

APPENDIX H
CORRESPONDENCE WITH THE WYOMING NATURAL DIVERSITY
DATABASE

UNIVERSITY OF WYOMING

Wyoming Natural Diversity Database
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12 July 2005

Jim Dunder
Wildlife Management Biologist
USDI Bureau of Land Management
280 Highway 191 North
Rock Springs, WY 82901

Dear Jim,

The attached files fill your request for information regarding rare species occurrences in T17-18N R101W, Sweetwater Co, WYunty, Wyoming. Of the species that you were interested in, only one record was found in the within the request area: White-Tailed Prairie Dog ([tr_pod.xls](#)). However, several of the species you are interested in are documented in the surrounding townships; these records can be found in the files with “buffer” in the file name and are also addressed in the attached zoological and botanical comments.

For additional information, especially about codes, abbreviations, and our data dictionary (describes field headings), or for additional data requests, please consult the data request portion of our website listed under the “Products” heading at <http://www.uwyo.edu/wyndd/>

Recommended citation:

Wyoming Natural Diversity Database. 2005. Data compilation for J. Dunder, completed July 12, 2005. Unpublished report. Wyoming Natural Diversity Database, University of Wyoming, Laramie, Wyoming.

Thank you for your data request. Please do not hesitate to call if you have any questions about the search. We ask that you not disseminate these data, except for your environmental assessment, without our permission.

Sincerely,

Melanie Arnett, Database Specialist, (307) 766-2296, arnett@uwyo.edu

¹Doug Keinath will be out of the office doing field work during the summer months. During this period Melanie Arnett will prepare the zoological comments.

ZOOLOGICAL COMMENTS

Wyoming Natural Diversity Database

Prepared for:

Jim Dunder – USDI Bureau of Land Management

14 July 2005

Project Description:

T17-18N R101W, Sweetwater County, Wyoming

Habitat Notes:

Towns: Request area is approximately 20-30 miles east/southeast of Rock Springs.

Water: Black Butte Creek runs through the western portion of the request area.

Habitat: The request area consists of Wyoming Big Sage Steppe, Juniper, Desert Shrub, and Basin Rock & Soil.

Approximate Elevation: 7,000 – 8,000 feet

Zoology Comments:

Please report new occurrences of any of these species to WYNDD so that our database continues to be current and useful to future requesters. Thank you!

This data represents what we currently have in the database as well as our informed opinion on what might occur in the request area if local habitat is appropriate. Please note that absence of a species occurrence in our database is not proof that the species in question does not exist there. It is highly possible that people have never looked for, or reported, information on the species in question in the request area. Our data for private land is particularly sparse, so absence of observations on private parcels should be viewed with caution. Also, please note that (in general) only animals likely to breed or winter near the project area have been included in this list. Other animals, particularly migratory birds, may use portions of the study area in other seasons. Finally, this list includes only species that we actively track in our database, the full list of which can be found on our website (<http://uwadmnweb.uwyo.edu/wyndd/>).

Animals for which we have records in our Biotics database are presented in bold face type. Biotics records generally represent observations for which information is available to suggest persistent recurrence in the area. Animals for which we have records in our Point Observation Database (POD) are presented in italics. Point observations mean that the animal in question has been documented in the area at one time, but sufficient information is not available to conclude persistence. It is particularly important to our database that people report occurrences of populations that would allow us to add Biotics records.

Prepared by: Melanie Arnett, Database Specialist, arnett@uwyo.edu

Direct questions to: Doug Keinath, Zoologist; dkeinath@uwyo.edu

Sensitive Birds Potentially in Request Area				
Common Name	Scientific Name	Heritage Rank	Management Status	Habitat Notes
Ferruginous hawk	<i>Buteo regalis</i>	G4/S4B/S5N	USFS R2 Sensitive, Wyoming BLM Sensitive, WYGF NSS3	Open grasslands and shrublands
Golden eagle	<i>Aquila chrysaetos</i>	G5/S3B		Open grasslands and shrublands esp. around cliffs and canyons
Merlin	<i>Falco columbarius</i>	G5/S4	WYGF NSS3	Open woodlands, grasslands, and shrublands sometimes in cities in winter
Greater sage grouse	<i>Centrocercus urophasianus</i>	G4/S4	USFWS ESA Listing Denied, USFS R2 Sensitive, Wyoming BLM Sensitive	Sagebrush basins and foothills, generally close to water
Snowy plover	<i>Charadrius alexandrinus</i>	G4/SA	USFS R2 Sensitive	Sandy beaches and shores of alkaline ponds
Mountain plover	<i>Charadrius montanus</i>	G2/S2	USFWS ESA Listing Denied, USFS R2 Sensitive, WYGF NSS4	Sparse shortgrass or mixed grass prairie. Also in short-sagebrush plains. Often associated with prairie dog towns.
American avocet	<i>Recurvirostra americana</i>	G5/S3B		Marshes, ponds, and shores, esp. alkaline areas
Long-billed curlew	<i>Numenius americanus</i>	G5/S3B	USFS R2 Sensitive, Wyoming BLM Sensitive, WYGF NSS3	Meadows, pastures, shorelines, and marshes
Short-eared owl	<i>Asio flammeus</i>	G5/S2	USFS R2 Sensitive	Open grasslands, meadows, marshes, and farmland, especially around tall grass or weeds
Burrowing owl*	<i>Athene cunicularia</i> [<i>Speotyto cunicularia</i>]	G4/S3	USFS R2 Sensitive, Wyoming BLM Sensitive, WYGF NSS4	Plains and basins, often associated with prairie dog towns
Loggerhead shrike	<i>Lanius ludovicianus</i>	G4/S3	USFS R2 Sensitive, Wyoming BLM Sensitive	Open country with scattered trees and shrubs
Ash-throated flycatcher	<i>Myiarchus cinerascens</i>	G5/S3B	WYGF NSS3	Juniper woodlands
Western scrub-jay	<i>Aphelocoma californica</i> [<i>Aphelocoma coerulescens</i>]	G5/S1	WYGF NSS3	Juniper woodlands
Juniper titmouse [Plain titmouse]	<i>Baeolophus griseus</i> [<i>Parus inornatus</i>]	G5/S1	WYGF NSS3	Juniper woodlands
Bushtit	<i>Psaltriparus milesnimus</i>	G5/S1	WYGF NSS3	Juniper woodlands
Canyon wren	<i>Catherpes mexicanus</i>	G5/S2S3		Rocky canyons and cliffs
Sage thrasher*	<i>Oreoscoptes montanus</i>	G5/S5	Wyoming BLM Sensitive	Tall sagebrush and greasewood
Black-throated gray warbler	<i>Dendroica nigrescens</i>	G5/S2		Juniper woodlands

Sensitive Birds Potentially in Request Area				
Common Name	Scientific Name	Heritage Rank	Management Status	Habitat Notes
Sage sparrow*	<i>Amphispiza belli</i>	G5/S3	USFS R2 Sensitive, Wyoming BLM Sensitive	Medium to tall sagebrush shrubland
Brewer's sparrow*	<i>Spizella breweri</i>	G5/S5	USFS R2 Sensitive, Wyoming BLM Sensitive	Sagebrush foothills and medium-height sagebrush in basins. Also, mountain mahogany hills.
Scott's oriole	<i>Icterus parisorum</i>	G5/S1	WYGF NSS3	Juniper woodlands

Sensitive Mammals Potentially In Request Area				
Common Name	Scientific Name	Heritage Rank	Management Status	Habitat Notes
Silver-haired bat	<i>Lasiorycteris noctivagans</i>	G5/S3		Occur in a wide variety of habitats across Wyoming. Roosts: trees, caves, milesnes, houses
Long-eared myotis*	<i>Myotis evotis</i>	G5/S4	Wyoming BLM Sensitive, WYGF NSS2	Found in conifer forests, especially ponderosa pine. Forage over water holes and possible openings in conifer forest. Roosts: caves, buildings, milesnes.
Hoary bat	<i>Lasiurus cinereus</i>	G5/S4		Widespread and mobile, hoary bats are found in shrublands, grasslands, and aspen-pine forests near roosting habitat. Roosts: deciduous trees.
Spotted bat	<i>Euderma maculatum</i>	G4/S3	USFS R2 Sensitive, USFS R4 Sensitive, Wyoming BLM Sensitive, WYGF NSS2	Cliff roosting, generally near perennial water in a variety of habitats (including desert, shrub-steppe, and evergreen forest).
Townsend's big-eared bat	<i>Corynorhinus townsendii</i> [<i>Plecotus townsendii</i>]	G4/S2	USFS R2 Sensitive, USFS R4 Sensitive, Wyoming BLM Sensitive, WYGF NSS2	Hibernates and day-roosts in caves and milesnes and will use buildings as day roosts. Typical habitat includes desert shrublands, pinyon-juniper woodlands, and dry conifer forests, generally near riparian or wetland areas.
Pallid bat	<i>Antrozous pallidus</i>	G5/S1	WYGF NSS2	Generally found in desert and grasslands. Roosts in small crevices in buildings, rocks and open places.
Wyoming ground squirrel	<i>Spermophilus elegans</i>	G5/S3S4		Found in open habitats from sage grasslands to alpine meadows.
White-tailed prairie dog	<i>Cynomys leucurus</i>	G4/S3	USFWS ESA Listing Denied, USFS R2 Sensitive, Wyoming BLM Sensitive, WYGF NSS3	Found in grassland and shrub-grass communities, often with loose, sandy soils. Colonies are usually not as large or dense as black-tailed prairie dog colonies.
Wyoming pocket gopher	<i>Thomomys clusius</i> [<i>Thomomys talpoides</i>]	G2/S2	USFS R2 Sensitive, Wyoming BLM Sensitive	Dry upland areas (ridgetops, etc.) characterized by loose, gravel-like soil. Endemic to Wyoming, they are often observed near Bidger's Pass.

Sensitive Mammals Potentially In Request Area				
Common Name	Scientific Name	Heritage Rank	Management Status	Habitat Notes
Olive-backed pocket mouse	<i>Perognathus fasciatus</i>	G5/S4	WYGF NSS3	Dry habitats ranging from gravelly soils to sandy areas of short grass prairies to sand dunes.
Canyon mouse	<i>Peromyscus crinitus</i>	G5/S1	WYGF NSS3	Rangewide canyon mice are found in and near rock crevices. In Wyoming they have been found in a few localities around sandstone outcrops near limber and juniper woodlands, typically with sandy soils.
Swift fox	<i>Vulpes velox</i>	G3/S2	USFWS ESA Listing Denied, USFS R2 Sensitive, Wyoming BLM Sensitive, WYGF NSS3	Shortgrass prairie, but can be found in sage-grasslands. They are particularly found in sparsely vegetated areas such as prairie dog towns.
Black-footed ferret*	<i>Mustela nigripes</i>	G1/S1	USFWS Endangered, WYGF NSS1	Always occur in or near prairie dog colonies, generally on short or mixed-grass prairie.

Sensitive Herptiles Potentially in Request Area				
Common Name	Scientific Name	Heritage Rank	Management Status	Habitat Notes
Tiger salamander	<i>Ambystoma tigrinum</i>	G5/S4	WYGF NSS4	Found in fairly moist environments ranging from rodent burrows to window wells to burrows in sand dunes. Larvae found in intermittent streams, ponds, and lakes.
Great Basin spadefoot toad*	<i>Spea intermontana</i> [<i>Scaphiopus intermontanus</i>]	G5/S3	Wyoming BLM Sensitive, WYGF NSS4	Sagebrush communities at lower elevations. Wyoming occurrences are mostly in the Wyoming Basin and the Green River Valley.
Northern leopard frog	<i>Rana pipiens</i>	G5/S3	USFS R2 Sensitive, Wyoming BLM Sensitive, WYGF NSS4	Found near permanent water in areas up to about 9,000 feet Lower elevation sites are usually swampy cattail marshes and higher ones tend to be beaver ponds.
Great Basin gopher snake	<i>Pituophis melanoleucus deserticola</i>	G5/T5/S3		Sagebrush communities in arid habitats in southwestern Wyoming.

Sensitive Fish Potentially in Request Area				
Common Name	Scientific Name	Heritage Rank	Management Status	Habitat Notes
Bluehead sucker	<i>Catostomus discobolus</i>	G4/S3	USFS R2 Sensitive, Wyoming BLM Sensitive, WYGF NSS1	Occurs rarely in larger streams and rivers of the Little Snake, Bear, Green and Snake River drainages.

Botany Comments

Wyoming Natural Diversity Database

Prepared for:

Jim Dunder – USDI Bureau of Land Management

12 July 2005

Project Description:

T17-18N R101W, Sweetwater Co, WYunty, Wyoming

There are no known RSFO Special Status Species plant species in the request area. However, in the adjacent townships there are two known RSFO Special Status Species plant species: *Astragalus nelsonianus* (Nelson’s mileslkvetch) and *Descurainia torulosa* (Wyoming tansymustard).

Astragalus nelsonianus is a regional endemic of Wyoming, Colorado, and Utah. Over half of its range is in Wyoming. It is usually found in sparsely vegetated shrub and grassland communities and on disturbed or eroded soils.

Descurainia torulosa is a Wyoming state endemic restricted to the Rock Springs Uplift and southern Absaroka Range in Sweetwater, Fremont, Park, and Teton counties. It is found in sandy soil at the base of cliffs composed of volcanic breccia or sandstone, under slight overhangs, in cavities in the volcanic rock, or on ledges.

Species abstracts providing description, more complete habitat characterization, distribution, and references are available on the WYNDD homepage (<http://www.uwo.edu/WYNDD/>).

The table below provides a summary of each species with its status and ranks.

Common name	Scientific name	Tracked?	Global rank	State rank	Federal status
Nelson’s mileslkvetch	<i>Astragalus nelsonianus</i>	Watch	G3	S3	Wyoming BLM Sensitive
Wyoming tansymustard	<i>Descurainia torulosa</i>	Y	G1	S1	U.S. Forest Service Regions 2 & 4 and Wyoming BLM Sensitive

Please note that the absence of a species or occurrence from this list does not mean it does not occur in the area, simply that no known observations have been made there. Many locations in Wyoming, particularly on private lands, have not been botanically surveyed.

If you have any questions about the plant species or the data provided, please feel free to contact WYNDD.

Please report new occurrences of any of these species to WYNDD so that our database continues to be current and useful to future requesters. Thank you!

Prepared by:

Joy Handley, Assistant Botanist

thuja@uwyo.edu

Data Request Data Dictionary and File Naming Conventions

Wyoming Natural Diversity Database

This Data Dictionary describes the column headings (see table) and file naming conventions (bold words on this page) for ArcView shapefiles and Excel spreadsheets generated for from our Biotics and POD databases.

ArcView shapefiles are in geographic (decimal degrees) North American Datum 1983.

A species or natural community is referred to as an Element.

Biotics Element Occurrence Representation

An Element Occurrence is an area of land and/or water in which a species or natural community is, or was, present. An Element Occurrence should have practical conservation value for the Element as evidenced by potential continued (or historical) presence and/or regular recurrence at a given location. For species Elements, the Element Occurrence often corresponds with the local population, but when appropriate may be a portion of a population (e.g., long distance dispersers) or a group of nearby populations (e.g., metapopulation). For community Elements, the Element Occurrence may represent a stand or patch of a natural community, or a cluster of stands or patches of a natural community. Because they are defined on the basis of biological information, EOs may cross jurisdictional boundaries.

An Element Occurrence Representation (EOREP) is a data management tool that has both spatial and tabular components including a mappable feature and its supporting database. Element Occurrences are typically represented by bounded, mapped areas (polygons) of land and/or water. Element Occurrence Representations are most commonly created for current or historically known occurrences of natural communities or native species of conservation interest. They may also be created, in some cases, for extirpated occurrences. All Element Occurrence REPs encompass one or more observations (Source Features).

Biotics source (Source Feature)

Source Features represent individual observations of a specific element at a specific place and time. They can be represented by points, lines, or polygons. If certain criteria (e.g. “evidence of breeding” or “within X kilometers of another Source Feature of the same Element with no separation barriers”) are met, individual Source Features are incorporated into an Element Occurrence Representation. Source Features that do not qualify for inclusion in an Element Occurrence REP remain independent (INDEPEN_SF = Y).

The source feature attribute table will be populated with observation/survey data as each record is revised according to the new data methodology in Biotics. Until the records are revised, they will only contain identification numbers and the text “HDMS DEFAULT CONVERSION VALUES” in the DESCRIPTOR field. Also, please note that the point source feature for these unrevised records is equivalent to the centroid of the Element Occurrence (from the old BCD methodology). Observation and survey data for these records can still be found in the Element Occurrence _DATA field in Element Occurrence REP files (the EOREP and related SOURCE files can be cross-referenced using the ‘Element Occurrence _ID’ field). Please bear with us during this transitional period.

Point Observation Database

Point Observation Database point locations are carried over from our previous system; they are animal Elements comparable to Source Features but not yet detailed in Biotics. Please note that files containing negative survey data (the Element was searched for but not found: POS_NEG = 0) are in separate files

with the naming convention pod_negative. Note also that some fields are longer than the 254-character limit imposed on dbase files. If you are missing information that you require, please contact us with the RECNUM for the record(s) you are interested in.

Sensitive

Separate shapefiles are made for data that are sensitive in both Biotics and POD. These records are provided at the township scale only. Data are considered sensitive if they meet one or more of the following criteria:

- Records of source features and/or element occurrences on private land that are not documented in publicly available references, but for which WYNDD has permission from the land owner to archive and disseminate at the township level.
- Records of source features and/or element occurrences submitted to WYNDD by an outside party who has requested that the data be treated as sensitive.
- Source features and/or element occurrences that are especially sensitive to disturbance, over-harvest, over-collection, intentional destruction, or unintentional destruction.
- Element occurrences that encompass one or more source features that are considered sensitive for any reason.
- tr (township/range) Refers to the township and range of request area.
- buffer (buffer) Refers to the buffer (of townships) around request area, if any.
- boundary (boundary of township/range and/or buffer).
- Italics indicate that data are sensitive and specific location information is not released.
- .xls only = data are in Excel spreadsheets, but not ArcView shapefiles.

Biotics Source	Biotics EOREP	POD	Definition
FEATURE_ID	FEATURE_ID		A unique identification code for the shape in Biotics.
EO_ID	EO_ID		Identification number for the Element Occurrence (EO) in Biotics.
SOURCE_ID			Identification number for the Source Feature in Biotics.
		RECNUM	A unique record number in POD.
SHAPE_TYPE .xls only		SHAPE	Whether the shape is a point, line, or polygon.
		POS_NEG (negative records are in a separate shapefile)	Species presence: 1 - present 0 - absent Records with a negative value indicate that a survey was conducted but the Element was not found.

Biotics Source	Biotics EOREP	POD	Definition
ELCODE	ELCODE	ELCODE	Element code assigned to each species by NatureServe.
SNAME	SNAME	SNAME	Scientific name.
COMNAME	COMNAME	CNAME	Common name.
EO_NUM	EO_NUM		Element Occurrence number for the element.
INDEPEN_SF			Independent Source Feature: Y - Yes, Source Feature did not qualify for inclusion in an EOREP. N - No, Source Feature is part of an EOREP.
DATA_SENS	DATA_SENS	SENSITIVE	Data are sensitive: Y - Yes. Specific location is not released. N - No.
ID_CONFIRM	ID_CONFIRM	IDENTIFIED	Indicates whether identification has been confirmed by a reliable individual: Y - Yes N - No ?/Q - Questionable U - Unknown
BUFFERDIST DIST_UNIT	PRECISION ACCURACY	PRECISION	SOURCE - BUFFERDIST Estimated accuracy of the location given as a buffered distance (represented in the EOREP shapefile). SOURCE - DIST_UNIT Unit of distance measure for BUFFERDIST. EOREP and POD - PRECISION Estimated precision of the data (old method, carried over from previous system; as records are updated in Biotics this value is deleted and the next field is populated): G - Low - within 7.5 km M - Medium - within 700 S - High - within 20 m EOREP – ACCURACY Estimated accuracy of the data (new method, populated as data are updated in Biotics): Very High (>95%) High (>80%, <=95%) Medium (>20%, <=80%) Low (>0%, <=20%) Unknown
OBSERVER .xls only		OBSERVER	Observer.

Biotics Source	Biotics EOREP	POD	Definition
OBS_DATE (If multiple observations are documented at one location, more than one date will appear in this field. Observation data can be found in the supplemental Excel spreadsheet).	SURVEYDATE FIRST_OBS LAST_OBS	YEAR MONTH DAY	SOURCE - OBS_DATE Observation date(s). EOREP - SURVEY DATE Date of the last known survey at this location. EOREP - FIRST_ - and LAST_OBS The first and last date, respectively, the element was observed at this location. POD - YEAR, MONTH, and Day Year of observation. Month of observation. Day of observation.
OBS_DATA .xls only	EO_DATA	BIOLOGICAL	Details of each observation, including biological.
LITERATURE .xls only	BESTSOURCE	LITERATURE	SOURCE and POD - LITERATURE Literature source for specific observation. EOREP - BESTSOURCE The best source of information for the EOREP.
COUNTY .xls only	COUNTY	COUNTY	County. POD - the first four letters only.
LOCATOR	TOWN_RANGE	TOWN RANGE SECTION	SOURCE - LOCATOR Township/Range/Section (format: 045N118W Sec 23 SE4) and sometimes a brief description of specific location. EOREP - TOWN_RANGE Township/Range. POD - TOWN, RANGE, and <i>SECTION</i> Township, Range, <i>Section</i> .
TRS_NOTE .xls only	TRS_NOTE	TRS_COM	Quarter quarter sections.
	MAPSHEET		USGS 1:24000 state quad code.
	DIRECTIONS	LOCATION	Directions to, or description of, the location.
	MIN_ELEV		Minimum elevation in feet
	MAX_ELEV		Maximum elevation in feet
	GEN_DESC		General habitat description for the location.
TRACKSTAT	TRACKSTAT	SEOTRACK	Tracking Status: Y - Element tracked by WYNDD. W - Element watched for potential tracking by WYNDD.
G_RANK	G_RANK	GRANK	Global Heritage rank assigned by NatureServe.

Biotics Source	Biotics EOREP	POD	Definition
S_RANK	S_RANK	SRANK	State Heritage rank assigned by WYNDD biologists.
USESA	USESA	USFWS_ESA	Status under the Endangered Species Act.
		ESA_CODE	Endangered Species Act status code.
AGENCYSTAT	AGENCYSTAT	USFS_R2 USFS_R4 WY_BLM WGFD	Status assigned by: U.S. Forest Service (Region 2 and 4) Wyoming BLM Wyoming Game and Fish Department
		DOCUMENTAT	Documentation comments.
DESCRIPTOR	EO_TYPE	PO_TYPE	A brief description of the Source Feature or Element Occurrence. When the DESCRIPTOR field in Biotics SOURCE files is populated with "HDMS DEFAULT CONVERSION VALUES", use the EOREP file to view data by cross-referencing EO_ID. We are currently in transition from the old BCD methodology to Biotics.
	MANAGED_A REA		Land management area (i.e. agency land ownership).
	SPECIMEN		Specimen or voucher information.
	SURVEYTYPE		Survey type.
	SIZE_OF_EO		Size of Element Occurrence in acres unless otherwise noted.
	INVENT_COM		Inventory comments.

APPENDIX I
CUMULATIVE PERSONAL EARNINGS BY INDUSTRY FOR 2000

Industry Type	Earnings in \$1,000s
Farm earnings	305
Nonfarm earnings	952,591
Private earnings	813,637
Agricultural services, forestry, fishing & other	1,390
Agricultural services	1,336
Forestry, fishing, and other	54
Forestry	0
Fishing	54
Other	0
Mining	318,679
Metal Mining	(D)
Coal Mining	(D)
Oil and gas extraction	151,471
Nonmetallic minerals, except fuels	130,377
Construction	56,715
General building contractors	7,748
Heavy construction contractors	28,349
Special trade contractors	20,618
Manufacturing	115,381
Durable goods	2,911
Lumber and wood products	0
Furniture and fixtures	0
Stone, clay, and glass products	1,843
Primary metal industries	0
Fabricated metal products	0
Industrial machinery and equipment	1,063
Electronic and other electric equipment	0
Motor vehicles and equipment	0
Other transportation equipment	(D)
Instruments and related products	0
Miscellaneous manufacturing industries	(D)
Ordinance	(N)
Nondurable goods	112,470
Food and kindred products	(D)
Tobacco products	0
Textile mill products	(D)
Apparel and other textile products	0
Paper and allied products	0
Printing and publishing	1,605
Chemicals and allied products	109,600
Petroleum and coal products	0
Rubber and miscellaneous plastics products	0
Leather and leather products	0
Transportation and public utilities	100,301

Industry Type	Earnings in \$1,000s
Railroad transportation	(D)
Trucking and warehousing	21,492
Water transportation	(D)
Other transportation	5,714
Local and interurban passenger transit	1,846
Transportation by air	1,965
Pipelines, except natural gas	0
Transportation services	1,903
Communications	7,787
Electric, gas, and sanitary services	44,935
Wholesale trade	21,856
Retail trade	67,451
Building materials and garden equipment	4,677
General merchandise stores	8,439
Food stores	10,978
Automotive dealers and service stations	18,342
Apparel and accessory stores	1,250
Home furniture and furnishings stores	3,496
Eating and drinking places	15,581
Miscellaneous retail	4,688
Finance, insurance, and real estate	26,455
Depository and nondepository institutions	(D)
Other finance, insurance, and real estate	(D)
Security and commodity brokers	(D)
Insurance carriers	1,209
Insurance agents, brokers, and services	2,629
Real estate	9,273
Combined real estate, insurance, etc.	(N)
Holding and other investment offices	2,761
Services	105,409
Hotels and other lodging places	10,987
Personal services	5,011
Private households	(D)
Business services	22,288
Automotive repair, services, and parking	6,235
Miscellaneous repair services	4,138
Amusement and recreation services	1,384
Motion pictures	578
Health services	22,721
Legal services	3,910
Educational services	(D)
Social services	6,136
Museums, botanical, zoological gardens	0
Membership organizations	3,596

Industry Type	Earnings in \$1,000s
Engineering and management services	13,744
Miscellaneous services	(D)
Government and government enterprises	138,954
Federal, civilian	16,575
Military	3,208
State and local	119,171
State government	9,240
Local government	109,931
<p>(E) The estimate shown here constitutes the major portion of the true estimate.</p> <p>(D) Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.</p> <p>(L) Less than \$50,000</p> <p>(N) Data not available for this year.</p> <p>Source: U.S. Bureau of Economic Analysis</p>	

APPENDIX J
FEDERAL AND STATE MITIGATION AND MONITORING
REQUIREMENTS INHERENT TO THE PROPOSED ACTION

In the case of surface coal mining, various federal and state law require mitigation and monitoring designed to ensure that reclamation standards are met following mining. The major mitigation measure and monitoring measure that are required by state or federal regulation are summarized in the following table. More specific information about some of these mitigation and monitoring measures have been described in Chapter 2 – Proposed Action.

Measures that are required by regulation are considered to be part of the Proposed Action. These requirements, mitigation plans, and monitoring plans are in place as part of the current approved mining and reclamation plan for the existing Black Butte Mine. If the LBA tract is leased, these requirements, mitigation plans, and monitoring plans would be included in the mining and reclamation plan amendment required for the LBA tract and the project area as a whole. This mining and reclamation plan would have to be approved before mining could occur on the tract, regardless of who acquires the tract.

If impacts are identified during the leasing process that are not mitigated by existing required mitigation measures, BLM can include additional mitigation measures (stipulations) on the new lease within the limits of its regulatory authority. In general, the levels of mitigation and monitoring required for surface coal mining by SMCRA and Wyoming state law are more extensive than those required for other surface disturbing activities; however, concerns are periodically identified that are not monitored or mitigated under existing procedures.

The following page presents a table of required mitigation and monitoring measures inherent in the Proposed Action for resources with identified issues.

Required Mitigation and Monitoring Measures Inherent in the Proposed Action for Resources with Identified Issues

Resource	Regulatory Compliance or mitigation Required by Stipulations, State, or Federal Law	Monitoring
Air Quality	Dispersion modeling of Mining plan for annual average particulate pollution impacts on ambient air; Using particulate pollution control technologies; Using work practices designed to minimize fugitive particulate emissions; Using EPA- or state-mandated BACT, watering or using chemical dust suppression on haul roads and exposed soils, Containment of truck dumps and primary crushers; Revegetation of exposed soils, Watering of active work areas, Reclamation plan to minimize surface disturbances subject to wind erosion, Paving of access roads, Haul truck speed limits, Following voluntary and required measures to avoid exposing the public to NO2 from blasting clouds, including: Monitoring weather and atmospheric conditions prior to decisions to blast, Minimizing blast sizes, Posting signs on public roads.	On-site air quality monitoring for PM ₁₀ ; off-site ambient monitoring for PM ₁₀ ; meteorological monitoring; on-site compliance inspections.
Geology & Minerals	Identifying and selectively placing or mixing chemically or physically unsuitable overburden materials to minimize adverse effects to vegetation or groundwater. Restoring to approximate original contour or other approved topographic configuration.	LQD requires monitoring in advance of mining to detect unsuitable overburden. LQD checks as-built vs. approved topography with each annual report.

Resource	Regulatory Compliance or mitigation Required by Stipulations, State, or Federal Law	Monitoring
Soil	Salvaging soil suitable to support plant growth for use in reclamation; Protecting soil stockpiles from disturbance and erosional influences; Selectively placing at least four feet of suitable overburden on the graded backfill surface below replaced topsoil to meet guidelines for vegetation root zones.	Monitoring vegetation growth on reclaimed areas to determine need for soil amendments.
Surface Water	Building and maintaining sediment control ponds or other devices during mining; restoring approximate original drainage patterns during reclamation;	Monitoring quality of discharges;
Groundwater	Evaluating cumulative impacts to water quantity and quality associated with proposed mining; Replacing existing water rights that are interrupted, discontinued, or diminished by mining with water of equivalent quantity and quality.	Monitoring wells track water levels in overburden, coal, interburden, underburden, and backfill.
Vegetation	Permanently revegetate reclaimed areas according to a comprehensive revegetation plan using approved permanent reclamation seed mixtures consisting predominantly of species native to the area; Reclaiming 20 percent of reclaimed area with native shrubs at a density of one per square meter; Controlling erosion on reclaimed lands prior to seeding with final seed mixture using mulching, cover crops, or other approved measures; Chemically and mechanically controlling weed infestation; Direct hauling of topsoil, whenever possible; Planting sagebrush; Creating depressions and rock piles; Using special planting procedures around rock piles; Posting reclamation bond covering the cost of reclamation. Monitoring revegetation growth and diversity until release of final reclamation bond (minimum 10 years).	Monitoring erosion to determine need for corrective action during establishment of vegetation. Using annual monitoring during revegetation evaluation to determine suitability for post-mining land uses.
Wildlife (including special status species)	Restoring pre-mining topography to the maximum extent possible; Planting a diverse mixture of grasses, forbs and shrubs in configurations beneficial to wildlife; Raptor-proofing power transmission poles; Increasing habitat diversity by creating rock clusters and shallow depressions on reclaimed land; Reducing vehicle speed limits to minimize mortality; Instructing employees not to harass or disturb wildlife; Avoiding bald eagle disturbance; Using raptor safe power lines; Preparing raptor mitigation plans.	Baseline and annual wildlife monitoring surveys; Annual monitoring for MBHFI.
Wild Horses Need language	Suitably restoring reclaimed areas	
Land Use	Suitably restoring reclaimed area for historic uses (grazing and wildlife).	Revegetation evaluation to determine suitability for post mining land uses.
Visual Resources	Restoring landscape character during reclamation through return to approximate original contour and revegetation with native species.	No specific monitoring program.

Resource	Regulatory Compliance or mitigation Required by Stipulations, State, or Federal Law	Monitoring
Cultural Resources	<p>Conducting Class I and III surveys to identify cultural properties on all state and federal lands and on private lands affected by federal undertakings;</p> <p>Consulting with SHPO to evaluate eligibility of cultural properties for the NRHP;</p> <p>Avoiding or recovering data from significant cultural properties identified by surveys, according to an approved plan;</p> <p>Notifying appropriate federal personnel if historic or prehistoric materials are uncovered during mining operations;</p> <p>Instructing employees of the importance of and regulatory obligations to protect cultural resources.</p> <p>Notifying Native American tribes with known interest in this area of leasing action and request for help in identifying potentially significant religious or cultural sites</p>	<p>Monitoring mining activities during topsoil stripping;</p> <p>Cessation of activities and notification of authorities if unidentified sites are encountered during topsoil removal.</p>
Socioeconomics	<p>Paying royalty and taxes as required by federal, state, and local regulations.</p>	<p>Surveying and reporting to document volume of coal removed.</p>

APPENDIX K
NEAR-FIELD MONITORING PROTOCOL AND RESULTS

POLLUTANT DISPERSION MODEL ASSUMPTIONS

General Assumptions

Several key assumptions will apply to the inventorying of emissions and performance of atmospheric dispersion modeling for the Pit 14 EIS:

- The entire Black Butte mine will be analyzed for emissions and modeled for ambient impacts, with Pit 14 included as a maintenance tract to extend existing mining operations.
- PM₁₀ and NO_x emissions will be projected for the maximum-production-case of 7 million tons per year, based on the existing permit limit. Within this scenario, the year with maximum PM₁₀ emissions will be modeled for ambient impacts.
- Average annual concentrations of the criteria pollutants PM₁₀ and NO₂ will be modeled.

Dispersion Modeling Assumptions and Proposed Protocol

The purpose of the modeling will be to predict air quality impacts from the proposed project. Impacts will be predicted in the form of annual average ambient concentrations of PM₁₀ and NO₂, using the ISCLT3 dispersion model (version 95250). Assumptions and model options used in the analysis include:

- Calculations for annual concentration
- Emission rates do not vary temporally
- Rural dispersion
- Regulatory default option
- Final plume rise
- Stack-tip downwash
- Buoyancy induced dispersion
- Default wind profile exponents
- Default vertical potential temperature gradients
- No exponential decay for rural mode
- Flat terrain
- No flagpole receptors
- No dry deposition algorithms to be used
- Pollutant types: PM₁₀, NO₂

Point sources are not located near buildings. Therefore, building downwash effect on point sources will not be considered in the analyses.

Emission Sources

This modeling study treats the proposed lease as a maintenance tract; therefore all sources will be included in the impact analyses. These include both Pit 14 sources and existing Black Butte mine sources as identified in the mine plan. PM₁₀ and NO_x emission sources will each be quantified and spatially coordinated for the worst-case (i.e. highest emissions) year during the projected life of Pit 14. Emission factors from Wyoming DEQ Air Quality Division and EPA AP-42 guidance documents will be used to quantify annual PM₁₀ and NO_x emissions. Where emission control technologies are employed, applicable control efficiencies will be applied to these emission factors.

PM₁₀ sources treated as area sources will include:

- The active pit areas for topsoil stripping, blasting, overburden excavation and coal loading.
- Haul roads used for coal and overburden haulage.
- Total disturbed areas subject to wind erosion such as access roads, storage and parking facilities, pre-stripped topsoil areas, etc.

- Overburden backfill areas and stockpiles, if applicable.
- Topsoil stockpiles.

Some of the PM₁₀ sources are best represented in the model as point sources. They include a truck dump and hopper at Pit 8, a crusher and train loadout at the Mine headquarters, and conveyor transfer points. For modeling, the emissions from these sources will be represented as coming from a 1 meter diameter stack at ambient temperature and having no exit velocity.

Potential sources of NO_x will be identified and quantified for the projected, worst-case PM₁₀ year. All NO_x sources from the proposed project will be treated as area sources, including equipment tailpipe emissions and blasting emissions. NO_x emissions will be quantified in terms of total NO_x and NO₂. The criteria pollutant NO₂ will be modeled using ISC3LT. The modeled sources of NO₂ emissions in Pit 14 will include:

- Gases produced from blasting (NO_x emissions from blasting will be assumed to contain 1 ton of NO for every 2.4 tons of NO₂) (Chaiken et al 1974).
- Gases released from tailpipes of diesel-powered mobile equipment and gasoline-powered service vehicles (equipment NO_x emissions are assumed to be 90% NO and 10% NO₂) (Cole and Summerhays 1979, EPA 1997).

Receptors

PM₁₀ and NO₂ impacts will be estimated at receptors on a 500-meter, rectangular grid, emanating outward from the combined boundaries of the Pit 14 lease and the existing mine permit. The receptor grid will extend at least 5 kilometers in all directions from these boundaries. If the model predicts significant impacts (concentrations greater than 1 µg/m³) beyond 5 kilometers, the receptor grid will be expanded accordingly. Grid spacing beyond 5 kilometers will be 1000 meters. In addition, points around the lease/permit boundary, spaced 250 meters apart, will form a boundary receptor grid. Receptors will be on flat terrain (no elevation input).

Meteorological Data

Near-surface meteorological data used in this impact analysis were collected at the Black Butte Mine during a three-year period from 1/1/2002 through 12/31/2004. This measurement site is located approximately 8 miles northeast of the Pit 14 site, at an elevation of approximately 6,600 ft. above sea level. Anemometer height is 10 meters. All meteorological instruments meet or exceed EPA specifications. The quality assurance and processing of meteorological data also meet EPA requirements. A wind speed summary and wind rose will be generated from the meteorological data.

Meteorological data from the Black Butte monitoring site will be input to the ISC3LT model. Pasquill-Gifford stability class will be determined for each hour of data using the lateral turbulence criteria (σ_{θ}) for the initial estimate, then wind-speed adjusted for determining the final estimate. Hourly data will be processed to produce a joint frequency distribution (JFD) for the year 2004. Averaging period will be three full years. Average mixing heights will be taken from annual average values for Wyoming, obtained from the Wyoming DEQ Air Quality Division. Ambient temperatures will be input in the form of 3-year averages for each of the six stability classes.

Modeling Outputs

- ISC3 main output print file, containing receptor concentrations as annual average PM₁₀ and NO₂ (µg/m³) for worst-case year.
- Top 10 receptor concentrations of annual average PM₁₀ and NO₂ in worst-case year.
- ISC3 plot file with receptor concentrations and coordinates, from which to generate isopleth maps for worst-case year.
- Isopleth maps (contour lines of constant concentration) will be generated for PM₁₀ and NO₂. Isopleths will be overlain on the area map, which will show the Pit 14 lease boundary, mine permit boundary, and receptor grid area.

2010 PM₁₀ EMISSION SOURCE INVENTORY

Source	Area or Point Source Name	Allocation Basis	Units	Aggregate PM ₁₀ TPY	Allocated PM ₁₀ TPY	Total PM ₁₀ TPY by Source
Primary Crusher	Primary Crusher	2,269,000	tons	1.53	1.53	1.53
Secondary Crusher	Secondary Crusher	7,000,000	tons	4.73	4.73	4.73
Train Loadout	Train Loadout	7,000,000	tons	29.40	29.40	29.40
Uncontrolled Conveyor Belt Transfer	Belt Transfer	4,731,000	tons	12.06	12.06	12.06
Pit 8 Truck Dump Hopper	Pit 8 Truck Dump	4,731,000	tons	9.05	9.05	
Pit 8 Feeder Breaker	Pit 8 Truck Dump	4,731,000	tons	3.19	3.19	12.24
Main Stockpile	Main Stockpile	1,500,000	tons	43.55	43.55	43.55
Blade	Pit 10 Haul Road	12,319	hours	22.44	5.37	
Coal Haul Truck	Pit 10 Haul Road	1,863,000	tons	41.47	18.70	
Light Vehicles	Pit 10 Haul Road	50,000	hours	123.52	8.23	
Water Truck	Pit 10 Haul Road	2,591	hours	0.83	0.20	32.50
Highwall Miner Coal Discharge	Pit 10 Production	1,863,000	tons	3.56	3.56	
Coal Loading	Pit 10 Production	1,863,000	tons	2.36	0.63	4.19
Blade	Pit 11 Haul Road	12,319	hours	22.44	6.55	
Coal Haul Truck	Pit 11 Haul Road	2,269,000	tons	41.47	22.77	
Light Vehicles	Pit 11 Haul Road	200,000	hours	123.52	32.94	
Water Truck	Pit 11 Haul Road	2,591	hours	0.83	0.24	62.50
Coal Blasting	Pit 11 Production	2,269,000	tons	0.40	0.18	
Dozer	Pit 11 Production	16,020	hours	10.56	10.56	
Coal Loading	Pit 11 Production	2,269,000	tons	2.36	0.77	
OB Blasting	Pit 11 Production	19,240,000	bey	0.12	0.07	
OB Dragline Excavation	Pit 11 Production	19,240,000	bey	76.49	76.49	88.06
Blade	Pit 14 Haul Road	12,319	hours	22.44	8.27	
Coal Haul Truck	Pit 14 Haul Road	2,868,000	tons	26.57	26.57	
Light Vehicles	Pit 14 Haul Road	200,000	hours	123.52	32.94	
Water Truck	Pit 14 Haul Road	2,591	hours	0.83	0.31	68.09
Coal Blasting	Pit 14 Production	2,868,000	tons	0.40	0.23	
Dozer	Pit 14 Production	16,025	hours	10.56	10.56	
Coal Loading	Pit 14 Production	2,868,000	tons	2.36	0.97	
OB Blasting	Pit 14 Production	11,925,000	bey	0.12	0.05	
OB Dragline Excavation	Pit 14 Production	11,925,000	bey	76.51	76.51	88.31
Dozer	Pit 3 Reclamation	7,310,000	bey	6.58	6.58	6.58
Dozer	Pit 8 Reclamation	1,270,000	bey	1.14	1.14	1.14
Pit 8 Stockpile	Pit 8 Stockpile	918,000	tons	42.34	42.34	42.34
Light Vehicles	Service Road	300,000	hours	123.52	49.41	
Blade	Service Road	12,319	hours	22.44	2.24	
Water Truck	Service Road	2,591	hours	0.83	0.08	51.73
Disturbed Acreage Wind Erosion	Disturbed Acres	7,013	acres	525.98	525.98	525.98
				Totals	1074.94	1074.94

2010 NO₂ EMISSION SOURCE INVENTORY

Source	Area or Point Source Name	Allocation Basis	Units	Aggregate NO ₂ TPY	Allocated NO ₂ TPY	Total NO ₂ by Area
Light Vehicles	Access Road	180,000	hours	0.29	0.06	0.06
Diesel Locomotive	Main Stockpile			7.64	7.64	
Dozer	Main Stockpile	1,500,000	tons	8.03	0.87	8.51
Blade	Pit 10 Haul Road (highwall)	1,863,000	tons	0.81	0.22	
Coal Haul Truck	Pit 10 Haul Road (highwall)	1,863,000	tons	11.47	3.05	
Light Vehicles	Pit 10 Haul Road (highwall)	180,000	hours	0.29	0.06	
Water Truck	Pit 10 Haul Road (highwall)	1,863,000	tons	0.57	0.15	3.48
Dozer	Pit 10 Production (highwall)	328,117	tons	8.03	0.19	0.19
Blade	Pit 11 Haul Road	2,269,000	tons	0.81	0.26	
Coal Haul Truck	Pit 11 Haul Road	2,269,000	tons	11.47	3.72	
Light Vehicles	Pit 11 Haul Road	180,000	hours	0.29	0.06	
Water Truck	Pit 11 Haul Road	2,269,000	tons	0.57	0.19	4.23
Coal Blasting	Pit 11 Production	2,269,000	tons	110.12	3.44	
DMM3 Drill	Pit 11 Production	(total)		4.50	4.50	
Dozer	Pit 11 Production	1,224,000	tons	8.03	0.71	
Front End Loader	Pit 11 Production	2,269,000	tons	4.55	2.01	
OB Blasting	Pit 11 Production	19,240,000	bey	110.12	64.89	75.55
Blade	Pit 14 Haul Road	2,868,000	tons	0.81	0.33	
Coal Haul Truck	Pit 14 Haul Road	2,868,000	tons	11.47	4.70	
Light Vehicles	Pit 14 Haul Road	180,000	hours	0.29	0.06	
Water Truck	Pit 14 Haul Road	2,868,000	tons	0.57	0.23	5.33
Backhoe	Pit 14 Production	(total)		0.12	0.12	
Coal Blasting	Pit 14 Production	1,030,000	tons	110.12	1.56	
DM45 Drill	Pit 14 Production	(total)		1.15	1.15	
Dozer	Pit 14 Production	1,307,000	tons	8.03	0.76	
Front End Loader	Pit 14 Production	2,868,000	tons	4.55	2.54	
OB Blasting	Pit 14 Production	11,925,000	bey	110.12	40.22	46.35
Dozer	Pit 3 Reclamation	7,310,000	bey	8.03	4.24	4.24
Dozer	Pit 8 Reclamation	1,270,000	bey	8.03	0.74	0.74
Dozer	Pit 8 Stockpile	918,000	tons	8.03	0.53	0.53
Light Vehicles	Service Road	180,000	hours	0.29	0.06	0.06
				Total	149.26	

MODEL OUTPUTS

PM10

*** THE MAXIMUM 10 ANNUAL AVERAGE CONCENTRATION VALUES FOR GROUP: ALL ***
INCLUDING SOURCE(S): MASTK , P3REC , P8REC , P8STK , P10R1 , P10R2 ,
P10R3 , P10R4 , P10R5 , P10R6 , P10R7 , P10PR , P11R1 , P11R2 , P11R3 , P11R4 , P11R5 , P11R6
, P11R7 , P11R8 , P11PR , P14R1 , P14R2 , P14R3 , P14R4 , P14R5 , P14PR , SVRD1 , SVRD2 ,
SVRD3 , ... ,

** CONC OF TOXICS IN MICROGRAMS/CUBIC-METER **

RANK CONC AT RECEPTOR (XR,YR) OF TYPE RANK CONC AT RECEPTOR (XR,YR) OF TYPE

-
1. 25.371775 AT (682786.19, 4592271.50) DC
 2. 6.978081 AT (697038.56, 4612395.50) DC
 3. 6.647432 AT (697039.94, 4612145.50) DC
 4. 6.464054 AT (685193.38, 4593576.00) DC
 5. 6.174025 AT (696094.69, 4612899.00) DC
 6. 6.070236 AT (697043.88, 4608774.00) DC
 7. 5.876761 AT (697500.00, 4609000.00) GC
 8. 5.766881 AT (696344.69, 4612898.00) DC
 9. 5.707059 AT (697037.19, 4612645.50) DC
 10. 5.559469 AT (682792.13, 4592022.00) DC

NO2

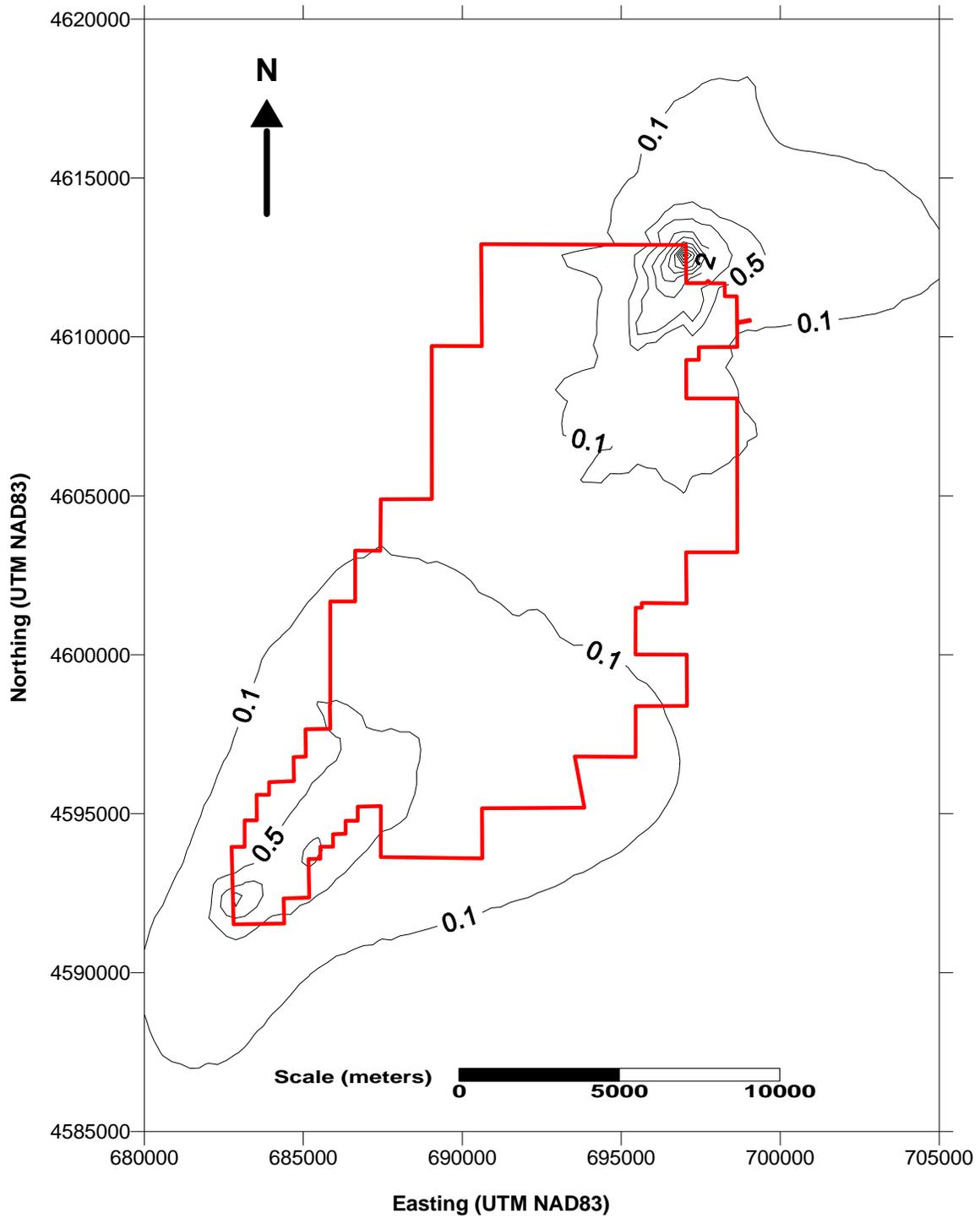
*** THE MAXIMUM 10 ANNUAL AVERAGE CONCENTRATION VALUES FOR GROUP: ALL ***
INCLUDING SOURCE(S): ACRD1 , ACRD2 , ACRD3 , ACRD4 , ACRD5 , ACRD6 ,
ACRD7 , MASTK , P3REC , P8REC , P8STK , P10R1 , P10R2 , P10R3 , P10R4 , P10R5 , P10R6 ,
P10R7 , P10PR , P11R1 , P11R2 , P11R3 , P11R4 , P11R5 , P11R6 , P11R7 , P11R8 , P11PR , P14R1
, P14R2 , ... ,

** CONC OF TOXICS IN MICROGRAMS/CUBIC-METER **

RANK CONC AT RECEPTOR (XR,YR) OF TYPE RANK CONC AT RECEPTOR (XR,YR) OF TYPE

-
1. 12.864506 AT (697038.56, 4612395.50) DC
 2. 11.360383 AT (697037.19, 4612645.50) DC
 3. 7.337164 AT (682786.19, 4592271.50) DC
 4. 4.566653 AT (697039.94, 4612145.50) DC
 5. 4.167009 AT (696844.69, 4612896.00) DC
 6. 3.629278 AT (697500.00, 4612500.00) GC
 7. 2.537692 AT (696594.69, 4612897.00) DC
 8. 1.666575 AT (698000.00, 4612500.00) GC
 9. 1.587512 AT (697041.38, 4611895.50) DC
 10. 1.520051 AT (697500.00, 4613000.00) GC

Black Butte Mine Projected Annual Average NO₂ (ug/m³)



Black Butte Mine Projected Annual Average PM10 (ug/m3)

