Summary of Changes to Source Volumes and Typical Conceptual Designs for Alternative 3+(d) Source Sites in the Ninemile Creek Watershed

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1.0 Introduction

This Technical Memorandum (TM) presents a summary of modifications to the selected remedial actions for source sites located within the Ninemile Creek Watershed that were included in the U.S. Environmental Protection Agency's (EPA's) Preferred Alternative identified in the *Proposed Plan, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site* (EPA, 2010). The Preferred Alternative included the remedial actions identified in Alternative 3+(d), as presented in the Proposed Plan and the *Draft Final Focused Feasibility Study* [FFS] *Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site* (CH2M HILL, 2010). Modifications to the remedial actions included in Alternative 3+(d) for source sites in the Ninemile Creek Watershed have been made based on an enhanced understanding of the physical setting and distribution of contamination within the watershed. The modifications include revised estimates of the volume of waste associated with selected source sites, and revisions to the selected remedial action typical conceptual designs (TCDs) for the selected source sites within the Ninemile Creek Watershed. These modifications will be incorporated into the Selected Remedy for the Upper Coeur d'Alene Basin that will be documented in the forthcoming Record of Decision (ROD) Amendment for the Upper Basin (EPA, in preparation).

2.0 Revisions to Source Site Waste Volume Estimations

The waste volumes for source sites within the Ninemile Creek subbasin were originally developed by the 1992 U.S. Department of the Interior Bureau of Land Management mine site assessment program, and were carried through into the Draft Final FFS Report (CH2M HILL, 2010). These volumes were updated with the results of Light Detection and Ranging (LiDAR) surveys that were conducted in 2011 to obtain topographical elevations of

the ground surface of the entire Ninemile Creek Watershed, as well as other areas within the Coeur d'Alene River Basin.

The topographical survey contours obtained from the LiDAR survey were used to create a three-dimensional model of the ground surface of the Ninemile Creek Watershed. The initial lateral boundaries of each source site included in Alternative 3+(d) were loaded into the topographic surface model. Historically, at most source sites wastes were placed within the surface water drainages nearest the site. Gravity then drove the materials downhill and into the drainages during historical mining operations. Given this general placement of the waste materials, it was possible to use the topographic surface surrounding each source site to estimate a pre-mining native ground surface elevation. For each specific source site, the contours of the undisturbed area surrounding the site source area were examined to estimate the elevation of the historical drainage ways beneath the site. During this examination, an extrapolated "native" pre-mining ground surface elevation under each site source area was developed. InRoads© software was then used to estimate the volume of materials located in each source site by subtracting the ground elevation of the suspected native ground surface from the actual ground elevation determined from the LiDAR survey.

In addition, the lateral boundaries of the each source site were revised to reflect the intersection with the estimated native ground surface and the actual ground surface. This initial volumetric estimate was used to guide the locations of soil borings and test pits installed in 2011. Attachment A contains plan view and section details for the source sites that were included in this evaluation. These details indicate the original lateral extents of the source sites, the estimated native ground surface, and the revised lateral extents of the source sites. The topographic model was not used to revise the volume estimates for floodplain sediment waste types, as there was not a definable pre-mining native ground surface from which to extrapolate below the source site.

The volume estimates of waste materials associated with the Interstate-Callahan Mine/Rock Dumps (BUR053 and BUR160), the Interstate Millsite (BUR055), the Tamarack 400 Level site (BUR170), and the Success Mine Rock Dump (OSB044) were further refined using the data collected during the 2011 Ninemile Creek remedial design investigation conducted for EPA and the Successor Coeur d'Alene Custodial and Work Trust (Maul Foster & Alongi, 2011). The boring logs for soil borings and test pits were reviewed, and the depths to native materials were incorporated into the previously assumed native material surfaces. Attachment A contains plan view and section details that present the results of this analysis and show how the estimated native ground surface at each site was revised based on the additional information collected during the remedial design investigation field efforts.

Table 1 presents a summary of Ninemile Creek source sites, original waste volume estimates as reported in the Draft Final FFS Report (CH2M HILL, 2010), updated waste volumes as determined by the estimation from the LiDAR survey, and/or updated waste volumes as determined by the 2011 Ninemile Creek remedial design investigation. As shown in Table 1, the FFS total estimated volume of waste materials from Ninemile Creek source sites was approximately 1.9 million cubic yards, compared with a revised total estimated volume of approximately 1.25 million cubic yards.

3.0 Revisions to Selected TCDs for the Ninemile Creek Watershed

The LiDAR survey and the collection of data during the 2011 remedial design investigation resulted in a more refined understanding of the physical conditions and contaminant distributions within the Ninemile Creek Watershed. This better understanding of site conditions and the reduced volume of anticipated waste materials presented the opportunity to reevaluate the TCD approach for the source sites, in order to determine whether the total revised volume could be consolidated in one or more waste consolidation areas (WCAs) located within the Ninemile Creek Watershed. This would be different from the existing TCD approach, which called for the excavation of mine wastes and onsite consolidation with a low-permeability cap, seepage collection and treatment if necessary, or offsite hauling and disposal in a regional repository.

Revising the TCDs to include the WCAs would allow for a more complete remediation of the Ninemile Creek Watershed than if onsite consolidation at individual source sites and capping were to be used, as was specified in Alternative 3+(d). With the WCA approach, waste materials would be excavated down to a native soil horizon and hauled to a WCA located within the Ninemile Creek Watershed. The WCA would be located sufficiently far from surface water sources to keep the materials dry and out of contact with water. Onsite consolidation and capping of materials at individual source sites would typically require double-handling of materials to create a sufficient base for onsite consolidation and placement of mine wastes in the onsite WCA. In addition, onsite consolidation of mine wastes would require the design and development of a robust underdrain and/or surface water conveyance to prevent upstream water from infiltrating through mine wastes or coming into contact with the lower portion of the consolidated materials.

In addition, consolidation of the mine wastes at each individual site would limit the ability to restore natural functions and biological resource habitat within the site area. Removal of mine wastes down to native materials (as would be done if the wastes were being placed in a WCA) would result in a more complete removal of wastes and would increase the opportunities for habitat restoration, by others, over the entire source site. Since all the waste materials would be removed, the restored area could be converted to recreational use without restricted controls that would limit public access. Further, complete removal and consolidation of all wastes to a WCA would allow for focused development, operation, closure, and monitoring of mine wastes at a facility that was sited and operated specifically for long-term functionality, and would minimize (or even eliminate) wastes that might otherwise go to a regional repository nearer community areas.

Potential WCA sites were identified, screened, and evaluated for potential development (as summarized in the TM *Ninemile Creek Waste Consolidation Area Screening Evaluation,* CH2M HILL, 2011a). The initial screening assessment identified five potential WCAs within the Ninemile Creek Watershed for more detailed evaluation. These potential WCA development areas included:

- A ridge area between the Interstate-Callahan Mine/ Upper and Lower Rock Dumps (BUR053 and BUR160)

- A ridge east of the Tamarack Rock Dumps (BUR056)
- A ridge east of the Success Mine Rock Dump (OSB044)
- A ridge south of the existing Dayrock Mine Tailings Pile SVNRT Repository (OSB052)
- A bench east of the Rex No. 2 site (BUR054)

Each potential WCA was further evaluated for development in a two-phase detailed assessment. The first phase of the assessment, as described in the TM *Ninemile Creek Waste Consolidation Area Site Selection Evaluation* (CH2M HILL, 2011b), indicated that there is significant overall cost benefit to be derived by selecting a single WCA for development located relatively close to the remediation sites. Recommendations from the first phase of the assessment were carried into a second phase described in the TM *Ninemile Creek Sub-basin Waste Consolidation Area: Next Phase Concept Evaluations and Design Approach Recommendations* (CH2M HILL, 2012a). Based on the second phase of the assessment, the Interstate Callahan South WCA was recommended for development as the Ninemile Creek WCA to contain all anticipated waste materials excavated from individual source sites.

Based on the reduced volume of mine waste materials, the availability of a suitable area for a WCA, and increased restoration opportunities after the waste materials have been removed from the source site, EPA has revised the TCDs for selected source areas within the Ninemile Creek Watershed to optimize the use of the WCA. Table 2 presents a summary of the TCD modifications for site source areas within the Ninemile Creek Watershed.

The revised TCDs are not a significant departure from the TCDs selected in the 2002 *Record of Decision, The Bunker Hill Mining and Metallurgical Complex Operable Unit 3* (EPA, 2002) and are consistent with achieving the remedial action objectives identified for the watershed. The revised TCDs identify the complete removal of mine wastes and native materials exceeding cleanup goals and disposal in a WCA located in the Ninemile Creek Watershed, as opposed to the existing TCDs for excavation of mine wastes and onsite consolidation with a low-permeability cap and seepage collection and treatment, if necessary. As discussed in the TM *Overview of the Simplified Tool for Estimating Post-Remediation Water Quality* (CH2M HILL, 2009), each remedial action was assigned a remedial effectiveness factor (REF) for dissolved zinc load reductions. The REFs, which were assigned based on best engineering judgment, were established in the Predictive Analysis (PA) (EPA, 2007) and carried through into the simplified version of the PA. The REF for excavation and removal of source materials assumes a higher level of effectiveness than the REF for onsite capping and consolidation. As such, the revised TCDs are anticipated to result in a more substantial improvement in dissolved zinc water quality in the East Fork of Ninemile Creek. The rationale for this change is driven primarily by the significant difference between mine waste volume estimates presented in the *Final [Revision 2] Remedial Investigation Report, Coeur d'Alene Basin Remedial Investigation/Feasibility Study* (EPA, 2001) and estimates based on the results of the topographic model and field data, as well as by opportunities to conduct a more thorough restoration of the subbasin to pre-mining conditions. In addition, the source materials would be isolated from precipitation runoff, which would result in a significant decrease in the entrainment and downstream transport of metal-contaminated sediments from the source sites in the Ninemile Creek Watershed.

4.0 References

CH2M HILL. November 19, 2009. *Technical Memorandum: Overview of the Simplified Tool for Estimating Post-Remediation Water Quality.* Prepared for U.S. Environmental Protection Agency Region 10.

CH2M HILL. July 2010. *Draft Focused Feasibility Study Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*. Prepared for U.S. Environmental Protection Agency Region 10.

CH2M HILL. October 14, 2011 (2011a). *Technical Memorandum: Ninemile Creek Waste Consolidation Area Screening Evaluation*. Prepared for U.S. Environmental Protection Agency Region 10.

CH2M HILL. December 12, 2011 (2011b). *Technical Memorandum: Ninemile Creek Waste Consolidation Area Site Selection Evaluation*. Prepared for U.S. Environmental Protection Agency Region 10.

CH2M HILL. February 22, 2012 (2012a). *Technical Memorandum: Ninemile Creek Sub-basin Waste Consolidation Area: Next Phase Concept Evaluations and Design Approach Recommendations*. Prepared for U.S. Environmental Protection Agency Region 10.

CH2M HILL. May 25, 2012 (2012b). *Technical Memorandum: Upper Coeur d'Alene Basin 2011 Focused Characterization Sampling: Results from Selected Mine and Mill Sites.* Prepared for U.S. Environmental Protection Agency Region 10.

Maul Foster & Alongi, Inc. December 22, 2011. *2011 Remedial Design Investigation Report, East Fork Ninemile Creek Basin*. Prepared for Successor Coeur d'Alene Custodial and Work Trust.

U.S. Environmental Protection Agency (EPA). September 2001. *Final [Revision 2] Remedial Investigation Report, Coeur d'Alene Basin Remedial Investigation/Feasibility Study*. Prepared by URS Greiner and CH2M HILL for EPA Region 10.

U.S. Environmental Protection Agency (EPA). September 2002. *Record of Decision, The Bunker Hill Mining and Metallurgical Complex Operable Unit 3.*

U.S. Environmental Protection Agency (EPA). October 1, 2007. *A Predictive Analysis of Post-Remediation Metals Loading*.

U.S. Environmental Protection Agency (EPA). July 12, 2010. *Proposed Plan, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*.

Tables

TABLE 1

Summary of Revised Volumes for the Source Sites in the Ninemile Creek Watershed

Summary of Changes to Source Volumes and Typical Conceptual Designs for Alternative 3+(d) Source Sites in the Ninemile Creek Watershed

Source Site Number	Site Name	Waste Type	Waste Volume (FFS)	Waste Volume (LiDAR)	Waste Volume (Remedial Design Investigation)	Revised Volume (cy)	Comments
BUR052	LITTLE SUNSET MINE	Upland waste rock	4,000	17,390		17,400	Removed from the Upper Basin Selected Remedy because the site is not currently under consideration for remedial action, based on the results of focused characterization sampling conducted in 2011 (CH2M HILL, 2012b).
BUR053	INTERSTATE-CALLAHAN MINE/ROCK DUMPS	Upland waste rock (erosion potential)	692,000	266,220	111,500	111,500	
BUR054	REX NO. 2	Upland tailings	225,000			225,000	Removed from the Upper Basin Selected Remedy (remediated site).
BUR054	REX NO. 2	Upland waste rock	75,000			75,000	Removed from the Upper Basin Selected Remedy (remediated site).
BUR055	INTERSTATE MILLSITE	Floodplain sediments	5,500	108,950		30,700	
BUR055	INTERSTATE MILLSITE	Upland tailings	14,000			78,200	
BUR056	TAMARACK ROCK DUMPS	Upland waste rock (potential intermixed tailings)	293,000	276,940	253,600	253,600	
BUR058	TAMARACK NO.3	Upland waste rock	23,000	13,500		13,500	
BUR139	REX NO.1	Upland waste rock	0	5,505		5,500	
BUR140	NINEMILE CREEK IMPACTED FLOODPLAIN	Floodplain sediments	10,000			10,000	
BUR160	INTERSTATE-CALLAHAN LOWER ROCK DUMPS	Upland waste rock (erosion potential)	0	69,310	74,100	74,100	
BUR170	TAMARACK 400 LEVEL	Upland waste rock (potential intermixed tailings)	11,000	7,445	17,700	17,700	
BUR171	TAMARACK NO.5	Upland waste rock (potential intermixed tailings)	0	6,455		6,500	
BUR172	TAMARACK UNNAMED ADIT	Upland waste rock	0	4,255		4,300	
BUR173	TAMARACK MILLSITE	Upland tailings	0	5,235		5,200	

TABLE 1

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Summary of Changes to Source Volumes and Typical Conceptual Designs for Alternative 3+(d) Source Sites in the Ninemile Creek Watershed

Source Site Number	Site Name	Waste Type	Waste Volume (FFS)	Waste Volume (LiDAR)	Waste Volume (Remedial Design Investigation)	Revised Volume (cy)	Comments
OSB032	DULUTH MINE BLACKCLOUD CK	Floodplain waste rock	20,000	10,600		10,600	Removed from the Upper Basin Selected Remedy because the site is not currently under consideration for remedial action, based on the results of focused characterization sampling conducted in 2011 (CH2M HILL, 2012b).
OSB033	RUTH MINE	Upland waste rock (erosion potential)	16,000	1,890		1,900	Removed from the Upper Basin Selected Remedy because the site is not currently under consideration for remedial action, based on the results of focused characterization sampling conducted in 2011 (CH2M HILL, 2012b).
OSB038	CALIFORNIA NO.4	Floodplain waste rock	31,000	15,090		15,100	
OSB039	DAYROCK MINE	Floodplain sediments	22,000			22,000	
OSB039	DAYROCK MINE	Upland tailings	11,000			11,000	
OSB040	EF NINEMILE CK HECLA REHAB	Floodplain sediments	19,000			19,000	
OSB044	SUCCESS MINE ROCK DUMP	Floodplain sediments	10,000	154,305	166,700	4,300	
OSB044	SUCCESS MINE ROCK DUMP	Upland tailings	360,000			155,100	
OSB044	SUCCESS MINE ROCK DUMP	Upland waste rock	17,000			7,300	
OSB048	AMERICAN MINE	Upland waste rock	200			200	
OSB052	DAYROCK MINE TAILINGS PILE/SVNRT REPOSITORY	Upland tailings - inactive facilities	200,000	191,345		191,300	
OSB056	EF NINEMILE CK IMPACTED RIPARIAN	Floodplain sediments	1,600			1,600	
OSB057	EF NINEMILE CK IMPACTED RIPARIAN	Floodplain sediments	13,000			13,000	
OSB058	EF NINEMILE CK SVNRT REHAB	Floodplain sediments	1,600			1,600	
OSB059	NINEMILE CK BELOW DAYROCK MINE	Floodplain sediments	33,000			33,000	

TABLE 1

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Source Site Number	Site Name	Waste Type	Waste Volume (FFS)	Waste Volume (LiDAR)	Waste Volume (Remedial Design Investigation)	Revised Volume (cy)	Comments
OSB060	NINEMILE CK SVNRT REHAB NEAR BLACKCLOUD	Floodplain sediments	800			800	
OSB061	BLACKCLOUD CK MILLSITE	Upland tailings	7,000			7,000	
OSB082	MONARCH MINE BLACKCLOUD CK	Floodplain waste rock	13,000			13,000	
OSB084	BLACKCLOUD CK IMPACTED RIPARIAN	Floodplain sediments	0				Removed from the Upper Basin Selected Remedy because the site is not currently under consideration for remedial action, based on the results of focused characterization sampling conducted in 2011 (CH2M HILL, 2012b).
OSB085	BLACKCLOUD CK IMPACTED RIPARIAN	Floodplain sediments	0				Removed from the Upper Basin Selected Remedy because the site is not currently under consideration for remedial action, based on the results of focused characterization sampling conducted in 2011 (CH2M HILL, 2012b).
OSB115	OPTION MINE	Upland waste rock (erosion potential)	200	280		300	
WAL006	NORTHSIDE MINE	Upland waste rock (erosion potential)	200			200	Removed from the Upper Basin Selected Remedy because the site is not currently under consideration for remedial action, based on the results of focused characterization sampling conducted in 2011 (CH2M HILL, 2012b).
WAL033	NINEMILE CK POTENTIAL TAILINGS DEPOSIT	Floodplain sediments	34,000			34,000	
		Total Volume (cy)	1,916,100			1,245,500	

Notes:

cy = cubic yards; EF = East Fork; FFS = Focused Feasibility Study
LiDAR = Light Detection and Ranging; SVNRT = Silver Valley Natural Resource Trust

TABLE 2

Summary of Revised Typical Conceptual Designs for the Source Sites in the Ninemile Creek Watershed

Summary of Changes to Source Volumes and Typical Conceptual Designs for Alternative 3+ (d) Source Sites in the Ninemile Creek Watershed

Source Site Number	Site Name	Waste Type	Alternative 3+ TCD	Alternative 3+ TCD Code	Revised TCD	Revised TCD Code
BUR052	LITTLE SUNSET MINE	Upland waste rock	Excavate and Cap	C01+C03	Removed from Upper Basin Selected Remedy	NONE
BUR053	INTERSTATE-CALLAHAN MINE/ROCK DUMPS	Upland waste rock (erosion potential)	Excavate and Cap w/Seep Collection	C01+C04	Excavate/WCA	C01+C07+HAUL-2
BUR054	REX NO. 2	Upland tailings	Impoundment Closure	C09	Remediated site	NONE
BUR054	REX NO. 2	Upland waste rock	Low-Permeability Cap	C03	Remediated site	NONE
BUR055	INTERSTATE MILLSITE	Floodplain sediments	Excavate and Repository	C01B+C08A	Excavate/WCA	C01B+C07+HAUL-2
BUR055	INTERSTATE MILLSITE	Upland tailings	Excavate and Dispose	C01+C07	Excavate/WCA	C01+C07+HAUL-2
BUR056	TAMARACK ROCK DUMPS	Upland waste rock (potential intermixed tailings)	Regrade/ Consolidate/Revegetate	C02B	Excavate/WCA	C01+C07+HAUL-2
BUR058	TAMARACK NO.3	Upland waste rock	None	NONE	Excavate/WCA	C01+C07+HAUL-2
BUR139	REX NO.1	Upland waste rock	Low-Permeability Cap	C03	Excavate/WCA	C01+C07+HAUL-2
BUR140	NINEMILE CREEK IMPACTED FLOODPLAIN	Floodplain sediments	Excavate and Repository	C01B+C08A	Excavate/WCA	C01B+C07+HAUL-2
BUR160	INTERSTATE-CALLAHAN LOWER ROCK DUMPS	Upland waste rock (erosion potential)	Excavate and Cap w/Seep Collection	C04	Excavate/WCA	C01+C07+HAUL-2
BUR170	TAMARACK 400 LEVEL	Upland waste rock (potential intermixed tailings)	Low-Permeability Cap	C03	Excavate/WCA	C01+C07+HAUL-2
BUR171	TAMARACK NO.5	Upland waste rock (potential intermixed tailings)	Low-Permeability Cap	C03	Excavate/WCA	C01+C07+HAUL-2
BUR172	TAMARACK UNNAMED ADIT	Upland waste rock	Low-Permeability Cap	C03	Excavate/WCA	C01+C07+HAUL-2
BUR173	TAMARACK MILLSITE	Upland tailings	Excavate and Dispose	C01+C07	Excavate/WCA	C01+C07+HAUL-2
OSB032	DULUTH MINE BLACKCLOUD CK	Floodplain waste rock	Excavate and Cap	C01+C03	Removed from Upper Basin Selected Remedy	NONE
OSB033	RUTH MINE	Upland waste rock (erosion potential)	Excavate and Cap	C01+C03	Removed from Upper Basin Selected Remedy	NONE
OSB038	CALIFORNIA NO.4	Floodplain waste rock	Excavate and Cap	C01+C03	Excavate/WCA	C01+C07+HAUL-2
OSB039	DAYROCK MINE	Floodplain sediments	Excavate and Repository	C01B+C08A+NONE [50]	Excavate/WCA	C01B+C07+HAUL-2
OSB039	DAYROCK MINE	Upland tailings	Excavate and Dispose	C01+C07	Excavate/WCA	C01+C07+HAUL-2

TABLE 2

Summary of Revised Typical Conceptual Designs for the Source Sites in the Ninemile Creek Watershed

Summary of Changes to Source Volumes and Typical Conceptual Designs for Alternative 3+ (d) Source Sites in the Ninemile Creek Watershed

Source Site Number	Site Name	Waste Type	Alternative 3+ TCD	Alternative 3+ TCD Code	Revised TCD	Revised TCD Code
OSB040	EF NINEMILE CK HECLA REHAB	Floodplain sediments	Excavate and Repository	C01B+C08A+NONE [89]	Excavate/WCA	C01B+C07+HAUL-2
OSB044	SUCCESS MINE ROCK DUMP	Floodplain sediments	Excavate and Repository	C01B+C08A	Excavate/WCA	C01B+C07+HAUL-2
OSB044	SUCCESS MINE ROCK DUMP	Upland tailings	Excavate and Repository	C01+C08A	Excavate/WCA	C01+C07+HAUL-2
OSB044	SUCCESS MINE ROCK DUMP	Upland waste rock	Regrade/Consolidate/Revegetate	C02A	Excavate/WCA	C01+C07+HAUL-2
OSB056	EF NINEMILE CK IMPACTED RIPARIAN	Floodplain sediments	Excavate and Repository	CO1B+C08A	Excavate/WCA	C01B+C07+HAUL-2
OSB057	EF NINEMILE CK IMPACTED RIPARIAN	Floodplain sediments	Excavate and Repository	CO1B+C08A	Excavate/WCA	C01B+C07+HAUL-2
OSB058	EF NINEMILE CK SVNRT REHAB	Floodplain sediments	Excavate and Repository	CO1B+C08A	Excavate/WCA	C01B+C07+HAUL-2
OSB059	NINEMILE CK BELOW DAYROCK MINE	Floodplain sediments	Excavate and Repository	CO1B+C08A	Excavate/WCA	C01B+C07+HAUL-2
OSB060	NINEMILE CK SVNRT REHAB NEAR BLACKCLOUD	Floodplain sediments	Excavate and Dispose	CO1B+C07	Excavate/WCA	C01B+C07+HAUL-2
OSB061	BLACKCLOUD CK MILLSITE	Upland tailings	Excavate and Dispose	CO1B+C07	Excavate/WCA	C01B+C07+HAUL-2
OSB082	MONARCH MINE BLACKCLOUD CK	Floodplain waste rock	Excavate and Cap	C01+C03	Excavate/WCA	C01+C07+HAUL-2
OSB084	BLACKCLOUD CK IMPACTED RIPARIAN	Floodplain sediments	Excavate and Repository	CO1B+C08A	Removed from Upper Basin Selected Remedy	NONE
OSB085	BLACKCLOUD CK IMPACTED RIPARIAN	Floodplain sediments	Excavate and Repository	CO1B+C08A	Removed from Upper Basin Selected Remedy	NONE
OSB115	OPTION MINE	Upland waste rock (erosion potential)	Excavate and Cap	C01+C03	Excavate/WCA	C01+C07+HAUL-2
WAL006	NORTHSIDE MINE	Upland waste rock (erosion potential)	Excavate and Cap	C01+C03	Removed from Upper Basin Selected Remedy	NONE
WAL033	NINEMILE CK POTENTIAL TAILINGS DEPOSIT	Floodplain sediments	Excavate and Dispose	C01B+C07+NONE[97]	Excavate/WCA	C01B+C07+HAUL-2

Notes:

EF = East Fork

SVNRT = Silver Valley Natural Resource Trust

TCD = typical conceptual design

WCA = waste consolidation area

ATTACHMENT A

Topographic Details and Sections of Source Sites in the Ninemile Creek Watershed

BLM Source Area Boundary
Design Surface Exterior Boundary
Existing Major Contour (100-foot interval)
Existing Minor Contour (25-foot interval)
Cross Section Alignment
Design Surface Major Contour
Design Surface Minor Contour

N

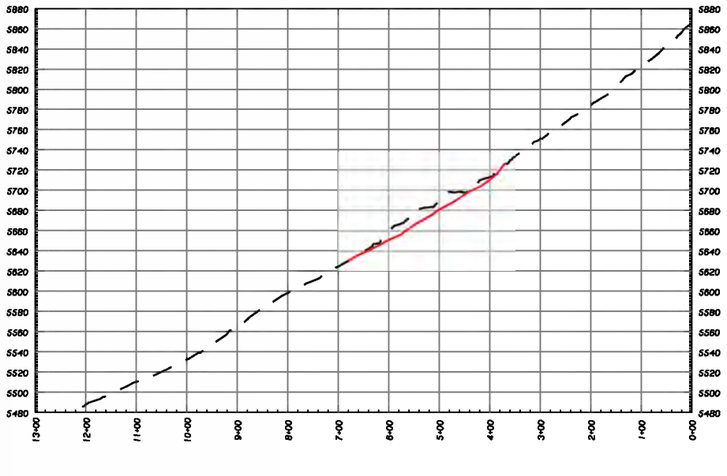
0 500 1,000 Feet

Source: 2006 1 meter imagery from the National Agriculture Imagery Program, 10 meter Digital Elevation Model

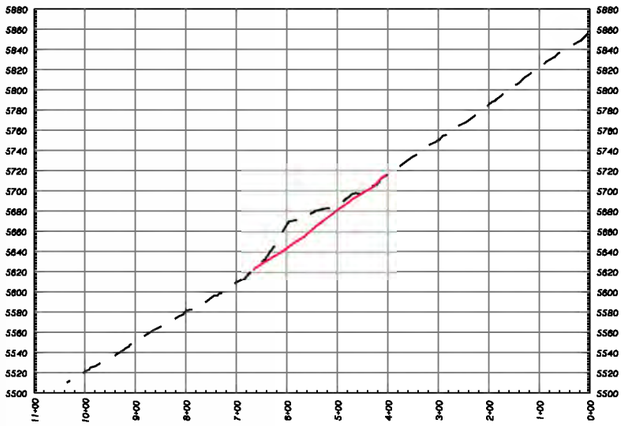
FIGURE A-1
Plan View of Ninemile Creek Watershed Source Sites (BUR052)

BUR052

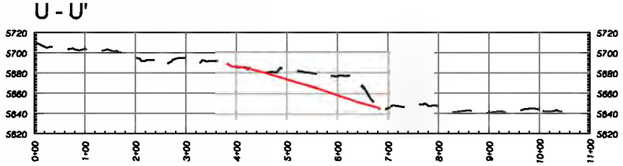
S' - S

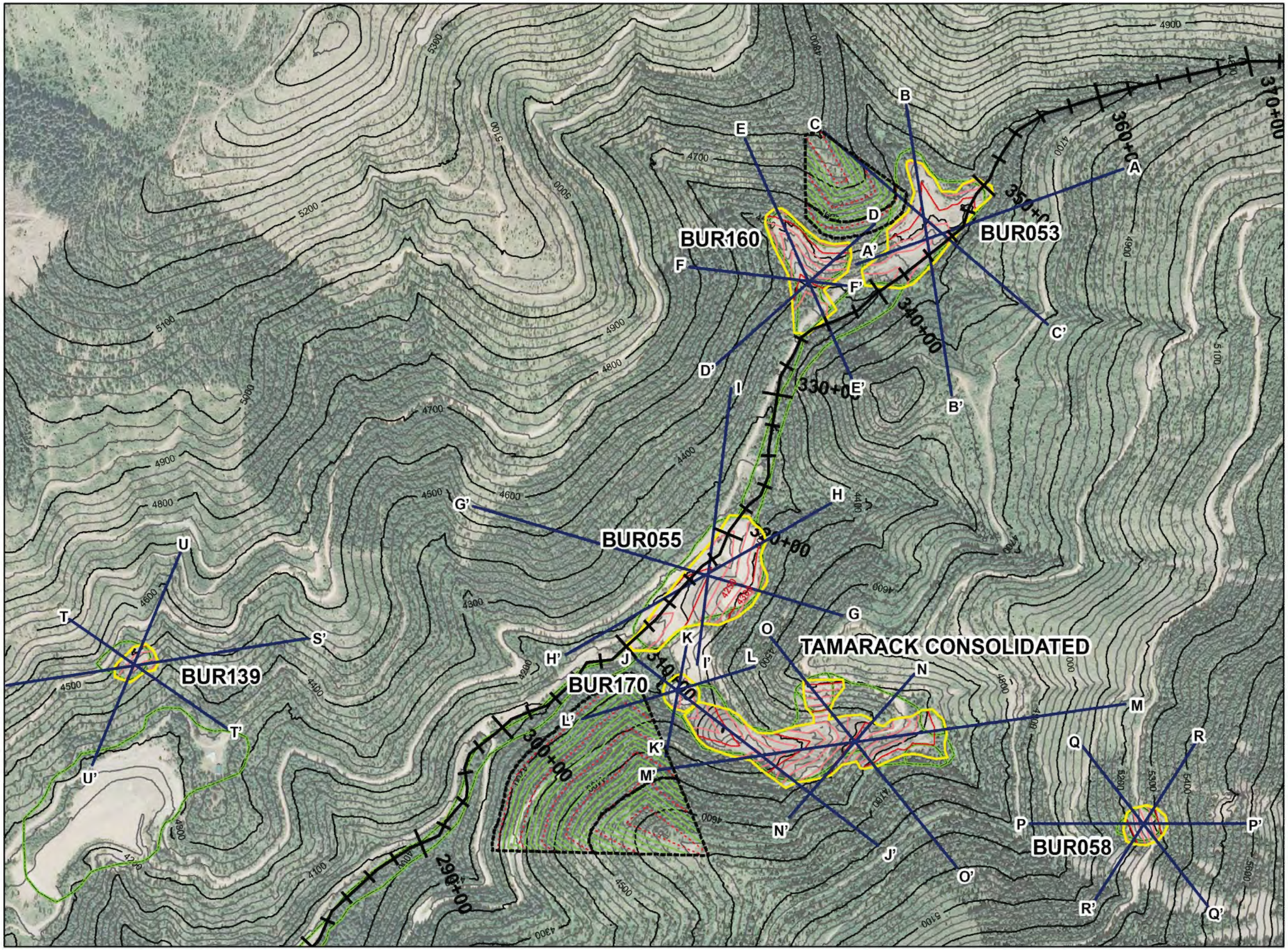


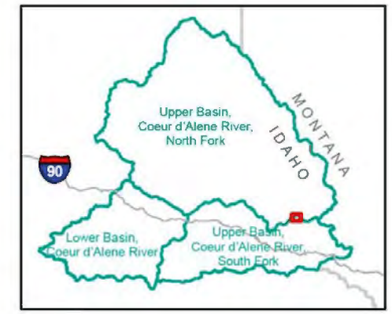
T' - T



U - U'







BLM Source Area Boundary
Design Surface Exterior Boundary
Existing Major Contour (100-foot interval)
Existing Minor Contour (25-foot interval)
Cross Section Alignment
Design Surface Major Contour
Design Surface Minor Contour
Proposed Repository Boundary
Repository Major Contour (100-foot interval)
Repository Minor Contour (25-foot interval)

N
0 500 1,000 Feet

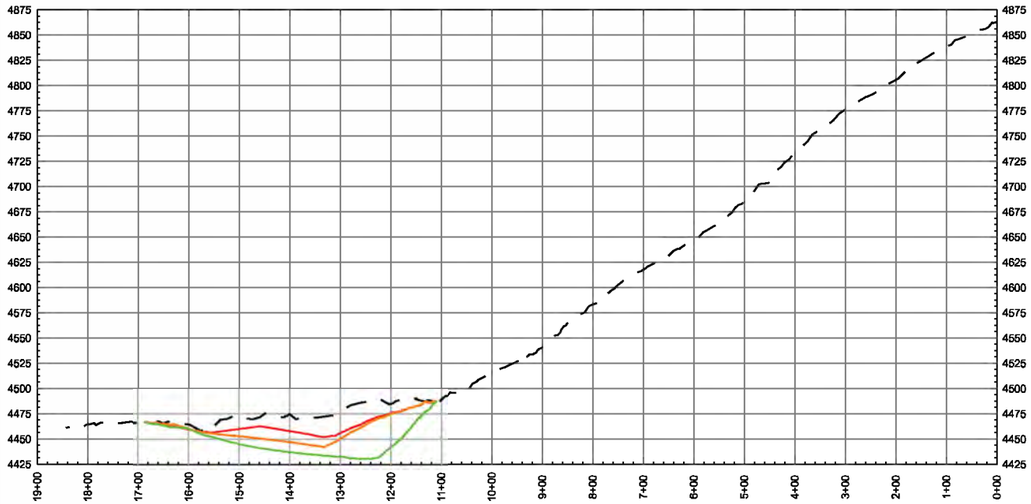
Source: 2006 1 meter imagery from the National Agriculture Imagery Program, 10 meter Digital Elevation Model

FIGURE A-2
Plan View of Ninemile Creek Watershed Source Sites (BUR053, BUR055, BUR058, BUR139, BUR160, BUR170)

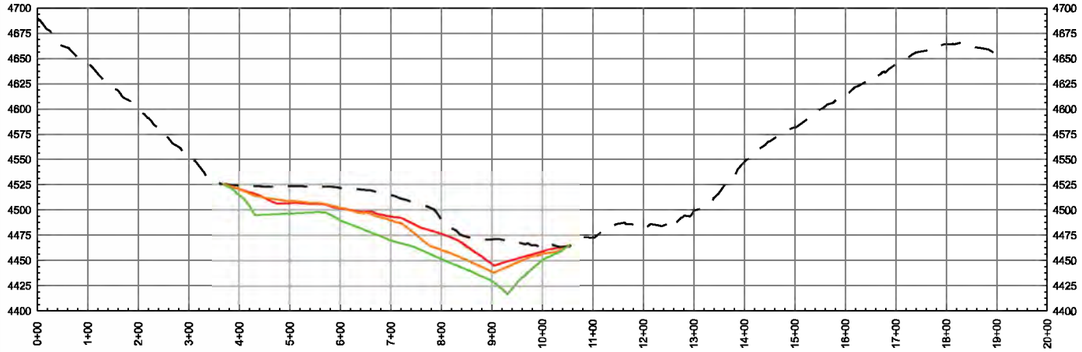
CH2MHILL

BUR053

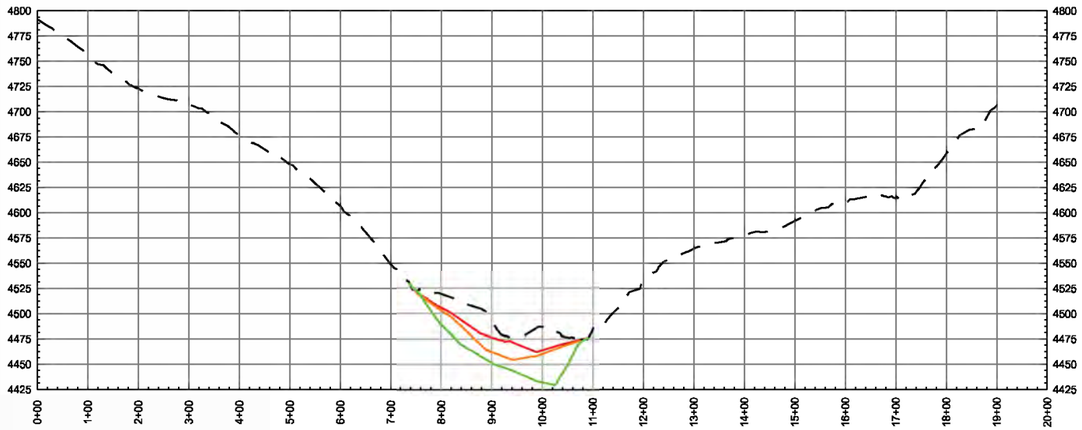
A' - A



B - B'

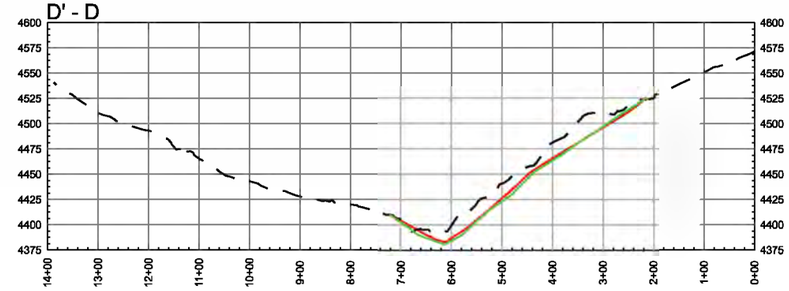


C - C'

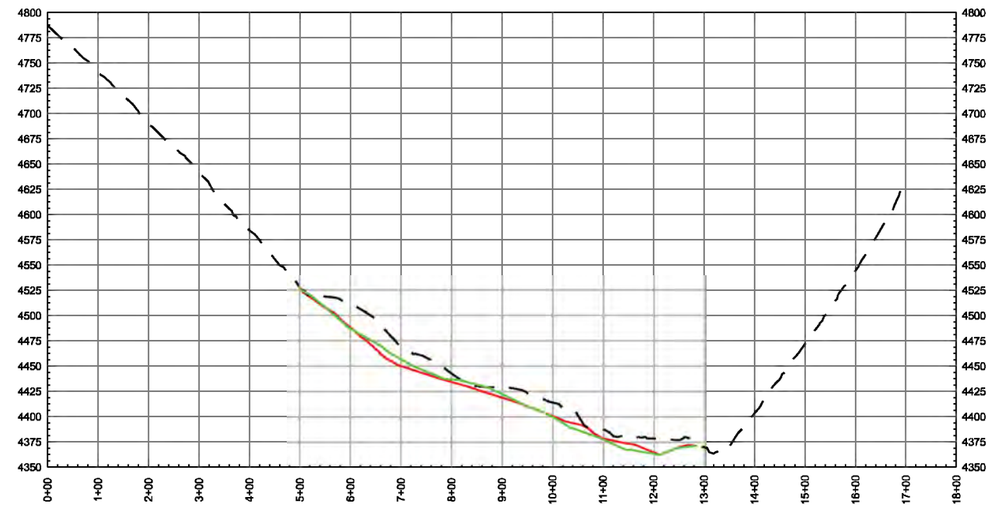


BUR160

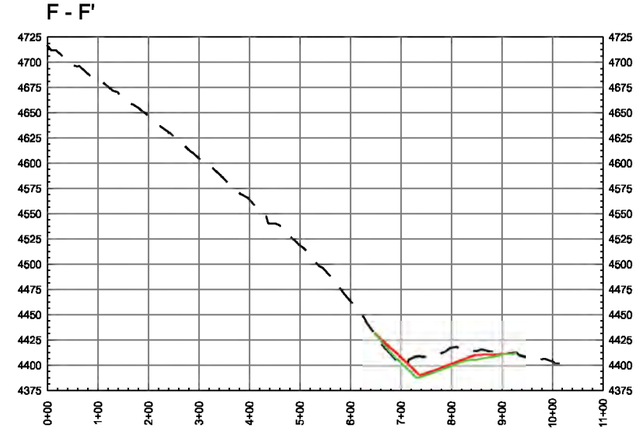
D' - D



E - E'



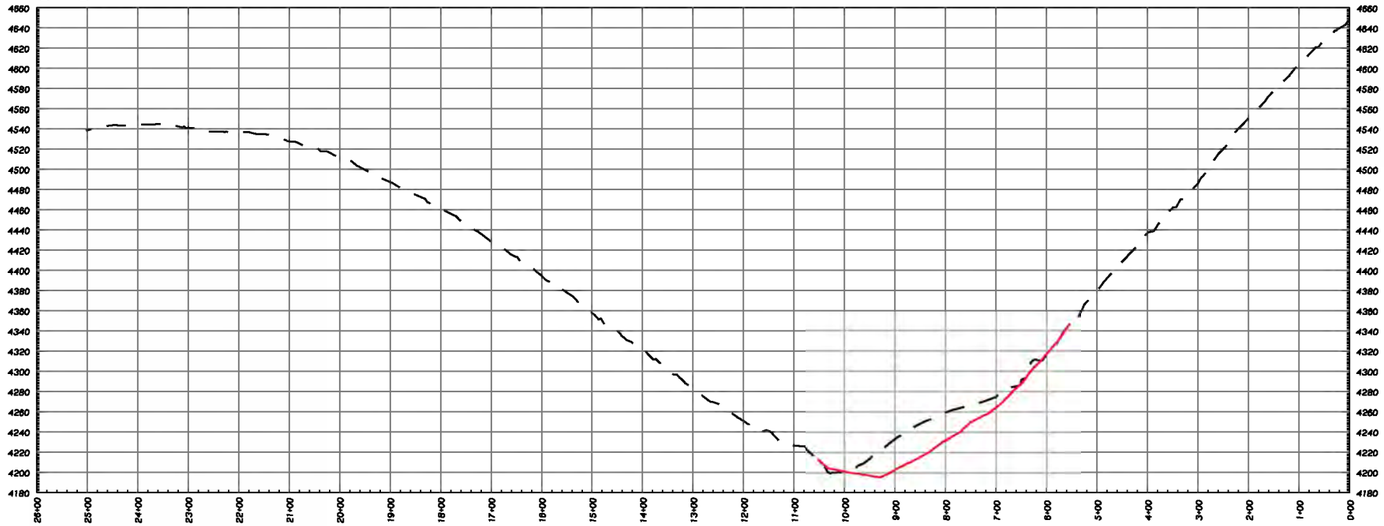
F - F'



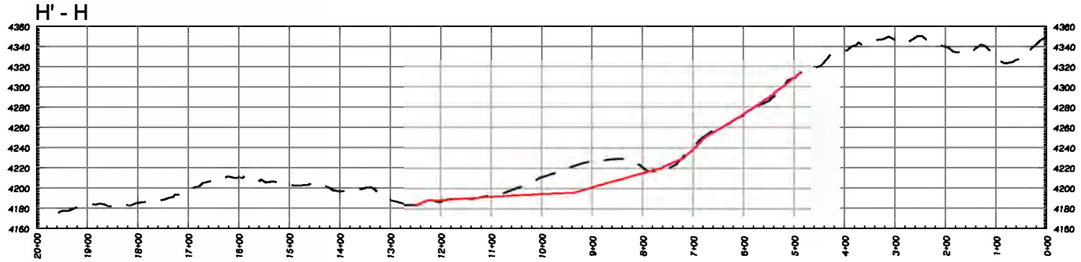
EXISTING GROUND
APPROXIMATE NATIVE GROUND SURFACE (REVISED 09/13/11)
APPROXIMATE NATIVE GROUND SURFACE (REVISED 07/29/11)
APPROXIMATE NATIVE GROUND SURFACE (REVISED 05/20/11)

BUR055

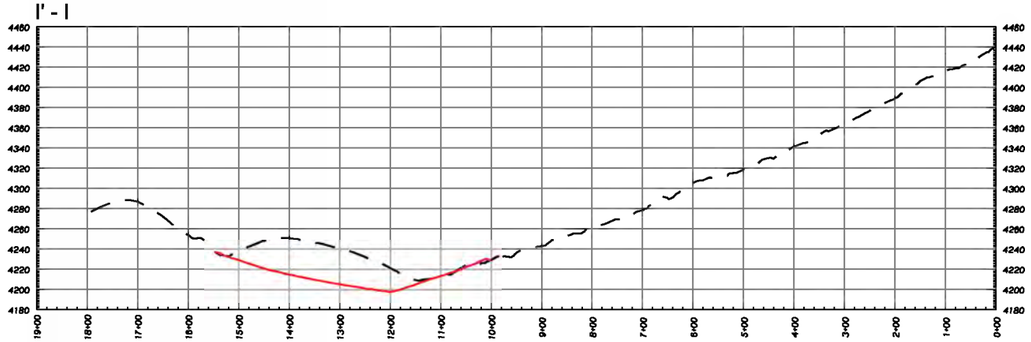
G' - G



H' - H

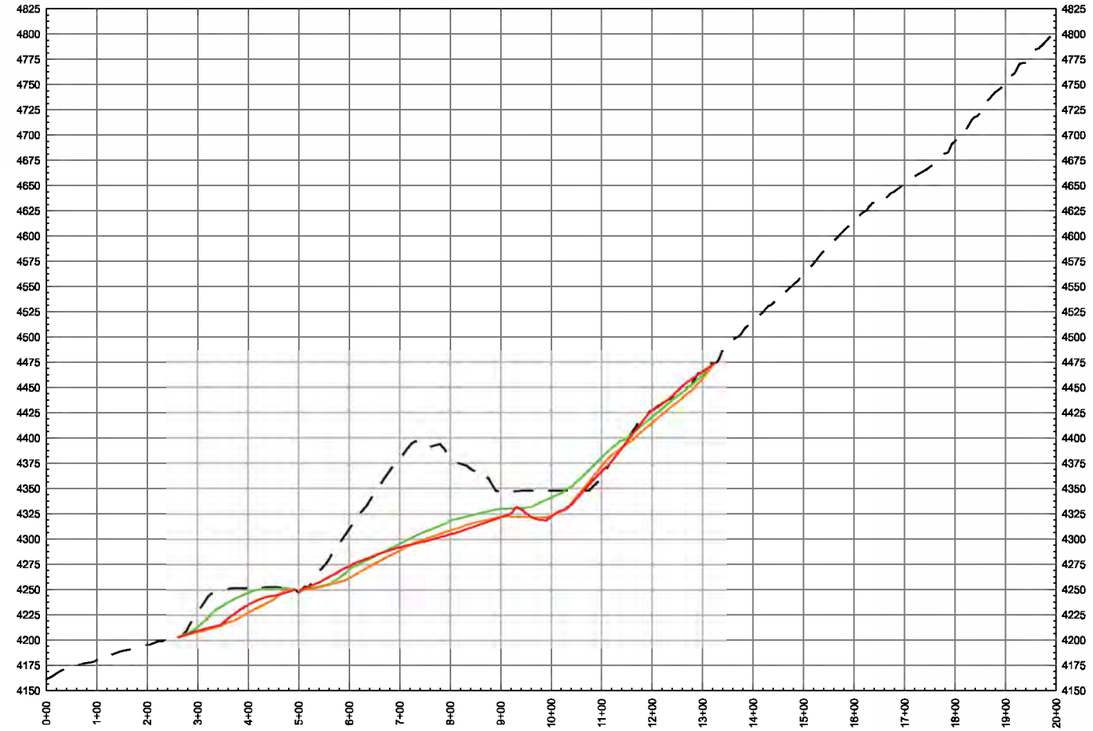


I' - I



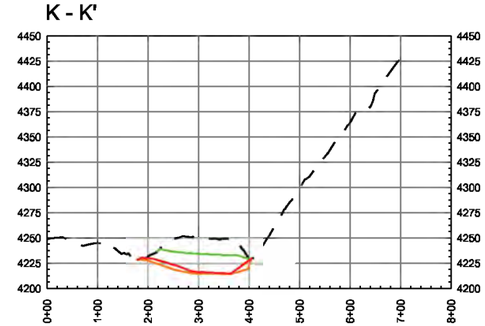
BUR170

J - J'

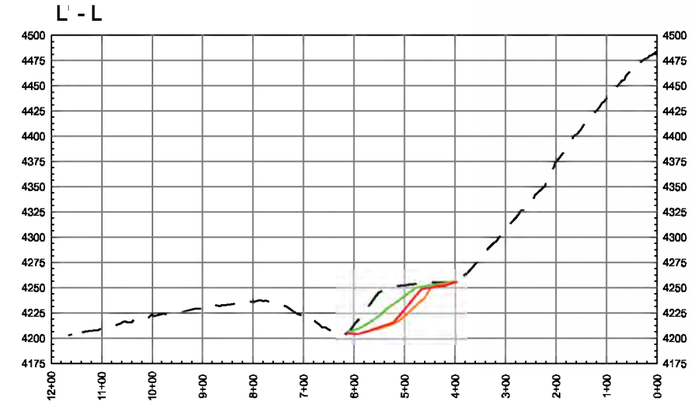


EXISTING GROUND
APPROXIMATE NATIVE GROUND SURFACE (REVISED 09/13/11)
APPROXIMATE NATIVE GROUND SURFACE (REVISED 07/29/11)
APPROXIMATE NATIVE GROUND SURFACE (REVISED 05/20/11)

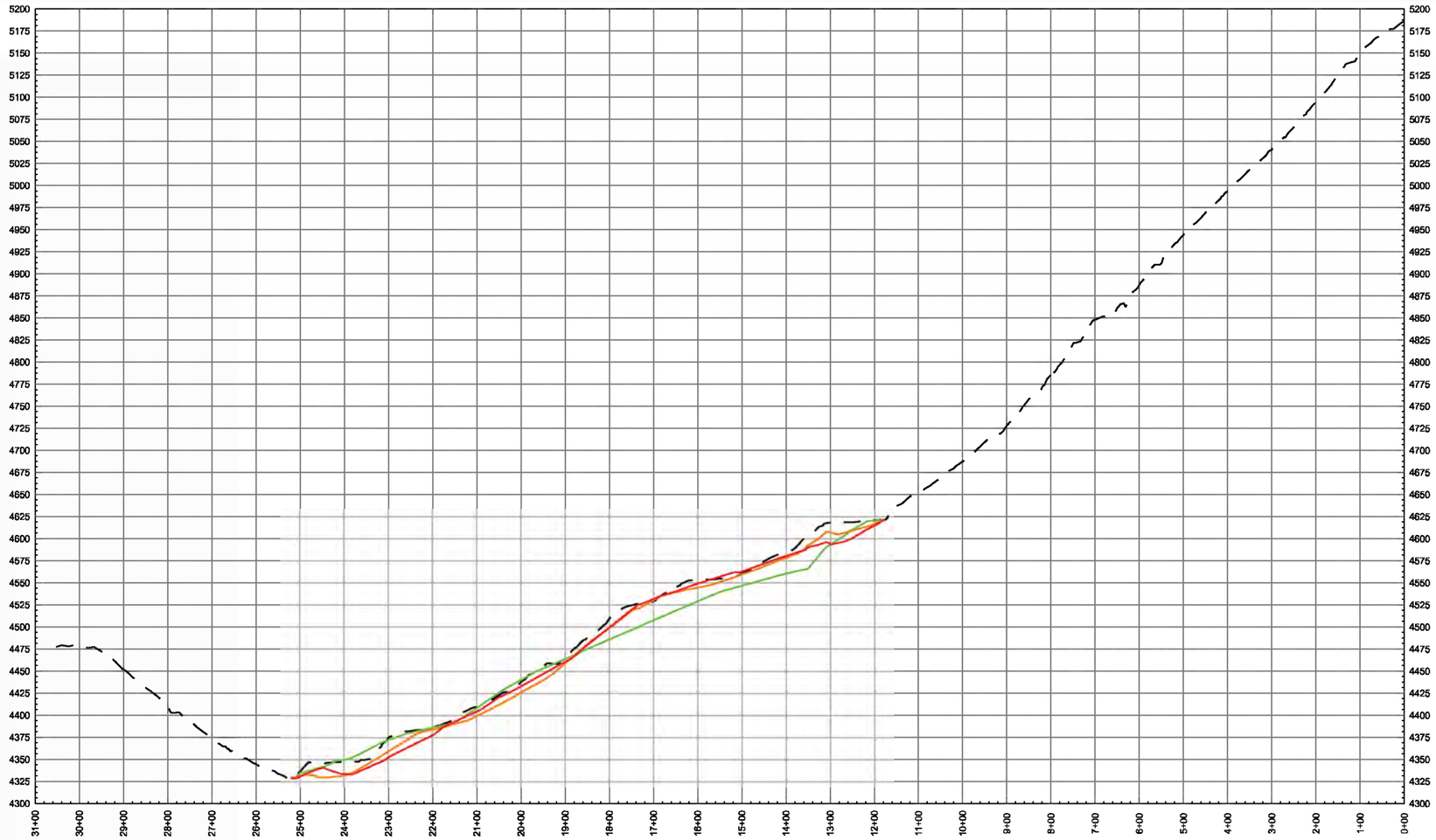
K - K'



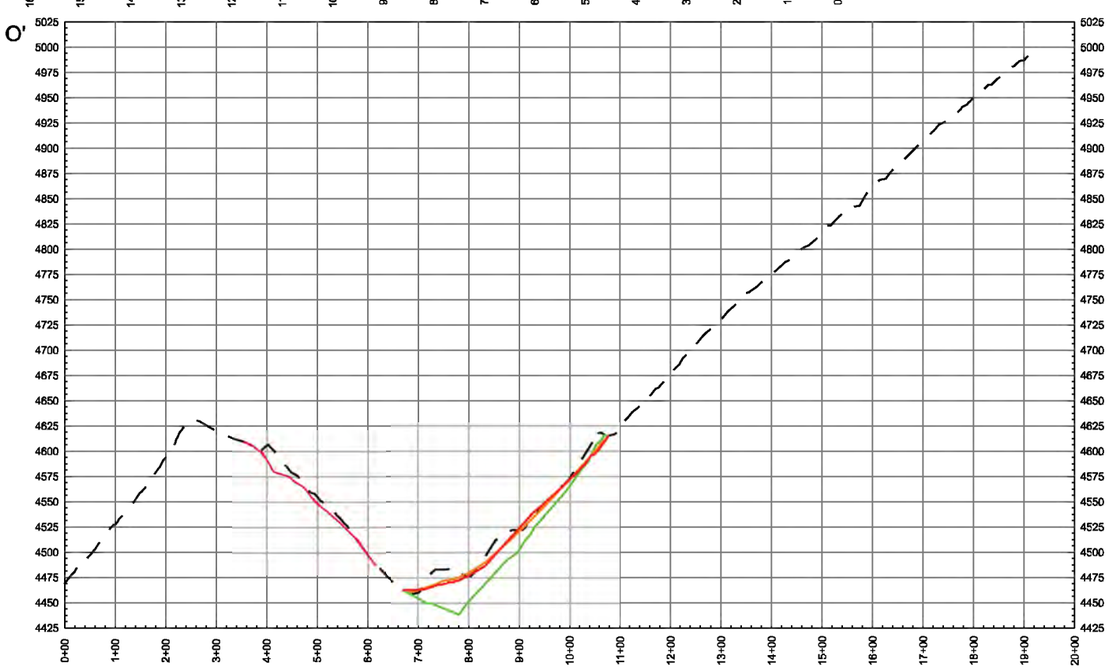
L' - L



M' - M

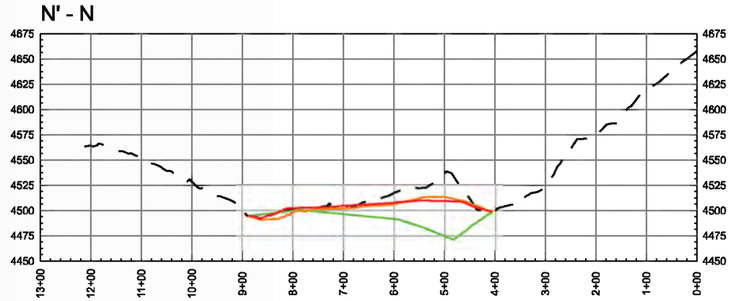


O - O'



EXISTING GROUND
APPROXIMATE NATIVE GROUND SURFACE (REVISED 09/13/11)
APPROXIMATE NATIVE GROUND SURFACE (REVISED 07/29/11)
APPROXIMATE NATIVE GROUND SURFACE (REVISED 05/20/11)

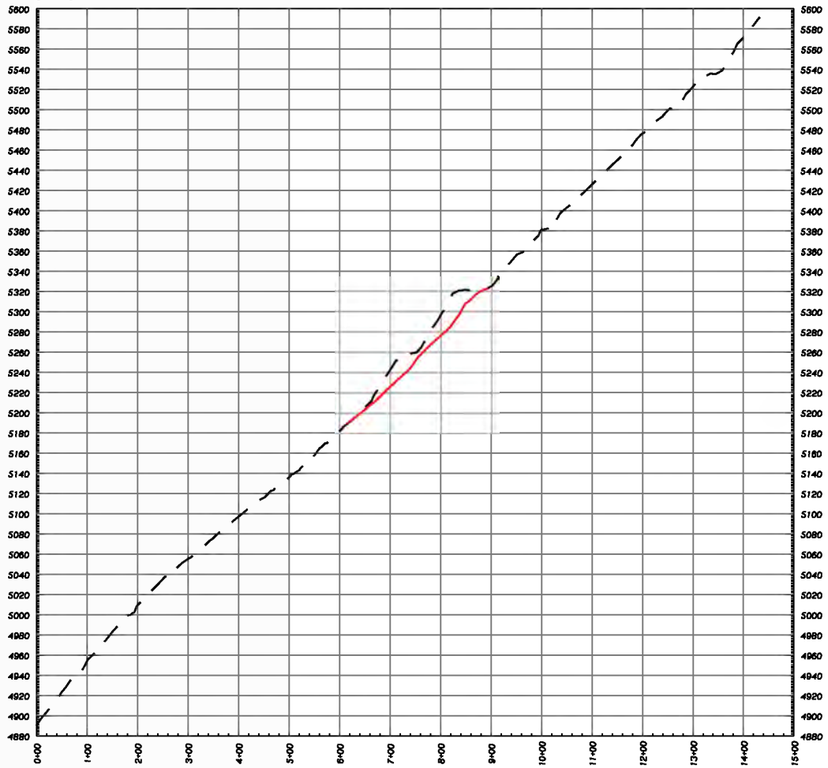
N' - N



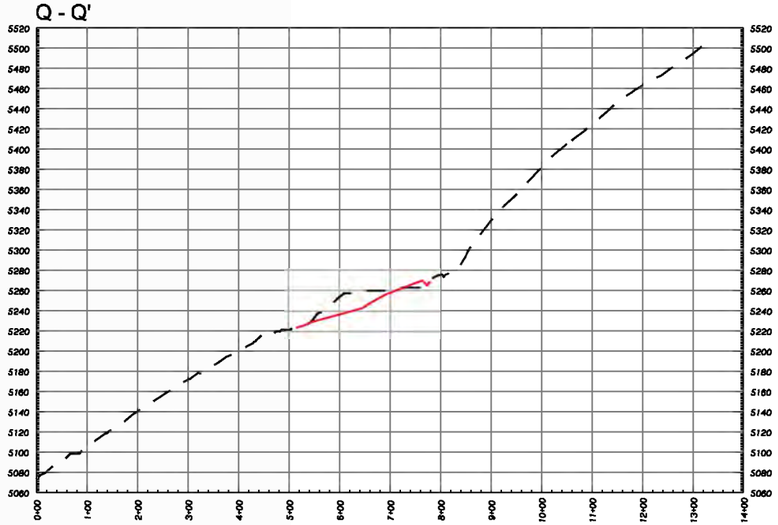
TAMARACK CONSOLIDATED

BUR058

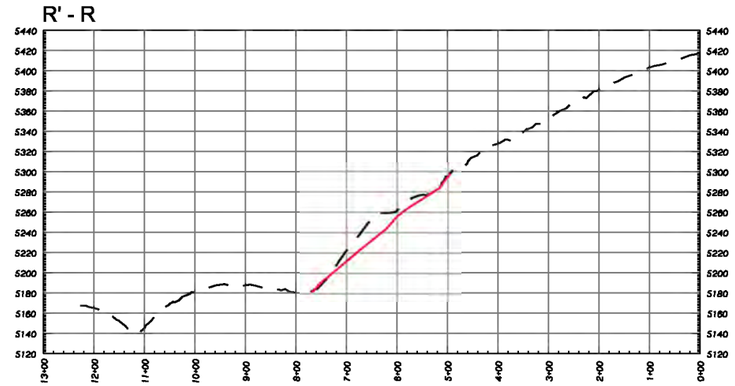
P - P'



Q - Q'

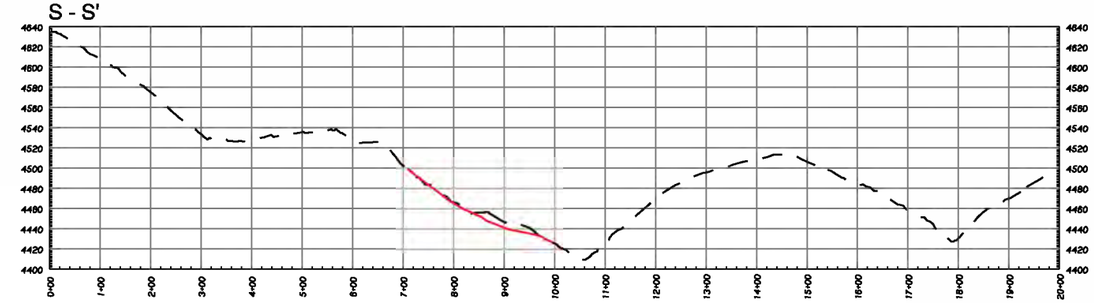


R' - R

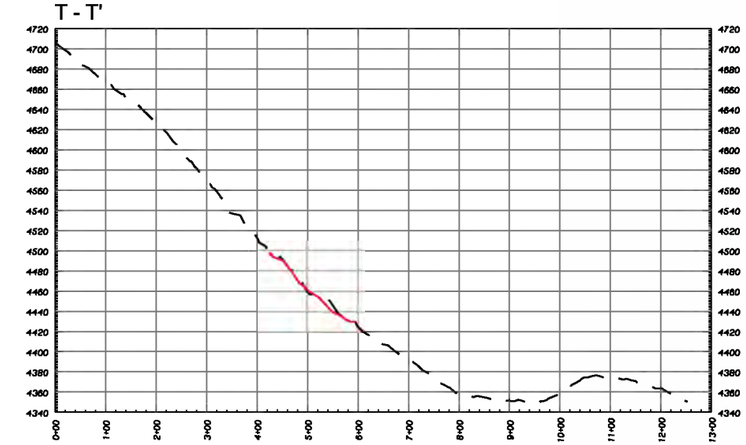


BUR139

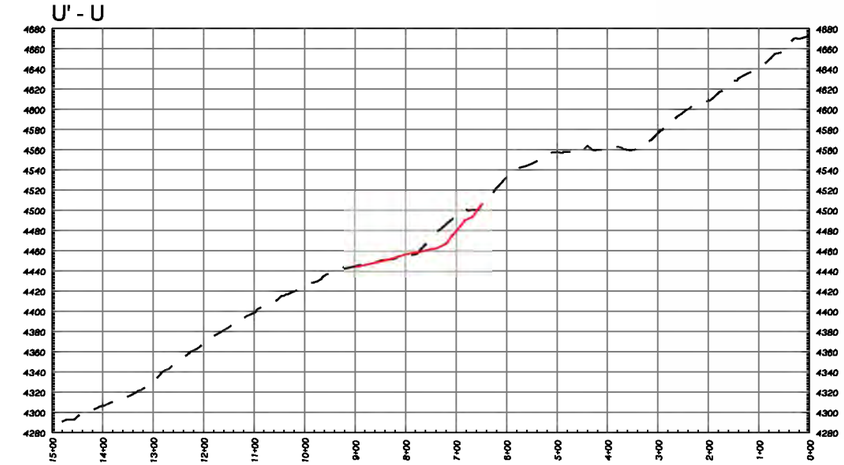
S - S'

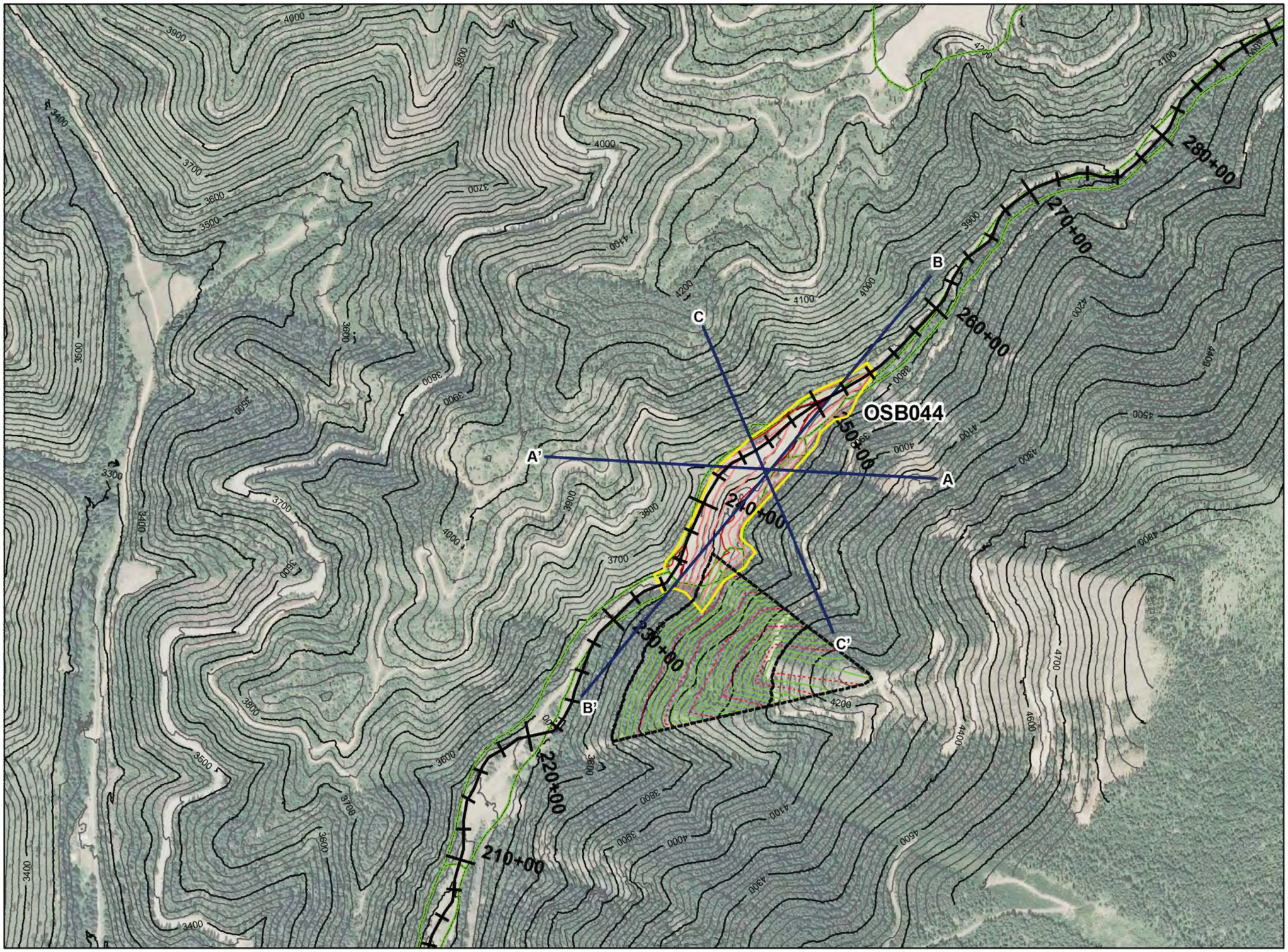


T - T'



U' - U





BLM Source Area Boundary
Design Surface Exterior Boundary
Existing Major Contour (100-foot interval)
Existing Minor Contour (25-foot interval)
Cross Section Alignment
Design Surface Major Contour
Design Surface Minor Contour
Proposed Repository Boundary
Repository Major Contour (100-foot interval)
Repository Minor Contour (25-foot interval)

N
0 500 1,000 Feet

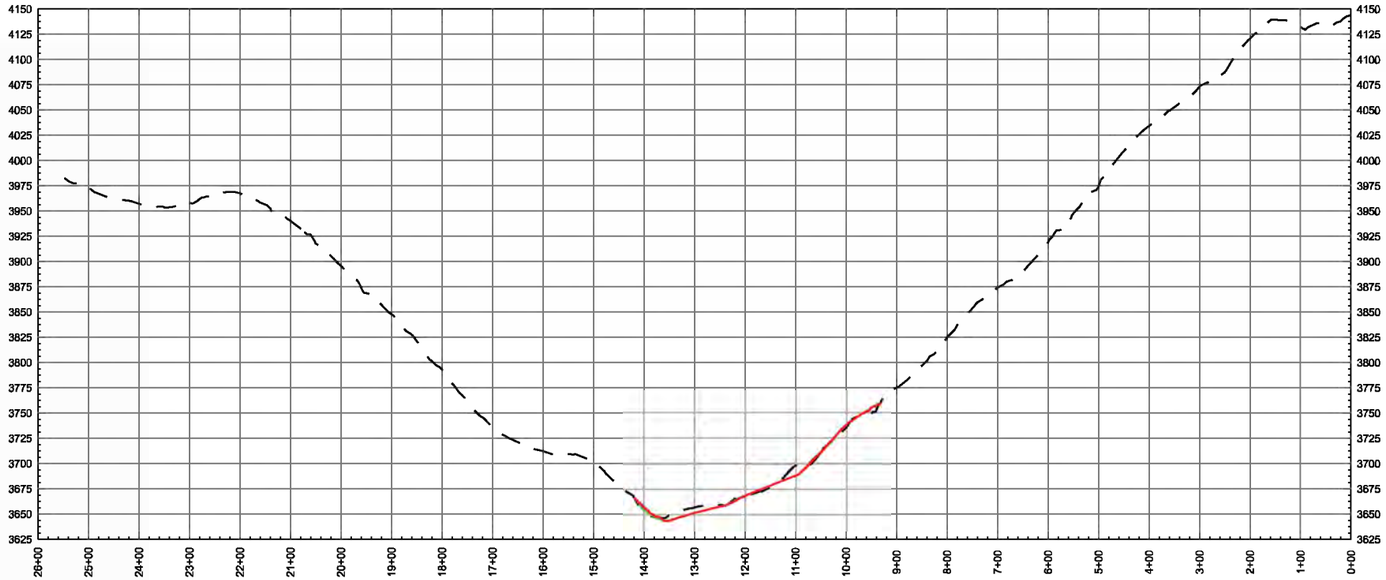
Source: 2006 1 meter imagery from the National Agriculture Imagery Program, 10 meter Digital Elevation Model

FIGURE A-3
Plan View of Ninemile Creek Watershed Source Sites (OSB044)

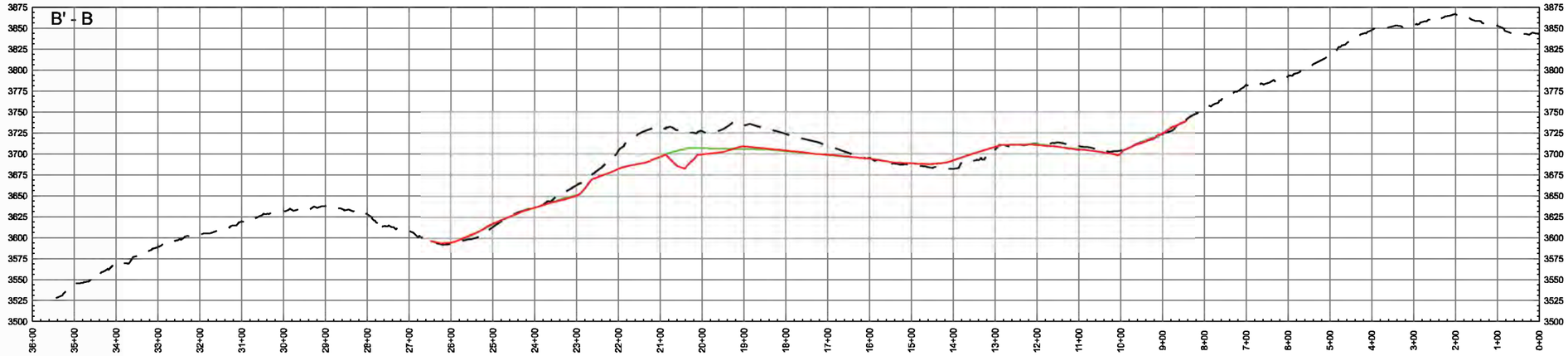
CH2MHILL

OSB044

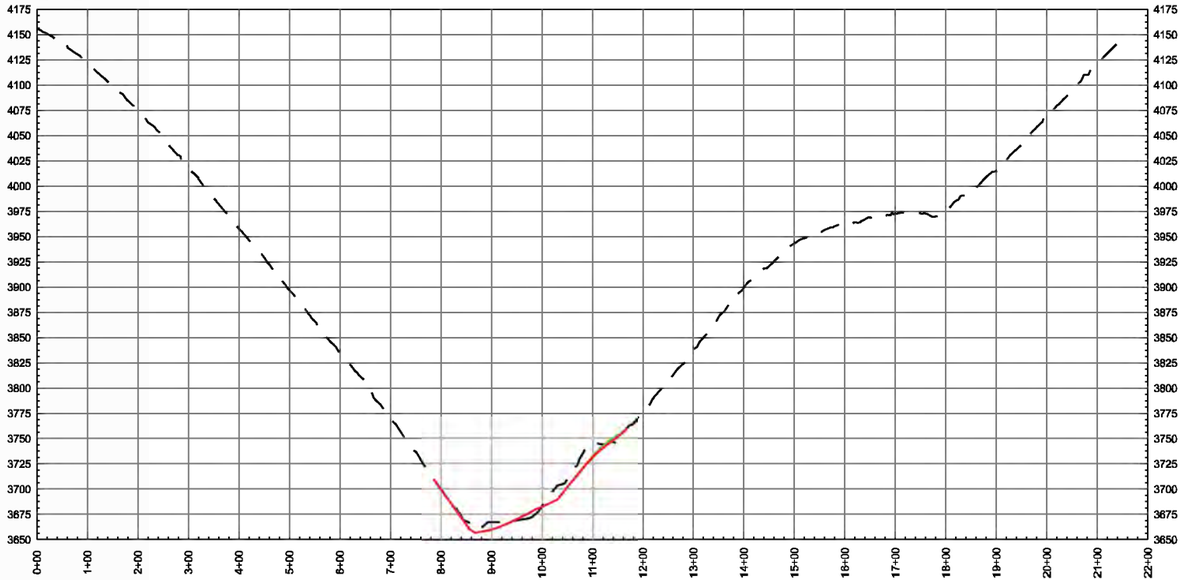
A' - A



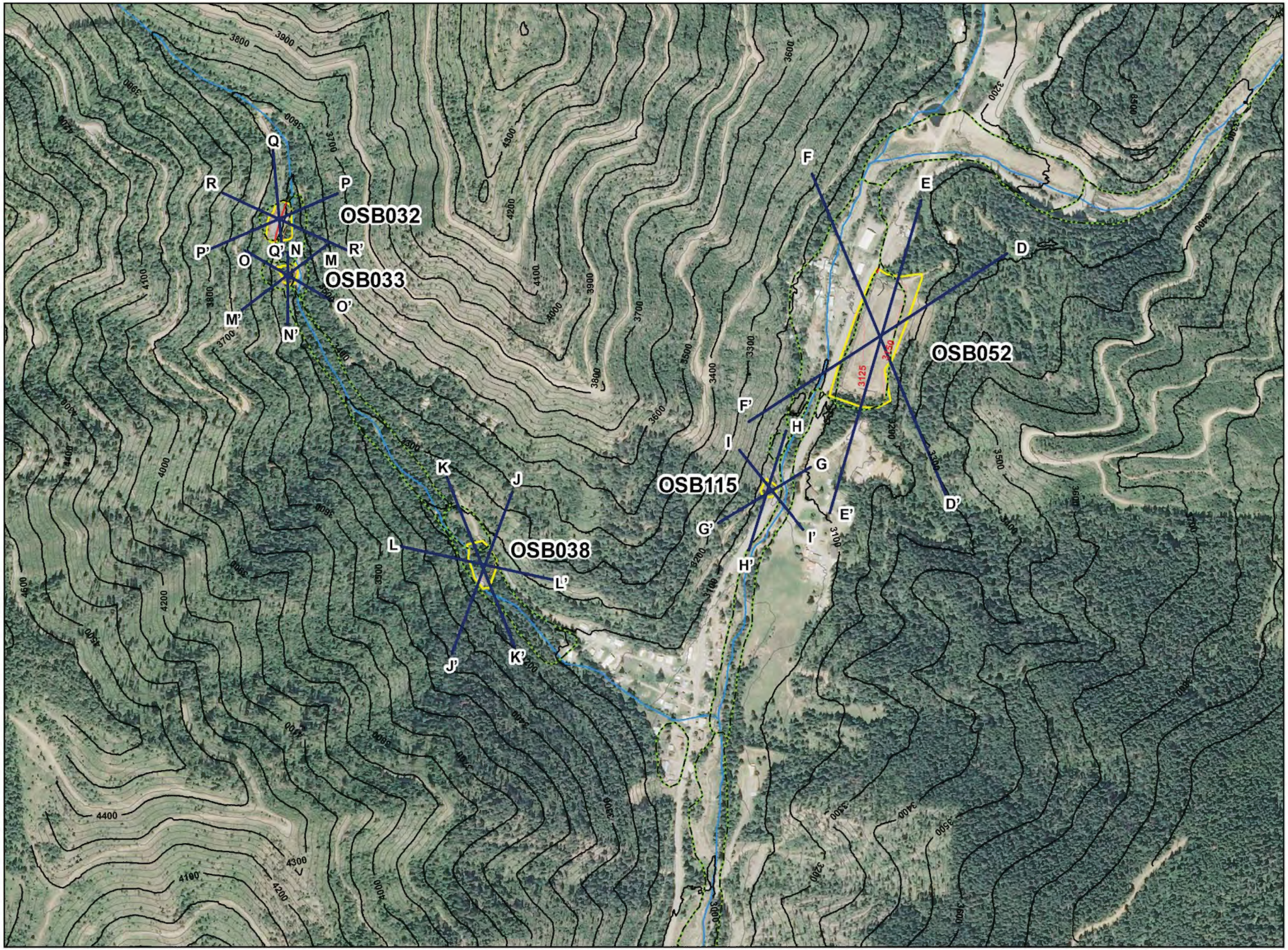
B' - B



C - C'



EXISTING GROUND
APPROXIMATE NATIVE GROUND SURFACE (REVISED 09/13/11)
APPROXIMATE NATIVE GROUND SURFACE (REVISED 07/29/11)
APPROXIMATE NATIVE GROUND SURFACE (REVISED 05/20/11)



BLM Source Area Boundary
Design Surface Exterior Boundary
Existing Major Contour (100-foot interval)
Existing Minor Contour (25-foot interval)
Cross Section Alignment
Design Surface Major Contour
Design Surface Minor Contour

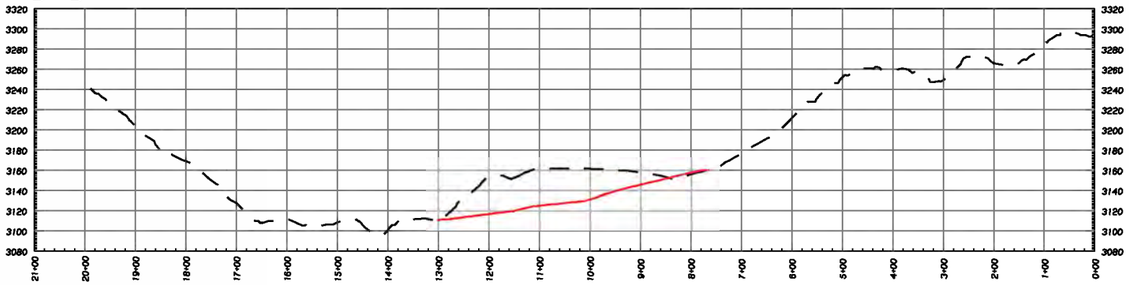
N
0 500 1,000 Feet

Source: 2006 1 meter imagery from the National Agriculture Imagery Program, 10 meter Digital Elevation Model

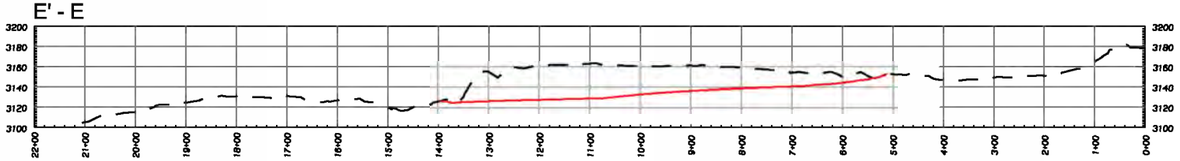
FIGURE A-4
Plan View of Ninemile Creek Watershed Source Sites (OSB032, OSB033, OSB038, OSB052, OSB115)

OSB052

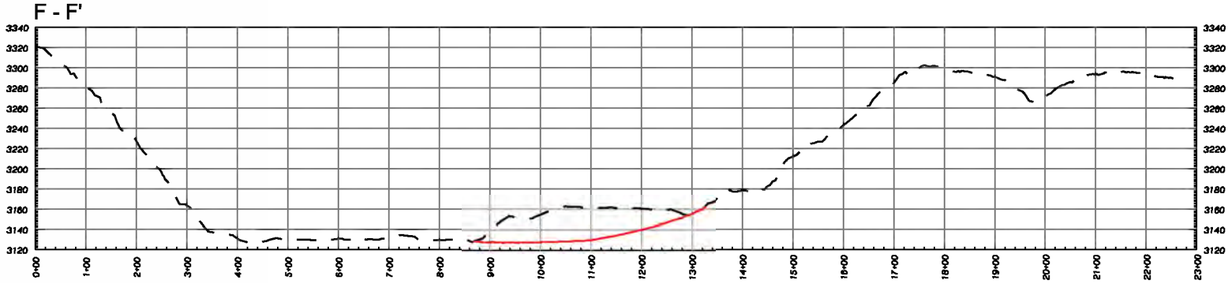
D' - D



E' - E

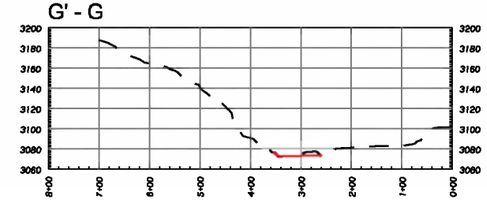


F - F'

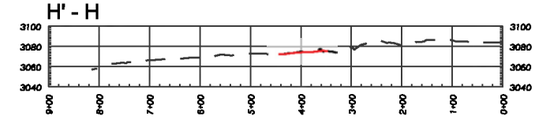


OSB115

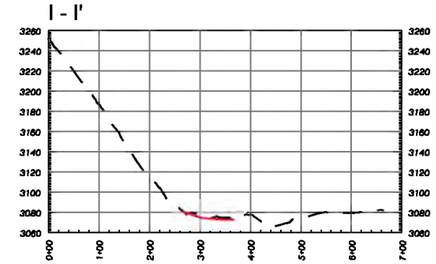
G' - G



H' - H

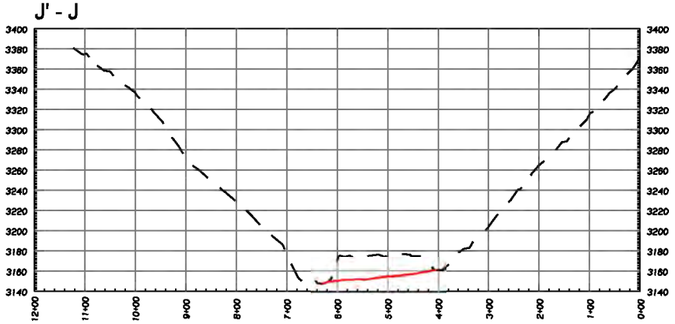


I - I'

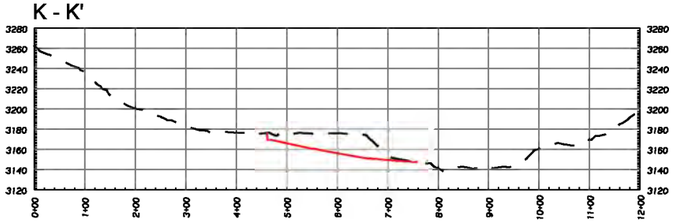


OSB038

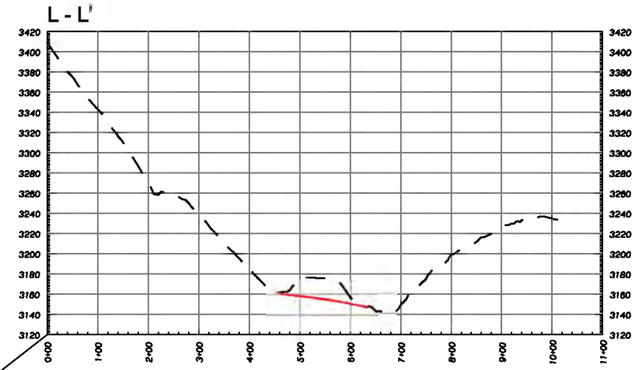
J' - J



K - K'

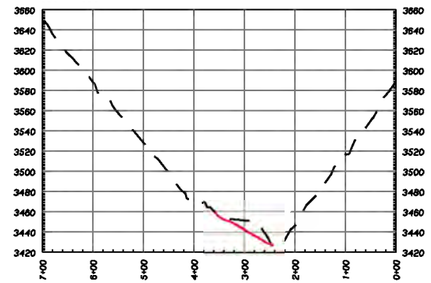


L - L'

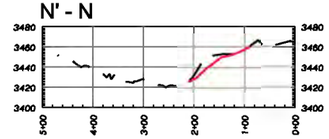


OSB033

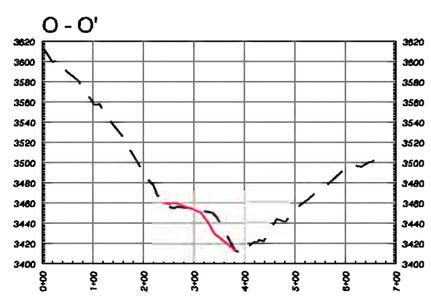
M' - M



N' - N

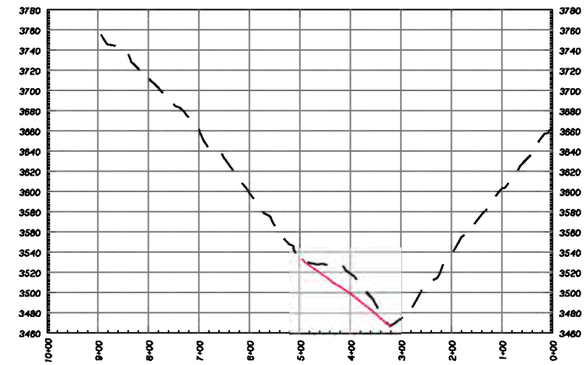


O - O'

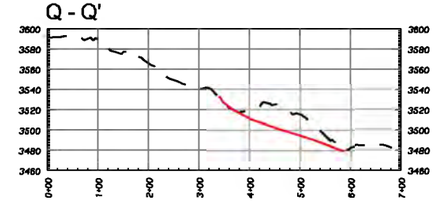
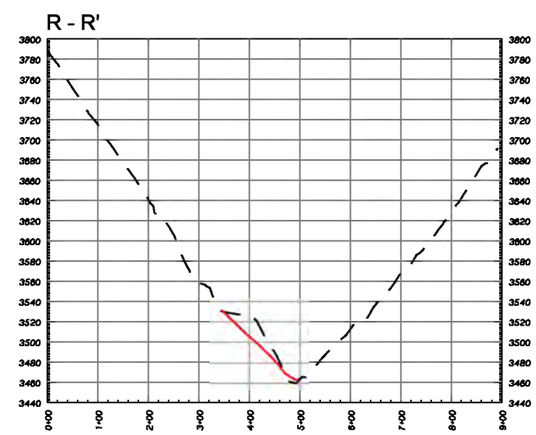


OSB032

P' - P



Q - Q'



R - R'