

Navajo Nation Abandoned Uranium Mines



Data format: Shapefile

File or table name: NN_AUM_Poly_Surf

Coordinate system: Geographic

Theme keywords: Abandoned Uranium Mines, AUMs, Ground Surface Extents

Abstract: This is a polygon shapefile of 602 surficially mapped abandoned uranium mines (AUMs) for the six Abandoned Uranium (AUM) Regions on or within one mile of the Navajo Nation. The attributes identify the Mine ID; primary and alias mine names with reference sources for these names; UTM, Zone 12, NAD83 metric centroids; area in meters; Map ID used in the "Navajo Nation AUM Region Screening Assessment Report," ranked distance to a perennial or intermittent stream; reclamation status with reference, ID/Name from original source with reference author name and source (Skey), references for the AUM boundary, comments related to AUM, and five other attributes documenting the development of the final AUM boundary extents.

FGDC and ESRI Metadata:

- [Identification Information](#)
- [Data Quality Information](#)
- [Spatial Data Organization Information](#)
- [Spatial Reference Information](#)
- [Entity and Attribute Information](#)
- [Distribution Information](#)
- [Metadata Reference Information](#)
- [Binary Enclosures](#)

Metadata elements shown with blue text are defined in the Federal Geographic Data Committee's (FGDC) [Content Standard for Digital Geospatial Metadata \(CSDGM\)](#). Elements shown with green text are defined in the [ESRI Profile of the CSDGM](#). Elements shown with a green asterisk (*) will be automatically updated by ArcCatalog. ArcCatalog adds hints indicating which FGDC elements are mandatory; these are shown with gray text.

Identification Information:

Citation:

Citation information:

Originators: TerraSpectra Geomatics

Title:

Navajo Nation Abandoned Uranium Mines

***File or table name:** NN_AUM_Poly_Surf

Publication date: July 2007

***Geospatial data presentation form:** vector digital data

Publication information:

Publication place: San Francisco, CA

Publisher: U. S. Environmental Protection Agency, Region 9, Superfund Program

***Online linkage:** \\Terra_dc\Navajo\NAUM_NN_Summary\Products\FINAL\TSG-07066\DVD_GIS\DB\AUM\NN_AUM_Poly_Surf.shp

Description:

Abstract:

This is a polygon shapefile of 602 surficially mapped abandoned uranium mines (AUMs) for the six Abandoned Uranium (AUM) Regions on or within one mile of the Navajo Nation. The attributes identify the Mine ID; primary and alias mine names with reference sources for these names; UTM, Zone 12, NAD83 metric centroids; area in meters; Map ID used in the "Navajo Nation AUM Region Screening Assessment Report," ranked distance to a perennial or intermittent stream; reclamation status with reference, ID/Name from original source with reference author name and source (Skey), references for the AUM boundary, comments related to AUM, and five other attributes documenting the development of the final AUM boundary extents.

Purpose:

This dataset was developed to support the U.S. Environmental Protection Agency (USEPA) in its undertaking of an extensive scientific study to determine if abandoned uranium mines (AUM) and related mine features pose a significant risk to human health and the environment, and to identify areas requiring action to reduce risk for the Navajo Nation.

***Language of dataset:** en

Time period of content:

Time period information:

Single date/time:

Calendar date: July 2007

Currentness reference:

publication date

Status:

Progress: Complete

Maintenance and update frequency: None planned

Spatial domain:

Bounding coordinates:

***West bounding coordinate:** -111.640152

***East bounding coordinate:** -107.836992

***North bounding coordinate:** 37.412150

***South bounding coordinate:** 35.316133

Local bounding coordinates:

***Left bounding coordinate:** -111.640152

***Right bounding coordinate:** -107.836992

***Top bounding coordinate:** 37.412150

***Bottom bounding coordinate:** 35.316133

Keywords:

Theme:

Theme keywords: Abandoned Uranium Mines, AUMs, Ground Surface Extents

Theme keyword thesaurus: None

Place:

Place keywords: Navajo Nation, Arizona, New Mexico, Eastern AUM Region, Utah, United States

Place keyword thesaurus: None

Access constraints: None

Use constraints:

This dataset includes abandoned uranium mines found in the six Abandoned Uranium (AUM) Regions on or within one mile of the Navajo Nation. This dataset does not necessarily include all uranium prospects or occurrences.

Use of this data generally requires computer workstations with ESRI's Arc/Info (8.x or above), ArcGIS (8.x or above), or ArcView (3.x), or some other GIS or CAD software that is capable of reading or converting this dataset.

The data are provided "as-is," without warranty of any kind, either express or implied.

These data have been compiled as part of a desktop project to collect existing spatial data to support the study of Navajo abandoned uranium mines. No field verifications were undertaken as part of this desktop study.

Point of contact:

Contact information:

Contact organization primary:

Contact organization: U. S. Environmental Protection Agency, Region 9, Superfund Program

Contact address:

Address type: mailing and physical address

Address:

75 Hawthorne St (SFD 8-2)

City: San Francisco

State or province: CA

Postal code: 94105

Country: USA

Contact voice telephone: 415-972-3167

Security information:

Security classification system: None

***Native dataset format:** Shapefile

***Native data set environment:**

Microsoft Windows XP Version 5.1 (Build 2600) Service Pack 2; ESRI ArcCatalog 9.1.0.780

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Data Quality Information:

Attribute accuracy:

Attribute accuracy report:

Attributes values were visually inspected for consistency with source reference documents.

Logical consistency report:

These data were visually inspected for consistency with source reference documents. No field verifications were undertaken as part of this desktop study.

Completeness report:

This dataset includes abandoned uranium mines found in the six Abandoned Uranium (AUM) Regions on or within one mile of the Navajo Nation. This dataset does not necessarily include all uranium prospects or occurrences.

Positional accuracy:

Horizontal positional accuracy:

Horizontal positional accuracy report:

The Navajo Abandoned Mine Lands Reclamation Program (NAMLRP) sourced AUMs were prepared from sets of 7.5 minute USGS topographic maps (accurate to ~67 feet) for the Navajo Nation with project areas located and identified. Chenoweth, McLemore, Holen and Hatchel, and the US Department of Energy sourced AUMs were mapped by georeferencing against USGS 1:24,000 scale topo map (~67 feet) and USGS DOQQs (7m or ~23ft RMSE). Chenoweth, Dare, Utah Geological Survey, and VCA sourced AUMs were mapped by georeferencing against USGS 1:24,000 scale topo map (~67 feet) and USGS DOQQs (7m or ~23ft RMSE). Maps from these sources were locally georeferenced. Some AUMs were adjusted positionally or by shape based on Excess Bismuth 214 radiation contours, DOQQ apparent surface disturbance, DRG mapped mines, and mine maps from literature. The PolySkey field records the source (Skeys) for these sources used to change AUM polygons, The horizontal accuracy for these changes would be taken from the reference source's horizontal accuracy report in its metadata. Some AUMs were adjusted positionally or by shape based on DOQQ apparent surface disturbance, DRG mapped mines, and mine maps from literature. The PolySkey field records the source (Skeys) for these sources used to change AUM polygons, The horizontal accuracy for these changes would be taken from the reference source's horizontal accuracy report in its metadata.

Lineage:

Source information:

Source citation abbreviation:

N_AUM_Poly_Surf.shp

Source contribution:

Produced for the Northern AUM Region Screening Assessment Report and source of most of the AUMs for this AUM Region.

Source information:

Source citation abbreviation:

W_AUM_Poly_Surf.shp

Source contribution:

Produced for the Western AUM Region Screening Assessment Report and source of most of the AUMs for this AUM Region.

Source information:

Source citation abbreviation:

NC_AUM_Poly_Surf.shp

Source contribution:

Produced for the North Central AUM Region Screening Assessment Report and source of most of the AUMs for this AUM Region.

Source information:

Source citation abbreviation:

C_AUM_Poly_Surf.shp

Source contribution:

Produced for the Central AUM Region Screening Assessment Report and source of most of the AUMs for this AUM Region.

Source information:

Source citation abbreviation:

S_AUM_Poly_Surf.shp

Source contribution:

Produced for the Southern AUM Region Screening Assessment Report and source of most of the AUMs for this AUM Region.

Source information:**Source citation abbreviation:**

E_AUM_Poly_Surf.shp

Source contribution:

Produced for the Eastern AUM Region Screening Assessment Report and source of most of the AUMs for this AUM Region.

Process step:**Process description:**

NORTHERN AUM REGION

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The Navajo Abandoned Mine Lands Reclamation Program (NAMLRP) non-coal abandoned mine reclamation project areas shapefile, S06220501.shp (Skey=S06220501) was used to create the initial AUM polygon dataset. NAMLRP reclamation project areas (AUM polygons) with uranium as the commodity were selected. Unreclaimed uranium mine point features (e.g. portals, prospects, rim strips/pits, vertical shafts, and waste piles), from S06220502.shp (Skey=S06220502) were selected and buffered at 200 feet to generate AUM polygons. Melvin Yazzie (NAMLRP) identified which NAMLRP AUM mine feature points had associated unreclaimed waste piles. NAMLRP project polygons were extended 200 feet downslope in the vicinity of unreclaimed debris piles.

To the above initial AUM polygon shapefile, AUMs were added based upon the following references.

Based upon the work of William L. Chenoweth fifteen AUMs were added within the Northern AUM Region, including

Aneth 1 (Mine_ID=295), Bettie No. 1 (Mine_ID=638), Castle Tsosie (Mine_ID=617), Chimney No. 1 (Mine_ID=661), Climax Transfer Station (Mine_ID=667), Deneh Nezz 3 (Mine_ID=616), Enos Johnson (Mine_ID=614), Harvey Begay 3 (Mine_ID=639), Joe Ben 1 (Mine_ID=615), Last Chance (Mine_ID=626), Plot 14 (Mine_ID=620), Plot 15 (Mine_ID=619), Reed Henderson (Mine_ID=613), School Boy (Mine_ID=662), and Sheepskin Mesa (Mine_ID=618). See the RefSrcKey, PolySkey, and Comments attributes for information on the reference sources used.

From the Utah Geological Survey (Sprinkel, 1999, Skey=S03100504), a point shapefile (MINERALS.SHP) database of Utah mineral locations was selected for uranium occurrences on or within one mile of the Navajo Nation. Of the four selected uranium occurrences only one, the Pete 6 & 7 Mine, produced uranium as an economic commodity. It is located partially within the Aneth Chapter and off the Navajo Nation. A DRG was used to locate adits and generate an AUM polygon.

The Cove Transfer Station (Mine_ID=472) was added based upon Dare (1961) and the aerial radiation survey described below.

The Mesa I Mine 10 (Mine_ID=654) was added based upon a VCA map (See the RefSrcKey and PolySkey attributes).

Where these four sources were used the Literature field was attributed "yes."

Aerial radiation surveys were flown over 41 AUM areas on the Navajo Nation during the period from October 1994 to October 1999 (Hendricks, 2001; Skey = S03310309). The aerial surveys characterized both the overall radioactivity levels (gross counts) and excess bismuth-214 activity (indicator of uranium ore deposits and/or uranium mines) within the surveyed areas. Excess bismuth-214 radiation contour data were compared with the AUMs generated as described above. A threshold of 170 cps (counts per second or approximately 7.4 uR/h) was used as minimum excess bismuth-214 value for the comparison. AUM polygons were expanded to encompass the extent of the excess bismuth-214 radiation contours. The excess bismuth-214 radiation data was also used to identify some mines that had not been included in the NAMLRP AUM reclamation program. If an area had elevated excess bismuth-214 radiation levels and could be identified with a previously undocumented AUM (USGS DRGs; USGS DOQQs; and other AUM locations maps) an AUM polygon was added. If radiation data was used to add or change an AUM boundary a "yes" will be found in the Rad attribute.

This resulting AUM polygon shapefile was compared to USGS DOQQs. Where AUM related surface disturbance was identified outside an AUM, the AUM was extended to the extent of the photointerpreted disturbance. Where this was done the DOQQ field was attributed with a "Yes."

Where mining symbols on a USGS 7.5 minute topographic map (DRG) was used to change an AUM boundary the DRG field was attributed with a "yes."

The Ref_ID attribute maintains the AUM identifier from the original source. Ref_IDs that have the format "NA-####" are NAMLRP reclamation project numbers. Source_IDs that have the format "Bec####", "Blk####", "Cam####", "Cov####", "Mon####", "Oak####", "San####", "Swt####", or "Tse####" are AUMs whose polygon boundaries are 200 ft buffered NAMLRP unreclaimed mine features. Other Ref_IDs are mine names or alphanumeric identifiers used by the author identified in the Ref_Name attribute and are identified in more detail by the RefSrcSkey attribute.

AUMS that could not be ascribed a mine name were given the NAMLRP Project Name (e.g. NA-0809), as also identified in the Ref_ID attribute. Where this was not available then the NAMLRP mine site feature ID was used (e.g. Tse079; see the discussion on Reference ID's).

The Comment field provides additional notable information.

The OneMiOvrIn field was populated with a "yes" value when the AUM was within one mile upslope of a perennial or intermittent stream course. The AUM polygons were buffered one mile and compared to the Drainages_Downstream.shp shapefile of medium resolution National Hydrography Dataset (NHD), streams automated from USGS 1:24,000 scale DRGs, and USGS DOQQ photointerpreted stream courses. See the metadata for Drainages_Downstream.shp for more information on the development of the streams dataset.

Perimeter and Area in meters, Acres, and UTM_East and UTM_North polygon centroids in UTM, Zone12, NAD83 Easting and Northing meters are all calculated values within ArcMap 9.1, using the XTools Pro 3.0 extension.

The following attributes were created to document information about AUMs, source of information used to develop AUM polygons, source and dates of changes to AUM polygons, and reclamation status and sources:

NameSource - provides the Skey reference(s) for the Mine Name and mine name Aliases

AliasSrc - Provides the Skey(s) for alias mine name reference(s)

Rec_Status - provides the reclamation status of the AUM

RecStatSrc - Skey source reference for the reclamation status of the AUM

Ref_Name - identifies the first source for an AUM by name; these names include: Chenoweth, Dare, NAMLRP, Utah Geological Survey, and VCA (Vanadium Corporation of America)

RefSrcSkey - provides the Skey source reference for the original source of the AUM. This provides the full source reference as opposed to the general reference provided by Ref_Name

PolySkey - provides the Skey source reference for the initial AUM polygon boundary

Comments - provides comments about the AUM

The following attributes provide a quick method to identify AUMs that have been added or modified from that identified by NAMLRP:

Debris - identifies with a "yes" that this AUM was extended downslope based on the presence of unmapped mine waste debris piles

DOQQ - identifies with a "yes" that this AUM was extended based upon photointerpreted surficial mine activity

DRG - identifies with a "yes" that this AUM was extended based upon mine features mapped on a USGS 7.5 minute topographic map (Digital Raster Graphic - DRG)

Rad - identifies with a "yes" that this AUM was extended to the 7.4 uR/hr excess Bismuth214 contour

Literature - identifies with a "yes" that this AUM was adjusted based upon other literature sources, see PolySkey to identify these sources

During the development of the Mapped Underground AUMs shapefile (AUMs_Underground.shp) it was found that some surficially mapped AUM boundaries needed to be shifted or changed in some manner. These reference source Skeys are documented in the PolySkey field when changes were made. Typically, these changes were prompted when georeferencing a map of an underground mine, and finding the mine was not fully accommodated at the surface by an AUM boundary. Changes were made typically based upon an underground mine map, the DOQQs and DRGs used in georeferencing, NAMLRP field books and field sketch books. These are referenced by PolySkey.

The field MAP_ID was added:

MAP_ID - provides a generally northwest to southeast sequential numeric scheme across the Northern AUM Region for presentation in maps of the Northern AUM Region Screening Assessment Report

In a final review, these AUMs were plotted on several maps for review of position, extent, mine name, and alias name by William L. Chenoweth. Review comments and provided unpublished documents were used to make changes. These changes are documented within the appropriate attribute fields.

William L. Chenoweth is a retired AEC/DOE geologist that studied the uranium and vanadium mines of the Colorado Plateau starting in the 1950s. His publications of the 1980's to the present are the most important sources for uranium mining on the Navajo Nation. He continues to publish on the on uranium mining on the Navajo Nation.

Process software and version: ESRI ArcGIS 8.3 & 9.1

Process date: March 2005

Source produced citation abbreviation:

N_AUM_Poly_Surf.shp

Process contact:

Contact information:

Contact organization primary:

Contact organization: TerraSpectra Geomatics

Contact address:

Address type: mailing and physical address

Address:

2700 E Sunset Rd, Ste A-10

City: Las Vegas

State or province: NV

Postal code: 89120

Country: USA

Contact voice telephone: 702-795-8254

Process step:

Process description:

WESTERN AUM REGION

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The Navajo Abandoned Mine Lands Reclamation Program (NAMLRP) non-coal abandoned mine reclamation project areas shapefile, S06220501.shp (Skey=S06220501) was used to create the initial AUM polygon dataset. NAMLRP reclamation project areas (AUM polygons) with uranium as the commodity were selected. Unreclaimed uranium mine point features (e.g. portals, prospects, rim strips/pits, vertical shafts, and waste piles), from S06220502.shp (Skey=S06220502) were selected and buffered at 200 feet to generate AUM polygons. Melvin Yazzie (NAMLRP) identified which NAMLRP AUM mine feature points had associated unreclaimed waste piles. NAMLRP project polygons were extended 200 feet downslope in the vicinity of unreclaimed debris piles.

The Navajo Nation dataset described above was clipped to the Western AUM Region. To this initial AUM polygon shapefile, AUMs were added based upon the following references.

AUMs were identified where an AUM had recorded uranium production. Nineteen (19) AUM polygons were identified based on reports of uranium production by Chenoweth in his report on the Cameron area (S10100239). These included AUM polygons with Mine_IDs:

AUMS CHENOWETH REPORTS DOCUMENTED PRODUCTION

Mine_ID	Mine Name
=====	=====
451	A & B No. 7
452	A & B No. 13
454, 527	Section 1 Lease
457, 458, 459	Section 9 Lease
463	Black Point Murphy Group
530	Jack Daniels No. 3
533	Tommy
534	June
535	Montezuma No. 7C
536	Charles Huskon No. 5

537	Yellow Jeep No. 7A and 7B
538	Adolf Maloney No. 2
539	Amos Chee No. 2 and No. 3
540	Martin Johnson No. 4
543	Lemuel Littleman No. 3
546	Max Huskon No. 1

Of the AUMs Chenoweth reports documented production, the following were located based on an elevated radiation levels based upon DOE's aerial radiation survey (S03310309) on or near the mine locations in Chenoweth's S10100239 report:

Mine_ID	Mine Name
=====	=====
451	A & B No. 7
452	A & B No. 13
454, 527	Section 1 Lease
457, 458, 459	Section 9 Lease

Of the AUMs Chenoweth reports documented production, the following five (5) AUMs were located based on Navajo Tribal Mining Department Maps (S02080605, S02180601, and/or S02080605):

Mine_ID	Mine Name
=====	=====
463	Black Point Murphy Group
530	Jack Daniels No. 3
540	Martin Johnson No. 4
546	Max Huskon No. 1
536	Charles Huskon No. 5

of these, photointerpretation of DOQQs was used to help locate three (3): the Black Point Murphy Group, Martin Johnson No. 4, and Charles Huskon No. 5 AUMs. See the Comments and PolySkey fields to identify the exact source used for each of the five AUMs.

Of the AUMs Chenoweth reports documented production, five (5) were located based upon two US Atomic Energy Commission (USAEC) claim maps (S02080606 for Mine_IDs 538 & 539, S02080607 for Mine_IDs 533 & 534) and one likely USAEC claim map (S02080608 for Mine_ID 537):

Mine_ID	Mine Name
=====	=====
533	Tommy
534	June
537	Yellow Jeep No. 7A and 7B
538	Adolf Maloney No. 2
539	Amos Chee No. 2 and No. 3

Of the AUMs Chenoweth reports documented production, one (1) productive AUM:

Mine_ID	Mine Name
=====	=====
535	Montezuma No. 7C

was located based upon a combination of information from Chenoweth (S10100239), NAMLRP's mining feature location (S030904809), an elevated radiation signature (S03310309), a Public Land Survey System location from Scarborough (S09240202), and possible disturbance seen on a DOQQ.

Of the AUMs Chenoweth reports documented production, one (1) productive AUM:

Mine_ID	Mine Name
=====	=====
543	Lemuel Littleman No. 3

was located based upon a combination of information from Chenoweth (S10100239) and a claim location from a NTMD claim map (S02080605).

One productive AUM reported by Chenoweth (S10100239) and Scarborough (S09240202) could not be located due to incomplete and conflicting information. This is the "Hosteen Nez" AUM. It is likely located at the foot of the Moenkopi Plateau in the Adeii Eechii Cliffs, along the east margin of the Ward Terrace, and

southeast of the Yellow Jeep No. 7A and 7B AUM.

AUMs were added that had no documented production, only when the following conditions were met:

- elevated radiation levels were present based upon DOE's aerial radiation survey (S03310309; see aerial radiation discussion below)
- located on a known uranium mining claim or prospect
- surface disturbance could be identified on a DOQQ

Five (5) AUMs were added that had no documented production. They have elevated radiation levels based upon DOE's aerial radiation survey (S03310309). They were also located on a known claim or prospect. The first three (Mine_IDs 456, 547, & 548) were located on claims identified by the NTMD claim map (S02080605). The last (Mine_ID 529) was identified as a prospect on the map in Chenoweth's Cameron report (S10100239). They are:

Mine_ID	Mine Name
=====	=====
456	Taylor Reid No. 3
547	Harry Walker No. 19
548	Ryan No. 3
529	Ada and Nordell

The AUM identified as:

Mine_ID	Mine Name
=====	=====
528	Grub No. 14

was identified by Chenoweth as a uranium prospect with no reported production (S10100239). This AUM was added based on elevated radiation levels as seen from DOE's aerial radiation survey (S03310309). A USGS DOQQ showed evidence of surface disturbance, and the USGS 7.5 minute topographic map (DRG) showed a prospect.

Where literature sources were used the Literature field was attributed "yes."

Where radiation data was used to add or change an AUM boundary a "yes" will be found in the Rad attribute. Aerial radiation surveys were flown over 41 AUM areas on the Navajo Nation during the period from October 1994 to October 1999 (Hendricks, 2001; Skey = S03310309). The aerial surveys characterized both the overall radioactivity levels (gross counts) and excess bismuth-214 activity (indicator of uranium ore deposits and/or uranium mines) within the surveyed areas. Excess bismuth-214 radiation contour data were compared with the AUMs generated as described above. A threshold of 170 cps (counts per second or approximately 7.4 uR/h) was used as minimum excess bismuth-214 value for the comparison. AUM polygons were expanded to encompass the extent of the excess bismuth-214 radiation contours. The excess bismuth-214 radiation data was also used to identify some mines that had not been included in the NAMLRP AUM reclamation program. If an area had elevated excess bismuth-214 radiation levels and could be identified with a previously undocumented AUM (USGS DRGs; USGS DOQQs; and other AUM locations maps) an AUM polygon was added.

Where AUM related surface disturbance was identified outside an AUM, the AUM was extended to the extent of the photointerpreted disturbance. Where this was done the DOQQ field was attributed with a "Yes." Where photointerpretation of a DOQQ was used to add a new AUM the DOQQ field was attributed with a "Yes."

Where mining symbols on a USGS 7.5 minute topographic map (DRG) were used to change an AUM boundary or to add a new AUM the DRG field was attributed with a "yes."

The Ref_ID attribute maintains the AUM identifier from the original source. Ref_IDs that have the format "NA-####" are NAMLRP reclamation project numbers. Source_IDs that have the format "Bec####", "Blk####", "Cam####", "Cov####", "Mon####", "Oak####", "San####", "Swt####", or "Tse####" are AUMs whose polygon boundaries are 200 ft buffered NAMLRP unreclaimed mine features. Other Ref_IDs are mine names or alphanumeric identifiers used by the author identified in the Ref_Name attribute and are identified in more detail by the RefSrcSkey attribute.

AUMS that could not be ascribed a mine name were given the NAMLRP Project Name (e.g. NA-0809), as also identified in the Ref_ID attribute. Where this was not available then the NAMLRP mine site feature ID was used (e.g. Cam060; see the discussion on Reference ID's).

The Comment field provides additional notable information.

The OneMiOvrIn field was populated with a "yes" value when the AUM was within one mile upslope of a perennial or intermittent stream course. The AUM polygons were buffered one mile and compared to the W_Drainage_AUM.shp shapefile of medium resolution National Hydrography Dataset (NHD), streams automated from USGS 1:24,000 scale DRGs, and USGS DOQQ photointerpreted stream courses. See the metadata for Drainages_Downstream.shp for more information on the development of the streams dataset.

Perimeter and Area in meters, Acres, and UTM_East and UTM_North polygon centroids in UTM, Zone12, NAD83 Easting and Northing meters are all calculated values within ArcMap 9.1, using the XTools Pro 3.2 extension.

The following attributes were created to document information about AUMs, source of information used to develop AUM polygons, source and dates of changes to AUM polygons, and reclamation status and sources:

NameSource - provides the Skey reference(s) for the Mine Name and mine name Aliases

AliasSrc - Provides the Skey(s) for alias mine name reference(s)

Rec_Status - provides the reclamation status of the AUM

RecStatSrc - Skey source reference for the reclamation status of the AUM

Ref_Name - identifies the first source for an AUM by name; these names include: Chenoweth, NAMLRP, NTMD (Navajo Tribal Mining Department), and TerraSpectra (TerraSpectra Geomatics).

RefSrcSkey - provides the Skey source reference for the original source of the AUM. This provides the full source reference as opposed to the general reference provided by Ref_Name

PolySkey - provides the Skey source reference for the initial AUM polygon boundary

Comments - provides comments about the AUM

The following attributes provide a quick method to identify AUMs that have been added or modified from that identified by NAMLRP:

Debris - identifies with a "yes" that this AUM was extended downslope based on the presence of unmapped mine waste debris piles

DOQQ - identifies with a "yes" that this AUM was extended based upon photointerpreted surficial mine activity

DRG - identifies with a "yes" that this AUM was extended based upon mine features mapped on a USGS 7.5 minute topographic map (Digital Raster Graphic - DRG)

Rad - identifies with a "yes" that this AUM was extended to the 7.4 uR/hr excess Bismuth214 contour

Literature - identifies with a "yes" that this AUM was adjusted based upon other literature sources, see PolySkey to identify these sources

No Mapped Underground AUMs were available in the literature. This region was primarily mapped by open pit.

The field MAP_ID was added:

MAP_ID - provides a generally northwest to southeast sequential numeric scheme across the Western AUM Region for presentation in maps of the Western AUM Region Screening Assessment Report

The Rec_Status field is used to denote reclamation status. Where NAMLRP has performed a reclamation project, this field shows "Reclaimed by NAMLRP." Most AUMs were initially mapped based on NAMLRP reclamation project polygons. However, these polygons have often been enlarged to reflect the greater footprint of AUMs as opposed to representing only the reclaimed areas. Therefore the "Reclaimed by NAMLRP" statement should be recognized to apply only to the original extent of the NAMLRP reclamation project polygons. The polygon shapefile S06220501_NAMLRP_2004.shp shows the original extent of these NAMLRP reclamation project polygons.

Note that any AUM that shows "NAMLRP" in the Ref_Name field and a "yes" in any of the DOQQ, DRG, Rad, or Literature fields has been modified from its original polygon extent.

In a continuous review process, these AUMs were reviewed for position, extent, mine name, and alias name by William L. Chenoweth. Where review comments and provided published and unpublished documents were used to make changes, the Skeys for these comments and documents were recorded into the appropriate shapefile attributes.

William L. Chenoweth is a retired AEC/DOE geologist that studied the uranium and vanadium mines of the Colorado Plateau starting in the 1950s. His publications of the 1980's to the present are the most important sources for uranium mining on the Navajo Nation. He continues to publish on the on uranium mining on the Navajo Nation.

Process software and version: ESRI ArcGIS 8.3 & 9.1

Process date: May 2006

Source produced citation abbreviation:

W_AUM_Poly_Surf.shp

Process contact:

Contact information:

Contact organization primary:

Contact organization: TerraSpectra Geomatics

Contact address:

Address type: mailing and physical address

Address:

2700 E Sunset Rd, Ste A-10

City: Las Vegas

State or province: NV

Postal code: 89120

Country: USA

Contact voice telephone: 702-795-8254

Process step:

Process description:

NORTH CENTRAL AUM REGION

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The Navajo Abandoned Mine Lands Reclamation Program (NAMLRP) non-coal abandoned mine reclamation project areas shapefile, S06220501_NAMLRP_2004.shp was used to create the initial AUM polygon dataset. NAMLRP reclamation project areas (AUM polygons) with uranium as the commodity were selected. Unreclaimed uranium mine point features (e.g. portals, prospects, rim strips/pits, vertical shafts, and waste piles), from NC_AUM_Pt_Features were selected and buffered at 200 feet to generate AUM polygons. Melvin Yazzie (NAMLRP) identified which NAMLRP AUM mine feature points had associated unreclaimed waste piles. NAMLRP project polygons were extended 200 feet downslope in the vicinity of unreclaimed debris piles.

The Navajo Nation dataset described above was clipped to the North Central AUM Region. To this initial AUM polygon shapefile, AUMs were added based upon the following references.

AUMs were identified where an AUM had recorded uranium production. Five (5) AUM polygons were identified based on reports of uranium production by Chenoweth in his reports on Monument Valley area (S10020201, S10100233, S10100226, S04070601, S04200601). These included AUM polygons with Mine_IDs:

AUMS CHENOWETH REPORTS WITH DOCUMENTED PRODUCTION

Mine Name	Mine_ID	Skey Reference
=====	=====	=====
Harvey Blackwater No. 1	700	S10020201
Starlight	701	S10100233
Mitchell Mesa	703	S10100226
Tract 17	705	S04070601

See the Comments and PolySkey fields to identify the exact source used for each of the four AUMs.

Based upon a personal communication with Chenoweth (S04200601) the Mexican Hat Stockpile

(Mine_ID=707) was identified. It was located using his reference to the 1955 Four Corners Geological Society Guidebook for the Four Corners Field Conference, 1955 (GEOLOGY OF PARTS OF PARADOX, BLACK MESA, & SAN JUAN BASINS) of which he included a copy of the page that described the location of the Stockpile and USGS DOQQs. Note that this AUM is not an abandoned uranium mine but is included as a potentially contaminated area directly related to former uranium mining, where ore was stored and transferred.

Mine Name	Mine_ID	Skey Reference
=====	=====	=====
Mexican Hat Stockpile	707	S04200601

One productive AUM reported by Chenoweth (S03100502) could not be located due to incomplete and conflicting information. This is the "Henry L. Sampson Nos. 1 and 9" AUM. Chenoweth reports that the AEC believed it to be in the Comb Ridge Area of San Juan County, UT. He also reports that based on the Navajo Tribal Mining Dept. records and a personal communication that this may be Mining Permit MP-269, assigned to Spencer Uranium Company, that was believed to be near Harvey Blackwater No. 3, possibly in Arizona.

Where literature sources were used the Literature field was attributed "yes."

Where radiation data was used to add or change an AUM boundary a "yes" will be found in the Rad attribute. Aerial radiation surveys were flown over 41 AUM areas on the Navajo Nation during the period from October 1994 to October 1999 (Hendricks, 2001; Skey = S03310309). The aerial surveys characterized both the overall radioactivity levels (gross counts) and excess bismuth-214 activity (indicator of uranium ore deposits and/or uranium mines) within the surveyed areas. Excess bismuth-214 radiation contour data were compared with the AUMs generated as described above. A threshold of 170 cps (counts per second or approximately 7.4 uR/h) was used as minimum excess bismuth-214 value for the comparison. AUM polygons were expanded to encompass the extent of the excess bismuth-214 radiation contours. The excess bismuth-214 radiation data was also used to identify some mines that had not been included in the NAMLRP AUM reclamation program. If an area had elevated excess bismuth-214 radiation levels and could be identified with a previously undocumented AUM (USGS DRGs; USGS DOQQs; and other AUM locations maps) an AUM polygon was added.

Where AUM related surface disturbance was identified outside an AUM, the AUM was extended to the extent of the photointerpreted disturbance. Where this was done the DOQQ field was attributed with a "Yes." Where photointerpretation of a DOQQ was used to add a new AUM the DOQQ field was attributed with a "Yes."

Where mining symbols on a USGS 7.5 minute topographic map (DRG) were used to change an AUM boundary or to add a new AUM the DRG field was attributed with a "yes."

The Ref_ID attribute maintains the AUM identifier from the original source. Ref_IDs that have the format "NA-####" are NAMLRP reclamation project numbers. Source_IDs that have the format "Bec####", "Blk####", "Cam####", "Cov####", "Mon####", "Oak####", "San####", "Swt####", or "Tse####" are AUMs whose polygon boundaries are 200 ft buffered NAMLRP unreclaimed mine features. Other Ref_IDs are mine names or alphanumeric identifiers used by the author identified in the Ref_Name attribute and are identified in more detail by the RefSrcSkey attribute.

AUMS that could not be ascribed a mine name were given the NAMLRP Project Name (e.g. NA-0809), as also identified in the Ref_ID attribute. Where this was not available then the NAMLRP mine site feature ID was used (e.g. Cam060; see the discussion on Reference ID's).

The Comment field provides additional notable information.

The OneMiOvrln field was populated with a "yes" value when the AUM was within one mile upslope of a perennial or intermittent stream course. The AUM polygons were buffered one mile and compared to the NC_Drainage_AUM.shp shapefile of medium resolution National Hydrography Dataset (NHD), streams automated from USGS 1:24,000 scale DRGs, and USGS DOQQ photointerpreted stream courses. See the metadata for Drainages_Downstream.shp for more information on the development of the streams dataset.

Perimeter and Area in meters, Acres, and UTM_East and UTM_North polygon centroids in UTM, Zone12, NAD83 Easting and Northing meters are all calculated values within ArcMap 9.1, using the XTools Pro 3.2 extension.

The following attributes were created to document information about AUMs, source of information used to

develop AUM polygons, source and dates of changes to AUM polygons, and reclamation status and sources:

NameSource - provides the Skey reference(s) for the Mine Name and mine name Aliases

AliasSrc - Provides the Skey(s) for alias mine name reference(s)

Rec_Status - provides the reclamation status of the AUM

RecStatSrc - Skey source reference for the reclamation status of the AUM

Ref_Name - identifies the first source for an AUM by name; these names include: Chenoweth, NAMLRP, NTMD (Navajo Tribal Mining Department), and TerraSpectra (TerraSpectra Geomatics).

RefSrcSkey - provides the Skey source reference for the original source of the AUM. This provides the full source reference as opposed to the general reference provided by Ref_Name

PolySkey - provides the Skey source reference for the initial AUM polygon boundary

Comments - provides comments about the AUM

The following attributes provide a quick method to identify AUMs that have been added or modified from that identified by NAMLRP:

Debris - identifies with a "yes" that this AUM was extended downslope based on the presence of unmapped mine waste debris piles

DOQQ - identifies with a "yes" that this AUM was extended based upon photointerpreted surficial mine activity

DRG - identifies with a "yes" that this AUM was extended based upon mine features mapped on a USGS 7.5 minute topographic map (Digital Raster Graphic - DRG)

Rad - identifies with a "yes" that this AUM was extended to the 7.4 uR/hr excess Bismuth214 contour

Literature - identifies with a "yes" that this AUM was adjusted based upon other literature sources, see PolySkey to identify these sources

During the development of the Mapped Underground AUMs shapefile (NC_AUM_Poly_Undrgrnd.shp) it was found that some surficially mapped AUM boundaries needed to be shifted or changed in some manner. These reference source Skeys are documented in the PolySkey field when changes were made. Typically, these changes were prompted when georeferencing a map of an underground mine, and finding the mine was not fully accommodated at the surface by an AUM boundary. Changes were made typically based upon an underground mine map, the DOQQs and DRGs used in georeferencing, NAMLRP field books and field sketch books. These are referenced by PolySkey.

The field MAP_ID was added:

MAP_ID - provides a generally northwest to southeast sequential numeric scheme across the North Central AUM Region for presentation in maps of the North Central AUM Region Screening Assessment Report

The Rec_Status field is used to denote reclamation status. Where NAMLRP has performed a reclamation project, this field shows "Reclaimed by NAMLRP." Most AUMs were initially mapped based on NAMLRP reclamation project polygons. However, these polygons have often been enlarged to reflect the greater footprint of AUMs as opposed to representing only the reclaimed areas. Therefore the "Reclaimed by NAMLRP" statement should be recognized to apply only to the original extent of the NAMLRP reclamation project polygons. The polygon shapefile S06220501_NAMLRP_2004.shp shows the original extent of these NAMLRP reclamation project polygons.

Note that any AUM that shows "NAMLRP" in the Ref_Name field and a "yes" in any of the DOQQ, DRG, Rad, or Literature fields has been modified from its original polygon extent.

In a continuous review process, these AUMs were reviewed for position, extent, mine name, and alias name by William L. Chenoweth. Where review comments and provided published and unpublished documents were used to make changes, the Skeys for these comments and documents were recorded into the appropriate shapefile attributes.

William L. Chenoweth is a retired AEC/DOE geologist that studied the uranium and vanadium mines of the Colorado Plateau starting in the 1950s. His publications of the 1980's to the present are the most important sources for uranium mining on the Navajo Nation. He continues to publish on uranium mining on

the Navajo Nation.

Process software and version: ESRI ArcGIS 8.3 & 9.1

Process date: May 2006

Source produced citation abbreviation:

NC_AUM_Poly_Surf.shp

Process contact:

Contact information:

Contact organization primary:

Contact organization: TerraSpectra Geomatics

Contact address:

Address type: mailing and physical address

Address:

2700 E Sunset Rd, Ste A-10

City: Las Vegas

State or province: NV

Postal code: 89120

Country: USA

Contact voice telephone: 702-795-8254

Process step:

Process description:

CENTRAL AUM REGION

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The Navajo Abandoned Mine Lands Reclamation Program (NAMLRP) non-coal abandoned mine reclamation project areas shapefile, C_S06220501_NAMLRP_2004.shp was used to create the initial AUM polygon dataset. NAMLRP reclamation project areas (AUM polygons) with uranium as the commodity were selected. Unreclaimed uranium mine point features (e.g., portals, prospects, rim strips/pits, vertical shafts, and waste piles), from C_AUM_Pt_Features were selected and buffered at 200 feet to generate AUM polygons. Melvin Yazzie (NAMLRP) identified which NAMLRP AUM mine feature points had associated unreclaimed waste piles. NAMLRP project polygons were extended 200 feet downslope in the vicinity of unreclaimed debris piles.

The Navajo Nation dataset described above was clipped to the Central AUM Region. To this initial AUM polygon shapefile, AUMs were added based upon the following references. AUMs were identified where an AUM had recorded uranium production. Three (3) AUM polygons were identified based on reports of uranium production by William Chenoweth in his reports on Monument Valley area (S10020201, S10100233, S10100226, S04070601, S04200601). These included AUM polygons with Mine_IDs: AUM'S CHENOWETH REPORTS WITH DOCUMENTED PRODUCTION

Mine Name	Mine_ID	Skey Reference
Claim 10	807	S06220501
Thomas Begay No. 1	800	S06220501
Dan Taylor No. 1	803	S10100236

See the Comments and PolySkey fields to identify the exact source used for each of the three AUMs.

Where literature sources were used the Literature field was attributed "yes." Where radiation data was used to add or change an AUM boundary a "yes" will be found in the Rad attribute. Aerial radiation surveys were flown over 41 AUM areas on the Navajo Nation during the period from October 1994 to October 1999 (Hendricks, 2001; Skey = S03310309). The aerial surveys characterized both the overall radioactivity levels (gross counts) and excess bismuth-214 activity (indicator of uranium ore deposits and/or uranium mines) within the surveyed areas. Excess bismuth-214 radiation contour data were compared with the AUMs generated as described above. A threshold of 170 cps (counts per second or approximately 7.4 uR/h) was used as minimum excess bismuth-214 value for the comparison. AUM polygons were expanded to encompass the extent of the excess bismuth-214 radiation contours. The excess bismuth-214 radiation data was also used to identify some mines that had not been included in the NAMLRP AUM reclamation program. If an area had elevated excess bismuth-214 radiation levels and could be identified with a previously undocumented AUM (USGS DRGs; USGS DOQQs; and other AUM locations maps) an AUM polygon was added. Where AUM related surface disturbance was identified outside an AUM, the AUM was extended to the extent of the photointerpreted disturbance. Where this was done the DOQQ field was attributed with a "Yes." Where photointerpretation of a DOQQ was used to add a new AUM the DOQQ field was attributed with a "Yes." Where mining symbols on a USGS 7.5 minute topographic map (DRG) were used to change an AUM boundary or to add a new AUM the DRG field was attributed with a "yes."

Eight non-productive AUMs were mapped based on reports (S10100212, S10100236, and S10020207) by or personal communication (S06220608) with William Chenoweth. These AUMs were also added based on corroborating information. The AUMs named Jim Hatattly (two separate AUM polygons), Claim 16, Claim 3 / Claim 4, and Claim 6 were corroborated by aerial radiation data (Hendricks, 2001; Skey = S03310309).

The Occurrence B and three Zhealy Tso AUMs were corroborated by DOQQ. The Occurrence B AUM was additionally corroborated by its identification as a borrow pit on a DRG.

AUM	Mine_ID	Key Reference
=====	=====	=====
Jim Hatattly	801	S10100212
Jim Hatattly	802	S10100212
Claim 16	806	S10100236
Claim 3 / Claim 4	805	S06220608
Claim 6	804	S06220608
Occurrence B	296	S10020207
Zhealy Tso	297	S10020207
Zhealy Tso	298	S10020207
Zhealy Tso	300	S10020207

See the Comments and PolySkey fields to identify the sources used for each of these eight AUMs.

The Ref_ID attribute maintains the AUM identifier from the original source. Ref_IDs that have the format "NA-####" are NAMLRP reclamation project numbers. Source_IDs that have the format "Bec####", "Blk####", "Cam####", "Cov####", "Mon####", "Oak####", "San####", "Swt####", or "Tse####" are AUMs whose polygon boundaries are 200 ft buffered NAMLRP unreclaimed mine features. Other Ref_IDs are mine names or alphanumeric identifiers used by the author identified in the Ref_Name attribute and are identified in more detail by the RefSrcSkey attribute. AUMs that could not be ascribed a mine name were given the NAMLRP Project Name (e.g. NA-0809), as also identified in the Ref_ID attribute. Where this was not available then the NAMLRP mine site feature ID was used (e.g. Cam060; see the discussion on Reference ID's). The Comment field provides additional notable information. The OneMiOvrIn field was populated with a "yes" value when the AUM was within one mile upslope of a perennial or intermittent stream course. The AUM polygons were buffered one mile and compared to the C_Drainage_AUM.shp shapefile of medium resolution National Hydrography Dataset (NHD), streams automated from USGS 1:24,000 scale DRGs, and USGS DOQQ photointerpreted stream courses. See the metadata for Drainages_Downstream.shp for more information on the development of the streams dataset. Perimeter and Area in meters, Acres, and UTM_East and UTM_North polygon centroids in UTM, Zone12, NAD83 Easting and Northing meters are all calculated values within ArcMap 9.1, using the XTools Pro 3.2 extension.

The following attributes were created to document information about AUMs, source of information used to develop AUM polygons, source and dates of changes to AUM polygons, and reclamation status and sources: NameSource - provides the Skey reference(s) for the Mine Name and mine name Aliases AliasSrc - Provides the Skey(s) for alias mine name reference(s) Rec_Status - provides the reclamation status of the AUM RecStatSrc - Skey source reference for the reclamation status of the AUM Ref_Name - identifies the first source for an AUM by name; these names include: Chenoweth, NAMLRP, NTMD (Navajo Tribal Mining Department), and TerraSpectra (TerraSpectra Geomatics). RefSrcSkey - provides the Skey source reference for the original source of the AUM. This provides the full source reference as opposed to the general reference provided by Ref_Name PolySkey - provides the Skey source reference for the initial AUM polygon boundary Comments - provides comments about the AUM The following attributes provide a quick method to identify AUMs that have been added or modified from that identified by NAMLRP: Debris - identifies with a "yes" that this AUM was extended downslope based on the presence of unmapped mine waste debris piles DOQQ - identifies with a "yes" that this AUM was extended based upon photointerpreted surficial mine activity DRG - identifies with a "yes" that this AUM was extended based upon mine features mapped on a USGS 7.5 minute topographic map (Digital Raster Graphic - DRG) Rad - identifies with a "yes" that this AUM was extended to the 7.4 uR/hr excess Bismuth214 contour Literature - identifies with a "yes" that this AUM was adjusted based upon other literature sources, see PolySkey to identify these sources

The field MAP_ID was added: MAP_ID - provides a generally northwest to southeast sequential numeric scheme across the Central AUM Region for presentation in maps of the Central AUM Region Screening Assessment Report

The Rec_Status field is used to denote reclamation status. Where NAMLRP has performed a reclamation project, this field shows "Reclaimed by NAMLRP." Most AUMs were initially mapped based on NAMLRP reclamation project polygons. However, these polygons have often been enlarged to reflect the greater footprint of AUMs as opposed to representing only the reclaimed areas. Therefore the "Reclaimed by NAMLRP" statement should be recognized to apply only to the original extent of the NAMLRP reclamation project polygons. The polygon shapefile C_S06220501_NAMLRP_2004.shp shows the original extent of these NAMLRP reclamation project polygons. Note that any AUM that shows "NAMLRP" in the Ref_Name field and a "yes" in any of the DOQQ, DRG, Rad, or Literature fields has been modified from its original polygon extent.

In a continuous review process, these AUMs were reviewed for position, extent, mine name, and alias name by William L. Chenoweth. Where review comments and provided published and unpublished documents were used to make changes, the Skeys for these comments and documents were recorded into the appropriate shapefile attributes. William L. Chenoweth is a retired AEC/DOE geologist that studied the uranium and vanadium mines of the Colorado Plateau starting in the 1950s. His publications of the 1980's to the present are the most important sources for uranium mining on the Navajo Nation. He continues to publish on uranium mining on the Navajo Nation.

Process software and version: ESRI ArcGIS 8.3 & 9.1

Process date: May 2006

Source produced citation abbreviation:

C_AUM_Poly_Surf.shp

Process contact:

Contact information:

Contact organization primary:

Contact organization: TerraSpectra Geomatics

Contact address:

Address type: mailing and physical address

Address:

2700 E Sunset Rd, ste A-10

City: Las Vegas

State or province: NV

Postal code: 89120

Country: USA

Contact voice telephone: 702-795-8254

Process step:

Process description:

SOUTHERN AUM REGION

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The Navajo Abandoned Mine Lands Reclamation Program (NAMLRP) non-coal abandoned mine reclamation project areas shapefile, S06220501_NAMLRP_2004.shp was used to create the initial AUM polygon dataset. NAMLRP reclamation project areas (AUM polygons) with uranium as the commodity were selected. Unreclaimed uranium mine point features (e.g. portals, prospects, rim strips/pits, vertical shafts, and waste piles), from S_AUM_Pt_Features were selected and buffered at 200 feet to generate AUM polygons. Melvin Yazzie (NAMLRP) identified which NAMLRP AUM mine feature points had associated unreclaimed waste piles. NAMLRP project polygons were extended 200 feet downslope in the vicinity of unreclaimed debris piles.

The Navajo Nation dataset described above was clipped to the Southern AUM Region. To this initial AUM polygon shapefile, AUMs were added based upon the following references.

A search for additional AUMs with recorded uranium production. No AUM polygons were identified based on reports of uranium production by Chenoweth in his report on the Morale mine (S10020205) or Scarborough's report on uranium in Arizona (S09240202).

Four AUMs were added based upon Chenoweth's Morale Mine Report (S10020205), and located based largely upon Wenrich and Mascarenas (S06280601), they are:

Mine_ID Mine Name

=====

850	Sjodin claim
851	Gwen claim
852	Hoskie Tso No. 1
853	Mail Box claim

Each of these was added as an AUM based upon Chenoweth's report of exploration activities (pits, rim stripping, and/or exploratory drilling). See the Comments and PolySkey fields for further information.

Where literature sources were used the Literature field was attributed "yes."

Where radiation data was used to add or change an AUM boundary a "yes" will be found in the Rad attribute. Aerial radiation surveys were flown over 41 AUM areas on the Navajo Nation during the period from October 1994 to October 1999 (Hendricks, 2001; Skey = S03310309). The aerial surveys characterized both the overall radioactivity levels (gross counts) and excess bismuth-214 activity (indicator of uranium ore deposits and/or uranium mines) within the surveyed areas. Excess bismuth-214 radiation contour data were compared with the AUMs generated as described above. A threshold of 170 cps (counts per second or approximately 7.4 uR/h) was used as minimum excess bismuth-214 value for the comparison. AUM polygons were expanded to encompass the extent of the excess bismuth-214 radiation contours. The excess bismuth-214 radiation data was also used to identify some mines that had not been included in the NAMLRP AUM reclamation program. If an area had elevated excess bismuth-214 radiation levels and could be identified with a previously undocumented AUM (USGS DRGs; USGS DOQQs; and other

AUM locations maps) an AUM polygon was added.

Where AUM related surface disturbance was identified outside an AUM, the AUM was extended to the extent of the photointerpreted disturbance. Where this was done the DOQQ field was attributed with a "Yes." Where photointerpretation of a DOQQ was used to add a new AUM the DOQQ field was attributed with a "Yes."

Where mining symbols on a USGS 7.5 minute topographic map (DRG) were used to change an AUM boundary or to add a new AUM the DRG field was attributed with a "yes."

The Ref_ID attribute maintains the AUM identifier from the original source. Ref_IDs that have the format "NA-####" are NAMLRP reclamation project numbers. Source_IDs that have the format "Bec####", "Blk####", "Cam####", "Cov####", "Mon####", "Oak####", "San####", "Swt####", or "Tse####" are AUMs whose polygon boundaries are 200 ft buffered NAMLRP unreclaimed mine features. Other Ref_IDs are mine names or alphanumeric identifiers used by the author identified in the Ref_Name attribute and are identified in more detail by the RefSrcSkey attribute.

AUMS that could not be ascribed a mine name were given the NAMLRP Project Name (e.g. NA-0809), as also identified in the Ref_ID attribute. Where this was not available then the NAMLRP mine site feature ID was used (e.g. Cam060; see the discussion on Reference ID's).

The Comment field provides additional notable information.

The OneMiOvrIn field was populated with a "yes" value when the AUM was within one mile upslope of a perennial or intermittent stream course. The AUM polygons were buffered one mile and compared to the S_Drainage_AUM.shp shapefile of medium resolution National Hydrography Dataset (NHD), streams automated from USGS 1:24,000 scale DRGs, and USGS DOQQ photointerpreted stream courses. See the metadata for Drainages_Downstream.shp for more information on the development of the streams dataset.

Perimeter and Area in meters, Acres, and UTM_East and UTM_North polygon centroids in UTM, Zone12, NAD83 Easting and Northing meters are all calculated values within ArcMap 9.1, using the XTools Pro 3.2 extension.

The following attributes were created to document information about AUMs, source of information used to develop AUM polygons, source and dates of changes to AUM polygons, and reclamation status and sources:

NameSource - provides the Skey reference(s) for the Mine Name and mine name Aliases

AliasSrc - Provides the Skey(s) for alias mine name reference(s)

Rec_Status - provides the reclamation status of the AUM

RecStatSrc - Skey source reference for the reclamation status of the AUM

Ref_Name - identifies the first source for an AUM by name; these names include: Chenoweth, NAMLRP, NTMD (Navajo Tribal Mining Department), and TerraSpectra (TerraSpectra Geomatics).

RefSrcSkey - provides the Skey source reference for the original source of the AUM. This provides the full source reference as opposed to the general reference provided by Ref_Name

PolySkey - provides the Skey source reference for the initial AUM polygon boundary

Comments - provides comments about the AUM

The following attributes provide a quick method to identify AUMs that have been added or modified from that identified by NAMLRP:

Debris - identifies with a "yes" that this AUM was extended downslope based on the presence of unmapped mine waste debris piles

DOQQ - identifies with a "yes" that this AUM was extended based upon photointerpreted surficial mine activity

DRG - identifies with a "yes" that this AUM was extended based upon mine features mapped on a USGS 7.5 minute topographic map (Digital Raster Graphic - DRG)

Rad - identifies with a "yes" that this AUM was extended to the 7.4 uR/hr excess Bismuth214 contour

Literature - identifies with a "yes" that this AUM was adjusted based upon other literature sources, see PolySkey to identify these sources

No mapped underground AUMs were identified.

 The field MAP_ID was added:

MAP_ID - provides a generally northwest to southeast sequential numeric scheme across the Southern AUM Region for presentation in maps of the Southern AUM Region Screening Assessment Report

 The Rec_Status field is used to denote reclamation status. Where NAMLRP has performed a reclamation project, this field shows "Reclaimed by NAMLRP." Most AUMs were initially mapped based on NAMLRP reclamation project polygons. However, these polygons have often been enlarged to reflect the greater footprint of AUMs as opposed to representing only the reclaimed areas. Therefore the "Reclaimed by NAMLRP" statement should be recognized to apply only to the original extent of the NAMLRP reclamation project polygons. The polygon shapefile S06220501_NAMLRP_2004.shp shows the original extent of these NAMLRP reclamation project polygons.

Note that any AUM that shows "NAMLRP" in the Ref_Name field and a "yes" in any of the DOQQ, DRG, Rad, or Literature fields has been modified from its original polygon extent.

 In a continuous review process, these AUMs were reviewed for position, extent, mine name, and alias name by William L. Chenoweth. Where review comments and provided published and unpublished documents were used to make changes, the Skeys for these comments and documents were recorded into the appropriate shapefile attributes.

William L. Chenoweth is a retired AEC/DOE geologist that studied the uranium and vanadium mines of the Colorado Plateau starting in the 1950s. His publications of the 1980's to the present are the most important sources for uranium mining on the Navajo Nation. He continues to publish on uranium mining on the Navajo Nation.

Process software and version: ESRI ArcGIS 8.3 & 9.1

Process date: August 2006

Source produced citation abbreviation:

S_AUM_Poly_Surf.shp

Process contact:

Contact information:

Contact organization primary:

Contact organization: TerraSpectra Geomatics

Contact address:

Address type: mailing and physical address

Address:

2700 E Sunset Rd, Ste A-10

City: Las Vegas

State or province: NV

Postal code: 89120

Country: USA

Contact voice telephone: 702-795-8254

Process step:

Process description:

EASTERN AUM REGION

=====

The Navajo Abandoned Mine Lands Reclamation Program (NAMLRP) non-coal abandoned mine reclamation project areas shapefile, S06220501_NAMLRP_2004.shp was used to create the initial AUM polygon dataset. NAMLRP reclamation project areas (AUM polygons) with uranium as the commodity were selected. Unreclaimed uranium mine point features (e.g. portals, prospects, rim strips/pits, vertical shafts, and waste piles), from E_AUM_Pt_Features were selected and buffered at 200 feet to generate AUM polygons. Melvin Yazzie (NAMLRP) identified which NAMLRP AUM mine feature points had associated unreclaimed waste piles. NAMLRP project polygons were extended 200 feet downslope in the vicinity of unreclaimed debris piles.

 The Navajo Nation dataset described above was clipped to the Eastern AUM Region. To this initial AUM polygon shapefile, AUMs were added based upon the following references. Of 101 AUMs only five AUMS

were developed from reclamation project polygons of the Navajo Abandoned Mine Lands Reclamation Program (NAMLRP). This is mostly related to the fact that the NAMLRP was concerned with AUM's known to be clearly on Navajo Trust Lands.

The following provides information on how AUM polygons were initially developed and modified from initial sources. Each heading refer to an initial source:

NAMLRP

Five AUMs were identified from three NAMLRP reclamation project areas (S06220501). These include: Christensen Mine (Mine_ID=111), Foutz No. 1 (Mine_ID=209), Foutz No. 2 (Mine_ID=1032), Foutz No. 3 (Mine_ID=110), and Rats Nest Mine (Mine_ID=1004). One other AUM was identified from a point location provided by NAMLRP (S08200609). It was Williams and Reynolds (Mine_ID=1003).

US Department of Energy

Section 26 (Mine_ID=1012) was added based on the Department of Energy (S08020610) Certification Report on the Hanosh Mines.

Holen and Hatchell

Mariano Lake (Mine_ID=301) was added based on a Holen and Hatchell (S08200601) report on In Situ Leaching. Holen and Hatchell documented that pregnant ponds associated with old stope leaching at Mariano Lake. Their extent was mapped using a USGS topo and DOQQs.

McLemore

The initial identification of 90 AUMs was based on McLemore's database of New Mexico uranium and thorium locations (S12160205), these include: Alta (Mine_ID=336), Bibo Trespass (Mine_ID=1034), Billy the Kid (Mine_ID=329), Black Jack No. 1 (Mine_ID=322), Black Jack No. 2 (Mine_ID=319), Blue Peak (Mine_ID=361), Bobcat (Mine_ID=360), Buckey (Mine_ID=1013), C D and S (Mine_ID=310), Church Rock (Mine_ID=1030), Church Rock (Mine_ID=307), Church Rock ISL (Mine_ID=1005), Crownpoint, Monument (Mine_ID=1015), Crownpoint, Monument (Mine_ID=1016), Crownpoint, Section 9 (Mine_ID=315), Crownpoint, South Trend (Mine_ID=1018), Crownpoint, South Trend (Mine_ID=1019), Crownpoint, South Trend (Mine_ID=1036), Crownpoint, South Trend (Mine_ID=316), Dakota (Mine_ID=348), Delter (Mine_ID=1002), Diamond No. 2 (Mine_ID=314), Divide (Mine_ID=362), Dysart No. 1 (Mine_ID=358), Elkins (Mine_ID=326), Elkins (Mine_ID=327), Eunice Becenti (Mine_ID=313), Evelyn (Mine_ID=334), Febco (Mine_ID=450), Francis (Mine_ID=335), Glover (Mine_ID=1009), Grace Insitu Leach (Mine_ID=309), Haven (Mine_ID=331), Haystack (Mine_ID=342), Haystack (Mine_ID=345), Haystack No. 1 (Mine_ID=344), Haystack No. 2 (Mine_ID=341), Hogback No. 4 (Mine_ID=312), Homestake Sapin Mine No. 15 (Mine_ID=357), Homestake Sapin Mine No. 23 (Mine_ID=355), Homestake Sapin Mine No. 25 (Mine_ID=353), June (Mine_ID=1025), Junior (Mine_ID=352), Kermac Mine No. 10 (Mine_ID=359), Kermac Mine No. 22 (Mine_ID=356), Kermac Mine No. 24 (Mine_ID=354), Largo (Mine_ID=1007), Lost Mine (Mine_ID=338), Mac No. 1 (Mine_ID=318), Mac No. 2 (Mine_ID=320), Mariano Lake (Mine_ID=317), Mary No. 1 (Mine_ID=1014), NE Church Rock (Mine_ID=304), NE Church Rock No. 1 (Mine_ID=305), NE Church Rock No. 1-East (Mine_ID=303), NE Church Rock No. 2 (Mine_ID=306), Pat (Mine_ID=350), Red Cap (Mine_ID=1037), Red Point Lode (Mine_ID=347), Red Top (Mine_ID=330), Ruby No. 1 (Mine_ID=321), Ruby No. 3 (Mine_ID=323), Section 1 (Mine_ID=474), Section 13 (Mine_ID=308), Section 18 (Mine_ID=1010), Section 18 (Mine_ID=343), Section 18 SEQ (Mine_ID=1027), Section 2 (Mine_ID=473), Section 22 (Mine_ID=1028), Section 23 (Mine_ID=364), Section 24 (Mine_ID=1033), Section 25 Decline (Mine_ID=1029), Section 25 Open Pits (Mine_ID=363), Section 25 Open Pits (Mine_ID=365), Section 25 Open Pits (Mine_ID=366), Section 26 (Mine_ID=1011), Section 26 (Mine_ID=1035), Section 29-Conoco (Mine_ID=1017), Section 30 (Mine_ID=371), Section 32, 33 (Mine_ID=302), Section 34 (Mine_ID=337), Section 36 (Mine_ID=372), Section 4 (Mine_ID=349), Section 5 (Mine_ID=346), Silver Bit No. 15 (Mine_ID=324), Silver Bit No. 18 (Mine_ID=325), Silver Spur (Mine_ID=340), Standing Rock (Mine_ID=1006), Westwater #1 (Mine_ID=311), and Yucca (Mine_ID=333). These were point locations. Additional literature searches were used to find sources that would help define a mine polygon. These sources are identified in the PolySkey attribute with additional comments on developing the polygons found in the Comments attribute.

McLemore and Chenoweth

The initial identification of 2 AUMs was based on McLemore and Chenoweth's 1991 report on uranium mins and deposit in the Grant's district (S03030608), including Crownpoint ISL (Mine_ID=1020) and Nose Rock No. 1 (Mine_ID=1001)

See the Comments and PolySkey fields for further information on identifying and mapping all AUMs. 99 AUMs were mapped in some way using literature sources other than the initial NAMLRP mapping and

reclamation of AUMs.

DOQQs and DRGs

85 AUMs were mapped with assistance from USGS late 1990's black-and-white Digital Orthophoto Quarter Quads (DOQQs). Late in the mapping process the 2005 USGS Color DOQQs became available. All AUMs were reviewed using these DOQQs. A yes in the DOQQ field indicates DOQQs were used to map the extent of an AUM. Where AUM related surface disturbance was identified outside an AUM, the AUM was extended to the extent of the photointerpreted disturbance. Where this was done the DOQQ field was attributed with a "Yes." Where photointerpretation of a DOQQ was used to add a new AUM the DOQQ field was attributed with a "Yes."

40 AUMs were mapped with the assistance of USGS 7.5 minute topo maps (Digital Raster Graphics - DRGs). A yes in the DRG field indicates DRGs were used to map the extent of an AUM. Where mining symbols on a USGS 7.5 minute topographic map (DRG) were used to change an AUM boundary or to add a new AUM the DRG field was attributed with a "yes."

Rad

Aerial radiation surveys were flown over 41 AUM areas on the Navajo Nation during the period from October 1994 to October 1999 (Hendricks, 2001; Skey = S03310309). This area of the Navajo Nation was not surveyed. No AUMs were mapped using aerial radiation surveys.

The Ref_ID attribute maintains the AUM identifier from the original source. Ref_IDs that have the format "NA-####" are NAMLRP reclamation project numbers. Ref_IDs are mine names or alphanumeric identifiers used by the author identified in the Ref_Name attribute and are identified in more detail by the RefSrcSkey attribute.

All AUMs were assigned a mine name, and the NameSource field identifies the source of the name. Most AUMs had one or more aliases or alternate mine names and the Alias_Drc field identifies the source of these names.

The Comment field provides additional notable information.

The OneMiOvrIn field was populated with a "yes" value when the AUM was within one mile upslope of a perennial or intermittent stream course. The AUM polygons were buffered one mile and compared to the E_Drainage_AUM.shp shapefile of medium resolution National Hydrography Dataset (NHD), streams automated from USGS 1:24,000 scale DRGs, and USGS DOQQ photointerpreted stream courses. See the metadata for E_Drainages_AUMs.shp for more information on the development of the streams dataset.

Perimeter and Area in meters, Acres, and UTM_East and UTM_North polygon centroids in UTM, Zone12, NAD83 Easting and Northing meters are all calculated values within ArcMap 9.1, using the XTools Pro 3.2 extension.

The following attributes were created to document information about AUMs, source of information used to develop AUM polygons, source and dates of changes to AUM polygons, and reclamation status and sources:

NameSource - provides the Skey reference(s) for the Mine Name and mine name Aliases

AliasSrc - Provides the Skey(s) for alias mine name reference(s)

Rec_Status - provides the reclamation status of the AUM

RecStatSrc - Skey source reference for the reclamation status of the AUM

Ref_Name - identifies the first source for an AUM by name; these names include: Chenoweth, NAMLRP, NTMD (Navajo Tribal Mining Department), and TerraSpectra (TerraSpectra Geomatics).

RefSrcSkey - provides the Skey source reference for the original source of the AUM. This provides the full source reference as opposed to the general reference provided by Ref_Name

PolySkey - provides the Skey source reference for the initial AUM polygon boundary

Comments - provides comments about the AUM

The following attributes provide a quick method to identify AUMs that have been added or modified from that identified by NAMLRP:

- Debris - identifies with a "yes" that this AUM was extended downslope based on the presence of unmapped mine waste debris piles
- DOQQ - identifies with a "yes" that this AUM was extended based upon photointerpreted surficial mine activity
- DRG - identifies with a "yes" that this AUM was extended based upon mine features mapped on a USGS 7.5 minute topographic map (Digital Raster Graphic - DRG)
- Rad - identifies with a "yes" that this AUM was extended to the 7.4 uR/hr excess Bismuth214 contour
- Literature - identifies with a "yes" that this AUM was adjusted based upon other literature sources, see PolySkey to identify these sources

Mapped underground AUMs were identified, and these corresponding underground AUMs are provided in the E_AUM_Poly_Undrgrnd.shp shapefile.

The field MAP_ID was added:

MAP_ID - provides a generally northwest to southeast sequential numeric scheme across the Eastern AUM Region for presentation in maps of the Eastern AUM Region Screening Assessment Report.

The Rec_Status field is used to denote reclamation status. Where NAMLRP has performed a reclamation project, this field shows "Reclaimed by NAMLRP." Some AUMs were initially mapped based on NAMLRP reclamation project polygons. However, these polygons have often been enlarged to reflect the greater footprint of AUMs as opposed to representing only the reclaimed areas. Therefore the "Reclaimed by NAMLRP" statement should be recognized to apply only to the original extent of the NAMLRP reclamation project polygons. The polygon shapefile S06220501_NAMLRP_2004.shp shows the original extent of these NAMLRP reclamation project polygons.

Note that any AUM that shows "NAMLRP" in the Ref_Name field and a "yes" in any of the DOQQ, DRG, Rad, or Literature fields has been modified from its original polygon extent.

In a continuous review process, these AUMs were reviewed for position, extent, mine name, and alias name by William L. Chenoweth. Where review comments and provided published and unpublished documents were used to make changes, the Skeys for these comments and documents were recorded into the appropriate shapefile attributes.

William L. Chenoweth is a retired AEC/DOE geologist that studied the uranium and vanadium mines of the Colorado Plateau starting in the 1950s. His publications of the 1980's to the present are the most important sources for uranium mining on the Navajo Nation. He continues to publish on uranium mining on the Navajo Nation.

Process software and version: ESRI ArcGIS 9.1

Process date: October 2006

Source produced citation abbreviation:

E_AUM_Poly_Surf.shp

Process contact:

Contact information:

Contact organization primary:

Contact organization: TerraSpectra Geomatics

Contact address:

Address type: mailing and physical address

Address:

2700 E Sunset Rd, Ste A-10

City: Las Vegas

State or province: NV

Postal code: 89120

Country: USA

Contact voice telephone: 702-795-8254

Process step:

Process description:

FINAL NAVAJO NATION COMPILATION OF SIX AUM REGIONS WITH UPDATES

=====

The six surficial AUM polygons for each AUM Region were compiled into a single shapefile, NN_AUM_Poly_Surf.shp.

In the Eastern AUM Region

Two polygons were added for the Haystack mine (Mine_IDs 1038 and 10390 based upon McLemore and Chenoweth, 1991 (S03030608) and a written communication with Bill Chenoweth (2007 - S01150705).

The "Section 32, 33" mine was split into two mines along the N-S bisecting section line, forming the "Section 32" mine (Mine ID 302) and the Section 33 mine (Mine_ID 1040). This was based upon the McLemore and Chenoweth, 1991 (S03030608) and a written communication with Bill Chenoweth (2007 - S01150705), and with photointerpretive assistance from a USGS DOQQ.

Based upon a personal communication with Chris Shuey SW Research Information Center (2007 - S05110701) all the polygons for the "Crownpoint, Monument" (Mine_IDs 1015 and 1016) and "Crownpoint, South Trend" (Mine_IDs 316, 1018, 1019, and 1036) were eliminated from this dataset. Shuey reported that despite some clearings and fenced areas visible on color DOSSs that these facilities were never constructed or operated.

Minor modifications to other AUM polygons were made and are found in the Comments or PolySkey attributes.

In the North Central AUM Region

The "Gothe Mine" was added based on personal communication with Bill Chenoweth (S01300702), near a mapped Shinarump channel mapped by Witkind and others (1963 - S01310701), on a Shinarump cliff seen in a DOQQ, and in a high gross count radiation trend.

In the Western AUM Region

"The Hosteen Nez" mine was approximately located primarily based on a site visit by George Billingsley, USGS (email communication - S03130701) and Billingsley's 1987 geologic map of the SW Moenkopi Plateau (S02100602), with assistance from a DOQQ and DRG of the area.

A second polygon (Mine_ID 1041) for the Julius Chee No. 2 mine was identified by Bill Chenoweth (S01150702) based on a site visit when the mine was working. This was split off from the Julius Chee No. 4 mine polygon (Mine_ID 159) that was largely defined on NAMLRP GPS location and extent (S03090401) and an AEC Claim map and geology of the Cameron Area (S02080605). A smaller Julius Chee No. 4 mine polygon (Mine_ID 159) remains.

Process software and version: ESRI ArcGIS 9.1

Process date: July 2007

Source used citation abbreviation:

N_AUM_Poly_Surf.shp

Source used citation abbreviation:

W_AUM_Poly_Surf.shp

Source used citation abbreviation:

NC_AUM_Poly_Surf.shp

Source used citation abbreviation:

C_AUM_Poly_Surf.shp

Source used citation abbreviation:

S_AUM_Poly_Surf.shp

Source used citation abbreviation:

E_AUM_Poly_Surf.shp

Source produced citation abbreviation:

NN_AUM_Poly_Surf.shp

Process contact:

Contact information:

Contact organization primary:

Contact organization: TerraSpectra Geomatics

Contact address:

Address type: mailing and physical address

Address:

2700 E Sunset Rd, Ste A-10

City: Las Vegas
State or province: NV
Postal code: 89120

Contact voice telephone: 702-795-8254

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Spatial Data Organization Information:

*Direct spatial reference method: Vector

Point and vector object information:

SDTS terms description:

*Name: NN_AUM_Poly_Surf
*SDTS point and vector object type: G-polygon
*Point and vector object count: 602

ESRI terms description:

*Name: NN_AUM_Poly_Surf
*ESRI feature type: Simple
*ESRI feature geometry: Polygon
*ESRI topology: FALSE
*ESRI feature count: 602
*Spatial index: TRUE
*Linear referencing: FALSE

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Spatial Reference Information:

Horizontal coordinate system definition:

Coordinate system name:

*Geographic coordinate system name: GCS_North_American_1983

Geographic:

*Latitude resolution: 0.000000
*Longitude resolution: 0.000000
*Geographic coordinate units: Decimal degrees

Geodetic model:

*Horizontal datum name: North American Datum of 1983
*Ellipsoid name: Geodetic Reference System 80
*Semi-major axis: 6378137.000000
*Denominator of flattening ratio: 298.257222

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Entity and Attribute Information:

Detailed description:

*Name: NN_AUM_Poly_Surf

Entity type:

*Entity type label: NN_AUM_Poly_Surf
*Entity type type: Feature Class
*Entity type count: 602

Entity type definition:

Abandoned Uranium Mines on or within One Mile of the Northern AUM Region of the Navajo Nation

Attribute:

*Attribute label: FID
*Attribute alias: FID
*Attribute definition:
Internal feature number.
*Attribute definition source:
ESRI

*Attribute type: OID
*Attribute width: 4
*Attribute precision: 0
*Attribute scale: 0

Attribute domain values:

*Unrepresentable domain:
Sequential unique whole numbers that are automatically generated.

Attribute:

*Attribute label: Shape
*Attribute alias: Shape
*Attribute definition:
Feature geometry.
*Attribute definition source:
ESRI

*Attribute type: Geometry
*Attribute width: 0
*Attribute precision: 0
*Attribute scale: 0

Attribute domain values:

*Unrepresentable domain:
Coordinates defining the features.

Attribute:

*Attribute label: MINE_ID
*Attribute alias: MINE_ID

*Attribute type: Number
*Attribute width: 4

Attribute:

*Attribute label: MINE_NAME
*Attribute alias: MINE_NAME

*Attribute type: String
*Attribute width: 50

Attribute:

*Attribute label: NAMESOURCE
*Attribute alias: NAMESOURCE

*Attribute type: String
*Attribute width: 45

Attribute:

*Attribute label: ALIASES
*Attribute alias: ALIASES

*Attribute type: String
*Attribute width: 175

Attribute:

*Attribute label: UTM_EAST
*Attribute alias: UTM_EAST

*Attribute type: String
*Attribute width: 60

Attribute:

*Attribute label: UTM_NORTH
*Attribute alias: UTM_NORTH

*Attribute type: Number
*Attribute width: 19
*Attribute number of decimals: 2

Attribute:

*Attribute label: REGION
*Attribute alias: REGION

*Attribute type: Number
*Attribute width: 19
*Attribute number of decimals: 2

Attribute:

*Attribute label: NameSource
*Attribute alias: NameSource

*Attribute type: String
*Attribute width: 15

Attribute:

*Attribute label: AREA
*Attribute alias: AREA

*Attribute type: Number
*Attribute width: 19
*Attribute number of decimals: 2

Attribute:

*Attribute label: ONEMIOVRLN
*Attribute alias: ONEMIOVRLN

*Attribute type: String
*Attribute width: 10

Attribute:

*Attribute label: REC_STATUS
*Attribute alias: REC_STATUS

*Attribute type: String
*Attribute width: 75

Attribute:

*Attribute label: RECSTATSRC
*Attribute alias: RECSTATSRC

*Attribute type: String
*Attribute width: 35

Attribute:

*Attribute label: REF_ID
*Attribute alias: REF_ID

*Attribute type: String
*Attribute width: 40

Attribute:

*Attribute label: REF_NAME
*Attribute alias: REF_NAME

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*Attribute label: REFSRCSKEY
*Attribute alias: REFSRCSKEY

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*Attribute alias: POLYSKEY

*Attribute type: String
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*Attribute label: COMMENTS
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*Attribute label: DEBRIS

*Attribute alias: DEBRIS

*Attribute type: String

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*Attribute label: Mine_Name

*Attribute alias: Mine_Name

*Attribute type: String

*Attribute width: 10

Attribute:

*Attribute label: Aliases

*Attribute alias: Aliases

*Attribute type: String

*Attribute width: 10

Attribute:

*Attribute label: RAD

*Attribute alias: RAD

*Attribute type: String

*Attribute width: 10

Attribute:

*Attribute label: LITERATURE

*Attribute alias: LITERATURE

*Attribute type: String

*Attribute width: 10

Attribute:

*Attribute label: Map_ID_No

*Attribute alias: Map_ID_No

*Attribute type: Number

*Attribute width: 4

Attribute:

*Attribute label: Map_ID

*Attribute alias: Map_ID

*Attribute type: String

*Attribute width: 6

Attribute:

*Attribute label: UTM_East

*Attribute alias: UTM_East

*Attribute type: String

*Attribute width: 10

Attribute:

*Attribute label: UTM_North

*Attribute alias: UTM_North

*Attribute type: String

*Attribute width: 50

Attribute:

*Attribute label: Area

*Attribute alias: Area

*Attribute type: Number

*Attribute width: 19

*Attribute number of decimals: 2

Attribute:

***Attribute label:** OneMiOvrIn
***Attribute alias:** OneMiOvrIn

***Attribute type:** Number
***Attribute width:** 19
***Attribute number of decimals:** 2

Attribute:

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***Attribute type:** String
***Attribute width:** 15

Attribute:

***Attribute label:** Rec_Status
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***Attribute width:** 4

Attribute:

***Attribute label:** RecStatSrc
***Attribute alias:** RecStatSrc

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***Attribute width:** 19
***Attribute number of decimals:** 2

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***Attribute label:** RefSrcSkey
***Attribute alias:** RefSrcSkey

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***Attribute alias:** Mine_ID

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***Attribute width:** 40

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***Attribute alias:** Ref_ID

***Attribute type:** String
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***Attribute label:** Comments
***Attribute alias:** Comments

***Attribute type:** String
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***Attribute alias:** MAP_ID

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***Attribute width:** 80

Attribute:

***Attribute label:** Ref_Name

***Attribute alias:** Ref_Name

***Attribute type:** String

***Attribute width:** 200

Attribute:

***Attribute label:** Debris

***Attribute alias:** Debris

***Attribute type:** String

***Attribute width:** 10

Attribute:

***Attribute label:** DOQQ

***Attribute alias:** DOQQ

***Attribute type:** String

***Attribute width:** 10

Attribute:

***Attribute label:** DRG

***Attribute alias:** DRG

***Attribute type:** String

***Attribute width:** 10

Attribute:

***Attribute label:** Rad

***Attribute alias:** Rad

***Attribute type:** String

***Attribute width:** 10

Attribute:

***Attribute label:** Literature

***Attribute alias:** Literature

***Attribute type:** String

***Attribute width:** 10

Overview description:

Dataset overview:

There are 602 AUM polygons identified on or within one mile of the Navajo Nation.

Entity and attribute overview:

There are 23 thematic attributes for this AUM polygon dataset, as follows:

- Mine ID - arbitrary, unique identifier assigned to each of the AUM site.
- Mine_Name - Primary mine name.
- NameSource - Skey source reference for the AUM Mine_Name
- Aliases - Alias or secondary mine names.
- Alias_Src - Skey reference source for alias or secondary mine names.
- UTM_East - UTM Easting - Centroid point for the AUM polygon in Universal Transverse Mercator (UTM), Zone 12, NAD 83 projection (x-coordinate).
- UTM_North - UTM Northing - Centroid point for the AUM polygon in Universal Transverse Mercator (UTM), Zone 12, NAD 83 projection (y-coordinate).
- Region - Identifies the Abandoned Uranium Mine (AUM) Region of the Navajo Nation that this AUM belongs.

- Map_ID - provides a generally northwest to southeast sequential numeric scheme across the whole of the Northern AUM Region for presentation in maps of the Northern AUM Region Screening Assessment Report.
- Area - The AUM area in square meters.
- OneMiOvrIn - Yes or No, is an intermittent or perennial stream present downslope and within one mile overland.
- Rec_Status - The reclamation status of the AUM.
- RecStatSrc - Skey source reference for the reclamation status of the AUM.
- Ref_ID - Due to the variety of sources used for the AUM GIS dataset, there is currently no single, consistent identifier for AUMs. AUM identifiers from the 3 primary sources include: NAMLRP reclamation project names (NA-xxx), NAMLRP unreclaimed Site IDs (e.g., COV023; The naming convention used for Site ID was the first three characters of the NAMLRP Problem Area name and a three digit sequential number), McLemore uranium occurrences (NMMKxxxx), and a few designations from other sources that were used (e.g., Chenoweth).
- Ref_Name - identifies the first source for this AUM by author name; these names include: Chenoweth, Dare, NAMLRP, Utah Geological Survey, and VCA (Vanadium Corporation of America); see RefSrcSkey for detailed references.
- RefSrcSkey - The Skey source reference for the original source of the AUM.
- PolySkey - The Skey source reference for the initial AUM polygon boundary.
- Comments - Other pertinent information about the AUM.
- Debris - identifies whether this AUM was extended downslope based on the presence of unmapped mine waste debris piles.
- DOQQ - identifies whether this AUM was extended based upon photointerpreted surficial mine activity.
- DRG - identifies whether this AUM was extended based upon mine features mapped on a USGS 7.5 minute topographic map (Digital Raster Graphic - DRG).
- Rad - identifies whether this AUM was extended to the 7.4 uR/hr excess Bismuth214 contour.
- Literature - identifies whether this AUM was adjusted based upon other literature sources, see PolySkey to identify these sources.

See the Metadata Process Steps for more information about the development of the AUM attributes.

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Distribution Information:

Distributor:

Contact information:

Contact organization primary:

Contact organization: U. S. Environmental Protection Agency, Region 9, Superfund Records Center

Contact address:

Address type: mailing address

Address:

95 Hawthorne St (SFD-7C)

City: San Francisco

State or province: CA

Postal code: 94105

Country: USA

Contact voice telephone: 415-536-2033

Resource description: Abandoned Uranium Mines (AUM) of the Eastern AUM Region

Distribution liability:

Although these data have been processed successfully on a computer system for the USEPA, no warranty expressed or implied is made by the USEPA or its contractors regarding the utility of the data on any other system, nor shall the act of distribution constitute any such warranty. No responsibility is assumed by USEPA or its contractors in the use of these data.

Standard order process:**Digital form:****Digital transfer information:**

*Transfer size: 0.381

*Dataset size: 0.381

Custom order process:

Contact the USEPA for a custom order.

Technical prerequisites:

Use of this data generally requires computer workstations with ESRI's Arc/Info (8.x or above), ArcGIS (8.x or above), or ArcView (3.x), or some other GIS or CAD software that is capable of reading or converting this dataset.

Available time period:**Time period information:****Single date/time:**[Back to Top](#)

Metadata Reference Information:

*Metadata date: 20070811

*Language of metadata: en

Metadata contact:**Contact information:****Contact person primary:****Contact person:** Andrew Bain**Contact organization:** U. S. Environmental Protection Agency, Region 9, Superfund Program**Contact position:** Project Manager**Contact address:****Address type:** mailing and physical address**Address:**

75 Hawthorne St (SFD 8-2)

City: San Francisco**State or province:** CA**Postal code:** 94105**Country:** USA**Contact voice telephone:** 415-972-3167

*Metadata standard name: FGDC Content Standards for Digital Geospatial Metadata

*Metadata standard version: FGDC-STD-001-1998

*Metadata time convention: local time

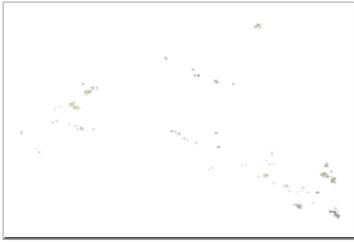
Metadata access constraints: None.**Metadata use constraints:**

None.

Metadata security information:**Metadata security classification system:** None**Metadata extensions:***Online linkage: <http://www.esri.com/metadata/esriprof80.html>

*Profile name: ESRI Metadata Profile

[Back to Top](#)**Binary Enclosures:****Thumbnail:****Enclosure type:** Picture



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