Yueh Chuang
Manager Environmental Remediation

BNSF Railway Company
800 N. Last Chance Gulch, Suite 101
Helena, MT 59601

Phone (406) 256-4040
Fax (406) 449-8610

Letter of Transmittal

To: Kathy Olsen, Montana DNRC

Reference: Petition for Revised CGA - BNSF Former Tie Treatment Plant, Somers, MT

Quantity	Item	Description	
1	Petition Form	Signed by P. David Myerowitz, MD, Chair for BOH	
1	May 18, 2017 BOH Meeting Minutes	Contains motion to approve filing the petition	
1	Filing Fee	Check for $1,500.00	
2	CGA Petition Supporting Information (incl. 2 CDs)	Hardcopy and CD containing supporting information for petition	

Remarks:

On behalf of the Flathead City-County Board of Health (BOH), BNSF is submitting this petition to revise the CGA for the BNSF Former Tie Treatment Plant, located in Somers, MT.

Please feel free to contact either Joe Russell (BOH; 406-751-8101) or Yueh Chuang (BNSF; 406-202-5018 [cell]) with questions.

Signature: Yueh Chuang

Yueh Chuang, Manager Environmental Remediation

Form No. 630 R05/2014

PETITION FOR CONTROLLED GROUNDWATER AREA

This form can be filed by a state or local public health agency for identified public health risks; a municipality, county, conservation district, or local water quality district formed under Title 7, chapter 13, part 45; or by at least one third of the water right holders in an area proposed for designation of a controlled groundwater area. An incomplete or non-qualifying petition will be returned.

A fee of $1500 must accompany this petition. Petitioners must also pay reasonable costs of giving notice pursuant to MCA § 85-2-506 and A.R.M. 36.12.103

Make checks payable to "DNRC"

Filing Fee: $1500.00

RECEIVED
DNRC WATER RESOURCES
JUN 27 2017
KALISPELL UNIT

FOR DEPARTMENT USE ONLY

Application # 30111620 Basin 76LJ
Date 6/27/17
Time 11:40 AM / PM
Rec'd By MNS
Fee Rec'd $ 1,500.00 Check # 1600506 11
Deposit Receipt # KEW1732212
Payor BNSF
Refund $_____ Date _____

Contact Person: ☒ Contact is Petitioner ☐ Contact is Consultant ☐ Contact is Attorney ☐ Contact is Other
Contact Name Flathead City - County Board of Health / Joe Russell 224257
Mailing Address 1035 1st Avenue West
City Kalispell State Montana ZIP 59901
Phone Numbers: Home _____ Work 406-751-8101 Cell _____
Email Address jrussell@flathead.mt.gov

General Location of Proposed Controlled Groundwater Area: **Portions of Sections 23, 24, and 25, Township 27 North Range 21 West, Principal Meridian: Montana, Somers, Flathead County, Montana.**

TYPE OF DESIGNATION OR PROVISIONS REQUESTED: Is the petition for a permanent or temporary designation?

☒ **Permanent**. If permanent, proceed to Section 1.

☐ **Temporary**. If temporary, proceed to Section 2.

Section 1. **PERMANENT DESIGNATION PROPOSED** *Please provide the following:*

A. MCA § 85-2-506 requires that this petition must contain analysis prepared by a hydrogeologist, a qualified scientist, or a qualified licensed professional engineer concluding that one or more of the following criteria:

☐ Current or projected reductions of recharge to the aquifer or aquifers in the proposed controlled ground water area will cause ground water levels to decline to the extent that water right holders cannot reasonably exercise their water rights;

☐ Current or projected ground water withdrawals from the aquifer or aquifers in the proposed controlled ground water area have reduced or will reduce ground water levels or surface water availability necessary for water right holders to reasonably exercise their water rights;

☒ Current or projected ground water withdrawals from the aquifer or aquifers in the proposed controlled ground water area have induced or altered or will induce or alter contaminant migration exceeding relevant water quality standards;

☒ Current or projected ground water withdrawals from the aquifer or aquifers in the proposed controlled ground water area have impaired or will impair ground water quality necessary for water right holders to reasonably exercise their water rights based on relevant water quality standards;

☒ Ground water within the proposed controlled ground water area is not suited for beneficial use; or public health, safety, or welfare is or will become at risk.

B. Please attach all supporting information, including the name, address and qualifications of the person who prepared the analysis.

C. Explain why the condition occurring or likely to occur cannot be appropriately mitigated.

D. Describe the kind of corrective controls or provisions you are requesting. A controlled ground water area may include but is not limited to the following control provisions:

☒ A provision closing the controlled ground water area to further appropriation of ground water;

☒ A provision restricting the development of future ground water appropriations in the controlled ground water area by flow, volume, purpose, aquifer, depth, water temperature, water quality, density, or other criteria that the department determines necessary;

☐ A provision requiring measurement of future ground water or surface water appropriations;

☒ A provision requiring the filing of notice on land records within the boundary of a permanent controlled ground water area to inform prospective holders of an interest in the property of the existence of a permanent controlled ground water area.

☐ A provision for well spacing requirements, well construction constraints, and prior department approval before well drilling, unless the well is regulated pursuant to Title 82, chapter 11;

☐ A provision for mitigation of ground water withdrawals;

☐ A provision for water quality testing;

☐ A provision for data reporting to the department

Proceed to Section 3.

Section 2. **TEMPORARY DESIGNATION PROPOSED** *Please provide the following:*

A. A study plan that may include measurement, water quality testing, and reporting requirements for new and/or replacement wells during the period of the temporary closure.

B. Include information on funding for any proposed investigations including any plans for pursuing funding under the renewable resource grant and loan program, and any planned investigation under the ground water investigation program.

C. Describe how any necessary investigations can be completed in a timely fashion not to exceed 6 years.

Proceed to Section 3.

Section 3. **PERMANENT OR TEMPORARY DESIGNATION PROPOSED** *Please provide the following:*

A. **Map:** A U.S. Geological Survey quadrangle map, or one of similar size, scale and detail level **must** accompany the petition. In addition to the information provided on the USGS map, the map **must** also show the following:
   a. north direction;
   b. township and range numbers;
   c. section corners and numbers;
   d. accurate outline of the proposed controlled area;
      i. location of any known groundwater recording equipment;
      ii. points of diversion of all groundwater users, including wells and developed springs.

B. **Land Ownership:** Attach a list to this petition of all the landowners within the proposed boundaries of the controlled groundwater area. Land ownership may be found at the county assessors office or at http://svc.mt.gov/msl/mtcadastral/ The list must include the name and complete mailing address of the property owner.

WATER RESOURCES OFFICES

BILLINGS: AIRPORT INDUSTRIAL PARK, 1371 RIMTOP DR., BILLINGS MT 59105-1978
PHONE: 406-247-4415 FAX: 406-247-4416
SERVING: Big Horn, Carbon, Carter, Custer, Fallon, Powder River, Prairie, Rosebud, Stillwater, Sweet Grass, Treasure, and Yellowstone Counties

BOZEMAN: 2273 BOOT HILL COURT, SUITE 110, BOZEMAN MT 59715
PHONE: 406-586-3136 FAX: 406-587-9726
SERVING: Gallatin, Madison, and Park Counties

GLASGOW: 222 6TH STREET SOUTH, PO BOX 1269, GLASGOW MT 59230-1269
PHONE: 406-228-2561 FAX: 406-228-8706
SERVING: Daniels, Dawson, Garfield, McCone, Phillips, Richland, Roosevelt, Sheridan, Valley, and Wibaux Counties

HAVRE: 210 6TH AVENUE, PO BOX 1828, HAVRE MT 59501-1828
PHONE: 406-265-5516 FAX: 406-265-2225
SERVING: Blaine, Chouteau, Glacier, Hill, Liberty, Pondera, Teton, and Toole Counties

HELENA: 1424 9TH AVE., PO BOX 201601, HELENA MT 59620-1601
PHONE: 406-444-6999 FAX: 406-444-9317
SERVING: Beaverhead, Broadwater, Deer Lodge, Jefferson, Lewis and Clark, Powell, and Silver Bow Counties

KALISPELL: 655 TIMBERWOLF PARKWAY, SUITE 4, KALISPELL MT 59901-1215
PHONE: 406-752-2288 FAX: 406-752-2843
SERVING: Flathead, Lake, Lincoln, and Sanders Counties

LEWISTOWN: 613 NORTHEAST MAIN ST., SUITE E, LEWISTOWN MT 59457-2020
PHONE: 406-538-7459 FAX: 406-538-7089
SERVING: Cascade, Fergus, Golden Valley, Judith Basin, Meagher, Musselshell, Petroleum, and Wheatland Counties

MISSOULA: 2705 SPURGIN RD. BLDG. C, PO BOX 5004, MISSOULA MT 59806-5004
PHONE: 406-721-4284 FAX: 406-542-5899
SERVING: Granite, Mineral, Missoula, and Ravalli Counties

MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
Water Resources Division - Water Rights Bureau
1424 9th Avenue, PO Box 201601, Helena, MT 59620-1601
Phone: 406-444-6610 Website: **http://dnrc.mt.gov/wrd/**

SIGNATURES

This form must be filed by a state or local public health agency for identified public health risks; a municipality, county, conservation district, or local water quality district formed under Title 7, chapter 13, part 45; or by at least one third of the water right holders in an area proposed for designation of a controlled groundwater area. **Print or type** the full name of the water user and mailing address and sign on the appropriate line. Attach additional sheets if necessary.

WE THE UNDERSIGNED GROUNDWATER USERS IN THE PROPOSED CONTROLLED AREA PETITION THE DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION FOR A CONTROLLED GROUNDWATER AREA IN ACCORDANCE WITH § 85-2-506, MCA AND THIS PETITION.

Printed Name Signature

1. P. David Myerowitz, MD Chair, Flathead City-County Board of Health
Mail Address 1035 1st Avenue West, Kalispell, MT 59901 406-751-8101

2. /
Mail Address Phone

3. /
Mail Address Phone

4. /
Mail Address Phone

5. /
Mail Address Phone

6. /
Mail Address Phone

7. /
Mail Address Phone

8. /
Mail Address Phone

9. /
Mail Address Phone

10. /
Mail Address Phone

11. /
Mail Address Phone

12. /
Mail Address Phone

13. /
Mail Address Phone

14. /
Mail Address Phone

Printed Name	Signature
15.	/
Mail Address	Phone
16.	/
Mail Address	Phone
17.	/
Mail Address	Phone
18.	/
Mail Address	Phone
19.	/
Mail Address	Phone
20.	/
Mail Address	Phone
21.	/
Mail Address	Phone
22.	/
Mail Address	Phone
23.	/
Mail Address	Phone
24.	/
Mail Address	Phone
25.	/
Mail Address	Phone
26.	/
Mail Address	Phone
27.	/
Mail Address	Phone
28.	/
Mail Address	Phone
29.	/
Mail Address	Phone
30.	/
Mail Address	Phone
31.	/
Mail Address	Phone
32.	/
Mail Address	Phone

FLATHEAD CITY—COUNTY BOARD OF HEALTH
MINUTES OF REGULAR MEETING
MAY 18, 2017
1:00 – 3:00 PM
CONFERENCE ROOM A&B/2ND FLOOR
EARL BENNETT BUILDING
1035 1ST AVENUE WEST
KALISPELL, MONTANA

Members Present	Members Absent	Others
Bill Burg, CPA		Connie Abadie
Pam Holmquist, Commissioner		Cliff Bennett
Duane Larson, City Representative		Dan Boon
Aaron McConkey, PE		Kate Cassidy
Wayne Miller, MD		Yueh Chuang
P. David Myerowitz, MD		Paul Conrad
Mike Nicosia, PhD		Lisa Dennison
Ronalee Skees		Hillary Hansen
		Roger Hoogerheide
		Ross Lane
		Kathy Olson
		David Randall
		Jen Rankosky
		Joe Russell
		Everit Sliter

Call to Order
Chairperson P. David Myerowitz called the meeting to order at 1:00.

Attendance

Approval of Agenda
MOTION Bill Burg to approve the Agenda.
SECOND Wayne Miller **MOTION CARRIED**

Approval of Minutes
MOTION Miller to approve the minutes from the April 20, 2017 regular meeting.
SECOND Aaron McConkey **MOTION CARRIED**

Citizen Comments
There were no citizen comments.

Burlington Northern Santa Fe

Myerowitz asked Joe Russell if he invited the three landowners of the properties affected by the toxins to the meeting. Russell said he did and that some of them were present at the meeting. Myerowitz stated to the landowners that the Board wanted them to be to be involved in the discussion of the Board regarding the expansion of the controlled groundwater area, so that they were fully aware of all the issues. A representative of the landowners, Everit Sliter stated that they appreciated the invitation and that they have been in contact with Burlington Northern and are aware of the situation. Russell introduced Yueh Chang with Burlington Northern, Roger Hoogerheide with the Environmental Protection Agency, Kathy Olsen with the Department of Natural Resources and Conservation, and Ross Lane with Burlington Northern, who were present to answer any questions. Chuang explained that, after the discussion in the previous meeting regarding boundary lines, they have changed the proposed boundary lines to encompass less area on the east. This proposal will need approval by the lead hydrologist at the Department of Natural Resources and Conservation. Miller reiterated his concerns from the last meeting that Burlington Northern may not compensate the affected property owner's for the depreciation of their land. Lane spoke to this issue by saying these negotiations will be between the Burlington Northern, their legal department and the landowners. Miller asked if the sheen found on Flathead Lake relates to the clean-up site. Lane and Hoogerheide spoke to the issue saying that testing is in process, with samples taken by the Environmental Protection Agency and Burlington Northern, and there is no conclusive evidence at the time that it is directly connected. They said that the compounds found in the sheen could come from a variety of sources. Hoogerheide stated that some of the chemical constituents found in the lake would also be associated with the tie treatment plant. There was a lengthy discussion regarding the chemicals found in the lake and their possible source.

MOTION Miller to authorize the Chairperson to sign the Petition for Controlled Groundwater Area rulemaking as received and reviewed by the Board.
SECOND Duane Larson **MOTION CARRIED**

Variance Request—Becker

Russell briefed the board on the variance request of Adam Becker, saying that the property in question has a high seasonal groundwater level, with the highest being 24" and the lowest at 30". This does not comply with Section 6.7.1 of the Flathead County Construction standards of a required 36" minimum setback for seasonal groundwater for new construction. Russell explained that the 36 inch setback found in the Section 6.7.1 of the construction standards is not a design standard but a value needed to proceed with design. The system is designed to meet the required treatment depth of soil/media of 48 inches as described in Section 10.2 of the Regulation. In order to meet this requirement, A2Z Engineering has designed a septic system with an elevated sand mound drainfield that Russell stated would meet this 48 inch requirement. There was a brief discussion for some clarification.

MOTION McConkey to approve the Variance Request of Becker.
SECOND Burg **MOTION CARRIED**

Initiation of Rule Making—Water Well Placement Regulations

Myerowitz reported that, since the previous discussion of the matter of Water Well Placement, MACo, the insurer for the Health Department, reviewed the proposed Initiation of Rule Making. According to the insurer, the Health Department may not have the authority to regulate the placement of water wells and Myerowitz said MACo might not defend them should there be a lawsuit. David Randall, Deputy County Attorney, later clarified that MACo did not say they would not defend any legal actions that arose because of the rule, but was not under any obligation to defend the Health Department in matters relating to the implementation of the proposed regulations. This is also the opinion of the County Attorney's office. Myerowitz suggested that Russell and Hillary Hanson draft legislation to amend the existing statute and submit it to the Legislature via a Sponsoring Legislator. Myerowitz believes Randall should sign off on this legislation before it goes to the Legislature, and that he should get the MACo legal department to agree they will defend them in any action should this legislation be passed. Myerowitz believes the Board of Health should pursue getting this legislation fixed to meet the legal standards of all legal counsels. Myerowitz said that Pam Holmquist submitted to him a draft of an agreement she suggests well drillers give to the homeowners to sign. Holmquist explained that the document would be a type of checklist the well drillers would give to the homeowners to do research themselves. Holmquist worked with two engineers to formulate the checklist, and then she submitted it to some well drillers for their input. Her suggestion is that this be something they try as an alternate until legislation is changed. Myerowitz disagreed that the responsibility is the homeowners and felt that the suggested checklist is overwhelming for a homeowner. He believes that the well driller's should be professional enough to understand the best placement of a well. Myerowitz believes that approaching this at a legislative level is the best action to take. There was a continued discussion. Russell stated that, in his opinion, without regulation behind it, the form suggested by Holmquist has no merit. He believes that approaching this through legislative action is on the right track. A discussion continued regarding the necessity of Rule Making for Water Well Placement. Miller added that it is imperative that whatever they do, it will meet with the approval of MACo. Randall agreed that pursuing legislation is the right approach and that he is happy to work with Russell and Hanson. He stated that he is not sure he can get a guarantee from the Legal Department of MACo; however, he believes they would agree to putting the language into the statute. A discussion for clarification continued.

MOTION Miller to table the Initiation of Rule Making – Water Well Placement Regulations, directing the Health Officer, the Deputy Health Officer, and the Deputy County Attorney to draft amending legislation.
SECOND Burg **MOTION CARRIED**

Fiscal Year 18 Preliminary Budget Review and Approval

Burg explained the preliminary budgets for the Health Department and the Flathead Community Health Center. There is a reduction in the Fiscal Year 2018 Preliminary Health Department Budget of approximately 10%, from $6.8M in Fiscal Year 2017 to $6.2M. The principal contributing changes for this are:

- A reduction in the Capital Improvement Plan (CIP) fund of about $450,000.00.
- The retirement of the Health Officer.
- A reduction in expenses for Home Health.

The Flathead Community Health Center will increase from $5.1M in Fiscal Year 2017 to $5.3M. The primary reasons for this increase are:

- The addition of one more doctor.
- Salary adjustments for the mid-level salaries resulting from a series of studies, which showed these salaries to be 8% to 10% below the national average.

There was no further discussion.

MOTION Burg, on behalf of the Finance Committee, to adopt the Fiscal Year 2018 Preliminary Budgets for the Health Department and the Flathead Community Center. MOTION CARRIED

Note: Because the Finance Committee recommended that the Board of Health adopt the budgets, a seconding was not required.

Departmental Reports

Community Health/WIC

Lisa Dennison reported for Community Health and WIC.

- No reported outbreaks in any long-term care facility in April.
- A Public Health Nurse from Community Health has been visiting assisted living facilities and long-term care facilities to educate about the new outbreak reporting rules for congregant settings. She is also informing them about the Employee Flu Vaccination Forum led by Kalispell Regional Medical Center (KRMC). The date has not yet been set.

Myerowitz is skeptical that there will be a good turnout for this forum and believes a better response would come from individual visits to facilities. Hanson said she feels there is less intimidation with a group setting rather than individual contact. Hanson said KRMC representatives from Human Resources and Quality Department who monitor Infection Control have agreed to help with this effort. Myerowitz asked which staff they plan to invite. Hanson said it would be administrators and directors of nursing staff.

- There was one Tetanus case reported. This individual worked for several days in gardening soil with bare hands that had open sores and burns on them. There was a short discussion about vaccination for Tetanus.

Myerowitz asked about the reported Lyme disease case. Dennison said this individual found an engorged tick after he visited Oregon.

- Requests for religious exemption for vaccines, including Varicella, have increased slightly over the past year. Requests for religious exemptions for children enrolling in Kindergarten have also increased.

Hanson remarked that they had expected the requests for religious exemption to decrease after the mandatory Varicella vaccination push last year, but they have not. Dennison said that they have prepared a "report card" for each school that will show immunizations rate for that school and will give a comparison of each school. The hope is that this will motivate the schools to compete with other schools and to educate parents more. There was a discussion regarding immunization numbers.

- Conditional vaccination numbers are coming down to a normal level after having the increased numbers resulting from the mandated Varicella vaccination last year.

Hanson reported for WIC.

- The Home Visiting Program has yet to find out if they will receive funding. The State has applied for Federal funding and if the State receives their funding, then Home Visiting will apply to them for funding.
- WIC continues to struggle to get their participant numbers up. They will know by July what their funding is for the next fiscal year and Hanson anticipates it will be cut somewhat.

Environmental Health

Kate Cassidy reported for Environmental Health.

- One facility received a poor score last month.
- Nine property owners have taken the recently implemented Self Install Septic System test. Three passed the first time, four passed on their second attempt, and one failed the second attempt. He will return to attempt it for a third time.

Myerowitz asked how many questions were on the test and if a study guide is given to them prior to taking the test. Cassidy said there are around 50 questions and the only guide is the Construction Standards on line. Myerowitz suggested they develop an abbreviated study guide. Russell said that it is something they will develop and suggested they assign this task to the Intern who is working with Environmental Health.

- Two persons in Environmental Health now have their State of Montana Subdivision Reviewers certifications.
- A sushi business with consistently poor scores and warnings, which the board discussed in a previous meeting, is now on an accelerated inspection schedule. The sanitarian assigned to this business has met with a manager, the franchisee, and the manager of the grocery store where they lease space. The sanitarian gave the sushi business ultimatums if they do not comply with requirements. The manager of the grocery store understands that it would reflect on their store should this sushi business infect someone with parasites.

Myerowitz asked what the difference is between the Monthly High Risk Population Food Purveyors Inspection Report and the School Inspections Report. Cassidy said that the School Inspections are different in that they do not inspect food service facilities but they check for any health and safety issues in the classrooms and on the playgrounds. The food inspections are reported separately.

Community Health/Family Planning

There was no report given for Community Health/Family Planning.

Health Promotion

Hanson reported for Health Promotion.

- The Breast and Cervical Screening program is still trying to improve their numbers.
- The Safe Kids Safe Communities Car Seat program collaborated with Northwest Montana Head Start to offer car seat checks during drop off and pick up times. They received a mixed response, with some parents avoiding them.
- On May 23, a meeting is planned with various community services providers to discuss the possibility of expansion of services to the underserved population in Hungry Horse. There is a vacant space at the Canyon Elementary school that may possibly be utilized for a community outreach location.

- The Superintendent of Evergreen Schools is enthusiastic about any effort to bring services to the Evergreen Schools and the community as a whole. Community Health staff discussed ideas with her regarding immunization clinics and a variety of possible services, such as WIC and a monthly immunization clinic. Community Health will most likely close the monthly Whitefish Immunization Clinic and relocate in Evergreen. On a broader perspective, Evergreen Schools are considering the possibility of having the Health Department open a community clinic in the school. The Evergreen Schools have a day in August called the Student Experience Day where the school invites parents and students to come and be acquainted with teachers and acclimate to the school environment. Community Health and Health Promotion plan to participate with various services and give out a survey to assess the needs of the community. The date for this event is August 29.

Myerowitz said the survey is a good idea and suggested they get names, phone numbers and addresses for follow-up. He believes a similar survey would be good for the Hungry Horse project as well.

Home Health

Paul Conrad Reported for Home Health.

- Referral numbers are remaining steady with the beginning, ending, and average daily census being 70.
- The referral sources are varied, which is good.
- Physical Therapy was busier than Nursing.
- The cost per visits improved.
- There is $378,000.00 in accounts receivable. Conrad has pressed the billing service providers to work harder at bringing in these accounts.

Animal Shelter

Cliff Bennett gave the report for the Animal Shelter.

- Numbers are up a bit, especially with cats.
- Bennett attended the annual Humane Society of the United States Animal Expo in Fort Lauderdale, Florida. Bennett will attend the Pet Health Animal Shelter CEO Summit in Toronto.

Mosquito District

Bruce Gunderson reported for the Mosquito District.

- Since the last report, the staff have conducted and additional 701 inspections.
- Treatment area increased by 184 acres.
- They have used 1729 pounds of granular larvicide so far this season.
- When larvae are more mature, it is necessary to use liquid pupacide as a last resort.
- The Flathead River rose 4' in four days and then receded allowing an opportunity to treat the flooded area with a chemical called BTI, which is less expensive and more effective in killing larvae. BTI does not last long, so when the water rose again, there was no residual that entered the stream.
- Gunderson expects a big mosquito year because of the high water runoff.

- Gunderson and Jake Rubow were in Helena recently to approach the Department of Health and Human Services about receiving additional funding for the West Nile surveillance operation.
- They hired three temporary employees for the season; two returned from last year and one is a graduate of Flathead Valley Community College.
- Rubow was in Washington DC recently speaking to our legislators regarding maintaining the Center for Disease Control funding for West Nile Surveillance and Testing.
- Gunderson and Rubow have finished working with the Montana Department of Agriculture to update the Montana Mosquito Control Training Manual. The last update was 26 years ago. The new version will be available within the next year.

Miller asked how they get into the wet and boggy areas around the rivers. Gunderson said that they have two eight-wheeled vehicles that can get into these places. They broadcast the granules with a pull behind grass seeder.

Finance Report
There was no finance report given.

Health Officer's Report
Russell gave the Health Officer's Report. He explained the deviation request provided to Alex Hasson. A well on the neighboring property and the water line, which services Hasson's property, encumbers Hasson's lot. Hasson wants to replace an existing cesspool with a septic system; however, the lot is too small to accommodate a standard septic system. Russell said that they have come up with a design that is not ideal, but will suffice and a waiver to the Regulations and Construction Standards is necessary.

Russell with be in the Republic of Georgia June 9 through the 17th with staff from the Centers for Disease Control and Prevention.

Committee Reports
There were no committee reports.

Other Business
There was no other business.

Board Member Comments
There were no member comments

Adjournment
The meeting adjourned at 3:05

Transcribed by Wanda Forbes

AECOM Environment

Prepared for:
Flathead City-County Health Department
Kalispell, MT

Submitted by:
BNSF Railway Company
and AECOM
60485257-220
June 2017

Controlled Groundwater Area Petition Supporting Information

BNSF Former Tie Treatment Plant
Somers, Montana

AECOM Environment

Prepared for:
Flathead City-County Health Department
Kalispell, MT

Submitted by:
BNSF Railway Company
and AECOM
60485257-220
June 2017

Controlled Groundwater Area Petition Supporting Information

BNSF Former Tie Treatment Plant
Somers, Montana

Prepared by
Shelly Young, Deputy Project Manager

Reviewed by
Richard Henry, P.G., Project Hydrogeochemist

Reviewed by
Craig Niedermeier, P.E., Program Manager

Contents

List of Appendices

List of Figures

List of Acronyms

%	Percent
µg/L	Micrograms per liter
AECOM	AECOM Technical Services, Inc.
Agencies	USEPA and MDEQ
AOC	Administrative Order of Consent
ARAR	applicable or relevant and appropriate requirements
ARM	Administrative Rules of Montana
AST	aboveground storage tank
bgs	Below ground surface
BNSF	BNSF Railway Company
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CGA	controlled groundwater area
COC	Constituent of concern
CPAH	carcinogenic polycyclic aromatic hydrocarbons
DNAPL	dense non-aqueous phase liquid
DNRC	Department of Natural Resources and Conservation
DPT	direct-push technology
ESD	Explanation of Significant Differences
FS	Feasibility Study
FFS	Focused Feasibility Study
ft/day	Feet per day
ft/ft	Feet per foot
ft/year	Feet per year
gpm	Gallons per minute
GWTS	groundwater recovery system
HHRA	Human Health Risk Assessment
LTMO	Long-Term Monitoring Optimization
LTU	land treatment unit
MAROS	Monitoring and Remediation Optimization System
MCA	Montana Code Annotated
MCL	Maximum contaminant level
MDEQ	Montana Department of Environmental Quality

MDHES	Montana Department of Health and Environmental Sciences
mg/kg	Milligrams per kilogram
MNA	Monitored natural attenuation
NAPL	non-aqueous phase liquid
NPL	National Priorities List
OSRTI	USEPA Office of Superfund Remediation and Technology Innovation
OSWER	Office of Solid Waste and Emergency Response
PAH	polycyclic aromatic hydrocarbons
PRG	Preliminary Remediation Goal
RCRA	Resource Conservation and Recovery Act
RI	Remedial investigation
ROD	Record of Decision
RSL	Regional Screening Levels
Site	BNSF Former Tie Treatment Plant in Somers, Montana
SOW	Statement of Work
TarGOST®	Tar-specific Green Optical Screening Tool
TPAH	total polycyclic aromatic hydrocarbons
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	Volatile organic compound

1.0 Introduction

This report presents supporting information for the petition to revise the permanent controlled groundwater area (CGA) boundary for the BNSF Railway Company's (BNSF) Somers, Montana former tie treating plant, hereafter referred to as the site. The site is located in northwestern Montana in the unincorporated town of Somers, Flathead County. This CGA petition has been prepared by AECOM Technical Services, Inc. (AECOM) on behalf of BNSF Railway Company (BNSF) for the Flathead City-County Health Department to submit to the Montana Department of Natural Resources and Conservation (DNRC). Ongoing site activities are being conducted pursuant to the Consent Decree between BNSF and the U.S. Environmental Protection Agency (USEPA). **Figure 1-1** presents the US Geological Survey quadrangle map of the area and shows the topography in the vicinity of the site.

A 67-acre permanent CGA designation for the site was approved by the MDNRC in 2003 (MDNRC 2003). The CGA designation prohibited the installation of groundwater supply wells or the extraction of groundwater from the alluvial aquifer for any purpose other than remediation, and is one institutional control implemented at the site. The area encompassed by the existing CGA is shown in **Figure 1-2**.

1.1 Revised CGA Description

Based on data collected since the original CGA designation, a revised CGA boundary is being requested by the Flathead City-County Board of Health pursuant to Montana Code Annotated (MCA) 85-2-506(5) in order to prevent potential exposure to COCs in groundwater where the September 1989 Record of Decision (ROD) (USEPA 1989) remedial goals for the site are exceeded, to prevent groundwater withdrawals from the CGA alluvial aquifer that may induce or alter migration of COCs, and/or to prevent installation of groundwater wells into the bedrock aquifer that may induce COC impacts from the alluvial aquifer into the bedrock aquifer. New wells within the revised CGA boundary would be limited to monitoring wells and other wells required for remedial action as directed and approved by the USEPA.

1.2 Site and Regulatory History

The following is a brief description of the site and regulatory history. For reference, a more comprehensive description is provided in **Appendix A**.

BNSF and its predecessors operated a railroad tie treating plant from 1901 until its closure in 1986. Wood preservatives used at the site consisted of creosote, zinc chloride, and for a short time, chromated zinc chloride. In October 1985, BNSF entered into an Administrative Order of Consent (AOC) with USEPA to conduct a remedial investigation and feasibility study (RI/FS). The RI/FS report was finalized with the issuance of the Record of Decision (ROD) in September 1989. The COCs at the site originated from the wood preservatives used in the former tie treating process and as identified in the 1989 ROD included total polycyclic aromatic hydrocarbons (TPAH), carcinogenic polycyclic aromatic hydrocarbons (CPAH), and total phenolic compounds.

Soil and groundwater were affected by separate phase and dissolved phase constituents originating from the tie treating process. Non-aqueous phase liquids (NAPL), primarily creosote, have been observed in two areas of the site (AECOM 2013a). There are two dissolved phase plumes in groundwater at the site believed to be related to each of the two source areas (**Figure 1-2**). The first, and primary, dissolved phase plume (approximately 10 acres) is located near and downgradient from the former CERCLA Lagoon source area. The second, and smaller, dissolved phase plume (approximately 3.2 acres) is northwest of the former CERCLA Lagoon, near the former location of aboveground storage tanks (ASTs). The extent of dissolved phase concentrations that exceed the ROD remedial goals is limited to wells that are screened in the alluvial aquifer.

1.3 Remedy Implementation

This section briefly describes the implementation of the soil and groundwater remedies that were selected in the ROD. For reference, a more comprehensive description is provided in **Appendix A.**

1.3.1 Groundwater Remedial Action Summary

Implementation of the Somers groundwater remedy began in December 1993 with the Phase I groundwater remedial action. Groundwater recovery and treatment operations continued until 2007 when fate-and-transport analyses demonstrated that the low permeability of the alluvial aquifer provides a natural containment barrier and, as a result, there was minimal demonstrable risk associated with the presence of creosote impacted groundwater at the site. Since that time, semi-annual groundwater monitoring has been conducted at the site to measure and document groundwater elevation, flow direction, and concentrations of dissolved phase constituents.

A biosparge pilot test was completed in the former AST area in 2015 to evaluate the effectiveness of this technology in reducing dissolved phase constituents. Based on the performance of the pilot test, the biosparge system was restarted and operated between July 13, 2016 and December 21, 2016. The data collected from pilot test and operating the biosparge system in 2015 can be used in designing a full system as appropriate.

In addition, manual NAPL recovery began at the site in 2011 through pumping and the use of sorbent socks.

1.3.2 Soil Remedial Action Summary

Prior to the ROD being in place, soil remedial activities at the site included removal of impacted soil in the swamp pond and a small area of Flathead Lake. After the ROD was in place, additional soil remedial activities were completed including excavation of impacted soil from CERCLA Lagoon, drip track, drainage ditch, beneath the retort building, slough bank, swamp pond, and beach areas of Flathead Lake. These excavated soils were placed and treated within a Land Treatment Unit (LTU). In addition to the soil remedy actions, rehabilitation of the former swamp pond to a functional wetland and acquiring wetland acreage on the north shore of Flathead Lake was completed per an approved Wetlands Mitigation Plan.

1.4 Additional Site Activities

Additional activities have been conducted at the site in addition to those discussed in Section 1.3 above and in **Appendix A** and have been documented in various reports. These activities included additional site investigations (AECOM 2013a), vapor intrusion evaluations (AECOM 2013b), and completion of additional investigation activities for delineation of dissolved phase impacts.

BNSF has also adopted deed notifications and land use controls, pursuant to the 1991 Consent Decree, as additional forms of institutional controls. BNSF filed a notation to the BNSF property on October 23, 2006, following approval of the LTU closure to notify potential purchasers of the property of the use restrictions. On December 8, 2008, an additional deed notice was filed with the Flathead County Clerk and Recorder indicating property use restrictions on the affected portion prohibiting installation of wells without approval from the USEPA. The restrictions and controls were approved by the USEPA pursuant to the Consent Decree prior to adoption and filing. At the request of the USEPA and upon selection of a final remedy to address remaining site impacts in groundwater, BNSF anticipates recording deed restrictions to replace the prior deed notifications and to restrict use of property within the subject area recently acquired by BNSF.

A Focused Feasibility Study (FFS) is currently being prepared in accordance with the NCP (NCP [40 Code of Federal Regulations (CFR) 300]) and USEPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355.3-01 "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" (USEPA 1988). Consistent with these documents, the FFS will evaluate remedial action goals and objectives,

available remedial action methods, and identify the most appropriate methods to address the remaining impacts at the site. This information, along with information regarding community concerns and State of Montana concerns (two additional criteria), as well as other information contained in the administrative record for this action, will be used by USEPA, in accordance with the NCP, to make an appropriate remedial decision regarding groundwater cleanup at the site. The selected remedy will be documented in a decision document amendment.

2.0 Site Characteristics

2.1 Geology and Hydrologic Setting

2.1.1 Regional Geology

The regional geology of the Flathead Valley has been the subject of several investigations. The information presented below is taken from the studies completed by Konizeski (1968) and Noble (1986) for the State of Montana Bureau of Mines and Geology in association with the U. S. Geological Survey.

The site is located on the west side of the Kalispell Valley. The Kalispell Valley, a trench-like depression formed by down faulting of the basement Precambrian rocks during late Paleocene-Eocene time, was partly filled with material eroded from the nearby mountains during Tertiary time (Konizeski and others, 1968). In Pleistocene time, the sediments of Tertiary age were partly eroded and the remnants were buried beneath ice-contact and glaciolacustrine deposits. As the ice from the last glacial stage melted, Lake Missoula expanded northward and the Kalispell Valley was inundated. Sand, silt, and clay (glacial flour) were deposited in Lake Missoula. While the lake was receding about 12,000 years ago, the Flathead River and its tributaries entrenched their courses about 100 feet into the unconsolidated valley-fill deposits. The flood plains were subsequently broadened and graded to the level at which the lake had stabilized. Gravity data indicate a maximum depth of about 4,800 feet of valley-fill deposits of Tertiary and Quaternary age (Konizeski and others, 1968).

A variety of sequential post-glacial events is reflected in the geologic complexity of the lower Kalispell valley in the general vicinity of the site. Prior to the Flathead River establishing its present channel, the river flowed into Flathead Lake near Somers. A chain of small ponds and sloughs are aligned along the former river course, one of which is located along the northern boundary of the site. The geomorphological characteristics of tight meander bends and associated point bar deposits of this abandoned channel imply a fluvial, aggrading depositional environment. In addition, the area north of Somers is 10 to 20 feet higher topographically than the rest of the Lower Valley. Bathymetric maps show that an ancient deltaic lobe extends approximately two miles out from the present lakeshore in Somers Bay. The size of the ancient deltaic lobe suggests that the former river channel was well established. Noble's report provides a map displaying the deltaic deposits in the Lower Valley (Figure 7 in Noble, 1986). In areas abandoned by the river as it changed its course, sediment influx would be diminished causing the previously deposited sediment to be reworked by the action of the lake.

2.1.2 Site Geology

The site is located in Flathead Valley and consists of glacial deposits from the Salish Mountains as well as fluvial deposits reworked by the Flathead River. Much of the site from Somers Road to the former swamp pond is believed to have been previously covered by Flathead Lake. As a result of these depositional environments, the geology consists of fine-grained, discontinuous and interbedded silt, sand and clay stratigraphy. Cross sections depicting site wide geological conditions were originally presented in the *RI/FS Report* (RETEC, 1989). Updated cross sections were generated following collection of additional data through 2013 and were presented in the draft *Site Characterization Report* (AECOM 2013a) to aide in demonstrating the heterogeneity of the geology at the site.

Local geology is comprised of five units (AECOM 2013a), with the fill and the bedrock occurring at the top and bottom layers respectively, and the other units present as discontinuous and interbedded, vertically and horizontally heterogeneous units distributed above the bedrock.

- **Fill.** Mainly in the developed areas, composed of silts and sands, largely unsaturated (10 to 15 feet below ground surface [bgs]).
- **Sandy silt and silty sand.** Ranging in thickness from 0 to 80 feet bgs, typically saturated.
- **Sand unit.** Discontinuous, fine grained sand lenses present intermittently across the site; typically saturated.
- **Clay unit.** Can be up to 60 feet in thickness with sand lenses, typically saturated.
- **Bedrock unit.** Approximately 80 to 100 feet bgs sloping to the east, Precambrian bedrock, gray, silty, stromatolite-bearing dolomite.

While the five units described above are generally present, distinct contacts between the units are not always apparent. In some areas of the site, slight gradational changes may be the only distinguishing feature between two units with similar grain size. This lack of distinct layering and discontinuous nature of the sediments suggest the reworking of the underlying glaciolacustrine materials resulting in the complex and heterogeneous geology at Somers. However, the clay unit described above was observed to be present above the bedrock in the deep borings installed at the site.

The surficial geology in the area of the former CERCLA Lagoon consists of the sandy silt and silty sand and clay units, with interbedded lenses of the sand unit throughout ranging in thickness from 3 inches to 1.5 feet. The upper 15 feet of the former CERCLA Lagoon is occupied by fill placed after the 1993 excavation. The fill consists of silty sand with some small cobbles and gravel.

Silt, silty sand, and fine sand units are dominant in the northern portion of the site near the BNSF property boundary southwest of Pickleville Road. The observed sand lenses were generally thicker (up to 15 feet thick) in this area of the site than in the area within and downgradient from the former CERCLA Lagoon.

2.1.3 Hydrogeology

Two aquifers are considered to be present at the site: an alluvial aquifer in the low-permeability, heterogeneous silt and silty sand, and a lower bedrock aquifer. The alluvial aquifer has been characterized in more detail compared to the bedrock aquifer, which is generally 40 feet deeper than observed impacts.

2.1.3.1 Groundwater Use

The low yield and high iron content of the alluvial aquifer limits the quantity and quality of groundwater that can be extracted from the site or downgradient areas. Historically, some limited use of the alluvial aquifer did occur in areas surrounding the site, however, high iron content in the groundwater and low yield eliminated the use of many of these wells.

A new municipal water supply well was installed in the bedrock aquifer due to increased water demands in the town of Somers. The municipal well (**Figure 1-2**) is located cross gradient from and southwest of the site and is outside of the boundaries of the proposed revised CGA.

The present beneficial use of the alluvial aquifer at the Somers site is for monitoring related to remedial activities and limited seasonal recharge to Flathead Lake. The present beneficial use of the bedrock aquifer is for the Somers municipal water supply.

2.1.3.2 Alluvial Aquifer

The alluvial aquifer is a water table aquifer, with groundwater typically encountered at depths of 16 to 18 feet bgs in the former operational areas of the site, and becoming shallower as the ground surface elevation decreases toward Flathead Lake and the slough. The alluvial aquifer has low hydraulic conductivity that occurs

within the fine-grained interbedded silt, clay, and sand. Groundwater flow occurs predominantly through the sand lenses. However, since the sand lenses are thin and discontinuous, the groundwater flow paths are not uniform, but rather short and tenuous.

The limited paths available for groundwater flow in combination with the overall low permeability result in low water yield. For the silt and sand unit, hydraulic conductivities ranged from 0.02 to 0.54 feet per day (ft/day), averaging 0.16 ft/day. For the interbedded sand unit (primarily present in interbedded lenses), the hydraulic conductivity ranged from 2.5 to 6.5 ft/day averaging 4.0 ft/day. The undisturbed soil cores collected in 2012 did not contain a representative clay unit that could be analyzed for hydraulic conductivity; however, the finest grain sample contained 20 percent (%) clay and 72% silt, which could represent the upper limit of the clay unit hydraulic conductivity at 0.02 ft/day (AECOM 2013a). For groundwater modeling, discussed in more detail in Section 2.4, a conservative hydraulic conductivity range of 0.25 to 10 ft/day was used.

Based on the October 2016 sampling event, the groundwater flow in the northwestern portion of the site in the former LTU area was to the east at a gradient of approximately 0.0029 feet per foot (ft/ft). In the northeastern area of the site between the former storage tanks and Pickleville Road, groundwater flow was to the northeast at a gradient of approximately 0.00036 ft/ft. The groundwater flow direction in and downgradient from the former groundwater recovery area varied slightly from the east-northeast to northeast and was approximately 0.0017 ft/ft.

Based on data collected from the soil cores, the average pore fluid velocity in the alluvial aquifer silt and sand unit, the predominant stratigraphic unit at the site, was 0.2 to 1.0 feet per year (ft/yr) in the area of the former CERCLA Lagoon. Within the discontinuous sand lenses, the average pore velocity ranged from 6 to 25 ft/yr.

The north/northeast/easterly flow of groundwater is due to a slough present northeast of the site. The slough is a remnant of ancient surface water features associated with meanders of the Flathead River. Flathead Lake is located south and east of the site and is hydraulically connected to groundwater. The lake is natural, but lake levels are maintained by a dam. Lake levels are kept high during summer months, but are allowed to drop during winter months to prepare for water storage demands during the spring snow melt.

The Flathead Lake water level is artificially controlled by Kerr Dam at the south end of the lake. Under an agreement with the Flathead Lakefront property owners, the lake level should be at full pool by June 15 of every year. The lake level is maintained at full pool until after Labor Day, although this is dependent on weather and the demand for power. In the fall, the lake level is artificially dropped to create storage for snow melt and spring runoff. The artificially-controlled elevation of the lake level creates a seasonal condition. During the late spring, summer and early fall months, the surficial aquifer is recharged by the lake. During the late fall, winter, and early spring, if the lake level is lowered, the surficial aquifer discharges to the lake. With the seasonal gradient reversal, the transport of chemicals, if present, also would be reversed.

The groundwater level fluctuations in the aquifer are much less than the lake levels due to the low hydraulic conductivity of the aquifers. Seasonal aquifer fluctuations range from approximately 4 feet near the lake and about 1 foot in the interior of the site. In addition, the low hydraulic conductivity of the alluvial aquifers causes a lag in time between the highest lake levels and the measured highest groundwater levels, where the peak groundwater level does not coincide with the peak lake level. Although there is an annual cycle in lake levels that influence groundwater levels near the lake, these impacts are muted and decrease rapidly away from the lake. Hydrographs of the nested well sets and corresponding Flathead Lake elevations are presented in **Appendix B**.

Vertical groundwater flow has been documented by collecting data from nested wells (wells completed at different depths in close proximity to each other). Historical vertical gradient analysis shows a seasonal variation in gradient direction. The gradient in nested wells S-85-6A and S-85-6B/S-85-6BR was downward (positive) during the winter and spring monitoring events, and was upward (negative) during the summer and fall events.

In the former swamp pond area, S-84-10 and S-91-4, the vertical gradient was similar to previous years; generally upward in the winter, early summer and fall and generally downward during the spring.

2.1.3.3 Bedrock Aquifer

The bedrock aquifer is encountered approximately 80 to 100 ft bgs and exists under confined to semiconfined conditions where it is overlain by less permeable alluvium and occurs within the fractured bedrock and overlying gravels. Konizeski et al. (1968) studied the groundwater resources in the Kalispell Valley, including the site area. The oldest aquifer is the Precambrian bedrock aquifer where groundwater is found in secondary bedrock features, i.e., joints and fractures. These features have small storage capacities but serve as conduits for water supplied from precipitation and leakage from adjacent aquifers. The Precambrian bedrock yields water to wells and springs where it crops out or where it is thinly covered by low permeability alluvium.

The water yield is variable and generally small ranging from 0.5 to 33 gpm, and averaging less than 10 gpm (Konizeski et al. 1968). These wells are located primarily along the east and west shores of Flathead Lake, at Bigfork and Somers, where the aquifer yields enough water for domestic use. However, Konizeski et al. concludes that it is not a source of large, regional groundwater supplies. Konizeski et al. reported that this aquifer was tapped by a well near the Somers site, and was presumed to be the Somers School well which has subsequently been abandoned. The well was reported to be 467 feet deep, penetrating bedrock for 185 feet and produced 33 gallons per minute (gpm) with a drawdown of 97 feet. The well was located in the NW1/4, SW1/4 of Section 24, T27N, R21W. The low specific capacity, 0.34 gpm/foot (i.e., the pumping rate divided by the drawdown), of the bedrock wells indicates that large drawdowns are required for small yields.

There are currently two wells that provide potable water to the town of Somers, the Tank Well and the Yacht Club Well. Both wells were drilled and installed in 1994 and completed mostly in bedrock at total depths of 362 feet below grade in the Yacht Club Well, and 660 feet below grade in the Tank Well. Long-term pumping tests conducted following drilling in 1994 and short-term pumping tests recently conducted by the town of Somers indicate that the specific capacity of Tank Well ranges from 3.6 to 6 gpm/foot and the Yacht Club Well from 8.7 to 9.2 gpm/foot. These specific capacities are significantly higher than the specific capacity reported for the former Somers School Well. The Town of Somers indicated that the Tank and Yacht Club Wells are typically pumped intermittently for approximately 30 minutes three to four times per day depending on water consumption. The Tank Well, referred to as the municipal well or town well (TW-1) in the sampling notes and in reports, is closest to the site and is sampled semi-annually for COCs related to past activities at the site. Since starting sampling in 1994, no COCs have been detected above drinking water standards in the Tank Well.

Based on semi-annual water level measurements presented in the annual reports (Tables 3 and 4; AECOM 2016), the bedrock and alluvial aquifer show a pattern of the bedrock aquifer recharging the alluvial aquifer in the summer, fall, and winter, and to a lesser degree the alluvial aquifer recharging the bedrock aquifer in the spring. Water levels in the deep bedrock wells fluctuate in direct response to the level of Flathead Lake, whereas the alluvial wells appear to respond inversely because of a lag in groundwater level due to the low hydraulic conductivity of the alluvial aquifer (**Appendix B**). This data implies that Flathead Lake acts as an external load on both the alluvial aquifer and the confined bedrock aquifer, which increases the hydraulic head in these aquifers during high lake levels.

2.2 Creosote Distribution

The NAPL source material at this site is composed of creosote originating from the treatment of railroad ties at two locations: the former CERCLA Lagoon and the former ASTs. Wood treating activities were conducted for 85 years and ceased nearly 30 years ago, and the timing of releases in the two source areas is not known; therefore, the composition of NAPL may have been affected by preferential weathering of creosote present at different portions of the site.

NAPL mainly exists in small lenses and stringers which are intermittent and disconnected. The heterogeneity of the deposits underlying the site and surrounding properties had significant effects on groundwater flow and COC distribution at various depth intervals and NAPL migration. Due to its physical properties (i.e., density, viscosity, interfacial tension), it can be transported differently in the subsurface than dissolved solutes. TarGOST® borings and field observations from direct-push technology (DPT) soil borings and wells have been used to delineate the vertical and horizontal extent of NAPL impacts at the site (AECOM 2013a). Historical gauging and sampling data suggest that an emulsified NAPL is present in some source area groundwater wells, based on field observations of groundwater having an overall dark color or the presence of dark, suspended liquid globules.

Previous soil excavation activities removed impacted soil in the former CERCLA Lagoon down to a depth of 15 feet (approximately down to the top of groundwater). Based on TarGOST® and visual soil observation, creosote in the former CERCLA Lagoon source area is generally present as thin lenses (typically less than 0.5 feet thick and not greater than 2.5 feet thick) up to 60 feet bgs. The undisturbed cores collected from this area indicated NAPL fluorescence to a depth of nearly 30 feet bgs, mostly distributed within lenses and stringers.

The second area where source material was observed in the shallow interval was limited to one location near the location of the former ASTs. This boring was surrounded by other DPT borings that had no indication of creosote in the similar shallow interval, and was outside of the extent of TarGOST® borings. An undisturbed soil core collected from this location showed NAPL fluorescence from approximately 24 to 32 feet bgs, mostly distributed across the water table with bands and mottling above and below the water table.

2.3 Groundwater Quality

A comprehensive groundwater monitoring program has been established and maintained at the Somers site since 1992 and groundwater monitoring has been conducted at the site on a quarterly or semiannual basis for over 30 years. As discussed in Section 2.2, dissolved phase COC impacts to groundwater that are related to former tie treating operations originated from two source areas. The dissolved-phase impacts in groundwater originating from the former CERCLA Lagoon extend in a northeast and easterly direction across Somers Road, are characteristic of dissolved phase creosote constituents, and are comprised mainly of PAH and phenolic constituents, although benzene is also present. The second area of dissolved-phase impacts in groundwater appear to originate from the former AST area and extends to the north across Pickleville Road and is comprised primarily of PAH constituents and benzene. Phenol concentrations in this area are below ROD cleanup levels, even in samples collected from wells installed in the identified source area. COCs are present below the ROD remedial goals at locations between these two impacted dissolved phase areas.

Figure 1-2 presents the dissolved phase concentrations greater than 1 ug/L. Note that this conservatively depicts extent of impacts because the ROD criteria are greater than 1 ug/L.

2.3.1 Dissolved Phase Plume Stability Evaluation

The stability of each of the dissolved phase plumes between 2004 and 2014 was evaluated by BNSF (GSI 2015) using a suite of techniques known as Long-Term Monitoring Optimization (LTMO) included in the Monitoring and Remediation Optimization System (MAROS) software (AFCEE 2006). Naphthalene, benzene, and 2,4-dimethylphenol were used to evaluate the stability of the plumes because they are the individual COCs with the greatest areal distribution and exceedance of remedial and screening goals. The results of the LTMO evaluation indicate that overall the plumes are largely stable in the alluvial aquifer under natural (non-pumping) flow conditions and that impacts are concentrated in a relatively small area of the site near the source areas where residual NAPL remains.

Given the results of the LTMO evaluation, the current and predicted future extent of dissolved phase plumes for naphthalene, benzene, and 2,4-dimethylphenol from the two source areas was used, in part, to define the proposed revised boundary of the CGA and proposed restrictions on groundwater use.

2.4 Groundwater Modeling Analysis

Groundwater modeling was performed using the GFLOW (Version 2.1.2) to simulate groundwater flow and contaminant transport (using particle tracking) in the alluvial aquifer at the Somers site to support development of a revised CGA boundary. GFLOW is a highly efficient stepwise analytical element groundwater flow modeling system developed by Haitjema Software (2007), a subsidiary of Haitjema Consulting, Inc. It models steady state flow in a single heterogeneous aquifer using the Dupuit-Forchheimer assumption. GFLOW is particularly suitable for modeling regional two-dimensional (2-D) horizontal flow.

The analytic element method was developed by Otto Strack at the University of Minnesota (Strack and Haitjema, 1981a and 1981b; Haitjema 1995). The method discretizes surface water features for model input (Haitjema Software, 2007). Lake and stream sections, wells, and recharge are represented by closed form analytic solutions, called analytic elements and the solution is obtained by the superposition of all elements in the model.

A 2-D steady-state groundwater flow model was developed for the alluvium using regional surface water elevations, site groundwater levels, and aquifer hydraulic properties. As discussed in Section 4.2, the alluvial aquifer was included in the model because of the unlikelihood that dissolved phase constituents would impact the bedrock aquifer. Also, although there is an annual cycle in lake levels that influences groundwater levels near the lake, these impacts are muted and decrease rapidly away from the lake as discussed in Section 2.1.3.2. Given the localized impacts of the short-term, annual cycle of lake level changes, a steady-state model provides a reasonable approximation of the average long-term (30-year) groundwater flow and potential contaminant transport conditions.

The model was calibrated by adjusting the hydraulic conductivities until the predicted and observed site groundwater levels reasonably matched. After the model was calibrated, it was used to predict the potential future extent of dissolved groundwater contaminants from the AST and CERCLA Lagoon areas using particle tracking and the current, conservative 1 microgram per liter (ug/L) or greater plume extents for a 30-year time period. Sensitivity analyses were performed by modifying the alluvium hydraulic conductivities and by pumping a hypothetical well at rates of 1, 5, and 10 gallons per minute (gpm) in the alluvium. The groundwater flow model results are presented in **Appendix C**.

3.0 CGA Petition Criteria

Section 85-2-506(2) MCA requires that "designation or modification of an area may be proposed to the board by ... petition of a state or local public health agency for identified public health risks...". Flathead City-County Board of Health, as the sole petitioner, submits that it is a qualified petitioner under this statute since it is the local public health agency for Flathead County. The MDNRC can designate a permanent CGA by rule if one or more of the criteria specified in MCA 85-2-506 are met. The following criteria apply to this CGA petition for BNSF Somers former tie treating plant.

- Current or projected groundwater withdrawals from the aquifer or aquifers in the proposed CGA have induced or altered or will induce or alter contaminant migration exceeding relevant water quality standards (MCA 85-2-506 (5)(c)); and/or
- Current or projected ground water withdrawals from the aquifer or aquifers in the proposed controlled groundwater area have impaired or will impair ground water quality necessary for water right holders to reasonably exercise their water rights based on relevant water quality standards (MCA 85-2-506 (5)(d)); and/or
- Groundwater within the proposed CGA is not suited for beneficial use; or public health, safety, or welfare is or will become at risk (MCA 85-2-506 (5)(e) and (f)).

This petition summarizes aquifer and water quality characteristics:

- Groundwater flow occurs under water table conditions in the low permeability, fine-grained, sandy to clayey silt alluvial aquifer.
- Within the alluvial aquifer, groundwater flow occurs predominantly through interbedded sand lenses, however, since the sand lenses are thin and discontinuous, the groundwater flow paths are not uniform, but rather short and tortuous.
- Groundwater in the alluvial aquifer in the site vicinity is not used as a potable source due to low yield, high iron and the availability of a municipal water supply from bedrock wells.
- The alluvial aquifer grades downward into silty clay with no sand lenses from approximately 65 to 100 feet, below which lies bedrock. DNAPL was not observed in sand lenses occurring at depths greater than about 45 feet below ground surface (bgs).
- Recharge to the alluvial aquifer occurs via infiltration of precipitation and recharge from Flathead Lake during high lake levels.
- The net groundwater flow direction across the site is generally to the east.

4.0 CGA Boundary and Property Ownership

The proposed revised CGA boundary is conservatively based on: (1) existing interpreted horizontal and vertical extents of dissolved-phase COCs in groundwater; (2) assumption that no natural degradation is occurring; and 3) no ongoing remedial actions are being implemented. Where possible, the proposed CGA boundary is located to coincide with physical features, such as roads or legal boundaries, such as parcel boundaries or section lines, to facilitate physical interpretation of boundary locations. The boundary is intended to meet CGA objectives of preventing unacceptable exposure to groundwater-borne contaminants or spreading of the groundwater plumes due to groundwater pumping, while minimizing the impacts of groundwater usage restrictions on property owners to the extent practicable.

4.1 Permanent CGA Boundary

The proposed CGA boundary includes property in Sections 23, 24, and 25 in Township 27 North, Range 21 West of Flathead County as shown on **Figure 4-1**.

4.2 Vertical Boundary

The proposed revised CGA boundary includes both the alluvial and bedrock aquifers, whereas, the existing CGA boundary was limited to the alluvial aquifer. While the possibility of downward migration of groundwater from the impacted alluvial aquifer into the bedrock aquifer under current conditions is remote (see the discussion in below paragraph), it is possible that the bedrock aquifer may be affected as an artifact of drilling. If installation of a future well into the bedrock aquifer occurs in an area within the boundary of the CGA that has impacts in the alluvial aquifer, COCs could be pulled downward during the drilling process.

Groundwater flow modeling performed in conjunction with the 2003 permit indicated that no groundwater would be drawn from the alluvial aquifer to the bedrock aquifer at a continuous pumping rate of 100 gpm. It would require approximately 10 years of pumping from the bedrock aquifer at 500 gpm in order to draw water from the alluvial aquifer. Currently, the Town of Somers municipal bedrock well pumps at an average rate of about 33 gpm, which indicates that alluvial groundwater will likely not be drawn into the bedrock aquifer. In addition, the flow time discussed above represents a transport time for a groundwater particle which is conservative, whereas the actual transport time for dissolved COCs in the groundwater would generally be more because they are attenuated during transport because of sorption, natural decay, and dispersion.

4.3 Basis for CGA Boundary

The basis for revising the existing CGA boundary is a combination of data collection and analysis, groundwater flow modeling, property and legal boundaries, and professional judgment. The groundwater flow modeling was performed using the software GFLOW, a 2-dimensional analytical element model capable of simulating steady state groundwater flow and particle transport conditions. A particle tracking analysis based on a calibration to observed field data and a corresponding sensitivity analysis were used to estimate the potential fate of existing COC plumes at the site. The existing CGA boundary was adjusted so simulated particle tracks in the most conservative, which are also unlikely, scenarios generally remained within the proposed boundary. Further information regarding the modeling performed for this petition can be found in **Appendix C**. The CGA boundary on the upgradient side of the COC plumes was partly adjusted using professional judgment as groundwater is not anticipated to travel in that direction.

4.4 Property Ownership

Figure 4-1 shows the property ownership within the proposed expanded CGA boundary. Land use within and around the site is categorized as residential and commercial rural. Residential properties are located to the south, north, and east of the site and include land owned by property owners with assessor numbers of 0000799150, 0000002252, and 0000005499. The commercial rural properties include the former tie treating area (the site), agricultural fields, and wetland areas. The majority of the proposed CGA lies within BNSF owned property.

5.0 Proposed Groundwater Usage Restrictions

Water quality within the alluvial aquifer is not suitable for domestic, industrial, and municipal use insofar as groundwater would be used for drinking purposes. To protect the integrity of the site activities and reduce the potential for contaminant migration, groundwater withdrawals for other purposes must be limited. Therefore, Flathead City-County Board of Health requests that the Director of the Montana DNRC designate the area delineated in **Figure 4-1** as a CGA. Flathead City-County Board of Health requests that the Director enter an order closing the alluvial and bedrock aquifers within the Area to further appropriation until groundwater is restored to appropriate standards. The closure order would allow monitoring wells and new appropriations that are required for remedial action as directed and approved by the USEPA.

The following groundwater usage restrictions are proposed to prevent exposure to COCs in drinking water and to prevent groundwater withdrawals from the CGA aquifer that may cause, induce, or alter migration of dissolved phase COCs.

- A complete moratorium on all new water supply wells, including but not limited to: private, community or municipal water supply wells, irrigation wells and industrial use wells. These restrictions would apply within the lateral and vertical boundaries of the expanded CGA, including both the alluvial and bedrock aquifers.
- Groundwater monitoring wells, test wells, and remediation wells associated with the remediation programs being conducted at the site, or other government administered hydrogeologic investigations, would be allowed within the expanded CGA, provided the proposed well(s) would not cause unacceptable exposure to or migration of dissolve phase COCs. Such wells would be subject to other well drilling and groundwater usage permitting requirements administered by MDNRC.
- Continued use of existing monitoring wells within the CGA would be allowed, but only for their current uses. Based on currently available information, no private wells currently exist with the potential expanded CGA boundary.

The groundwater usage restrictions outlined above are consistent with current rules regarding appropriation of groundwater within a controlled groundwater area as outlined in 85-2-506, 85-2-508 and 85-2-306 MCA. The town supply well is located outside of the CGA boundary and will not be affected by groundwater usage restrictions.

Once the Site is remediated and the groundwater is restored to acceptable conditions, the petitioner or other qualifying petitioners may request the CGA designation be lifted or reduced in size. A primary objective of the agencies is to make the restricted groundwater resource available to the community at the earliest opportunity.

6.0 Mitigation of Applicable Petitioning Criteria and Monitoring

As detailed in the referenced documents (see Section 7.0), assessment, remedial design, and pilot-test work has been completed to date to reduce environmental impacts at the site. Site remediation is currently being addressed under the Superfund program. Ongoing remedial activities include NAPL recovery, as-needed operation of a biosparge treatment system downgradient of the former AST area, and preparation of a Focused Feasibility Study Report.

The proposed revision of the CGA boundary is determined to be critical by USEPA for preventing unacceptable exposure to impacted groundwater and/or potential migration of dissolved phase COCs resulting from additional groundwater withdrawals. The remedy performance phase of the project is expected to extend for a number of years. Groundwater monitoring will continue in the coming years to assess groundwater quality and to evaluate the need for additional remedies and/or modifications to the CGA boundary and/or provisions.

7.0 References

AECOM, 2013a. Additional Site Characterization Report - DRAFT. BNSF Former Tie Treatment Plant, Somers, Montana. October 2013.

AECOM, 2013b. 2013 Vapor Intrusion Investigation Summary Report – Final. BNSF Former Tie Treatment Plant, Somers, Montana. March 2014.

AECOM. 2015a. *Groundwater Monitoring and Sampling Analysis Plan - Final. BNSF Former Tie Treating Plant, Somers, Montana.* June 2015.

AECOM, 2015b. Electronic correspondence to R. Hoogerheide, USEPA, and B. Quinones, MDEQ. RE: Somers – October 2015 NAPL Removal. October 21, 2015.

AECOM, 2015c. Biosparging Pilot Study Report – Revision 1. BNSF Former Tie Treatment Plant, Somers, Montana. July 2015.

AECOM, 2015d. Seventh Annual Interim Monitoring Report December 2013 through November 2014 – Revision 1. May 2015.

AECOM, 2016. 2015 Annual Groundwater Monitoring Report – Final, BNSF Former Tie Treating Plant, Somers, Montana. June 10.

AFCEE. 2006. Monitoring and Remediation Optimization System (MAROS) Software User's Guide, Version 2.2.

CDM Smith. 2015. Memo to EPA, Region 8. BNSF Somers – Preliminary Remediation Goals for Human Health. CDM Smith. March 18, 2015.

Cohen, R. M. and J. W. Mercer. 1993. DNAPL Site Evaluation. EPA/600/R-93/022. February 1993.

ENSR, 2008. *Request to Modify the Groundwater Treatment System Report*, Revised. May 2008.

GSI Environmental, 2015. Long-term Monitoring and Optimization Report. Somers Former Tie Treating Plant Site, Flathead County, Montana. May 12, 2015.

Haitjema, H. 1995. Analytic Element Modeling of Groundwater Flow, Academic Press.

Haitjema Software. 2007. GFLOW Analytic Element Model Software Version 2.1.2.

Kennedy/Jenks Consultants, 2016. Biosparge Optimization Report, BNSF Former Tie Treatment Plant, Somers, Montana. April 2016.

Konizeski, R.L., A. Brietkrietz, and R.G. McMurtrey. 1968. Geology and Ground Water Resources of the Kalispell Valley, Northwestern Montana. Montana Bureau of Mines and Geology Bulletin 68. 42 pp and 5 plates.

MDNRC, 2003. Order Designating Controlled Groundwater Area. BNSF Somers Site. 76LJ-30005258. Montana Department of Natural Resources and Conservation. May 9, 2003.

Noble, R.A. and J.A. Stanford, 1986. *Groundwater Resources and Water Quality of the Unconfined Aquifers in the Kalispell Valley, Montana,* Montana Bureau of Mines and Geology, Open File Report 177. 1986.

Strack, O. and H. Haitjema, 1981a. Modeling double aquifer flow using a comprehensive potential and distributed singularities 1. Solution for homogeneous permeability. *Water Resour. Res.*, 17(5), pp.1535-1549.

Strack, O. and H. Haitjema, 1981b. Modeling double aquifer flow using a comprehensive potential and distributed singularities 2. Solution for inhomogeneous permabilities. *Water Resour. Res.*, 17(5), pp.1551-1560.

RETEC. 2007. *Interim Groundwater Treatment System Shut-Down Plan.* ENSR Corporation (dba The RETEC Group, Inc.). October 11, 2007.

RETEC, 1990. Results of Pumping Test at Somers Yacht Club Well and Long Term Pumping of Tank Well. Prepared for Burlington Northern Railroad. October 1990.

RETEC. 1989. *Remedial Investigation and Feasibility Study for the Somers Tie Plant.* Prepared for Burlington Northern Railroad. April 1989.

USA, 1991. Consent Decree for Remedial Design/Remedial Action (Civil Action No. CV-91-32-M-CCL). United States of America District Court Missoula Division. February 1991.

USEPA. 2015. Human Health Risk Assessment, BNSF Railway Company Somers Tie-Treating Plant, Somers, Montana. United States Environmental Protection Agency. March 2015.

USEPA, 2005. Letter to Craig S. Trueblood, Preston Gates & Ellis, LLP. RE: EPA Review of Wetlands Restoration Actions at BN Somers Plant Site, Somers, Montana. October 5, 2005.

USEPA, 1998. Explanation of Significant Differences, Burlington Northern (Somers Plant) Site, Flathead County, Montana. United States Environmental Protection Agency. July 1998.

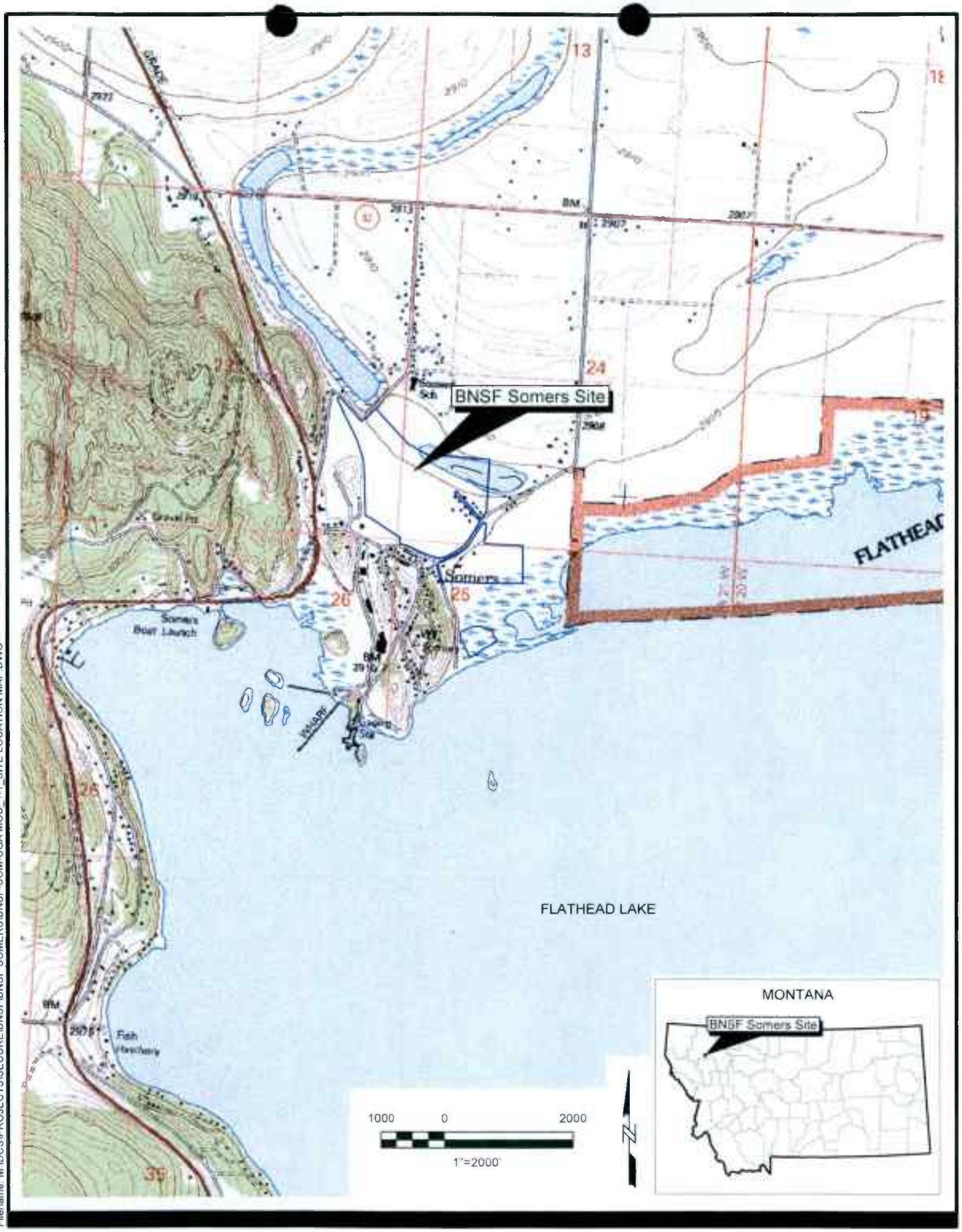
USEPA, 1989. Record of Decision (ROD). Burling Northern (Somers Plant) Superfund Site, Flathead County, Somers, Montana. U.S. Environmental Protection Agency. September 1989.

USEPA, 1988. OSWER Directive 9355.3-01: Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. United States Environmental Protection Agency. October 1988.

USFWS, 2003. Letter to James Harris, EPA. RE: Wetland Mitigation, Former BNSF Tie Plant, Somers, Montana. November 21, 2003.

Willumsen, P.A. and U. Karlson. 1997. Screening of bacteria, isolated from PAH-contaminated soils, for production of biosurfactants and bioemulsifiers Biodegradation. 7:415-423.

Figures



Last saved by SCHWARTZE(2017-01-13) Last Plotted: 2017-01-27
Filename: M:\DCS\PROJECTS\SECURE\BNSF-SOMERS\BNSF-SOM-CGA MOD_1-1_SITE LOCATION MAP.DWG

Project Management Initials: Designer E.S.S. Checked ____ Approved: ____ ANSI A 8.5" x 11"

Controlled Groundwater Area Petition
Supporting Information
BNSF - Somers, MT
Project No.: 60485257 Date: 01/27/17

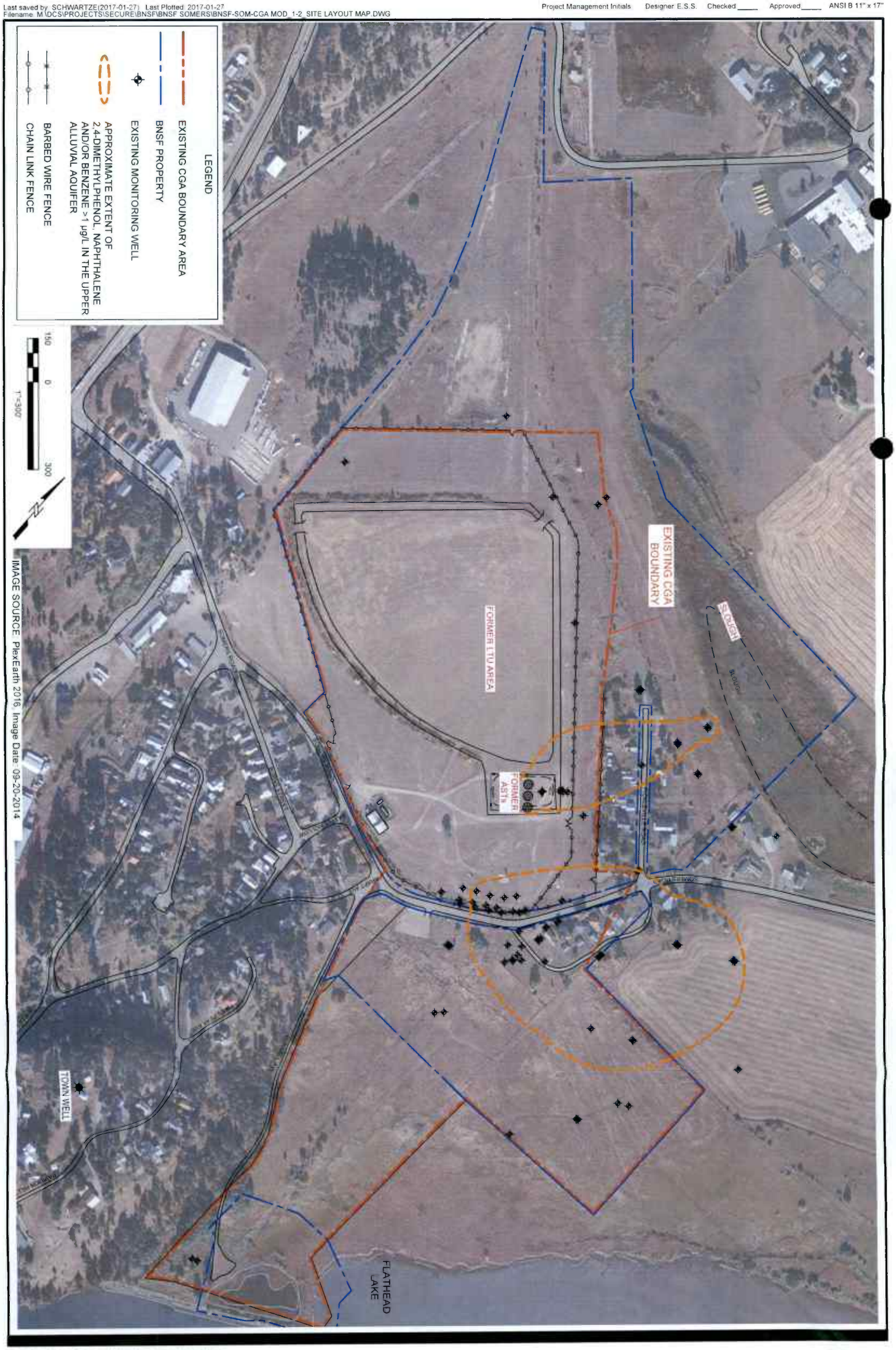
SITE LOCATION MAP

AECOM

Figure: 1-1

Last saved by: SCHWARTZE(2017-01-27) Last Plotted: 2017-01-27
Filename: M:\DCS\PROJECTS\SECURE\BNSF\BNSF SOMERS\BNSF-SOM-CGA MOD_1-2_SITE LAYOUT MAP.DWG

Project Management Initials Designer E.S.S. Checked ____ Approved____ ANSI B 11" x 17"



Controlled Groundwater Area Petition
Supporting Information
BNSF - Somers, MT
Project No.: 60485257 Date: 01/27/17

EXISTING CONTROLLED GROUNDWATER AREA MAP

AECOM

Figure: 1-2

Project Management Initials Designer E.S.S. Checked ____ Approved ____ ANSI B 11" x 17"

[0000192304]

PROPOSED CGA BOUNDARY

[0000015114]

[000E015250]

[0000799150]

[0000000779]

[0000005499]

[0000002252]

[0000192304]

[0000799150]

[000E014754, 000E015020]

EXISTING CGA BOUNDARY

BNSF

[0000799150]

[0000978433]

[0000977376]

[0000978432]

[0000799150]

[0000977376]

[0000012991]

[000U002170]

[0000799150]

FLATHEAD LAKE

[0000006031]

BNSF [0000977376]

[0000799150]

BNSF Railway Properties Tax ID Summary	
ID on Figure	Tax ID
1	[0000066220]
2	[0000192301]
3	[0000192150]
4	[0000561610]
5	[0000136600]
6	[0000012991]
7	[0000192400]
8	[0000246750]
9	[0000483000]
10	[0000482990]
11	[0000008200]
12	[0000733900]
13	[0000483100]
14	[0000483050]
15	[0000483260]
16	[0000157600]

LEGEND

- PROPOSED CGA BOUNDARY AREA
- EXISTING CGA BOUNDARY AREA
- BNSF PROPERTY
- [000E015250] PROPERTY OWNER [TAX IDENTIFICATION CODE]
- EXISTING MONITORING WELL
- APPROXIMATE EXTENT OF 2,4-DIMETHYLPHENOL, NAPHTHALENE AND/OR BENZENE >1 µg/L IN THE UPPER ALLUVIAL AQUIFER
- BARBED WIRE FENCE
- CHAIN LINK FENCE

150 0 300

1"=300'

IMAGE SOURCE: PlexEarth 2016, Image Date: 09-20-2014

Last saved by: SCHWARTZE (2017-04-17) Last Plotted: 2017-04-25
Filename: M:\DC\PROJECTS\SEGURE\BNSF SOMERS\BNSF-SOM-CGA MOD_4-1_PROPOSED CGA.DWG

AECOM

Figure: 4-1

PROPERTY OWNERSHIP AND POTENTIAL REVISED CGA MAP

Controlled Groundwater Area Petition
Supporting Information
BNSF - Somers, MT
Project No.: 60485257 Date: 04/24/17

Appendix A

Site History

BNSF and its predecessors operated a railroad tie treating plant from 1901 until its closure in 1986. The plant treated railroad ties and other miscellaneous lumber products to protect the materials from weathering and insects. Wood preservatives used at the site consisted of creosote, zinc chloride, and for a short time, chromated zinc chloride. In wood treatment applications, creosote may generally have been applied undiluted or may have been mixed with coal tar or petroleum oil (referred to as carriers). For creosote, carrier ratios ranging from 80:20 to 50:50 have been reported (Cohen and Mercer 1993).

Wastewater generated during the treatment process was disposed of in two locations at the site. During the operation of the Somers plant, BNSF discharged wastewater to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Lagoon and overflow from this Lagoon discharged through an open ditch into Flathead Lake. The discharge of oily wastes was regulated under a permit issued by the Montana State Board of Health (RETEC 1989). Prior to 1946, waste material discharged through the open ditch accumulated and formed a pond in the area adjacent to Flathead Lake, termed the "swamp pond." In 1971, the CERCLA Lagoon and ditch were abandoned, and in 1984, a recycling program was implemented to eliminate all wastewater discharges. Two new wastewater impoundments were constructed in 1971 north of the retort and were subject to regulation under the Resource Conservation and Recovery Act (RCRA). The RCRA impoundments were used for wastewater disposal until 1984. A recycling system was implemented at the Somers tie plant in 1984, and all wastewater discharge was halted (RETEC 1989).

In February 1984, the Montana Department of Health and Environmental Sciences (MDHES) sampled soils in the CERCLA Lagoon. Based on these results, USEPA proposed the Somers site for inclusion on the National Priorities List (NPL) in October 1984 (49 CFR 40320, October 15, 1984). The proposed listing cited "potential negative effects on Flathead Lake and the water supply for the town of Somers, which is drawn from the lake" (USEPA 1989). In October 1985, BNSF entered into an Administrative Order of Consent (AOC) with USEPA to conduct a remedial investigation and feasibility study (RI/FS). The RI/FS report was finalized with the issuance of the ROD in September 1989. In 1991, BNSF and USEPA entered into a Consent Decree to implement the remedy selected in the ROD (USA 1991). The ROD specified a soil remedy consisting of a combination of excavation and onsite land treatment of impacted soils coupled with a groundwater remedy for the remaining subsurface residuals. USEPA withdrew its proposal to list the site on the NPL on February 11, 1991.

The COCs at the site originated from the wood preservatives used in the former tie treating process and were identified in the 1989 ROD (USEPA 1989). COCs include total polycyclic aromatic hydrocarbons (TPAH), carcinogenic polycyclic aromatic hydrocarbons (CPAH), and total phenolic compounds. ROD remedial goals were also assigned to individual compounds (naphthalene, acenaphthene, fluoranthene, benzene, and zinc).

Current ROD remedial goals for groundwater COCs at the site are shown below in **Table A-1**.

Table A-1 Priority COCs and Remedial Goals

Constituent Name	Affected Media	Remedial Goal
Benzene	Groundwater	5 µg/L
TPAH		40 µg/L
CPAH		0.03 µg/L
Naphthalene		620 µg/L
Acenaphthene		20 µg/L
Fluoranthene		42 µg/L
Total Phenolics		6,000 µg/L
Zinc		5 mg/L

µg/L = micrograms per liter; mg/L = milligrams per liter.
Remedial goals based on 1998 ESD (USEPA 1998).
Zinc is no longer considered a COC; however is listed on table because it was included as COC in original ROD.

USEPA prepared an updated Human Health Risk Assessment (HHRA) and Draft Preliminary Remediation Goal (PRG) Memorandum, which was prepared by CDM Smith for USEPA, in March 2015 (USEPA 2015 and CDM Smith 2015, respectively). The PRG Memo supplemented the HHRA and compared the ROD remedial goals to other groundwater cleanup standards. In a December 15, 2014 email, USEPA indicated appropriate standards would be adopted through a proposed plan and a decision document following submittal of a Focused Feasibility Study (FFS) by BNSF.

Soil and groundwater are affected by separate phase and dissolved phase constituents originating from the tie treating process. Non-aqueous phase liquids (NAPL), primarily creosote, have been observed in two areas of the site (AECOM 2013a). There are two dissolved phase plumes in groundwater at the site related to each of the two source areas (**Figure 1-2**). The first, and primary, dissolved phase plume (approximately 10 acres) is located near and downgradient from the former CERCLA Lagoon source area. This impacted area was identified during early investigation activities conducted in the RI/FS (RETEC 1989). The second, and smaller, dissolved phase plume (approximately 2 acres) is northwest of the former CERCLA Lagoon, near the former location of aboveground storage tanks (ASTs) and was not identified until additional site activities were conducted in 2012 (AECOM 2013a). The extent of dissolved phase concentrations that exceed the ROD remedial goals is limited to wells that are screened in the alluvial aquifer.

Past Remedial Activities

Groundwater Remedial Action Summary

The ROD, as amended by subsequent Explanation of Significant Differences (ESDs), presented a 50-year time period for groundwater restoration as a project goal. The ROD also included provisions for groundwater monitoring and post-closure care for up to 30 years, or placement of deed restrictions if hazardous constituents remained above risk-based ROD remediation levels (USEPA 1989). Institutional controls, as discussed in Section 1.0, have been implemented at the site to prevent use of the alluvial aquifer and exposure to impacted groundwater.

Implementation of the Somers groundwater remedy began in December 1993 with the Phase I groundwater remedial action. The Phase I remedy consisted of installation of six extraction and fourteen injection wells and construction of facilities to treat and enrich extracted groundwater. Startup of the Phase I groundwater treatment system (GWTS) was initiated in the spring of 1994.

Groundwater treatment operations were conducted from 1994 to 2007. Monitoring of the Phase I system and fate-and-transport analyses demonstrated that the low permeability aquifer provides a natural containment barrier and, as a result, there was minimal demonstrable risk associated with the presence of creosote impacted groundwater at the Somers site. Consequently, BNSF requested to terminate operation of the GWTS and modify continued groundwater monitoring through the *Request to Modify the Groundwater Treatment System* (Request) report, initially submitted by BNSF on April 30, 2004, revised September 2004, and finalized May 2008 (ENSR 2008). The *Interim Groundwater Treatment System Shut-Down Plan* (RETEC 2007) was approved by USEPA and Montana Department of Environmental Quality (MDEQ), hereafter referred to collectively where appropriate as the agency, following a public meeting on October 11, 2007. Groundwater extraction ceased on October 12, 2007.

Fifty-five monitoring wells are included in the current monitoring network approved in the 2015 *Groundwater Monitoring Sampling and Analysis Plan* (SAP) (AECOM 2015a). A municipal well located southwest of the Somers site is also monitored semiannually. Over 100 groundwater monitoring wells have been installed at the BNSF Somers site, most of which were historically monitored to document groundwater elevation and to determine the direction of groundwater flow across the site.

Manual NAPL recovery has occurred at the site from 2011 through 2016 through pumping and the use of sorbent socks. The total NAPL fluid volume removed from all monitoring wells between July 2013 and October 2016 of approximately 600 gallons (AECOM 2016). This volume does not include NAPL that was removed through sorbent socks that had been placed in Monitoring Wells S-88-2, S-93-5S, and S-10-1I up through April 21, 2013.

Soil Remedial Action Summary

The following soil remedy actions were taken prior to the ROD.

- Removal of creosote impacts in water and soil at the swamp pond per an Administrative Order for Immediate Removal, Docket Number VII-85-02, issued by USEPA in 1985. This area was determined to represent an imminent and substantial threat to Flathead Lake because of the presence of creosote impacts in water and soil within 20 feet of the shoreline.
- Investigation of a small area of creosote on the surface of the Flathead Lake beach sediment in 1988. BNSF found that the impacted area of beach sediment ran approximately 30 feet along the riprap wall and 20 feet out into the beach in a semicircular pattern (RETEC 1989). Creosote impacts were limited to the surface of the sediment, and were not encountered at a depth of greater than 1.5 feet. In May 1988, the area was excavated and backfilled with clean material.
- Installation of a high-density polyethylene liner alongside the riprap wall on the inland side in an effort to prevent further migration of creosote impacted groundwater along a seep that was observed coming from the west (RETEC 1989).

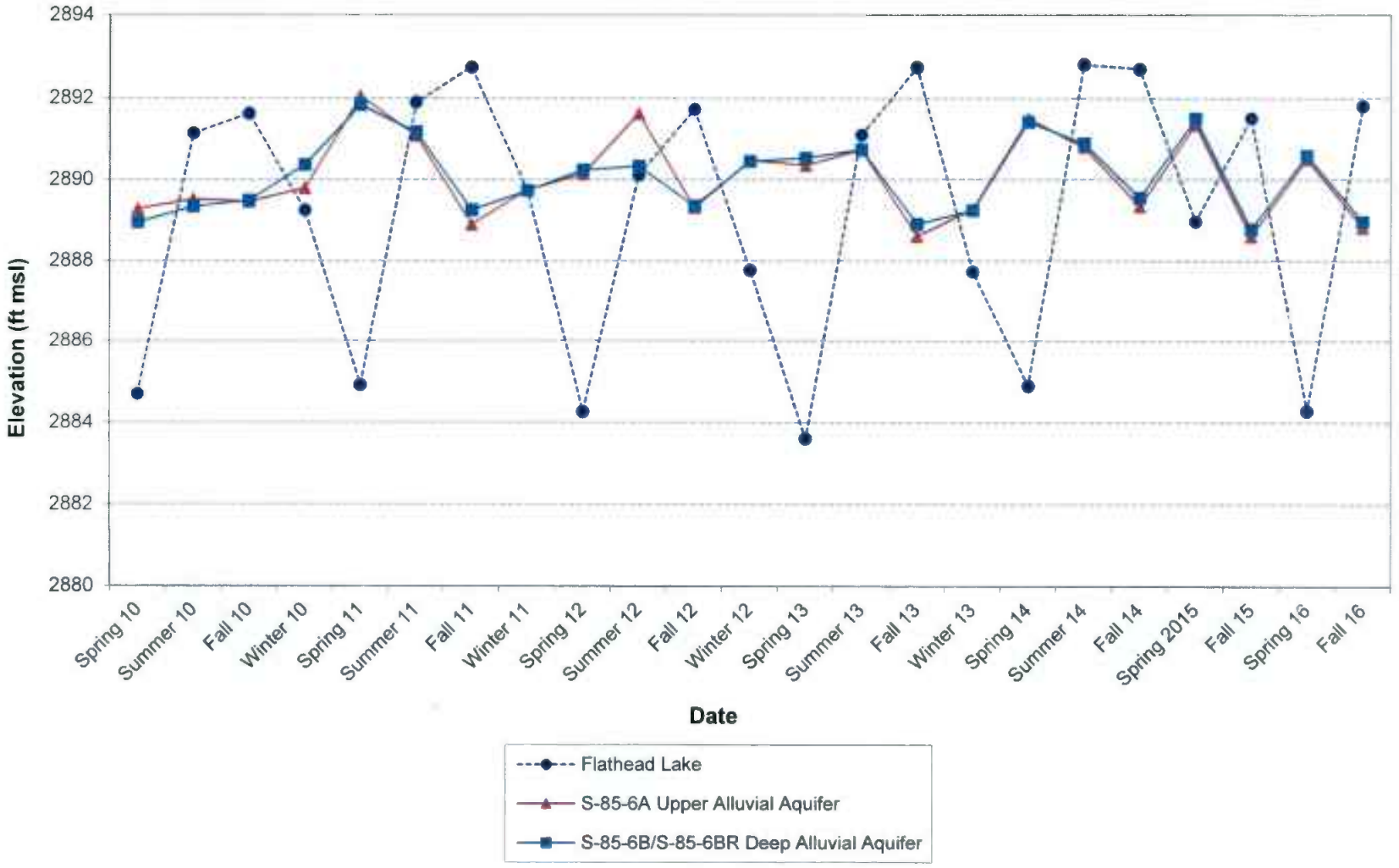
The objective of the selected soil remedy in the ROD was to reduce human exposure to COCs in the soil through excavation and biological treatment of soils in an on-site land treatment unit (LTU). The soil remedy in the ROD consisted of:

- Excavation of creosote and zinc impacted soil in the unsaturated zone from the CERCLA Lagoon, drip track, drainage ditch, beneath the retort building, slough bank, swamp pond, and beach areas.
- Backfilling excavated areas with clean borrow soil and revegetating and replacing or restoring the wetlands lost during the excavation.
- Treatment of soil excavated from these areas in the LTU. The purpose of the LTU was to maximize degradation, transformation, and immobilization of creosote constituents, primarily polycyclic aromatic hydrocarbons (PAHs), in the soil treatment zone using naturally occurring microorganisms.

The second component of the soil and sediment remedy specified in the ROD was the "restoration and/or replacement of wetlands lost during the 1985 emergency action." To meet this requirement, BNSF rehabilitated the former swamp pond to a functional wetland and acquired wetland acreage on the north shore of Flathead Lake. The U.S. Fish and Wildlife Service (USFWS) conducted a post-remedy evaluation of the swamp pond in 2003 (USFWS 2003). The evaluation concluded the reclaimed swamp pond had reached a successful and functional service level and deemed no further physical action for on-site wetlands mitigation was necessary. In addition, USEPA determined that BNSF had completed all required activities under the Wetlands Mitigation Plan (USEPA 2005).

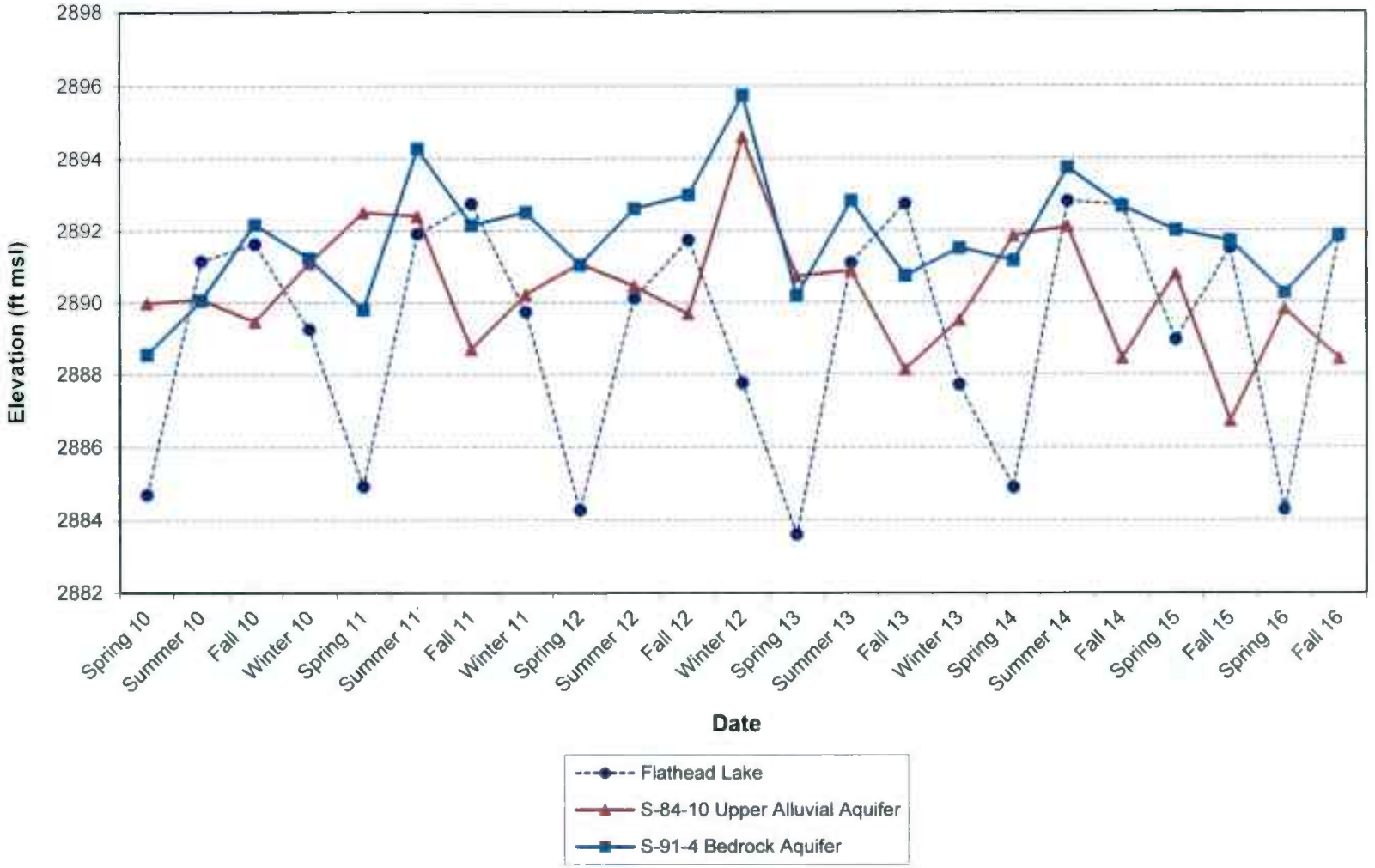
Appendix B

Flathead Lake Elevation and Surficial Aquifer Hydrograph
BNSF - Somers, MT



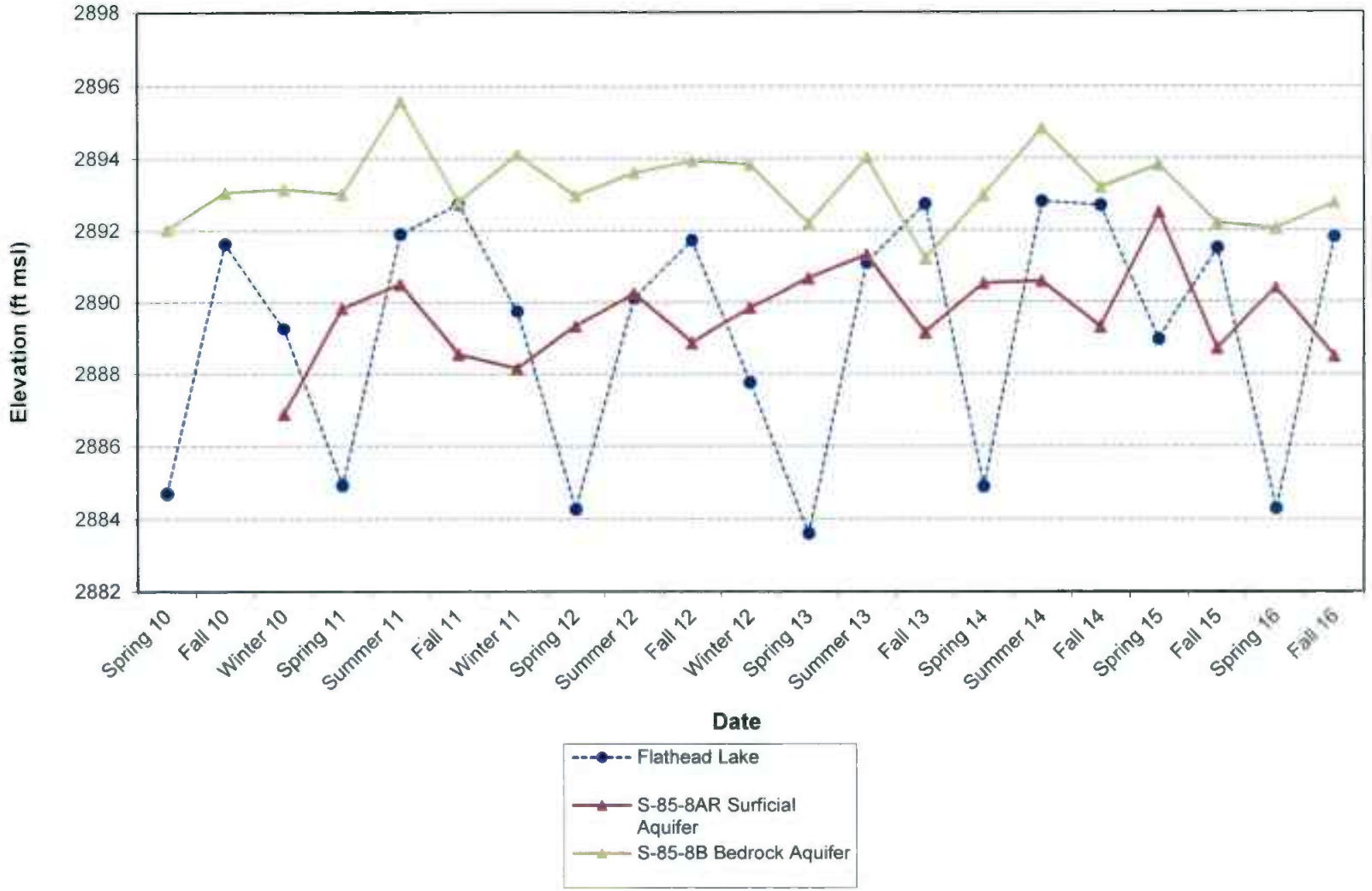
Notes = Wells were resurveyed December 2010. Groundwater elevations for well S-85-6A October 2010 are based on the new survey. Well S-85-6B was abandoned prior to Decemeber 2010 survey and October elevations are based on previous data.

Flathead Lake Elevation, Surficial and Bedrock Aquifer Hydrograph
BNSF - Somers, MT



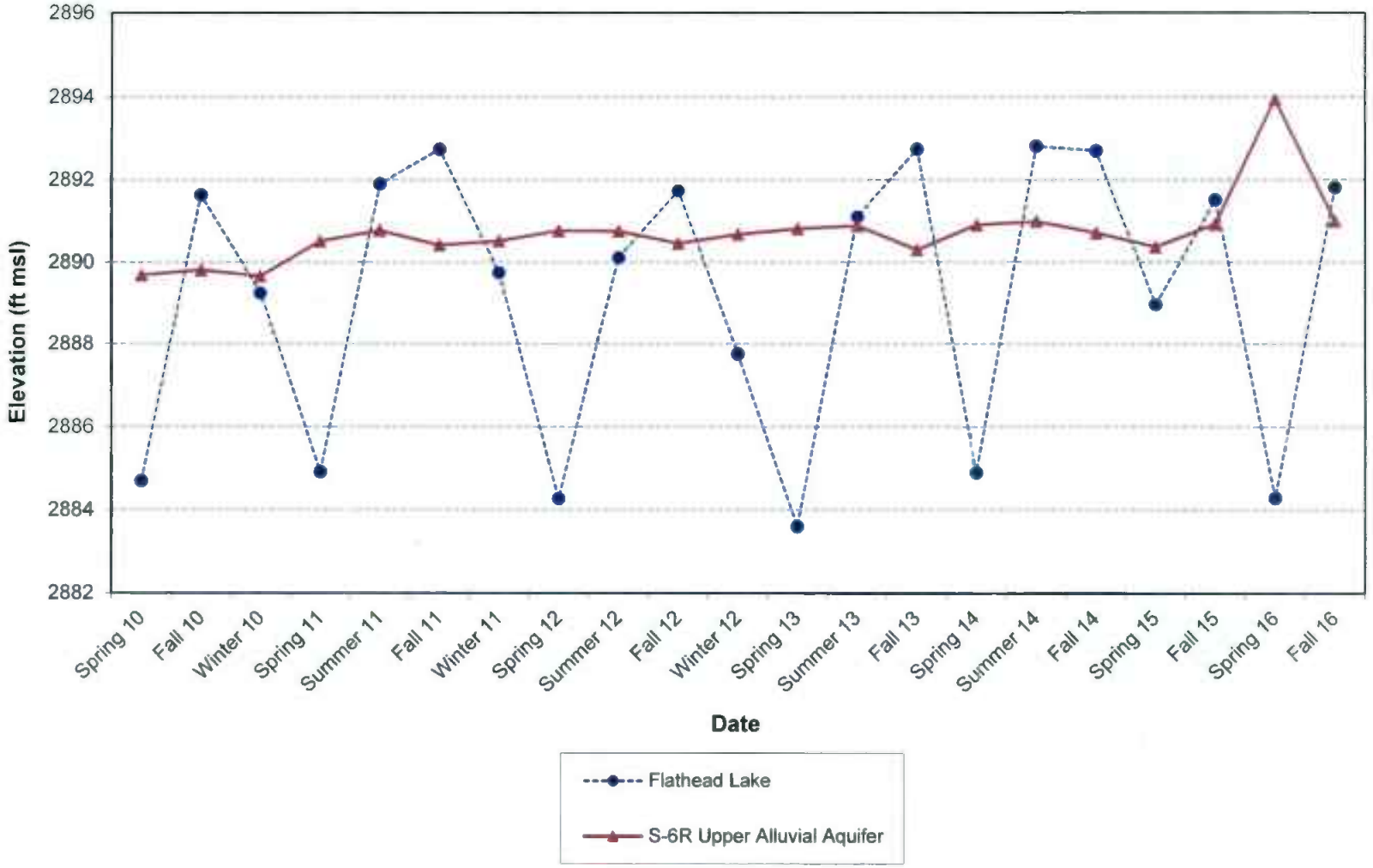
Notes = Wells were resurveyed December 2010. Groundwater elevations for October 2010 are based on the new survey.

Flathead Lake Elevation, Surficial Aquifer Hydrograph
BNSF - Somers, MT



Notes = Wells were resurveyed December 2010. Groundwater elevations for October 2010 are based on the new survey.

Flathead Lake Elevation, Surficial Aquifer Hydrograph
BNSF - Somers, MT



Notes = Wells were resurveyed December 2010. Groundwater elevations for October 2010 are based on the new survey.

Appendix C

BNSF Somers, Flathead County, Montana
Revised Controlled Groundwater Area
Groundwater Flow Modeling Results

Model Purpose

The purpose of this work was to use model simulations to evaluate options for a revised controlled groundwater area (CGA) boundary at the BNSF site in Somers, MT. An analytical element model (AEM), GFLOW, was used the simulations. Initial model runs were calibrated to existing observed alluvial groundwater elevations and observed plume extents. Various scenarios were examined including a sensitivity analysis within a range of reasonable hydraulic conductivity values as well as the effect of a hypothetical pumping well located outside the proposed CGA boundary on long-term (30 years) plume migration in the alluvium at various constant pumping rates (1, 5, and 10 gallons per minute (gpm). The particle tracking results from the GLFOW model reflect a conservative analysis because they only represent flow of groundwater and do not account for any natural attenuation or retardation of the plumes; the natural attenuation/retardation processes are observed based on data collected over time at Somers.

Software Selection

Requirements of the modeling software included quick, simple setup and calibration, and two dimensional (2D) steady state groundwater flow and pathline solutions. GFLOW is a highly efficient stepwise groundwater flow modeling system developed by Haitjema Software, a subdivision of Haitjema Consulting, Inc. GFLOW is a Windows program based on the analytic element method (Haitjema Software, 2016). It models steady-state flow in a single heterogeneous aquifer using the Dupuit-Forchheimer assumption. GFLOW is particularly suitable for modeling regional 2D horizontal flow.

The analytic element method was developed by Otto Strack at the University of Minnesota. The method does not use grids, specific domains, or traditional boundary conditions, only surface water features are discretized for model input. Lake and stream sections, wells, and recharge are represented by closed form analytic solutions, called analytic elements and the solution is obtained by the superposition of all elements in the model.

Model Input Parameters and Calibration Process

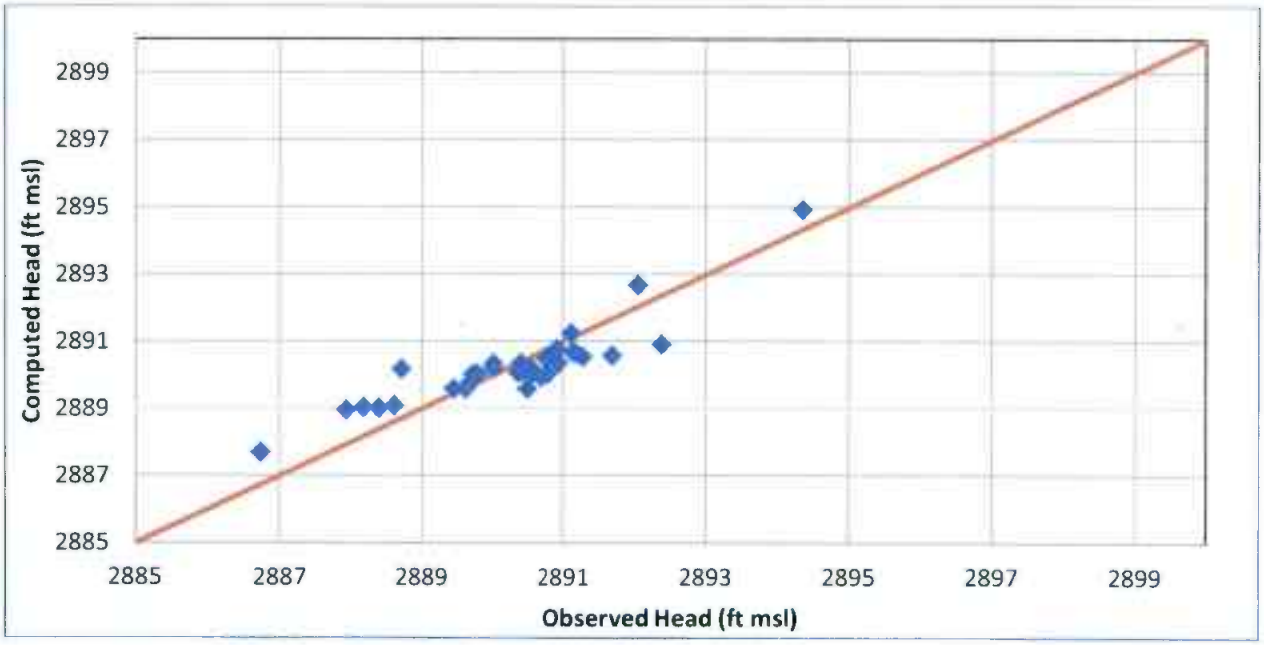
Input parameters for GFLOW include linesinks, used to represent water sources or sinks such as rivers, lakes, drainages, aquifer depth, hydraulic conductivity, porosity, and recharge. Aquifer properties can vary aerially. Regional surface water features assigned linesinks are shown on Figure 2. Features located far from the site area were included to minimize influence of local boundary conditions on simulation results. Elevations of water features were assigned based on digital elevation model (DEM). All aquifer parameters were varied within specified ranges consistent with site characteristics and observations for calibration. Parameter calibration ranges and final values are shown in Table 1.

Table 1: Model Input and Calibration Parameters

Parameter	Calibration Range	Final Calibrated Value
Aquifer Base Elevation (ft amsl)	Fixed	2800
Aquifer Thickness (ft)	Fixed	~90
Hydraulic Conductivity (ft/d)	Alluvium - 0.25 to 10 Glacial Till/Bedrock - 0.001 to 1	Alluvium -3.49 Glacial Till/Bedrock - 0.27
Recharge (% of 15.5 ft precip/yr)	5-20%	15% (0.194 ft/yr)
Lake Level (ft amsl)	2885-2892	2887.5
Slough Drain Bottom Elevation (ft amsl)	2885-2892	2889

Typical calibration criteria for a groundwater flow model is a scaled root mean square error (RMSE) of less than 10% comparing observed and computed groundwater elevations. The second component of the model calibration was matching of particle tracking pathlines from the known source areas at both the Aboveground Storage Tanks (ASTs) and the former CERCLA Lagoon to the shape of the existing plume extents.

The GFLOW model was calibrated to October 11, 2015 observed groundwater levels (similar to current groundwater levels) as shown in the graph below. The observed heads are plotted against the computed heads and ideally fall on the 1:1 red line. No clear biases or error trends are apparent.



Calibration statistics are shown in Table 2.

Table 2: Calibration Statistics from GFLOW Model for October 11, 2015 Conditions

Residual Mean	-0.03
Residual Standard Deviation	0.67
Residual Sum of Squares	13.90
Root Mean Square Error	0.66
Absolute Residual Mean	0.54
Minimum Residual	0.02
Maximum Residual	1.46
Observed Head Range	7.62
Res. Std. Dev/Range	8.78%

GFLOW Model Simulation Results

In the below discussions of the model simulations results, the 30-year particle tracking results reflect a conservative analysis because the GFLOW model simulates the flow of groundwater only and does not account for any natural attenuation or retardation of the plume.

Base Case

The base case scenario corresponds to the calibrated model conditions. Particle tracking pathlines were simulated from the outer edge of the largest extent of the constituent of concern plumes, observed in October 2016, for a travel time period of 30 years. Simulation results are shown in Figure 3. Results indicate that the particles tracking from the AST plume flows northeast into the slough within 30 years. Particle tracking from the CERCLA Lagoon plume flows east and splits along a groundwater divide to the southeast of the slough, flowing partially towards the slough to the north and partially towards Flathead Lake to the south. The particle tracking in the northern portion of the CERCLA Lagoon plume flows approximately half way to the slough in 30 years. The particle tracking in the eastern portion of the CERCLA Lagoon plume flows partially towards slough and partially towards Flathead Lake. Gradients are more gradual to the east and groundwater velocities are slower. The particle tracking in the southern portion of the CERCLA Lagoon plume shows particles flowing towards Flathead Lake, extending about half way from the October 2016 position to the lake in 30 years.

Pumping Wells

Three simulations were performed with a theoretical pumping well located to the west of the slough, with pumping rates of 1 gallon per minute (GPM), 5 GPM, and 10 GPM.

1 GPM

This simulation used a pumping rate of 1 GPM, the likely sustained pumping rate for an alluvial well, based on pump and treat system operation. Results are shown in Figure 4. No significant differences were observed from the base case scenario.

5 GPM

This simulation used a pumping rate of 5 GPM, which represents the possible high end of sustained pumping rate from the alluvium aquifer, based on available information. Results are shown in Figure 5. The results show the particle tracking from the AST plume is not significantly different from the base case scenario. The particle tracking from the CERCLA Lagoon plume flows east and begins to split partially towards the slough and partially towards Flathead Lake. Generally, the particle tracking from the extent of the CERCLA Lagoon plume shows flow in the same general directions, with slightly faster velocities, compared to the base case scenario.

10 GPM

This simulation used a pumping rate of 10 GPM, which represents a flow rate unlikely to be sustained, and is included for a complete sensitivity analysis. Results are shown in Figure 6. Results show particle tracking from the AST plume flowing into the slough slightly to the east of the base case scenario, similar to the 5 GPM simulation results. The particle tracking from the CERCLA Lagoon plume flows northeast and begins to split partially towards the pumping well and partially towards Flathead Lake. Most of the particle tracks from the northern and western plume extent flow towards the pumping well.

Additional Sensitivity Analysis

Alluvium Hydraulic Conductivity – 0.35 ft/d

This hydraulic conductivity sensitivity simulation was performed with an alluvial hydraulic conductivity of 0.35 ft/d, representing the geometric mean of results from slug tests performed at the site. The results yielded groundwater levels >10 ft higher than observed, and therefore is not likely a realistic representation of site conditions. Results are shown in Figure 7. Particle tracking pathlines showed the AST plume having similar flow paths compared to base case scenario. The CERCLA Lagoon plume generally splits at the western end of the plume extent, with the northern half of the plume flowing into the slough, slightly faster than the base case, and the southern half of the plume flowing towards Flathead Lake at approximately half of the velocity as the base case scenario.

Alluvium Hydraulic Conductivity – 6.5 ft/d

This hydraulic conductivity sensitivity simulation was performed with an alluvial hydraulic conductivity of 6.5 ft/d, representing the maximum hydraulic conductivity from slug tests performed at the site. While this simulation appears to represent actual site conditions better than the simulation with the hydraulic conductivity of 0.35 ft/d, it doesn't appear to be representative of site conditions based on water levels being approximately 1 ft lower and observed flow direction of constituents of concern. Results are shown in Figure 8. The AST plume flow pattern moves more to the east compared to the base scenario. The CERCLA lagoon plume travel times are generally shorter than in the base case scenario. In this scenario, the northern portion of the plume flows to the south east and the southern and eastern portions of the plume flow directly to Flathead Lake.

Conclusions

The GFLOW model was reasonably calibrated to observed site conditions. The scaled root mean square error (RMSE) between observed and computed heads is equal to 8.78%, which is below the typically

acceptable value of 10%. The particle tracking pathlines were also calibrated to produce a similar shape to observed plumes in the AST and CERCLA Lagoon areas.

A revised controlled groundwater area (CGA) has been proposed based on a combination of data collection and analysis, property and legal boundaries, professional judgment, and the the simulation results, as shown in Figures 3 through 8. The 30-year particle tracking results of the simulations reflect a conservative analysis because they represent flow of groundwater only and do not account for any natural attenuation or retardation of the plume.

Some uncertainty is associated with the simulations performed in this work. Based on previous site characterization investigations, the alluvium is hydrogeologically heterogeneous consisting of interbedded clays, silts, and sands. It is likely that preferential flow paths exist within the aquifer. Additionally, in all cases the AST plume flows into the slough which is a likely groundwater discharge area. In GFLOW, once the pathlines reach the drain boundary, they exit the model and are no longer tracked.

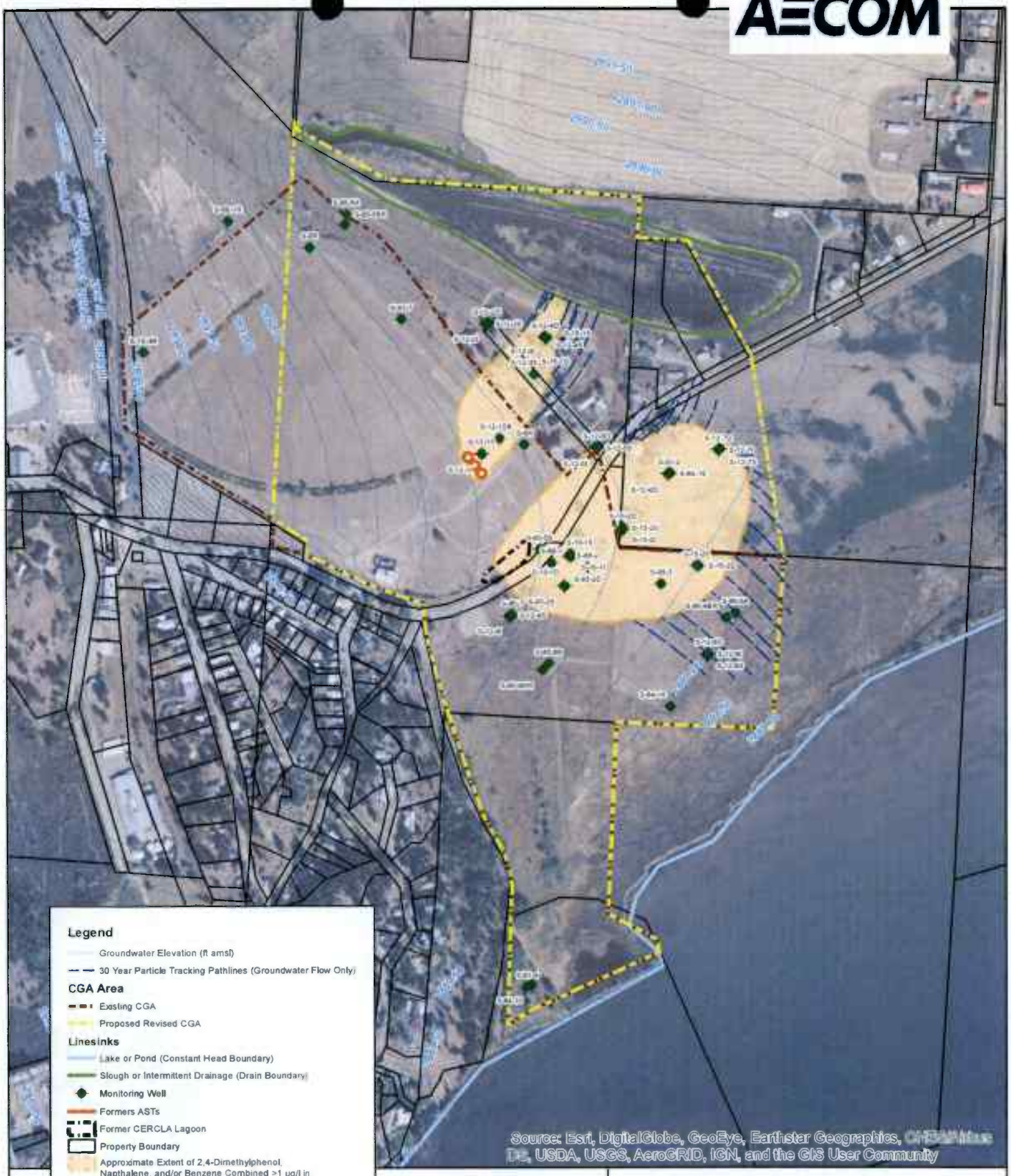
Figure 1
BNSF Site Somers, MT
Observed Plumes for Consituents of Concern

Date: March 2017

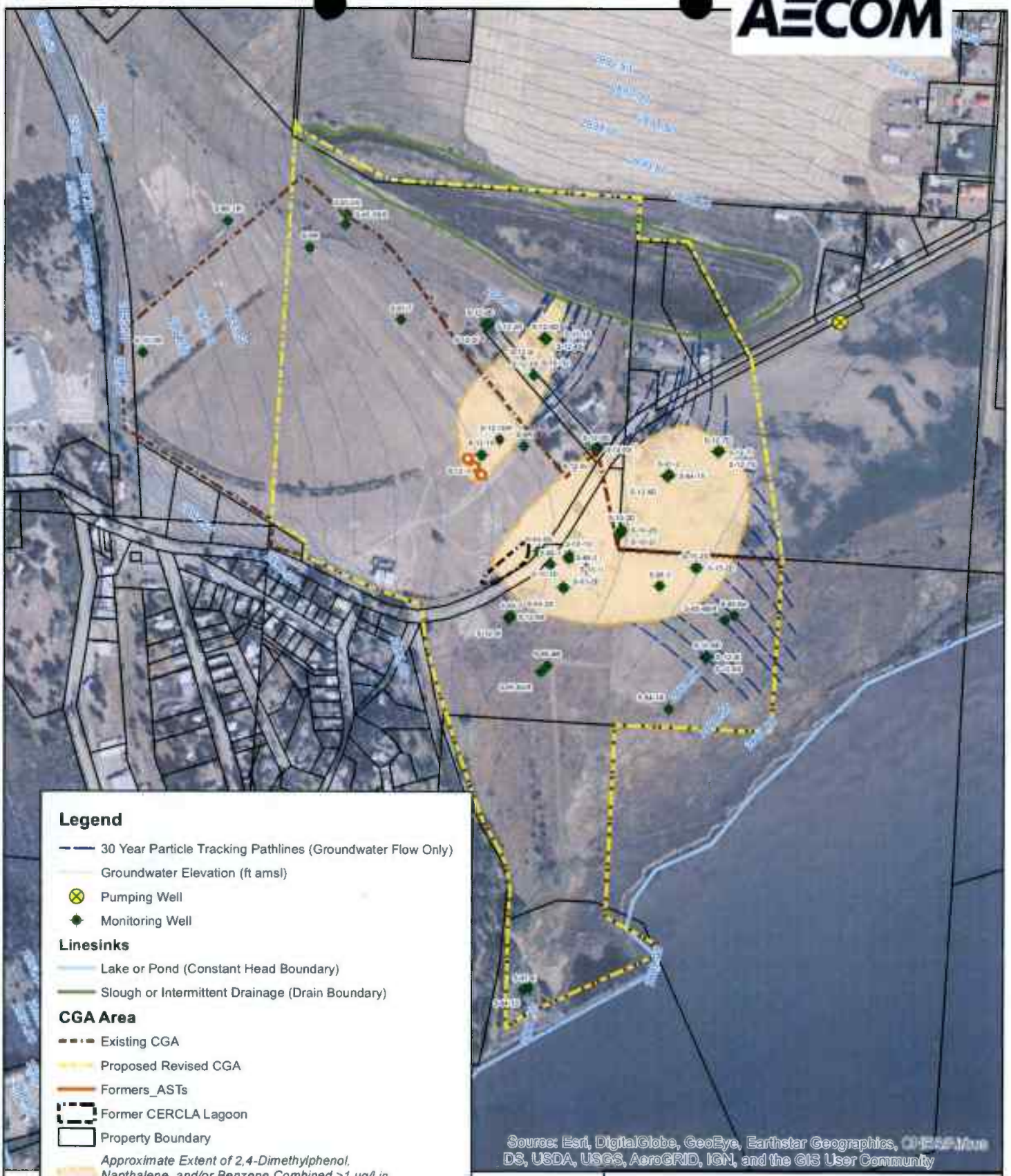
Figure 2

BNSF Site Somers, MT
GFLOW Model Setup

Date: March 2017


AECOM
Legend
Groundwater Elevation (ft amsl)
30 Year Particle Tracking Pathlines (Groundwater Flow Only)
CGA Area
Existing CGA
Proposed Revised CGA
Linesinks
Lake or Pond (Constant Head Boundary)
Slough or Intermittent Drainage (Drain Boundary)
Monitoring Well
Formers ASTs
Former CERCLA Lagoon
Property Boundary
Approximate Extent of 2,4-Dimethylphenol, Napthalene, and/or Benzene Combined >1 µg/l in the Upper Alluvial Aquifer
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Constituent of concern plume extents are estimated from concentrations measured in October 2016
N
W
E
S
500 250 0 500 1,000
Feet
Figure 3
BNSF Site Somers, MT
GFLOW Model Results
Groundwater Elevation
Date: June 2017


AECOM
Legend
Pumping Well
30 Year Particle Tracking Pathlines (Groundwater Flow Only)
Groundwater Elevation (ft amsl)
CGA Area
Existing CGA
Proposed Revised CGA
Linesinks
Lake or Pond (Constant Head Boundary)
Slough or Intermittent Drainage (Drain Boundary)
Monitoring Well
Formers ASTs
Former CERCLA Lagoon
Property Boundary
Approximate Extent of 2,4-Dimethylphenol, Napthalene, and/or Benzene Combined >1 µg/l in the Upper Alluvial Aquifer
Source: Esri, DigitalGlobe, Earthstar Geographies, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Constituent of concern plume extents are estimated from concentrations measured in October 2016
500 250 0 500 1,000
Feet
N
W
E
S
Figure 4
BNSF Site Somers, MT
GFLOW Model Results
Groundwater Elevation
Pumping Well Rate 1 gpm
Date: June 2017


AECOM
Legend
30 Year Particle Tracking Pathlines (Groundwater Flow Only)
Groundwater Elevation (ft amsl)
Pumping Well
Monitoring Well
Linesinks
Lake or Pond (Constant Head Boundary)
Slough or Intermittent Drainage (Drain Boundary)
CGA Area
Existing CGA
Proposed Revised CGA
Formers_ASTs
Former CERCLA Lagoon
Property Boundary
Approximate Extent of 2,4-Dimethylphenol, Napthalene, and/or Benzene Combined >1 µg/l in the Upper Alluvial Aquifer
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Constituent of concern plume extents are estimated from concentrations measured in October 2016
N
W
E
S
500 250 0 500 1,000
Feet
Figure 5
BNSF Site Somers, MT
GFLOW Model Results
Groundwater Elevation
Pumping Well Rate 5 gpm
Date: March 2017

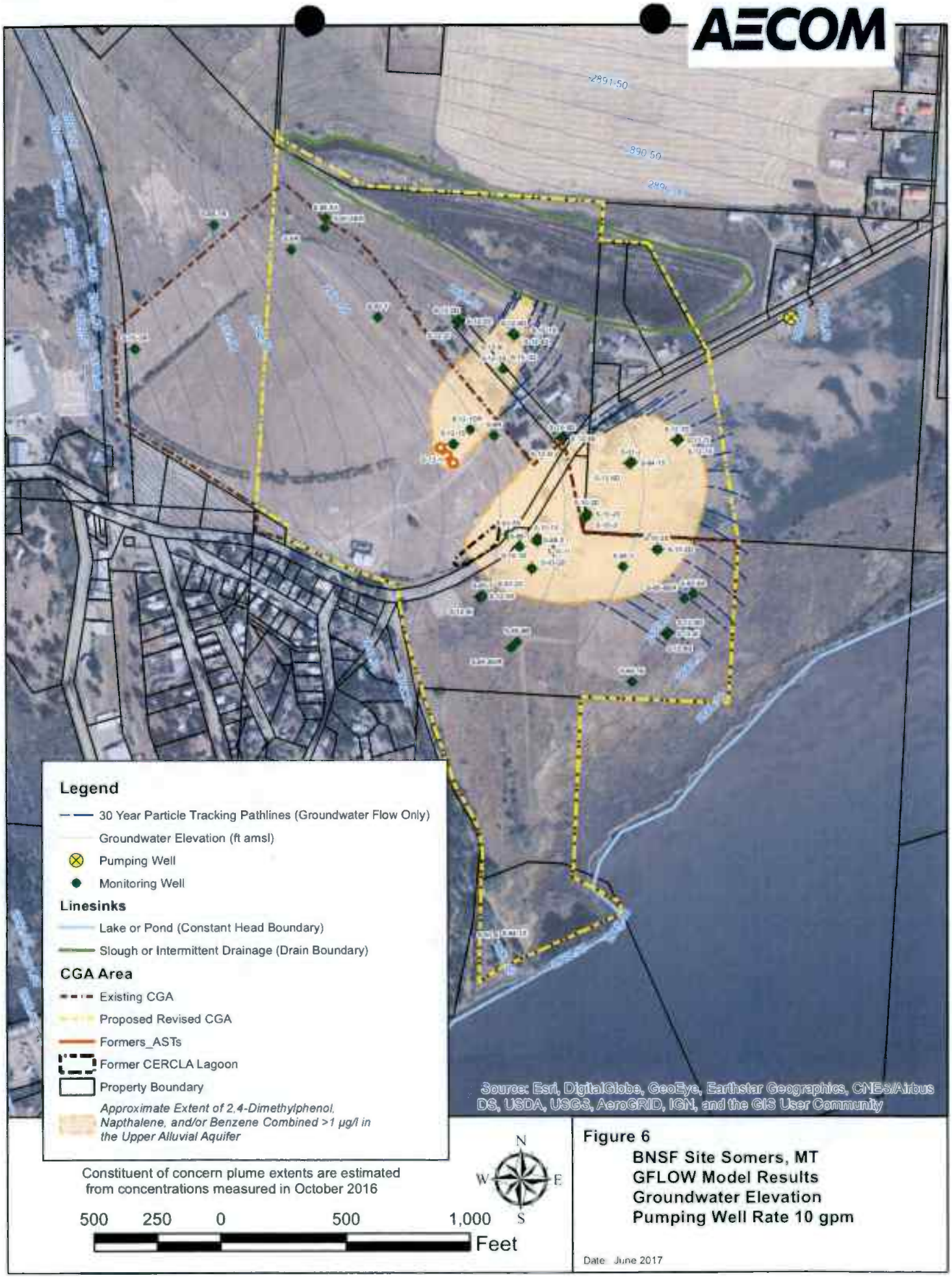

AECOM
2891.50
2890.50
Legend
30 Year Particle Tracking Pathlines (Groundwater Flow Only)
Groundwater Elevation (ft amsl)
Pumping Well
Monitoring Well
Linesinks
Lake or Pond (Constant Head Boundary)
Slough or Intermittent Drainage (Drain Boundary)
CGA Area
Existing CGA
Proposed Revised CGA
Formers_ASTs
Former CERCLA Lagoon
Property Boundary
Approximate Extent of 2,4-Dimethylphenol, Napthalene, and/or Benzene Combined >1 µg/l in the Upper Alluvial Aquifer
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Constituent of concern plume extents are estimated from concentrations measured in October 2016
N
W
E
S
500 250 0 500 1,000
Feet
Figure 6
BNSF Site Somers, MT
GFLOW Model Results
Groundwater Elevation
Pumping Well Rate 10 gpm
Date June 2017

Figure 7
BNSF Site Somers, MT
GFLOW Sensitivity Analysis Model Results
Groundwater Elevation
Alluvial Hydraulic Conductivity = 0.35 ft/d

Date: March 2017

Figure 8
BNSF Site Somers, MT
GFLOW Sensitivity Analysis Model Results
Groundwater Elevation
Alluvial Hydraulic Conductivity = 6.5 ft/d

Date: March 2017

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

Kalispell Water Resources Office

STEVE BULLOCK, GOVERNOR

PHONE: (406) 752-2288
FAX: (406) 752-2843

655 TIMBERWOLF PARKWAY, SUITE 4
KALISPELL, MONTANA 59901

February 20, 2018

Flathead City-County Board of Health
1035 1st Avenue W
Kalispell MT 59901

RE: Petition for Controlled Groundwater Area No. 76LJ 30111620, BNSF Somers Site

Dear P. David Myerowitz, MD Chair,

Following the Correct & Complete determination made December 22, 2017, the Department of Natural Resources and Conservation (Department) will proceed under § 85-2-506(4)(a)(ii), MCA:

> *inform the petitioner that the department will study the information presented in the petition for a period not to exceed 90 days before denying or proceeding with the petition...*

Within this time, you can expect to receive a copy of the decision document and, if the Department proposes to grant the petition, a draft copy of the proposed Administrative Rules of Montana for your review.

If you have any questions or concerns, please feel free to contact me at 406-752-2706.

Sincerely,

Kathy Olsen

Kathy Olsen
Kalispell Regional Manager
kolsen@mt.gov

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

Kalispell Water Resources Office

STEVE BULLOCK, GOVERNOR

PHONE: (406) 752-2288
FAX: (406) 752-2843

655 TIMBERWOLF PARKWAY, SUITE 4
KALISPELL, MONTANA 59901

December 22, 2017

Flathead City-County Board of Health
1035 1st Avenue W
Kalispell MT 59901

RE: Petition for Controlled Groundwater Area No. 76LJ 30111620, BNSF Somers Site

Dear P. David Myerowitz, MD Chair,

The Department of Natural Resources and Conservation (Department) has determined that your Petition for Controlled Groundwater Area is correct and complete. Please note that correct and complete does not mean that your petition will be granted. Correct and complete simply means that the Department has enough credible information to begin analyzing your controlled groundwater area petition.

The Department will proceed under § 85-2-506, MCA, and notify the Petitioner of its progress.

Please remember that this letter does not indicate that your petition will be authorized. The purpose of this letter is to indicate that the Department has enough credible information to analyze your petition.

If you have any questions or concerns, please feel free to contact me at 406-752-2706.

Sincerely,

Kathy Olsen

Kathy Olsen
Kalispell Regional Manager
kolsen@mt.gov

DEPARTMENT OF NATURAL RESOURCES
AND CONSERVATION

STEVE BULLOCK
GOVERNOR

DIRECTOR'S OFFICE (406) 444-2074
TELEFAX NUMBER (406) 444-2684

STATE OF MONTANA

WATER RESOURCES DIVISION (406) 444-6601
TELEFAX NUMBERS (406) 444-0533 / (406) 444-5918
http://www.dnrc.mt.gov

1424 9TH AVENUE
PO BOX 201601
HELENA, MONTANA 59620-1601

To: Kathy Olsen, Unit Manager
Kalispell Water Resource Office

From: Russell Levens, Groundwater Hydrologist
Water Management Bureau

Date: August 18, 2017

RE: BNSF Somers Controlled Ground Water Area Petition

Introduction

The purpose of this report is to review a petition requesting the Department of Natural Resources and Conservation (DNRC) to revise the BNSF Somers Controlled Ground Water Area (CGWA) for the former railroad tie treating plant in Somers, Flathead County. The petition is submitted by the Flathead City-County Board of Health Department to revise the boundary of the CGWA and extend restrictions to the bedrock aquifer based on data collected since the CGWA was established in 2003.

The purpose of the existing CGWA is to prevent exposure to constituents of concern (COCs) in groundwater by prohibiting groundwater appropriations within the alluvial aquifer consisting of all sediments underlying the 67-acre site. Monitoring wells and wells required for remedial action are allowed as directed and approved by the U.S. Environmental Protection Agency (EPA). Wells for any purpose are allowed in bedrock under the original CGWA.

The petition requests revisions to the CGWA to prevent exposure to COCs in groundwater where the September 1989 Record of Decision (ROD) (USEPA, 1989) remedial goals for the site are exceeded, to prevent groundwater withdrawals in the alluvial aquifer that may induce or alter migration of COCs, and/or prevent installation of groundwater wells into the bedrock aquifer that may induce COC impacts from the alluvial aquifer into the bedrock aquifer.

Background

BNSF Railway Company and its predecessors operated a railroad tie treating plant at Somers from 1901 through 1986. Wood preservatives used at the site consisted of creosote, zinc chloride and chromated zinc chloride. A remedial investigation and feasibility study, and subsequent ROD (USEPA, 1989) identified COCs at the site included polycyclic aromatic hydrocarbons (TPAH), carcinogenic polycyclic aromatic hydrocarbons (CPAH), and total phenolic compounds. Remedial goals also were assigned

in the ROD for naphthalene, acenaphthene, flouranthene, benzene, and zinc. Undisolved non-aqueous phase liquids (NAPL) and dissolved contaminants originated with unknown timing over the 85 years of operation from two main sources: the former Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Lagoon source area and the former aboveground storage tanks (ASTs) source area.

The petition for the existing CGWA submitted in 2002 by the Flathead City-County Board of Health Department alleged that: a) excessive groundwater withdrawals will cause contaminant migration, and b) water quality within the groundwater area is not suited for a specific use defined in §85-2-102 (2) (a), specifically that exceedance of drinking water standards for COCs render the groundwater unusable as a drinking water source. The CGWA did not place restrictions on use of the bedrock aquifer beneath the site because modeling submitted with the petition demonstrated that long-term pumping at relatively high rates would be necessary to draw contaminants from the site into bedrock.

Contaminant remediation actions conducted at the Somers site include groundwater recovery and treatment from 1993 through 2007, a biosparge pilot test in 2015 and 2016, and manual recovery of NAPL through pumping and use of sorbent socks beginning in 2011. Semi-annual groundwater monitoring has been conducted at the site to measure and document groundwater elevation, flow direction, and concentrations of dissolved compounds. Additional investigations of site conditions and extent of dissolved compounds in groundwater have been completed or are ongoing. In particular, a Focused Feasibility Study (FFS) is being prepared to evaluate remedial action goals and objectives, and available remedial action methods, and to identify the most appropriate methods to address the remaining impacts at the site. The selected remedy will be based on information from ongoing investigations as well as community and state concerns and presented in an amendment to the decision document.

Site Conditions

The site is located on the west side of the Kalispell Valley within the Rocky Mountain Trench, a bedrock depression formed by faulting and downdrop of bedrock. The Kalispell Valley is filled with materials derived from nearby mountains by erosion during the Tertiary geologic period, ice abrasion and till deposition during glacial advance, deposit of glacial lake sediments during retreat in the Pleistocene geologic epoch, and sediments reworked by present day surface waters. Surficial materials at the site consist of fill, glacial deposits, and fluvial deposits overlying bedrock encountered at approximately 80 to 100 feet below ground surface. Surficial materials are generally described as discontinuous sandy silt and silty sand, clay, and sand with indistinct layering attributed to reworking by the Flathead River. A clay unit up to 60 feet thick is observed above bedrock.

The petition identifies an alluvial aquifer consisting of low permeability, heterogenerous silt and silty sand, and a fractured bedrock aquifer consisting of silty dolomite. Groundwater monitoring documents that the extent of contamination is limited to the alluvial aquifer near or down gradient of the two source areas.

The heterogeneity of the alluvial aquifer has significant effects on groundwater flow and COC distribution and NAPL migration. Based on a groundwater monitoring program

summarized in the petition, NAPL occurs as intermittent and disconnected small lenses and stringers up to 60 feet beneath the two source areas. A groundwater plume comprised of PAH, phenolic constituents, and benzene extends from the CERCLA lagoon source in a northeasterly to easterly direction. A second groundwater plume of PAH and benzene with phenol constituents below ROD cleanup levels extends north from the AST area. The petition states that the plumes are stable overall under non-pumping conditions and concentrated near source areas where NAPL remains.

The petition includes details of modeling to simulate groundwater flow and contaminant transport in the alluvial aquifer under pumping conditions in order to support development of a revised CGWA boundary. Groundwater flow within the alluvial aquifer was simulated using a simple analytical element model (GFLOW) by Haitjema Software (2007) to produce water particle traces for non-pumping and pumping scenarios to assess the potential extent of contamination 30 years into the future. The model was calibrated to groundwater level data by adjusting model parameters including aquifer thickness and hydraulic properties, recharge from precipitation, Flathead Lake level, and slough bottom elevation to achieve a best fit between observed and computed groundwater levels. Sensitivity of model outputs to different values of aquifer hydraulic conductivity was assessed to evaluate uncertainties in model results. Although simple, the analytical element modeling using GFLOW provides useful support for the petition by illustrating potential behavior of the plume to justify a boundary.

Evaluation of Evidence

The objective of this review is to evaluate the adequacy of evidence submitted with the petition and the petitioner's justification for the proposed CGWA relative to criteria for establishing a CGWA in 85-2-506 MCA.

MCA 85-2-506 (5)(c): Current or projected groundwater withdrawals from the aquifer or aquifers in the proposed controlled groundwater area have induced or altered or will induce or alter contaminant migration exceeding relevant water quality standards.

The 2003 order designating the original BNSF Somers CGWA found that groundwater withdrawals from the alluvial aquifer within the proposed boundary may cause contaminant migration. The potential that current or projected groundwater withdrawals in the alluvial aquifer will induce or alter contaminant migration is assessed further in the current petition from information on contaminants of concern, aquifer characteristics and modeling of observed plume extent as well as potential pumping effects on plume behavior.

The current petition includes a review of published investigations of regional and site geology, groundwater occurrence, flow direction, water use, and contaminant occurrence and behavior. A groundwater model was used to simulate 30-year particle traces resulting from hypothetical pumping at rates of 1 gallon per minute (gpm), 5 gpm, and 10 gpm from a well located west of the slough. Simulated particle traces produced from the 1 gpm model scenario selected to be representative of use from an individual household well was not significantly different from the base case scenario. Particle tracking results from the 5 gpm pumping scenario modeled to represent the high end of sustainable pumping as well as the 10 gpm pumping scenario meant to represent likely unsustainable pumping were not significantly different form the base case for the AST plume. Particle

traces from the CERCLA Lagoon plume for the 5 gpm scenario were similar to the base case with slightly higher velocities compared to the base case whereas particle traces for the 10 gpm scenario flow mostly toward the pumping well instead of the slough and less toward Flathead Lake than for lower pumping rates.

The original petition did not request restrictions on bedrock use and the 2003 order found that inclusion of the bedrock aquifer in the CGWA was not justified because of the high rate and duration of pumping necessary to draw water from the alluvial aquifer to bedrock. The current petition acknowledges that the possibility that COCs could migrate down into bedrock is remote; however, restrictions are requested based on the possibility that COCs could be pulled into the bedrock aquifer during well drilling through the overlying alluvium. Another concern in support of establishing restrictions on bedrock wells is the potential that COCs could migrate downward along poorly constructed wells.

The information on aquifer characteristics and modeling approaches generally provides a credible understanding of the potential for groundwater withdrawals to induce or alter contamination migration. Concerns over well drilling activities and inadequate well construction spreading contaminants to bedrock beneath the alluvial aquifer are sound.

MCA 85-2-506 (5)(d): Current or projected ground water withdrawals from the aquifer or aquifers in the proposed controlled ground water area have impaired or will impair ground water quality necessary for water right holders to reasonably exercise their water rights based on relevant water quality standards.

MCA 85-2-506 (5)(e): Groundwater within the proposed controlled groundwater area is not suited for beneficial use.

The present beneficial use of the alluvial aquifer at Somers is for monitoring related to remedial activities. The present beneficial use of the bedrock aquifer is outside the CGWA boundary for the Somers municipal water supply and domestic use for individual houses. The 2003 order designating the original BNSF Somers CGWA found that the original petition "provided sufficient data showing that water quality standards for zinc and compounds found in PAH have been exceeded in samples taken from the alluvial aquifer." The 2003 order further states that information provided in the original petition and presented at the hearing demonstrated that water in the underlying contaminant plume in the alluvial aquifer is not suitable as a domestic water source.

The current petition provides maps of COC plumes defined by the extent of 2,4-Dimethylphenol, Napthalene, and/or Benzene combined > 1µg/l for the alluvial aquifer measured in October 2016. Together, past and current monitoring provides credible evidence of concerns about the suitability of groundwater for human consumption within the alluvial aquifer of the proposed CGWA.

MCA 85-2-506 (5)(f): Public health, safety, or welfare is or will become at risk.

Evidence of groundwater contamination presented in the petition demonstrates the public health risk related to elevated concentrations of COCs. Modeling provides further understanding of public health risk and potential for spread of contaminants if wells are allowed within the CGWA.

CGWA Boundaries

The proposed CGWA boundary is based on subsurface conditions, the existing horizontal and vertical extent of COCs, property and legal boundaries, model simulations of future behavior of COC plumes, and extensive interaction between BNSF, EPA, and DNRC. Existing contamination is based on detailed water sampling and modeling of future behavior is based on conservative assumptions that COCs will not degrade and that no remedial actions are being implemented. Results of the non-pumping model scenario indicate that the plume from the vicinity of the AST continues northeast into a slough that is currently outside the existing CGWA boundary in the 30-year model period. Particle tracking from the base case indicates the CERCLA Lagoon plume flows east and splits with flow extending half way toward the slough to the north as well as extending half way toward Flathead Lake to the southeast.

Ongoing remedial activities will reduce the potential for exposure to COCs and ultimately should lead to improvements that may warrant shrinking the proposed CGWA boundary. Ongoing remedial activities include NAPL recovery, biosparge treatment, and preparation of the FFS Report. Furthermore, continuing groundwater monitoring will provide early warning of any unforeseen changes in plume behavior and allow evaluation of the need for additional remedies or changes to the CGWA boundary.

Summary

The petition provides a good description of site conditions, evidence of the extent of COCs, and modeling of future COC behavior. Overall, conclusions drawn from information on aquifer characteristics, aquifer recharge and groundwater modeling are conservative and provide a reasonable basis for delineating the boundaries of the proposed CGWA. The relatively stable COC plumes, continuing monitoring, and remedial actions provide protections against unforeseen COC behavior and allow for adjustments to CGWA boundaries or site restrictions in the future.

References

Haitjema Software. 2007. GFLOW Analytic Element Model Software Version 2.1.2.

MDNRC, 2003. Order Designating Controlled Groundwater Area. BNSF Somers Site. 76LJ-30005258. Montana Department of Natural Resources and Conservation. May 9, 2003.

USEPA, 1989. Record of Decision (ROD). Burlington Northern (Somers Plant) Superfund Site, Flathead County, Somers, Montana. U.S. Environmental Protection Agency. September 1989.