

Appendix F

Pump test # 8 Report – Appendices A through D

Appendix A – Well Completion Report

Appendix B – Ground Water Levels and Barometric Pressure Data

Appendix C – Type Curve Matches

Appendix D – Water Level Data on CD ROM – Copy Available in the NRC Public Document Room

Appendix A

WELL COMPLETION REPORTS

Nebraska Department of Environmental Quality

Permit No. NE0122611

Well Completion Report

Company: Crow Butte Resources, Inc.

Well Type: Production/Injection _____ Monitor X

Ground Elevation: 4259 ft.

Drilling Contractor: Landrill Exploration

Mud Products: 6 Bags Super Gel 2 Quart Polymer

Bit Size: 8 Inch

Drilling Begun: 8/24/2010

Completed Formation: Brule

Casing Diameter: 4.95 inch O.D.

Casing Depth: 279 ft.

Packer Type: Johnson K-packer

Centralizer Depths: 20, 40, 100, 160, 220 Ft

Screen Size: 3 inch by .020 inch

Screened Interval(s): 285 ft. - 365 ft.
ft. - ft.

Completed Formation Upper Boundary: 270 ft.

Cement Contractor: Crow Butte Resources

Estimated Cement Volume: 10.8 bbls.

Cement Density: 12.4 lbs/gal

Cement Type/Class: I/II API

Cement Circulated to Surface: 0 bbls.

Logging Contractor: Century Geophysical Corp.

Unit No.: 0001

Log Type: Gamma, SP, Resistance, Deviation

Well Deviation: 1.2 ft. at 342.2 degrees

Remarks: Tremmed 4 bbls to surface

Project: Crow Butte

Well No. BOW-2010-1

Wellhead Elevation: 4260 ft.

Driller: J. Lemmon

2 Bags Lost Circulation Material

Drilling Completed On: 8/26/2010

Depth Drilled: 420 ft.

Casing Type: White Certalok

Basket Depth: N/A ft.

Packer Depth: 275 ft.

Gravel Size:

ft. - ft.
ft. - ft.

Lower Boundary: 400 ft.

Operator: Klein

Actual Cement Volume Used: 16.2 bbls.

Water Volume Used: 11.6 bbls.

Additives: 500 lbs. Salt 500 lbs. Bentonite

Density At Surface: 9 lbs/gal

Operator: Dunn

Probe No.: 9055C

This report was filled out by: Wade Beins

Representing: Crow Butte Resources, Inc.

On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins

Title: Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality

Permit No. NE0122611

Well Completion Report

Company: Crow Butte Resources, Inc.

Well Type: Production/Injection _____ Monitor X

Ground Elevation: 4322 ft.

Drilling Contractor: Landrill Exploration

Mud Products: 7 Bags Super Gel 2 Quart Polymer

Bit Size: 8 Inch

Drilling Begun: 8/25/2010

Completed Formation: Brule

Casing Diameter: 4.95 inch O.D.

Casing Depth: 339 ft.

Packer Type: Johnson K-packer

Centralizer Depths: 20, 40, 100, 160, 220, 280 Ft

Project: Crow Butte

Well No. BOW-2010-2

Wellhead Elevation: 4323 ft.

Driller: J. Lemmon

1 Bags Lost Circulation Material

Drilling Completed On: 8/27/2010

Depth Drilled: 420 ft.

Casing Type: White Certalok

Basket Depth: N/A ft.

Packer Depth: 328 ft.

Screen Size: 3 inch by .020 inch

Screened Interval(s): 338 ft. - 398 ft.
ft. - ft.

Completed Formation Upper Boundary: 330 ft.

Cement Contractor: Crow Butte Resources

Estimated Cement Volume: 13.1 bbls.

Cement Density: 12.3 lbs/gal

Cement Type/Class: I/II API

Cement Circulated to Surface: 0 bbls.

Logging Contractor: Century Geophysical Corp.

Unit No.: 0001

Log Type: Gamma, SP, Resistance, Deviation

Well Deviation: 2.7 ft. at 300.1 degrees

Remarks: Tremmied 3 bbls to surface

Gravel Size:

ft. - ft.
ft. - ft.

Lower Boundary: 410 ft.

Operator: Klein

Actual Cement Volume Used: 19.6 bbls.

Water Volume Used: 14.1 bbls.

Additives: 500 lbs. Salt 500 lbs. Bentonite

Density At Surface: 9.4 lbs/gal

Operator: Dunn

Probe No.: 9055C

This report was filled out by: Wade Beins

Representing: Crow Butte Resources, Inc.

On:

Certification:

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By: Wade Beins

Title: Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality

Permit No. NE0122611

Well Completion Report

Company: Crow Butte Resources, Inc.

Project: Crow Butte

Well Type: Production/Injection _____ Monitor X

Well No. BOW-2010-3

Ground Elevation: 4350 ft.

Wellhead Elevation: 4350 ft.

Drilling Contractor: Landrill Exploration

Driller: L. Corbin

Mud Products: 6 Bags Super Gel 1 Quart Polymer

2 Bags Lost Circulation Material

Bit Size: 8 Inch

Drilling Begun: 8/20/2010

Drilling Completed On: 8/24/2010

Completed Formation: Brule

Depth Drilled: 450 ft.

Casing Diameter: 4.95 inch O.D.

Casing Type: White Certalok

Casing Depth: 339 ft.

Basket Depth: N/A ft.

Packer Type: Johnson K-packer

Packer Depth: 336 ft.

Centralizer Depths: 20, 40, 100, 160, 220, 280 Ft

Screen Size: 3 inch by .020 inch

Gravel Size:

Screened Interval(s): 346 ft. - 416 ft.
ft. - ft.ft. - ft.
ft. - ft.

Completed Formation Upper Boundary: 330 ft.

Lower Boundary: 440 ft.

Cement Contractor: Crow Butte Resources

Operator: Klein

Estimated Cement Volume: 13.1 bbls.

Actual Cement Volume Used: 19.6 bbls.

Cement Density: 12.2 lbs/gal

Water Volume Used: 14.1 bbls.

Cement Type/Class: I/II API

Additives: 500 lbs. Salt 500 lbs. Bentonite

Cement Circulated to Surface: 4 bbls.

Density At Surface: 12.2 lbs/gal

Logging Contractor: Century Geophysical Corp.

Operator: Dunn

Unit No.: 0001

Probe No.: 9055C

Log Type: Gamma, SP, Resistance, Deviation

Well Deviation: 3.6 ft. at 320.7 degrees

Remarks:

This report was filled out by: Wade Beins

Representing: Crow Butte Resources, Inc.

On:

Certification:

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By: Wade Beins

Title: Senior Geologist

Date:

May 27, 2011

Nebraska Department of Environmental Quality

Permit No. NE0122611

Well Completion Report

Company: Crow Butte Resources, Inc.

Project: Crow Butte

Well Type: Production/Injection _____ Monitor X

Well No. CPW-2010-1

Ground Elevation: 4260 ft.

Wellhead Elevation: 4262 ft.

Drilling Contractor: Landrill Exploration

Driller: L. Corbin

Mud Products: 11 Bags Super Gel 4 Quart Polymer

2 Bags Lost Circulation Material

Bit Size: 8 Inch

Drilling Begun: 8/31/2010

Drilling Completed On: 9/2/2010

Completed Formation: Chadron

Depth Drilled: 1070 ft.

Casing Diameter: 4.95 inch O.D.

Casing Type: White Certalok

Casing Depth: 1009 ft.

Basket Depth: N/A ft.

Packer Type: Johnson K-packer

Packer Depth: 995 ft.

Centralizer Depths: 20, 40, 100, 160, 220, 280, 340, 400, 460, 520, 580, 640, 700, 760, 820, 880, 940 Ft

Screen Size: 3 inch by .020 inch

Gravel Size:

Screened Interval(s): 1015 ft. - 1048 ft.
ft. - ft.ft. - ft.
ft. - ft.

Completed Formation Upper Boundary: 1016 ft.

Lower Boundary: 1046 ft.

Cement Contractor: Crow Butte Resources

Operator: Klein

Estimated Cement Volume: 38.8 bbls.

Actual Cement Volume Used: 58.2 bbls.

Cement Density: 12.4 lbs/gal

Water Volume Used: 41.7 bbls.

Cement Type/Class: I/II API

Additives: 500 lbs. Salt 500 lbs. Bentonite

Cement Circulated to Surface: 5 bbls.

Density At Surface: 11.6 lbs/gal

Logging Contractor: Century Geophysical Corp.

Operator: Dunn

Unit No.: 0001

Probe No.: 9055C

Log Type: Gamma, SP, Resistance, Deviation

Well Deviation: 4.1 ft. at 203.5 degrees

Remarks:

This report was filled out by: Wade Beins

Representing: Crow Butte Resources, Inc.

On:

Certification:

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By: Wade Beins

Title: Senior Geologist

Date:

May 27, 2011

Nebraska Department of Environmental Quality
Well Completion Report

Permit No. NE0122611

Company: Crow Butte Resources, Inc.

Project: Crow Butte

Well Type: Production/Injection Monitor X

Well No. CPW-2010-1A

Ground Elevation: 4261 ft.

Wellhead Elevation: 4263 ft.

Drilling Contractor: Landrill Exploration

Driller: S. Osmotherly

Mud Products: 7 Bags Super Gel 2 Quart Polymer

3 Bags Lost Circulation Material

Bit Size: 8 Inch

Drilling Begun: 3/14/2011

Drilling Completed On: 3/16/2011

Completed Formation: Chadron

Depth Drilled: 1080 ft.

Casing Diameter: 4.95 inch O.D.

Casing Type: White Certalok

Casing Depth: 1019 ft.

Basket Depth: N/A ft.

Packer Type: Johnson K-packer

Packer Depth: 1005 ft.

Centralizer Depths: 20, 40, 100, 160, 220, 280, 340, 400, 460, 520, 580, 640, 700, 760, 820, 880, 940 Ft

Screen Size: 3 inch by .020 inch

Gravel Size:

Screened Interval(s): 1025 ft. - 1055 ft.

ft. - ft.

ft. - ft.

ft. - ft.

Completed Formation Upper Boundary: 1024 ft.

Lower Boundary: 1050 ft.

Cement Contractor: Crow Butte Resources

Operator: Klein

Estimated Cement Volume: 39.2 bbls.

Actual Cement Volume Used: 58.8 bbls.

Cement Density: 12.3 lbs/gal

Water Volume Used: 42.1 bbls.

Cement Type/Class: I/II API

Additives: 500 lbs. Salt 500 lbs. Bentonite

Cement Circulated to Surface: 4 bbls.

Density At Surface: 11 lbs/gal

Logging Contractor: Century Geophysical Corp.

Operator: Dunn

Unit No.: 0001

Probe No.: 9055C

Log Type: Gamma, SP, Resistance, Deviation

Well Deviation: 24.9 ft. at 153.3 degrees

Remarks:

This report was filled out by: Wade Beins

Representing: Crow Butte Resources, Inc.

On:

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By: Wade Beins

Title: Senior Geologist

Date:

May 27, 2011

Nebraska Department of Environmental Quality

Permit No. NE0122611

Well Completion Report

Company: Crow Butte Resources, Inc.

Well Type: Production/Injection _____ Monitor X

Ground Elevation: 4197 ft.

Drilling Contractor: Landrill Exploration

Mud Products:

Bit Size: 8 Inch

Drilling Begun: 4/7/1989

Completed Formation: Chadron

Casing Diameter: 4.95 inch O.D.

Casing Depth: 974 ft.

Packer Type: Johnson K-packer

Centralizer Depths: ###

Project: Crow Butte

Well No. Monitor 2

Wellhead Elevation: 4198 ft.

Driller: G. Land

Drilling Completed On: 4/9/1989

Depth Drilled: 1030 ft.

Casing Type: White Certalok

Basket Depth: N/A ft.

Packer Depth: 974 ft.

Screen Size: 3 inch by .020 inch

Screened Interval(s): 980 ft. - 1015 ft.
ft. - ft.

Completed Formation Upper Boundary: 974 ft.

Cement Contractor: Crow Butte Resources

Estimated Cement Volume: 37.5 bbls.

Cement Density: Not Avail lbs/gal

Cement Type/Class: I/II API

Cement Circulated to Surface: Not Avail bbls.

Logging Contractor: Century Geophysical Corp.

Unit No.: 0001

Log Type: Gamma, SP, Resistance, Deviation

Well Deviation: 14.6 ft. at 128 degrees

Remarks:

Gravel Size:

ft. - ft.
ft. - ft.

Lower Boundary: 1015 ft.

Operator: Klein

Actual Cement Volume Used: 56.2 bbls.

Water Volume Used: bbls.

Additives: 500 lbs. Salt 500 lbs. Bentonite

Density At Surface: Not Avail lbs/gal

Operator: Dunn

Probe No.: 9055C

This report was filled out by: Wade Beins

Representing: Crow Butte Resources, Inc.

On:

Certification:

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By: Wade Beins

Title: Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality

Permit No. NE0122611

Well Completion Report

Company: Crow Butte Resources, Inc.

Well Type: Production/Injection _____ Monitor X

Ground Elevation: 4260 ft.

Drilling Contractor: Landrill Exploration

Mud Products:

Bit Size: 8 Inch

Drilling Begun: 4/14/1989

Completed Formation: Chadron

Casing Diameter: 4.95 inch O.D.

Casing Depth: 1008 ft.

Packer Type: Johnson K-packer

Centralizer Depths: ###

Screen Size: 3 inch by .020 inch

Screened Interval(s): 1015 ft. - 1050 ft.
ft. - ft.

Completed Formation Upper Boundary: 1014 ft.

Cement Contractor: Crow Butte Resources

Estimated Cement Volume: 38.8 bbls.

Cement Density: Not Avail lbs/gal

Cement Type/Class: I/II API

Cement Circulated to Surface: Not Avail bbls.

Logging Contractor: Century Geophysical Corp.

Unit No.: 0001

Log Type: Gamma, SP, Resistance, Deviation

Well Deviation: 13.8 ft. at 72 degrees

Remarks:

Project: Crow Butte

Well No. Monitor 3

Wellhead Elevation: 4261 ft.

Driller: G. Land

Drilling Completed On: 4/18/1989

Depth Drilled: 1070 ft.

Casing Type: White Certalok

Basket Depth: N/A ft.

Packer Depth: 1008 ft.

Gravel Size:

ft. - ft.
ft. - ft.

Lower Boundary: 1046 ft.

Operator: Klein

Actual Cement Volume Used: 58.1 bbls.

Water Volume Used: bbls.

Additives: 500 lbs. Salt 500 lbs. Bentonite

Density At Surface: Not Avail lbs/gal

Operator: Dunn

Probe No.: 9055C

This report was filled out by: Wade Beins

Representing: Crow Butte Resources, Inc.

On:

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By: Wade Beins

Title: Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality

Permit No. NE0122611

Well Completion Report

Company: Crow Butte Resources, Inc.

Project: Crow Butte

Well Type: Production/Injection _____ Monitor X

Well No. Monitor 4A

Ground Elevation: 4326 ft.

Wellhead Elevation: 4328 ft.

Drilling Contractor: Landrill Exploration

Driller: L. Corbin

Mud Products: 6 Bags Super Gel 3 Quart Polymer

Bit Size: 8 Inch

Drilling Begun: 11/3/2010

Drilling Completed On: 11/5/2010

Completed Formation: Chadron

Depth Drilled: 1140 ft.

Casing Diameter: 4.95 inch O.D.

Casing Type: White Certalok

Casing Depth: 1079 ft.

Basket Depth: N/A ft.

Packer Type: Johnson K-packer

Packer Depth: 1060 ft.

Centralizer Depths: 20, 40, 100, 160, 220, 280, 340, 400, 460, 520, 580, 640, 700, 760, 820, 880, 940, 1000 Ft

Screen Size: 3 inch by .020 inch

Gravel Size:

Screened Interval(s): 1080 ft. - 1110 ft.
ft. - ft.ft. - ft.
ft. - ft.

Completed Formation Upper Boundary: 1081 ft.

Lower Boundary: 1109 ft.

Cement Contractor: Crow Butte Resources

Operator: Klein

Estimated Cement Volume: 41.5 bbls.

Actual Cement Volume Used: 62.2 bbls.

Cement Density: 12.5 lbs/gal

Water Volume Used: 44.6 bbls.

Cement Type/Class: I/II API

Additives: 500 lbs. Salt 500 lbs. Bentonite

Cement Circulated to Surface: 8 bbls.

Density At Surface: 11.9 lbs/gal

Logging Contractor: Century Geophysical Corp.

Operator: Dunn

Unit No.: 0001

Probe No.: 9055C

Log Type: Gamma, SP, Resistance, Deviation

Well Deviation: 11.3 ft. at 53.7 degrees

Remarks:

This report was filled out by: Wade Beins

Representing: Crow Butte Resources, Inc.

On:

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By: Wade Beins

Title: Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality

Permit No. NE0122611

Well Completion Report

Company: Crow Butte Resources, Inc.

Project: Crow Butte

Well Type: Production/Injection _____ Monitor X

Well No. Monitor 5

Ground Elevation: 4337 ft.

Wellhead Elevation: 4340 ft.

Drilling Contractor: Landrill Exploration

Driller: J. Lemmon

Mud Products: 8 Bags Super Gel 7 Quart Polymer

3 Bags Lost Circulation Material

Bit Size: 8 Inch

Drilling Begun: 8/30/2010

Drilling Completed On: 9/1/2010

Completed Formation: Chadron

Depth Drilled: 1140 ft.

Casing Diameter: 4.95 inch O.D.

Casing Type: White Certalok

Casing Depth: 1069 ft.

Basket Depth: N/A ft.

Packer Type: Johnson K-packer

Packer Depth: 1060 ft.

Centralizer Depths: 20, 40, 100, 160, 220, 280, 340, 400, 460, 520, 580, 640, 700, 760, 820, 880, 940, 1000 Ft

Screen Size: 3 inch by .020 inch

Gravel Size:

Screened Interval(s): 1070 ft. - 1120 ft.

ft. - ft.

ft. - ft.

ft. - ft.

Completed Formation Upper Boundary: 1066 ft.

Lower Boundary: 1116 ft.

Cement Contractor: Crow Butte Resources

Operator: Klein

Estimated Cement Volume: 41.1 bbls.

Actual Cement Volume Used: 61.7 bbls.

Cement Density: 12.2 lbs/gal

Water Volume Used: 44.2 bbls.

Cement Type/Class: I/II API

Additives: 500 lbs. Salt 500 lbs. Bentonite

Cement Circulated to Surface: 3 bbls.

Density At Surface: 11.5 lbs/gal

Logging Contractor: Century Geophysical Corp.

Operator: Dunn

Unit No.: 0001

Probe No.: 9055C

Log Type: Gamma, SP, Resistance, Deviation

Well Deviation: 27 ft. at 142.1 degrees

Remarks:

This report was filled out by: Wade Beins

Representing: Crow Butte Resources, Inc.

On:

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By: Wade Beins

Title: Senior Geologist

Date: May 27, 2011

Nebraska Department of Environmental Quality

Permit No. NE0122611

Well Completion Report

Company: Crow Butte Resources, Inc.

Project: Crow Butte

Well Type: Production/Injection _____ Monitor X

Well No. Monitor 6

Ground Elevation: 4214 ft.

Wellhead Elevation: 4215 ft.

Drilling Contractor: Landrill Exploration

Driller: L. Corbin

Mud Products: 13 Bags Super Gel 8 Quart Polymer

4 Bags Lost Circulation Material

Bit Size: 8 Inch

Drilling Begun: 8/16/2010

Drilling Completed On: 8/18/2010

Completed Formation: Chadron

Depth Drilled: 1050 ft.

Casing Diameter: 4.95 inch O.D.

Casing Type: White Certalok

Casing Depth: 989 ft.

Basket Depth: N/A ft.

Packer Type: Johnson K-packer

Packer Depth: 982 ft.

Centralizer Depths: 20, 40, 100, 160, 220, 280, 340, 400, 460, 520, 580, 640, 700, 760, 820, 880, 940 Ft

Screen Size: 3 inch by .020 inch

Gravel Size:

Screened Interval(s): 992 ft. - 1025 ft.
ft. - ft.ft. - ft.
ft. - ft.

Completed Formation Upper Boundary: 982 ft.

Lower Boundary: 1023 ft.

Cement Contractor: Crow Butte Resources

Operator: Klein

Estimated Cement Volume: 38.1 bbls.

Actual Cement Volume Used: 57.1 bbls.

Cement Density: 12 lbs/gal

Water Volume Used: 40.9 bbls.

Cement Type/Class: I/II API

Additives: 500 lbs. Salt 500 lbs. Bentonite

Cement Circulated to Surface: 3 bbls.

Density At Surface: 10 lbs/gal

Logging Contractor: Century Geophysical Corp.

Operator: Dunn

Unit No.: 0001

Probe No.: 9055C

Log Type: Gamma, SP, Resistance, Deviation

Well Deviation: 17.1 ft. at 37.3 degrees

Remarks:

This report was filled out by: Wade Beins

Representing: Crow Butte Resources, Inc.

On:

Certification:

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By: Wade Beins

Title: Senior Geologist

Date:

May 27, 2011

Nebraska Department of Environmental Quality

Permit No. NE0122611

Well Completion Report

Company: Crow Butte Resources, Inc.

Project: Crow Butte

Well Type: Production/Injection _____ Monitor X

Well No. Monitor 7

Ground Elevation: 4243 ft.

Wellhead Elevation: 4244 ft.

Drilling Contractor: Landrill Exploration

Driller: L. Corbin

Mud Products: 6 Bags Super Gel 6 Quart Polymer

3 Bags Lost Circulation Material

Bit Size: 8 Inch

Drilling Begun: 8/20/2010

Drilling Completed On: 8/23/2010

Completed Formation: Chadron

Depth Drilled: 1080 ft.

Casing Diameter: 4.95 inch O.D.

Casing Type: White Certalok

Casing Depth: 999 ft.

Basket Depth: N/A ft.

Packer Type: Johnson K-packer

Packer Depth: 993 ft.

Centralizer Depths: 20, 40, 100, 160, 220, 280, 340, 400, 460, 520, 580, 640, 700, 760, 820, 880, 940 Ft

Screen Size: 3 inch by .020 inch

Gravel Size:

Screened Interval(s): 1003 ft. - 1046 ft.

ft. - ft.

ft. - ft.

ft. - ft.

Completed Formation Upper Boundary: 1007 ft.

Lower Boundary: 1044 ft.

Cement Contractor: Crow Butte Resources

Operator: Klein

Estimated Cement Volume: 38.4 bbls.

Actual Cement Volume Used: 57.6 bbls.

Cement Density: 11.7 lbs/gal

Water Volume Used: 41.3 bbls.

Cement Type/Class: I/II API

Additives: 500 lbs. Salt 500 lbs. Bentonite

Cement Circulated to Surface: 2 bbls.

Density At Surface: 10.2 lbs/gal

Logging Contractor: Century Geophysical Corp.

Operator: Dunn

Unit No.: 0001

Probe No.: 9055C

Log Type: Gamma, SP, Resistance, Deviation

Well Deviation: 32.2 ft. at 159.9 degrees

Remarks:

This report was filled out by: Wade Beins

Representing: Crow Butte Resources, Inc.

On:

Certification:

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By: Wade Beins

Title: Senior Geologist

Date:

May 27, 2011

Nebraska Department of Environmental Quality

Permit No. NE0122611

Well Completion Report

Company: Crow Butte Resources, Inc.

Project: Crow Butte

Well Type: Production/Injection _____ Monitor X

Well No. Monitor 8

Ground Elevation: 4352 ft.

Wellhead Elevation: 4354 ft.

Drilling Contractor: Landrill Exploration

Driller: L. Corbin

Mud Products: 10 Bags Super Gel 4 Quart Polymer

4 Bags Lost Circulation Material

Bit Size: 8 Inch

Drilling Begun: 8/27/2010

Drilling Completed On: 8/30/2010

Completed Formation: Chadron

Depth Drilled: 1150 ft.

Casing Diameter: 4.95 inch O.D.

Casing Type: White Certalok

Casing Depth: 1079 ft.

Basket Depth: N/A ft.

Packer Type: Johnson K-packer

Packer Depth: 1067 ft.

Centralizer Depths: 20, 40, 100, 160, 220, 280, 340, 400, 460, 520, 580, 640, 700, 760, 820, 880, 940, 1000 Ft

Screen Size: 3 inch by .020 inch

Gravel Size:

Screened Interval(s): 1087 ft. - 1127 ft.
ft. - ft.ft. - ft.
ft. - ft.

Completed Formation Upper Boundary: 1085 ft.

Lower Boundary: 1123 ft.

Cement Contractor: Crow Butte Resources

Operator: Klein

Estimated Cement Volume: 41.5 bbls.

Actual Cement Volume Used: 62.2 bbls.

Cement Density: 12.8 lbs/gal

Water Volume Used: 44.6 bbls.

Cement Type/Class: I/II API

Additives: 500 lbs. Salt 500 lbs. Bentonite

Cement Circulated to Surface: 5 bbls.

Density At Surface: 11.5 lbs/gal

Logging Contractor: Century Geophysical Corp.

Operator: Dunn

Unit No.: 0001

Probe No.: 9055C

Log Type: Gamma, SP, Resistance, Deviation

Well Deviation: 38.5 ft. at 173.6 degrees

Remarks:

This report was filled out by: Wade Beins

Representing: Crow Butte Resources, Inc.


On:

Certification:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this form and all its attachments and that, based on inquiry of those individuals immediately responsible for obtaining information, I believe the information is true, accurate, and complete. Further, I certify awareness that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

By: Wade Beins

Title: Senior Geologist

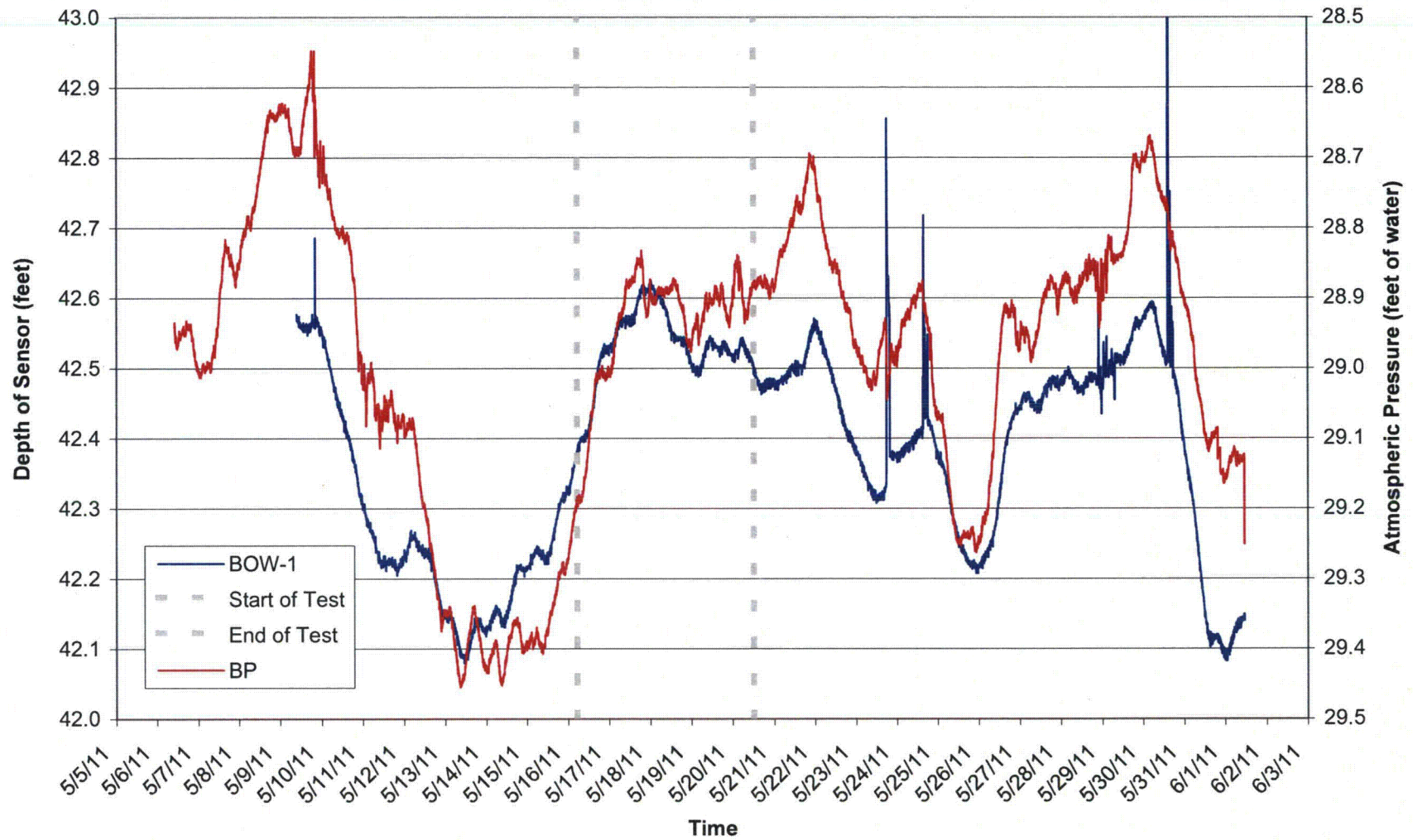


Date: May 27, 2011

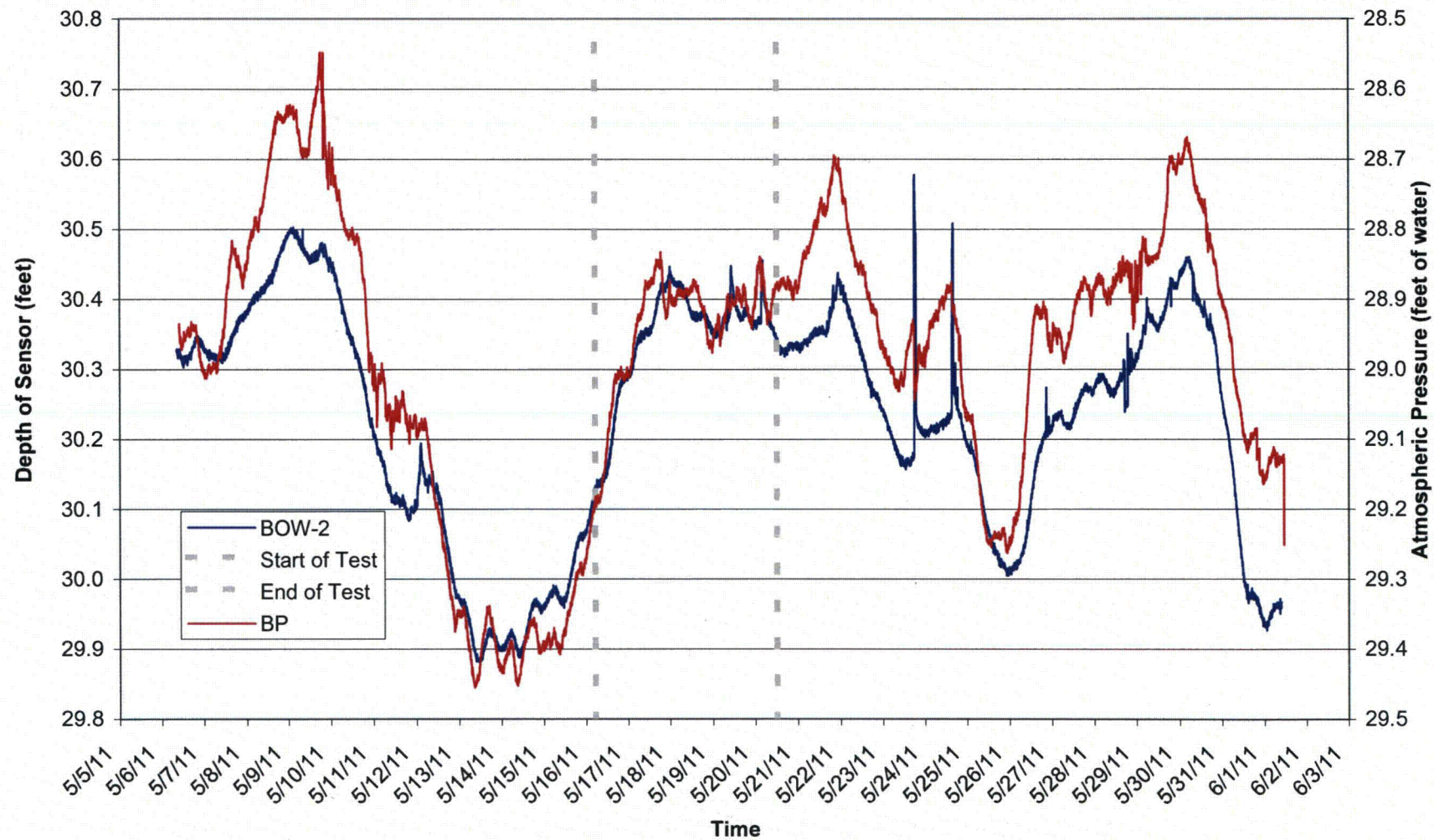
Appendix B

GROUNDWATER LEVELS AND BAROMETRIC PRESSURE DATA

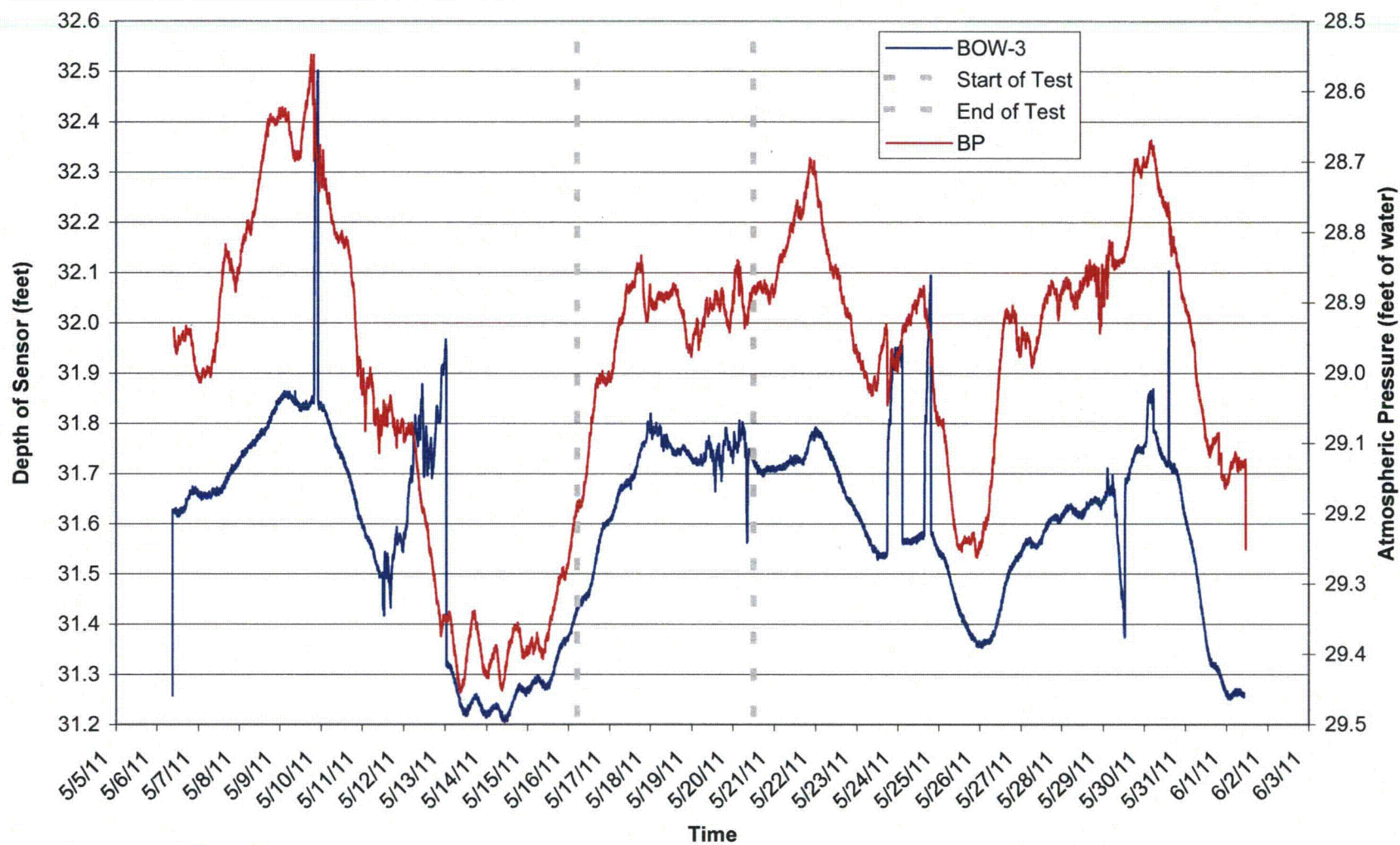
Graph B1 - Groundwater Levels and Barometric Pressure vs. Time in BOW-1



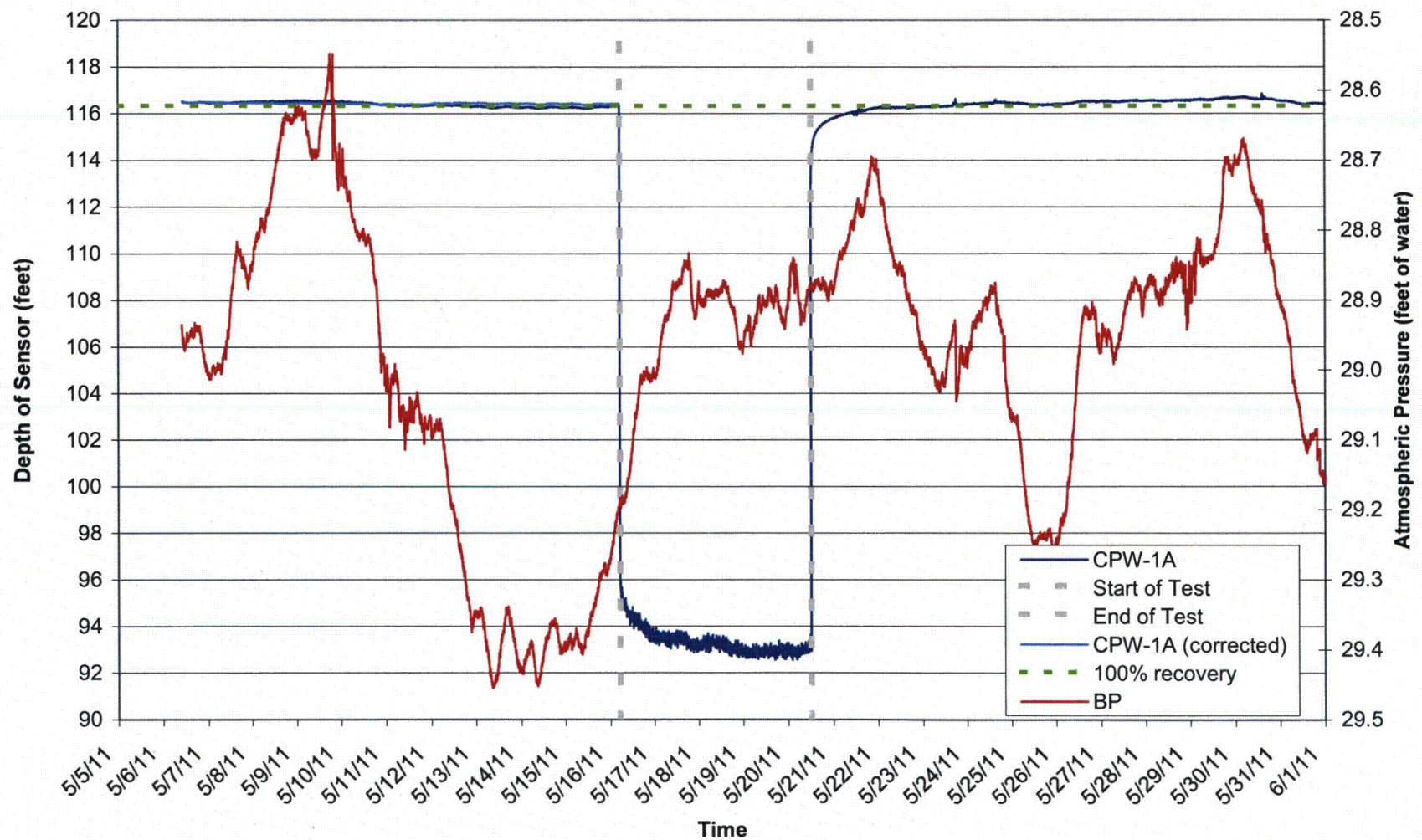
Graph B2 - Groundwater Levels and Barometric Pressure vs. Time in BOW-2



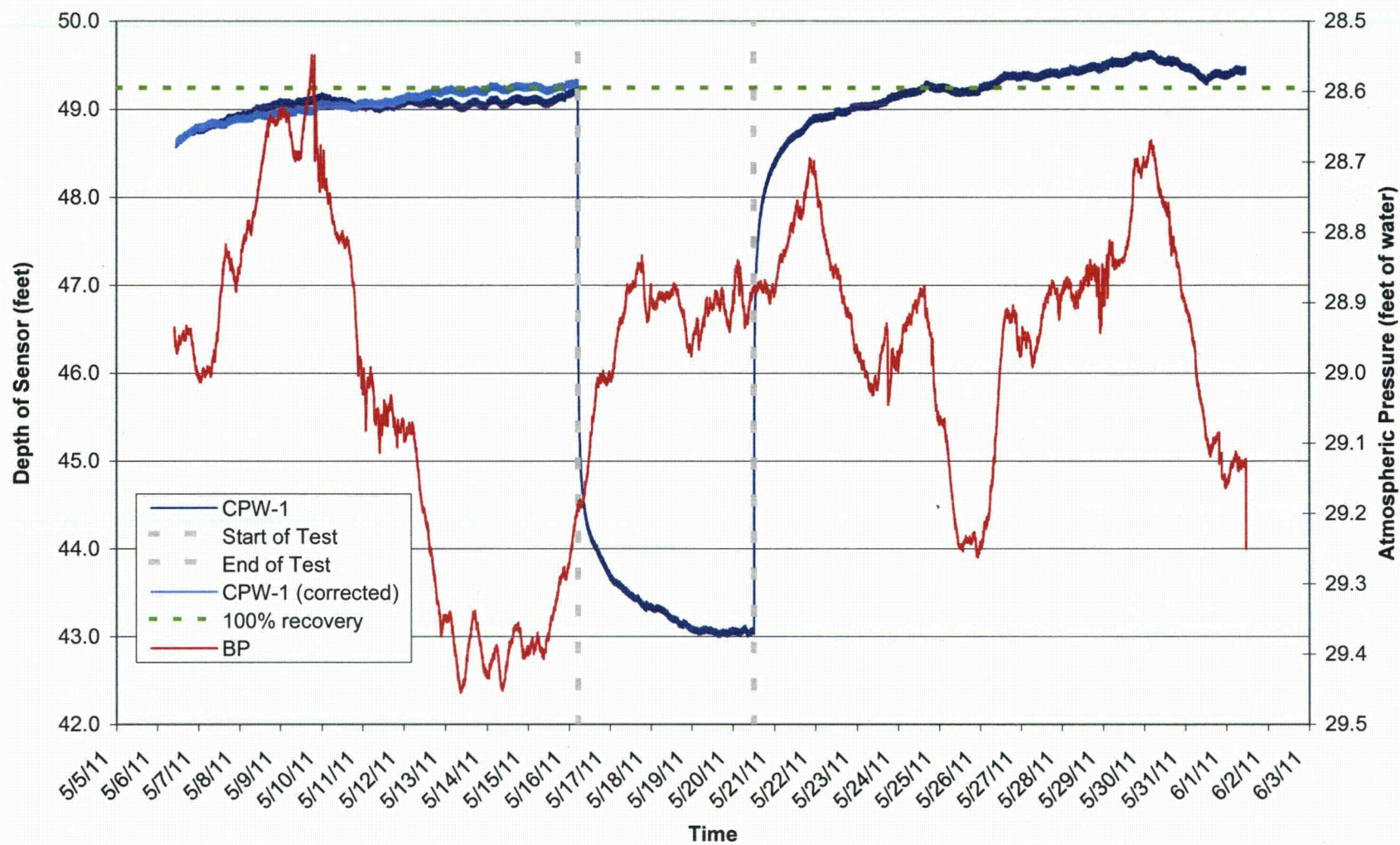
Graph B3 - Groundwater Levels and Barometric Pressure vs. Time in BOW-3



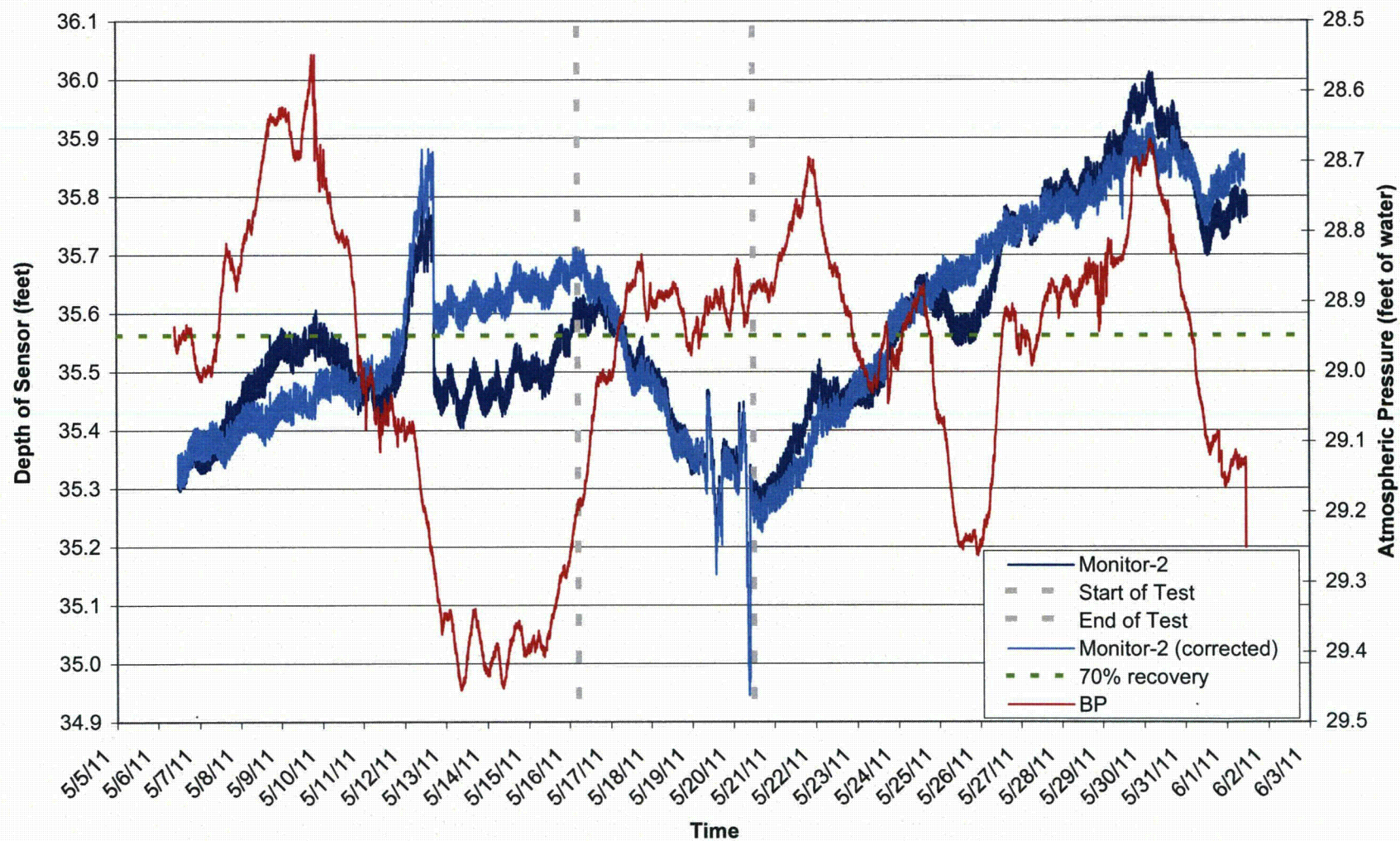
**Graph B4 - Groundwater Levels and Barometric Pressure vs. Time in CPW-1A
(Pumping Well)**



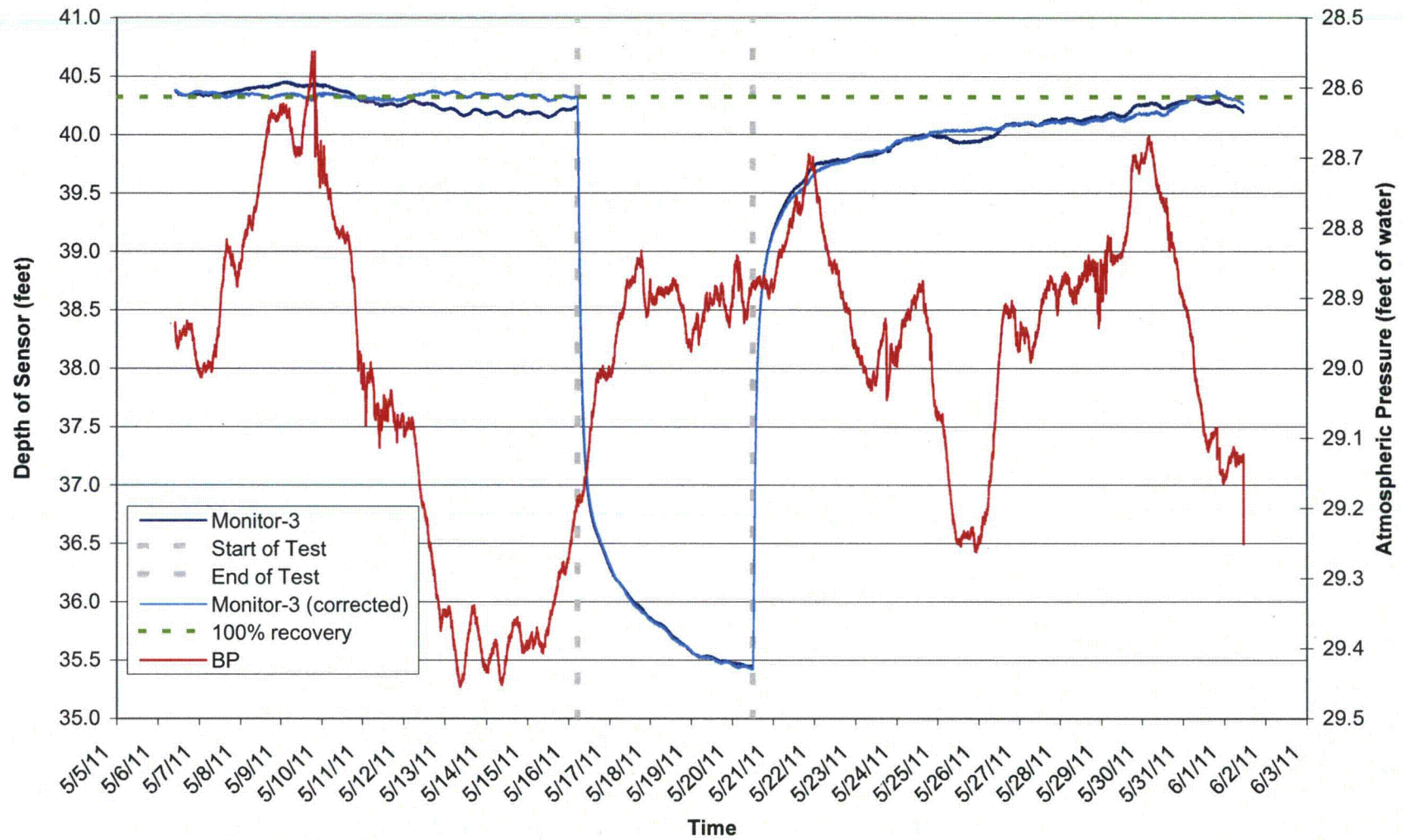
Graph B5 - Groundwater Levels and Barometric Pressure vs. Time in CPW-1



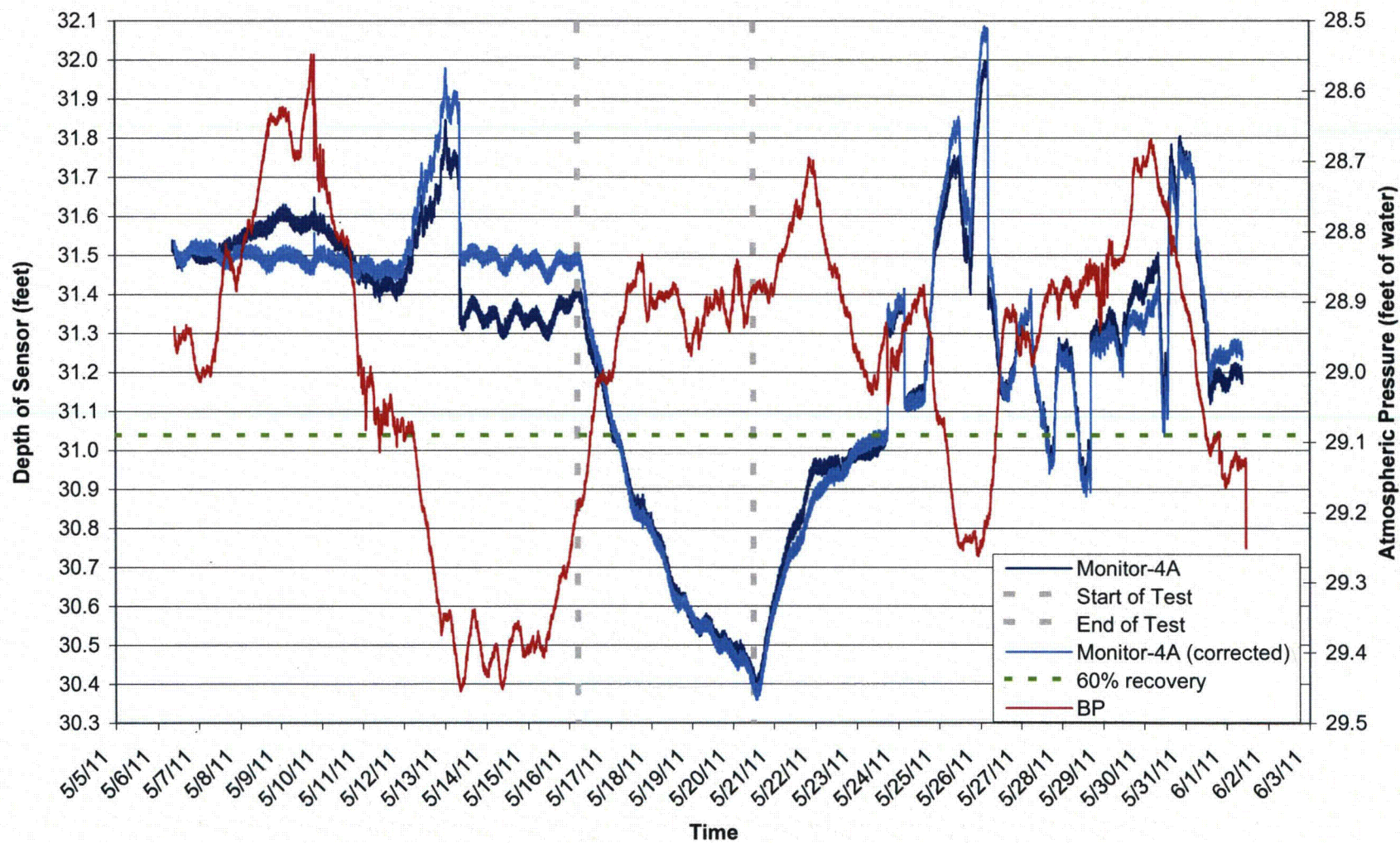
Graph B6 - Groundwater Levels and Barometric Pressure vs. Time in Monitor-2



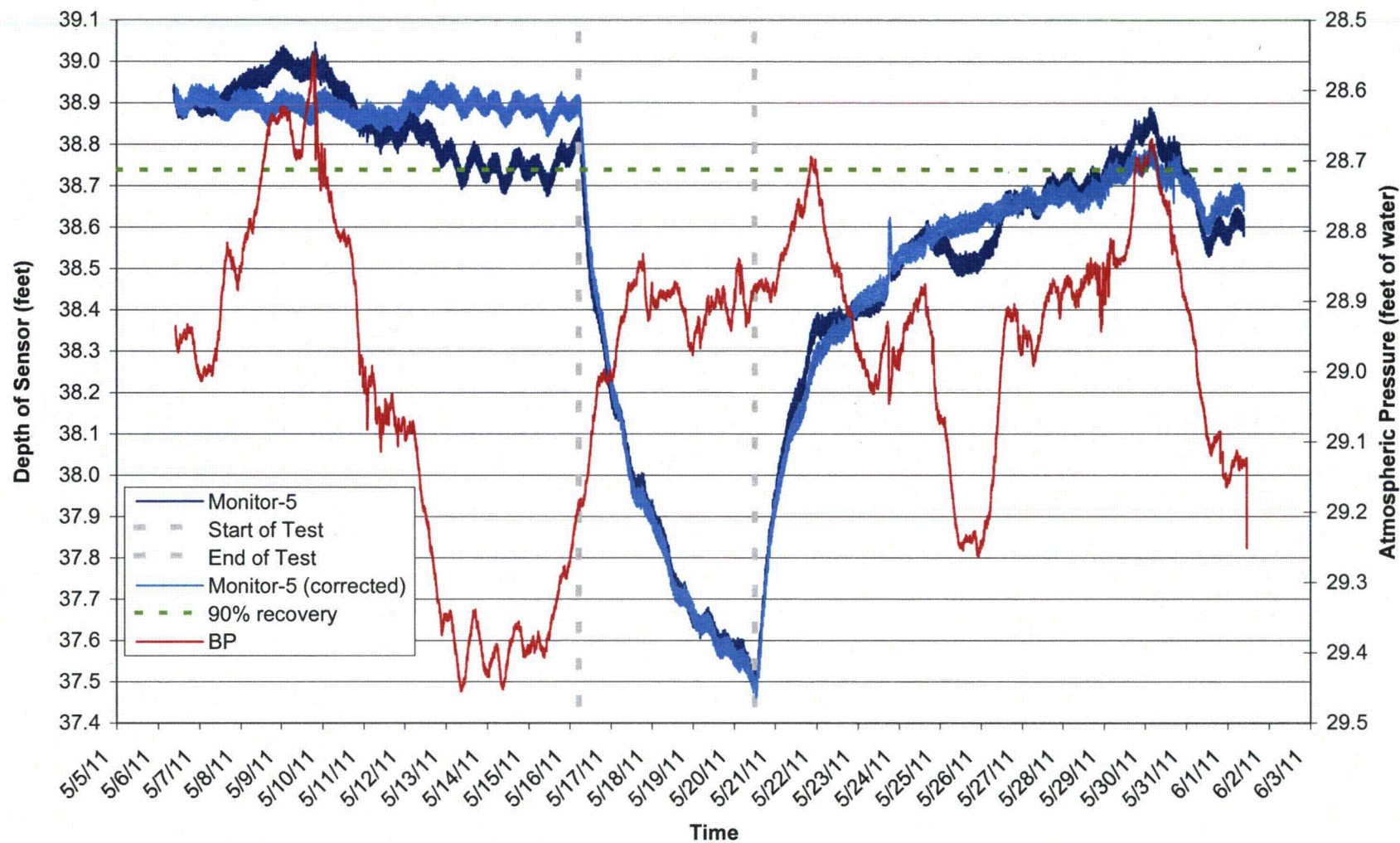
Graph B7 - Groundwater Levels and Barometric Pressure vs. Time in Monitor-3



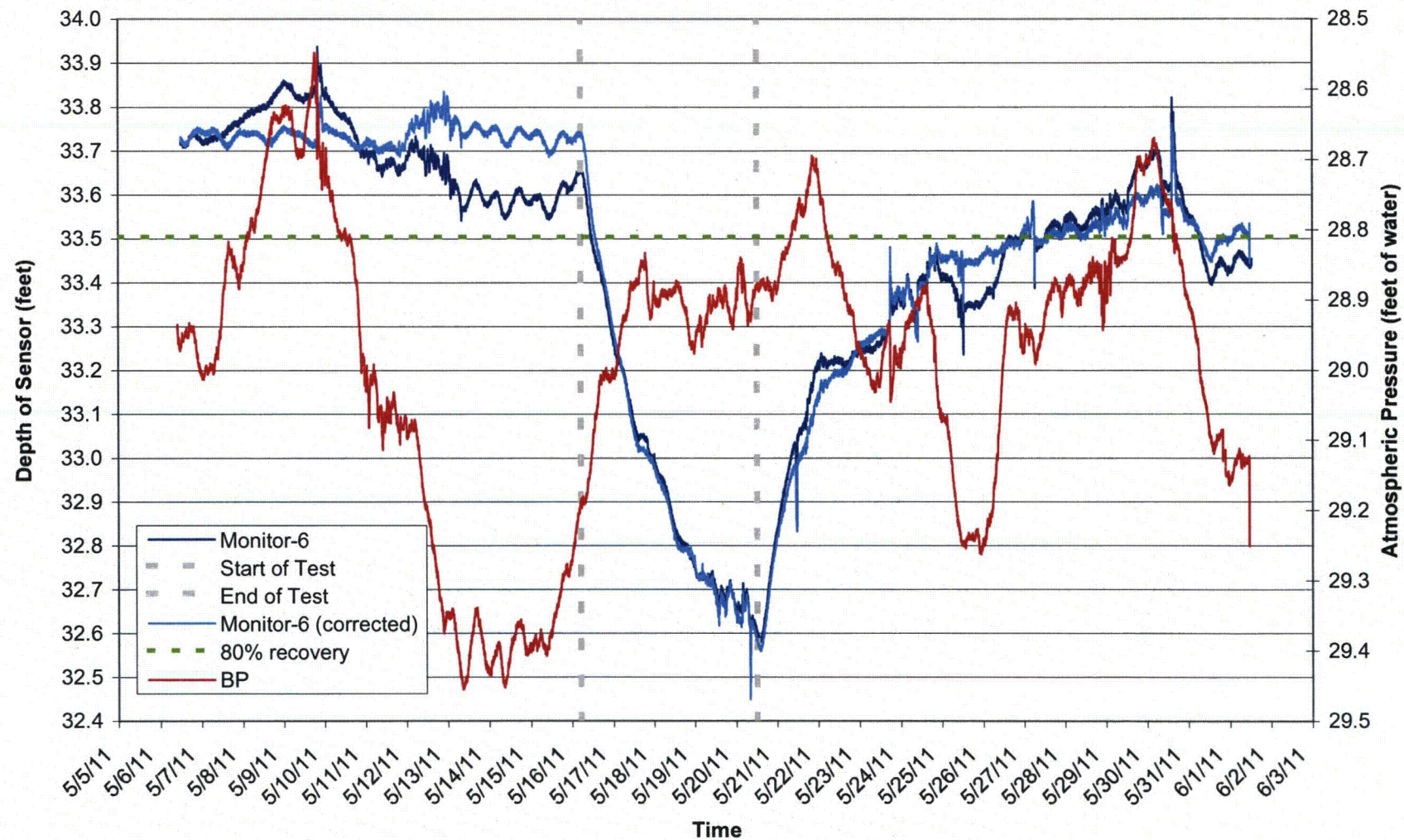
Graph B8 - Groundwater Levels and Barometric Pressure vs. Time in Monitor-4A



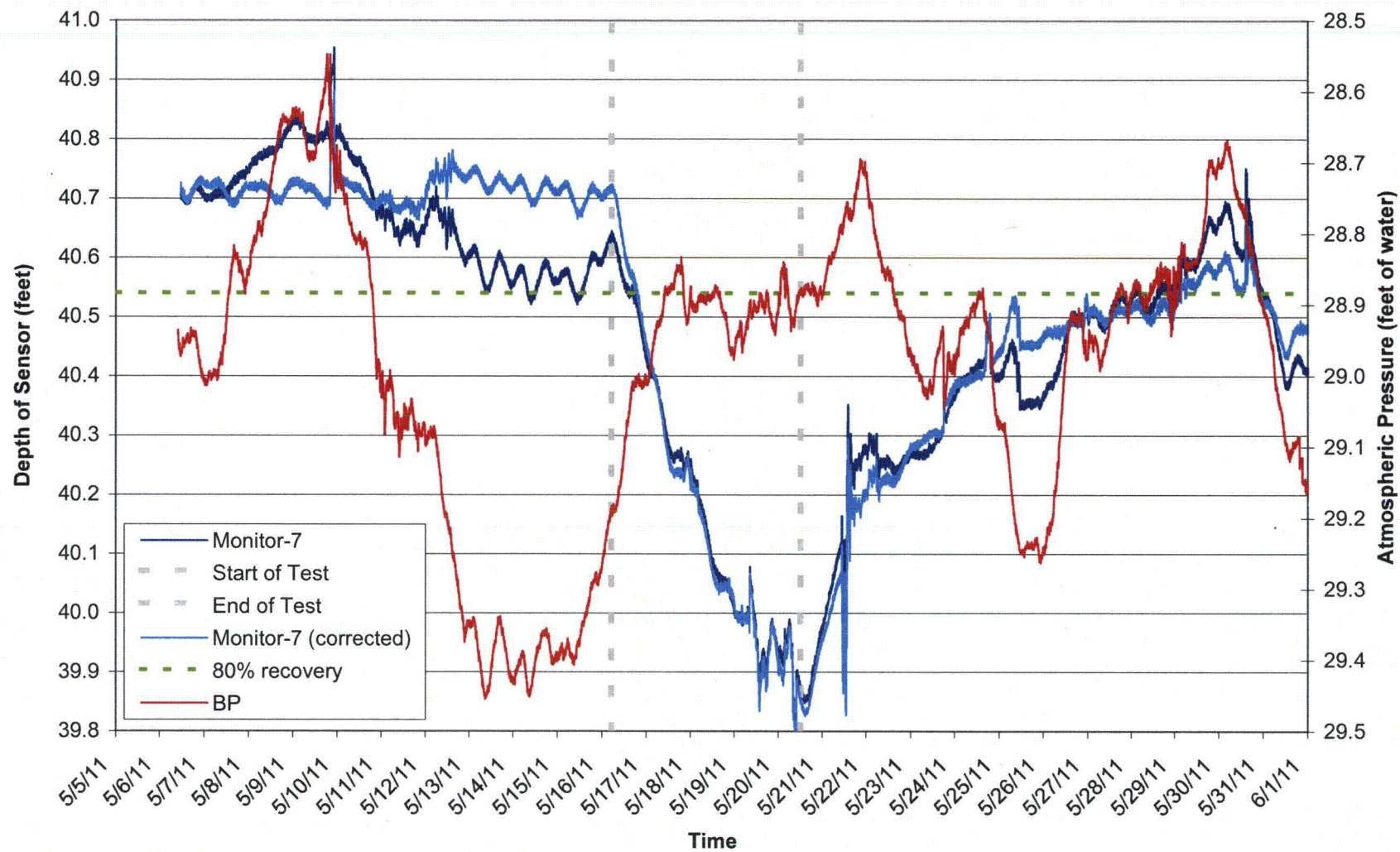
Graph B9 - Groundwater Levels and Barometric Pressure vs. Time in Monitor-5



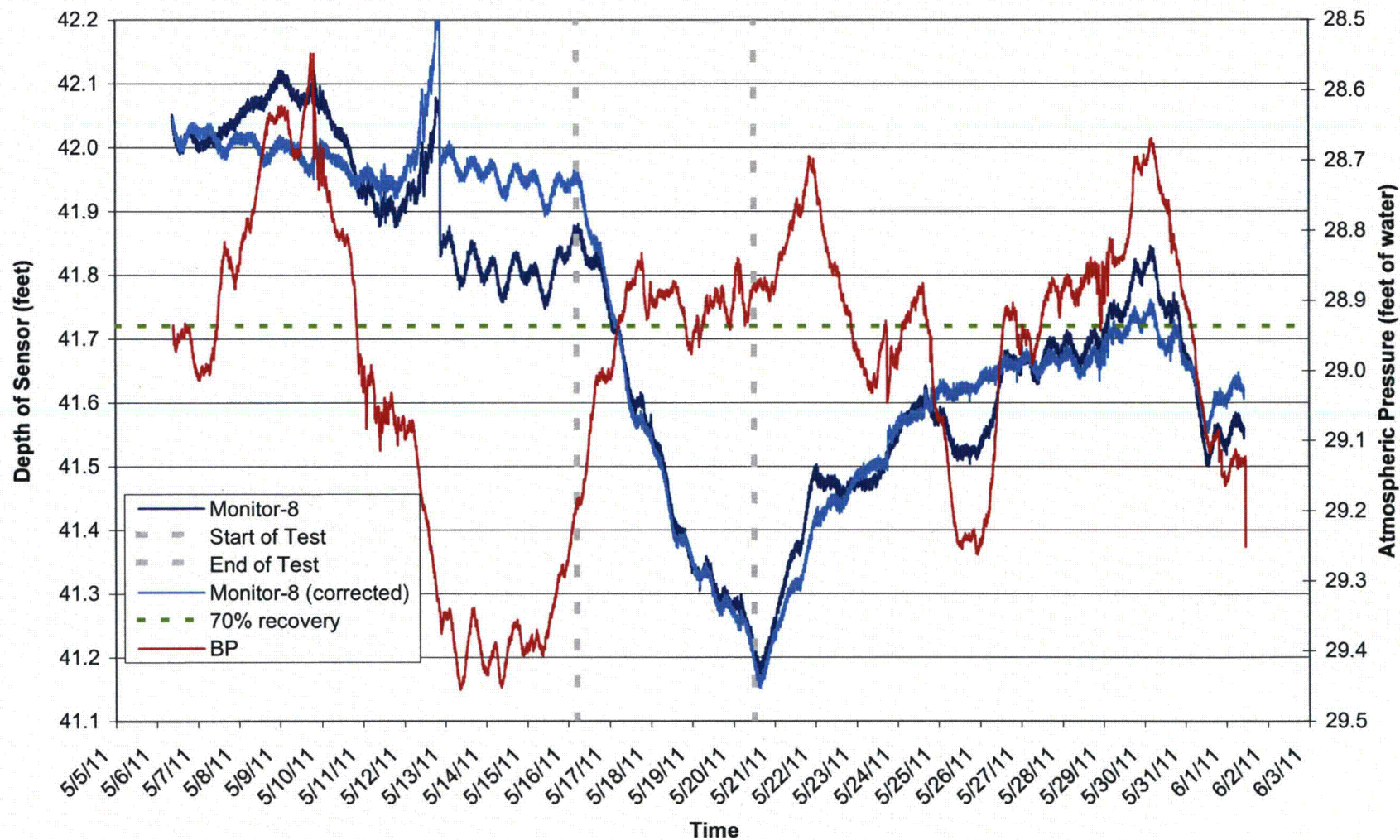
Graph B10 - Groundwater Levels and Barometric Pressure vs. Time in Monitor-6



Graph B11 - Groundwater Levels and Barometric Pressure vs. Time in Monitor-7



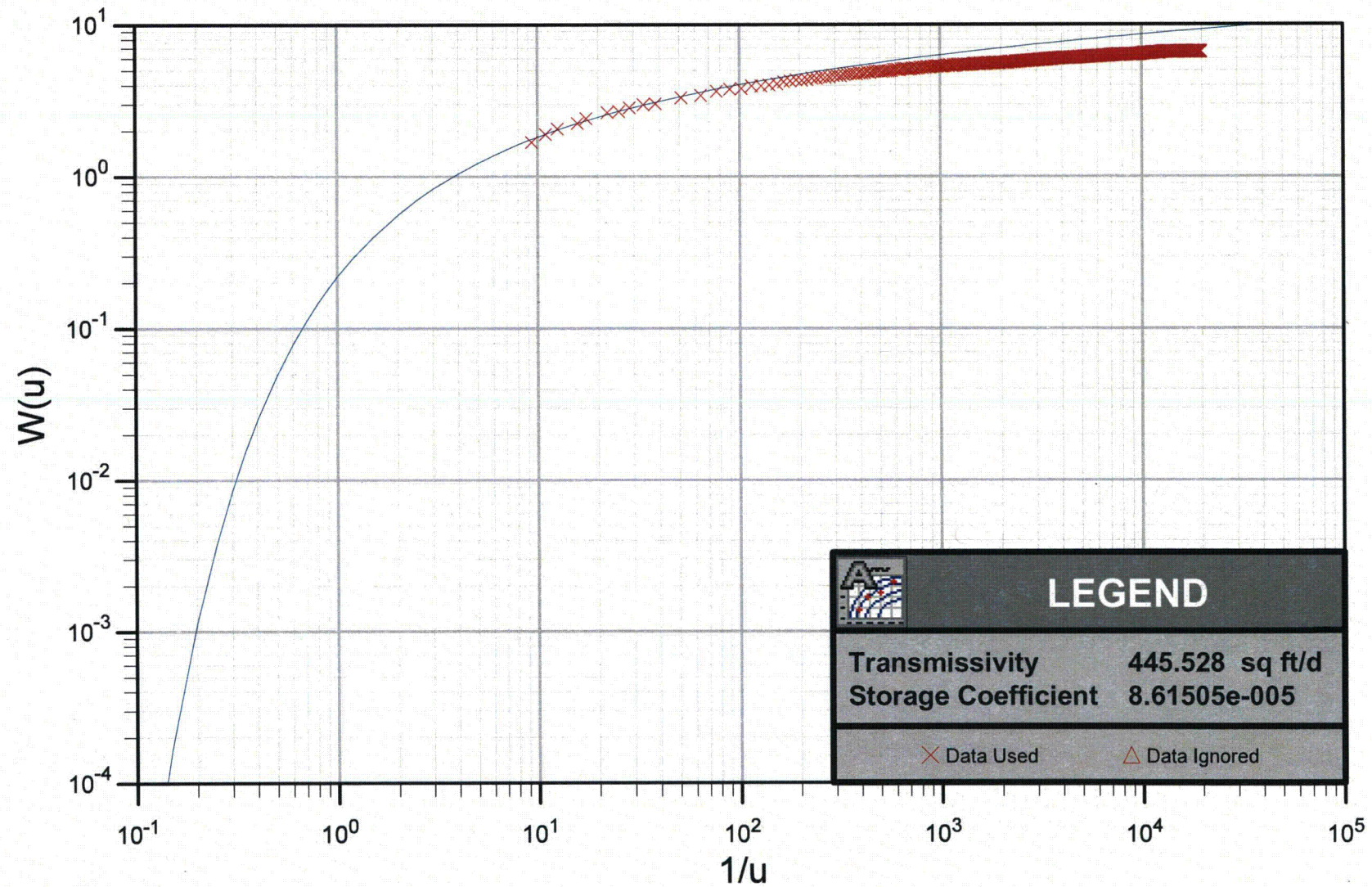
Graph B12 - Groundwater Levels and Barometric Pressure vs. Time in Monitor-8



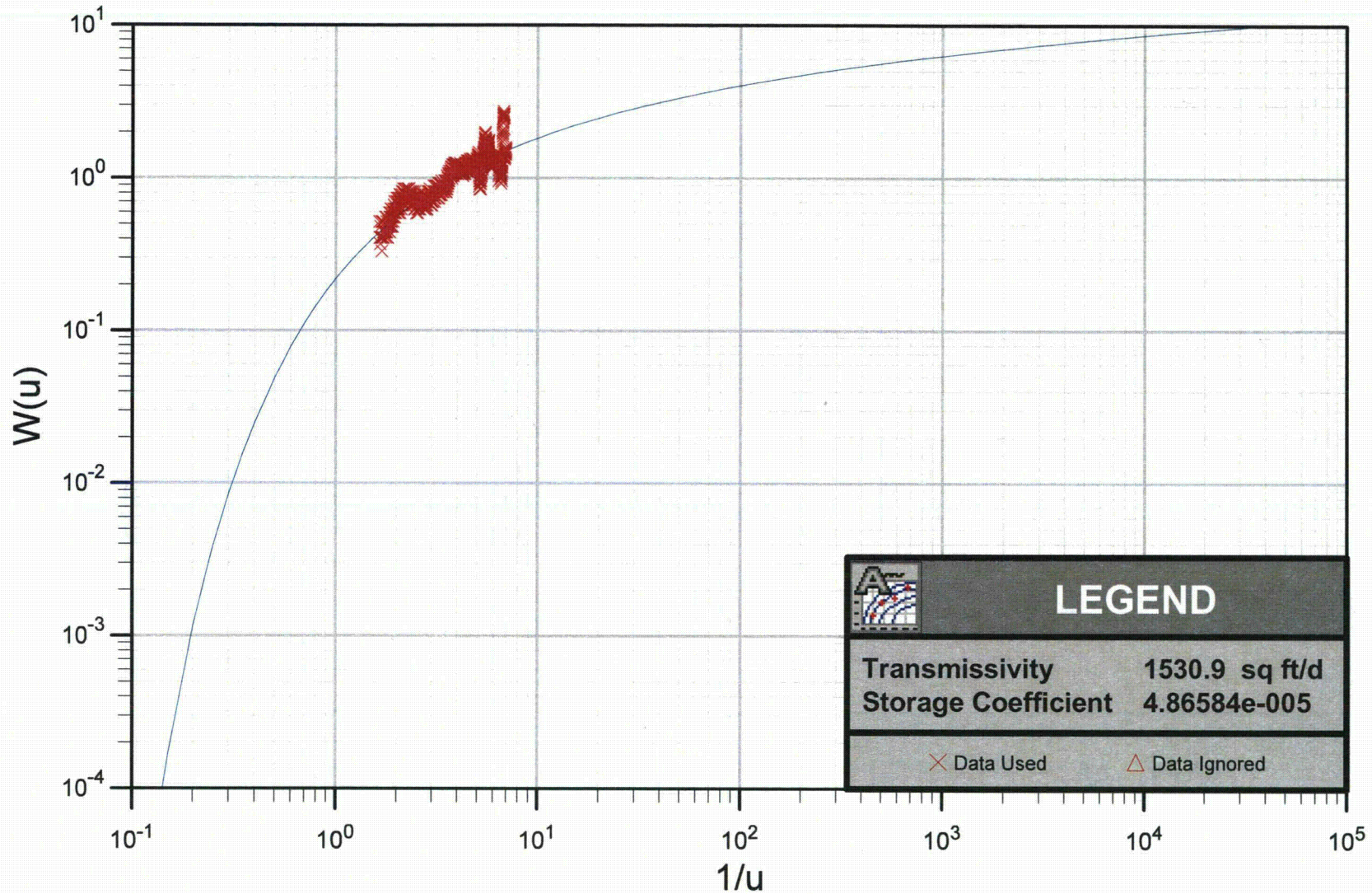
Appendix C

TYPE CURVE MATCHES

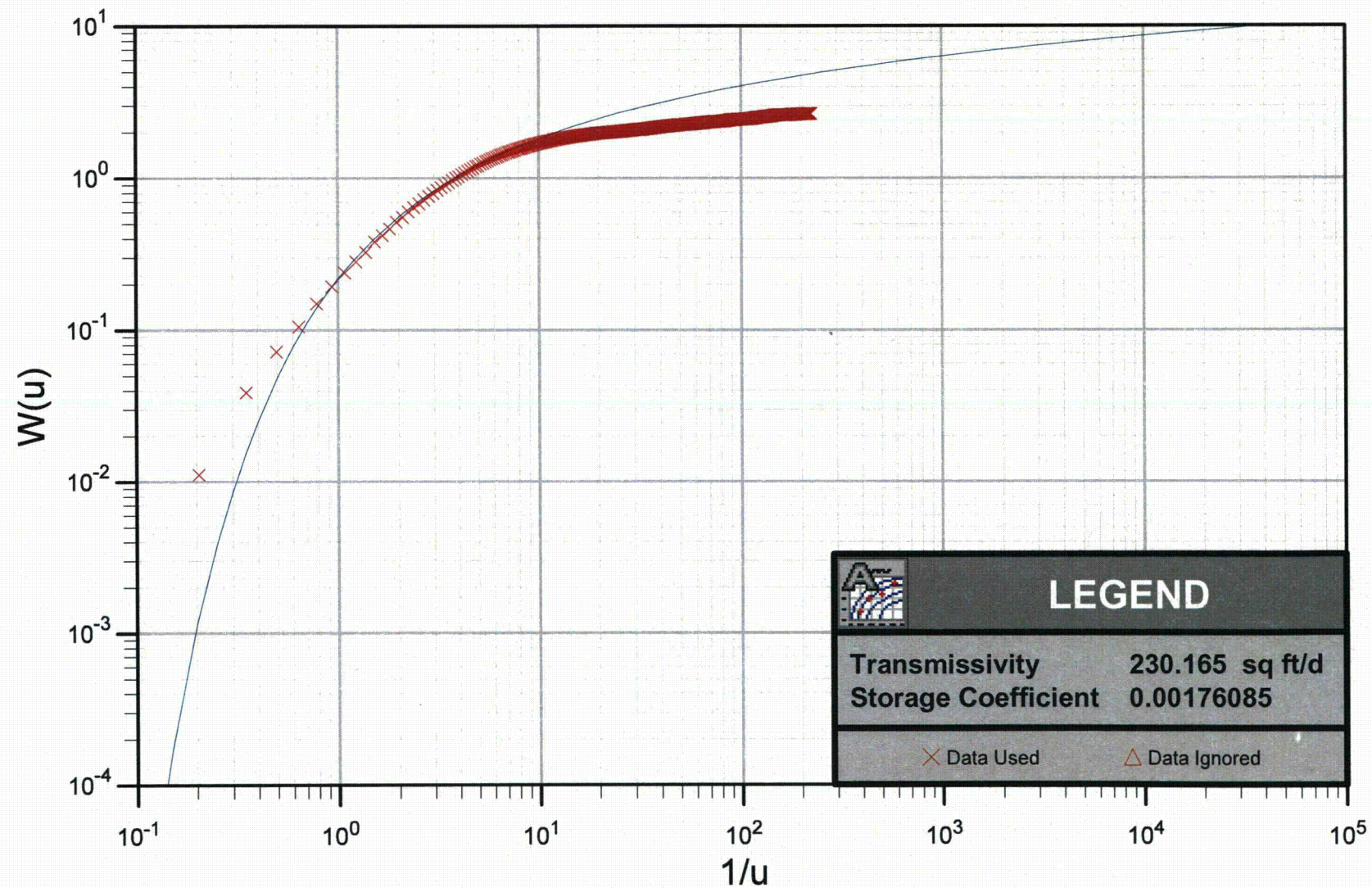
Graph C1 - CPW-1, Theis Drawdown



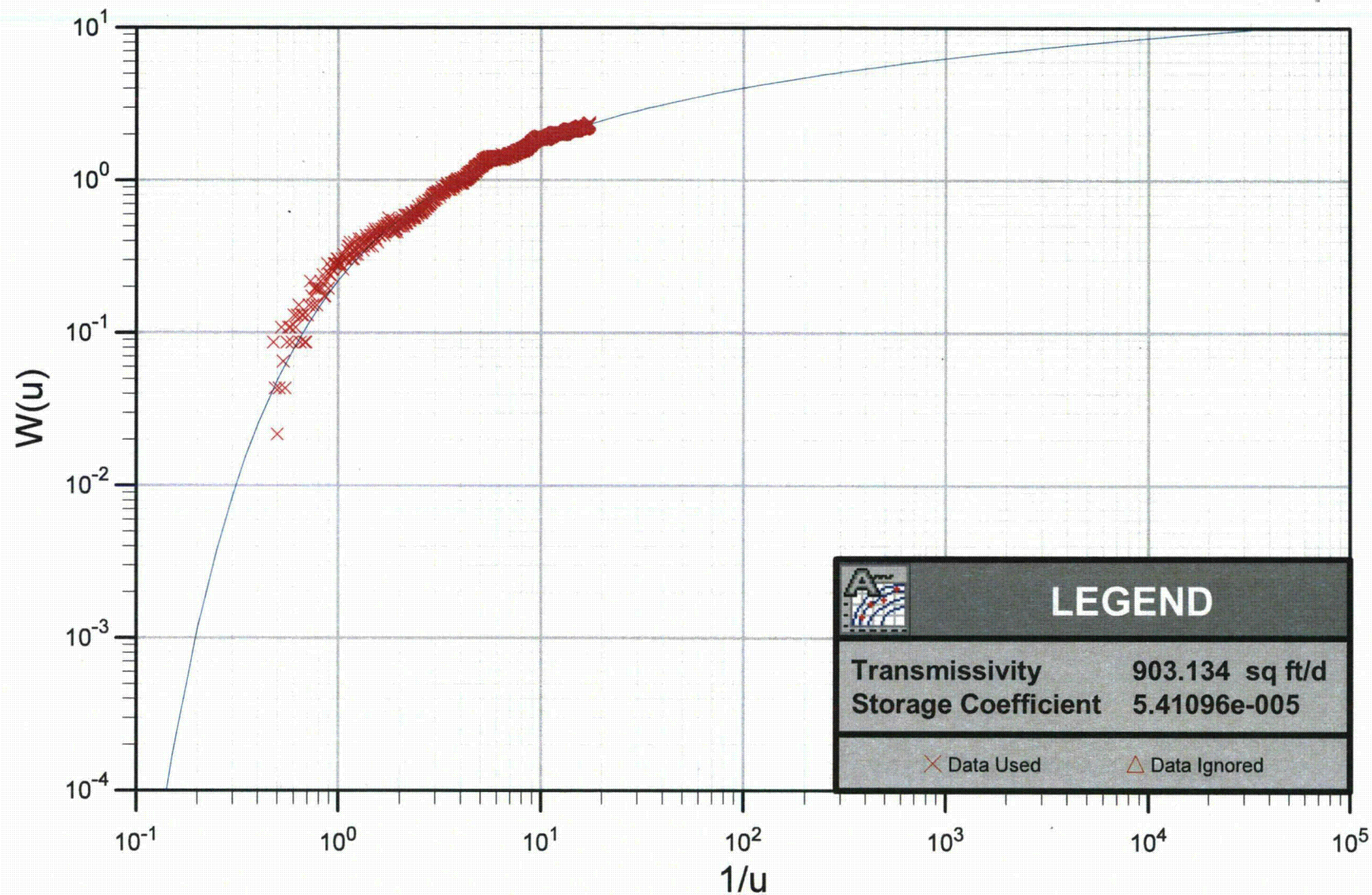
Graph C2 - Monitor-2, Theis Drawdown



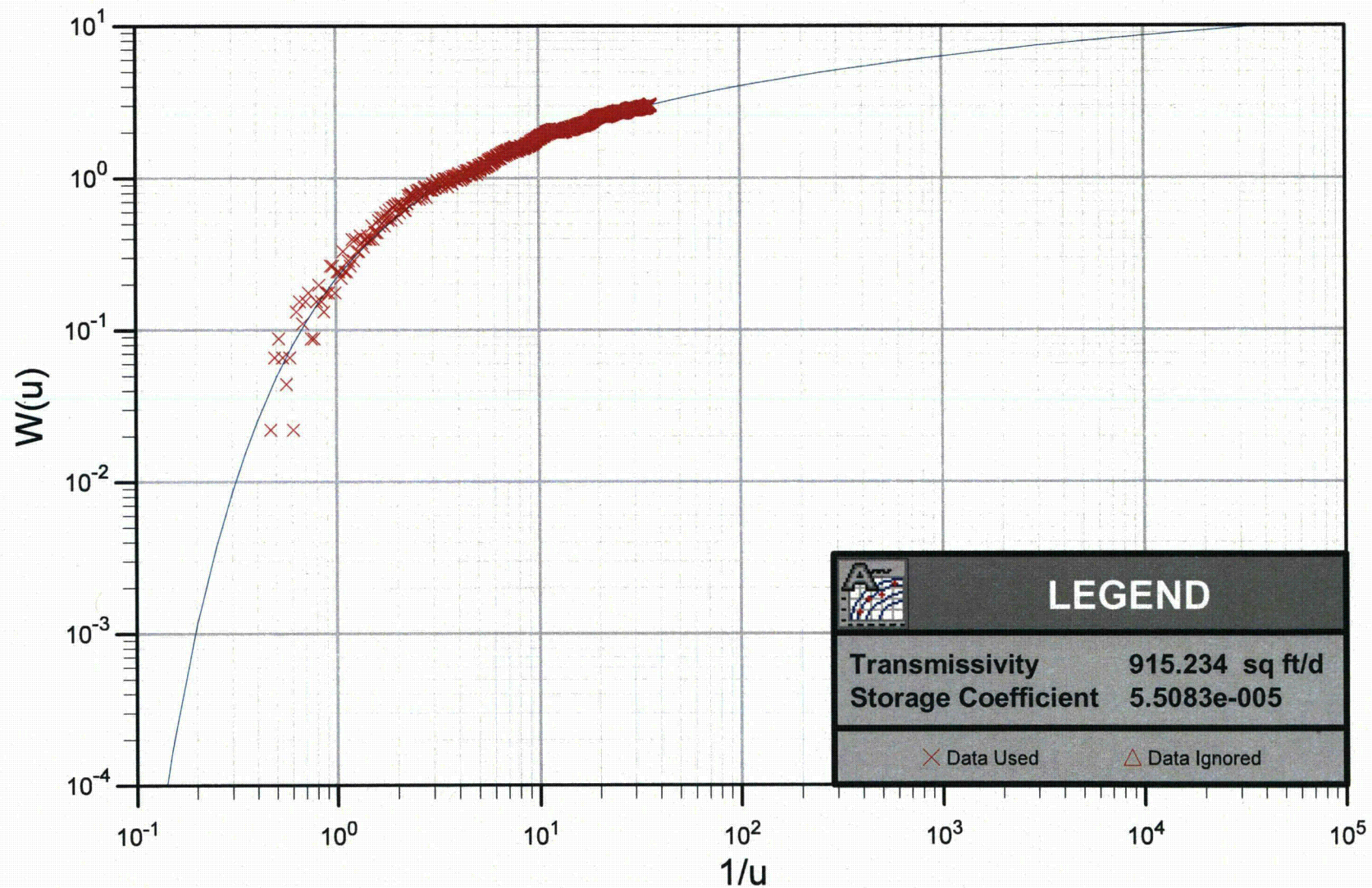
Graph C3 - Monitor-3, Theis Drawdown



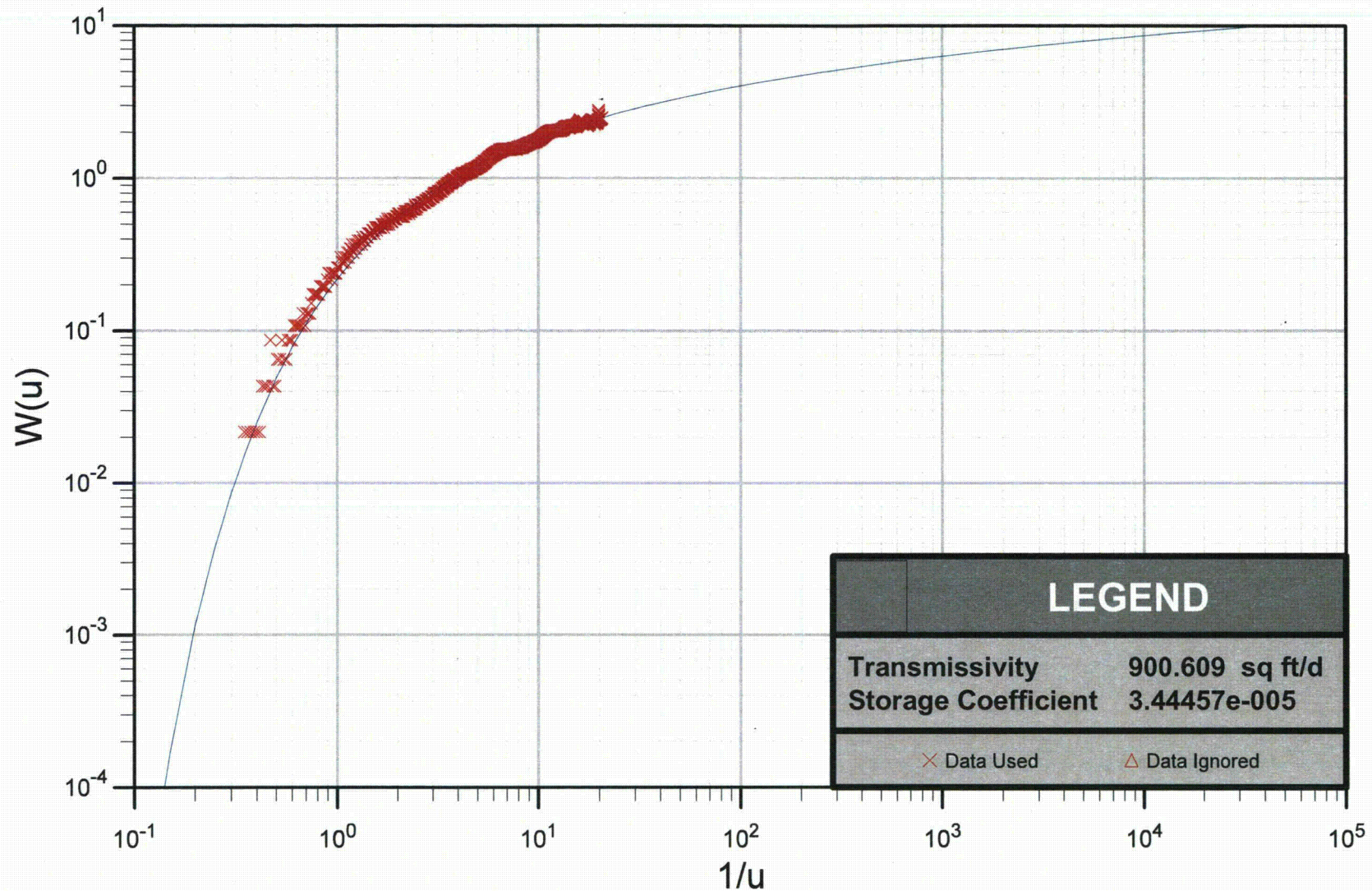
Graph C4 - Monitor-4A, Theis Drawdown



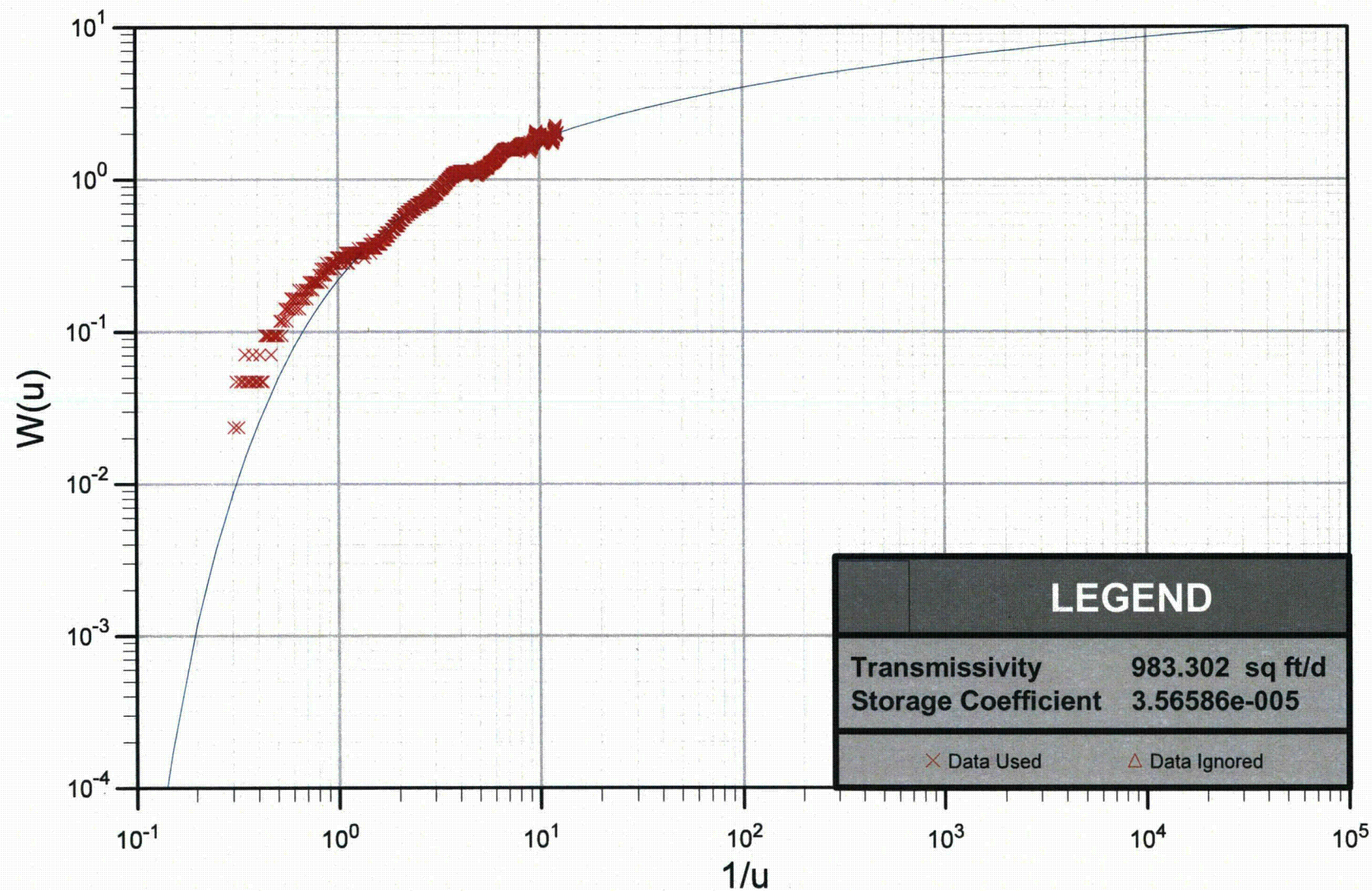
Graph C5 - Monitor-5, Theis Drawdown



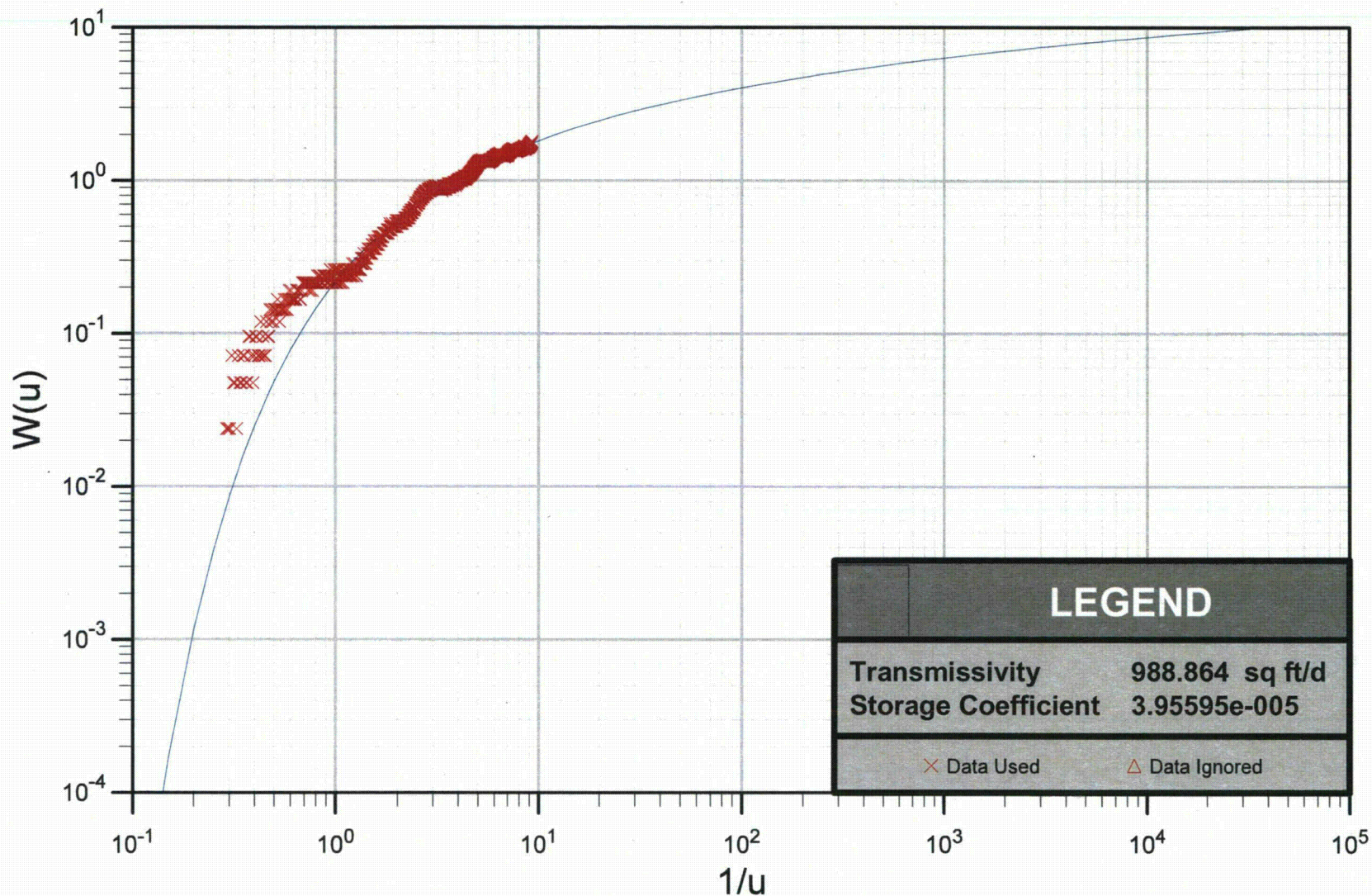
Graph C6 - Monitor-6, Theis Drawdown



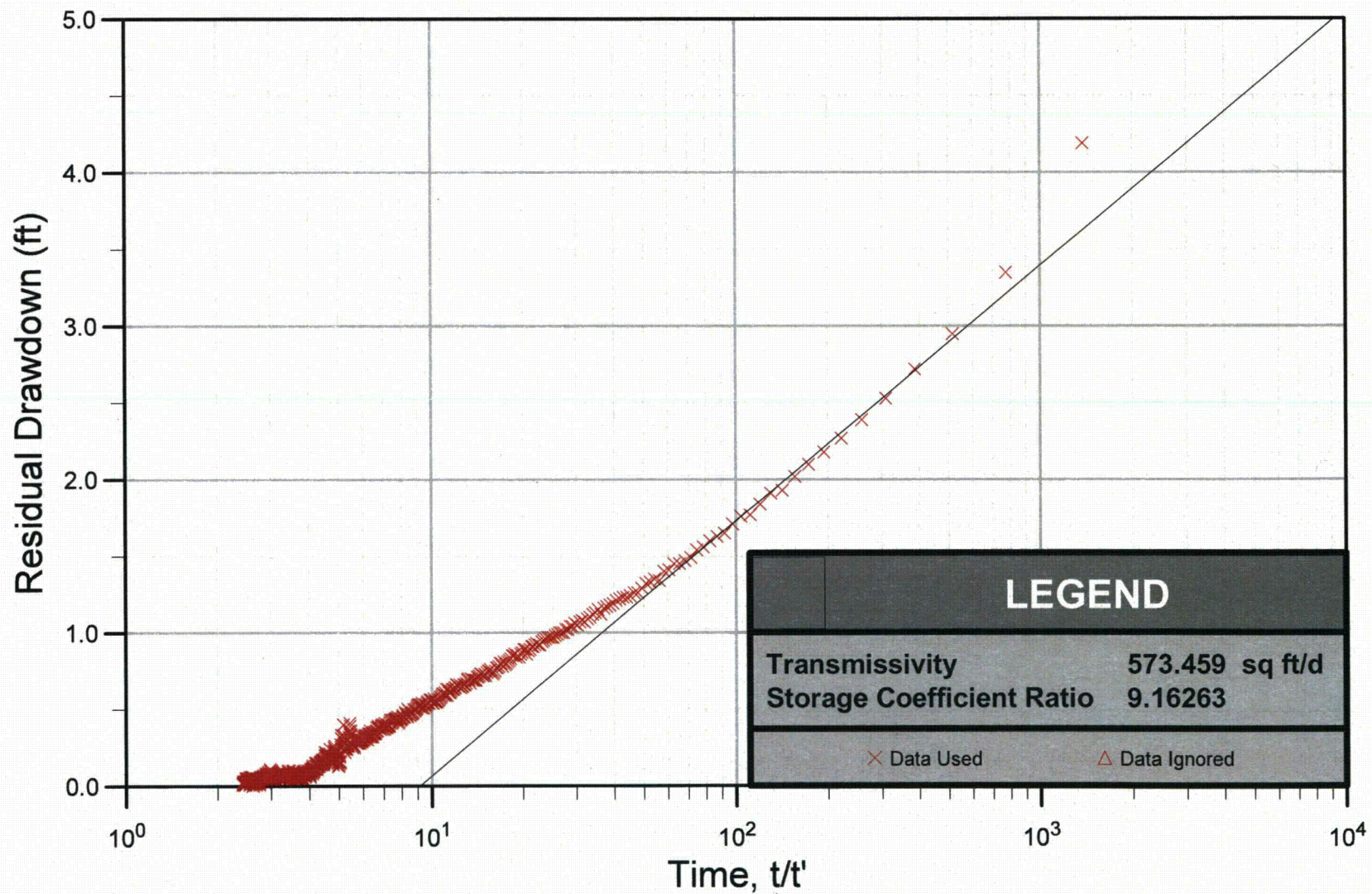
Graph C7 - Monitor-7, Theis Drawdown



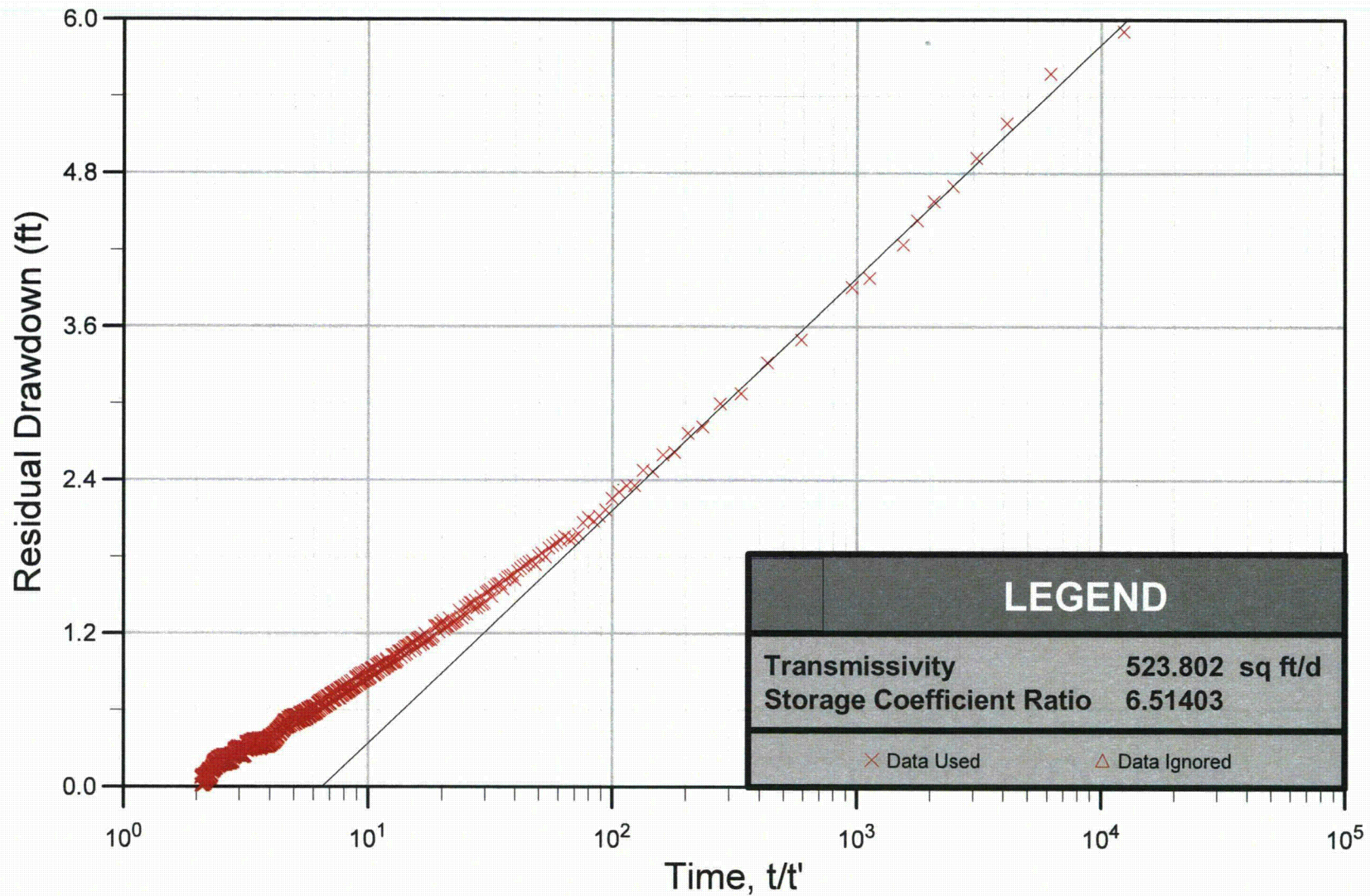
Graph C8 - Monitor-8, Theis Drawdown



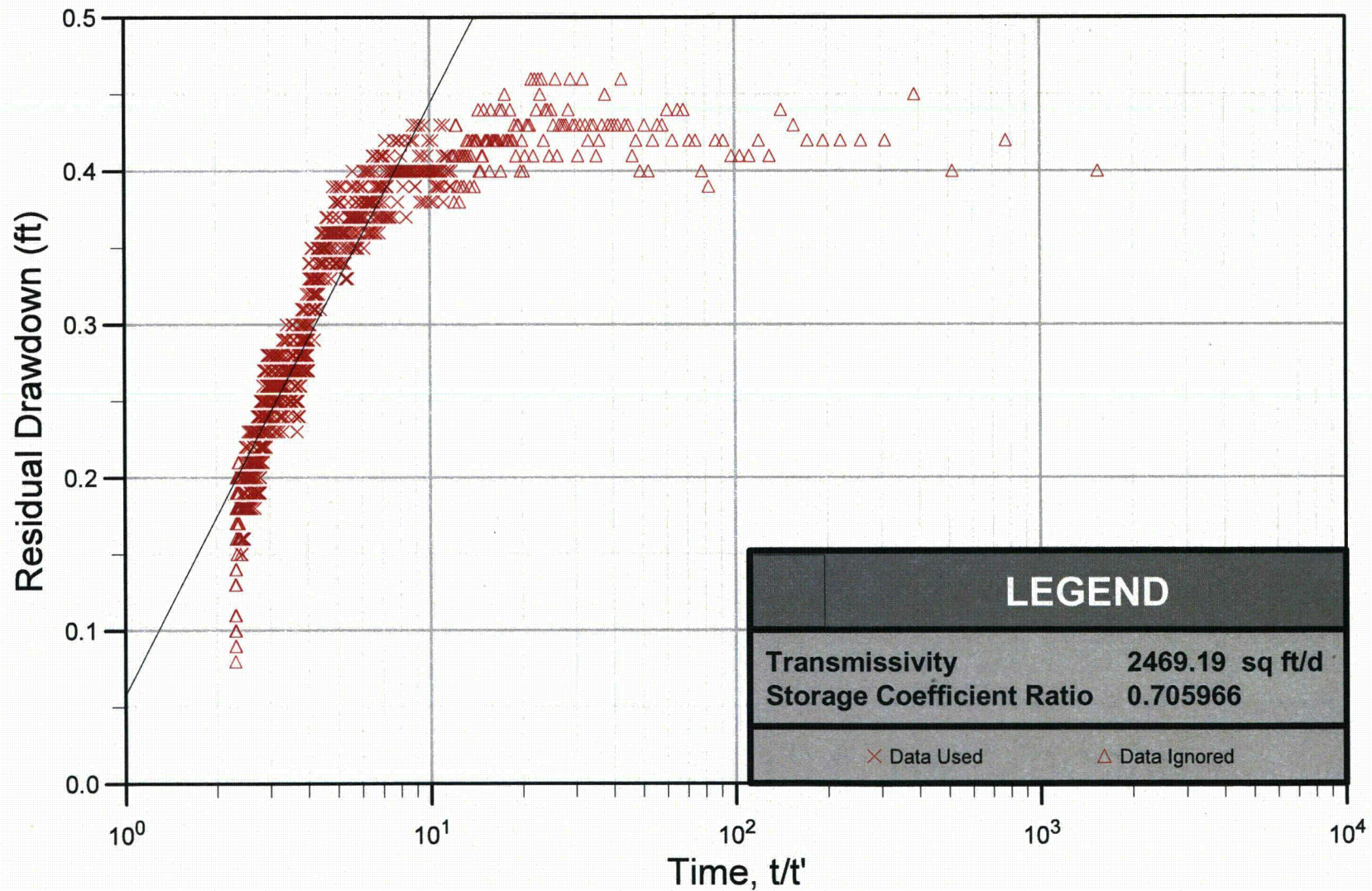
Graph C9 - CPW-1A, Theis Recovery



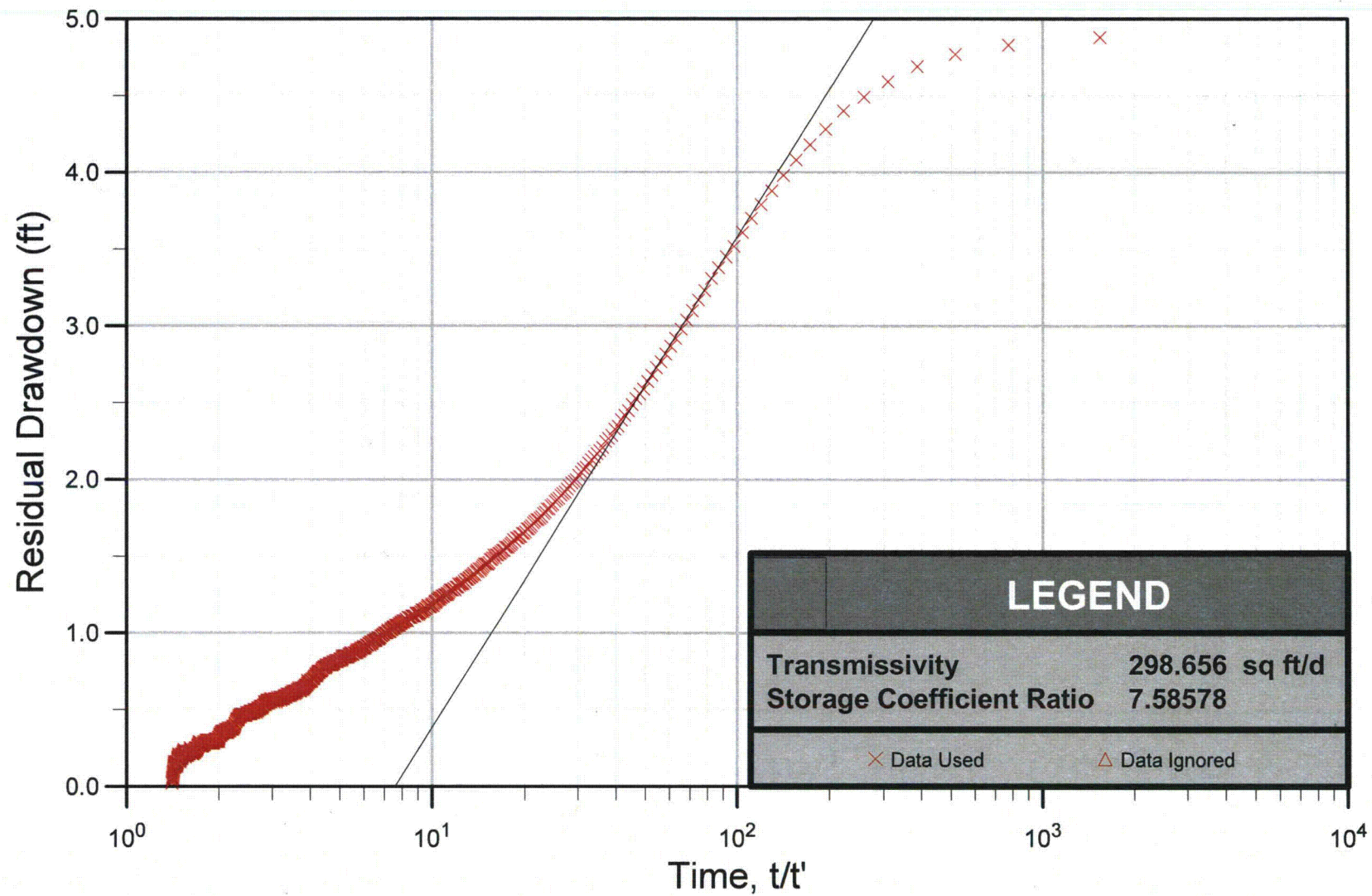
Graph C10 - CPW-1, Theis Recovery



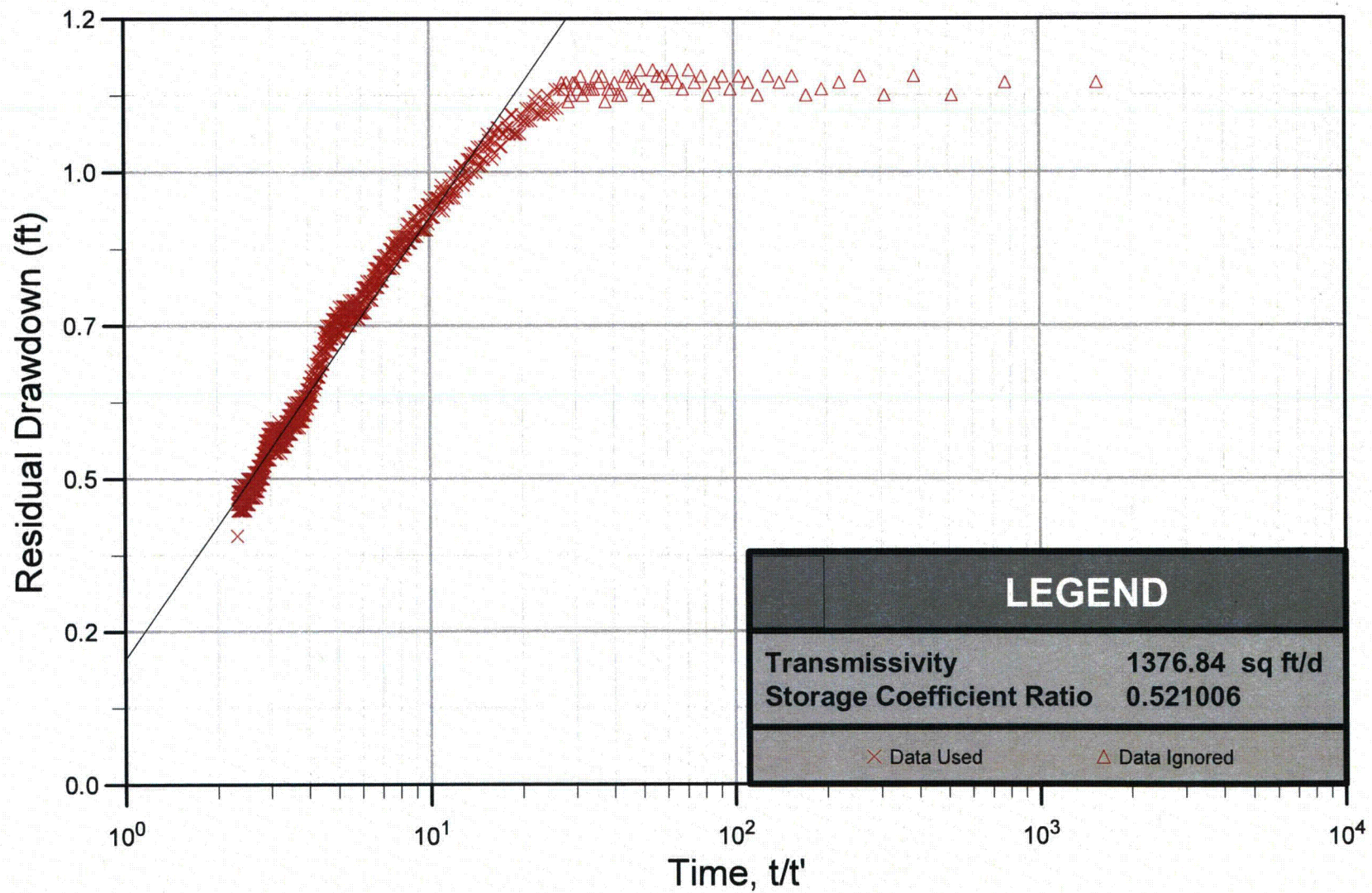
Graph C11 - Monitor-2, Theis Recovery



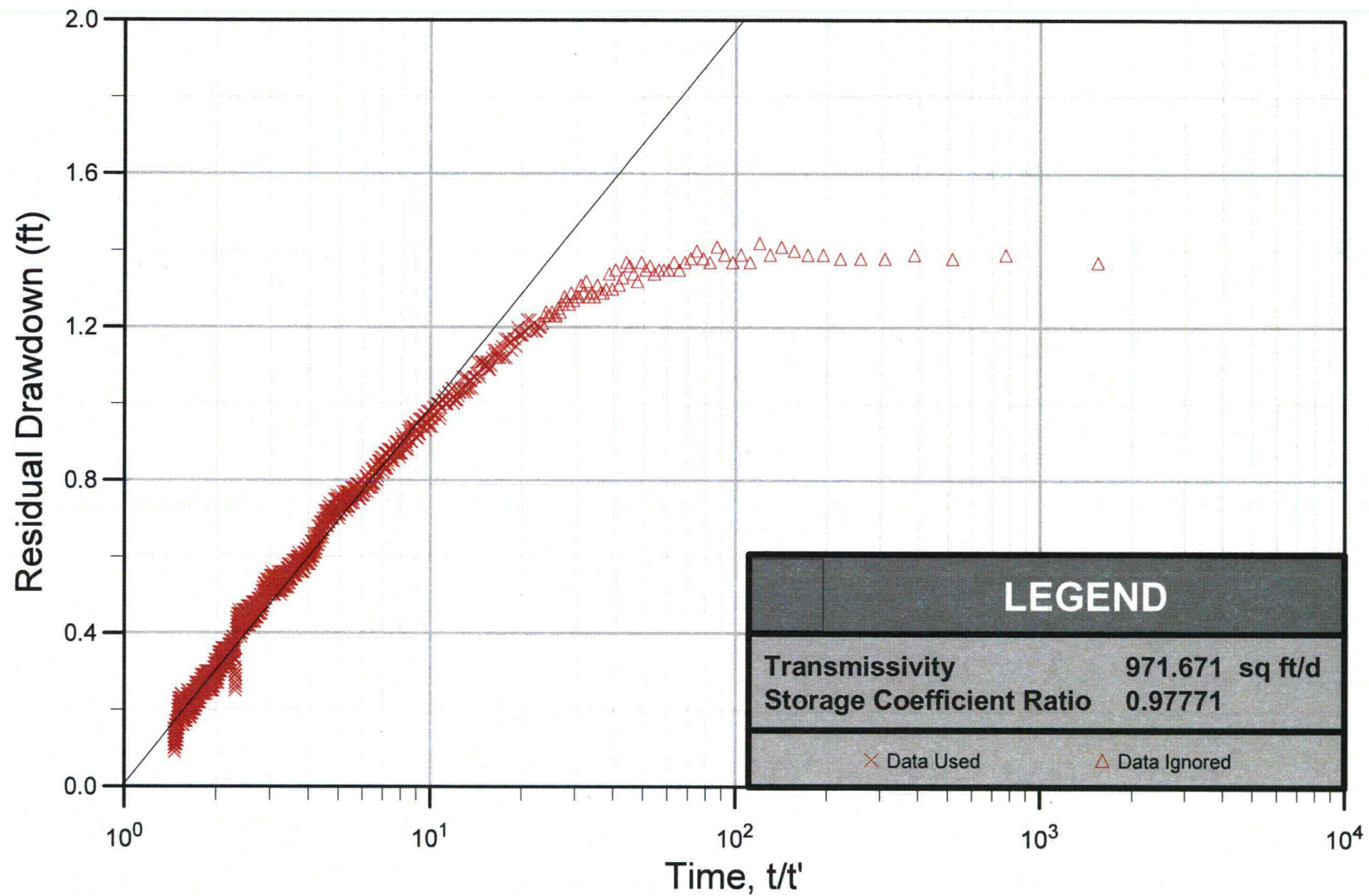
Graph C12 - Monitor-3, Theis Recovery



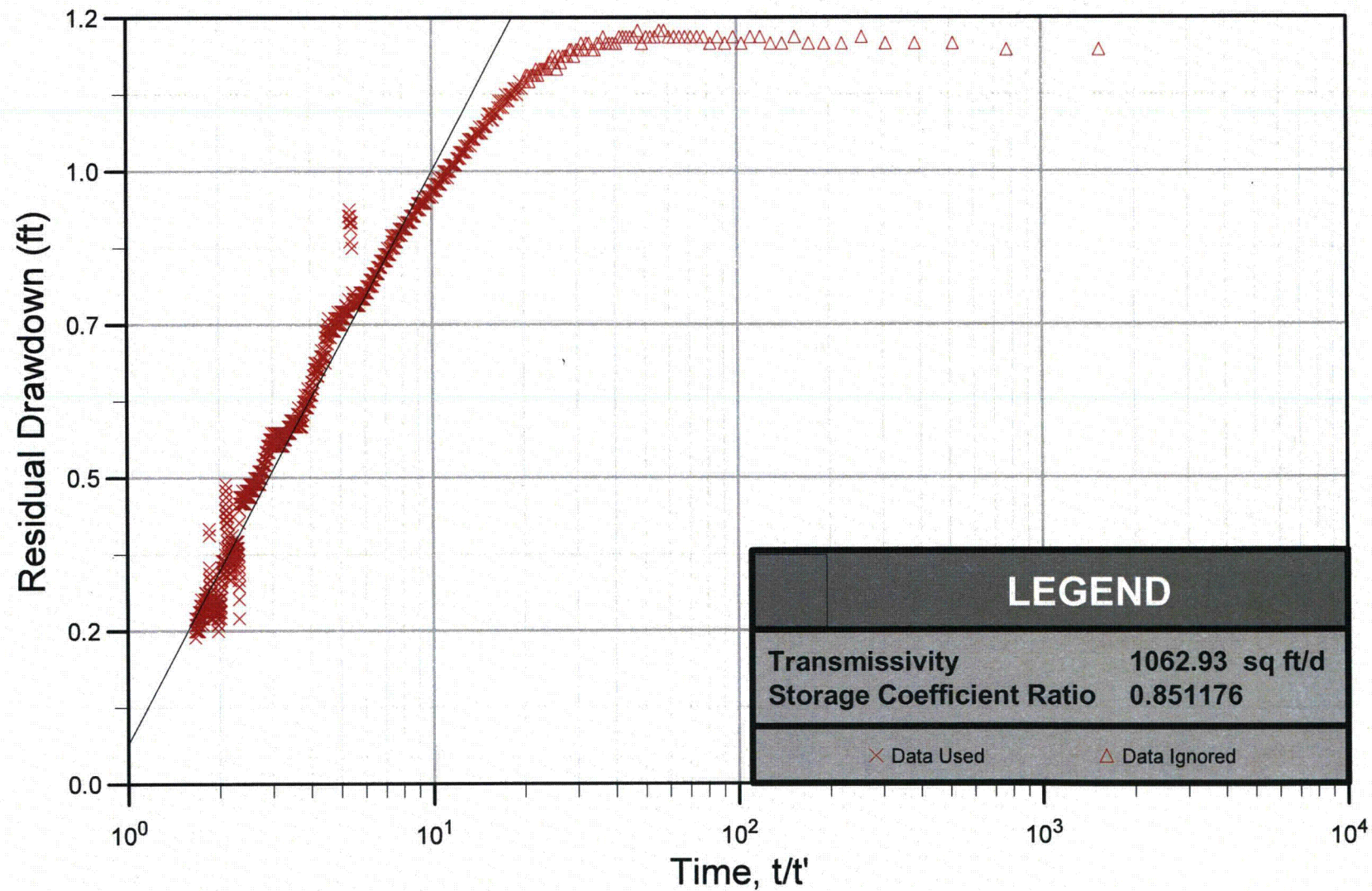
Graph C13 - Monitor-4A, Theis Recovery



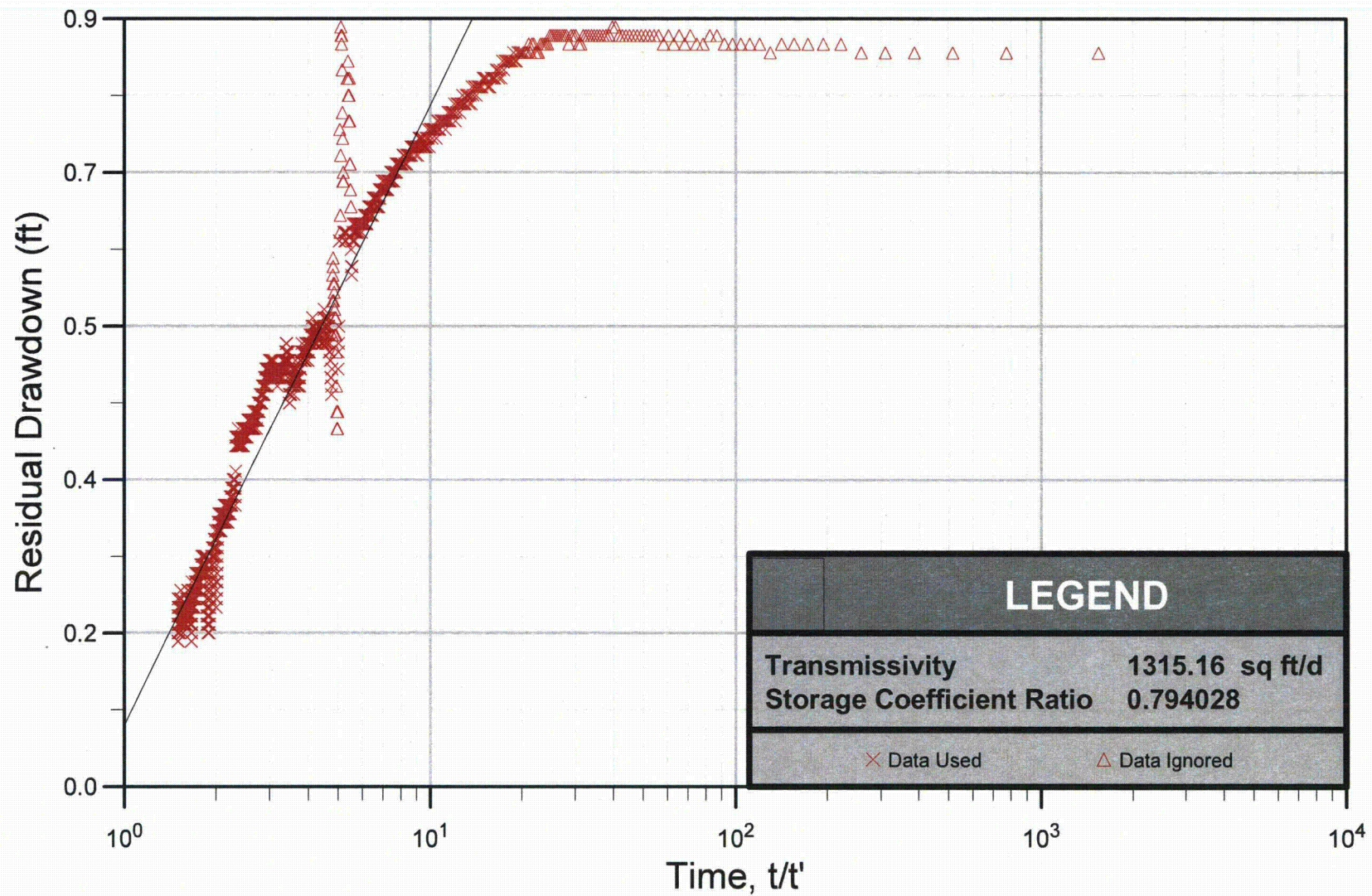
Graph C14 - Monitor 5, Theis Recovery



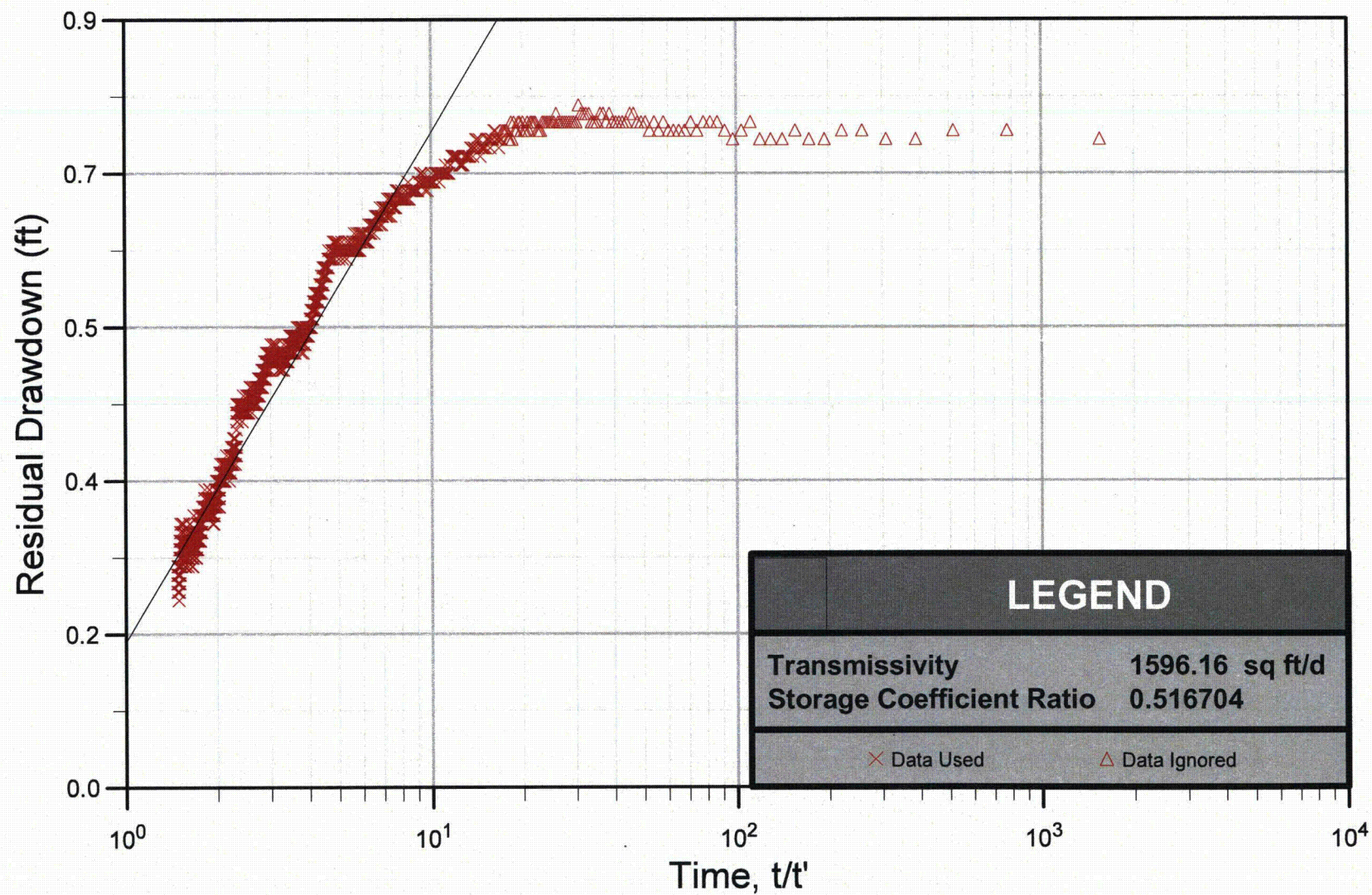
Graph C15 - Monitor-6, Theis Recovery



Graph C16 - Monitor-7, Theis Recovery



Graph C17 - Monitor-8, Theis Recovery



Appendix D (on CD ROM)

WATER LEVEL DATA

Appendix H

Flora and Fauna Lists

Appendix H-1

Plant Species List

PLANT SPECIES LIST

Scientific Name	Common Name
EQUISETACEAE	
<i>Equisetum laevigatum</i>	Smooth horsetail
PINACEAE	
<i>Pinus ponderosa</i>	Ponderosa pine
RANUNCULACEAE	
<i>Anemone patens</i>	Pasque-flower
<i>Clematis ligusticifolia</i>	Western clematis
<i>Ranunculus abortivus</i>	Early wood buttercup
<i>Thalictrum dasycarpum</i>	Purple meadowrue
PAPAVERACEAE	
<i>Argemone polyanthemos</i>	Prickle poppy
FUMARIACEAE	
<i>Corydalis aurea</i>	Golden corydalis
ULMACEAE	
<i>Ulmus americana</i>	American elm
<i>Ulmus pumila</i>	Siberian elm
CANNABACEAE	
<i>Humulus lupulus</i>	Common hop
URTICACEAE	
<i>Urtica dioica</i>	Stinging nettle
CACTACEAE	
<i>Coryphantha vivipara</i>	Pincushion cactus
<i>Opuntia fragilis</i>	Brittle prickly pear
CARYOPHYLLACEAE	
<i>Arenaria hookeri</i>	Hooker sandwort
<i>Cerastium arvense</i>	Prairie chickweed
<i>Paronychia jamesii</i>	James nailwort
<i>Stellaria media</i>	Common chickweed
CHENOPODIACEAE	
<i>Chenopodium album</i>	Lamb's-quarters
<i>Chenopodium fremontii</i>	Fremont goosefoot
<i>Chenopodium leptophyllum</i>	Maple-leaved goosefoot
CHENOPODIACEAE	
<i>Kochia scoparia</i>	Kochia
<i>Salsola iberica</i>	Russian thistle
AMARANTHACEAE	
<i>Amaranthus graecizans</i>	Tumbleweed
<i>Amaranthus retroflexus</i>	Rough pigweed
POLYGONACEAE	

PLANT SPECIES LIST

Scientific Name	Common Name
<i>Polygonum convolvulus</i>	Wild buckwheat
<i>Polygonum ramosissimum</i>	Bushy knotweed
MALVACEAE	
<i>Malva rotundifolia</i>	Common mallow
<i>Sphaeralcea coccinea</i>	Red false mallow
VIOLACEAE	
<i>Viola canadensis</i>	Canada violet
<i>Viola nuttallii</i>	Yellow prairie violet
SALICACEAE	
<i>Populus deltoids</i>	Plains cottonwood
<i>Salix exigua</i>	Coyote willow
CAPPARACEAE	
<i>Cleome serrulata</i>	Rocky mountain beeplant
BRASSICACEAE	
<i>Arabis holboellii</i>	Rockcress
<i>Brassica kaber</i>	Charlock
<i>Capsella bursa-pastoris</i>	Shepherd's purse
<i>Chorispora tenella</i>	Blue mustard
<i>Descurainia pinnata</i>	Tansy mustard
<i>Descurainia sophia</i>	Flixweed
<i>Draba reptans</i>	Whote whitlowwort
<i>Erysimum asperum</i>	Western wallflower
<i>Erysimum repandum</i>	Bushy wallflower
<i>Lesquerella ludoviciana</i>	Bladderpod
<i>Sisymbrium altissimum</i>	Tumbling mustard
<i>Thlaspi arvense</i>	Penny cress
PRIMULACEAE	
<i>Androsace occidentalis</i>	Western rock jasmine
SAXIFRAGACEAE	
<i>Ribes odoratum</i>	Buffalo currant
ROSACEAE	
<i>Prunus americana</i>	Wild plum
<i>Prunus virginiana</i>	Chokecherry
<i>Rosa acicularis</i>	Prickly wild rose
<i>Rosa arkansana</i>	Prairie wild rose
<i>Rosa woodsii</i>	Western wild rose
FABACEAE	
<i>Astragalus gracilis</i>	Slender milkvetch
<i>Astragalus missouriensis</i>	Missouri milkvetch
<i>Lupinus argentus</i>	Silvery lupine
<i>Medicago falcata</i>	Yellow lupine

PLANT SPECIES LIST

Scientific Name	Common Name
<i>Medicago sativa</i>	Alfalfa
<i>Melilotus alba</i>	White sweetclover
<i>Melilotus officinalis</i>	Yellow sweetclover
<i>Oxytropis lambertii</i>	Purple locoweed
<i>Psoralea argophylla</i>	Silver-leaf scurf pea
<i>Psoralea esculenta</i>	Breadroot scurf pea
<i>Psoralea lanceolata</i>	Lemon scurf pea
<i>Vicia americana</i>	American vetch
ONAGRACEAE	
<i>Gaura coccinea</i>	Velvety gaura
<i>Oenothera caespitosa</i>	Gumbo lily
<i>Oenothera nuttallii</i>	White-stemmed evening primrose
CORNACEAE	
<i>Comandra umbellata</i>	Bastard toadflax
EUPHORBIACEAE	
<i>Croton texensis</i>	
<i>Euphorbia podperae</i>	
VITACEAE	
<i>Parthenocissus vitacea</i>	Woodbine
ACERACEAE	
<i>Acer negundo</i>	Box elder
ANACARDIACEAE	
<i>Rhus amomata</i>	Aromatic sumac
<i>Toxicodendron rydbergii</i>	Poison ivy
ZYGOPHYLLACEAE	
<i>Tribulus terrestris</i>	Puncture vine
LINACEAE	
<i>Linum perenne</i>	Blue flax
<i>Linum rigidum</i>	Stiffstem flax
POLYGALACEAE	
<i>Polygala alba</i>	White milkwort
APIACEAE	
<i>Lomatium nuttallii</i>	Wild parsley
APOCYNACEAE	
<i>Apocynum cannabinum</i>	Hemp dogbane
ASCLEPIADACEAE	
<i>Asclepias speciosa</i>	Showy milkweed
SOLANACEAE	
<i>Solanum rostratum</i>	Buffalo bur
CONVOLVULACEAE	

PLANT SPECIES LIST

Scientific Name	Common Name
<i>Convolvulus arvensis</i>	Field bindweed
<i>Convolvulus sepium</i>	Hedge bindweed
POLEMONIACEAE	
<i>Phlox andicola</i>	Moss phlox
BORAGINACEAE	
<i>Cryptantha jamesii</i>	James' cryptantha
<i>Lappula redowskii</i>	Low stickseed
<i>Lithospermum incisum</i>	Narrow-leaved puccoon
LAMIACEAE	
<i>Mentha arvensis</i>	Field mint
<i>Monarda pectinata</i>	Spotted beebalm
PLANTAGINACEAE	
<i>Plantago patagonica</i>	Buckhorn
OLEACEAE	
<i>Fraxinus pennsylvanica</i>	Green ash
SCROPHULARIACEAE	
<i>Penstemon albidus</i>	White beardtongue
<i>Penstemon angustifolius</i>	Narrow beardtongue
<i>Penstemon glaber</i>	Smooth beardtongue
<i>Penstemon grandiflorus</i>	Large beardtongue
<i>Verbascum thapsus</i>	Common mullein
CAMPANULACEAE	
<i>Campanula rotundifolia</i>	Harebell
RUBIACEAE	
<i>Galium aparine</i>	Catchweed bedstraw
CAPRIFOLIACEAE	
<i>Symphoricarpos occidentalis</i>	Western snowberry
ASTERACEAE	
<i>Achillea millefolium</i>	Yarrow
<i>Agoseris glauca</i>	False dandelion
<i>Antennaria rosea</i>	Rose pussytoes
<i>Artemisia campestris</i>	Western sagebrush
<i>Artemisia frigida</i>	Fringed sagebrush
<i>Artemisia ludoviciana</i>	White sage
<i>Chrysopsis villosa</i>	Golden aster
<i>Cirsium undulatum</i>	Wavyleaf thistle
<i>Cirsium vulgare</i>	Bull thistle
<i>Crepis runcinata</i>	Hawk's-beard
<i>Echinacea angustifolia</i>	Purple coneflower
<i>Erigeron pumilus</i>	Low fleabane

PLANT SPECIES LIST

Scientific Name	Common Name
<i>Grindelia squarrosa</i>	Curly-top gumweed
<i>Gutierrezia sarothrae</i>	Broom snakeweed
<i>Helianthus annuus</i>	Common sunflower
<i>Helianthus petiolaris</i>	Plains sunflower
<i>Lygodesmia juncea</i>	Skeleton-weed
<i>Ratibida columnifera</i>	Prairie coneflower
<i>Ridbeckia hirta</i>	Black-eyed susan
<i>Senecio plattensis</i>	Prairie ragwort
<i>Taraxacum officinale</i>	Dandelion
<i>Townsendia exscapa</i>	Easter daisy
<i>Tragopogon dubius</i>	Goatsbeard
COMMELINACEAE	
<i>Tradescantia occidentalis</i>	Prairie spiderwort
JUNCACEAE	
<i>Juncus balticus</i>	Baltic rush
CYPERACEAE	
<i>Carex filifolia</i>	Thread-leaved sedge
<i>Carex hystericina</i>	Bottlebrush sedge
<i>Carex lanuginosa</i>	Wooly-headed sedge
<i>Carex nebraskensis</i>	Nebraska sedge
<i>Carex rossii</i>	Ross' sedge
POACEAE	
<i>Agropyron cristatum</i>	Crested wheatgrass
<i>Agropyron intermedium</i>	Intermediate wheatgrass
<i>Agropyron pectiniforme</i>	Smooth crested wheatgrass
<i>Agropyron smithii</i>	Western wheatgrass
<i>Agropogon scoparius</i>	Little bluestem
<i>Aristida longiseta</i>	Red threeawn
<i>Bouteloua gracilis</i>	Blue grama
<i>Bromus inermis</i>	Smooth brome
<i>Bromus japonicus</i>	Japanese brome
<i>Bromus tectorum</i>	Cheatgrass
<i>Buchloe dactyloides</i>	Buffalo-grass
<i>Cenchrus longispinus</i>	Field sandbur
<i>Elymus canadensis</i>	Canada wild rye
<i>Festuca octoflora</i>	Six-weeks fescue
<i>Hordeum jubatum</i>	Foxtail barley
<i>Hordeum pusillum</i>	Little barley
<i>Koeleria pyramidata</i>	Junegrass
<i>Oryzopsis hymenoides</i>	Indian ricegrass
<i>Panicum capillare</i>	Witchgrass

PLANT SPECIES LIST

Scientific Name	Common Name
<i>Poa compressa</i>	Canada bluegrass
<i>Poa pratensis</i>	Kentucky bluegrass
<i>Poa sandbergii</i> = (<i>P. secunda</i>)	Sandberg bluegrass
<i>Setaria glauca</i>	Yellow foxtail
<i>Setaria viridis</i>	Green foxtail
<i>Sitanion hystrix</i>	Squirreltail
<i>Stipa comata</i>	Needle-and-thread
<i>Stipa viridula</i>	Green needlegrass
<i>Triticum aestivum</i>	Wheat
LILIACEAE	
<i>Allium textile</i>	White wild onion
<i>Calochortus nuttallii</i>	Mariposa lily
<i>Leucocrinum montanum</i>	Mountain lily
<i>Smilacina stellata</i>	Spikenard
<i>Yucca glauca</i>	Yucca
<i>Zigadenus venenosus</i>	Death camass
IRIDACEAE	
<i>Sisyrinchium montanum</i>	Blue-eyed grass

Appendix H-2

Mammal Species List

MAMMAL SPECIES LIST

Order/Common Name	Scientific Name	Documented Status ¹
CARNIVORES		
Carnivora		
Raccoon	<i>Procyon lotor</i>	D
Long-tailed weasel	<i>Mustela frenata</i>	D
Mink	<i>Mustela vison</i>	D
Black-footed ferret	<i>Mustela nigripes</i>	*
Badger	<i>Taxidea taxus</i>	C
Eastern Spotted skunk	<i>Spilogale putorius</i>	E
Striped skunk	<i>Mephitis mephitis</i>	D
Coyote	<i>Canis latrans</i>	C
Swift fox	<i>Vulpes velox</i>	R
Red fox	<i>Vulpes vulpes</i>	D
Bobcat	<i>Lynx rufus</i>	D
Mountain lion	<i>Puma concolor</i>	R
BIG GAME MAMMALS		
Artiodactyla		
Mule deer	<i>Odocoileus hemionus</i>	C
White-tailed deer	<i>Odocoileus virginianus</i>	C
Pronghorn	<i>Antilocapra americana</i>	C
Elk	<i>Cervus elaphus</i>	C
Bighorn sheep	<i>Ovis canadensis</i>	D
Bison	<i>Bison bison</i>	D
Moose	<i>Alces alces</i>	R
SMALL MAMMALS		
Chiroptera		
Keen myotis	<i>Myotis keeni</i>	E
Little brown myotis	<i>Myotis lucifugus</i>	E
Fringe-tailed myotis	<i>Myotis thysanodes pahasapensis</i>	E
Long-eared myotis	<i>Myotis evotis</i>	E
Long-legged myotis	<i>Myotis volans</i>	E
Western small-footed myotis	<i>Myotis ciliolabrum</i>	E
Silver-haired bat	<i>Lasionycteris noctivagans</i>	E
Eastern red bat	<i>Lasiurus borealis</i>	E
Big brown bat	<i>Eptesicus fuscus</i>	E
Hoary bat	<i>Lasiurus cinereus</i>	E
Townsend's big-eared bat	<i>Corynorhinus townsendi</i>	E

MAMMAL SPECIES LIST

Order/Common Name	Scientific Name	Documented Status ¹
Insectivora		
Masked shrew	<i>Sorex cinereus</i>	E
Dwarf shrew	<i>Sorex nanus</i>	E
Merriam shrew	<i>Sorex merriami</i>	E
Least shrew	<i>Cryptotis parva</i>	E
Eastern mole	<i>Scalopus aquaticus</i>	D
Lagomorpha		
White-tailed jackrabbit	<i>Lepus townsendii</i>	C
Black-tailed jackrabbit	<i>Lepus californicus</i>	D
Eastern cottontail	<i>Sylvilagus floridanus</i>	D
Desert cottontail	<i>Sylvilagus auduboni</i>	D
Rodentia		
Black-tailed prairie dog	<i>Cynomys ludovicianus</i>	C
Thirteen-lined ground squirrel	<i>Spermophilus tridecemlineatus</i>	C
Spotted ground squirrel	<i>Citellus spilosoma</i>	D
Least chipmunk	<i>Tamias minimus</i>	D
Eastern fox squirrel	<i>Sciurus niger</i>	C
Northern pocket gopher	<i>Thomomys talpoides</i>	E
Plains pocket gopher	<i>Geomys bursarius</i>	E
Olive-backed pocket mouse	<i>Perognathus fasciatus</i>	E
Silky pocket mouse	<i>Perognathus flavus</i>	E
Hispid pocket mouse	<i>Chaetodipus hispidus</i>	E
Ord kangaroo rat	<i>Dipodomys ordii</i>	D
Beaver	<i>Castor canadensis</i>	C
Plains harvest mouse	<i>Reithrodontomys montanus</i>	E
Western harvest mouse	<i>Reithrodontomys megalotis</i>	E
White-footed mouse	<i>Peromyscus leucopus</i>	D
Deer mouse	<i>Peromyscus maniculatus</i>	D
Northern grasshopper mouse	<i>Onychomys leucogaster</i>	E
Eastern woodrat	<i>Neotoma floridana</i>	E
Bushy-tailed woodrat	<i>Neotoma cinerea</i>	E
Norway rat	<i>Rattus norvegicus</i>	E
House mouse	<i>Mus musculus</i>	D
Meadow vole	<i>Microtus pennsylvanicus</i>	D

MAMMAL SPECIES LIST

Order/Common Name	Scientific Name	Documented Status ¹
Prairie vole	<i>Microtus ochrogaster</i>	D
Muskrat	<i>Ondatra zibethicus</i>	D
Meadow jumping mouse	<i>Zapus hudsonicus</i>	D
Porcupine	<i>Erethizon dorsatum</i>	C

- ¹
- C Confirmed during field surveys in 2011.
 - D Documented in the 1982 baseline study.
 - E Expected to occur - historical or recent evidence.
 - R Reported by knowledgeable individual(s).
 - * Extirpated previously; historical records only.

Appendix H-3

Bird Species List

BIRD SPECIES LIST

Common Name	Scientific Name	Status ¹
GAVIIFORMES		
Common loon	<i>Gavia immer</i>	R
Arctic loon	<i>Gavia arctica</i>	R
Pacific loon	<i>Gavia pacifica</i>	E
PODICIPEDIFORMES		
Red-necked grebe	<i>Podiceps grisegena</i>	R
Horned grebe	<i>Podiceps auritus</i>	D
Eared grebe	<i>Podiceps caspicus</i>	D
Clark's grebe	<i>Aechmophorus clarkii</i>	E
Western grebe	<i>Aechmophorus occidentalis</i>	D
Pied-billed grebe	<i>Podilymbus podiceps</i>	E
PELECANIFORMES		
American white pelican	<i>Pelicanus erythrorhynchos</i>	D
Double-crested cormorant	<i>Phalacrocorax auritus</i>	D
CICONIFORMES		
Great blue heron	<i>Ardea herodias</i>	C
Little blue heron	<i>Egretta caerulea</i>	E
Green heron	<i>Butorides virescens</i>	R
Cattle egret	<i>Bubulcus ibis</i>	R
Great egret	<i>Ardea albus</i>	R
Snowy egret	<i>Egretta thula</i>	R
Black-crowned night heron	<i>Nycticorax nycticorax</i>	E
Yellow-crowned night heron	<i>Nyctanassa violacea</i>	R
American bittern	<i>Botaurus lentiginosus</i>	D
White-faced ibis	<i>Plegadis chihi</i>	R
ANSERIFORMES		
Trumpeter swan	<i>Cygnus buccinator</i>	D
Tundra swan	<i>Cygnus columbianus</i>	R
Canada goose	<i>Branta canadensis</i>	C
Brant	<i>Branta bernicla</i>	R
Greater white-fronted goose	<i>Anser albifrons</i>	D
Snow goose	<i>Chen caerulescens</i>	D
Ross's goose	<i>Chen rossii</i>	E
Wood Duck	<i>Aix sponsa</i>	C
Mallard	<i>Anas platyrhynchos</i>	C
American black duck	<i>Anas rubripes</i>	R
Gadwall	<i>Anas strepera</i>	D
Northern pintail	<i>Anas acuta</i>	D

BIRD SPECIES LIST

Common Name	Scientific Name	Status ¹
Green-winged teal	<i>Anas crecca</i>	D
Blue-winged teal	<i>Anas discors</i>	C
Cinnamon teal	<i>Anas cyanoptera</i>	D
American wigeon	<i>Mareca americana</i>	D
Eurasian wigeon	<i>Anas penelope</i>	E
Northern shoveler	<i>Anas clypeata</i>	D
Redhead	<i>Aythya americana</i>	D
Ring-necked duck	<i>Aythya collaris</i>	D
Canvasback	<i>Aythya valisineria</i>	D
Lesser scaup	<i>Aythya affinis</i>	D
Common goldeneye	<i>Bucephala clangula</i>	D
Barrow's goldeneye	<i>Bucephala islandica</i>	R
Bufflehead	<i>Bucephala albeola</i>	D
Long-tailed duck	<i>Clangula hyemalis</i>	R
White-winged scoter	<i>Melanitta fusca</i>	R
Surf scoter	<i>Melanitta perspicillata</i>	R
Black scoter	<i>Melanitta nigra</i>	R
Ruddy duck	<i>Oxyura jamaicensis</i>	D
Hooded merganser	<i>Lophodytes cucullatus</i>	D
Common merganser	<i>Mergus merganser</i>	D
Red-breasted merganser	<i>Mergus serrator</i>	R
FALCONIFORMES		
Turkey vulture	<i>Cathartes aura</i>	C
Northern goshawk	<i>Accipiter gentilis</i>	D
Sharp-shinned hawk	<i>Accipiter striatus</i>	D
Cooper's hawk	<i>Accipiter cooperi</i>	C
Red-tailed hawk	<i>Buteo jamaicensis</i>	C
Red-shouldered hawk	<i>Buteo lineatus</i>	R
Broad-winged hawk	<i>Buteo platypterus</i>	R
Swainson's hawk	<i>Buteo swainsoni</i>	C
Rough-legged hawk	<i>Buteo lagopus</i>	C
Ferruginous hawk	<i>Buteo regalis</i>	C
Golden eagle	<i>Aquila chrysaetos</i>	C
Bald eagle	<i>Haliaeetus leucocephalus</i>	C
Northern harrier	<i>Circus cyaneus</i>	C
Osprey	<i>Pandion haliaetus</i>	R
Mississippi kite	<i>Ictinia mississippiensis</i>	E
Gyr falcon	<i>Falco rusticolus</i>	E
Prairie falcon	<i>Falco mexicanus</i>	D
Peregrine falcon	<i>Falco peregrinus</i>	C
Merlin	<i>Falco columbarius</i>	D

BIRD SPECIES LIST

Common Name	Scientific Name	Status ¹
American kestrel	<i>Falco sparverius</i>	C
GALLIFORMES		
Sharp-tailed grouse	<i>Pedioecetes phasianellus</i>	D
Northern bobwhite	<i>Colinus virginianus</i>	R
Ring-necked pheasant	<i>Phasianus colchicus</i>	C
Wild turkey	<i>Meleagris gallopavo</i>	C
Gray partridge	<i>Perdix perdix</i>	D
GRUIFORMES		
Sandhill crane	<i>Grus canadensis</i>	D
Virginia rail	<i>Rallus limicola</i>	D
Sora	<i>Porzana carolina</i>	D
American coot	<i>Fulica americana</i>	D
CHARADRIIFORMES		
Semipalmated plover	<i>Charadrius semipalmatus</i>	R
Mountain plover	<i>Charadrius montainus</i>	E
Piping plover	<i>Charadrius melodus</i>	R
Snowy plover	<i>Charadrius alexandrinus</i>	R
Killdeer	<i>Charadrius vociferus</i>	C
American golden plover	<i>Pluvialis dominica</i>	R
Black-bellied plover	<i>Pluvialis squatarola</i>	D
Hudsonian godwit	<i>Limosa haemastica</i>	E
Marbled godwit	<i>Limosa fedoa</i>	D
Whimbrel	<i>Numenius phaeopus</i>	R
Long-billed curlew	<i>Numenius americanus</i>	C
Upland sandpiper	<i>Bartramia longicauda</i>	C
Greater yellowlegs	<i>Tringa melanoleuca</i>	D
Lesser yellowlegs	<i>Tringa flavipes</i>	D
Solitary sandpiper	<i>Tringa solitaria</i>	D
Willet	<i>Tringa semipalmata</i>	D
Spotted sandpiper	<i>Actitis macularia</i>	D
Wilson's snipe	<i>Gallinago delicata</i>	D
Short-billed dowitcher	<i>Limnodromus griseus</i>	R
Long-billed dowitcher	<i>Limnodromus scolopaceus</i>	D
Red knot	<i>Calidris canutus</i>	R
Sanderling	<i>Calidris alba</i>	D
Dunlin	<i>Calidris alpina</i>	E
Semipalmated sandpiper	<i>Calidris pusillus</i>	D
Western sandpiper	<i>Calidris mauri</i>	R
Least sandpiper	<i>Calidris minutilla</i>	D
White-rumped sandpiper	<i>Calidris fuscicollis</i>	R
Baird's sandpiper	<i>Calidris bairdii</i>	D

BIRD SPECIES LIST

Common Name	Scientific Name	Status ¹
Pectoral sandpiper	<i>Calidris melanotos</i>	R
Stilt sandpiper	<i>Calidris himantopus</i>	D
Buff-breasted sandpiper	<i>Tryngites subruficollis</i>	R
Black-necked stilt	<i>Himantopus mexicanus</i>	E
American avocet	<i>Recurvirostra americana</i>	D
Wilson's phalarope	<i>Phalaropus tricolor</i>	D
Red-necked phalarope	<i>Phalaropus lobatus</i>	D
Parasitic jaeger	<i>Stercorarius parasiticus</i>	R
Black-headed gull	<i>Chroicocephalus ridibundus</i>	R
Herring gull	<i>Larus argentatus</i>	R
California gull	<i>Larus californicus</i>	R
Ring-billed gull	<i>Larus delawarensis</i>	D
Franklin's gull	<i>Larus pipixcan</i>	D
Bonaparte's gull	<i>Larus philadelphia</i>	R
Sabine's gull	<i>Xema sabini</i>	E
Caspian tern	<i>Hydroprogne caspia</i>	E
Forster's tern	<i>Sterna forsteri</i>	D
Common tern	<i>Sterna hirundo</i>	R
Least tern	<i>Sterna antillarum</i>	R
Black tern	<i>Chlidonias niger</i>	D
COLUMBIFORMES		
Mourning dove	<i>Zenaidura macroura</i>	C
Rock dove	<i>Columba livia</i>	C
Inca dove	<i>Columbina inca</i>	E
Eurasian collared dove	<i>Streptopelia decaocto</i>	C
CUCULIFORMES		
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	D
Black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>	D
STRIGIFORMES		
Barn owl	<i>Tyto alba</i>	D
Eastern screech-owl	<i>Megascops asio</i>	D
Great horned owl	<i>Bubo virginianus</i>	C
Snowy owl	<i>Bubo scandiacus</i>	R
Burrowing owl	<i>Athene cunicularia</i>	C
Long-eared owl	<i>Asio otus</i>	R
Short-eared owl	<i>Asio flammeus</i>	D
Northern saw-whet owl	<i>Aegolius acadicus</i>	D
CAPRIMULGIFORMES		
Common poorwill	<i>Phalaenoptilus nuttallii</i>	D
Common nighthawk	<i>Chordeiles minor</i>	C

BIRD SPECIES LIST

Common Name	Scientific Name	Status ¹
APODIFORMES		
Chimney swift	<i>Chaetura pelagica</i>	D
White-throated swift	<i>Aeronautes saxatalis</i>	D
Broad-tailed hummingbird	<i>Selasphorus platycercus</i>	R
Rufous hummingbird	<i>Selasphorus rufus</i>	R
CORACIIFORMES		
Belted kingfisher	<i>Ceryle alcyon</i>	C
PICIFORMES		
Northern flicker	<i>Colaptes auratus</i>	C
Red-bellied woodpecker	<i>Melanerpes carolinus</i>	R
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>	C
Lewis' woodpecker	<i>Melanerpes lewis</i>	D
Red-naped sapsucker	<i>Sphyrapicus nuchalis</i>	E
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	R
Hairy woodpecker	<i>Picoides villosus</i>	C
Downy woodpecker	<i>Picoides pubescens</i>	D
PASSERIFORMES		
Eastern kingbird	<i>Tyrannus tyrannus</i>	C
Western kingbird	<i>Tyrannus verticalis</i>	C
Cassin's kingbird	<i>Tyrannus vociferans</i>	R
Scissor-tailed flycatcher	<i>Tyrannus forficatus</i>	R
Ash-throated flycatcher	<i>Myiarchus cinerascens</i>	E
Great crested flycatcher	<i>Myiarchus crinitus</i>	D
Eastern phoebe	<i>Sayornis phoebe</i>	D
Say's phoebe	<i>Sayornis saya</i>	C
Black phoebe	<i>Sayornis nigricans</i>	D
Willow flycatcher	<i>Empidonax traillii</i>	D
Least flycatcher	<i>Empidonax minimus</i>	D
Hammond's flycatcher	<i>Empidonax hammondii</i>	R
Cordilleran flycatcher	<i>Empidonax occidentalis</i>	E
Eastern wood-pewee	<i>Contopus virens</i>	D
Western wood-pewee	<i>Contopus sordidulus</i>	C
Olive-sided flycatcher	<i>Contopus cooperi</i>	R
Horned lark	<i>Eremophila alpestris</i>	C
Violet-green swallow	<i>Tachycineta thalassina</i>	D
Tree swallow	<i>Tachycineta bicolor</i>	D
Bank swallow	<i>Riparia riparia</i>	C
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	D
Barn swallow	<i>Hirundo rustica</i>	C

BIRD SPECIES LIST

Common Name	Scientific Name	Status ¹
Cliff swallow	<i>Petrochelidon pyrrhonota</i>	C
Purple martin	<i>Progne subis</i>	R
Gray jay	<i>Perisoreus canadensis</i>	R
Blue jay	<i>Cyanocitta cristata</i>	C
Stellar's jay	<i>Cyanocitta stelleri</i>	R
Black-billed magpie	<i>Pica hudsonia</i>	D
American crow	<i>Corvus branchyrhynchus</i>	C
Common raven	<i>Corvus corax</i>	C
Pinyon jay	<i>Gymnorhinus cyanocephalus</i>	C
Clark's nutcracker	<i>Nucifraga columbiana</i>	R
Black-capped chickadee	<i>Poecile atricapillus</i>	C
Tufted titmouse	<i>Baeolophus bicolor</i>	R
White-breasted nuthatch	<i>Sitta carolinensis</i>	C
Red-breasted nuthatch	<i>Sitta canadensis</i>	C
Pygmy nuthatch	<i>Sitta pygmaea</i>	C
Brown creeper	<i>Certhia americana</i>	D
American dipper	<i>Cinclus mexicanus</i>	R
House wren	<i>Troglodytes aedon</i>	C
Winter wren	<i>Troglodytes troglodytes</i>	R
Bewick's wren	<i>Thryomanes bewickii</i>	R
Marsh wren	<i>Cistothorus palustris</i>	D
Canyon wren	<i>Catherpes mexicanus</i>	R
Rock wren	<i>Salpinctes obsoletus</i>	D
Northern mockingbird	<i>Mimus polyglottos</i>	C
Gray catbird	<i>Dumetella carolinensis</i>	D
Brown thrasher	<i>Toxostoma rufum</i>	C
Sage thrasher	<i>Oreoscoptes montanus</i>	R
American robin	<i>Turdus migratorius</i>	C
Wood thrush	<i>Hylocichla mustelina</i>	D
Hermit thrush	<i>Catharus guttatus</i>	D
Swainson's thrush	<i>Catharus ustulatus</i>	D
Gray-cheeked thrush	<i>Catharus minimus</i>	D
Veery	<i>Catharus fuscenscens</i>	D
Eastern bluebird	<i>Sialia sialis</i>	C
Mountain bluebird	<i>Sialia currucoides</i>	C
Townsend's solitaire	<i>Myadestes townsendi</i>	D
Blue-gray gnatcatcher	<i>Poliophtila caerulea</i>	R
Golden-crowned kinglet	<i>Regulus satrapa</i>	R
Ruby-crowned kinglet	<i>Regulus calendula</i>	D
American pipit	<i>Anthus rubescens</i>	E

BIRD SPECIES LIST

Common Name	Scientific Name	Status ¹
Bohemian waxwing	<i>Bombycilla garrulus</i>	D
Cedar waxwing	<i>Bombycilla cedrorum</i>	D
Northern shrike	<i>Lanius excubitor</i>	D
Loggerhead shrike	<i>Lanius ludovicianus</i>	C
European starling	<i>Sturnus vulgaris</i>	C
White-eyed vireo	<i>Vireo griseus</i>	R
Bell's vireo	<i>Vireo bellii</i>	D
Yellow-throated vireo	<i>Vireo flavifrons</i>	R
Blue-headed vireo	<i>Vireo solitarius</i>	R
Plumbeous vireo	<i>Vireo plumbeus</i>	E
Red-eyed vireo	<i>Vireo olivaceus</i>	D
Philadelphia vireo	<i>Vireo philadelphicus</i>	R
Warbling vireo	<i>Vireo gilvus</i>	D
Black and white warbler	<i>Mniotilta varia</i>	D
Prothonotary warbler	<i>Protonotaria citrea</i>	R
Tennessee warbler	<i>Vermivora peregrina</i>	D
Orange-crowned warbler	<i>Vermivora celata</i>	D
Nashville warbler	<i>Vermivora ruficapilla</i>	D
Northern parula	<i>Parula americana</i>	R
Yellow warbler	<i>Dendroica petechia</i>	C
Magnolia warbler	<i>Dendroica magnolia</i>	R
Cape May warbler	<i>Dendroica tigrina</i>	R
Yellow-rumped warbler	<i>Dendroica coronata</i>	D
Townsend's warbler	<i>Dendroica townsendi</i>	R
Black-throated green warbler	<i>Dendroica virens</i>	R
Cerulean warbler	<i>Dendroica cerulea</i>	R
Blackburnian warbler	<i>Dendroica fusca</i>	R
Chestnut-sided warbler	<i>Dendroica pensylvanica</i>	R
Blackpoll warbler	<i>Dendroica striata</i>	D
Palm warbler	<i>Dendroica palmarum</i>	R
Ovenbird	<i>Seiurus aurocapillus</i>	D
Northern waterthrush	<i>Seiurus noveboracensis</i>	D
Mourning warbler	<i>Oporornis philadelphia</i>	R
MacCillivray's warbler	<i>Oporornis tolmiei</i>	R
Common yellowthroat	<i>Geothlypis trichas</i>	C
Yellow-breasted chat	<i>Icteria virens</i>	D
Golden-winged warbler	<i>Vermivora chrysoptera</i>	E
Hooded warbler	<i>Wilsonia citrina</i>	R
Wilson's warbler	<i>Wilsonia pusilla</i>	D
American redstart	<i>Setophaga ruticilla</i>	D
House sparrow*	<i>Passer domesticus</i>	D

BIRD SPECIES LIST

Common Name	Scientific Name	Status ¹
Bobolink	<i>Dolichonyx oryzivorus</i>	C
Eastern meadowlark	<i>Sturnella magna</i>	D
Western meadowlark	<i>Sturnella neglecta</i>	C
Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	D
Red-winged blackbird	<i>Agelaius phoeniceus</i>	C
Orchard oriole	<i>Icterus spurius</i>	D
Baltimore oriole	<i>Icterus galbula</i>	E
Bullock's oriole	<i>Icterus bullockii</i>	D
Rusty blackbird	<i>Euphagus carolinus</i>	R
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	C
Common grackle	<i>Quiscalus quiscula</i>	C
Brown-headed cowbird	<i>Molothrus ater</i>	C
Western tanager	<i>Piranga ludoviciana</i>	D
Scarlet tanager	<i>Piranga olivacea</i>	D
Northern cardinal	<i>Cardinalis cardinalis</i>	R
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	E
Black-headed grosbeak	<i>Pheucticus melanocephalus</i>	R
Blue grosbeak	<i>Passerina caerulea</i>	D
Indigo bunting	<i>Passerina cyanea</i>	D
Lazuli bunting	<i>Passerina amoena</i>	D
Dickcissel	<i>Spiza americana</i>	R
Evening grosbeak	<i>Coccothraustes vespertinus</i>	D
Purple finch	<i>Carpodacus purpureus</i>	R
Cassin's finch	<i>Carpodacus cassinii</i>	R
House finch	<i>Carpodacus mexicanus</i>	D
Pine grosbeak	<i>Pinicola enucleator</i>	E
Gray-crowned rosy finch	<i>Leucosticte tephrocotis</i>	R
Common redpoll	<i>Carduelis flammea</i>	R
Pine siskin	<i>Carduelis pinus</i>	D
American goldfinch	<i>Carduelis tristis</i>	C
Lesser goldfinch	<i>Carduelis psaltria</i>	E
Red crossbill	<i>Loxia curvirostra</i>	C
White-winged crossbill	<i>Loxia leucoptera</i>	R
Green-tailed towhee	<i>Pipilo chlorurus</i>	R
Spotted towhee	<i>Pipilo maculatus</i>	C
Lark bunting	<i>Calamospiza melanocoryx</i>	C
Savannah sparrow	<i>Passerculus sandwichensis</i>	D

BIRD SPECIES LIST

Common Name	Scientific Name	Status ¹
Grasshopper sparrow	<i>Ammodramus savannarum</i>	C
Vesper sparrow	<i>Pooecetes gramineus</i>	C
Lark sparrow	<i>Chondestes grammacus</i>	C
Black-throated sparrow	<i>Amphispiza bilineata</i>	R
Dark-eyed junco	<i>Junco hyemalis</i>	D
American tree sparrow	<i>Spizella arborea</i>	D
Chipping sparrow	<i>Spizella passerina</i>	C
Clay-colored sparrow	<i>Spizella pallida</i>	C
Brewer's sparrow	<i>Spizella breweri</i>	D
Field sparrow	<i>Spizella pusilla</i>	R
Harris' sparrow	<i>Zonotrichia querula</i>	R
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	D
White-throated sparrow	<i>Zonotrichia albicollis</i>	R
Fox sparrow	<i>Passerella iliaca</i>	R
Lincoln's sparrow	<i>Melospiza lincolnii</i>	D
Swamp sparrow	<i>Melospiza georgiana</i>	R
Song sparrow	<i>Melospiza melodia</i>	D
McCown's longspur	<i>Calcarius mccownii</i>	D
Lapland longspur	<i>Calcarius lapponicus</i>	D
Chestnut-collared longspur	<i>Calcarius ornatus</i>	D
Snow bunting	<i>Plectrophenax nivalis</i>	D

- ¹
- C Confirmed during field surveys in 2011.
 - D Documented in the 1982 baseline study.
 - E Expected to occur - historical or recent evidence.
 - R Reported by knowledgeable individual(s).

Appendix H-4

Amphibian and Reptile Species List

HERP SPECIES LIST FOR DAWES AND SIOUX COUNTIES, NEBRASKA

Common Name	Scientific Name	Status ¹
AMPHIBIANS		
Eastern tiger salamander	<i>Ambystoma tigrinum</i>	
Great plains toad	<i>Bufo cognatus</i>	D
Woodhouse's toad	<i>Bufo woodhousii</i>	D
Western chorus frog	<i>Pseudacris triseriata</i>	D
Plains spadefoot toad	<i>Spea bombifrons</i>	C
Northern leopard frog	<i>Rana pipiens</i>	C
Bullfrog	<i>Rana catesbeiana</i>	D
REPTILES		
Lesser earless lizard	<i>Holbrookia maculata</i>	
Great short-horned lizard	<i>Phrynosoma hernandesi</i>	
Northern prairie lizard	<i>Sceloporus undulatus garmani</i>	
Many-lined skink	<i>Eumeces multivirgatus</i>	R
Bullsnake	<i>Pituophis catenifer sayi</i>	D
Eastern yellow-bellied racer	<i>Coluber constrictor flaviventris</i>	D
Plains garter snake	<i>Thamnophis radix</i>	D
Red-sided garter snake	<i>Thamnophis sirtalis parietalis</i>	D
Plains hognose snake	<i>Heterodon nasicus nasicus</i>	
Prairie rattlesnake	<i>Crotalus viridis viridis</i>	
Western terrestrial garter snake	<i>Thamnophis elegans</i>	R
Central plains milk snake	<i>Lampropeltis triangulum</i>	R
Northern water snake	<i>Nerodia sipedon</i>	R
Common snapping turtle	<i>Chelydra serpentina</i>	C
Painted turtle	<i>Chrysemys picta</i>	D

¹ C Confirmed during field surveys in 2011.
D Documented by Nebraska Game and Parks Commission or during 1982 baseline study for Crow Butte Mine.
R Rare but possible

Appendix H-5

Fish Species List

FISH SPECIES LIST

Family/Common Name	Scientific Name	Status ¹
CATOSTOMIDAE		
River carpsucker	<i>Carpionodes carpio</i>	R
Longnose sucker	<i>Catostomus catostomus</i>	R
White sucker	<i>Catostomus commersoni</i>	C
CENTRARCHIDAE		
Green sunfish	<i>Lepomis cyanellus</i>	C
Bluegill	<i>Lepomis macrochirus</i>	D
Smallmouth bass	<i>Micropterus dolomieu</i>	R
Largemouth bass	<i>Micropterus salmoides</i>	D
Rock Bass	<i>Ambloplites rupestrinis</i>	D
Black crappie	<i>Pomoxis nigromaculatus</i>	D
CYPRINIDAE		
Common carp	<i>Cyprinus carpio</i>	D
Plains minnow	<i>Hybognathus placitus</i>	D
Flathead chub	<i>Platygobio gracilis</i>	R
Common shiner	<i>Luxilus cornutus</i>	D
Golden shiner	<i>Notemigonus crysoleucas</i>	D
Red shiner	<i>Cyprinella lutrensis</i>	C
Sand shiner	<i>Notropis stramineus</i>	D
Fathead minnow	<i>Pimephales promelas</i>	D
Longnose dace	<i>Rhinichthys cataractae</i>	D
Creek chub	<i>Semotilus atromaculatus</i>	D
CYPRINODONTIDAE		
Plains topminnow	<i>Fundulus sciadicus</i>	D
ESOCIDAE		
Northern pike	<i>Esox lucius</i>	C
HIODONTIDAE		
Goldeye	<i>Hiodon alosoides</i>	R
ICTALURIDAE		
Black bullhead	<i>Ameiurus melas</i>	D
Channel catfish	<i>Ictalurus punctatus</i>	R
Stonecat	<i>Noturus flavus</i>	R
PERCICHTHYIDAE		
White bass	<i>Morone chrysops</i>	D
PERCIDAE		
Walleye	<i>Sander vitreus</i>	D
SALMONIDAE		
Rainbow trout	<i>Oncorhynchus mykiss</i>	D
Brown trout	<i>Salmo trutta</i>	D

FISH SPECIES LIST

Family/Common Name	Scientific Name	Status ¹
Brook trout	<i>Salvelinus fontinalis</i>	D

- ¹
- C Confirmed during field surveys in 2011.
 - D Documented during 1982 and 1996 baseline studies.
 - R Reported by knowledgeable individual(s).

Appendix H-6

Macroinvertebrate Species and Relative Abundance

BENTHIC MACROINVERTEBRATE COMMUNITY VALUES IN APRIL 1982 AND SEPTEMBER 1996

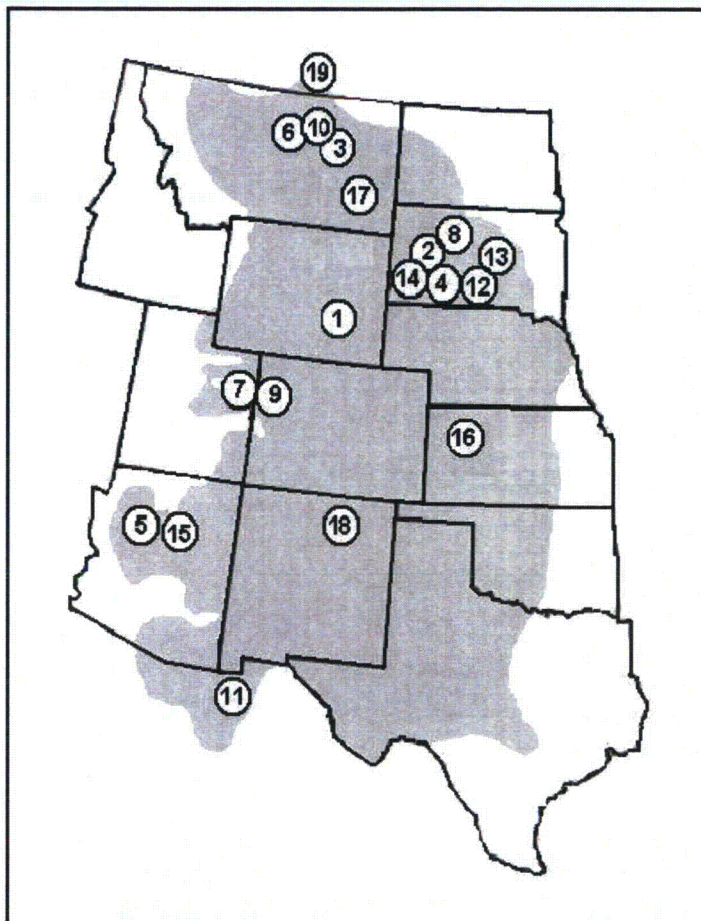
Sampling Locations																												
Parameter/ Sample Sampling Method**	Streams																Impoundments											
	E-1	E-2	E-3	S-1	S-2	S-2	S-3	S-4	WC-1	WC-2	W-1	W-2	W-1a*	B-1*	C-1*	SL-1*	1	2	3	4	5	6	7	8	9	10*	11*	
	P	P	P	S	P	S	S	P	P	P	P	P	H	D	D	D	P	P	P	P	P	P	P	P	P	D	D	
Density (Org./m ²)	13090	1745	3399	706	5729	897	5896	3062	5435	428	352	5818	786	560	1711	840		15	7237	8972	4792	4731	138	980	276	10242	710	689
Diversity ()	0.49	1.0	1.02	3.18	0.19	1.34	1.15	1.84	1.33	1.16	1.03	1.14	2.10	2.55	3.37	2.95		0	0.93	0.93	1.21	1.06	0	1.60	0	1.69	2.19	2.09
No. of Taxa	11	9	7	22	5	8	16	9	8	4	3	7	10	11	21	19		1	8	8	9	6	1	7	1	13	9	8
Community Structure (% Occurrence)																												
Taxon																												
Chironomidae	0.9	17.5	82.0	10.7	98.1	18.0	14.1	45.5	71.8	42.9	47.8	72.4	9.6	5.8	0.6	0.0		0.0	3.8	19.2	12.3	87.7	48.4	100	37.4	33.6	0.0	3.1
Oligochaeta	0.0	1.8	5.0	3.6	0.8	3.2	0.2	36.0	14.4	50.0	47.8	19.7	1.9	0.0	2.6	0.0		100	89.8	78.3	81.3	3.6	39.1	0.0	39.5	19.1	0.0	0.0
Ephemeroptera	0.0	0.0	0.0	20.3	0.0	65.2	6.8	0.0	0.0	0.0	0.0	7.9	6.8	36.5	10.7	6.4		0.0	0.0	0.0	0.9	0.0	4.7	0.0	16.6	7.0	4.5	1.6
Trichoptera	0.0	0.0	0.5	37.1	0.5	0.4	0.5	0.0	0.0	0.0	4.3	0.5	79.5	5.8	0.6	3.8		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0
Ceratopogonidae	94.5	56.1	0.0	0.5	0.0	0.4	0.2	1.0	8.7	7.1	0.0	0.3	0.0	0.0	0.0	0.0		0.0	1.7	0.6	0.0	0.0	0.0	0.0	4.2	14.5	0.0	0.0
Simuliidae	0.0	0.0	0.0	8.6	0.0	11.6	76.8	0.0	0.0	0.0	0.0	0.0	0.0	28.8	1.9	50.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0

* September 24, 1996 Sample Stations
 ** P = Ponar Dredge Sample; S = Surber Sample; H = HESS Sample; D = Dip Net Sample
 Org./m² Organisms Per Square Meter

Appendix H-7

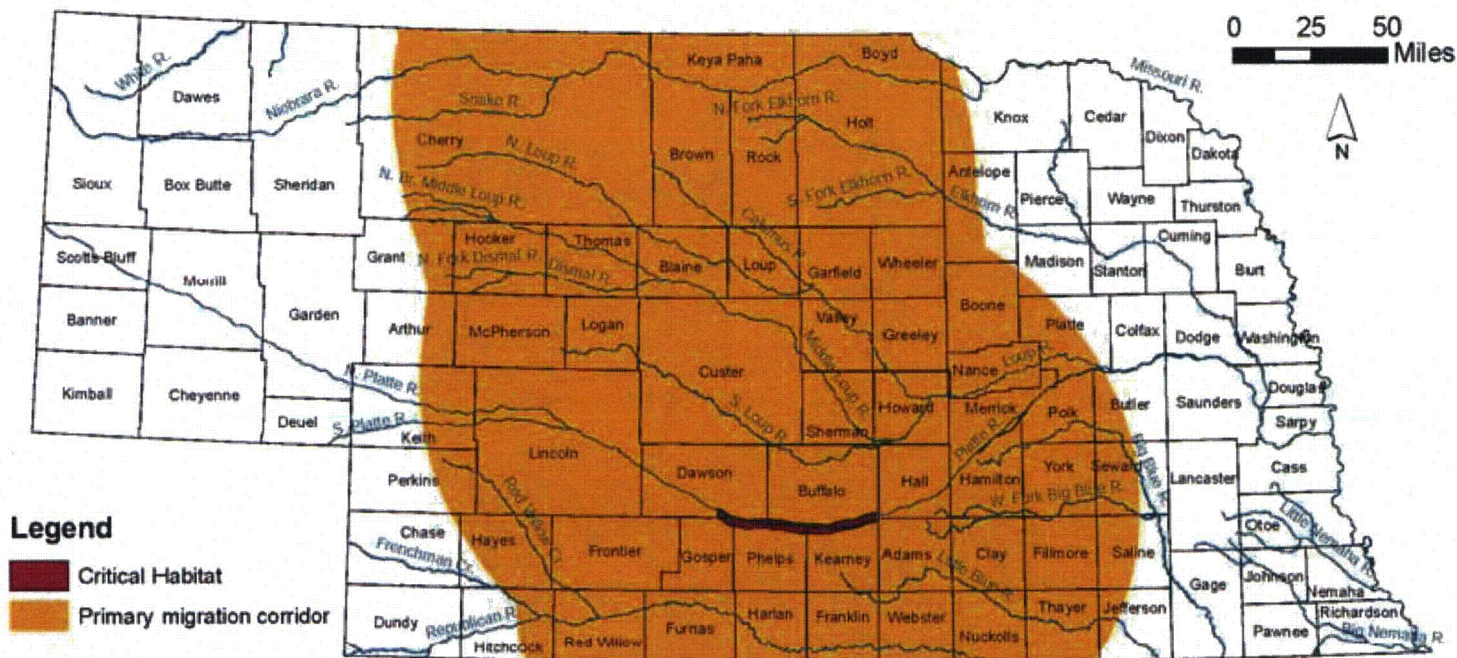
Range Maps for State and
Federally Listed Threatened and
Endangered Species for Dawes
County, Nebraska

Black-footed Ferret Reintroduction Sites



- 1) Shirley Basin, WY, 1991
- 2) Badlands NP, SD, 1994
- 3) UL Bend NWR, MT, 1994
- 4) Conata Basin, SD, 1996
- 5) Aubrey Valley, AZ, 1996
- 6) Ft. Belknap Indian Reservation, MT, 1997
- 7) Coyote Basin, UT, 1999
- 8) Cheyenne River Indian Reservation, SD, 2000
- 9) Wolf Creek, CO, 2001
- 10) BLM 40-complex, MT, 2001
- 11) Janos, Mexico, 2001
- 12) Rosebud Indian Reservation, SD, 2004
- 13) Lower Brule Indian Reservation, SD, 2006
- 14) Wind Cave NP, SD, 2007
- 15) Espee Ranch, AZ, 2007
- 16) Logan County, KS, 2007
- 17) Northern Cheyenne Indian Reservation, MT 2008
- 18) Vermejo Park Ranch, NM 2008
- 19) Grasslands NP, SK, Canada, 2009

Whooping Crane (*Grus americana*): Primary migration corridor and USFWS-designated Critical Habitat

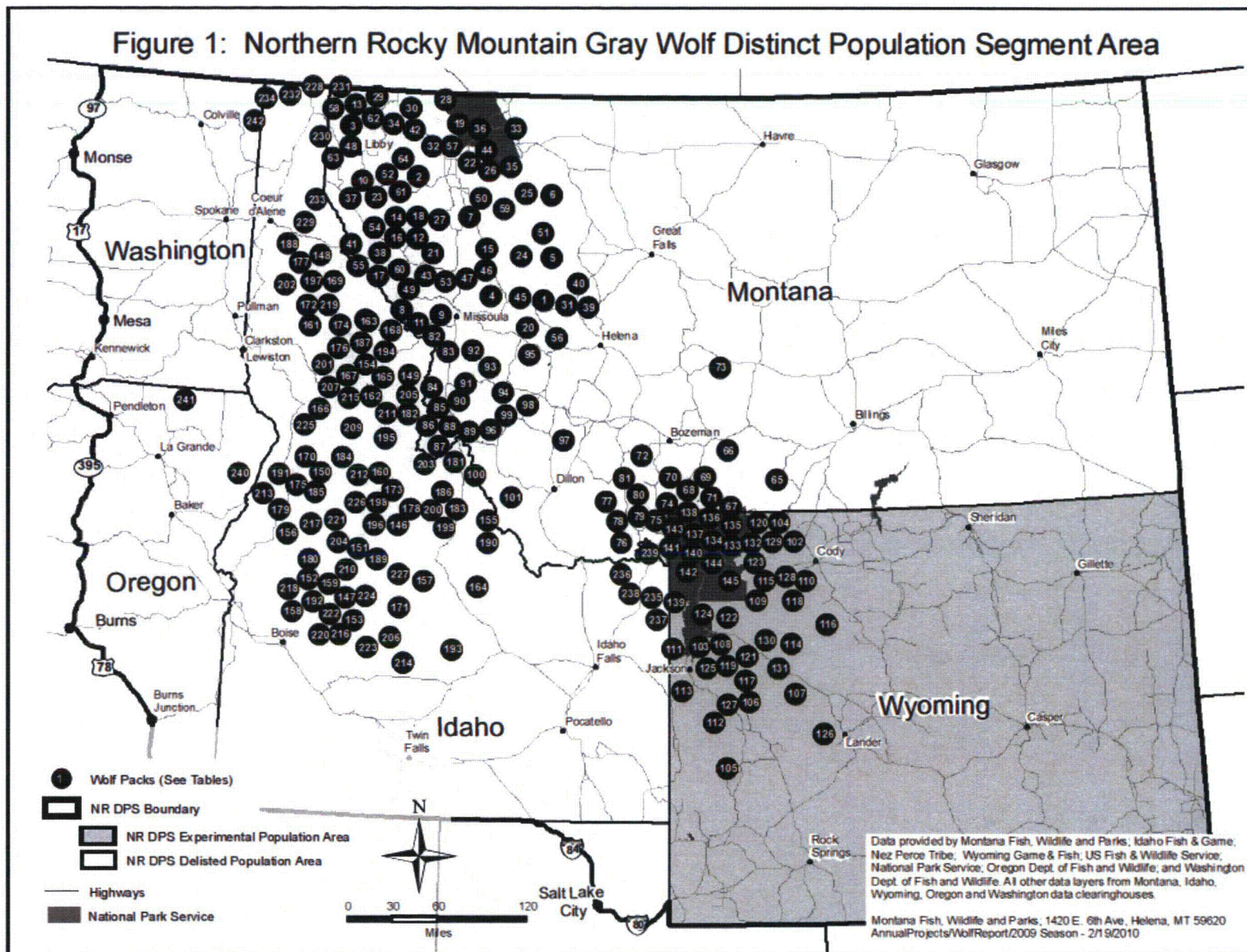


The primary migration corridor is the area identified by the U.S. Fish and Wildlife Service (USFWS) as encompassing 95% of documented Whooping Crane migratory stopovers between 1975 and 2007. Whooping Cranes have been documented far outside of this corridor in Nebraska. Data source: U.S. Fish and Wildlife Service. State-specific Nebraska flyway for Whooping Crane. Vector digital data. Unpublished shapefile received October 27, 2008 from Martha Tacha, USFWS, Region 6, Grand Island, Nebraska.

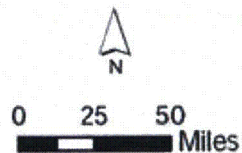
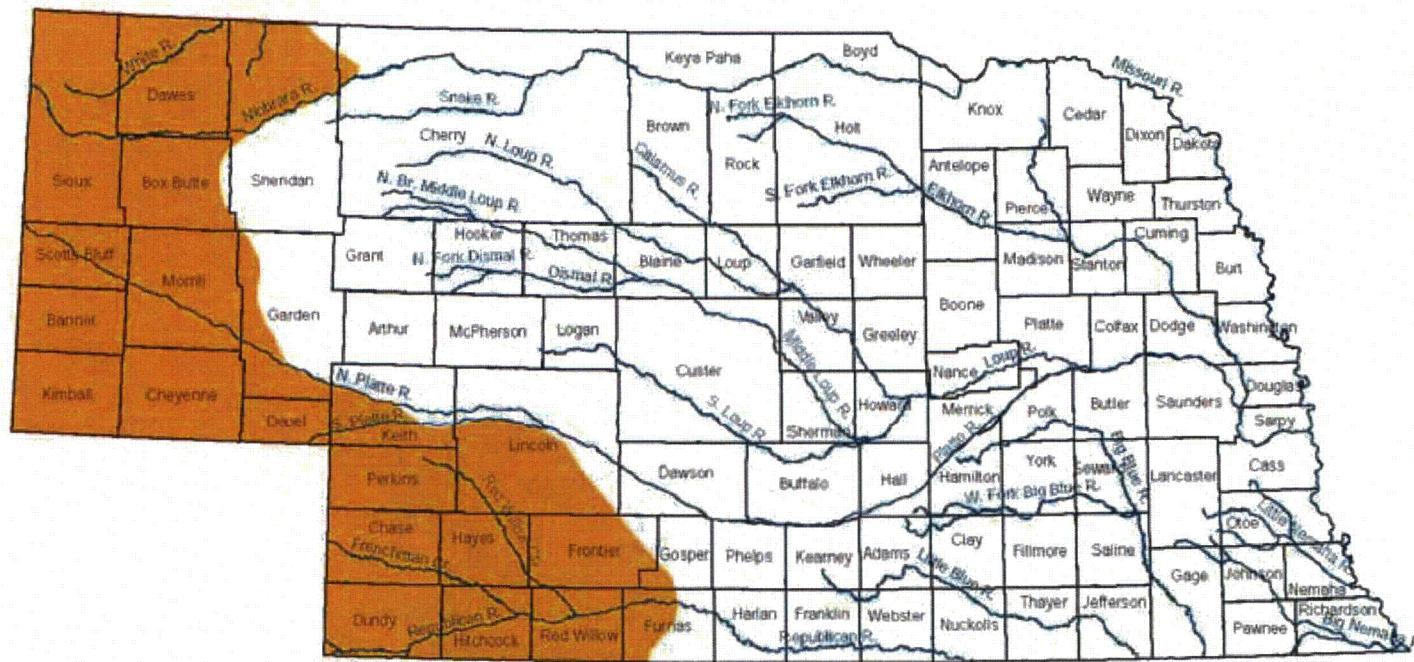
Critical Habitat areas are considered essential for the conservation of a listed species. Data source: U.S. Fish and Wildlife Service, Region 2. 2003. Whooping Crane critical habitat. Vector digital data. Downloaded October 29, 2008 from <http://crithab.fws.gov>.

Map produced by the Nebraska Natural Heritage Program, Nebraska Game and Parks Commission, November 2008.

Figure 1: Northern Rocky Mountain Gray Wolf Distinct Population Segment Area

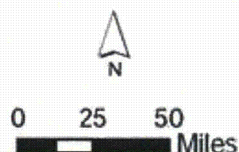
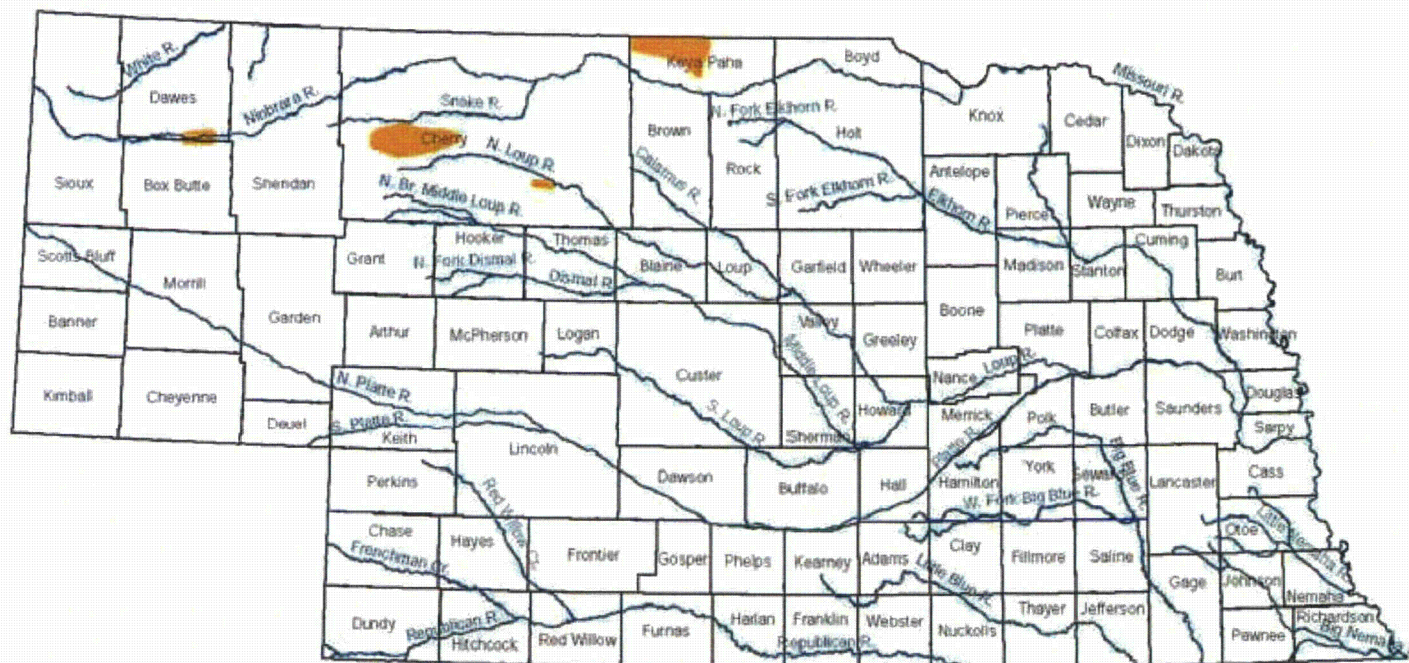


Estimated Current Range of Swift Fox (*Vulpes velox*)



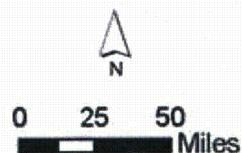
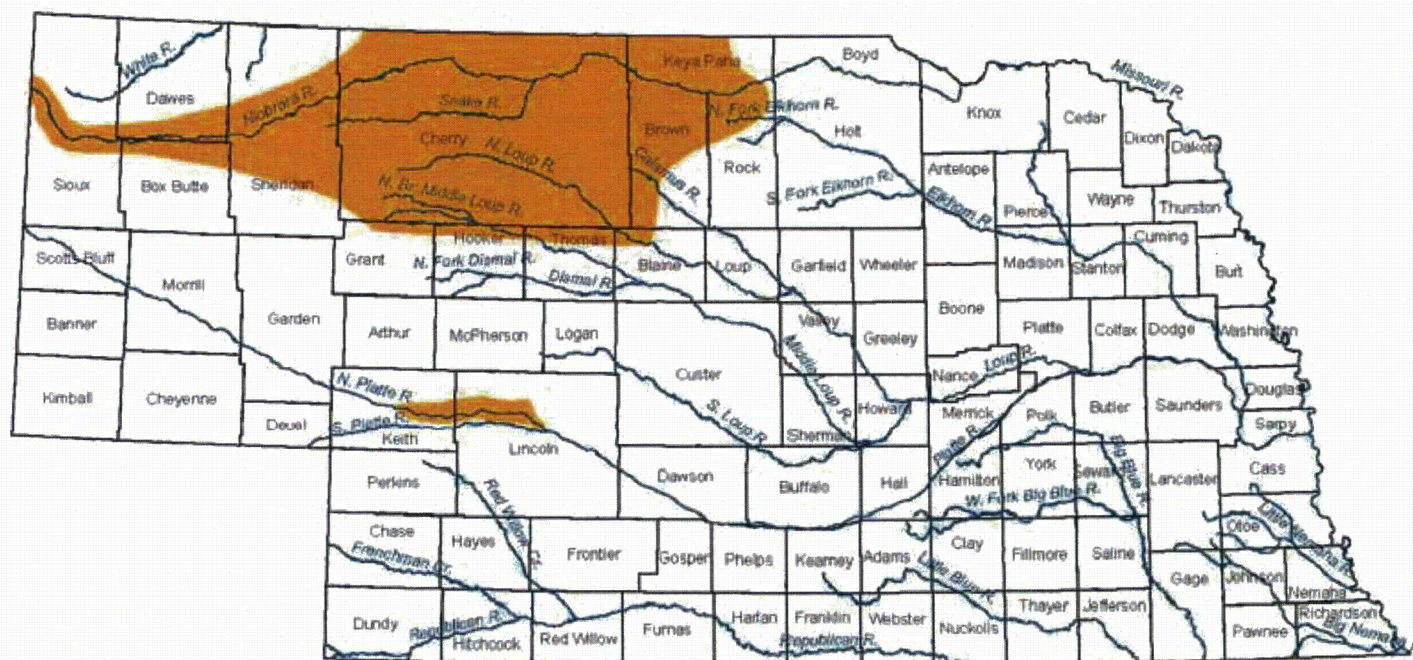
Nebraska Natural Heritage Program,
Nebraska Game and Parks Commission
June 2008

Estimated Current Range of Blacknose Shiner (*Notropis heterolepis*)



Nebraska Natural Heritage Program,
Nebraska Game and Parks Commission
June 2008

Estimated Current Range of Finescale Dace (*Phoxinus neogaeus*)
and Northern Redbelly Dace (*Phoxinus eos*)



Nebraska Natural Heritage Program,
Nebraska Game and Parks Commission
June 2008

Appendix I

Standard Operating Procedures for Air Particulate Samplers

STANDARD OPERATING PROCEDURE AIR PARTICULATE SAMPLING

**Cameco Resources
Crawford, Nebraska Facility**

Version 1

Prepared by:

**IML Air Science
Sheridan, Wyoming**

June, 2011

TABLE OF CONTENTS

1.0	Scope and Applicability	3
2.0	Summary of Method	3
3.0	Safety	4
4.0	Personnel Qualifications and Responsibilities	5
4.1	Project Manager or Site Manager	5
4.2	Project or Site Radiation Safety Officer (RSO).....	5
4.3	Field Technician.....	5
5.0	Equipment and Supplies.....	5
6.0	Procedure	6
6.1	Air Sampler Operation	6
6.2	Sampling Filter Replacement.....	6
6.3	Sample Handling.....	7
7.0	Data and Records Management.....	7
8.0	Quality Assurance and Quality Control.....	7
9.0	References	7

1.0 SCOPE AND APPLICABILITY

The purpose of this document is to define the standard operating procedure (SOP) to be followed for the collection of air sampling filters used to determine the concentrations of radionuclides in air as part of the baseline and operational radiological monitoring program at the Crow Butte facility and associated expansion facilities near Crawford, Nebraska. Air particulate samples are collected using F & J Specialty Products Models DF-75L-BL-AC and LV-1D (see operating manuals for these devices attached herewith), which have been or will be installed at permanent locations. A filter is collected from each air-sampling unit on approximately a weekly basis during a three-month quarter. The collected set of filters (typically about 13, one per week) for each air sampling unit is sent for contract laboratory analysis at the end of each quarter.

2.0 SUMMARY OF METHOD

The United States (U.S.) Nuclear Regulatory Commission's (NRC) Regulatory Guide 4.14 (*Radiological Effluent and Environmental Monitoring at Uranium Mills*) requires a year of preoperational data collection via continuously operating air samplers. Quarterly composites are to be analyzed for naturally occurring radionuclides as discussed below. Figure 1 presents the location of the air particulate samplers. Table 1 presents their GPS locations. The technical basis and rationale for selection of these locations is in accordance with the guidance presented in NRC Regulatory Guide 4.14.

The requirement for weekly collection and replacement of air filters is flexible. Unsafe weather conditions are sufficient cause to delay filter replacement for a day or more. The principal driver for this SOP is that air sampling should be essentially continuous, allowing the contract laboratory to meet minimum detectable activity (MDA) requirements for specific radionuclides as specified in Regulatory Guide 4.1.4 and in accordance with the quality assurance requirements described in NRC Regulatory Guide 4.15 (*Quality Assurance for Radiological Monitoring Programs (Normal Operations) – Effluent Streams and the Environment*). This means that, if a specific filter exchange is delayed for a day or several days, the sampling record remains continuous and the MDA can be met, since one filter may represent eight or more days of sampling while the next may represent six or fewer days, but the collection of sample filters during any quarter still represents 13 weeks of essentially continuous air sample collection.

A warning in this context is necessary, although it is not expected to be an issue in rural Nebraska. In severely dusty conditions, the sampling filters could become plugged with dust after fewer than 7 days. This will be apparent since the air sampler flow rate will drop significantly from the normal 56-60 liters per minute (lpm at local temperature and pressure) if filter plugging occurs. A sampler flow rate less than about 50 lpm is evidence of such dust plugging. During a period (such as a severe dust storm) when such plugging is likely, filters should be exchanged more often than the normal weekly requirement, recognizing the overriding need for personnel safety during such an

exchange. Experience will determine whether early filter exchanges may be necessitated by extremely dusty conditions. To gain this experience, following a dust storm the sampling units should be visited and the air sampler pump displays checked to determine whether the flow rate has been significantly reduced. If the flow rate is approaching the lower limit of 50 lpm, the filter should be exchanged (using this SOP).

Air sample filters will be analyzed by a contract laboratory for radiological constituents to determine airborne concentrations. Air samplers draw air and suspended particulate matter through the 47 millimeter (mm) collection filters at known volumetric flow rates for known periods of time. All respirable air particulate matter is assumed to be captured by the filters.

The filters are analyzed by a radiochemical laboratory to determine activity of each specified radionuclide (Ra-226, Th-230, Pb-210, and Natural (total) Uranium). Laboratory-reported specific radionuclide activities for the composite filter set are divided by the total volume of air that passed through the air filters over the quarterly sampling period to determine the average air concentrations for each radionuclide for the period sampled at that specific sampling location.

3.0 SAFETY

The following precautions should be taken when working at the air particulate monitoring stations:

- Regularly survey the area surrounding the air sampler location to be sure it is free of snakes or other hazardous biota or poisonous plants. Pay particular attention to areas that are not clearly visible and avoid stepping in or placing hands in locations with potential hidden dangers.
- Watch out for loose rocks and unstable footing.
- Inspect air filter sample envelopes and ziplock bags for cleanliness prior to use. Such containers shall not be reused, nor shall they be used if there is any question as to their origin. If applicable, sample containers supplied by or recommended by the contract laboratory shall be used.
- Clean hands immediately prior to sample collection and wear latex or nitrile gloves to ensure that samples are not contaminated. Clean sample handling tweezers between uses.
- Latex gloves should be discarded after sample collection at each location and new gloves worn.
- Appropriate footwear, long trousers and snake chaps should be used as determined to be appropriate by the site manager.
- Operate and handle all equipment, filters, and other key items in accordance with manufacturer specifications.

4.0 PERSONNEL QUALIFICATIONS AND RESPONSIBILITIES

The following sections summarize personnel responsibilities.

4.1 Project Manager or Site Manager

The Project Manager or Site Manager is responsible for:

- Providing appropriate support and resources to support the air particulate monitoring program
- Ensuring the oversight of all monitoring activities
- Ensuring that all individuals involved with implementing the air particulate monitoring are properly trained in the procedures outlined in this SOP

4.2 Project or Site Radiation Safety Officer (RSO)

The Radiation Safety Officer is responsible for:

- Ensuring compliance with radiation safety requirements during all sampling operations
- Providing appropriate radiation safety training for the sampling technician(s) as required
- Reviewing vendor supplied data when received for completeness and accuracy and using this data to calculate results for the air particulate monitoring program and to ensure program technical objectives are being met

4.3 Field Technician

Field Technicians are responsible for:

- Observing all safety requirements
- Following this SOP and completing all required documentation with the appropriate information
- Completing and maintaining quality assurance records (i.e. sample chain of custody forms and logbook entries as specified herein)
- Informing the Project Manager or Site Supervisor of monitoring activities which do not conform to specific requirements, and for carrying out any directions from the Site Supervisor or RSO to address any non-compliant monitoring activities

5.0 EQUIPMENT AND SUPPLIES

The following equipment is required for air filter collection:

- Appropriate safety clothing and other safety gear
- Air filter containers (new air filter sample envelopes and new plastic ziplock bags)

- Permanent marking pen (Sharpie, e.g.)
- New air filters (47 mm Teflon filters, specified by contract laboratory)
- Tweezers (to grasp edge of filter without contacting sampling area), or spare filter holders with filter pre-loaded, to exchange with filter holder in field
- Field log book
- Disposable gloves
- Water and clean, soft cotton cloth.

6.0 PROCEDURE

The following sections describe the procedures that should be followed when implementing the Air Particulate Sampling SOP.

6.1 Air Sampler Operation

See F & J Specialty Products operating manuals for Models DF-75L-BL-AC and LV-1D provided as attachments to this procedure.

6.2 Sampling Filter Replacement

The following section describes how to properly replace air sample filters.

- Extract air sample filter holder using the quick disconnect under the protective hood that shields the filter holder; unscrew filter holder ring and, using tweezers, gently remove air filter without contacting either surface of the filter. Take care in a windy environment not to allow the filter to blow loose or particulate to fall off the filter.
- Place the removed filter inside a clean, protective Petri dish and close the Petri dish.
- Place the closed Petri dish into a clean, pink zip-lock bag and seal the bag.
- With the Sharpie pen, mark today's date, the air sampler location and the air sampler's ID number on the zip-lock bag.
- Note filter removal date, sampler location, sampler ID and other information as specified in this SOP in the field logbook.
- Clean the air sample filter holder using a soft cloth. Using the tweezers carefully install a new filter without touching either side of the sampling area. Hand-tighten the filter holder ring, keeping the filter centered properly.
- Reconnect the air sample filter holder to the quick disconnect under the protective hood.
- Record current conditions (time of day, weather, temperature, any unusual conditions) in the sampling log book.

6.3 Sample Handling

The following describes procedures for handling air filter samples.

- Weekly air filters collected from each air sampler should be stored together in a larger ziplock bag marked with that sampler's location and ID #.
- No special preservation measures are required during collection and storage of each quarter's (three months) of air filters. The ziplock bags holding each collection of filters should be stored securely in a locked cabinet to prevent tampering or loss.
- At the end of each quarter, each large ziplock bag, containing the 13 air filters in their envelopes inside the smaller ziplock bags, should be packaged and delivered as quickly as possible to the designated contract laboratory, accompanied by paperwork as required by the laboratory and specified herein. Of critical importance is that the large bags be properly marked and sealed, and shipped in strong, tight containers suitable for rough handling and long distance shipment, with complete instructions for contract laboratory processing, analysis and data reporting included.

7.0 DATA AND RECORDS MANAGEMENT

All information pertinent to field sampling must be recorded in a log book. The field log book should be a bound book, with consecutively numbered pages. A log entry shall contain at a minimum the following information:

- Air sampler identification number
- Purpose of sampling ("Radionuclide air concentration measurement.")
- Location of sampler
- Name of sampling technician
- Date and time of sampling
- Analyses to be performed

Sampling situations can vary. The best guideline is to record sufficient information such that the sampling event could be reconstructed if necessary, without relying on the sampling technician's memory. Completed field log book(s) shall be maintained and filed chronologically.

8.0 QUALITY ASSURANCE AND QUALITY CONTROL

9.0 REFERENCES

United States NRC Regulatory Guide 4.14, *Radiological Effluent and Environmental Monitoring at Uranium Mills*, Revision 1. 1980

United States NRC Regulatory Guide 4.15, *Quality Assurance for Radiological Monitoring Programs (Normal Operations) – Effluent Streams and the Environment*. 1979