

Brooks
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FINAL REPORT

APPENDICES

ALASKA RAILROAD CORPORATION INTEGRATED VEGETATION MANAGEMENT RESEARCH PROJECT

by
Timothy Tilsworth
Lawrence A. Johnson
James D. Durst
Jill S. Chouinard
Darren F. Mulkey
Adam H. Owen
Tracey L. Preston

INE 89.15

March 1991



INSTITUTE OF
NORTHERN
ENGINEERING

UNIVERSITY OF
ALASKA FAIRBANKS

Fairbanks, Alaska 99775-176

APPENDIX A

Herbicide Application Concentrations

HERBICIDE MIXTURES

The following components were mixed through slow stirring (not shaking) for about 10 minutes prior to application and in the order listed:

1.	Water @ 70°F+	=	10,573	ml
2.	Velpar (262.4 grams)	=	210	ml
3.	NalControl	=	5.3	ml
4.	Garlon 3A	=	109.5	ml
5.	X-77	=	27.4	ml
6.	Hi-Lite	=	23	ml
	Total	=	10,948.2	ml

CHARACTERISTICS

Garlon 3A: Liquid with 44.4% A.I.

Application rate = 0.5 gal./acre

s.g. = 1.135 liquid @ 20°C

Velpar: Powder with 90% A.I.

Application rate = 10 lb./acre

s.g. = 1.25 beige powder @ 25°C

NalControl:

Application rate = 4.266 fld oz/acre
= 7.3 ml/area

Hi-Lite:

Application rate = 0.75+ oz/3 gal
= 21.4 ml/area

X-77:

Application rate = 0.25% of Volume
= 27.4 ml/area

APPENDIX B

Background Analyses



28 August 1990

**ANALYTICAL
RESOURCES
INCORPORATED**

ANALYSIS
CHEMISTS &
CONSULTANTS

133 Ninth Ave. North
Seattle, WA 98109-5187
206/821-5490
206/821-7523 (FAX)

Mr. Darren Mulkey
University of Alaska-Fairbanks
Environmental Quality Engineering
539 Duckering
Duckering Bldg., Room 361
Fairbanks, AK 99775-0660

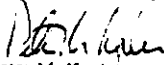
**RE: U of A-Fairbanks Project: Alaska Railroad. Herb.
samples received 7-20-90: ARI JOB #6697**

Dear Mr. Mulkey:

Please find the enclosed results for the above referenced project.

If you have any questions or need any further information, please feel free to call any time.

Sincerely,
ANALYTICAL RESOURCES, INC.


Peter M. Kepler
Project Coordinator

PMK/bv

Enclosures

cc: file#6697



**ANALYTICAL
RESOURCES
INCORPORATED**

Analytical
Chemists &
Consultants

133 North Ave. North
Seattle, WA 98109-5111
206/821-6490

ORGANICS ANALYSIS DATA SHEET
Organophosphorous Pesticides
by modified Method 8140 (GC/NPD)

Sample No: CL5-22-89

Lab Sample ID: 3085 A
Matrix: Soils/Sediments

QC Report No: 3085-UAF
Project: Alaska Railroad
VTSR: 06/05/89

Date Release Authorized: *[Signature]*
Report prepared 06/12/89 - MAC/C.C.G.

GPC Cleanup: YES

Date Extracted: 06/07/89
Date Analyzed: 06/09/89
Conc/Dil Factor: 1:2
Dry Wt Extracted: 32.27 gm

CAS Number		µg/Kg
314-40-9	Bromacil	1.00
51235-04-2	Hexazinon (Velpar)	10.0 U

Surrogate Recovery		
1,3-Dimethyl-2-nitrobenzene		46%

Data Qualifiers

- U Indicates compound was analyzed for but not detected at the given detection limit.
- NA Indicates compound not analyzed.



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Analytical
Chemists &
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133 North Ave. North
Seattle, Wa 98109-51
206/421-6490

ORGANICS ANALYSIS DATA SHEET - METHOD 8150

Lab Sample ID: 3085 A
Matrix: Sediment

Sample No.: C L S - 22 - 89

Client: Univ. Alaska
at Fairbanks

Date Extracted: 06/16/89

Date Analyzed: 06/22/89

Dry Weight: 29.51 g

Conc/Dil Factor: 1:5

QC Report No: 3085

VTSR: 06/05/89

Data Release Authorized: *Lita W. Holden*
Report prepared on MAC-C C.G. 06/26/89

CAS Number		µg/kg
94-75-7	2,4-D	1.5 U
1918-02-1	Picloram	1.0 U
	Triclopyr	0.3 U

* Herbicide Surrogate Recovery	
2,3-Dichloropropoxyacetic acid	39%

Data Qualifiers

U Indicates compound was analyzed for but not detected at the given detection limit.



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133 Ninth Ave. North
Seattle, WA 98109-5116
2061421-6490

ORGANICS ANALYSIS DATA SHEET
Organophosphorous Pesticides
by modified Method 8140 (GC/NPD)

Sample No: 5-23-89(Comp.)

Lab Sample ID: 3085 B
Matrix: Soils/Sediments

QC Report No: 3085-UAF
Project: Alaska Railroad
VTSR: 06/05/89

Data Release Authorized: *Peter M. Kaplan*
Report prepared 06/12/89 - MAC C.C.G.

GPC Cleanup: YES

Date Extracted: 06/07/89
Date Analyzed: 06/09/89
Conc/Dil Factor: 1.2
Dry Wt Extracted: 28.43 gm

CAS Number		ug/Kg
314-40-9	Bromachl	20.0 U
51235-04-2	Hexazinon (Velpar)	10.0 U

Surrogate Recovery	
1,3-Dimethyl-2-nitrobenzene	47%

Data Qualifiers

- U Indicates compound was analyzed for but not detected at the given detection limit.
NA Indicates compound not analyzed.



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CHEMICAL
ANALYSIS &
CONSULTANTS

101 North 4th Street
Fairbanks, Alaska 99709-5111
(907) 452-1549

ORGANICS ANALYSIS DATA SHEET - METHOD 8150

Lab Sample ID: 3085 B
Matrix: Sediment

Sample No. 5-23-89 Comp.

Client: Univ. Alaska
at Fairbanks

CC Report No: 3085

VTSR: 06/05/89

Date Extracted: 06/16/89

Date Analyzed: 06/22/89

Dry Weight: 26.46 g

Conc/Dil Factor: 5

Data Release Authorized: *[Signature]*

Report prepared on MAC: C.C.G. 06/26/89

CAS Number		ug/kg
94-75-7	2,4-D	1.5 U
1918-02-1	Pictoram	0.6 U
	Triclopyr	0.3 U

* Herbicide Surrogate Recovery	
2,3-Dichlorophenoxyacetic acid	48%

Data Qualifiers

U indicates compound was analyzed for but not detected at the given detection limit.



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CHEMISTS &
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333 North Ave. North
Seattle, WA 98109-51
2061821-6490

ORGANICS ANALYSIS DATA SHEET
Organophosphorous Pesticides
by modified Method 8140 (GC/NPD)

Sample No: B1(1)5-24-89

Lab Sample ID: 3085 C
Matrix: Soils/Sediment

QC Report No: 3085-UAF
Project: Alaska Railroad
VTSR: 06/05/89

Data Release Authorized: *[Signature]*
Report prepared 06/12/89 - MAC.C.C.G.

GPC Cleanup: YES

Date Extracted: 06/07/89
Date Analyzed: 06/09/89
Conc/Dil Factor: 1.2
Dry Wt Extracted: 29.04 gm

CAS Number		ug/Kg
314-40-9	Bromacil	20.0 U
51235-04-2	Hexazinon (Velpar)	0.0 U

Surrogate Recovery	
1,3-Dimethyl-2-nitrobenzene	43%

Data Qualifiers

- U Indicates compound was analyzed for but not detected at the given detection limit.
- NA Indicates compound not analyzed.



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Consultants

333 Ninth Ave. North
Seattle, Wa 98109-518
206/821-6490

ORGANICS ANALYSIS DATA SHEET - METHOD 8150

Lab Sample ID: 3085 C
Matrix: Sediment

Sample No. 5-24-89 81(1)

Client: Univ. Alaska
at Fairbanks

Date Extracted: 06/16/89
Date Analyzed: 06/22/89
Dry Weight: 30.97 g
Conc/Dil Factor: 1.5

GC Report No: 3085
VTSR: 06/05/89

Data Release Authorized: *Peter M. Kuhn*
Report prepared on MAC.C C.G. 06/26/89

CAS Number		ug/kg
94-75-7	2,4-D	1.5 U
1918-02-1	Picloram	0.8 U
	Triclopyr	1.03 U

* Herbicide Surrogate Recovery	
2,3-Dichlorophenoxyacetic acid	3.6 %

Data Qualifiers

U Indicates compound was analyzed for but not detected at the given detection limit.



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333 Ninth Ave. North
Seattle, WA 98109-5124
206/821-6490

ORGANICS ANALYSIS DATA SHEET
Organophosphorous Pesticides
by modified Method 8140 (GC/NPD)

Sample No: 81(2)5-24-89

Lab Sample ID: 3085 D
Matrix: Soils/Sediments

QC Report No: 3085-UAF
Project: Alaska Railroad
VTSR: 06/05/89

Data Release Authorized: *[Signature]*
Report prepared 06/12/89 - MAC/C.C.G.

GPC Cleanup: YES

Date Extracted: 06/07/89
Date Analyzed: 06/09/89
Conc/Dil Factor: 1.2
Dry Wt Extracted: 36.25 gm

CAS Number		µg/Kg
316-40-9	Bromacil	1.80
51235-04-2	Hexazinon (vepar)	10.0 U

Surrogate Recovery	
1,3-Dimethyl-2-nitrobenzene	54%

Data Qualifiers

- U Indicates compound was analyzed for but not detected at the given detection limit.
- NA Indicates compound not analyzed.



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— CHEMISTS &
— CONSULTANTS

100 Ninth Ave. North
Fairbanks, Alaska 99709-5100
(907) 452-5490

ORGANICS ANALYSIS DATA SHEET - METHOD 8150

Lab Sample ID: 3085 D
Matrix: Sediment

Sample No. 5-24-89 BI(2)

Client: Univ. Alaska
at Fairbanks

Date Extracted: 06/16/89
Date Analyzed: 06/22/89
Dry Weight: 28.51 g
Conc/Dil Factor: 1.5

OC Report No: 3085
VTSP: 06/05/89

Data Release Authorized: *Peter H. Kuylen*
Report prepared on MAC-C C.G. 06/28/89

CAS Number		µg/kg
94-75-7	2,4-D	1.5 U
1918-02-1	Picloram	5.0 U
	Triclopyr	0.4 U

* Herbicide Surrogate Recovery	
2,3-Dichlorophenoxyacetic acid	146%

Data Qualifiers

U Indicates compound was analyzed for but not detected at the given detection limit.



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133 Ninth Ave. North
Seattle, WA 98109-51
2061821-6490

ORGANICS ANALYSIS DATA SHEET
Organophosphorous Pesticides
by modified Method 8140 (GC/NPD)

Sample No: B1(3)5-24-89

Lab Sample ID: 3085 E
Matrix: Soils/Sediments

QC Report No: 3085-UAF
Project: Alaska Railroad
VTSR: 06/05/89

Data Release Authorized: [Signature]
Report prepared 06/12/89 - MAC.C.C.G.

GPC Cleanup: YES

Date Extracted: 06/07/89
Date Analyzed: 06/09/89
Conc/Dil Factor: 1:2
Dry Wt Extracted: 32.56 gm

CAS Number		µg/Kg
314-40-9	Bromacil	37
51235-04-2	Hexazinon (Velpar)	0.0 U

Surrogate Recovery	
1,3-Dimethyl-2-nitrobenzene	41%

Data Qualifiers

- U Indicates compound was analyzed for but not detected at the given detection limit.
- NA Indicates compound not analyzed.



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133 Ninth Ave. North
Seattle, WA 98109-512
206/821-6490

ORGANICS ANALYSIS DATA SHEET - METHOD 8150

Lab Sample ID: 3085 E
Matrix: Sediment

Sample No. 5-24-89 B1(3)

Client: Univ. Alaska
at Fairbanks

Date Extracted: 06/16/89
Date Analyzed: 06/22/89
Dry Weight: 31.52 g
Conc/Dil Factor: 1.5

CC Report No: 3085
VTSR: 06/05/89

Data Release Authorized: Peter M. Kaplan
Report prepared on MAC-C C.G. 06/26/89

CAS Number		µg/kg
94-75-7	2,4-D	1.5 U
1919-02-1	Picloram	1.5 U
	Triclopyr	0.3 U

* Herbicide Surrogate Recovery		
2,3-Dichlorophenoxyacetic acid		4.8 %

Data Qualifiers

U Indicates compound was analyzed for but not detected at the given detection limit.



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133 Ninth Ave North
Seattle, WA 98109-518
206/421-8490

ORGANICS ANALYSIS DATA SHEET
Organophosphorous Pesticides
by modified Method 8140 (GC/NPD)

Sample No: F15-24-89

Lab Sample ID: 3085 F
Matrix: Soils/Sediments

QC Report No: 3085-UAF
Project: Alaska Railroad
VTSR: 06/05/89

Data Release Authorized: [Signature]
Report prepared 06/12/89 - MAC/C.C.G.

GPC Cleanup: YES

Date Extracted: 06/07/89
Date Analyzed: 06/09/89
Conc/Dil Factor: 1:2
Dry Wt Extracted: 39.83 gm

CAS Number		ug/Kg
314-40-9	Bromacil	1.0
51235-04-2	Hexazinon (Velpar)	10.0 U

Surrogate Recovery	
1,3-Dimethyl-2-nitrobenzene	43%

Data Qualifiers

- U Indicates compound was analyzed for but not detected at the given detection limit.
- NA indicates compound not analyzed.



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133 North Ave. North
Seattle, WA 98109-51
206/521-5490

ORGANICS ANALYSIS DATA SHEET - METHOD 8150

Lab Sample ID: 3085 F
Matrix: Sediment

Sample No. F15-24-89

Client: Univ. Alaska
at Fairbanks

Date Extracted: 06/16/89
Date Analyzed: 06/22/89
Dry Weight: 34.64 g
Conc/Dil Factor: 1:5

QC Report No: 3085
VTSR: 06/05/89

Data Release Authorized: *[Signature]*
Report prepared on MAC:C.C.G. 06/26/89

CAS Number		ug/kg
94-75-7	2,4-D	1.5 U
1918-02-1	Picloram	8.0 U
	Triclopyr	0.4 U

* Herbicide Surrogate Recovery	
2,3-Dichlorophenoxyacetic acid	55%

Data Qualifiers

U indicates compound was analyzed for but not detected at the given detection limit.



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133 North Ave North
Seattle, WA 98109-51
206) 621-6490

ORGANICS ANALYSIS DATA SHEET
Organophosphorous Pesticides
by modified Method 8146 (GC/NPD)

Sample No: SES-31-89

Lab Sample ID: 3085 G
Matrix: Soils/Sediments

OC Report No: 3085-UAF
Project: Alaska Railroad
VTSR: 06/05/89

Data Release Authorized: *[Signature]*
Report prepared 06/12/89 - MAC:C.C.G.

GPC Cleanup: YES

Date Extracted: 06/07/89
Date Analyzed: 06/09/89
Conc/Dil Factor: 1:2
Dry Wt Extracted: 34.23 gm

CAS Number		µg/Kg
314-40-9	Bromacil	2.3
51235-04-2	Hexazinon (Velpar)	10.0 U

Surrogate Recovery	
1,3-Dimethyl-2-nitrobenzene	43%

Data Qualifiers

- U Indicates compound was analyzed for but not detected at the given detection limit.
- NA Indicates compound not analyzed.



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133 Ninth Ave. North
Seattle, Wa 98109-518
206/621-6490

ORGANICS ANALYSIS DATA SHEET - METHOD 8150

Lab Sample ID: 3085 G
Matrix: Sediment

Sample No. SE5-31-89

Client: Univ. Alaska
at Fairbanks

Date Extracted: 06/16/89
Date Analyzed: 06/22/89
Dry Weight: 35.60 g
Conc/Oil Factor: 1.5

QC Report No: 3085
VTSR: 06/05/89

Data Release Authorized: *Peter J. Kelle*
Report prepared on MAC.C C.G. 06/26/89

CAS Number		µg/kg
94-75-7	2,4-D	1.5 U
1918-02-1	Picloram	2.0 U
	Triclopyr	0.3 U

* Herbicide Surrogate Recovery	
2,3-Dichlorophenoxyacetic acid	58%

Data Qualifiers

U Indicates compound was analyzed for but not detected at the given detection limit.



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133 Ninth Ave. North
Seattle, Wa 98109-316
206/821-6490

ORGANICS ANALYSIS DATA SHEET
Organophosphorous Pesticides
by modified Method 8140 (GC/NPD)

Sample No: FT6-01-89

Lab Sample ID: 3085 H
Matrix: Soils/Sediments

QC Report No: 3085-UAF
Project: Alaska Railroad
VTSR: 06/05/89

Data Release Authorized: *[Signature]*
Report prepared 06/12/89 - MAC:C.C.G.

GPC Cleanup: YES

Date Extracted: 06/07/89
Date Analyzed: 06/09/89
Conc/Dil Factor: 1:2
Dry Wt Extracted: 36.12 gm

CAS Number		ug/Kg
314-40-9	Bromacil	20.0 U
51235-04-2	Hexazinon (Velpar)	10.0 U

Surrogate Recovery	
1,3-Dimethyl-2-nitrobenzene	37%

Data Qualifiers

- U Indicates compound was analyzed for but not detected at the given detection limit.
- NA indicates compound not analyzed.



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CHEMISTS &
CONSULTANTS

133 North Ave. North
Seattle, WA 98109-5117
206/821-6490

ORGANICS ANALYSIS DATA SHEET - METHOD 8150

Lab Sample ID: 3085 H
Matrix: Sediment

Sample No. FT 6-01-89

Client: Univ. Alaska
at Fairbanks

Date Extracted: 06/16/89

QC Report No: 3085

Date Analyzed: 06/22/89

VTSR: 06/05/89

Dry Weight: 32.82 g

Conc/Dil Factor: 1:5

Data Release Authorized: *[Signature]*
Report prepared on MAC-C C.G. 06/26/89

CAS Number		ug/kg
94-75-7	2,4-D	1.5 U
1918-02-1	Pictoram	0.9 U
	Triclopyr	0.4 U

* Herbicide Surrogate Recovery	
2,3-Dichlorophenoxyacetic acid	56%

Data Qualifiers

U Indicates compound was analyzed for but not detected at the given detection limit.



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133 North Ave. Norm
Seattle, WA 98109-5116
2061821-6490

**CREOSOTE ANALYSIS
BY GC/FID
DATA REPORT SHEET**

**QC Report: 3085- University of Alaska Fairbanks
VTSR: 06/05/89
MATRIX: Soil
PROJECT: Alaska Railroad**

<u>ABL SAMPLE #</u>	<u>CLIENT SAMPLE #</u>	<u>Creosote (ppm)</u>
3085 MB	Method Blank	20 U
3085 A	CLS-22-89	20 U
3085 B	5-23-89 (Comp)	20 U
3085 C	BK(1)5-24-89	20 U
3085 D	BK(2)5-24-89	20 U
3085 E	BK(3)5-24-89	20 U
3085 F	FIS-24-89	20 U
3085 G	SES-31-89	20 U
3085 H	FT6-01-89	20 U

DATA QUALIFIERS

U Indicates compound was analyzed for but not detected at the given detection limit.

Data Release Authorized Pete M. Kunkle
Report prepared 06/15/89 - MAC:C.C.G.



**ANALYTICAL
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Analysts
Chemists &
Consultants

133 Ninth Ave. North
Seattle, WA 98109-5167
(206) 621-6480
(206) 621-7523 (FAX)

25 July 1989

Dr. Tim Tilsworn
University of Alaska-Fairbanks
306 Tanana Drive
Duckering Bldg., Room 361
Fairbanks, AK 99775-0660

RE: U of A-Fairbanks Project: Alaska Railroad

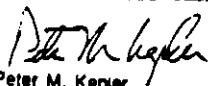
Dear Dr. Tilsworn:

Please find the enclosed results for the above referenced project.

If you have any questions or need any further information, please feel free to call any time.

Sincerely,

ANALYTICAL RESOURCES, INC.


Peter M. Kepler
GC Laboratory Manager

PMK/bv

Enclosures

cc: file#3295



ANALYTICAL
RESOURCES
INCORPORATED

Analysis
Chemists &
Consultants

133 Ninth Ave. North
Seattle, WA 98109-5167
206 821-6490
206 821-7523 (FAX)

Organics Analysis Data Sheet
Organophosphorus Pesticide by Method 8140

Matrix: Soil

QC Report: 3295 - Univ. of Alaska at Fairbanks
Project No: Alaska Railroad
Date Received: 07/14/89

Data Release Authorized
Report Prepared 07/24/89 - MAC:C.C.G.

Peter M. Kepler

Reported in ppb(µg/kg)

Client:	Method Blank	79 A	8 B	8 C	8 D
ARI #:	0718MB	3295 A	3295 B	3295 C	3295 D
Date Extracted:	07/18/89	07/18/89	07/18/89	07/18/89	07/18/89
Date Analyzed:	07/24/89	07/24/89	07/24/89	07/24/89	07/24/89
Dry Weight:	15.0 g	17.86 g	15.35 g	17.76 g	15.61 g
Dilution:	1:2	1:2	1:2	1:20	1:20
Velpar	40 U	40 U	1300	8400	7000
Surrogate Recovery*	49%	22%	26%	40%	47%

DATA QUALIFIERS

- * Surrogate is 1,3-Dimethyl-2-nitrobenzene
- J Indicates an estimated value when the result is less than the calculated detection limit.
- U Indicates compound was analyzed for but not detected at the given detection limit.



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Analysts
Charles A.
Conners

333 North Ave. North
Seattle, WA 98109-5187
206) 821-6480
206) 821-7523 (FAX)

**Organics Analysis Data Sheet
Herbicides by Method 8150**

Matrix: Soil

OC Report: 3295 - Univ. of Alaska at Fairbanks
Project No: Alaska Railroad
Date Received: 07/14/89

Data Release Authorized
Report Prepared 07/24/89 - MAC:G.C.G.

John W. Kaplan

Reported in ppb(µg/kg)

Client:	Method Blank	79 A	8 B	8 C	8 D
ARI #:	0718MB	3295 A	3295 B	3295 C	3295 D
Date Extracted:	07/18/89	07/18/89	07/18/89	07/18/89	07/18/89
Date Analyzed:	07/20/89	07/20/89	07/20/89	07/20/89	07/20/89
Dry Weight:	25.0 g	25.07 g	23.40 g	23.50 g	25.47 g
Dilution:	.5	.5	1:250	1:250	1:250
Garlon 3A(Triclopyr)	10 U	0.9 J	1100	1500	950
Surrogate Recovery*	63%	77%	91%	81%	84%

DATA QUALIFIERS

- * Surrogate is 2,3 - Dichlorophenoxyacetic Acid
- J Indicates an estimated value when the result is less than the calculated detection limit.
- U Indicates compound was analyzed for but not detected at the given detection limit.

12 January 1990



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ANALYTICAL
CHEMISTS &
CONSULTANTS

122 New Ave. North
Seattle, Wa 98109-5187
206/821-6490

Mr. Darren Mulkey
University of Alaska-Fairbanks
Environmental Quality Engineering
539 Duckering
Duckering Bldg., Room 351
Fairbanks, AK 99775-0660

RE: U of A-Fairbanks Project: Alaska Railroad, samples received
12-26-89.

Dear Mr. Mulkey:

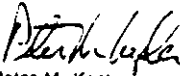
Please find the enclosed results of the analysis for Hexazinone for the above
referenced project.

As you know, the analysis for Triclopyr was not performed due to insufficient
sample. Also, your sample #5 was broken during shipment.

If you have any questions or need any further information, please feel free to call
any time.

Sincerely,

ANALYTICAL RESOURCES, INC.


Peter M. Kepler
GC Laboratory Manager

PMK/bv

Enclosures

cc: file#4319



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333 North Ave. North
Seattle, WA 98109-5187
206 621-6490

ORGANICS ANALYSIS DATA SHEET
Organophosphorous Pesticides
by modified Method 8140 (GC/NPD)

Lab Sample ID: 4319MB
Matrix: Soil

Sample No: Method Blank
QC Report No: University of Alaska
Project: Alaska Railroad
VTSR: 12/26/89

Date Extracted: 01/04/90
Date Analyzed: 01/08/90
Conc/Oil Factor: 1.2
Dry Weight: 20.0 grams

Data Release Authorized:
Report prepared 01/10/90 - MAC: C.C.P.G.I

CAS Number	Conc	ug/kg
51235-04-2	Hexazinon (Verpar)	U

Surrogate Recovery	Conc	%
Benidocarb		52%

Data Qualifiers

- U Indicates compound was analyzed for but not detected at the given detection limit.
- NA Indicates compound not analyzed.
- J Indicates an estimated value when result is less than specified detection limit.



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206/621-6490

ORGANICS ANALYSIS DATA SHEET
Organophosphorous Pesticides
by modified Method 8140 (GC/NPD)

Lab Sample ID: 4319 A
Matrix: Soil

Sample No: # 1
QC Report No: University of Alaska
Project: Alaska Railroad
VTSR: 12/26/89

Date Extracted: 01/04/90
Date Analyzed: 01/09/90
Conc/Dil Factor: 1:40
Dry Weight: 20.5 grams

Data Release Authorized: *[Signature]*
Report prepared 01/10/90 - MAC.C.C.P.G.

CAS Number		ug/kg
51235-04-2	Hexazinon (Velpar)	14000

Surrogate Recovery	
Benflorcarb	85%

Data Qualifiers

- U Indicates compound was analyzed for but not detected at the given detection limit.
- NA Indicates compound not analyzed.
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ORGANICS ANALYSIS DATA SHEET
Organophosphorous Pesticides
by modified Method #140 (GC/NPD)

Lab Sample ID: 4319 C
Matrix: Soil

Sample No: # 3
GC Report No: University of Alaska
Project: Alaska Railroad
VTSR: 12/26/89

Date Extracted: 01/04/90
Date Analyzed: 01/08/90
Conc/Dil Factor: 1:2
Dry Weight: 20.1 grams

Data Release Authorized: *[Signature]*
Report prepared 01/10/90 - MAC/C.C.P.G.

CAS Number		ug/kg
51235-04-2	Hexazinon (Velpar)	140

Surrogate Recovery	
Benidocarb	97%

Data Qualifiers

- U Indicates compound was analyzed for but not detected at the given detection limit.
- NA Indicates compound not analyzed.
- J Indicates an estimated value when result is less than specified detection limit.



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ORGANICS ANALYSIS DATA SHEET
Organophosphorous Pesticides
by modified Method 8140 (GC/NPD)

Lab Sample ID: 4319 D
Matrix: Soil

Sample No: 84
QC Report No: University of Alaska
Project: Alaska Railroad
VTSR: 12/26/89

Date Extracted: 01/04/90
Date Analyzed: 01/09/90
Conc/Dil Factor: 1:20
Dry Weight: 30.7 grams

Data Release Authorized: *[Signature]*
Report prepared 01/10/90 - MAC:G C.P.G.

CAS Number		ug/kg
51235-04-2	Hexazinon (Velpar)	420

Surrogate Recovery	
Benflocarb	97%

Data Qualifiers

- U Indicates compound was analyzed for but not detected at the given detection limit.
- NA Indicates compound not analyzed.
- J Indicates an estimated value when result is less than specified detection limit.



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ORGANICS ANALYSIS DATA SHEET
Organophosphorous Pesticides
by modified Method 8140 (GC/NPD)

Lab Sample ID: 4319 F
Matrix: Soil

Sample No: # 6
QC Report No: University of Alaska
Project: Alaska Railroad
VTSR: 12/26/89

Date Extracted: 01/04/90
Date Analyzed: 01/08/90
Conc/Dil Factor: 1:2
Dry Weight: 31.3 grams

Data Release Authorized: *[Signature]*
Report prepared 01/10/90 - MAC: C.C.P.G.

CAS Number	µg/kg
51235-04-2 Hexazinon (Veget)	170

Surrogate Recovery	
Benidocarb	132%

Data Qualifiers

- U Indicates compound was analyzed for but not detected at the given detection limit.
- NA Indicates compound not analyzed.
- J Indicates an estimated value when result is less than specified detection limit.



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333 North Ave. North
Seattle, WA 98109-5187
(206) 821-5430
(206) 821-7523 (FAX)

Organics Analysis Data Sheet
Triclopyr & Velpar Analysis

Matrix: Soil

QC Report: 6697 - Univ. of Alaska - Fairbanks
Project No: Alaska Railroad
Herbicide Project

Data Release Authorized *[Signature]*
Report Prepared 08/28/90 - cog

Date Received: 07/20/90

CHEMPRO #:	Method Blank	492	493	494	495	496	497
ARI #:	2815MB	6697 A	6697 B	6697 C	6697 D	6697 E	6697 F
Date Extracted:	08/15/90	08/15/90	08/15/90	08/15/90	08/15/90	08/15/90	08/15/90
Date Analyzed:	08/27/90	08/24/90	08/24/90	08/24/90	08/24/90	08/24/90	08/24/90
Dry Weight:	10.0 g	13.4 g	13.0 g	14.0 g	10.1 g	15.6 g	14.3 g
Dilution:	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5	1 to 5

Triclopyr (Garlon) - ppb(µg/kg):	30 U	80 U	80 U	80 U	80 U	80 U	39 U
----------------------------------	------	------	------	------	------	------	------

Surrogate Recovery:	78%	94%	94%	90%	92%	87%	95%
---------------------	-----	-----	-----	-----	-----	-----	-----

Surrogate used was Dichloropro

CHEMPRO #:	Method Blank	492	493	494	495	496	497
ARI #:	0730MB	6697 A	6697 B	6697 C	6697 D	6697 E	6697 F
Date Extracted:	07/30/90	07/30/90	07/30/90	07/30/90	07/30/90	07/30/90	07/30/90
Date Analyzed:	08/15/90	08/15/90	08/15/90	08/15/90	08/15/90	08/15/90	08/15/90
Dry Weight:	25.0 g	22.6 g	25.0 g	29.6 g	21.0 g	34.7 g	30.9 g
Dilution:	1 to 2	1 to 2	1 to 2	1 to 2	1 to 2	1 to 2	1 to 2

Velpar - ppb(µg/kg):	50 U	40	61	24	120	9.5	59
----------------------	------	----	----	----	-----	-----	----

Surrogate Recovery:	34%	71%	95%	81%	67%	83%	72%
Internal Standard Recovery:	100%	116%	148%	102%	114%	127%	124%

* Surrogate used was Alachlor
** Internal Standard used was Metribuzin.

DATA QUALIFIERS

- U Indicates compound was analyzed for but not detected at an given detection limit.
- NA Indicates not analyzed.
- NR Indicates not recovered due to chromatographic interference and/or dilution.



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ORGANICS ANALYSIS DATA SHEET - METHOD 8150

Lab Sample ID: 0616MB
Matrix: Sediment

Sample No.: Method Blk

Client: Univ. Alaska
at Fairbanks

QC Report No: 3085
VTSR: 06/05/89

Date Extracted: 06/16/89
Date Analyzed: 06/22/89
Dry Weight: 30.00 g
Conc/Dil Factor: 1.5

Data Release Authorized: *[Signature]*
Report prepared on MAC-C C.G. 06/26/89

CAS Number		ug/kg
94-75-7	2,4-D	1.5 U
1918-02-1	Picloram	0.3 U
	Triclopyr	0.3 U

* Herbicide Surrogate Recovery	
2,3-Dichlorophenoxyacetic acid	1.2 %

Data Qualifiers

U Indicates compound was analyzed for but not detected at the given detection limit.



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Seattle, WA 98109-5111
2061821-6490

ORGANICS ANALYSIS DATA SHEET
Organochlorine Pesticides
by modified Method 8140 (GC/NPD)

Sample No: Method Blank

Lab Sample ID: 0607MB
Matrix: Soils/Sediments

GC Report No: 3085-UAF
Project: Alaska Railroad
VTSR: 06/05/89

Data Release Authorized: Pete M. Kelleher
Report prepared 06/12/89 - MAC/C C.G.

GPC Cleanup: YES

Date Extracted: 06/07/89
Date Analyzed: 06/09/89
Conc/Dil Factor: 1.2
Dry Wt Extracted: 30.00 g

CAS Number	Compound	g/Kg
314-40-9	Bromacil	20 U
51235-04-2	Hexazinon (Veipar)	10 U

Surrogate Recovery	%
1,3-Dimethyl-2-nitrobenzene	47%

Data Qualifiers

- U Indicates compound was analyzed for but not detected at the given detection limit.
- NA Indicates compound not analyzed.

APPENDIX C

Analytical Extraction Methods

Velpar (Hexazinone) Method
Garlon (Triclopyr) Method

VELPAR (HEXAZINONE) METHOD

This method will extract the parent compound as well as metabolites A, B, D, and E.

EXTRACTION PROCEDURE:

1. Weigh out 10 gm of thoroughly mixed soil and transfer to a 250 ml centrifuge tube. Weigh 10 grams of the same soil into an aluminum weigh dish for moisture determination.
2. Add 30 ml of acetone/H₂O solution to the centrifuge tube.
3. Mix the soil and acetone/H₂O solution by shaking the capped tube vigorously and place in the centrifuge for 5 minutes.
4. Filter the aqueous portion through a Whatman #4 filter into a 125 ml Erlenmeyer flask.
5. Repeat steps 2-5 one more time.
6. Transfer the solution from the 125 ml Erlenmeyer flask into a 1 liter Roto-Vapor distillation flask.
7. Rinse the 125 ml Erlenmeyer flask with 10 ml. acetone/H₂O solution and combine it with the aqueous solution in the Roto-Vapor distillation flask.
8. Heat the distillation flask on the Roto-Vapor apparatus at 60 degree C, and under a vacuum, to remove the acetone.
9. Transfer the aqueous solution from the distillation flask into a 125 ml separatory funnel.
10. Rinse the distillation flask with 10 ml deionized H₂O and combine with the aqueous solution in the separatory funnel.
11. Add 20 ml hexane to the separatory funnel and shake for 2 minutes. (Release pressure periodically)
12. Decant aqueous phase (bottom phase) into another 125 ml separatory funnel.
13. Repeat steps 12 and 13 two more times for a total of three hexane extractions of the aqueous phase. (Release pressure periodically)

14. Decant the aqueous phase (bottom phase) into a 125 ml separatory funnel.

THE SAMPLE CAN BE SPLIT AT THIS POINT TO ANALYZE ALL OF THE METABOLITES (Both variations...see step #15). THE ALIQUAT SHOULD BE FIGURED INTO THE DILUTION FACTOR CALCULATION.

- 15a. For the parent compound and metabolites A and B, add 30 ml chloroform.
- 15b. For metabolites D and E, add 30 ml ethyl acetate.
16. Shake separatory funnel for 2 minutes. (Release pressure periodically)
17. Decant chloroform (bottom phase) or ethyl acetate extract into a 125 ml Erlenmeyer flask.
18. Repeat steps 16-18 two more times.
19. Add about 10 gm Na_2SO_4 to the organic solution to remove any water in solution and filter the organic phase through a Whatman #4 filter into a vacuum rotary evaporator distillation flask. Rinse filter paper with about 10 ml chloroform into the distillation flask.
20. Evaporate to dryness in a 60 degree water bath under a vacuum.
21. Redissolve the residue with 20 ml acetonitrile and transfer to a 125 ml separatory funnel. Rinse the vacuum rotary evaporator distillation flask with about 10 ml of acetonitrile and combine with the organic phase in the separatory funnel.
22. Add 20 ml hexane to the separatory funnel and shake for 1 minute. (Release pressure periodically)
23. Transfer the acetonitrile (bottom phase) into a 50 ml beaker and add 2-3 boiling stones. Evaporate on a hot plate to a volume of about 2 ml. Discard the hexane extract.
24. Quantitatively transfer acetonitrile solution into a conical thick walled screw cap vial. Purge with N_2 gas and evaporate to dryness. Be certain all water is evaporated.

SAMPLES CAN BE STORED AT THIS POINT, IN A COOL DARK PLACE UNTIL ESTERIFICATION AND ANALYSIS CAN BE COMPLETED ON THE SAME DAY.

ESTERIFICATION PROCEDURE:

25. Add 1 ml chloroform and 1 ml trifluoroacetic anhydride to the vial, cap it and shake to redissolve residue.
26. Place in a 60 degree C block heater for 30 minutes.
27. After 30 min., cool the sample and evaporate with N₂ gas to dryness.
28. Add exactly 1.00 ml ethyl acetate (be careful during pipetting), recap the vial and shake to redissolve residue and transfer to a G.C. vial. Crimp a lid on the vial and place in storage refrigerator.

READY FOR G.C.

GARLON (TRICLOPYR) METHOD

EXTRACTION

1. Weigh 5 grams of thoroughly mixed soil sample into a 250 ml ground glass Erlenmeyer flask.
2. Add 15 ml deionized H₂O, 50 ml ether, 2 ml 37% KOH solution and two clean boiling chips.
3. Place a flask weight on the Erlenmeyer flask.
4. Heat in a 60-65 degree Celsius water bath for 30-45 minutes. (The ether will evaporate in about 15 minutes)
5. Filter solution through a Whatman #4 filter into a 150 ml centrifuge tube.
6. Rinse flask with 5-10 ml deionized H₂O, swirl and filter again into the 150 ml centrifuge tube.
7. Add 20 ml diethyl ether to the centrifuge tube, swirl the tube gently before putting the cap on. Shake tube gently and vent it by opening the cap partially. Once all air has been released through the gentle shaking, close the bottle tight and shake for 1 min. (IMPORTANT! Release pressure through the cap periodically). Place the bottle in the centrifuge for 5 min.
8. Use a Pasteur pipet to remove the ether (upper) phase. Discard this ether. Add 2 ml cold (4 degree C) H₂SO₄(1+3) to the aqueous phase in the centrifuge bottle, shake and test for pH (2 or less). Add 20 ml diethyl ether to the centrifuge bottle.
9. Shake the acidified aqueous phase and ether solution for 1 min. (IMPORTANT! Shake gently at first and release pressure periodically.) Place the tube in the centrifuge for 5 min. Then pipet the ether (upper) phase into a clean 125 ml Erlenmeyer flask. It is OK if there is some ether left in the bottle at this stage, but avoid pipetting the aqueous phase.
10. Add 10 ml of diethyl ether to the aqueous phase in the centrifuge bottle, and repeat step 9. Add the ether phase obtained after the centrifuging to the same Erlenmeyer flask in step 9. Repeat the extraction one more time with another 10 ml of ether. A total of 40 ml of ether solution should be obtained. (It is recommended that another 10 ml of ether should be added

to the bottle to rinse it, shaking and centrifugation are not necessary at this stage.)

11. Add about 1-2 gm acidified anhydrous Na_2SO_4 to the 125 ml Erlenmeyer flask containing the organic solution, shake and place in a dark hood for 1-2 hours.
12. Filter solution through a Whatman #4 filter into an Erlenmeyer flask, and rinse flask with 10-20 ml diethyl ether. Pour rinse ether into the filter to combine with filtered ether.
13. Add 2-3 clean boiling chips to ether in flask. Place a flask weight on the flask and heat the Erlenmeyer flask in a 60-65 degree C water bath until a final volume of 20 ml or less is obtained (about 20 min.).
14. Cool and pour into a 40 ml test tube, then rinse flask with about 1-2 ml diethyl ether and pour into a 40 ml test tube.
15. Heat in a 60-65 degree C water bath until a final volume of about 1.0-2.0 ml is obtained.
16. Quantitatively transfer the contents to a conical, thick walled 2 ml vial.

ESTERIFICATION

1. Evaporate extract with N_2 gas to dryness at room temperature.
2. Add 0.25 ml BF_3 *Methanol, seal the vial with the cap and heat in an 80 degree C block heater for 1 hour.
3. Transfer solution to a separatory funnel by rinsing the vial with 20 ml 10% NaCl solution.
4. Add 30 ml hexane and shake for 1 minute. Transfer the aqueous solution to an erlenmyer flask. Transfer the hexane to a separate erlenmyer flask.
5. Place the aqueous solution back into the separatory funnel.
6. Repeat step #4. Discard NaCl solution. (bottom phase)
7. Add about 5-10 gm anhydrous Na_2SO_4 to the hexane in the erlenmyer flask.

8. Quantitatively filter the hexane through Whatman #4 filter into a 100 ml beaker and add 2-3 boiling stones.
9. Heat on a hot plate until a volume of less than 1 ml is obtained.
10. Transfer solution to a 1 ml condensing tube and adjust to exactly 1 ml with hexane (use the hexane to rinse the 100 ml beaker).
11. Transfer sample to a G.C. vial and crimp lid on it.
12. Place vial in storage refrigerator.

SAMPLE IS READY FOR G.C.

APPENDIX D

Alaska DOT&PF Soil Analyses

STATE OF ALASKA - NORTHERN REGION
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
REGIONAL MATERIALS LAB REPORT

PROJECT NAME JAF HERBICIDE PROJECT
PROJECT # 10553881
SAMPLE OF TEST PLOTS

JAB # 19-8003
FIELD # DL-5-22-80
L-OUT COMP 0-20

SAMPLED FROM L-OUT COMP 0-20
L REF
GRADE REF
SOURCE AK RAILROAD

REPRESENTS
TEM #
DATE SAMPLED MAY 22, 1980
DATE TESTED JUNE 15, 1980

ACCEPTANCE
INDEPENDENT ASSURANCE
INFORMATION
QUALITY 100%

SIEVE SIZE	AS FIELD SPEC REC'D SPLIT	TEST	AS FIELD SPEC REC'D SPLIT	PLOT OF MOISTURE/DENSITY RELATION
3"		OVERSIZE		
2"		DELETERIOUS		
1 1/2"		FRACTURE		
3/4"	100	LL	NV	
1/2"	98	PI	NP	
3/8"	82	SP GR		
2"	87	FINE AGG		
1/8"	59	COARSE AGG		
1/10"	58	% MOISTURE		
1/16"		% ORGANICS	4.4	
20	50	0.075mm		
40	40	0.075mm		
50	33	SAND EQUIV		
60		-12		
80	28	CALIF BEARINGS		
100	24			
200	19			
		SPECIAL TEST		

TEST RESULT	AS FIELD SPEC REC'D SPLIT
MAX DENSITY	
OPT MOIST	
CAV SP GR	
CAV POINT	3
CAV POINT	3
HOLD NO	1 2 3 4 5
DRY UNIT WT	
% MOISTURE	
FREE MOIST	
REMARKS	

UNIFIED CLASSIFICATION: SM

COMPARISON OF ASSURANCE/ACCEPTANCE SPLIT
ACCEPTABLE ___ UNACCEPTABLE ___
CONFORMS TO SPECIFICATIONS
YES ___ NO ___ NA

SIGNATURE Paul W. Mistry
PAUL W. MISTRY, TME

