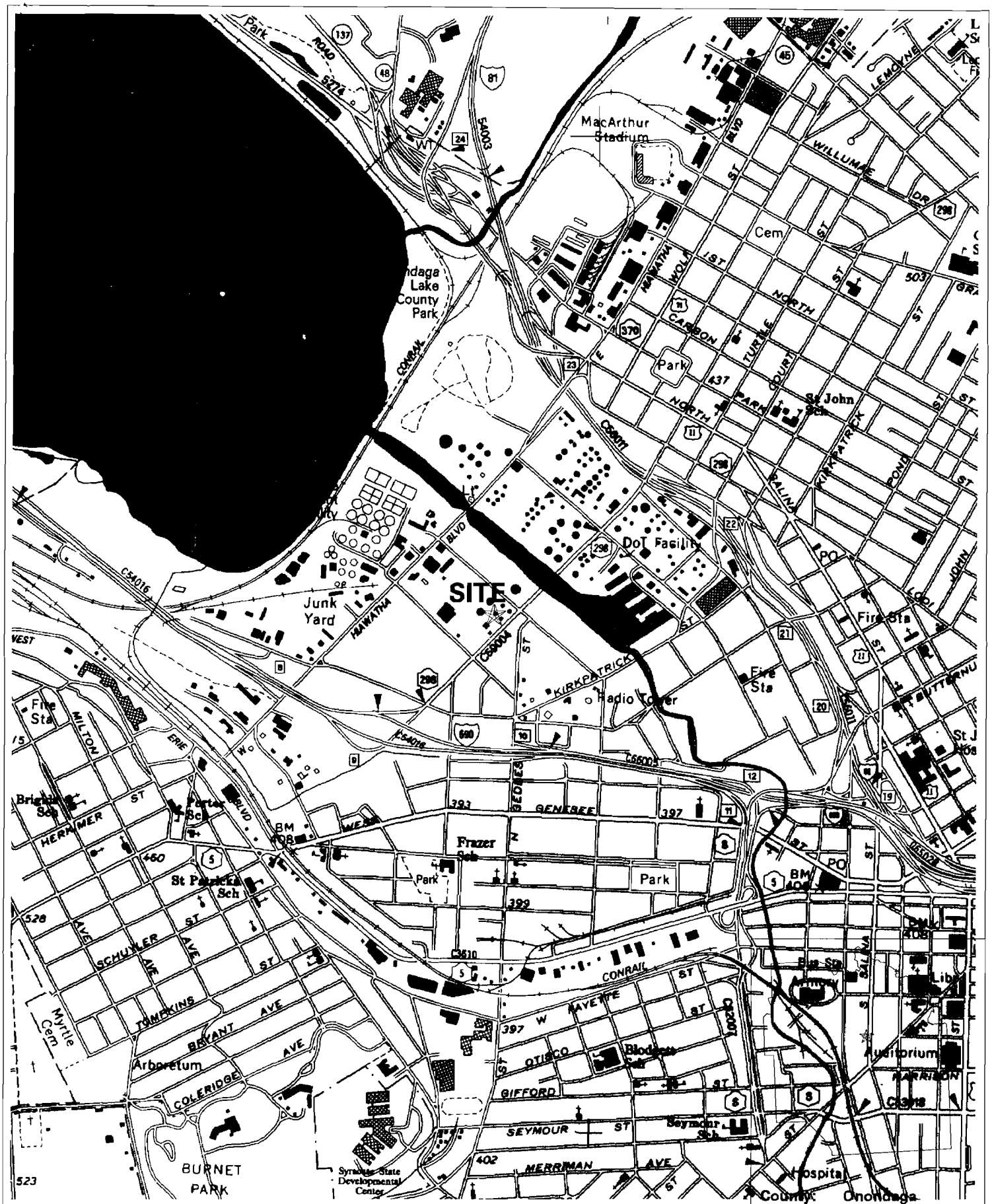
If acceptable, sign at the bottom of the form (Box #17) and return within 30 calendar days.

If unacceptable, please return with an explanation of your position in a separate memo or letter.

An important part of your review should include modifying, if necessary, the statement in Block 11 (Conclusion) for Classification Decision of the Investigation Form so that it can be used in all appropriate notification documentation (i.e., ENB, owner and adjacent property owner notification letter, and newspaper legal notice.

Please keep the supporting documentation for your records.

Attachment(s)



Site Location Map

734020 McKesson Envirosystems (Inland Site)

NYSDOT Planimetric Quadrangle(s):

Scale 1:24,000

REPORT

Remedial Design/Remedial Action Report Operable Unit No. 2 - Saturated Soils and Ground Water

Volume I of II

McKesson Envirosystems
Bear Street Facility
Syracuse, New York

December 1999

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

1.2 Site Description

The McKesson Envirosystems Bear Street facility is currently listed as a Class 2 Inactive Hazardous Waste Disposal Site by the NYSDEC. Reclassification of the site to Class 4 is anticipated to be initiated by the NYSDEC upon the NYSDEC's approval of this RD/RA Report (NYSDEC's March 1997 ROD; letter from Michael J. Ryan, P.E. of the NYSDEC, to David J. Ulm of BBL, dated July 9, 1998). Class 4 is defined by the NYSDEC as a site that has been properly closed but that requires continued operation, maintenance, and/or monitoring (Title 6 of the New York Compilation of Codes, Rules, and Regulations [NYCRR], Part 375).

The site, approximately 8.8 acres in size, is located on the north side of Bear Street in Syracuse, New York and is transversed by Van Rensselaer Street. The site is fenced and access is restricted to authorized persons only. The property and surrounding land are zoned for industrial use. Figure 1 shows the location of the site.

1.3 Site History

BBL conducted a Remedial Investigation (RI) at the site between April 1988 and February 1989; the results were submitted to the NYSDEC in April 1990. Based on the results of the RI, the following COCs were identified in unsaturated soils and ground water at the site: benzene, toluene, ethylbenzene, and xylene (BTEX); trichloroethene (TCE); methylene chloride; aniline; N,N-dimethylaniline; acetone; and methanol.

A *Feasibility Study (FS) Report*, prepared to address elevated COCs in the unsaturated soils, was submitted to the NYSDEC in November 1993 (BBL, November 1993). The *FS Report* identified and screened various remedial alternatives capable of addressing the COCs present in unsaturated soils. The remedial alternative recommended to address the COCs present in the unsaturated soils at the site was in-situ bioremediation.

The NYSDEC divided the site into two operable units to facilitate remediation of the site. The NYSDEC defined OU No. 1 as the unsaturated soils that contain COCs at concentrations greater than or equal to 5 parts per million (ppm), and OU No. 2 as the saturated soils and ground water. A ROD for OU No. 1 was issued by the NYSDEC in March 1994, specifying in-situ bioremediation as the remedy for OU No. 1.

During the summer of 1994, the unsaturated soils remedy for OU No. 1, consisting of in-situ bioremediation, was implemented. Within seven months of implementation, COC concentrations in unsaturated soils were reduced below soil cleanup levels specified in the ROD. Later in 1994, the site was covered with clean soil and graded to allow for controlled storm-water drainage. In addition, as specified in the ROD for OU No. 1, a biannual ground-water sampling and analysis program was implemented to monitor the ground-water quality at the downgradient property boundary and to verify that the COCs in ground water have not migrated beyond this boundary [at concentrations in excess of NYSDEC Class GA Ground-Water Quality Standards (Ground-Water Quality Standards)]. The schedule for the biannual sampling and analysis program is detailed in Subsection 3.3.2.4 of this report.

The results of the biannual ground-water sampling and analysis program indicate that COCs at concentrations in excess of Ground-Water Quality Standards have not migrated beyond this boundary, with the exception of aniline and N,N-dimethylaniline that have been periodically detected in the ground-water samples collected from monitoring wells MW-23S and MW-25S at concentrations in excess of Ground-Water Quality Standards. However, the analytical results of the most recent biannual ground-water sampling event (July 1999) indicate that COCs were not detected at concentrations exceeding Ground-Water Quality Standards. A summary of ground-water analytical results from the biannual ground-water monitoring program are presented in Table 1, and further discussed in Subsection 3.3.2.4 of this report.

A *Remedial Design/Remedial Action (RD/RA) Report* for OU No. 1 - Unsaturated Soils, was prepared and submitted to the NYSDEC in September 1995. The *RD/RA Report* was reviewed and subsequently approved by the NYSDEC in a September 28, 1995 letter from Robert W. Schick, P.E. of the NYSDEC, to David J. Ulm of BBL. That letter also stated that the NYSDEC considered remediation of OU No. 1 complete.

Subsequent to implementation of the remedial action for OU No. 1, the NYSDEC requested that an FS Report be prepared to address the COCs present in OU No. 2 - Saturated Soils and Ground Water (letter from Michael J. Ryan, P.E., of NYSDEC, to Robert D. Ritchie, P.E. of McKesson Corporation, dated November 15, 1994). To provide the additional data necessary for completion of the FS for OU No. 2, the Supplemental Saturated Soil and Ground-Water Sampling Investigation (Supplemental Investigation) and bench-scale biological treatability studies were performed. The results of the Supplemental Investigation for OU No. 2 were presented in the NYSDEC-approved *Supplemental Saturated Soil and Ground-Water Sampling Investigation Report* (BBL, revised September 1996) and pertinent characterization data/conclusions from that investigation are summarized below.

Physical Characterization Data

OU No. 2 was determined to be comprised of two hydrogeologic units: a shallow and a deep unit that are separated by a silt and clay lacustrine deposit. The shallow unit consists of a low-permeability silt and clay layer located beneath the fill that was graded over the site during the OU No. 1 remediation activities. This silt and clay layer ranges in depth from approximately 8 to 15 feet below ground surface (bgs) [approximately 366 to 359 feet above mean sea level (AMSL)], with an average thickness of 8 feet. The shallow hydrogeologic unit also consists of a low-permeability sand and silt unit located approximately 15 to 22 feet bgs (approximately 359 to 352 AMSL).

The deep hydrogeologic unit, which consists of a relatively high permeable sand and gravel, is located approximately 24 to 35 bgs (approximately 350 to 339 AMSL). The deep hydrogeologic unit is also characterized by the presence of a freshwater/saltwater interface at an elevation interpreted between 340 to 338 feet AMSL. Figure 4 presents a geologic cross-section of the site, depicting the shallow and deep hydrogeologic units, the silt and clay lacustrine deposit which separates these units, and the location of the freshwater/saltwater interface.

Chemical Characterization Data

The results of the Supplemental Investigation activities conducted at the site support that the highest concentrations and areal distribution of COCs in ground water are associated with three distinct on-site areas (see Figure 2) within the shallow hydrogeologic unit. Two of these "impacted areas" are located on the south parcel of the site, in the vicinity of monitoring wells TW-01 and TW-02 (Area 1 and Area 2, respectively). TW-02 was replaced with TW-02R during the OU No. 2 remedial activities. The third area is located on the north parcel of the site, in the vicinity of monitoring well MW-8S (Area 3). Furthermore, the data support that the concentrations of COCs in the deep hydrogeologic unit were relatively low, as there were no COCs detected, at concentrations in excess of Ground-Water Quality Standards, in the ground-water samples collected from the monitoring well points installed and sampled within the deep hydrogeologic unit.

Upon completion of the Supplemental Investigation, an *FS Report* (BBL, revised January 1997) was prepared which identified in-situ anaerobic bioremediation as the most effective remedial alternative capable of meeting the remedial action objectives for OU No. 2. Upon completion of the FS, the NYSDEC prepared a Proposed Remedial Action Plan, dated January 1997, and subsequently issued a ROD for OU No. 2, on March 19, 1997 (see Appendix A), specifying in-situ anaerobic bioremediation as the remedy for OU No. 2.

Pre-design activities were performed at the site from December 1996 to February 1997 to facilitate development and implementation of the NYSDEC-selected in-situ anaerobic bioremediation remedy. These activities further

characterized the concentration and distribution of COCs present within OU No. 2 and better defined the site hydrology to aid in design of the in-situ anaerobic bioremediation remedy. A description of these activities were presented in a NYSDEC-approved letter report (*Pre-Design Letter Report*) (letter to Michael J. Ryan, P.E. of the NYSDEC, from David J. Ulm of BBL, dated April 4, 1997).

As part of the OU No. 2 remedial design program, an *RD/RA Work Plan* was prepared and submitted to the NYSDEC in June 1997 and subsequently revised in August 1997. That work plan was approved by the NYSDEC in a September 3, 1997 letter from Michael J. Ryan, P.E. of the NYSDEC, to David J. Ulm of BBL.

The NYSDEC-selected remedy for OU No. 2, which consists of introducing nutrient-amended ground water into the shallow hydrogeologic unit to enhance naturally occurring anaerobic biodegradation of the COCs present in each of the three impacted areas identified on Figure 2 (Areas 1, 2, and 3), was constructed during 1997/1998. The components of the remedy implemented for OU No. 2 are identified below.

- An infiltration trench (see Figure 5) and a withdrawal trench (see Figure 6) were installed upgradient and downgradient, respectively, of Area 3 as a means to introduce Revised Anaerobic Mineral Media-(RAMM-) amended ground water into the shallow hydrogeologic unit while maintaining hydraulic control. RAMM consists of the specific chemicals and concentrations listed in Table 2. The introduction of RAMM supplies macronutrients and micronutrients to enhance naturally occurring anaerobic biodegradation of the COCs.

- Two additional infiltration trenches (see Figure 5) were installed within Area 3 to increase the distribution of RAMM-amended ground water within this impacted area and to act as overflow devices if the amended ground water in the aforementioned infiltration trench exceeds maximum capacity.

- Ground water from the withdrawal trench is being pumped, amended with RAMM, and distributed into the shallow hydrogeologic unit via the infiltration trenches described above.

- Two infiltration trenches (see Figure 7) were installed in both Areas 1 and 2. RAMM-amended ground water is periodically introduced into these trenches by manually filling standpipes screened within the filter pack of these trenches (i.e., within the shallow hydrogeologic unit). The ground water used is pumped from existing pumping well MW-26S, where COCs have not been detected in any of the ground-water samples collected from this well, the adjacent monitoring well MW-13S, or the previously existing adjacent monitoring well MW-14D that was abandoned during the OU No. 2 remediation activities in accordance with Subsection 3.4 of the *RD/RA Work Plan* for OU No. 2.

The locations of the withdrawal trench and the infiltration trenches are shown on Figure 2. In addition to these components, the remedy for OU No. 2 includes the following:

- Introducing RAMM into the shallow hydrogeologic unit within each of the three impacted areas, at discrete locations throughout each area, using a truck-mounted vertical injection mast; and

- Conducting a process control monitoring program to monitor the effectiveness of the in-situ anaerobic bioremediation treatment systems. The objectives of this program include:

  - Confirming that containment has been established in each of the three impacted areas;

  - Verifying that the ground-water withdrawal rates in Area 3 do not cause the freshwater/saltwater interface to upcone to the bottom of the withdrawal trench;

- Verifying that saturated soil/ground-water conditions within the shallow hydrogeologic unit are conducive to microbial degradation of the COCs by anaerobic microbial populations;

- Verifying that the concentration of COCs, RAMM constituents, and/or RAMM byproducts have not increased downgradient of each of the three impacted areas; and

- Verifying that the concentrations of COCs, RAMM constituents, and/or RAMM byproducts have not increased in the deep hydrogeologic unit.

At the request of the NYSDEC (letter to Jean A. Mescher of McKesson Corporation, from Michael J. Ryan, P.E. of the NYSDEC, dated November 5, 1998), a *Site Operation and Maintenance (O&M) Plan* (BBL, revised August 1999), was prepared for OU No. 1 and OU No. 2. The *O&M Plan* provides a description of the remedial actions, monitoring, O&M activities, and the O&M schedule for both operable units. That plan also provides a list of key project management personnel, the site-specific Health and Safety Plan (HASP), the Field Sampling Plan (FSP), the Quality Assurance Project Plan (QAPP), and specifications for the primary pieces of equipment comprising the Area 3 treatment system.

1.4 Project Objective

The project objective, as described in the NYSDEC-approved *RD/RA Work Plan,* is to implement in-situ anaerobic bioremediation in each of the three impacted areas shown on Figure 2 to address the COCs present in the shallow hydrogeologic unit. As described in the previous subsection, the in-situ anaerobic bioremediation remedy being implemented in Area 3 consists of introducing RAMM-amended ground water into the shallow hydrogeologic unit while maintaining hydraulic control between the withdrawal trench and infiltration trenches. The in-situ anaerobic bioremediation remedy in Areas 1 and 2 consists of using infiltration trenches to distribute RAMM-amended ground water into the shallow hydrogeologic unit of these areas. The in-situ anaerobic bioremediation remedy for each area also included a discrete RAMM injection event to distribute RAMM-amended ground water into the shallow hydrogeologic unit throughout each of these areas. Additional discrete RAMM injection events may be conducted (if necessary), based on the results of the ongoing process control monitoring program described in Section 3.

A process control monitoring program is being implemented to achieve the following for each of the three impacted areas:

- Document ground-water quality;

- Monitor biological activity;

- Confirm that containment is established; and

- Confirm that migration of COCs, RAMM constituents and/or RAMM byproducts is not occurring downgradient of each area or into the deep hydrogeologic unit.

In addition, the biannual ground-water monitoring program is being continued to monitor ground-water quality at the downgradient property boundary.

The in-situ anaerobic bioremediation remedy is being implemented to meet the following remedial goals for OU No. 2, as presented in the NYSDEC ROD:

- Reduce, control, or eliminate the concentrations of COCs within OU No. 2;

- Mitigate the potential for migration beyond the site boundary of ground water that contains concentrations of COCs in excess of their respective Ground-Water Quality Standard; and

- Attain Ground-Water Quality Standards, to the extent practicable, for the COCs present in the on-site ground water.

The following sections of this report have been developed to provide a description of the remedial activities and process control monitoring activities that have been conducted during the first year of in-situ anaerobic bioremediation treatment.

3.4 Conclusions and Recommendations

3.4.1 Conclusions

The process control monitoring data presented in this report provides information that has been and will continue to be used to monitor the effectiveness of the in-situ anaerobic bioremediation treatment systems. The following conclusions and recommendations are based on the process control monitoring data which have been obtained during the first year of treating the three areas.

- Containment was established in each of the three impacted areas during the first year of in-situ anaerobic bioremediation treatment, including maintaining a closed-loop hydraulic cell in Area 3. This closed loop cell has effectively increased the rate at which RAMM-amended ground water moves through the area of relatively higher concentrations of COCs within Area 3, while inducing a hydraulic gradient from downgradient perimeter well MW-23S toward the withdrawal trench and hydraulically influencing monitoring well MW-25S.

- Operating the Area 3 system has not affected the hydraulic head in the deep hydrogeologic unit beneath Area 3 and the freshwater/saltwater interface has not upconed to the base of the withdrawal trench. In addition, no discernable hydraulic effects were identified as a result of completing the initial discrete RAMM injection event.

- At each impacted area, the biological indicators indicate that the saturated soil/ground-water conditions within the shallow hydrogeologic unit are conducive to microbial degradation of the COCs by anaerobic microbial populations. The PLFA, PHA, and DMA data show a shift in the microbial community from aerobic bacteria to anaerobic bacteria. At monitoring locations where COCs are present at relatively higher concentrations (MW-8S and TW-02R), the influence of RAMM addition on the microbial community is greatest, as indicated by the increased anaerobic biomass growth at these locations since baseline sampling in January 1998. The biological data also indicate that the microbial community in each area is undergoing limited stress and continues to have high turnover rates. Furthermore, these data indicate that essential nutrients are present within the shallow hydrogeologic unit for maintaining or growing anaerobic biomass.

- The concentrations of COCs detected in ground water within the shallow hydrogeologic unit of each impacted area were similar to or less than the concentrations of COCs detected in monitoring locations during past investigative activities, prior to the implementation of the in-situ anaerobic bioremediation remedy. In some cases, the concentrations of some COCs have decreased significantly since implementation of the in-situ anaerobic bioremediation remedy (e.g., monitoring well MW-8S in Area 3).

- The data indicate that the concentrations of COCs, RAMM, and/or RAMM byproducts have not increased downgradient of each area or within the deep hydrogeologic unit. The concentrations of aniline have decreased to non-detectable in downgradient perimeter monitoring well MW-23S since implementation of the in-situ anaerobic bioremediation remedy. Although aniline was detected in the February 1999 and June 1999 ground-water samples collected from monitoring well MW-25S, the July 1999 data indicate a significant decrease in the aniline concentration at this location and that COCs were not detected in excess of Ground-Water Quality Standards.

3.4.2 Recommendations

Based on the data presented herein and the corresponding conclusions summarized above, the in-situ anaerobic bioremediation treatment process is meeting the remedial goals for OU No. 2 presented in the ROD and Subsection 1.4 of this report. Accordingly, the in-situ anaerobic bioremediation treatment activities will continue consistent with the operational procedures followed since mid-December 1998, as summarized below:

- Pumping ground water from the Area 3 extraction trench at an average rate of approximately 2 gpm, and distributing approximately 75% of the flow into secondary infiltration trench "B" and the remaining 25% into secondary infiltration trench "A"; and

- Introducing approximately 100 gallons of RAMM into the shallow hydrogeologic unit of each of the three areas once per month.

In addition to the above operational procedures, completion of an additional discrete RAMM injection event(s) in Area 1 and Area 2 is recommended to further stimulate the biodegradation rate within these areas.

The progress of the in-situ anaerobic bioremediation treatment activities will continue to be monitored and the results evaluated to determine if modifications are necessary to meet the objectives of the ROD. As detailed in the *RD/RA Work Plan,* the results of the short-term monitoring program have been used (in part) to determine the scope of the long-term process control monitoring program. A description of the long-term process control monitoring program has been submitted under separate cover to the NYSDEC for approval. Once approved by the NYSDEC, the long-term monitoring program will become an addendum to the *O&M Plan.*

Upon the NYSDEC's approval of this RD/RA Report, reclassification of the site from a Class 2 to a Class 4 Inactive Hazardous Waste Disposal Site is anticipated to be initiated by the NYSDEC (NYSDEC's March 1997 ROD; letter from Michael J. Ryan, P.E. of the NYSDEC, to David J. Ulm of BBL, dated July 9, 1998). Class 4 is defined by the NYSDEC as a site that has been properly closed but that requires continued operation, maintenance, and monitoring (6 NYCRR Part 375).

5. Engineering Certification

ENGINEER'S CERTIFICATION

McKESSON ENVIROSYSTEMS
BEAR STREET FACILITY
SYRACUSE, NEW YORK
SITE NO. 7-34-020

OPERABLE UNIT NO. 2 - SATURATED SOILS AND GROUND WATER

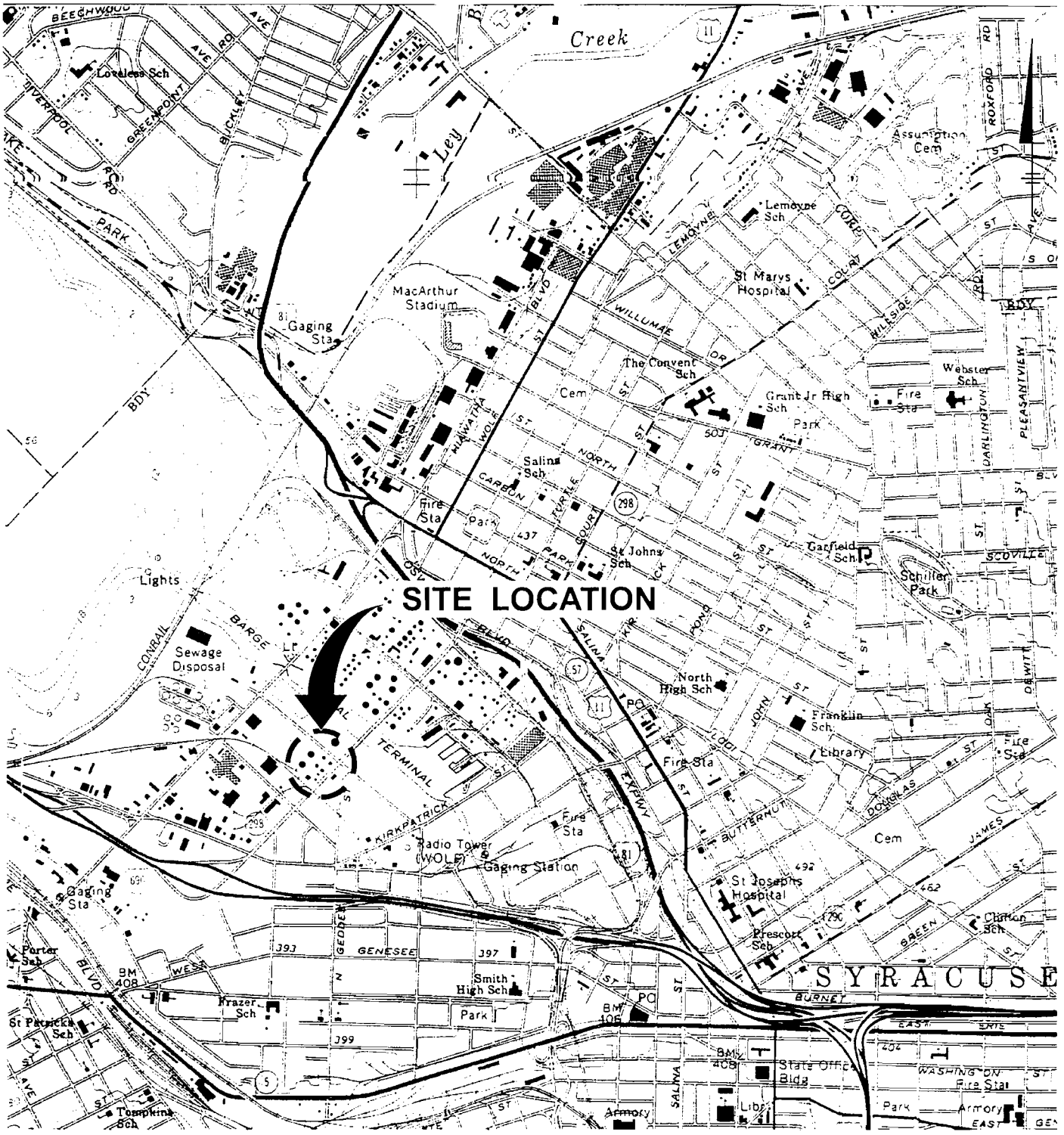
I, Robert K. Goldman, P.E., hereby certify, as a Professional Engineer registered in the State of New York, that based on Blasland, Bouck & Lee, Inc.'s (BBL's) observation of the remedial activities conducted by McKesson Corporation's remedial contractor and the remedial activities conducted by BBL Environmental Services, Inc., as detailed in Section 2 of this Remedial Design/Remedial Action (RD/RA) Report, the remedial activities were completed in conformance with the procedures and criteria presented in the following documents and/or approved field changes detailed in this RD/RA Report:

- "Record of Decision, McKesson Envirosystems Site, Syracuse (C), Onondaga County, New York, Site Number 7-34-020, Operable Unit No. 2", (NYSDEC, March 1997); and
- "Remedial Design/Remedial Action Work Plan, Operable Unit No. 2 - Saturated Soils and Ground Water", (BBL, revised August 1997).

By: _____ Date: 12/2/99

Robert K. Goldman, P.E.
President
Blasland, Bouck & Lee, Inc.
6723 Towpath Road
Syracuse, New York 13214

Registration Number: 60817



REFERENCE: SYRACUSE WEST, NY USGS QUAD.1973 PR 1978

2000' 0 2000'

APPROX. SCALE: 1" = 2000'

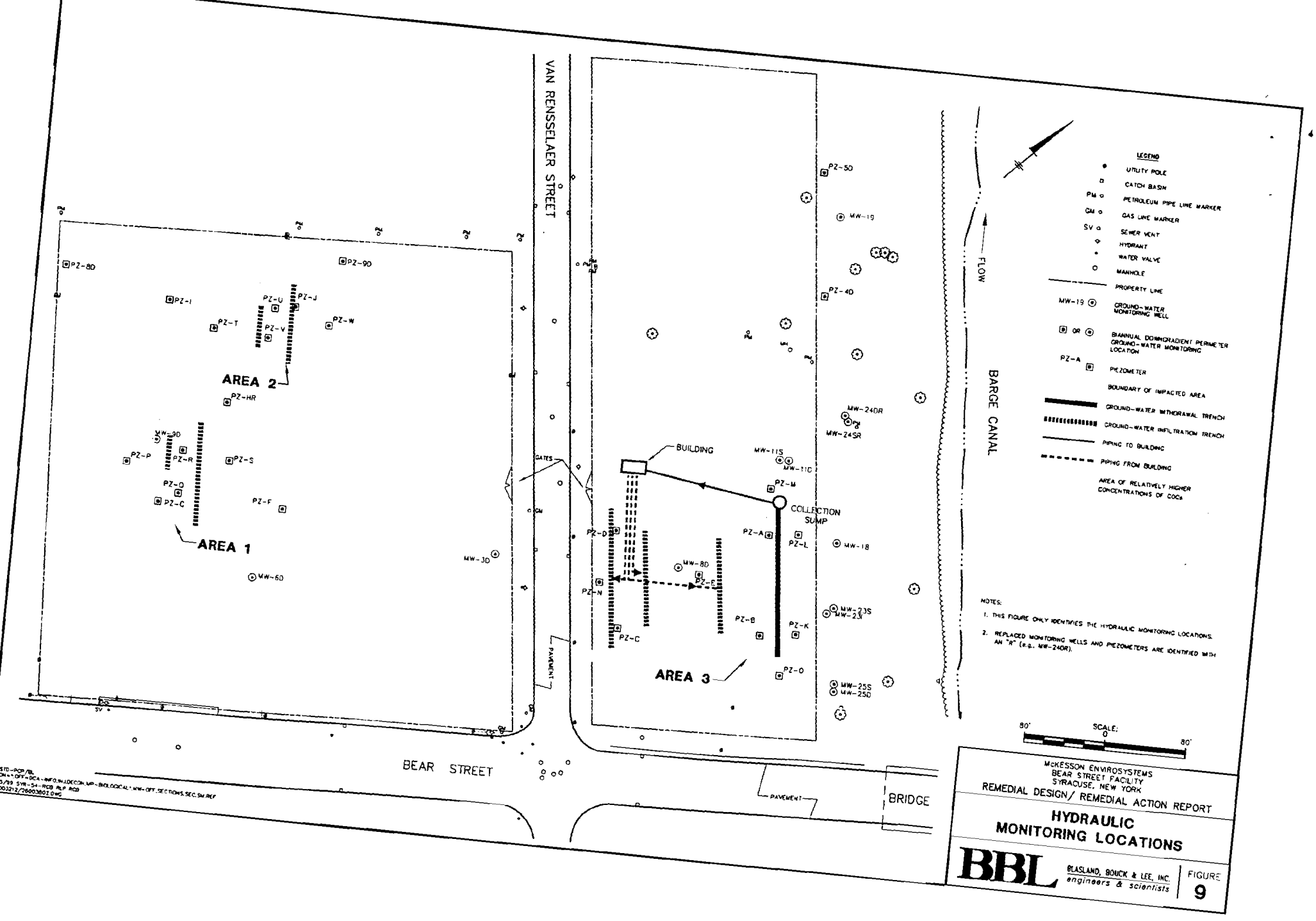
MCKESSON ENVIROSYSTEMS
BEAR STREET FACILITY - SYRACUSE, NEW YORK
REMEDIAL DESIGN/REMEDIAL ACTION REPORT

SITE LOCATION MAP

BBL BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE
1

10/98 SYR-D54-DJH
26003201/26003N01.CDR

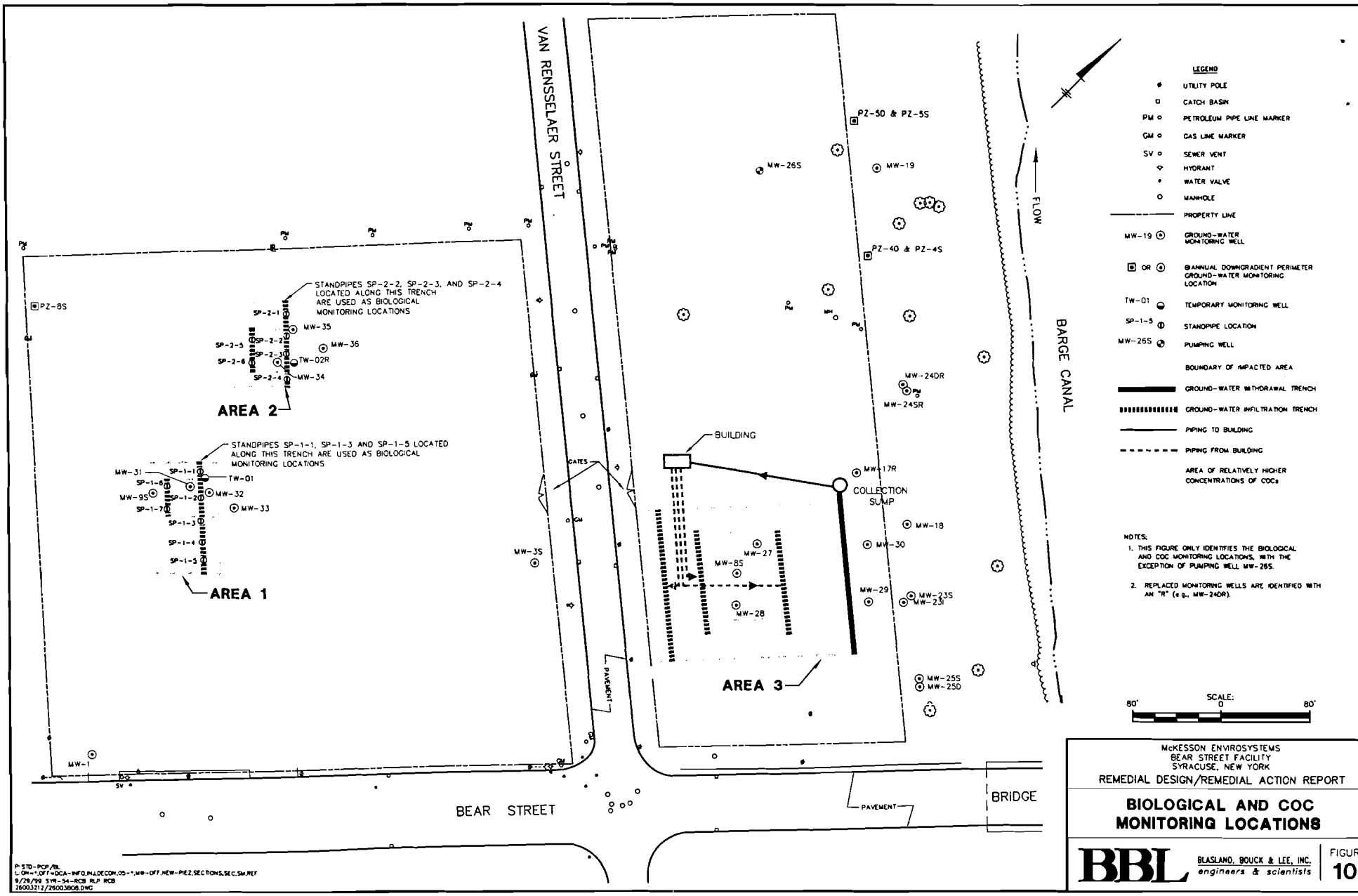


McKESSON ENVIROSYSTEMS
BEAR STREET FACILITY
SYRACUSE, NEW YORK
REMEDIAL DESIGN/ REMEDIAL ACTION REPORT

HYDRAULIC MONITORING LOCATIONS

BBL BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE 9



McKESSON ENVIROSYSTEMS
BEAR STREET FACILITY
SYRACUSE, NEW YORK
REMEDIAL DESIGN/REMEDIAL ACTION REPORT

BIOLOGICAL AND COC MONITORING LOCATIONS

BBL BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE 10

P:\STD-PGP/BL
L:ON=*,OFF=DCA-INFO,IN,DECOM,05-*,MW-OFF,NEW-PIEZ,SECTIONS,SEC,SM,REF
9/29/98 SYR-54-RCB RLP RCB
26003212/26003808.DWG

REPORT

REMEDIAL DESIGN/ REMEDIAL ACTION REPORT OPERABLE UNIT NO. 1 - UNSATURATED SOILS

McKesson Envirosystems
Bear Street Facility
Syracuse, New York

September 1995

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

1.0 - Introduction

1.1 General

This Remedial Design/Remedial Action (RD/RA) Report presents the results of the remedy (biological treatment using in-situ soil blending) for Operable Unit No. 1 - Unsaturated Site Soils at the McKesson Envirosystems, Bear Street facility (the site), located at 400 Bear Street in Syracuse, New York (see Figure 1). The RA conducted at this site conforms with the New York State Department of Environmental Conservation- (NYSDEC-) approved RD/RA Work Plan dated May 1994, and subsequently modified by the NYSDEC. The RD/RA report presents the following:

- A general description and schedule of the activities conducted during implementation of the in-situ bioremediation remedy;
- A summary of the bioremediation performance standards and process control monitoring data;
- A summary of the analytical results obtained during the soil verification sampling program;
- A summary of the analytical data generated as a result of the evaluation of the downgradient perimeter monitoring wells and piezometers;
- Boring logs and monitoring well construction details for the additional monitoring wells (MW-11S, MW-11D, MW-23S, MW-23I, MW-24S, MW-24D, MW-25S, and MW-25D) which were installed along the downgradient perimeter of the site; and
- A summary of the analytical results for the first round of ground-water samples collected as part of the semi-annual downgradient perimeter ground-water monitoring program.

Relevant background information and project objectives are summarized in Subsections 1.2 and 1.3, respectively.

1.2 Background Information

The remedy for the unsaturated soil at the site, Biological Treatment Using In-Situ Soil Blending, was selected by the NYSDEC based on the results of the Remedial Investigation/Feasibility Study (RI/FS) and using criteria that were identified for the evaluation of the proposed remedial alternatives. The selected remedy was presented in the NYSDEC's Record of Decision (ROD) for the McKesson (Safety-Kleen) Envirosystems Inactive Hazardous Waste Disposal Site, Operable Unit No. 1, dated March 14, 1994 (see Appendix A). The components of the selected remedy, as presented in the ROD, are as follows:

- Develop a remedial design program to verify the components of the conceptual design and provide details necessary for the construction, operation and maintenance, and monitoring of the remedial action;

- Conduct in-situ bioremediation of all areas of the site where the chemicals of concern (COCs) were detected at concentrations greater than 5 parts per million (ppm);

- Attain technology-based cleanup levels and performance of bioremediation as measured by a performance standard to be developed under the remedial design program;

- Install a minimum of 12 inches of clean soil over the remediated areas, graded and seeded to promote surface water runoff and limit infiltration of rain and surface water into the remediated areas;

- Install additional monitoring wells to supplement the existing site perimeter ground-water monitoring network; and

- Conduct a ground-water sampling and analysis program to verify that chemicals of interest have not migrated off-site.

As part of the remedial design program, the RD/RA Work Plan was prepared and submitted to the NYSDEC on May 16, 1994. This work plan was subsequently approved by the NYSDEC on May 20, 1994. Following approval of the RD/RA Work Plan, treatment of the unsaturated soil at the site using the selected remedy, in-situ bioremediation, was initiated on May 26, 1994.

1.3 Project Objective

The project objective was to implement in-situ bioremediation using soil blending techniques in Treatment Areas 1, 2, 3, and 4 as shown on Figure 2. The treatment areas delineated on Figure 2 represent unsaturated soils that contained COCs at concentrations greater than or equal to 5 ppm. The in-situ bioremediation process was used to reduce the concentrations of these COCs to less than the following NYSDEC-approved cleanup levels:

COCs	Cleanup Levels (ppm)	Concentration Range for the Verification Sample Results
Methylene Chloride	10	ND
Trichloroethene	10	ND
Benzene	10	ND
Toluene	10	ND - 0.21 J
Ethylbenzene	10	ND - 0.325
Xylene	10	ND - 0.95
N,N-dimethylaniline	10	ND - 8.6 D
Aniline	10	ND - 8.6 D
Methanol	10	ND
Acetone	10	ND

Notes:
1. ND = Not detected above laboratory detection limit.
2. D = Concentration based on diluted sample analysis.
3. J = estimated value, detected but below the practical quantitation limit.

4.0 - Summary

The results of the soil verification sampling indicated that the unsaturated soils which comprise OU1 were successfully treated using the in-situ bioremediation remedy. The data presented in Table 3 indicates that the residual concentrations of COCs present in the unsaturated soils following treatment were significantly less than the NYSDEC-approved cleanup levels.

The data presented in Table 1 - Process Control Monitoring Data, indicated that the unsaturated soils were maintained at conditions that would promote microbiological activity throughout the treatment process. Maintaining the optimum soil conditions manifested itself in increased microbiological activity that was maintained throughout the in-situ bioremediation process. This increased and sustained microbiological activity is indicated by the results of the soil gas analyses (see Table 2 - Soil-Gas Data) as well as the heterotrophic and hydrocarbon degrading bacterial growth curves that were presented in Figures 4 through 11. In particular, the sustained increase in hydrocarbon degrading bacteria and the increases in the percentage of carbon dioxide following a soil mixing event indicate that microbial respiration was occurring and that the carbon sources in the unsaturated soil were being oxidized. This indicates that the increased microbiological activity was the primary mechanism for reducing the concentration of the COCs in the unsaturated soils.

Detectable concentrations of the COCs were detected in ground-water samples collected from monitoring wells MW-11D and MW-11S (which were installed to replace piezometers PZ11D and PZ11S). These monitoring wells are located approximately 30 feet within the property boundary. Monitoring wells MW-24D and MW-24S, which are located off-property, approximately 60 feet downgradient of MW-11D and MW-11S, and are screened in the same general hydrogeologic interval as MW-11D and MW-11S, did not contain any detectable concentrations of the COCs. No other ground-water samples collected during the December 1994 ground-water sampling event contained detectable concentrations of the COCs. Therefore, based on the review of the analytical data for the first round of semi-annual ground-water sampling and

analysis program the COCs detected in on-site ground water have not migrated beyond the downgradient property boundary.

5.0 - Engineering Certification

ENGINEER'S CERTIFICATION

MCKESSON ENVIROSYSTEMS
BEAR STREET FACILITY
SYRACUSE, NEW YORK

OPERABLE UNIT NO. 1 - UNSATURATED SOILS

I hereby certify, as a Professional Engineer registered in the State of New York, that based on our observation of site activities and an assessment of the post-remediation data, that the remediation activities conducted at the McKesson Envirosystems, Bear Street Facility for Operable Unit No. 1 - Unsaturated Site Soils, have been completed in accordance with the procedures and criteria presented in the following documents, with the exceptions noted herein:

- "Record of Decision, McKesson Envirosystems, Inactive Hazardous Waste Site, Operable Unit No. 1, Syracuse, Onondaga County, New York, Site No. 07-34-020," dated March 1994; and
- "Remedial Design/Remedial Action Work Plan, Operable Unit No. 1, Unsaturated Site Soils," dated May 1994 and subsequently modified by the NYSDEC (approved by the NYSDEC on May 20, 1994).

I also certify that I, or a person under my direct supervision, observed the performance of the remediation activities and that the contents of the "Remedial Design/Remedial Action Report, Operable Unit No. 1, Unsaturated Site Soils, McKesson Envirosystems, Bear Street Facility, Syracuse, New York," dated July 1995, accurately represents the remediation activities that were conducted.

By: Edward R. Lynch Date: 9/20/95

Edward R. Lynch, P.E.
Executive Vice President

Registration Number: 057526

New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau of Hazardous Site Control, Room 252
50 Wolf Road, Albany, New York 12233-7010
Phone: (518) 457-8807 FAX: (518) 457-8989

John P. Cahill
Commissioner

MEMORANDUM

TO:
- T. Reamon — Investigation Section, Remedial Bureau (Cl. 2 only)
- C. Branagh — Regional Hazardous Waste Remediation Engineer
- G. Rider, O&M Section (As needed)
- A. Grant, DEE
- A. Carlson, DOH, Bureau of Environmental Exposure Investigation

FROM: Robert L. Marino, Chief, Site Control Section

SUBJECT: Review of Classification Package for Site # 734020

DATE: April 14, 2000

McKesson Envirosystems
2 → 4

The attached new "Registry Site Investigation Information Form" with supporting documentation is attached for your review and approval.

If acceptable, sign at the bottom of the form (Box #17) and return within 30 calendar days.

If unacceptable, please return with an explanation of your position in a separate memo or letter.

An important part of your review should include modifying, if necessary, the statement in Block 11 (Conclusion) for Classification Decision of the Investigation Form so that it can be used in all appropriate notification documents (i.e., ENB, owner and adjacent property owner notification letters, and newspaper legal notice).

Please keep the supporting documentation for your records.

Attachment(s)

SS7 Crample

Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision

McKesson Envirosystems Site
Syracuse (C), Onondaga County
Site Number 7-34-020
Operable Unit No. 2

March 1997

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* JOHN P. CAHILL, *Acting Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

McKesson Envirosystems Inactive Hazardous Waste Site
Operable Unit No. 2 - Saturated Soils and Groundwater
Syracuse (C), Onondaga County, New York
Site No. 7-34-020

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedial action for the McKesson Envirosystems inactive hazardous waste disposal site, Operable Unit No. 2, which was chosen in accordance with the New York State Environmental Conservation Law (ECL). The remedial program selected is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300).

This decision is based upon the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the McKesson Envirosystems Inactive Hazardous Waste Site and upon public input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A bibliography of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Assessment of the Site

Actual or threatened release of hazardous waste constituents from this site, if not addressed by implementing the response action selected in this ROD, presents a current or potential threat to public health and the environment.

Description of Selected Remedy

Based upon the results of the Remedial Investigation/Feasibility Study (RI/FS) for the McKesson Envirosystems Site and the criteria identified for evaluation of alternatives, the NYSDEC has selected In-Situ Anaerobic Bioremediation.

The remedy involves installation of an infiltration trench and a withdrawal trench upgradient and downgradient, respectively, of the portions of the site identified as Areas 1, 2 and 3 on Figure 3 (see page 12). Groundwater from the withdrawal trenches will be amended, as necessary, with nutrients prior to discharge to the upgradient infiltration trench. The infiltration trench will facilitate distribution of the amended groundwater to enhance the naturally occurring anaerobic biodegradation of the contaminants of concern (COCs). Shallow well points will also be installed

within each of the impacted areas for the purpose of distributing small quantities of amended groundwater, thus augmenting the system. As a component of the site operation and maintenance (O&M) program, a process control monitoring program will be instituted which will allow the effectiveness of the selected remedy to be monitored. Upon discontinuation of system operations, estimated to be about five years subsequent to system initiation, a post-remedial monitoring program will be established.

New York State Department of Health Acceptance

The New York State Department of Health concurs with the remedy selected for this site as being protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

3/19/97
Date

Michael J. O'Toole, Jr., Director
Division of Environmental Remediation

RECORD OF DECISION

McKesson Envirosystems
Operable Unit No. 2 - Saturated Soils and Groundwater
Syracuse (C), Onondaga County, New York
Site No. 7-34-020
March 1997

SECTION 1: SITE LOCATION AND DESCRIPTION

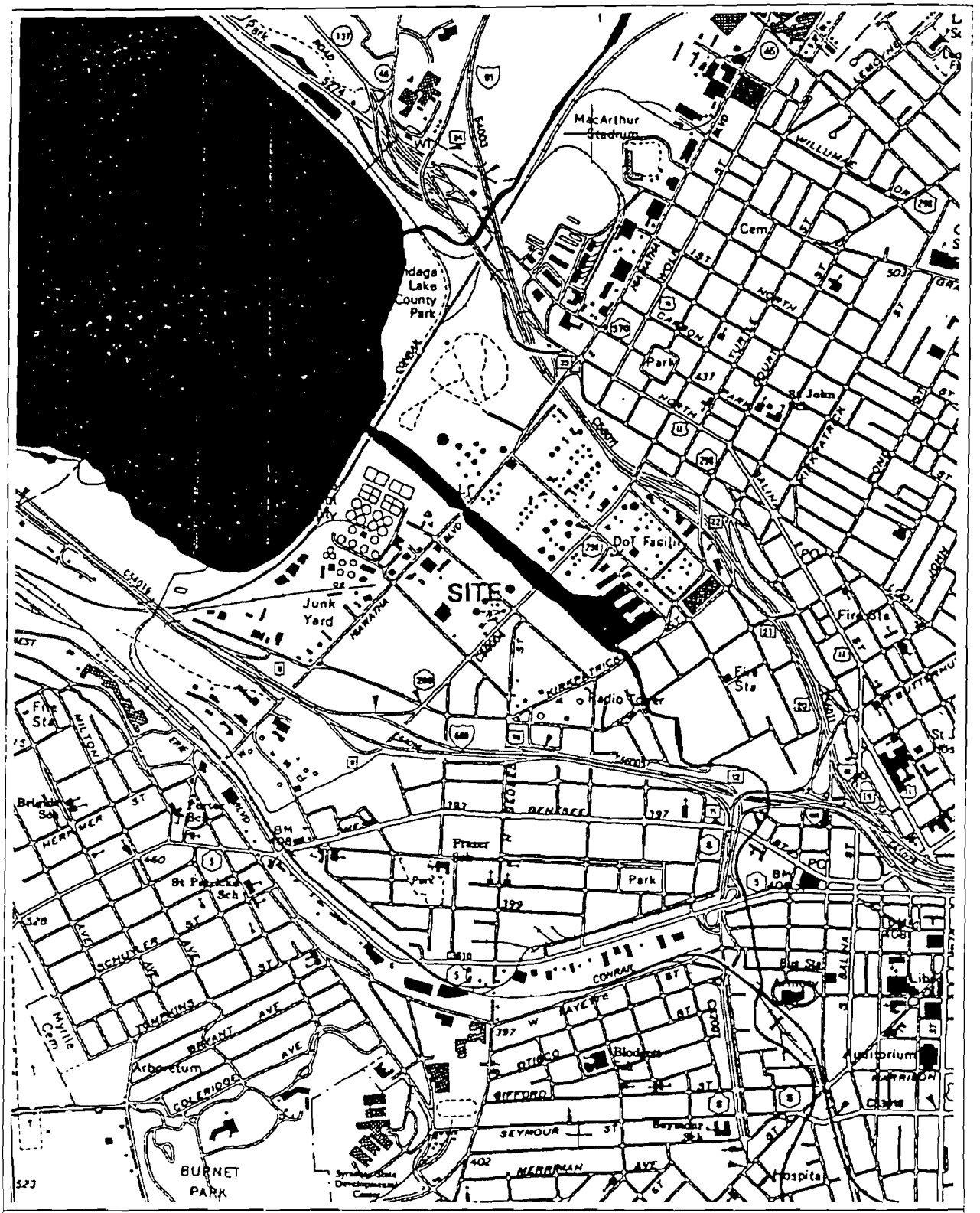
The McKesson Envirosystems Site is located in the City of Syracuse to the south of Onondaga Lake, adjacent to the west bank of the New York State Barge Canal Terminal channel. The site was formerly used for bulk storage of petroleum products and in later years, as storage for a variety of chemical waste streams. The site is approximately 8.8 acres in size and is separated by Van Rensselaer Street into two parcels (Figure 1). The parcel north of Van Rensselaer Street is within 150 feet of the Barge Canal. The largest of the former aboveground storage tanks (Tank 7) was located on this portion of the site. The majority of previous material storage and handling took place in the area south of Van Rensselaer Street, where ten former aboveground storage tanks were located.

The site is within one-quarter mile of Onondaga Lake, which is a major surface water body in the greater Syracuse area. Land use in the surrounding area is characterized as industrial/light industrial, being on the edge of the "Oil City" area of Syracuse, although there are current plans for significant non-industrial development in this area. Like the surrounding land, the McKesson property is zoned for industrial use.

The site is generally flat with a grass cover. It is fenced and access is restricted to authorized persons only.

Investigations have revealed that past site operations resulted in significant soil and groundwater contamination. Operable Unit No. 2, which is the subject of this PRAP, consists of the saturated soils (soils located below the groundwater table) and the groundwater beneath areas of the site. An Operable Unit represents a portion of the site remedy which for technical or administrative reasons can be addressed separately to eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. Another operable unit, Operable Unit No. 1 (OU-1) - the Unsaturated Soils, was the subject of a 1994 Record of Decision. The remedial work for OU-1 was completed in 1995 (ref. Section 2.2).

TABLE OF CONTENTS



Site Location Map

734020 McKesson Envirosystems (Inland Site)

NYSDOT Planimetric Quadrangle(s):

FIGURE 1

SECTION 2: SITE HISTORY

2.1: Operational/Disposal History

1920's: Occupied by various salt companies.

1928-1969: Petroleum Storage Facility (ARCO), Tanks 1-6 (South Parcel)

1951: Tank 7 installed (North Parcel)

1969-1973: Petroleum Storage Facility BP Oil Company (BP)

1973: Inland Chemical Corporation (ICC) purchases site from BP Oil Company for recycling waste streams and chemical storage including: methanol, methylene chloride and other solvents.

1982: ICC operations discontinued.

2.2: Remedial History

1980: ICC filed a Part A Permit Application for interim status as a hazardous waste storage facility under the Resource Conservation Recovery Act (RCRA).

1987: Revised part A application for closure submitted to NYSDEC. Remediation Consent Order signed 6/10/87.

1988: McKesson Corporation submitted a RCRA closure plan entitled "Verification of Aboveground Storage Tank Decontamination Protocol" to NYSDEC.

1989: RCRA Closure certification is submitted to NYSDEC. Aboveground tanks removed from the site.

1990: Notification from NYSDEC that facility was officially closed and that corrective actions would proceed under the Remediation Consent Order which was amended to include both McKesson Corporation and Safety-Kleen Environsystems Company as Respondents.

The Final Remedial Investigation Report was issued in April 1990. The RI revealed significant soil and groundwater contamination. A PAH Distribution Report was issued at the same time.

1992: A residential Risk Assessment and FS Screening of Alternatives were completed.

1993: A Soil Bioremediation Pilot study was conducted at the site using both in-situ and ex-situ techniques. A Feasibility Study and results of the Pilot Study were completed for OU-1, the Unsaturated Soils.

March 1994: A Record of Decision for Operable Unit No. 1 (OU-1), the Unsaturated Soils, was issued by the NYSDEC. The selected remedy was In-Situ Aerobic Bioremediation.

May 1994: An RD/RA Work Plan was developed and approved and remedial work was initiated for OU-1.

September 1995: The NYSDEC approved the RD/RA Report and declared the remedy for OU-1 complete.

September 1996: The PRP completed a "Supplemental Saturated Soil and Groundwater Investigation" in anticipation of the FS for OU-2.

December 1996: The NYSDEC approved the FS for OU-2.

January 1997: The NYSDEC released the PRAP for OU-2.

SECTION 3: CURRENT STATUS

In response to a determination that the presence of hazardous waste at the site presents a significant threat to human health and the environment, the McKesson Corporation has completed a Remedial Investigation/Feasibility Study (RI/FS).

3.1: Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The RI was conducted in 1988 and 1989. A report entitled *Final Remedial Investigation Report, April 1990,* has been prepared describing the field activities and findings of the RI in detail. To update existing data regarding the distribution of COCs in the saturated soil and groundwater, a supplemental investigation of saturated soil and groundwater was planned and initiated in 1995. This work was conducted as a preliminary component of the FS for Operable Unit No. 2. A report entitled *Supplemental Saturated Soil and Groundwater Investigation Report, Operable Unit No.2 - Saturated Soil and Groundwater, September 1996,* has been prepared describing the field activities and findings of the investigation in detail. The investigation tasks and findings are discussed below.

The RI activities consisted of the following:

- Installation of 136 soil borings
- Installation of 13 piezometer clusters
- Installation of 22 monitoring wells and related groundwater sampling
- Collection of 159 soil samples

The Supplemental Investigation field activities consisted of the following:

- Installation of 31 temporary well points and related groundwater sampling
- Installation of 7 monitoring wells and related groundwater sampling
- EM-39 geophysical "downhole" logging of 4 monitoring wells

To determine which media (soil, groundwater, etc.) contain contamination at levels of concern, the RI analytical data was compared to environmental Standards, Criteria, and Guidance (SCGs). Groundwater, drinking water and surface water SCGs identified for the McKesson Site were based on NYSDEC Ambient Water Quality Standards and Guidance Values and Part V of NYS Sanitary Code. NYSDEC TAGM 4046 soil cleanup guidelines for the protection of groundwater, background conditions, and risk-based remediation criteria were used as SCGs for soil.

Based upon the results of the remedial investigation in comparison to the SCGs and potential public health and environmental exposure routes, certain areas of the site require remediation. These are summarized below. More complete information can be found in the RI Report and the Supplemental Investigation Report.

Chemical concentrations are reported in parts per billion (ppb) and parts per million (ppm). For comparison purposes, SCGs are given for each medium.

3.1.1 Nature of Contamination:

As described in the RI Report and Supplemental Report, many soil and groundwater samples were collected at the site to characterize the nature and extent of contamination.

The primary contaminants detected at this site are those associated with past storage activities. These include various volatile and semi-volatile compounds. The investigations have identified that the contaminants of concern (COCs) at this site are: methylene chloride, trichloroethene, benzene, toluene, ethylbenzene, xylene, N,N-dimethylaniline, aniline, methanol and acetone.

3.1.2 Extent of Contamination

Table 1 summarizes the extent of contamination for the contaminants of concern and compares the data with the proposed remedial action levels (SCGs) for the site. The following is a summary of the findings of the investigations for these media.

Soils

The soil stratigraphy is relatively consistent across the site. The surface fill material consists of the unsaturated soil addressed by the OU-1 remedy and the overlying sand and gravel cover placed as a component of the remedy. The surface fill is underlain by silt and clay ranging in depth from approximately 8 to 15 feet below ground surface (bgs), followed by a layer of sand and silt from approximately 15 to 22 feet bgs. A silt and clay lacustrine deposit is present across the entire site at approximately 22 to 24 feet bgs. Underlying the lacustrine silt and clay are varying compositions of sand and gravel to approximately 62 feet bgs.

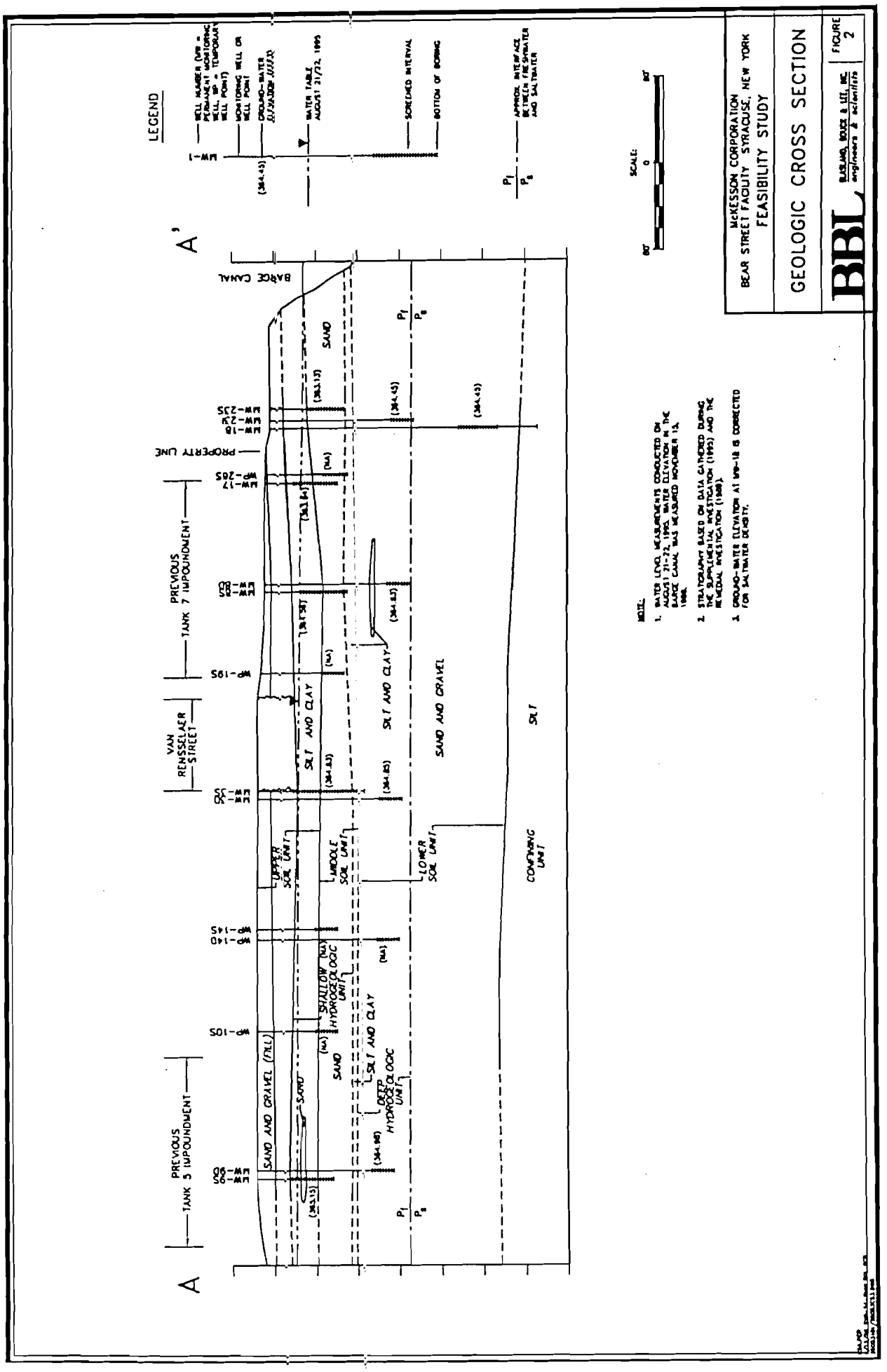
Sampling of the site soils during the RI revealed the presence of the above-mentioned COCs. In general, the COCs were detected near the former materials loading area and the former locations of the aboveground storage tanks. The RI sampling program, however, focused on the unsaturated soils which, as discussed, have since been remediated.

The investigation of the saturated zone, the subject of this operable unit, relied on analysis of groundwater. Since the groundwater and any associated contamination are coincident with the saturated soils, the findings of the investigation of this zone are discussed below.

Groundwater

Two hydrogeological units have been identified at this site. The lacustrine deposit separates a shallow hydrogeologic unit (15-22 feet bgs) from a deep hydrogeologic unit (24-62 feet bgs). This deposit appears to be a semi-confining unit which limits the vertical migration of groundwater between the two hydrogeologic units. Both the shallow and deep horizontal groundwater flow directions are generally to the northeast, toward the Barge Canal. Figure 2 illustrates the site hydrogeology.

The groundwater quality results indicate the presence of chemical compounds at concentrations above groundwater quality standards (ref. Table 1). The identified chemicals in groundwater are: methylene chloride, trichloroethene, benzene, toluene, ethylbenzene, xylenes, N,N-dimethylaniline, aniline, trans-1,2-dichloroethene, methanol, and acetone. Groundwater data from the RI, the Supplemental Sampling program and semi-annual monitoring events indicate that COCs, though present in on-site groundwater have not, with only one exception (aniline at 7 ppb), migrated beyond the site property boundaries. This off-site contaminant "hit" was detected during the August 1996 semi-annual sampling event.


LEGEND
WELL NUMBER (MW - PERMANENT MONITORING WELL, BP - TEMPORARY WELL POINT)
MONITORING WELL OR WELL POINT
GROUND-WATER ELEVATION (FEET)
WATER TABLE, AUGUST 21/22, 1995
SCREENED INTERVAL
BOTTOM OF BORING
APPROX. INTERFACE BETWEEN FRESHWATER AND SALTWATER
SCALE:
0
80'
A
A'
BARGE CANAL
PROPERTY LINE
PREVIOUS TANK 7 IMPOUNDMENT
PREVIOUS TANK 5 IMPOUNDMENT
VAN RENSSELAER STREET
SAND AND GRAVEL (FILL)
SAND
SILT AND CLAY
SAND
SILT AND CLAY
SAND AND GRAVEL
SILT
UPPER SOIL UNIT
MIDDLE SOIL UNIT
LOWER SOIL UNIT
SHALLOW HYDROGEOLOGIC UNIT
DEEP HYDROGEOLOGIC UNIT
CONFINING UNIT
MW-1
MW-2S
MW-2D
MW-2SS
MW-3S
MW-3D
MW-4S
MW-4D
MW-5S
MW-5D
MW-6S
MW-6D
MW-7S
MW-7D
MW-8S
MW-8D
MW-9S
MW-9D
MW-10S
MW-10D
MW-11S
MW-11D
MW-12S
MW-12D
MW-13S
MW-13D
MW-14S
MW-14D
MW-15S
MW-15D
MW-16S
MW-16D
MW-17S
MW-17D
MW-18S
MW-18D
MW-19S
MW-19D
MW-20S
MW-20D
MW-21S
MW-21D
MW-22S
MW-22D
MW-23S
MW-23D
MW-24S
MW-24D
MW-25S
MW-25D
NOTE:
1. WATER LEVEL MEASUREMENTS CONDUCTED ON AUGUST 21-22, 1995. WATER ELEVATION IN THE BARGE CANAL WAS MEASURED NOVEMBER 13, 1995.
2. STRATIGRAPHY BASED ON DATA GATHERED DURING THE SUPPLEMENTAL INVESTIGATION (1995) AND THE REMEDIAL INVESTIGATION (1988).
3. GROUND-WATER ELEVATION AT MW-18 IS CORRECTED FOR SALTWATER DENSITY.
McKESSON CORPORATION
BEAR STREET FACILITY SYRACUSE, NEW YORK
FEASIBILITY STUDY
GEOLOGIC CROSS SECTION
BBL
FIGURE 2

While recent information may indicate limited migration of contamination toward the Barge Canal, recent groundwater information (Supplemental Investigation) also supports that the concentration and areal distribution of COCs in groundwater appears to have decreased in comparison to historic (RI) data. Also, the data supports that contamination is generally confined to the shallow hydrogeologic unit. This was evidenced by the lack of groundwater standard contravention in samples from the deep well points installed during the Supplemental Investigation. Furthermore, within the deeper hydrogeologic unit there is a freshwater/saltwater interface. This interface exists at a depth of approximately 35 feet bgs. The groundwater in this deeper unit has historically been unusable for drinking because of its high chloride concentrations.

The shallow hydrogeologic unit, therefore, is the subject of this operable unit. As described above, this unit consists of two distinct soil layers, a silt and clay layer and an overlying sand layer.

Investigations have identified that the highest concentration and areal distribution of COCs in saturated soil and groundwater at this site are associated with three distinct on-site areas within the shallow hydrogeologic unit. Two of these "impacted areas" are located on the south parcel, in the vicinity of temporary well point locations WP-7S and WP-12S ("Area 1" and "Area 2", respectively). A third area is located on the north parcel in the vicinity of monitoring well cluster MW-8 ("Area 3"). Based on these findings, the potential remedies evaluated in the FS focused on these "impacted areas" (ref. Figure 3).

Groundwater data for the chemicals of concern are presented in Table 1 (page 22).

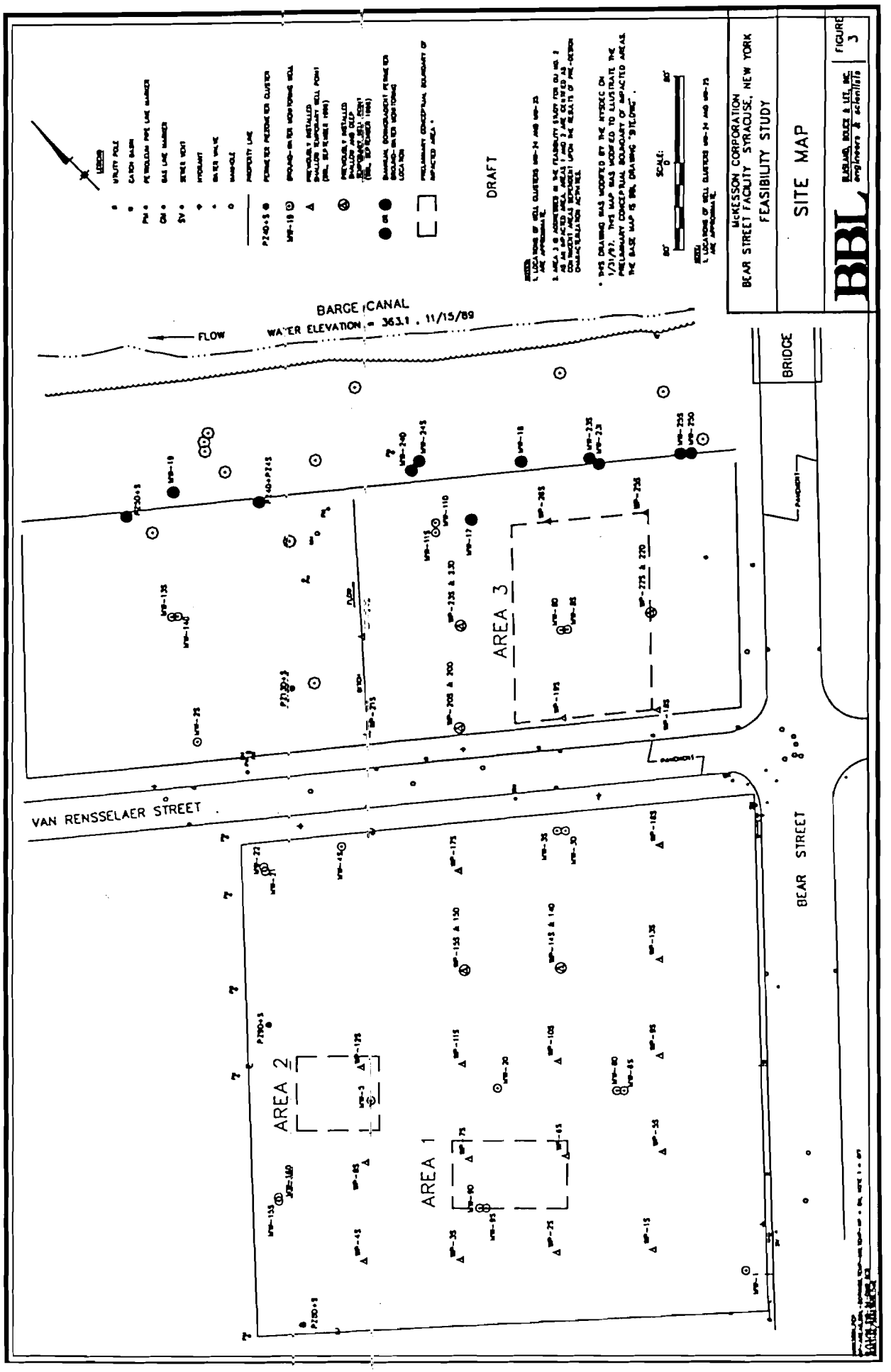
3.2 Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the potential health risks can be found in the RI Report.

An exposure pathway is the route by which an individual comes into contact with a contaminant. The five elements of an exposure pathway are 1) the source of contamination; 2) the environmental medium and transport mechanisms; 3) the point of exposure; 4) the route of exposure; and 5) the receptor population. These elements of an exposure pathway may be based on past, present, or future events. Completed pathways which are known to or may exist at the site in the future include:

- Dermal contact with groundwater by construction workers during possible future excavation activities;

- Inhalation of COCs volatilized from groundwater or potential ingestion of groundwater, should the site be redeveloped;


DRAFT
McKESSON CORPORATION
BEAR STREET FACILITY SYRACUSE, NEW YORK
FEASIBILITY STUDY
SITE MAP
BBL
FIGURE 3
BARGE CANAL
WATER ELEVATION = 363.1 , 11/15/89
FLOW
BRIDGE
VAN RENSSELAER STREET
BEAR STREET
AREA 1
AREA 2
AREA 3

3.3 Summary of Environmental Exposure Pathways:

This section summarizes the types of environmental exposures which may be presented by the site. The Habitat Based Assessment included in the RI presents a more detailed discussion of the potential impacts from the site to fish and wildlife resources. The following pathways for environmental exposure have been identified:

- Potential for contaminants leaching into groundwater and then discharging into Barge Canal/ Onondaga Creek and thence to Onondaga Lake.

SECTION 4: ENFORCEMENT STATUS

The NYSDEC and the McKesson Corporation entered into a Consent Order on June 10, 1987. The Order obligates the responsible parties to implement a full remedial program. The order was amended on May 9, 1990 to incorporate Safety Kleen Environsystems Company as a PRP. Under the terms of the order, the PRPs will implement the remedy selected for this operable unit by the Record of Decision.

The following is the chronological enforcement history of this site.

Date	Index No.	Order Subject
6/10/87	R7-0766-84-03	Remedial Program
5/09/90	R7-0766-84-03	Amended Rem. Prog.

SECTION 5: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. The overall remedial goal is to meet all Standards, Criteria, and Guidance (SCGs) and be protective of human health and the environment.

At a minimum, the remedy selected should eliminate or mitigate all significant threats to public health and to the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The goals selected for this site are:

- Reduce, control, or eliminate the concentrations of COCs present within the saturated soils at the McKesson Corporation Bear Street Facility;

- Attain the NYSDEC Class GA Groundwater Quality Standards, to the extent practicable, for the COCs present in onsite groundwater; and

- Mitigate the potential for migration beyond the site boundary of groundwater that contains concentrations of COCs in excess of their respective NYSDEC Class GA Groundwater Quality Standard.

SECTION 6: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy should be protective of human health and the environment, be cost effective, comply with other statutory laws and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the McKesson Envirosystems site were identified, screened and evaluated in a Feasibility Study. This evaluation is presented in the report entitled *Feasibility Study for Operable Unit No. 2 - Saturated Soils and Groundwater, January 1997.*

A summary of the detailed analysis follows. As used in the following text, the time to implement reflects only the time required to implement the remedy (e.g. estimated duration of system operation), and does not include the time required to design the remedy, procure contracts for design and construction or to negotiate with responsible parties for implementation of the remedy.

6.1: Description of Alternatives

The potential remedies are intended to address the contaminated saturated soils and groundwater at the site.

Alternative 1
No Action

The no action alternative is evaluated as a procedural requirement and as a basis for comparison. It requires continued monitoring only, allowing the site to remain in an unremediated state. This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment.

Alternative 2
Limited Action

Present Worth:	$257,000
Capital Cost:	$3,000
Annual O&M:	$16,500
Time to Implement	6 months

This alternative also would not include remedial actions to address the COCs present within the saturated soils and groundwater at the site, and would rely on natural attenuation processes to attain the remedial goal and RAOs identified for OU No. 2. This alternative, however, would include long-term groundwater monitoring to document groundwater quality.

Alternative 3
In-Situ Anaerobic Bioremediation

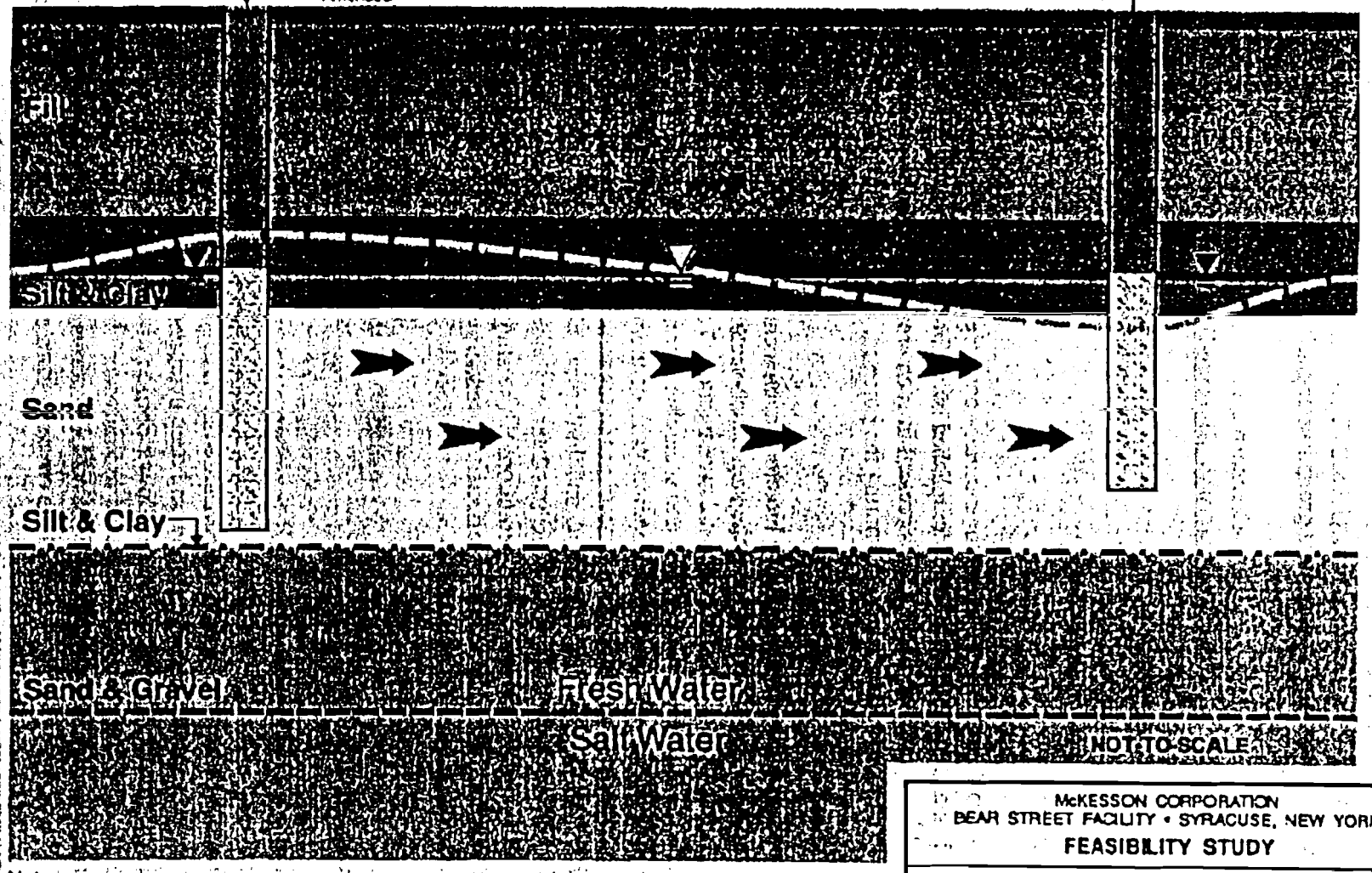
Present Worth:	$1,401,000
Capital Cost:	$844,000
Annual O&M:	$107,900
Time to Implement	5 years

This alternative would involve enhancing the naturally occurring anaerobic biodegradation process at Area Nos. 1, 2 and 3. This would be accomplished by adding nutrients to stimulate and increase the anaerobic biodegradation of the COCs present in each area. The process would function in a hydraulically-contained system, thus eliminating the potential for migration of contaminants from these areas.

To evaluate the feasibility of implementing bioremediation techniques to address the COCs present in the saturated soils and groundwater at the site, bench-scale biological treatability studies were conducted as a component of the Supplemental Investigation. The primary objective of these studies was to evaluate the effectiveness of aerobic and anaerobic bioremediation treatment in reducing the concentration of COCs present in these media. Each of the techniques involves stimulating the natural biological/microbial activity that is occurring in the saturated soils and groundwater on site. The treatability study involved chemical and biological characterization of these media by evaluating the effects of various amendments (methane, hydrogen peroxide, phosphorous, nitrogen, etc.) under both aerobic and anaerobic conditions. The study concluded that both aerobic and anaerobic treatment techniques could be effective at reducing the mass of COCs present, under appropriate conditions.

The specific components which would be included in this alternative, In-Situ Anaerobic Bioremediation, are as follows:

- Installing an infiltration trench and a withdrawal trench upgradient and downgradient, respectively, in Area Nos. 1, 2 and 3. These trenches would be installed within the shallow hydrogeologic unit, but would not penetrate the underlying silt and clay lacustrine deposit, which appears to separate the shallow and deep hydrogeologic units. The infiltration trench would be installed in the sand layer (lower portion of the shallow hydrogeologic unit) to facilitate distribution of the amended groundwater to enhance the naturally occurring anaerobic biodegradation of COCs. The actual locations and configurations of these trenches would be determined based on the data obtained from pre-design activities (ref. Figure 4).



Note:
The upper portion of the silt and clay layer was addressed during the remediation of OU No. 1.

McKESSON CORPORATION
BEAR STREET FACILITY • SYRACUSE, NEW YORK
FEASIBILITY STUDY

Conceptual Closed-Loop Hydraulic Cell

BBL BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE 4

- Withdrawing groundwater from the withdrawal trenches and amending the recovered groundwater, as necessary, with macro-nutrients (e.g., phosphorous, nitrogen) and Revised Anaerobic Mineral Media (RAMM) micro-nutrients (i.e., sulfate, iron(III)) prior to infiltration into the shallow hydrogeologic unit. These nutrients are among those which were evaluated and shown to be effective at stimulating biological growth during the bench-scale treatability study.

- Installing shallow well points in the silt and clay layer of the impacted areas (upper portion of the shallow hydrogeologic unit), for the purposes of distributing small quantities of amended groundwater and to provide locations to monitor the effectiveness of the groundwater withdrawal/infiltration system.

This alternative would also include long-term groundwater monitoring to document groundwater quality, monitor biological activity, and determine any migration of COCs beyond the downgradient perimeter at concentrations in excess of the NYSDEC Class GA Groundwater Quality Standards.

Alternative 4
In-Situ Aerobic and Anaerobic Bioremediation

Present Worth:	$1,922,000
Capital Cost:	$995,000
Annual O&M:	$193,000
Time to Implement	5 years

This alternative would involve the enhancement of naturally occurring microorganisms present in the saturated soils/groundwater of the sand layer located within the shallow hydrogeologic unit. While the permeable nature of the sand layer is conducive to an aerobic system, the relatively "tight" nature of the silt and clay layer is undesirable for such a system. Therefore, this alternative would consist of a dual aerobic/anaerobic approach. This would be accomplished by adding nutrients and dissolved oxygen to stimulate the degradation of COCs in the impacted areas of the site, to change the anaerobic system that currently exists within the sand (lower portion of the shallow hydrogeologic unit) unit into an aerobic system. In addition, nutrient-enriched groundwater would be introduced into the silt and clay layer (upper portion of the shallow hydrogeologic unit) to enhance the naturally occurring anaerobic biodegradation of the COCs in each impacted area. The specific components of In-Situ Aerobic and Anaerobic Bioremediation would include:

- Installing an infiltration trench and a withdrawal trench upgradient and downgradient, respectively, in the impacted areas similar to the trenches described under Alternative 3. As with Alternative 3, the actual locations and configurations of these trenches would be determined based on the data obtained from pre-design activities;

- Withdrawing groundwater from the withdrawal trenches and amending the recovered groundwater with macro-nutrients (e.g., phosphorous, nitrogen) and hydrogen peroxide (a source for dissolved oxygen) prior to infiltration into the sand layer (only) of the shallow hydrogeologic unit. Hydrogen peroxide had a demonstrated effectiveness during the treatability study, in supplying the oxygen necessary for aerobic bioremediation.

- Installing shallow well points in the silt and clay layer of the impacted areas for the purpose of distributing small quantities of RAMM-amended groundwater to promote anaerobic degradation of the COCs as well as and to provide locations to monitor the effectiveness of the anaerobic bioremediation system.

This alternative would also include long-term groundwater monitoring to document groundwater quality, monitor biological activity, and determine any migration of COCs beyond the downgradient perimeter at concentrations in excess of the NYSDEC Class GA Groundwater Quality Standards.

Alternative 5
Ex-Situ Aerobic Soil Bioremediation and In-Situ Anaerobic Bioremediation

Present Worth:	$3,155,000
Capital Cost:	$2,741,000
Annual O&M:	$78,400
Time to Implement	5 years

This alternative would involve excavating impacted soils from within the silt and clay layer (upper portion of the shallow hydrogeologic unit) at the impacted areas. The estimated average depth of the excavations would be approximately 18 feet bgs. Excavated soils would be treated on site using aerobic biological techniques to reduce the concentrations of COCs to less than the NYSDEC site-specific soil cleanup guidelines. In conjunction with the ex-situ treatment program, to address the COCs present in the sand layer (lower portion of the shallow hydrogeologic unit), naturally occurring anaerobic biodegradation processes would be enhanced. This would be accomplished by adding nutrients to stimulate and increase the biodegradation of the COCs as described above for Alternative 3. The specific components of this remedial approach would include:

- Excavating impacted soils from within the silt and clay layer (shallow hydrogeologic unit) at the impacted areas. The estimated average depth of the excavations would be approximately 18 feet bgs. Excavated soils would be treated on site using aerobic biological techniques to reduce the concentrations of COCs to less than the NYSDEC approved soil cleanup levels used for OU No. 1 - the Unsaturated Soils;

- The aerobic biological treatment technique would consist of mechanically blending the excavated soils to enhance the growth and activity of naturally occurring microorganisms that use the COCs as a source of carbon and energy, to convert the COCs to carbon dioxide

and water. The soils would be blended in a treatment unit that would be constructed on site. Upon confirmation that soil cleanup levels had been met, treated soils would be backfilled on site.

- To address the COCs present in the sand layer (lower portion of the shallow hydrogeologic unit) this alternative would involve enhancing the naturally occurring anaerobic biodegradation processes at each of the impacted areas. Enhancement of the naturally occurring anaerobic biodegradation processes would be accomplished by adding nutrients to stimulate and increase the biodegradation of the COCs present in these areas. This could be accomplished by adding nutrients directly into the open excavation or by implementing the specific components for in-situ bioremediation, as described above for Alternative 3, with the following exceptions: The infiltration and extraction trenches would not be installed in the impacted areas, because the silt and clay layer within the shallow hydrogeologic unit would be addressed by the excavation and ex-situ bioremediation treatment activities described above. Instead, vertical extraction and infiltration wells would be installed downgradient and upgradient, respectively, of the impacted areas. These wells would be screened in the sand layer. Groundwater from the sand layer would be extracted from the downgradient vertical extraction wells and amended with anaerobic nutrients (e.g., RAMM) prior to infiltration into the sand layer using the upgradient wells. The specific method(s) for enhancing the naturally occurring anaerobic biodegradation process would be determined during the remedial design using the information obtained during the pre-design characterization activities.

This alternative would also include long-term groundwater monitoring to document groundwater quality and to determine any migration of COCs beyond the downgradient perimeter at concentrations in excess of the NYSDEC Class GA Groundwater Quality Standards.

6.2 Evaluation of Remedial Alternatives

The criteria used to compare the potential remedial alternatives are defined in the regulation that directs the remediation of inactive hazardous waste sites in New York State (6NYCRR Part 375). For each of the criteria, a brief description is provided followed by an evaluation of the alternatives against that criterion. A detailed discussion of the evaluation criteria and comparative analysis is contained in the Feasibility Study.

1. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance.

All of the remedial alternatives would be designed and implemented to meet action-specific SCGs, however, the no-action and limited action alternatives include no measures to address contravention

of pertinent standards, should this occur. The remaining remedial alternatives would comply with pertinent SCGs.

2. Protection of Human Health and the Environment. This criterion is an overall evaluation of the health and environmental impacts to assess whether each alternative is protective.

All of the alternatives would provide for a reduction in the concentrations of COCs present in OU No.2, though no-action and limited-action would rely on natural attenuation. Natural attenuation would take years and off-site migration, which has now been evidenced, could impose increased threats to public health and the environment. The in-situ bioremediation alternatives (Alternatives 3 and 4) and the ex-situ soil bioremediation and in-situ anaerobic bioremediation alternative (Alternative 5) would provide better protection of the environment by providing a greater reduction in the total mass of COCs present in OU No. 2. However, implementation of Alternative 5 would pose greater potential impacts during the excavation and ex-situ treatment of impacted soils.

The next five "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

All of the remedial alternatives, except for the no-action alternative and the limited-action alternative, involve the excavation and handling of impacted soils. However, the excavation activities that would be implemented under Alternative 5 are much more extensive and present a higher potential for short-term risks to on-site workers and the community during implementation. For this alternative, a greater degree of mitigative measures would need to be implemented to control potential short-term environmental impacts to ambient air quality associated with off-site dust migration and volatilization of the chemicals of concern.

4. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the controls intended to limit the risk, and 3) the reliability of these controls.

The no-action alternative and limited-action alternative may not meet the RAOs for OU No. 2. Neither of these alternatives include any remedial activities to address the COCs present within OU No. 2. These alternatives rely on natural attenuation processes to meet the RAOs. The remaining remedial alternatives would meet the RAOs for the site within an estimated five year period. In the

interim, the groundwater treatment system(s) would serve to contain the contaminated groundwater, mitigating the potential for off-site migration.

5. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

The no-action and limited-action alternatives rely on natural attenuation processes to reduce the toxicity, mobility, or volume of the COCs present within OU No. 2. The remaining remedial alternatives would reduce the toxicity, mobility, and volume of the COCs through treatment. In addition, because the treatment system(s) would be hydraulically contained, concerns relative to off-site migration of contamination (i.e. contaminant mobility) during the remedy, would be allayed.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc.

All of the remedial alternatives are technically feasible and can be implemented at the site. Alternatives 4 and 5 require a greater degree of coordination than Alternative 3, however, which relies on a single, in-place treatment system. Alternative 4 involves two distinct biological systems. This would entail additional monitoring and maintenance and therefore, increased cost. Alternative 5, likewise, in light of the in-situ and ex-situ technologies, would require greater engineering, monitoring and maintenance. Further, implementation of the ex-situ aerobic bioremediation component of Alternative 5 would present numerous issues due to the potential site of the excavations, including volatilizing COCs during excavation activities, maintaining the stability of the excavation sidewalls, and potentially spreading the distribution of COCs (e.g. during the installation of sheet piling).

7. Cost. Capital and operation and maintenance costs are estimated for each alternative and compared on a present worth basis. Although cost is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the remaining criteria, cost effectiveness can be used as the basis for the final decision. The costs for each alternative are presented in Table 2.

This final criterion is considered a modifying criterion and is taken into account after evaluating those above. It is focused upon after public comments on the Proposed Remedial Action Plan have been received.

8. **Community Acceptance** - Concerns of the community regarding the RI/FS reports and the Proposed Remedial Action Plan have been evaluated. The "Responsiveness Summary", included as Appendix A, presents the public comments received and the Department's response to the concerns raised. No significant public comments were received.

SECTION 7: SUMMARY OF THE SELECTED REMEDY

Based upon the results of the RI/FS, and the evaluation presented in Section 6, the NYSDEC is selecting **Alternative 3, In-Situ Anaerobic Bioremediation**, as the remedy for this site.

This selection is based upon the comparative analysis of alternatives. In-situ Anaerobic Bioremediation (Alternative 3) will be the most effective remedial alternative capable of meeting the RAOs for the site. This is supported by the bench-scale treatability study which demonstrated the ability of this technology to address the contamination present. Further, this alternative, which involves a single anaerobic system, will also be best suited to address the physical characteristics of the zone of contamination (i.e. the silt layer overlying the sand layer). Biological treatment using in-situ anaerobic bioremediation techniques will be a destructive technology which has been proven effective at addressing the COCs present. When implemented at the site, this alternative will result in a permanent and significant reduction of the total mass of the COCs in the soil and groundwater in the impacted areas of OU No.2. The remedy will have the added benefit of providing hydraulic containment during the time required to biologically treat the COCs. Accordingly, In-Situ Anaerobic Bioremediation is the recommended remedial alternative.

The estimated present worth cost to implement the remedy will be $1,401,000. The cost to construct the remedy is estimated to be $844,000 and the estimated average annual operation and maintenance cost for 5 years will be $107,900.

The elements of the selected remedy will be as follows:

1. A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Any uncertainties identified during the RI/FS will be resolved.

2. Installation of an infiltration trench and a withdrawal trench upgradient and downgradient, respectively, of Areas 1, 2 and 3 (ref. Figure 3). These trenches will be installed within the sand unit, but will not penetrate the underlying silt and clay lacustrine deposit. The infiltration trench will be installed in the sand layer to facilitate distribution of the amended groundwater to enhance the naturally occurring anaerobic biodegradation of COCs.

3. Groundwater from the withdrawal trenches will be amended, as necessary, with macro-nutrients (e.g., phosphorous, nitrogen) and Revised Anaerobic Mineral Media (RAMM) micro-nutrients (i.e., sulfate, iron(III)) prior to discharge to the upgradient trench for infiltration back into the shallow hydrogeologic unit.

4. Installation of shallow well points in the silt and clay layer of the impacted areas for the purpose of distributing small quantities of amended groundwater and to provide locations to monitor the effectiveness of the groundwater withdrawal/infiltration system.

5. Since the remedy results in untreated hazardous waste remaining at the site, a process control monitoring program will be instituted which will allow the effectiveness of the selected remedy to be monitored and will be a component of the operation and maintenance for the site. Upon attainment of the remedial action objective for groundwater quality and discontinuation of system operations, estimated to be about five years subsequent to system initiation, a post-remedial monitoring program will be established.

6. Upon completion of the remediation, as demonstrated by the monitoring programs, the site will be considered for delisting from the New York State Registry of Inactive Hazardous Waste Disposal Sites. Once the remedy is in place, the site will be reclassified as a class 4, indicating that the remedial action is in place and only operation and maintenance will be required.

SECTION 8: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the remedial investigation process, a number of Citizen Participation (CP) activities were undertaken in an effort to inform and educate the public about conditions at the site and the potential remedial alternatives. The following public participation activities were conducted for this Operable Unit at the site:

- A repository for documents pertaining to the site was established.

- A site mailing list was established which included nearby property owners, local political officials, local media and other interested parties.

- In January 1997 a Fact Sheet was sent to the site mailing list announcing the availability of the Proposed Remedial Action Plan and plans for a public meeting to accept comments of the NYSDEC's proposed remedy.

- On February 18, 1997 the NYSDEC and the NYSDOH held a Public Meeting to explain the State's proposed remedy and to accept comments on the PRAP.

- In March 1997 a Responsiveness Summary was prepared and made available to the public, to address the comments received during the public comment period for the PRAP.

Table 1
Nature and Extent of Contamination

MEDIA	CLASS	CONTAMINANT OF CONCERN	CONCENTRATION RANGE (ppb)	FREQUENCY of EXCEEDING SCGs	SCG* (ppb)
Groundwater	Volatile Organic Compounds (VOCs)	Benzene	ND-2,000	19 of 175	0.7
		Toluene	ND-430(JD)	12 of 175	5
		Ethylbenzene	ND-610	14 of 175	5
		Xylene	ND-2,800	14 of 175	5
		Trichloroethylene	ND-60,000(JD)	4 of 175	5
		Methylene Chloride	ND-7,700,000(D)	22 of 175	5
		Methanol	ND-430,000	NA	NA
		Acetone	ND-470,000	4 of 175	50
	Semivolatile Organic Compounds (SVOCs)	Aniline	ND-39,000(D)	31 of 175	5
		N,N-dimethylaniline	ND-380,000(D)	21 of 175	5

* NYS Ambient Water Quality Standards and Guidance Values (TOGS 1.1.1)
D - Sample Diluted
J- Estimated Concentration

Table 2
Remedial Alternative Costs

Remedial Alternative	Capital Cost	Annual O&M	Total Present Worth
No Action	$0	$0	$0
Limited Action	$3,000	$16,500	$257,000
In-Situ Anaerobic Bioremediation	$844,000	$107,900	$1,401,000
In-Situ Aerobic and Anaerobic Bioremediation	$995,000	$193,000	$1,922,000
Ex-Situ Aerobic and In-Situ Anaerobic Bioremediation	$2,741,000	$78,400	$3,155,000

APPENDIX A

RESPONSIVENESS SUMMARY

McKesson Envirosystems Site
Operable Unit No. 2 - Saturated Soils and Groundwater
Proposed Remedial Action Plan
Syracuse(C), Onondaga County
Site No. 7-34-020

The Proposed Remedial Action Plan (PRAP) for Operable Unit No. 2 at the McKesson Envirosystems Site, was prepared by the New York State Department of Environmental Conservation (NYSDEC) and issued to the local document repository on January 31, 1997. This Plan outlined the preferred remedial measure proposed for the remediation of the saturated soils and groundwater at the McKesson Envirosystems Site. The preferred remedy is In-Situ Anaerobic Bioremediation.

The release of the PRAP was announced via a notice to the mailing list, informing the public of the PRAP's availability.

A public meeting was held on February 18, 1997 which included a presentation of the Remedial Investigation (RI) and the Feasibility Study (FS) as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site.

The public comment period for the PRAP officially closed on March 5, 1997.

This Responsiveness Summary responds to all questions and comments raised at the February 18, 1997 public meeting.

The following are the comments received at the public meeting, with the NYSDEC's responses:

COMMENT 1: The depth of the soils addressed by the Operable Unit No. 1 remedy was approximately eight feet?

RESPONSE 1: The groundwater table was used as the basis for the depth selected for the soils remediated by the Operable Unit No. 1 remedy. The groundwater table was typically situated five to six feet below the ground surface with maximum depths of approximately eight feet. As a component of the Operable Unit No. 1 remedy, subsequent to the bioremediation process, clean fill was brought onsite to raise the existing site grade. The water table, therefore, is now situated approximately eight to ten feet below the ground surface at the site.

COMMENT 2: Are there any off-site concerns associated with this type of remediation, whether it is odor, noise or visual? Is there anything that adjoining property owners would be concerned about?

RESPONSE 2: Implementation of this remedy will not result in any odor, noise or visual concerns to adjacent property owners or passersby.

COMMENT 3: You indicated that the remedy will take approximately five years to complete. Does the remediation preclude something from going on top of the soil, something being built or being used in any fashion, or should one assume that for the next five years these eight acres will not be developed?

RESPONSE 3: If monitoring supports that the remedial program is effectively addressing the contamination, it is likely that the site classification would be revised from a Class 2 Registry designation (significant threat to human health and/or the environment - action required) to a Class 4 (site properly closed - requires continued management). However, the site would remain on the Registry of Inactive Hazardous Waste Disposal Sites until such time as the remedy is declared by the NYSDEC to have been successfully completed. Therefore, for the duration of the remedial project (estimated at five years), development of the entire parcel is not possible. Development of a portion(s) of the site, however, is a possibility (see Response 4).

COMMENT 4: Could you pave the site, for instance install a parking lot, while the remediation effort is ongoing?

RESPONSE 4: Details on the system configuration and necessary space will be determined during the remedial design. There are large areas of the site, however, which are not impacted by the zones of contamination to be addressed by the proposed remedial program. A parking lot (for example) on these areas of the site, therefore, is a possibility. Any development of the property, however, is at the discretion of the site owner and would require the approval of the NYSDEC while the site remains on the Registry of Inactive Hazardous Waste Disposal Sites.

COMMENT 5: What is the McKesson Corporation planning to do with the site when the remediation is complete?

RESPONSE 5: The McKesson Corporation has not indicated their future intentions for the property.

COMMENT 6: Why did the data show that the level of aniline increased recently?

RESPONSE 6: Site data supports that to date there have been no off-site impacts associated with the site with the exception of one recent (August 1996) groundwater quality standard exceedence for aniline. This "hit" was detected in one of monitoring wells situated immediately beyond the

property line. This detection of 7 parts per billion (ppb) of aniline exceeded the standard of 5 ppb. This downgradient "hit" is indicative of contaminant migration. This exceedence was noted in well MW-23S, which is situated immediately downgradient and in relatively close proximity to Area 3. Area 3 has historically been shown to contain high concentrations of both aniline and dimethylaniline. While the close proximity of Area 3 may be factor, the re-working of soils associated with the Operable Unit No. 1 remedy, is also a possible factor for the detection of aniline at this location.

COMMENT 7: Are the three areas highlighted the only areas of concern? If the property line shifted, would there be areas of the site considered "clean"?

RESPONSE 7: There are significant portions of the site which are not affected by the contamination. These areas are considered "clean". The property is not particularly conducive to sub-division at this time, in light of the discontinuous nature of the three areas of concern, and because contamination has been identified on both of the McKesson-owned parcels (north of Van Rensselaer Street and south of Van Rensselaer Street).

COMMENT 8: The plan indicates there will be trenches. This will be a closed, under-the-ground system?

RESPONSE 8: The system in each of three areas of concern will have two under-the-ground trenches, one upgradient and one downgradient. This will create a closed "hydraulic cell" in each of the areas. There will some aboveground apparatus (piping, holding tanks, etc.), but the majority of the system will be situated below the ground surface.

COMMENT 9: There is a proposed Creek Walk being developed approximately 100 feet from the fence line. Do you envision any problems with the desire to place a Creek Walk in this area?

RESPONSE 9: There should not be any problems associated with the placement of a Creek Walk in the area proposed. The areas of contamination are located on the McKesson Corporation-owned property and situated approximately eight feet below the ground surface. The area of the proposed Creek Walk is sufficiently removed from the area of contamination and, accordingly, should in no way be impacted by the site.

COMMENT 10: What is the estimated project duration?

RESPONSE 10: The remedial project's duration is estimated at five years. The project will involve the simultaneous operation of three individual units in each of their respective areas of concern. If monitoring data supports that a shorter duration is appropriate for one or more of the systems, operation of that system(s) will be discontinued. Conversely, the data suggests additional treatment is required to meet the cleanup goals, consideration will be given to the continued operation of the system(s), beyond the five year duration.

COMMENT 11: Are there any detrimental side-effects associated with the usage of the proposed groundwater amendment?

RESPONSE 11: There will be no detrimental side-effects associated with the application of the groundwater amendment. The proposed amendment, a recipe which has beed developed to stimulate the growth of the bacteria required for the process, consists of various minerals and nutrients for the bacteria. The recipe is referred to as a Revised Anaerobic Mineral Media (RAMM). The treatability study supports that the addition of the RAMM will increase the health of the microorganisms, providing for a very effective treatment process. To gauge the effectiveness of the remedial program, regular monitoring will be conducted in each of the areas of concern and the systems will be adjusted to insure an optimum environment exists for the bacteria. The routine monitoring will also provide for maintaining a safe level of these ingredients within each of the designated hydraulic cells.

One written comment letter was received during the comment period. This letter is attached. No response is required.

Lakefront
Development
Corporation

February 19, 1997

Michael J. Ryan, P.E.
NYS Department of Environmental Conservation
50 Wolf Road, Room 242
Albany, NY 12233-7010

re: Inner Harbor Creekwalk

Dear Mike,

It was a pleasure meeting you last night at the Public Hearing regarding the Proposed Remedial Action Plan for the McKesson Site.

As we discussed, the Inner Harbor Creekwalk in an integral part of the overall redevelopment of this area. While there were no concerns expressed when we discussed this item, rest assured I am available to speak with you at anytime regarding this matter.

Again thank you for your time and interest in this important project.

Best regards,

Bart Bush, Executive Director
Lakefront Development Corporation

cc: Susan Miller, NYSDEC

WBB/ms

238 West Division Street. Syracuse, New York 13204
Busi: (315) 448-2244 Fax: (315) 448-1835
Email: ldcsyr@worldnet.att.net

APPENDIX B

ADMINISTRATIVE RECORD

The following documents, which have been available at the document repositories, constitute the Administrative Record for the McKesson Envirosystems Site, Remedial Investigation/Feasibility Study.

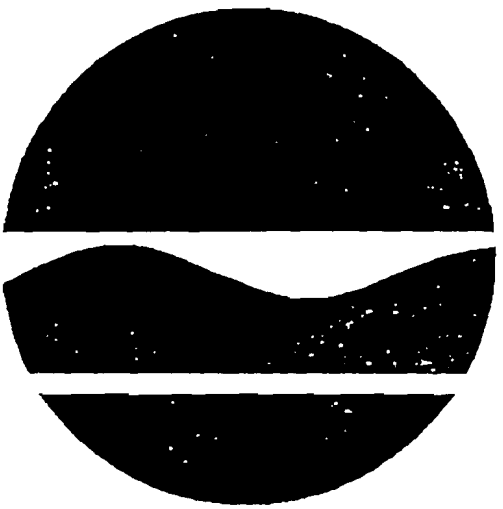
APRIL 1990:	Remedial Investigation Report
NOVEMBER 1993:	Feasibility Study Report, Operable Unit No. 1
JANUARY 1994:	Proposed Remedial Action Plan, Operable Unit No. 1
MARCH 1994:	Record of Decision, Operable Unit No. 1
SEPTEMBER 1995:	RD/RA Report, Operable Unit No. 1
SEPTEMBER 1996:	Supplemental Saturated Soil and Groundwater Investigation Report
DECEMBER 1996:	Feasibility Study Report, Operable Unit No. 2
JANUARY 1997:	Proposed Remedial Action Plan, Operable Unit No. 2

McKESSON ENVIROSYSTEMS
Inactive Hazardous Waste Site
Operable Unit No. 1

Syracuse (C), Onondaga County, New York
Site No. 07-34-020

RECORD OF DECISION

March 1994



Prepared by:

New York State Department of Environmental Conservation
Division of Hazardous Waste Remediation

Thermal desorption requires more chemical processing to destroy the chemical contaminants and the cost is roughly twice that of bioremediation.

The off-site destruction technologies have high costs associated with transportation and ultimate disposal, which is typical for these technologies. These costs are so high as to eliminate these technologies from consideration. Bioremediation is roughly one-tenth the cost of off-site treatment.

This final criterion is considered a modifying criterion and is taken into account after evaluating those above. It is focused upon after public comments on the Proposed Remedial Action Plan have been received.

8. Community Acceptance. Concerns of the community regarding the RI/FS reports and the Proposed Remedial Action Plan are evaluated. A "Responsiveness Summary" has been prepared which describes the comments received and the Department's response to the concerns raised. No public concerns were voiced in opposition to the proposed remedy. The Responsiveness Summary is included as Appendix A.

SECTION 7: SUMMARY OF THE SELECTED ALTERNATIVE

Based upon the results of the RI/FS, and the evaluation presented in Section 6, the NYSDEC is selecting alternative 4a: **Biological Treatment Using In-Situ Soil Blending**, as the remedy for this site.

This selection is based upon the following: Alternative 1 was not selected because it was not protective of the environment and would allow continued exposure to contaminants both through surface exposure routes and groundwater exposure routes. Alternative 2 would eliminate the route of exposure to surface soil contaminants but was not chosen because it would not eliminate the source of contamination, and would allow continued migration of the contaminants into the groundwater, although at a lesser rate than alternative 1. Alternatives 3, 5 and 6 are capable of meeting all the pertinent criteria, however, the cost of remediation is not justified for the off-site technologies given that alternative 4 can achieve equal or better results. Alternative 4 was chosen because it would meet all the criteria and does so at a reasonable cost.

Alternative 4a was chosen over 4b due to the practical consideration that more of the mass of contaminants will be bioremediated versus volatilized in this technology. The implementation of in-situ bioremediation lessens the handling of the soils and hence reduces the loss of contaminants due to volatilization. This technology will attain the technology-based cleanup levels, which substantially comply with the Remedial Action Objectives, and will result in a greater destruction of contaminant mass than any other technology.

The present worth cost to implement the remedy is $1,340,000.

The saturated soils and groundwater will be addressed as part of a separate operable unit for this site. Until the contaminated groundwater is dealt with, the possibility of recontamination of the saturated soils will still exists, therefore these media must be addressed together. The site will remain on the NYS Registry of Inactive Hazardous Waste Sites, as a class 2 site, until the second operable unit, and any other identified problems, are resolved through the remedial process.

The elements of the selected remedy are as follows:

1. A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Uncertainties identified during the RI/FS would be resolved.

2. In-situ bioremediation of all areas of the site where the contaminants of concern are greater than 5 ppm (see Figure 2).

Table 3
Remedial Alternative Costs

ALTERNATIVE	ESTIMATED PRESENT WORTH COST
No Action	-
Low Permeability Cap	$1,900,000
On-Site High Temperature Incineration	$10,630,000
On-Site Low Temperature Thermal Desorption (LTTD)	$4,240,000
Biological Treatment Using In-Situ Soil Blending	$1,340,000
Ex-Situ Liquid-/Solid-Phase Bioremediation	$4,200,000
Ex-Situ Solid Phase Bioremediation	$2,160,000
Off-Site Disposal at a Permitted Landfill	$21,060,000
Off-Site Incineration	$23,640,000

3. Attainment of technology-based cleanup levels and performance of bioremediation for a minimum 60 days as measured by a performance standard to be developed during the design phase of remediation and accepted by the Department. Should technology-based levels not be achieved in 60 days bioremediation would continue to a minimum 90 days duration and continue thereafter until the cleanup levels are achieved

4. Final contouring with a minimum of 12 inches of clean soil, grading and seeding of the site to promote surface water runoff and limit the infiltration of rain and surface water into the remediated areas.

5. Installation of additional monitoring well(s) to supplement the existing site perimeter groundwater monitoring network.

6. Conducting a program of groundwater sampling and analysis to verify that contamination has not migrated off the site. The present worth cost of this program is $275,000.

   The groundwater at the site and the contaminants in the saturated soils would be monitored by McKesson to verify to the NYSDEC that no off-site migration is occurring.

However, should evidence of off-site migration be discovered, the PRP would be required to implement remedial actions to prevent contaminant migration from leaving this site. A map showing the extent of groundwater contamination and the proposed monitoring network is attached as Figure 3.

SECTION 8: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the remedial investigation process, a number of Citizen Participation (CP) activities were undertaken in an effort to inform and educate the public about the conditions at the site and the potential remedial alternatives. The following public participation activities were conducted for the site:

- A repository for documents pertaining to the site was established.
- A site mailing list was established which included nearby property owners, local political officials, local media and other interested parties.
- A notification of the Proposed Remedial Action Plan (PRAP) was sent to interested individuals/groups announcing the availability of the PRAP and the public comment period.
- A public meeting was held on February 16, 1994 to discuss the proposed remedy for Operable Unit No. 1 and obtain public comment on it.
- A Responsiveness Summary was prepared to answer all comments received on the PRAP.

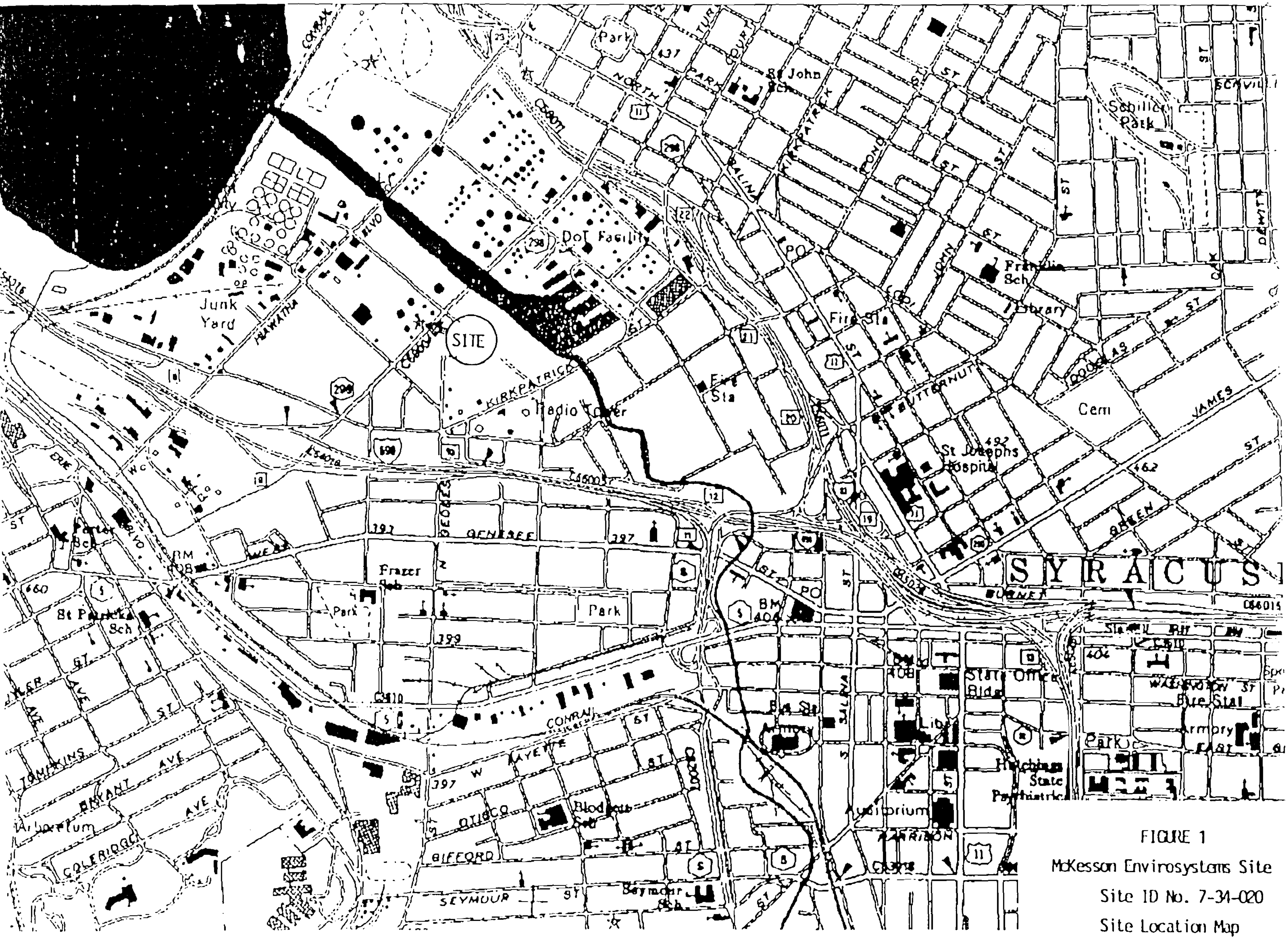
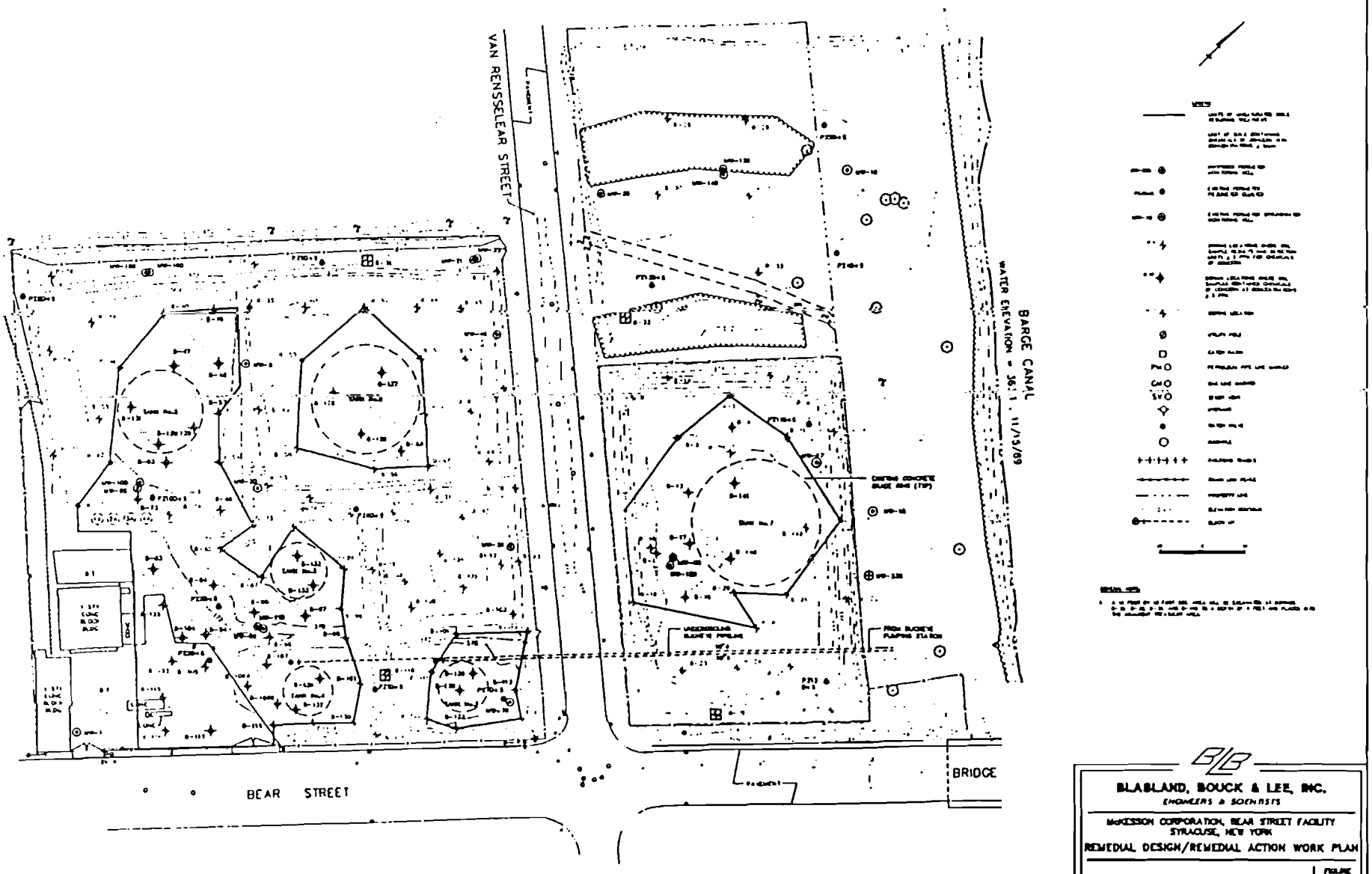


FIGURE 1
McKesson Envirosystems Site
Site ID No. 7-34-020
Site Location Map

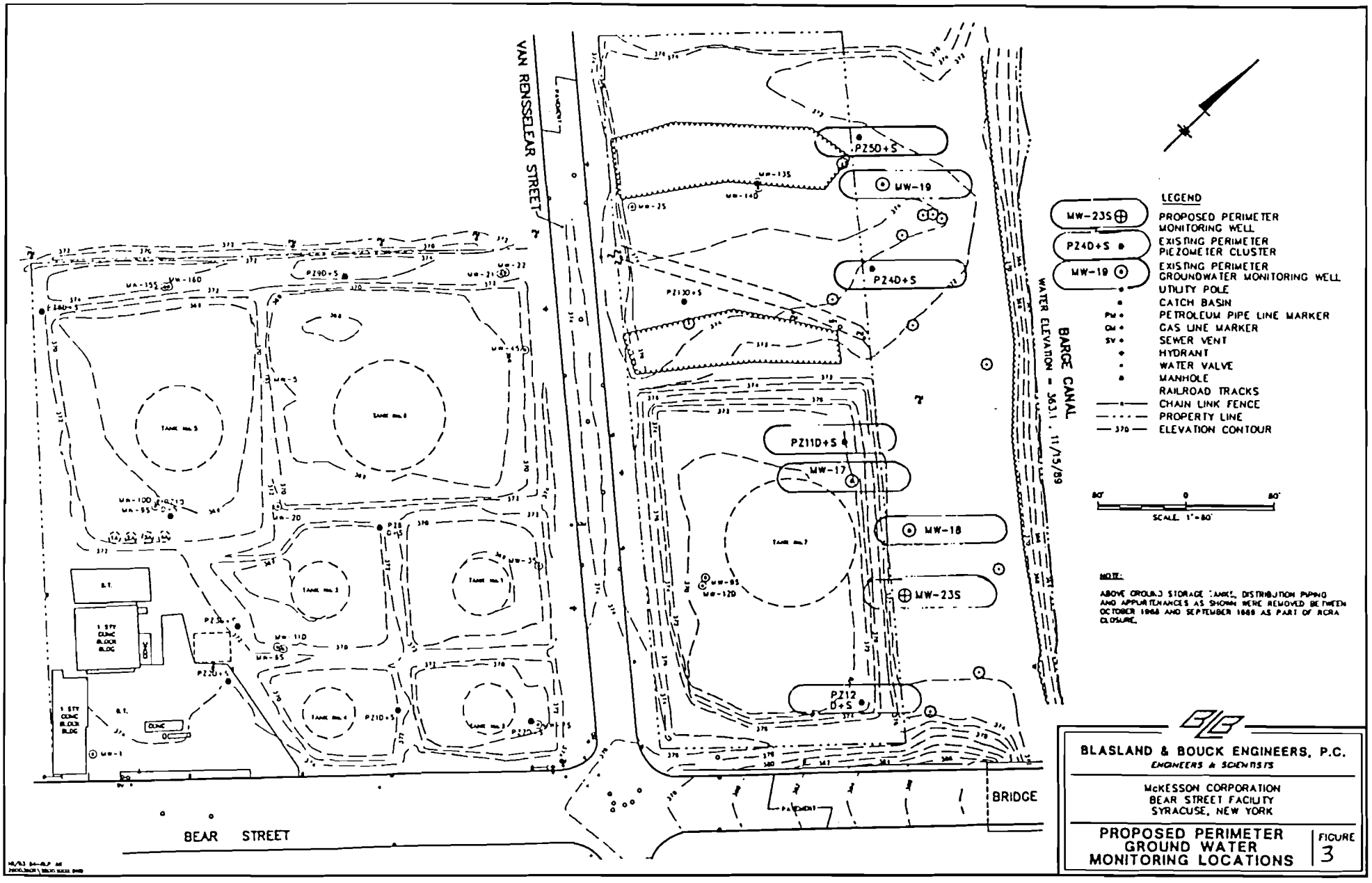


BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

McKESSON CORPORATION, BEAR STREET FACILITY
SYRACUSE, NEW YORK

REMEDIAL DESIGN/REMEDIAL ACTION WORK PLAN

SOIL TREATMENT AREAS | FIGURE 2



BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

McKESSON CORPORATION
BEAR STREET FACILITY
SYRACUSE, NEW YORK

PROPOSED PERIMETER GROUND WATER MONITORING LOCATIONS

FIGURE 3

APPENDIX A

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233

Thomas C. Jorling
Commissioner

RESPONSIVENESS SUMMARY

McKesson Envirosystems Inactive Hazardous Waste Site
Operable Unit No. 1 - Unsaturated Soils
Proposed Remedial Action Plan
Syracuse, Onondaga County
Site No. 7-34-020

The Proposed Remedial Action Plan (PRAP) for the McKesson Envirosystems Site, Operable Unit No. 1, was prepared by the New York State Department of Environmental Conservation (NYSDEC) and issued to the local document repository on January 24, 1994. This Plan outlined the remedial measure proposed for remediation of the unsaturated soils at the McKesson Envirosystems site. The preferred remedy consists of biological treatment using in-situ soil blending.

The release of the PRAP was announced via a notice to the mailing list, informing the public of the PRAP's availability.

A public meeting was held on February 16, 1994 which included a presentation of the Remedial Investigation (RI) and Feasibility Study (FS) as well as a discussion of the proposed remedy and the treatability study performed to evaluate its effectiveness. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. No comments were voiced at the meeting. Written comments were received from Blasland, Bouck and Lee, Inc., on behalf of McKesson Envirosystems (Inland), in a letter dated February 23, 1994. These comments have become part of the administrative record for this site.

The following are the comments received, with the NYSDEC's responses:

Comment letter, dated February 23, 1994, from Blasland, Bouck and Lee:

COMMENT No. 1:

The ROD should not include the PRAP's discussion about groundwater conditions and standards. The intent of the ROD should be to address remediation of Operable Unit No. 1, which does not include groundwater or saturated soils. Thus, there is no need for the ROD to address groundwater issues other than to affirm that the remedial action goal is to mitigate contaminant migration from the unsaturated soils into the groundwater. Should the ROD discuss groundwater conditions and standards, it should be made clear and at the beginning of that discussion that

groundwater is and has historically been unusable as a potable water supply due to its high chloride concentrations which contravene the New York State Department of Environmental Conservation (NYSDEC) Class GA water quality standards.

RESPONSE No.1:

The PRAP is the means by which the proposed remedy is presented to the public. The PRAP must contain a clear description of the site which includes the contamination detected, the lateral and vertical extent of that contamination and the media affected. It is necessary to discuss the contamination detected in groundwater since continued monitoring and a contingency to address migration are components of the ROD. It is necessary for the PRAP to address any and all information used in support of the remedy selected. This includes a discussion of all investigations to date and the findings of those studies. The PRAP, and now the ROD clearly state that the unsaturated soils are the subject of the document, however, it is appropriate to identify that groundwater is contaminated and that this problem will be dealt with as a separate operable unit.

The limited potable use of the groundwater is discussed within Section 4 of the PRAP. This has been reiterated at the beginning of the section entitled "Groundwater", in the ROD.

COMMENT No. 2:

The ROD for Operable Unit No. 1 should not imply that groundwater will be remediated in the future. As stated on page 2 of the PRAP, "The remaining operable unit for this site will address the saturated soils and groundwater, which will be the second operable unit at this site. Any remediation necessary will be subject of a future PRAP."

RESPONSE No.2:

Contamination has been documented in groundwater. It is the State's intention that this problem be addressed as a second Operable Unit and various remedial alternatives, including no action, will be evaluated in a future PRAP. The text on page 2 of the PRAP states that <u>any</u> remediation necessary will be the subject of a future PRAP. All references to groundwater in the ROD will be consistent with this statement.

COMMENT No. 3:

The remedy's anticipated reduction of chemicals of concern in soils will not completely eliminate the potential leaching of these chemicals to groundwater. Instead, the remedy will significantly minimize the potential leaching of the chemicals from unsaturated soils into groundwater. For this reason, the goals presented in the ROD be revised to read:

- Reduce, control, or mitigate the contamination present within the unsaturated soils on-site.

- Eliminate or mitigate a threat to surface waters by eliminating or mitigating any future

contaminated surface runoff from the contaminated soils on-site.

- o Eliminate or mitigate the potential for direct human or animal contact with the contaminated soils on-site.

- o Monitor the impacts of contaminated groundwater to the environment.

RESPONSE No. 3:

By definition a goal is the end toward which effort is directed. The goals listed are specific to Operable Unit No. 1, but were established through the remedy selection process stated in 6NYCRR Part 375. Recognizing the remedy's anticipated reduction of chemical concentrations may not completely eliminate potential leaching to groundwater, it would be inappropriate to not strive to achieve maximum removal. The goals for the remedial program, as presented in the PRAP, will remain as stated.

COMMENT No. 4:

A statement should be inserted on page 2 in the second paragraph to clarify that the site does not contain any NYSDEC-designated wetlands and that the remedial activities would not be subject to the requirements of 6NYCRR parts 662 through 665.

RESPONSE No. 4:

The text will be revised to state that no NYSDEC-designated wetlands are located on site.

COMMENT No. 5:

The ROD should define the unsaturated soils to be addressed by the remedy as those which are present above a groundwater elevation of 365 feet. The PRAP states that the unsaturated soils on the northern portion of the site lie above a groundwater elevation of 364 feet. Groundwater elevation data collected from the monitoring wells and piezometers located on the northern portion of the property for the years 1992 and 1993 indicates that the groundwater elevation ranges from approximately 367 feet in December to 365 feet in June.

RESPONSE No. 5:

Based on the more recent groundwater data, which was not included in the RI/FS report, the text will be revised to define the unsaturated soils to be addressed by the remedy as those which are "present above a groundwater elevation of 365 feet, unless field conditions support that a greater depth (i.e lower elevation) would be appropriate."

COMMENT No. 6:

In closing, the ROD should state that the NYSDEC has determined that the selected remedy likely will achieve the cleanup levels (Table 3 of the PRAP) and that those cleanup levels substantially

comply with the Remedial Action Objectives (RAOs) (page 15 of the PRAP). This approach is consistent with the statement on page 16 of the PRAP that "the environmental concerns associated with leaching into the groundwater would be minimized" by the selected remedy.

RESPONSE No. 6:

The text will be revised as suggested.

APPENDIX B

ADMINISTRATIVE RECORD

The following documents, which have been available at the document repositories, constitute the Administrative Record for the McKesson Envirosystems Site, Remedial Investigation/ Feasibility Study.

APRIL 1990:	Remedial Investigation Report
NOVEMBER 1993:	Feasibility Study Report
JANUARY 1994:	Proposed Remedial Action Plan, Operable Unit No. 1
FEBRUARY 1994:	1992 Groundwater Monitoring Program McKesson Corporation
FEBRUARY 1994:	Responsiveness Summary, Operable Unit No. 1

FIGURES

DECLARATION STATEMENT - RECORD OF DECISION

McKesson Envirosystems Inactive Hazardous Waste Site
Operable Unit No. 1 - Unsaturated Soils
Syracuse, Onondaga County, New York
Site No. 7-34-020

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedial action for the McKesson Envirosystems Inactive Hazardous Waste Disposal Site, Operable Unit No. 1, which was chosen in accordance with the New York State Environmental Conservation Law (ECL). The remedial program selected is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300).

This decision is based upon the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the McKesson Envirosystems Inactive Hazardous Waste Site and upon public input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A bibliography of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Assessment of the Site

Actual or threatened release of hazardous waste constituents from this site, if not addressed by implementing the response action selected in this ROD, presents a current or potential threat to public health and the environment.

Description of Selected Remedy

Based upon the results of the Remedial Investigation/Feasibility Study (RI/FS) for the McKesson Envirosystems site and the criteria identified for evaluation of alternatives, the NYSDEC has selected Biological Treatment Using In-Situ Soil Blending as the remedy for Operable Unit No. 1, the Unsaturated Soils. The components of the remedy are as follows:

- A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Uncertainties identified during the RI/FS would be resolved.

- In-situ bioremediation of all areas of the site where the contaminants of concern are greater than 5 ppm.

- o Attainment of technology-based cleanup levels and performance of bioremediation for a minimum 60 days as measured by a performance standard to be developed during the design phase of remediation and accepted by the Department. Should technology-based levels not be achieved in 60 days bioremediation would continue to a minimum 90 days duration and continue thereafter until the cleanup levels are achieved.

- o Final contouring with a minimum of 12 inches of clean soil, grading and seeding of the site to promote surface water runoff and limit the infiltration of rain and surface water into the remediated areas.

- o Installation of additional monitoring well(s) to supplement the existing site perimeter groundwater monitoring network.

- o Conducting a program of groundwater sampling and analysis to verify that contamination has not migrated off the site.

New York State Department of Health Acceptance

The New York State Department of Health concurs with the remedy selected for this Operable Unit as being protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

March 18, 1994
Date

Ann Hill DeBarbieri
Deputy Commissioner

TABLE OF CONTENTS

SECTION 1: SITE LOCATION AND DESCRIPTION

The McKesson Envirosystems (Inland Site) is located in the city of Syracuse to the south of Onondaga Lake. The site is approximately 8.2 acres in size and is separated by Van Rensselaer Street into two parcels (Figure 1). The parcel north of Van Rensselaer Street is within 150 feet of the New York State Barge Canal Terminal channel, most of which is well-vegetated with grasses, shrubs, and some trees. The largest of the former aboveground storage tanks (Tank 7) was located on this portion of the site.

The bulk of previous material storage and handling took place in the area south of Van Rensselaer Street, where ten former aboveground storage tanks were located. A paved parking area and buildings account for approximately ten percent of this southern parcel. The remainder supports vegetation consisting of weeds, grasses and the primary vegetation on the south parcel, wetland-associated species. The wetland plants are confined to areas near the locations of the former aboveground storage areas. Berms surround the site as well as the former tank areas, resulting in standing water which is present within the berms for significant periods of time. However, no NYSDEC-designated wetlands are located on site. These berms preclude surface water runoff to the Barge Canal, as evidenced by the standing water within the berms. The site is also within one-quarter mile of Onondaga Lake, which is a major surface water body in the greater Syracuse area.

Land use in the surrounding area may be characterized as industrial/light industrial, being on the edge of the "Oil City" area of Syracuse, although there are current plans for significant non-industrial development in this area. The McKesson property also has an industrial zoning classification.
The former storage areas of the site are secured against trespass with chain link fence and barbed wire. A soil berm is also present along most of the site perimeter, and berms surround the former tank areas.

Operable Unit No. 1, which is the subject of this Record of Decision (ROD), consists of the unsaturated soils at the site.

An Operable Unit represents a discrete portion of the remedy for a site which for technical or administrative reasons can be addressed separately to eliminate or mitigate a release, threat of release or exposure pathway resulting from the contamination present at a site. The remaining operable unit for this site will address the saturated soils and the groundwater, which will be the second operable unit at this site. Any remediation necessary to address this remaining contamination will be the subject of a future ROD.

SECTION 2: SITE HISTORY

2.1: Operational/Disposal History

1920's: Occupied by various salt companies.

1928-1969: Petroleum Storage Facility (ARCO), Tanks 1-6 (South Parcel)

1951: Tank 7 installed (North Parcel)

1969- 1973: Petroleum Storage Facility BP Oil Company (BP)

1973: Inland Chemical Corporation (ICC) purchases site from BP Oil Company for storage of waste streams including: methanol, methylene chloride and other solvents destined for recycling at other ICC facilities..

1982: ICC operations discontinued.

2.2: Remedial History

1980: ICC filed a Part A Permit Application for Interim status as a hazardous waste storage facility under the Resource Conservation Recovery Act (RCRA).

1987: Revised part A application for closure submitted to NYSDEC. Remediation Consent Order signed 6/10/87.

1988: McKesson Corporation submitted a RCRA closure plan entitled "Verification of Aboveground Storage Tank Decontamination Protocol" to NYSDEC.

1989: RCRA Closure certification submitted to NYSDEC Aboveground tanks removed from the site.

1990: Notification from NYSDEC that facility was officially closed and that corrective actions would proceed under the Remediation Consent Order which was amended to include both McKesson Corporation and Safety-Kleen Environsystems Company as Respondents.

The Final Remedial Investigation Report was issued in April 1990. A PAH Distribution Report was issued at the same time.

1992: A residential Risk Assessment and FS Screening of Alternatives were completed.

1993: A Soil Bioremediation Pilot study was conducted at the site using both in-situ and ex-situ techniques. A Feasibility Study and results of the Pilot Study were completed.

SECTION 3: CURRENT STATUS

In response to a determination that the presence of hazardous waste at the Site presents a significant threat to human health and/or the environment, the McKesson Corporation has recently completed a Remedial Investigation/Feasibility Study (RI/FS).

3.1: Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site.

The RI was conducted in 1988 and 1989. A report entitled *Final Remedial Investigation Report, April 1990,* has been prepared describing the field activities and findings of the RI in detail. A summary of the RI follows:

The RI activities consisted of the following:

- Installation of 136 soil borings
- 13 piezometer clusters
- 22 monitoring wells and related groundwater sampling
- 159 soil samples

The analytical data obtained from the RI was compared to environmental Standards, Criteria, and Guidance (SCGs). Groundwater, drinking water and surface water SCGs identified for the McKesson Corporation site were based on NYSDEC Ambient Water Quality Standards and Guidance Values and Part V of NYS Sanitary Code. Soil and sediment analytical results where evaluated against NYSDEC soil cleanup guidelines for the protection of groundwater, background conditions, and risk-based remediation criteria were evaluated in order to develop remediation goals for soil.

Soil cleanup values were obtained by evaluating the technology based limits of bioremediation and evaluating these limits during an on-site treatability study. The site specific conditions were taken into account during this evaluation, in particular the nature of the groundwater.

Based upon the results of the remedial investigation in comparison to the SCGs and potential public health and environmental exposure routes, certain areas and media of the site require remediation. These findings are summarized below. More complete information can be found in the RI Report.

Chemical concentrations are reported in parts per billion (ppb) and parts per million (ppm). For comparison purposes, where applicable, SCGs are given for each medium.

Soils

The unsaturated soils to be addressed by this operable unit at this site are those approximately four feet in depth which lie above the groundwater elevation, which corresponds to an elevation of 365 feet. Unsaturated soils above 365 feet will be addressed by the remedy, unless field conditions support that a greater depth (i.e. lower elevation) would be appropriate. These soils have been contaminated with materials previously stored in tanks at the site. The following 14 chemicals have been observed at the site during the RI: benzene, toluene, ethylbenzene, xylenes, tetrachloroethene, trichloroethene, trans-1,2-dichloroethene, methylene chloride vinyl chloride, aniline, N,N-dimethylaniline, acetone, methanol, and chlorobenzene and represent the Chemicals of Concern (COCs). For evaluation purposes, the Chemicals of Concern were grouped into four classes based on similar chemical characteristics and are identified

TABLE 1

MCKESSON CORPORATION
BEAR STREET FACILITY

CHEMICALS OF CONCERN
MAXIMUM CONCENTRATIONS OBSERVED
IN SOILS[1] AND GROUND WATER[2]

	Ground-Water Concen. (mg/l)	Monitoring Well Location	Soils Concen. (mg/kg)[3]	Soil Boring Location
Non-Halogenated Aromatics				
Benzene	1.8	MW-2	11.5	B83
Toluene	0.025	MW-9	17.	B83
Ethylbenzene	0.36	MW-2	49.	B83
Xylenes	0.81	MW-2	218.	B83
Chlorinated Aliphatics				
Tetrachloroethene	ND	---	0.34	B63
Trichloroethene	0.1	MW-3	140.	B135*
t-1,2-dichloroethene	1.8	MW-3	0.22	B92
Methylene Chloride	2800.	MW-8	827.	B135*
Vinyl Chloride	0.45	MW-3	ND	---
Dimethylaniline-Related Compounds				
Aniline	8.5	MW-8	282.	B137*
N,N-dimethylaniline	52.	MW-8	1,830.	B139*
Other				
Acetone	470.	MW-8	833.	B132*
Methanol	300.	MW-8	13,072.	B139*
Chlorobenzene	0.001	MW-5	4.2	B63

Notes:

ND = Not Detected.
[1] = Soil samples collected December 1988 and October 1989.
[2] = Ground-water samples collected November 1989.
[3] = Soil concentration units are dry weight basis.
* = Soil borings installed in October 1989 after tank removal.

as follows in the text: non-halogenated aromatics, chlorinated aliphatics, dimethylaniline-related compounds, and "other chemicals" which do not fit into the three stated classes. The specific compounds in each class are listed on Table 1.

Non-halogenated aromatics (benzene, toluene, ethylbenzene, and xylenes) are frequently detected in association with petroleum products (primarily gasoline). Chlorinated aliphatic compounds are commonly used as solvents. They include the following compounds detected at this site: tetrachloroethene (TeCE), trichloroethene (TCE), trans-1,2-dichloroethene (t-1,2-DCE), methylene chloride, and vinyl chloride. The dimethylaniline-related compounds observed at the site are aniline and N,N-dimethylaniline. Acetone, methanol, and chlorobenzene are "other chemicals" present at the site which do not fit into the other classes of chemicals.

In general, the chemicals of concern were detected near the former materials loading area and the former locations of the aboveground storage tanks. Maximum observed soils concentrations of the chemicals of concern and the borings from which the samples were taken are presented in Table 1.

Non-Halogenated Aromatics: The maximum observed concentrations of each of the BTEX compounds in soils above the water table were observed in soil boring B-83. This soil boring is located within 100 feet of the former main tanker truck materials loading area. These concentrations were: 11.5 ppm benzene, 17 ppm toluene, 49 ppm ethylbenzene, and 218 ppm xylenes. These concentrations were detected 2.5 to 3.5 feet below the surface in soil boring 83. Lower concentrations were detected at a more shallow depth (1.5 to 2.5 feet) in the same soil boring.

Chlorinated Aliphatics: The maximum observed concentrations of two of the four chlorinated aliphatics were detected in soil boring B-135, which was installed in November 1989 at the former location of Tank 1. Trichloroethene and methylene chloride were detected at 140 ppm and 827 ppm, respectively, in this boring at a depth of 2.5 to 3.5 feet. The maximum soils concentration of TeCE (0.34 ppm) was observed in soil boring B-63 which is located at the eastern perimeter of Tank 5. This concentration was detected at a depth of 1.5 to 2.5 feet. Trans-1,2-DCE was detected at a maximum concentration of 0.22 ppm in soil boring B-92. This soil boring is located in the area immediately adjacent to the former location of Tank 1. Vinyl chloride was not detected in any soil samples from the site.

Dimethylaniline-Related Compounds: The highest concentrations of aniline and N,N-dimethylaniline detected in soils were observed at former aboveground storage tank locations. Aniline was detected at 282 ppm in soil boring B-137 from the former Tank 4 area. N,N-dimethylaniline was detected at 1,830 ppm in soil boring B-139 from the former Tank 2 area. Both of these samples were obtained at a depth of 0.5 to 1.5 feet.

Other Compounds: Maximum observed concentrations of acetone and methanol were detected in soil samples collected at former aboveground storage tank locations. Acetone was found at a concentration of 833 ppm in soil boring B-132 in the area where Tank 3 was formerly located. Methanol was found at a concentration of 13,072 ppm in soil boring B-139 in the area where Tank 2 was formerly located. The maximum concentration of chlorobenzene (4.2 ppm) was detected in soil boring B-63 which is located at the perimeter of the area where Tank 5 was formerly located.

Groundwater

The stratigraphy beneath the site consists of four soil units having different hydraulic conductivities. The hydraulic conductivities range from the low hydraulic conductivity of the upper silt and clay soil unit and lower confining unit to moderate to high hydraulic conductivity of the middle and lower soil units. The low hydraulic conductivity of the upper silt and clay soil unit limits the amount of surface water infiltration from precipitation and snow melt runoff; which contributes to ponding water in the former tank impoundment areas. The silt and clay confining unit has a low hydraulic conductivity, and would act as a barrier to groundwater movement between the materials above the confining unit to those materials below the confining unit.

The three flow systems identified beneath the Bear Street site are: a deep flow system in the unconsolidated deposits beneath the confining layer, an intermediate flow system in the lower soil unit, and a shallow flow system in the upper and middle soil units. The intermediate flow system, in the lower soil unit, can be separated into a freshwater zone and saltwater zone. It is reported that groundwater in this zone is and has historically been unusable as a potable source due to its high chloride concentrations. Both the shallow and intermediate flow systems are influenced by seasonal or transient conditions including precipitation, ponding water and subsequent infiltration within the impoundments, and the water elevation of the Barge Canal. The discharge point for the shallow and intermediate flow systems is the Barge Canal, and the discharge point for the deep flow system appears to be Onondaga Lake.

The groundwater quality results indicate the presence of chemical compounds at concentrations above either groundwater quality standards or the background concentrations as measured at monitoring well MW-1. The identified chemicals in groundwater are: methylene chloride, trichloroethene, benzene, toluene, ethylbenzene, xylenes, N,N-dimethylaniline, aniline, trans-1,2-dichloroethene, methanol, and acetone. Monitoring data indicates that the identified chemicals have not migrated beyond the site property boundaries.

Maximum concentrations of the chemicals of concern observed in groundwater are presented in Table 1.

The naturally high sodium chloride content of the groundwater detected in the intermediate flow system exceeds the New York State groundwater quality standards, limiting the potable use of the site groundwater. No other exceedences of inorganic compounds were identified by the RI.

3.2 Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site. To date two health risks have been conducted for this site, one assuming an industrial use scenario and one assuming a residential use scenario. A more detailed discussion of the health risks can be found in the RI Report.

An exposure pathway is the route by which an individual comes into contact with a contaminant. The five elements of an exposure pathway are 1) the source of contamination; 2) the environmental medium

and transport mechanisms; 3) the point of exposure; 4) the route of exposure; and 5) the receptor population. These elements of an exposure pathway may be based on past, present, or future events.

Completed pathways which are known to or may exist at the site in the future include:

- o Dermal contact, inhalation or ingestion of soils and dust.
- o Dermal contact with groundwater at the site.
- o Inhalation of chemicals volatilized from groundwater or ingestion of groundwater in a residential setting.
- o Inhalation of contaminants volatilized from soils during construction activities.

This proposed plan deals with the source of contamination in the unsaturated surface soils at the site. Hence, the soil contamination routes of exposure will be addressed but the groundwater will only be dealt with to the extent that the source in the unsaturated soils will be mitigated and further degradation of the groundwater should not occur.

The remaining operable unit for this site will address the saturated soils and the groundwater, which will be the second operable unit at this site. Any remediation necessary to address this remaining contamination will be the subject of a future ROD.

3.3 Summary of Environmental Exposure Pathways:

This section summarizes the types of environmental exposures which may be presented by the site. The Habitat Based Assessment included in the RI presents a more detailed discussion of the potential impacts from the site to fish and wildlife resources. The RI concludes that there is a hydrogeologic connection between the shallow groundwater and the Barge Canal, however, the RI has not identified contaminant migration beyond the site boundaries. Therefore, at the present time, the site does not appear to be impacting the Barge Canal and/or Onondaga Lake. The following pathways for environmental exposure have been identified:

- * Potential for contaminants leaching into groundwater and then possibly discharging into Barge Canal/ Onondaga Creek and thence to Onondaga Lake.
- * Contaminants leaching into ponded surface water and reaching wildlife.
- * Contaminants affecting surface and subsurface wildlife through direct contact, ingestion, or inhalation.

SECTION 4: ENFORCEMENT STATUS

The NYSDEC and the McKesson Corporation entered into a Consent Order on June 10, 1987. The Order obligates the responsible parties to implement a full remedial program. The order was amended on June 20, 1990 to incorporate Safety Kleen Environsystems Company as a PRP.

The following is the chronological enforcement history of this site.

Date	Index No.	Order Subject
6/10/87	R7-0766-84-03	Remedial Program
6/20/90	R7-0766-84-03	Amended Remedial Program

SECTION 5: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. These goals are established under the guideline of meeting all standard, criteria, and guidance (SCGs) and protecting human health and the environment.

At a minimum, the remedy selected for the unsaturated surface soils should eliminate or mitigate all significant threats to the public health and to the environment presented by the hazardous waste disposed and remaining in the surface soils at the site through the proper application of scientific and engineering principles. The potential for exposure due to groundwater will be addressed by a second operable unit.

The goals selected for the unsaturated soils operable unit of this site are:

- Reduce, control, or eliminate the contamination present within the unsaturated soils on site.
- Eliminate a threat to surface waters by eliminating any future contaminated surface run-off from the contaminated soils on site.
- Eliminate the potential for direct human or animal contact with the contaminated soils on site.
- Monitor the impacts of contaminated groundwater to the environment.

SECTION 6: SUMMARY OF THE EVALUATION OF ALTERNATIVES

Potential remedial alternatives for the unsaturated soils at the McKesson Envirosystems (Inland) site were identified, screened and evaluated in a Feasibility Study. This evaluation is presented in the report entitled **Feasibility Study, November 1993.** A summary of the detailed analysis follows.

6.1: Description of Remedial Alternatives

The potential remedies are intended to address the contaminated unsaturated soils at the site and they are:

Alternative No. 1
No Action

The no action alternative is evaluated as a procedural requirement and as a basis for comparison. It requires continued monitoring only, allowing the site to remain in an unremediated state.

The site would remain in its present condition, and human health and the environment would not be provided any additional protection.

Alternative No. 2
Low Permeability Cap

Present Worth:	$1,900,000
Capital Cost:	$1,900,000
Annual O&M:	$18,000
Time to Implement:	1 year

Construction of a low-permeability cap over a five-acre portion of the site would minimize the infiltration of precipitation through the soils containing the chemicals of concern. The cap would be constructed of a low-permeability material such as natural clay, geosynthetics, asphalt or combinations of these materials, and would include drainage and top soil layers to achieve a well drained, vegetated surface upon completion. Limiting the amount of precipitation that percolates through the soils would reduce the leaching of the chemicals of concern into the groundwater beneath the site.

Prior to cap construction, impacted soils from the portion of the site located north of Van Rensselaer Street would be excavated and placed on the portion of the site to be covered by the cap (south side of Van Rensselaer Street). The resulting excavations would be backfilled with imported select clean fill material and compacted, and the site would be graded to promote drainage. Storm water run-off from the cap would drain to a storm water collection system located around the perimeter of the cap, which would discharge into the Barge Canal.

Alternative No. 3a
On-Site High Temperature Incineration

Present Worth:	$10,600,000
Capital Cost:	$10,600,000
Annual O&M:	$18,000
Time to Implement:	1 year

This alternative consists of excavating the estimated 10,000 cubic yards of impacted site soils and treating them in an on-site incinerator. This treatment technology has proven effective in treating soils containing organic constituents.

Incineration is a process that utilizes high temperature (typically between 1,400 and 2,200 degrees Fahrenheit) to thermally destruct organic compounds present in soils. Three types of mobile incinerators

commonly utilized include fluidized bed, rotary kiln, and infrared incinerators. The most common of these is the rotary kiln incinerator, which is described in this evaluation.

Site soils would be excavated, stockpiled, and screened to remove debris greater than two inches in diameter. Soil and debris with diameters greater than two inches would either be crushed prior to being fed into the high-temperature incinerator (HTI) with the smaller soil particles, or stockpiled and cleaned by another method such as steam cleaning. The screened soils would be fed directly into the HTI's rotating refractory-lined kiln. Lifters attached to the inside of the kiln are used to agitate the soils to improve heat transfer.

The combustion gases, which contain volatilized organic compounds, exit the kiln and pass through a hot cyclone for removal of relatively large particulates. The gases then pass from the cyclone into a secondary combustion chamber where any remaining organic vapors, carbon monoxide, and particulates are destroyed at temperatures of 1,800 to 2,200 degrees Fahrenheit. Any remaining combustion gases pass through an evaporative cooler to cool the gases, a bag house to collect particulates, and a paced-bed alkaline scrubbing unit to remove acid gases. The treated gases are then discharged to the atmosphere.

The HTI would be operated continuously until the site soils were satisfactorily treated. Continuous operation of the HTI would also increase the efficiency of the unit over the duration of the project.

After treatment, the resulting flyash (treated soils) is discharged from the incinerator into a pugmill, where filtered process water is added to cool the flyash and control dust. The treated soils would be analyzed for the chemicals of concern to verify that the soil cleanup levels had been achieved.

The treated soils may also require solidification to ensure that the soils meet TCLP requirements for inorganic constituents that may be concentrated by incineration. The solidified soils would then be directly backfilled on-site. The site would require a CAMU designation so that the incinerated and solidified soils could be backfilled directly without requiring the construction of a RCRA landfill cell.

Air monitoring would insure that on-site workers as well as the surrounding community are not exposed to volatilized contaminants during remediation.

Alternative No. 3b
On-Site Low-Temperature Thermal Desorption (LTTD)

Present Worth:	$4,240,000
Capital Cost:	$4,240,000
Annual O&M:	$18,000
Time to Implement:	1 year

This alternative consists of excavating 10,000 c.y. of impacted site soils and treating them on-site using a mobile LTTD unit. This treatment technology has proven effective at treating soils containing organic constituents.

LTTD is a process by which soils containing organic compounds are heated, and the organic compounds are volatilized from the soils into an induced air flow.

Site soils would be excavated, stockpiled, and screened to remove debris greater than two inches in diameter. Soil and debris with diameters greater than two inches would either be crushed prior to being fed into the LTTD with the small soil particles, or stockpiled and cleaned by another method, such as steam cleaning. The screened soils would be fed directly into the LTTD's rotating kiln, where the soil would be heated to 500 to 1,200 degrees Fahrenheit. The rotation of the kiln mixes the soils and conveys them through the unit. The moisture and organics vaporize due to the elevated temperature, and are released from the soil. The off-gases, which contain volatile organics and some particulates, are collected and treated further with a combust on after-burner or by passing the gases through a system consisting of a cyclone, baghouse, wet scrubber and activated carbon bed. In the combustion after-burner, the collected gases are incinerated at 1,300 to 2,200 degrees Fahrenheit. In the alternate system, the cyclone and baghouse remove the soil particulate, the wet scrubber removes the acid gases, and the activated carbon removes any remaining organics.

After processing is complete, the treated soils are transferred from the kiln into a pugmill, where water is added to cool the soils and reduce dust production. The treated soils are then stockpiled for backfill pending analytical testing.

Air monitoring would insure that on-site workers as well as the surrounding community are not exposed to volatilized contaminants during remediation.

Alternative No. 4a
Biological Treatment Using In-Situ Soil Blending

Present Worth:	$1,340,000
Capital Cost:	$1,340,000
Annual O&M:	$18,000
Time to Implement:	1 year

Biological treatment of soils is accomplished through the stimulation of indigenous microorganisms that use the biodegradable chemical constituents present in the soils as a source of carbon and energy, while converting them into carbon dioxide and water. Biological treatment through in-situ soil blending consists of mixing soils in place to improve the mass transfer of oxygen and nutrients which in turn enhances the growth and activity of aerobic bacteria.

In-situ biological treatment using soil blending at the site would require that the impacted soils be mixed and aerated using a hydraulic implement installed on an excavator.

Surface water would have to be pumped from one bermed area to another to facilitate treatment and would also be used as needed during the treatment process to maintain the desired moisture content within the soils being treated.

Air monitoring for total organic vapors, methylene chloride, and dust daily during the mixing activities would ensure that on-site workers and potential off-site receptors were not exposed to unacceptable levels of the chemicals of concern. Fertilizer would be added to the plot as required to maintain optimum nutrient levels.

Volatilization of chemical constituents can be controlled by adjusting the soil mixing rate to meet the NYSDEC air emissions requirements for remedial processes.

Alternative No. 4b
Ex-Situ Liquid/Solid Phase Bioremediation

Present Worth:	$1,880,000
Capital Cost:	$4,200,000
Annual O&M:	$233,000
Time to Implement:	16 years

Ex-situ liquid/solid phase bioremediation of soils involves treating excavated soils in a vessel. The estimated 10,000 c.y. of impacted soils would be excavated and would then be mixed with nutrient-amended water in a tank reactor to produce a slurry of 10 to 30 percent solids by weight.

In order to increase the level of dissolved oxygen, the slurry would be continuously aerated. In addition, the slurry is continuously mixed to maintain the solids in suspension and to ensure that the microorganisms make contact with the chemicals of concern. The bioremediation process can be operated in either a batch or continuous mode.

Once biodegradation is complete, the solids would be settled out from the treated slurry and residual water would be recycled back into the bioreactor. The treated, settled solids would then be sampled to ensure that the Remedial Action Objectives (RAO) had been achieved. Once the RAO is achieved, the solids would be backfilled into the excavated areas.

Air monitoring would insure that on-site workers as well as the surrounding community are not exposed to volatilized contaminants during remediation.

Alternative No. 4c
Ex-Situ Solid-Phase Bioremediation

Present Worth:	$2,160,000
Capital Cost:	$2,160,000
Annual O&M:	$18,000
Time to Implement:	1 year

The ex-situ solid-phase bioremediation technique consists of biologically treating the 10,000 c.y. of soils containing the chemicals of concern on a constructed land treatment cell. The treatment cell would consist of a polyethylene geomembrane liner covered with a one-foot-thick drainage layer of clean sand. The treatment cell would be surrounded by a lined storm water collection system to collect leachate and runoff from the cell. The system would be sloped to a lined sump where the collected liquids would remain until the soils on the cell required additional moisture. The liquids would then be reapplied to the treatment cell.

The cell would be loaded with a single layer of impacted soils approximately 12 to 15 inches deep. The soils on the cell would then be mixed with a chisel plow to enhance the mass transfer of gaseous oxygen. Fertilizer and water would be added, as needed, to maintain optimum conditions for bioremediation.

Once the RAO had been achieved, the treated soils would be placed back into the areas that they were excavated from.

Air monitoring would insure that on-site workers as well as the surrounding community are not exposed to volatilized contaminants during remediation.

Alternative No. 5
Off-Site Disposal at a RCRA-Permitted Landfill

Present Worth:	$21,060,000
Capital Cost:	$21,060,000
Annual O&M:	$18,000
Time to Implement:	1 year

This alternative would consist of excavating site soils that contain the chemicals of concern with concentrations above the soil cleanup levels and disposing of these soils off-site at a RCRA-permitted landfill facility.

The soils that contain the chemicals of concern with concentrations that exceed the cleanup levels would be excavated and placed into lined roll-offs. The roll-offs would then be loaded onto trucks and exterior surfaces decontaminated prior to leaving the site. Because the site soils are considered a hazardous waste, each roll-off would be sampled to characterize the soils prior to transport off site. If the soils meet the requirements of the Landfill Disposal Restrictions (LDRs) contained in 40 CFR 268, they would be taken directly to a RCRA-permitted hazardous waste landfill. If the soils are identified as not meeting the LDR requirements, they would have to be pre-treated prior to disposal at a RCRA-permitted landfill. For purposes of evaluating this alternative, incineration has been considered. Therefore, soils not meeting the LDR requirements would be transported to an off-site RCRA-permitted incinerator and incinerated prior to final landfill disposal. Based on existing site data, it has been estimated that approximately 80 percent of the site soils would require pre-treatment prior to land disposal.

The excavated areas of the site would be backfilled with imported select fill material and compacted. Upon completing the backfilling activities, the site would be graded to promote drainage.

Air monitoring would insure that on-site workers as well as the surrounding community are not exposed to volatilized contaminants during remediation.

Alternative No. 6
Off-Site Incineration

Present Worth:	$23,640,000
Capital Cost:	$23,640,000
Annual O&M:	$18,000

Time to Implement: 1 year

This alternative would involve excavating site soils that contain the chemicals of concern with concentrations above the soil cleanup levels and transporting them off site to a RCRA-permitted incinerator for treatment.

The soils that contain the chemicals of concern with concentrations that exceed the cleanup levels identified in the RAO would be excavated and placed into lined roll offs. The roll offs would then be loaded onto trucks and exterior surfaces decontaminated prior to leaving the site. A licensed hazardous waste hauler would transport the filled roll offs off site to a RCRA-permitted incinerator for treatment.

The excavated areas of the site would be backfilled with imported select fill material and compacted. After the backfilling activities were complete, the site would be graded to promote drainage.

Air monitoring would insure that on-site workers as well as the surrounding community are not exposed to volatilized contaminants during remediation.

6.2 Evaluation of Remedial Alternatives

The criteria used to compare the potential remedial alternatives are defined in the regulation that directs the remediation of inactive hazardous waste sites in New York State (6 NYCRR Part 375). For each of the criteria, a brief description is provided. A detailed discussion of the evaluation criteria and comparative analysis is contained in the Feasibility Study.

The first two evaluation criteria are termed threshold criteria and must be satisfied in order for an alternative to be considered for selection.

1. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance.

At this site the source of contamination in the unsaturated soils is being addressed by the remedy and the cleanup goals for the site are based on the NYSDEC, Technical and Administrative Guidance Memoranda (TAGM), HWR-92-4046.

The bioremediation remedy proposed for the site meets the alternative technology based cleanup levels determined by the Department as acceptable due to the site-specific conditions and the overall mass reduction of contaminants at the site.

The site-specific conditions of the site which influence the cleanup objectives are the groundwater use and potential migration of contaminants into Onondaga Lake.

The naturally high salinity and total dissolved solids concentration make and have made the groundwater unsuitable as a potable water supply. Concentrations of chloride in groundwater beneath the site range from 32,000 to 77,000 mg/l. The NYSDEC Class GA water quality standard for chloride is 250 mg/l.

Based on the presence of naturally-high salinity and total dissolved solids concentration, remediating the chemicals of concern present in groundwater beneath the site will not be sufficient to make the groundwater suitable for potable use.

Based on these conclusions, the Remedial Action Objectives (RAO) for the site are to reduce the concentration of the chemicals of concern in unsaturated soils to levels which will mitigate the potential leaching of these chemical constituents to groundwater, annual groundwater monitoring to verify that the chemicals of concern are not migrating past the site boundary and deed restrictions to prevent future use of and potential human exposure to site groundwater.

These RAOs, can be met using technology-based soil cleanup levels. The soil cleanup levels are based on the use of bioremediation as the remedial alternative for soils at the site and the practical limit of the technology in attaining groundwater protection cleanup levels. The cleanup levels are presented in Table 2.

Alternatives 1 and 2 do not meet the cleanup guidance criteria. Alternatives 3,4, 5, and 6 meet the RAOs and the guidance criteria. Any discharges of water and/or gas made necessary by these technologies would also be able to comply with State regulations.

2. Protection of Human Health and the Environment. This criterion is an overall evaluation of the health and environmental impacts to assess whether each alternative is protective.

Alternatives 1 and 2 do nothing to mitigate the source of contamination at this site and allow further contaminant migration from the unsaturated soils at the site, although alternative 2 would serve to slow the rate of migration by limiting the amount of precipitation infiltrating the waste at the site. The remainder of the alternatives are protective of human health and the environment through either removal, destruction or treatment.

The next five "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared with the other alternatives.

All alternatives can be implemented within a two year time period. A third bioremediation option (i.e. 4c) would take an estimated sixteen years to implement and has been eliminated for that reason.

The adverse short term impacts, due to the remediation, are a function of contaminant volatilization during material handling of the soils. Alternative 4a with in-situ soil blending would have controllable emissions by virtue of the ability to slow down mixing or stop if emissions occur and use mitigation

Table 2
Soil Cleanup Levels

Methylene chloride	10 ppm
Trichloroethene	10 ppm
Benzene	10 ppm
Toluene	10 ppm
Ethylbenzene	10 ppm
Xylene	10 ppm
N,N-dimethylaniline	10 ppm
Aniline	10 ppm
Methanol	10 ppm
Acetone	10 ppm

measures to minimize volatilization. Alternatives 3, 5, and 6 also involve extensive material handling with 5 and 6 including off-site trucking during which contaminant volatilization would be a concern during this handling.

4. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of alternatives after implementation of the response actions. If wastes or treated residuals remain on site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the controls intended to limit the risk, and 3) the reliability of these controls.

Alternative 1 would not be effective because it does not remove contaminants from the unsaturated soils. Alternative 2 would not remove contaminants from the soils, but it would slow the potential migration by reducing the infiltration of precipitation into the site waste. All the remaining are effective in that the source of contamination is removed from the site. The residual contaminants remaining on site would be less than 5 ppm in undisturbed areas and less than 10 ppm in treated areas. These concentrations are below the acceptable human health guidelines contained in the guidance HWR-92-4046 and the environmental concerns associated with leaching into the groundwater would be minimized.

5. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

Alternative 1 would have no effect on the mobility, toxicity or volume. Alternative 2 would have no reduction in toxicity or volume but would reduce mobility by preventing rainwater and surface water from entering the contaminant mass and transporting contaminants off site.

Incineration via alternatives 3 and 6 would destroy the contaminants at the site, however, the material handling would result in some volatilization of contaminants into the atmosphere.

Alternative 3 would destroy most of the contaminant mass at the site and volatilization would be minimized by in-situ blending of the soils. The ex-situ biotreatment would require more material handling and result in greater volatilization of contaminants.

Alternative 5 would remove the material from the site and is not a contaminant destruction technology. The material handling would result in volatilization of some of the contaminants.

Alternative 3a appears to be the most effective choice to maximize destruction of the contaminant mass while minimizing the loss of contaminants due to volatilization.

6. Implementability. The technical and administrative feasibility of implementing each alternative is evaluated. Technically, this includes the difficulties associated with the construction, the reliability of the technology, and the ability to monitor the effectiveness of the remedy. Administratively, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc..

All of the alternatives can be implemented at this site. Alternatives 1 and 2 are the easiest to implement due to the fact that they do not move or treat the contaminant mass at the site.

The on-site destruction technologies, alternatives 3 & 4 are more technically challenging and would require air monitoring and soil sampling for verification that remediation has occurred. Nevertheless, these alternatives can be implemented. Although the bioremediation alternative would be the most difficult to implement due to the necessary growth of microorganisms and insuring that they consume the contaminants, a treatability study completed in 1993 has documented the success of this technology at this site. The administrative task of verifying that the remediation has been completed satisfactorily would require more detail during design to insure a performance criteria as well as a sampling methodology to verify that the cleanup levels have been obtained throughout the site.

The off-site technologies, alternatives 5 & 6 would require monitoring and sampling during the excavation of the contaminated soils.

7. Cost. Capital and operation and maintenance costs are estimated for each alternative and compared on a present worth basis. Although cost is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the remaining criteria, cost effectiveness can be used as the basis for the final decision. The costs for each alternative are presented in Table 3.

The cost varies with the amount of material handling required and the amount of chemical processing required. Capping requires no handling of the contaminants and no chemical processing and the costs are the lowest of those which could be implemented at the site.

Bioremediation has minimal material handling in order to aerate the soils and to grow the microorganisms. The chemical processing is done by the microorganisms as they consume the chemical contaminants. The cost associated with bioremediation is the lowest of the treatment technologies.