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FINAL REPORT

**ALASKA RAILROAD
CORPORATION INTEGRATED
VEGETATION MANAGEMENT
RESEARCH PROJECT**

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FOREWORD

This project initially focused on an investigation of herbicide persistence and migration in Alaska. The scope was later broadened to include alternative methods of vegetation control.

Completion of this research investigation required the efforts of numerous individuals. Four students completed Master of Science theses on subjects associated with this project, and as required for their graduate degrees in the Environmental Quality Engineering and Science Program, Department of Civil Engineering, University of Alaska Fairbanks. The four students were Ms. Jill S. Chouinard, Mr. Darren F. Mulkey, Mr. Adam H. Owen and Ms. Tracey L. Preston.

The report that follows is in large part from the theses prepared for the respective students' University of Alaska thesis requirements. Those students are recognized and acknowledged for their efforts without which this project would not have been completed. The report reflects their efforts and those of others spanning more than two years of study.

An Executive Summary is included with this report to provide the reader with an overview of the project and its findings.

Timothy Tilsworth and Lawrence A. Johnson
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A large number of organizations and individuals assisted the investigators, for which we are very grateful. We acknowledge them for their assistance. However, we note that such acknowledgement does not necessarily imply endorsement of the study or its findings. Several other University employees participated and assisted with the project. They included:

- Ms. Erin Bashaw - Technician
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- Ms. Annie Pham - Technician
- Dr. Pham X. Quang - Statistics
- Ms. Wendy Redpath - Report Preparation
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- Mr. Ralph Chiperno - Roadmaster
- Ms. Debby Davis - Secretary
- Mr. Walter Earl - Logistics
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- Ms. Donna Rulien - Finance
- Ms. Juanita Stewart - Secretary
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- Dr. Sue Bishop, Anchorage
- Mr. Paul Bratton, Talkeetna
- Ms. Sue Libenson, Anchorage
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TABLE OF CONTENTS

FOREWORD	ii
ACKNOWLEDGEMENTS	iii
LIST OF FIGURES	xi
LIST OF TABLES	xv
EXECUTIVE SUMMARY	1 - 1
Conclusions	1 - 4
Recommendations	1 - 7
INTRODUCTION	2 - 1
Justification	2 - 1
Project History	2 - 1
Objectives	2 - 2
HERBICIDE PERSISTENCE AND MIGRATION	3 - 1
Introduction	3 - 1
Methods of Weed Control	3 - 1
Toxicity	3 - 2
Persistence and Migration	3 - 3
Herbicides	3 - 4
Phenoxy Herbicides	3 - 4
Triazine Herbicides	3 - 8
Summary - Persistence and Migration	3 - 14
Herbicide Methods and Materials	3 - 15
Field Testing	3 - 15
Site Description	3 - 15
Site Preparation	3 - 16
Herbicide Application	3 - 16
Herbicide Soil Sampling	3 - 18
Hexazinone Extraction and Analysis	3 - 20
Extraction	3 - 20
Gas Chromotography	3 - 21
Triclopyr Extraction and Analysis	3 - 21
Extraction	3 - 22
Gas Chromotography	3 - 22
Percent Solids Determination	3 - 23

Quality Assurance and Quality Control	3 - 23
Herbicide Data and Discussion	3 - 24
Introduction	3 - 24
Weather Stations	3 - 25
Ground Temperature	3 - 25
Soil Characteristics	3 - 27
Precipitation	3 - 27
Field Data	3 - 29
Hexazinone	3 - 29
Triclopyr	3 - 31
Summary	3 - 32
Laboratory Investigations	3 - 34
Introduction	3 - 34
Microbiological Degradation	3 - 34
Triclopyr	3 - 35
Hexazinone	3 - 37
Soil Microbial Population Counts	3 - 39
Soil Leaching Columns	3 - 39
Triclopyr	3 - 40
Hexazinone	3 - 41
Hydraulic Conductivity	3 - 42
Distribution Coefficient	3 - 42
Adsorption Isotherm Study	3 - 43
Summary and Conclusions	3 - 45
Figures	3 - 46
Tables	3 - 65
VEGETATION MANAGEMENT METHODS EVALUATION	4 - 1
Literature Review	4 - 1
Integrated Vegetation Management	4 - 3
Methods of Vegetation Control	4 - 10
Chemical Vegetation Control	4 - 10
Physical Vegetation Control	4 - 20
Other Methods	4 - 32
Survey of Management Alternatives and Costs	4 - 34
Methods	4 - 34
Results	4 - 35
Analysis of Reported Vegetation Control Costs	4 - 38
Costs Reported From Survey	4 - 39
Figures	4 - 42
Tables	4 - 45
ENGINEERING COST ANALYSES	5 - 1
Railroads Outside Alaska	5 - 1
Methods	5 - 1
Results	5 - 4
Herbicide Application Costs	5 - 4
Brushcutting	5 - 9
Ballast Regulator	5 - 11

Reballasting	5 - 13
Undercutting	5 - 16
Hand Clearing	5 - 21
Alaska Railroad	5 - 22
Methods	5 - 22
Results	5 - 25
Herbicide Application by ARRC	5 - 25
Herbicide Application by Contract	5 - 30
Physical Alternatives	5 - 33
Reballasting	5 - 33
Ballast Regulating	5 - 41
Undercutting	5 - 43
Brushcutting	5 - 52
Hand Weeding	5 - 57
Cost Per Mile	5 - 61
Discussion	5 - 61
Survey Dollar Base Conversion	5 - 61
Adjustment for Treatment Life	5 - 64
Summary	5 - 69
Figures	5 - 71
EFFECTIVENESS OF CONTROL METHODS	6 - 1
Introduction	6 - 1
Site Descriptions	6 - 1
Fort Wainwright	6 - 1
Clear	6 - 2
Chulitna	6 - 3
Birchwood	6 - 3
Bible Camp Road	6 - 3
Fire Creek	6 - 4
Salmon River	6 - 4
Seward	6 - 4
Methods	6 - 5
Sampling Design	6 - 5
Vegetation Assessments	6 - 6
Treatments	6 - 6
Rebuilt Track Sections	6 - 8
Ballast Particle Size	6 - 8
Root Excavations	6 - 8
Data Analyses	6 - 8
Total Vascular Cover	6 - 9
Woody Stems	6 - 10
Growth Forms	6 - 10
Ballast Fines	6 - 10
Results	6 - 11
Total Vascular Cover	6 - 11
Woody Stems	6 - 14
Growth Forms	6 - 16
Rebuilt Track Sections	6 - 18
Ballast Fines	6 - 18

Root Excavations	6 - 19
Observations	6 - 19
Discussion	6 - 20
Conclusions	6 - 23
Recommendations	6 - 24
Figures	6 - 25
Tables	6 - 32

BIBLIOGRAPHY AND SELECTED REFERENCE	7 - 1
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APPENDICES	Vol II
-------------------	---------------

A - Herbicide Application Concentrations
B - Background Analyses
C - Analytical Extraction Methods
D - Alaska DOT&PF Soil Analyses
E - Railroad Survey Forms
F - Railroads Contacted
G - Summary of Railroad Survey Responses
H - Species List by Site
I - Vegetation Analyses Summary Statistics

LIST OF FIGURES

- Figure 3.1. Phenoxy chemical structure.
- Figure 3.2. Triclopyr: [(3,5,6-trichloro-2-pyridinyl)oxy]acetic acid.
- Figure 3.3. Typical triazine molecule.
- Figure 3.4. Structures of hexazinone and its major degradation products (Rhodes, 1980).
- Figure 3.5. Herbicide application site (not to scale).
- Figure 3.6. Sector dimensions (not to scale).
- Figure 3.7. Precipitation at Ft. Wainwright for 1989.
- Figure 3.8. Precipitation at Clear for 1989.
- Figure 3.9. Precipitation at Birchwood for 1989.
- Figure 3.10. Precipitation at Firecreek for 1989.
- Figure 3.11. Precipitation at Seward for 1989.
- Figure 3.12. Hexazinone Concentration vs. Depth for Ft. Wainwright Plot.
- Figure 3.13. Triclopyr Concentration vs. Depth for Ft. Wainwright Plot.
- Figure 3.14. Hexazinone Concentration vs. Depth for Clear Plot.
- Figure 3.15. Triclopyr Concentration vs. Depth for Clear Plot.
- Figure 3.16. Hexazinone Concentration vs. Depth for Chulitna Plot.
- Figure 3.17. Triclopyr Concentration vs. Depth for Chulitna Plot.
- Figure 3.18. Hexazinone Concentration vs. Depth for Birchwood Combination Plot.
- Figure 3.19. Triclopyr Concentration vs. Depth for Birchwood Combination Plot.

- Figure 3.20. Hexazinone Concentration vs. Depth for Birchwood Hexazinone Plot.
- Figure 3.21. Triclopyr Concentration vs. Depth for Birchwood Triclopyr Plot.
- Figure 3.22. Hexazinone Concentration vs. Depth for Firecreek Plot.
- Figure 3.23. Triclopyr Concentration vs. Depth for Firecreek Plot.
- Figure 3.24. Hexazinone Concentration vs. Depth for Seward Plot.
- Figure 3.25. Triclopyr Concentration vs. Depth for Seward Plot.
- Figure 3.26. Microbial Degradation of Triclopyr in Soil Augmented With 3% (By Weight) Organic Matter.
- Figure 3.27. Microbial Degradation of Triclopyr in Soil With Zero Percent Organic Matter.
- Figure 3.28. Microbial Degradation Curve of Hexazinone in Soil With Zero Percent Organic Matter.
- Figure 3.29. Microbial Degradation of Hexazinone in Soil Augmented With 3% (By Weight) Organic Matter.
- Figure 3.30. Soil Column.
- Figure 3.31. Cumulative Percent Triclopyr Leached From Soil Columns.
- Figure 3.32. Concentration of Triclopyr in Eluates.
- Figure 3.33. Cumulative Percent Hexazinone Leached From Soil Columns.
- Figure 3.34. Concentration of Hexazinone in Eluates.
- Figure 3.35. Adsorption Isotherm for Triclopyr in Sand-Silt Soil With 0% Organic Content.
- Figure 3.36. Adsorption Isotherm for Hexazinone in Sand-Silt Soil With 0% Organic Content.
- Figure 4.1. Railroad Right-of-way Representation.

- Figure 4.2. Typical Hot Mix Asphalt Trackbed Cross-Sections (J.G. Rose, 1989).
- Figure 4.3. Railroad Vegetation Control, 1989 Survey Results.
- Figure 5.1. Year Versus U.S. Consumer Price Index, U.S. Average City Data (Adapted from U.S. Department of Labor, 1990.).
- Figure 5.2. 1991 Treatment Comparison: Alaska Cost Per Mile.
- Figure 5.3. 1991 Treatment Comparison: Alaska Cost Per Mile. Undercutting Alternative is omitted.
- Figure 5.4. Cost Components For Herbicide Application and Brush Cutting. Average U.S. city data, 1991 dollar base.
- Figure 5.5. Cost Components for Using the Ballast Regulator and Reballasting. Average U.S. city data, 1991 dollar base.
- Figure 5.6. Cost Components for Undercutting and Hand Clearing. Average U.S. city data, 1991 dollar base.
- Figure 5.7. Ranking of Alternatives for Six Lowest Cost Vegetation Control Methods. (Assumes the longest treatment life for each alternative. See text section "Adjustment for Treatment Life" for details and Table 5.66 for abbreviation key.) Average U.S. city data, 1991 dollar base.
- Figure 5.8. Ranking of Vegetation Control Alternatives Using Conservative Treatment Lives. (Assumes the shortest treatment life for each alternative. See text section "Adjustment for Treatment Life" for details and Table 5.66 for abbreviation key.) Average U.S. city data, 1991 dollar base.
- Figure 6.1. Ft. Wainwright site treatments.
- Figure 6.2. Clear site treatments.
- Figure 6.3. Birchwood site treatments.
- Figure 6.4. Seward site general plan.
- Figure 6.5. Seward Yard treatments.

Figure 6.6. Jessie Lee treatments.

Figure 6.7. Plot schematic for effectiveness of control methods.

LIST OF TABLES

- Table 3.1. LD₅₀s (rats) for various chemicals and pesticides.
- Table 3.2. Triclopyr physical properties.
- Table 3.3. Solubilities of Triclopyr @ 25°C.
- Table 3.4. Triclopyr Toxicological Properties (LD₅₀s).
- Table 3.5. LC₅₀s (for various fish and wildlife).
- Table 3.6. Solubilities of Hexazinone.
- Table 3.7. Chemical Properties of Hexazinone.
- Table 3.8. Toxicological Properties of Hexazinone.
- Table 3.9. Toxicological Properties of the Hexazinone Metabolites in Rats.
- Table 3.10. Summary of triclopyr and hexazinone general characteristics.
- Table 3.11. Strip identification for sampling events.
- Table 3.12. Sampling dates of herbicide application for each site and times (days) of follow-up sampling.
- Table 3.13. Ground temperature data for 1989.
- Table 3.14. Ground temperature data for 1990.
- Table 3.15. Site Soil Characteristics.
- Table 3.16. Unified Classification Designations.
- Table 3.17. Typical values of permeability coefficients.
- Table 3.18. Precipitation data for 1989.
- Table 3.19. Precipitation data for 1990.

- Table 3.20. Summary of significant precipitation events at Ft. Wainwright - 1989.
- Table 3.21. Summary of significant precipitation events at Clear - 1989.
- Table 3.22. Summary of significant precipitation events at Birchwood - 1989.
- Table 3.23. Summary of significant precipitation events at Firecreek - 1989.
- Table 3.24. Summary of significant precipitation events at Seward - 1989.
- Table 3.25. Amount of hexazinone in different soil layers at Fort Wainwright.
- Table 3.26. Qualification of hexazinone metabolites in different soil layers at Ft. Wainwright.
- Table 3.27. Amount of hexazinone in different soil layers at Clear.
- Table 3.28. Qualification of hexazinone metabolites in different soil layers at Clear.
- Table 3.29. Amount of hexazinone in different soil layers at Seward.
- Table 3.30. Qualification of hexazinone metabolites in different soil layers at Seward.
- Table 3.31. Amount of hexazinone in different soil layers at Chulitna.
- Table 3.32. Qualification of hexazinone metabolites in different soil layers at Chulitna.
- Table 3.33. Amount of hexazinone in different soil layers at Birchwood (Combination plot).
- Table 3.34. Qualification of hexazinone metabolites in different soil layers at Birchwood Combination plot.
- Table 3.35. Amount of hexazinone in different soil layers at Birchwood Hexazinone Only plot.

- Table 3.36. Qualification of hexazinone metabolites in different soil layers at Birchwood Hexazinone Only plot.
- Table 3.37. Amount of hexazinone in different soil layers at Firecreek.
- Table 3.38. Qualification of hexazinone metabolites in different soil layers at Firecreek.
- Table 3.39. Amount of triclopyr in different soil layers at Fort Wainwright.
- Table 3.40. Qualification of triclopyr metabolites in different soil layers at Ft. Wainwright.
- Table 3.41. Amount of triclopyr in different soil layers at Clear.
- Table 3.42. Qualification of triclopyr metabolites in different soil layers at Clear.
- Table 3.43. Amount of triclopyr in different soil layers at Seward.
- Table 3.44. Qualification of triclopyr metabolites in different soil layers at Seward.
- Table 3.45. Amount of triclopyr in different soil layers at Chulitna.
- Table 3.46. Qualification of triclopyr metabolites in different soil layers at Chulitna.
- Table 3.47. Amount of triclopyr in different soil layers at Birchwood (Combination plot).
- Table 3.48. Qualification of triclopyr metabolites in different soil layers at Birchwood (Combination plot).
- Table 3.49. Amount of triclopyr in different soil layers at Birchwood Triclopyr Only plot.
- Table 3.50. Qualification of triclopyr metabolites in different soil layers at Birchwood Triclopyr Only plot.
- Table 3.51. Amount of triclopyr in different soil layers at Firecreek.
- Table 3.52. Qualification of triclopyr metabolites in different soil layers at Firecreek.

- Table 3.53. Triclopyr Microbial Degradation Data in Soil With Three Percent Organics (mg/kg as dry weight basis).
- Table 3.54. Triclopyr Microbial Degradation Data in Soil With 0% Organics (mg/kg as dry weight basis).
- Table 3.55. Statistical Analysis of Triclopyr Concentrations in Soil Augmented With 3% Organic Content (mg/kg).
- Table 3.56. Statistical Analysis of Triclopyr Concentrations in Soil Augmented With 0% Organic Content (mg/kg).
- Table 3.57. Hexazinone Microbial Degradation Data in Soil With 3% Organics (mg/kg as dry weight basis).
- Table 3.58. Hexazinone Microbial Degradation Data in Soil With 0% Organics (mg/kg as dry weight basis).
- Table 3.59. Qualification of Hexazinone Metabolites in Laboratory Microbial Degradation Study.
- Table 3.60. Statistical Analysis of Hexazinone Concentrations in Soil Augmented With 3% Organic Content (mg/kg).
- Table 3.61. Statistical Analysis of Hexazinone Concentrations in Soil With 0% Organic Content (mg/kg).
- Table 3.62. Soil Bacteria Population Counts.
- Table 3.63. Concentration of Triclopyr in Soil Column Eluates and Percent Triclopyr Leached.
- Table 3.64. Concentration of Hexazinone in Soil Column Eluates and Percent Hexazinone Leached.
- Table 3.65. Typical Values of Hydraulic Conductivity in Different Soils.
- Table 3.66. Average Hydraulic Conductivity in Soil Columns.
- Table 3.67. Preparation of Solutions for Studying the Adsorption of Triclopyr*.
- Table 3.68. Adsorption of Triclopyr.
- Table 3.69. Adsorption of Hexazinone.

- Table 4.1. Summary of Environmental Influences.
- Table 4.2. Summary of Vegetation Control Methods.
- Table 4.3. Summary of Vegetation Control Methods Used by Survey Respondents.
- Table 4.4. Sample Calculation of Cost Conversion For Changes in Geographic Location.
- Table 4.5. Herbicide Cost Data, Reported in 1989 Dollar Base.
- Table 4.6. Brush Cutting Cost Data, Reported in 1989 Dollar Base.
- Table 4.7. Ballast Regulator Cost Data, Reported in 1989 Dollar Base.
- Table 5.1. Sample Calculation of CPI-US Conversion.
- Table 5.2. Sample Calculation of Yearly Cost.
- Table 5.3. Daily* Wage Rates by Job Classification. Reported in 1991 Dollar Base.
- Table 5.4. Summary of General Assumptions.
- Table 5.5. Sample Calculation for Herbicide Maintenance Costs. Average U.S. city data, 1991 dollar base.
- Table 5.6. Sample Calculation for Herbicide Annual Fuel Costs. Average U.S. city data, 1991 dollar base.
- Table 5.7. Summary of Annual Herbicide Application Equipment Costs. Average U.S. city data, 1991 dollar base.
- Table 5.8. Safety and Spill Cleanup Equipment. Average U.S. city data, 1991 dollar base.
- Table 5.9. Sample Calculation of Yearly Labor Cost. Average U.S. average city data, 1991 dollar base.
- Table 5.10. Summary of Herbicide Chemical Costs. Average U.S. city data, 1991 dollar base.
- Table 5.11. Sample Calculation for Velpar Chemical Cost. Average U.S. city data, 1991 dollar base.

- Table 5.12. Summary of Chemical Costs per Mile. Average U.S. city data, 1991 dollar base.
- Table 5.13. Sample Calculation for Equipment Cost per Mile. Average U.S. city data, 1991 dollar base.
- Table 5.14. Summary of Costs for Herbicide Application per Mile. Average U.S. city data, 1991 dollar base.
- Table 5.15. Summary of Mobilization and Demobilization Costs For a Chemical Cost of \$260 per Mile. Average U.S. city data, 1991 dollar base.
- Table 5.16. Summary of Mobilization and Demobilization Costs For a Chemical Cost of \$442 per Mile. Average U.S. city data, 1991 dollar base.
- Table 5.17. Sample Calculation of Overhead and Indirect Cost. Average U.S. city data, 1991 dollar base.
- Table 5.18. Sample Calculation for Herbicide Application Profit. Average U.S. city data, 1991 dollar base.
- Table 5.19. Summary of Overhead, Indirect, Profit and Total Costs for Herbicide Applications. 1991 dollar base.
- Table 5.20. Summary of Annual Brushcutter Equipment Costs. Average U.S. city data, 1991 dollar base.
- Table 5.21. Summary of Annual Brushcutting Costs. Average U.S. city data, 1991 dollar base.
- Table 5.22. Sample Calculation for per Mile Conversion for Brushcutting. Average U.S. city data, 1991 dollar base.
- Table 5.23. Summary of Brushcutting Costs per Mile. Average U.S. city data, 1991 dollar base.
- Table 5.24. Sample Calculation of Amortized Ballast Regulator Cost. Average U.S. city data, 1991 dollar base.
- Table 5.25. Summary of Annual Ballast Regulator Equipment Costs. Average U.S. city data, 1991 dollar base.
- Table 5.26. Summary of Annual Ballast Regulator Costs. 1991 dollar base.

- Table 5.27. Summary of Ballast Regulator Costs per Mile. 1991 dollar base.
- Table 5.28. Sample Calculation of Material Cost per Mile. Average U.S. city data, 1991 dollar base.
- Table 5.29. Sample Calculation for Ballast Material Costs per Mile. Average U.S. city data, 1991 dollar base.
- Table 5.30. Summary of Ballast Costs per Mile. Average U.S. city data, 1991 dollar base.
- Table 5.31. Sample Calculation of Conversion to Annual Ballast Cost. Average U.S. city data, 1991 dollar base.
- Table 5.32. Summary of Annual Ballast Material Cost. Average U.S. city data, 1991 dollar base.
- Table 5.33. Summary of Annual Overhead and Indirect Costs for Reballasting. Average U.S. city data, 1991 dollar base.
- Table 5.34. Summary of Annual Profit Costs for Reballasting. Average U.S. city data, 1991 dollar base.
- Table 5.35. Annual Cost Summary for Reballasting. Average U.S. city data, 1991 dollar base.
- Table 5.36. Per Mile Cost Summary for Reballasting. Average U.S. city data, 1991 dollar base.
- Table 5.37. Summary of Annual Tamper Equipment Costs. Average U.S. city data, 1991 dollar base.
- Table 5.38. Summary of Undercutter Equipment Costs. Average U.S. city data, 1991 dollar base.
- Table 5.39. Summary of Annual Undercutting Operation Equipment Costs. Average U.S. city data, 1991 dollar base.
- Table 5.40. Summary of Annual Labor Costs for the Undercutting Operation. Average U.S. city data, 1991 dollar base.
- Table 5.41. Sample Calculation of Ballast Quantity Required for Undercutting.

- Table 5.42. Summary of Ballast Costs per Mile With No Recovery. Average U.S. city data, 1991 dollar base.
- Table 5.43. Summary of Ballast Costs per Mile For Various Recovery Rates. Average U.S. city data, 1991 dollar base.
- Table 5.44. Sample Calculation of per Mile to Annual Cost Conversion. Average U.S. city data, 1991 dollar base.
- Table 5.45. Summary of Annual Ballast Costs for Various Recovery Rates. Average U.S. city data, 1991 dollar base.
- Table 5.46. Summary of Annual Undercutting Costs For Various Recovery Rates. Average U.S. city data, 1991 dollar base.
- Table 5.47. Summary of per Mile Undercutting Costs for Various Recovery Rates. Average U.S. city data, 1991 dollar base.
- Table 5.48. Summary of per Mile Undercutting Costs for Various Recovery Rates. Anchorage, Alaska data, 1991 dollar base.
- Table 5.49. Sample Calculation of Labor Rate per Mile for Hand Clearing. Average U.S. city data, 1991 dollar base.
- Table 5.50. Summary of Cost per Mile for Hand Clearing. 1991 dollar base.
- Table 5.51. Cost Indices for the years 1980-1991.
- Table 5.52. 1991 ARRC Herbicide Cost Per Track Mile.
- Table 5.53. 1991 Contract Herbicide Cost Per Track Mile.
- Table 5.54. 1991 Reballasting Cost Per Track Mile.
- Table 5.55. 1991 Ballast Regulating Cost Per Track Mile.
- Table 5.56. Undercutting Cost Per Track Mile: No Ballast Recovery.
- Table 5.57. Undercutting Cost Per Track Mile: 20% Ballast Recovery.
- Table 5.58. Undercutting Cost Per Track Mile: 50% Ballast Recovery.
- Table 5.59. Undercutting Cost Per Track Mile: 70% Ballast Recovery.

- Table 5.60. 1991 ARRC Brushcutting Cost Per Track Mile.
- Table 5.61. 1991 ARRC Hand Clearing Cost Per Track Mile.
- Table 5.62. 1991 Contract Hand Clearing Cost Per Track Mile.
- Table 5.63. Treatment Comparison: 1991 Cost Per Mile.
- Table 5.64. Sample Calculation of Reballasting Treatment Life Adjustment. Average U.S. city data, 1991 dollar base.
- Table 5.65. Cost Summary of Vegetation Control Methods. 1991 dollar base.
- Table 5.66. Key of Abbreviations Used in Figures 5.7 and 5.8.
- Table 5.67. Summary of Cost per Mile for Vegetation Control Methods Shown for Various Productivities. 1991 dollar base.
- Table 6.1. Dates and timing of events of the ARRC Integrated Vegetation Management Research Project. Sites: FT = Fort Wainwright (ARRC MP G-8), CL = Clear (MP 388), CH = Chulitna (MP 274), BI = Birchwood (MP 136), FI = Fire Creek (MP 131), SE = Seward (MP 3).
- Table 6.2. Total vascular cover (TVC) before treatment (in percentages).
- Table 6.3. Kruskal-Wallis analyses of total vascular cover (TVC) for Ft. Wainwright.
- Table 6.4. Kruskal-Wallis analyses of total vascular cover (TVC) for Clear.
- Table 6.5. Kruskal-Wallis analyses of total vascular cover (TVC) for Birchwood.
- Table 6.6. Kruskal-Wallis analyses of total vascular cover (TVC) for Seward.
- Table 6.7. Summary values for stems at 10 cm and 50 cm.
- Table 6.8. Kruskal-Wallis analyses of stems for Ft. Wainwright.
- Table 6.9. Kruskal-Wallis analyses of stems for Clear.

- Table 6.10. Kruskal-Wallis analyses of stems for Birchwood.
- Table 6.11. Kruskal-Wallis analyses of stems for Seward.
- Table 6.12. Summary values for total herbaceous and woody cover.
- Table 6.13. Kruskal-Wallis analyses of growth forms for Ft. Wainwright.
- Table 6.14. Kruskal-Wallis analyses of growth forms for Clear.
- Table 6.15. Kruskal-Wallis analyses of growth forms for Birchwood.
- Table 6.16. Kruskal-Wallis analyses of growth forms for Seward.
- Table 6.17. Kruskal-Wallis analyses for Salmon River (MP 4.8) as compared to Seward "Control" (no applied treatment).
- Table 6.18. Kruskal-Wallis analyses for Bible Camp Road as compared to Birchwood "Control" (no applied treatment).
- Table 6.19. Mean percent fines in ballast, mean percent TVC.
- Table 6.20. Tukey-Kramer of Ballast Fines.
- Table 6.21. Rooting depths for selected species.
- Table 6.22. Summary of Treatment Effectiveness by Site - number of instances where treatment is among the most effective as determined by Kruskal-Wallis analyses.



EXECUTIVE SUMMARY

****NOTE:** This executive summary has been prepared for the purpose of providing the reader a summary of the major findings of this study. It is not intended to be a stand-alone document. Therefore, the reader is cautioned to interpret information in the context in which it was intended.

This project consisted of field testing to determine persistence and migration of herbicides on the Alaska Railroad Corporation (ARRC) right-of-way, literature reviews of vegetation control methods used by railroads, a survey of operating railroads in the U.S. and Canada, cost analyses of vegetation control methods used by railroads in general and the Alaska Railroad in particular, laboratory testing under controlled conditions, and an evaluation of vegetation control methods along the ARRC right-of-way.

The herbicide portion of the project was designed to address the persistence and migration of two herbicides in the field. This was accomplished through laboratory determination of residual levels of the chemicals in soil applications. Analyses were done by taking soil samples and performing pesticide extraction and cleanup procedures on the soils so that the extracts could be analyzed by gas chromatography.

Concentrations of the herbicides were determined at four depths in the soil: surface (0 ft), 1 ft, 2 ft, and 3 ft. Soil samples were taken at intervals of approximately 0, 7, 49, and 365 days after initial application of the herbicides.

Persistence was evaluated by analysis of the parent compound through time, which was then compared to the original application concentration. Migration was tracked through analysis of samples at progressive depths through time and soil outside of the application zone.