Alton Coal Development

Coal Hollow Project

Mining and Reclamation Plan

ALTON COAL DEVELOPMENT
COAL HOLLOW PROJECT

File in:
☒ Confidential
☐ Shelf
☐ Expandable
Refer to Record No 0001 Date 6/14/07
In C/0025/0005, 2007, Incoming
For additional information

Volume 7

June 2007
C/025/0005

Confidential Binder

TABLE OF CONTENTS

ALL VOLUMES

R645-301-100 Through R645-301-800

Volume 1.....Chapter 1.....Legal, Financial, Compliance and Related Information

Chapter 2.....Soils

Volume 2.....Chapter 3.....Biology

Chapter 4.....Land Use and Air Quality

Volume 3 & 4.....Chapter 5.....Engineering

Volume 5.....Chapter 6.....Geology

Volume 6.....Chapter 7.....Hydrology

Chapter 8.....Bonding and Insurance

Volume 7.....Confidential

TABLE OF CONTENTS

Volume 6

CONFIDENTIAL BINDER

Volume 6	Appendix 1-1	**Alton Coal Development LLC** Members and Managers (112.310) Social Security Numbers of Members EIN Corporate Information
	Appendix 1-2	**Right of Entry –Lease Documents** Exhibit 1 – C. Burton Pugh Surface and Mineral Lease 9/10/04 Exhibit 2 – Alecia Swapp Dame Trust Surface and Mineral Lease 4/29/05
	Appendix 3-6	**DWR Raptor Survey (2006)** Nest number-Date-Species Raptor Survey Drawing (2006)
	Appendix 4-1	**Cultural Resource Inventory (Coal Hollow)** Cultural Inventory Report (3/10/06) Montgomery Archaeological Consultants Paleontological Survey (2/8/06) A.H. Hamblin Paleontogical Consulting Data Recovery Plan & Research Design For sites within the permit area Montgomery Archaeological Consulting (5/1/07)
	Appendix 6-1	**Coal Quality - Coal Hollow (2005-2006)** SGS /Commercial Testing & Engineering 4665 Paris Street, Suite B-200 Denver, CO 80239

APPENDIX 1-1

Social Security numbers of
Alton Coal Development, LLC
members and manager provided

112.310 Members and Managers of Alton Coal Development, L.L.C.

Social Security numbers of Alton Coal Development, LLC's members and manager provided in "CONFIDENTIAL BINDER" Appendix 1-1

Manager -	ALLEN P. CHILDS 570 North Main St. Orangeville, UT 84537 528-78-9126
Member	STONIE BARKER 714 Bob White Lane Naples, FL 34108 528-78-9126
Member	BEVERLY HOLWERDA 960 Cape Marco Drive Marco Island, FL 34145 528-78-9126
Member	ROBERT C. NEAD 6602 Ilex Circle Naples, FL 34109 528-78-9126
Member	JAMES J. WAYLAND 2841 Capistrano Way Naples, FL 34105 528-78-9126

All members and managers use the employer identification number of Alton Coal Development, LLC No. 42-1655092

Utah Department of Commerce
Division of Corporations & Commercial Code
160 East 300 South, 2nd Floor, PO Box 146705
Salt Lake City, UT 84114-6705
Service Center: (801) 530-4849
Toll Free: (877) 526-3994 Utah Residents
Fax: (801) 530-6438
Web Site: http://www.commerce.utah.gov

June 21, 2006

SNELL & WILMER LLP
JENNIFER E. AMES
15 WEST SOUTH TEMPLE STREET, STE 1200
SALT LAKE CITY, UTAH 84101

CERTIFICATE OF EXISTENCE

Registration Number: 5856415-0161
Business Name: ALTON COAL DEVELOPMENT LLC
Registered Date: MARCH 11, 2005
Entity Type: LLC-FOREIGN
Current Status: GOOD STANDING

The Division of Corporations and Commercial Code of the State of Utah, custodian of the records of business registrations, certifies that the business entity on this certificate is authorized to transact business and was duly registered under the laws of the State of Utah. The Division also certifies that this entity has paid all fees and penalties owed to this state; its most recent annual report has been filed by the Division; and, that Articles of Dissolution have not been filed.

Kathy Berg
Director
Division of Corporations and Commercial Code

DEAN HELLER
Secretary of State

RENEE L. PARKER
Chief Deputy
Secretary of State

PAMELA RUCKEL
Deputy Secretary
for Southern Nevada

STATE OF NEVADA

OFFICE OF THE
SECRETARY OF STATE

CHARLES E. MOORE
Securities Administrator

SCOTT W. ANDERSON
Deputy Secretary
for Commercial Recordings

ELLICK HSU
Deputy Secretary
for Elections

Certified Copy

March 8, 2005

Job Number: C20050308-0762
Reference Number: 00000052873-45
Expedite:
Through Date:

The undersigned filing officer hereby certifies that the attached copies are true and exact copies of all requested statements and related subsequent documentation filed with the Secretary of State's Office, Commercial Recordings Division listed on the attached report.

Document Number(s)	Description	Number of Pages
LLC20627-2004-001	Articles of Organization	1 Pages/1 Copies

Respectfully,

DEAN HELLER
Secretary of State

By Jacqueline Urrig
Certification Clerk

Commercial Recording Division
200 N. Carson Street
Carson City, Nevada 89701-4069
Telephone (775) 684-5708
Fax (775) 684-5630

SECRETARY OF STATE

STATE OF NEVADA

CERTIFICATE OF EXISTENCE WITH STATUS IN GOOD STANDING

I, DEAN HELLER, the duly elected and qualified Nevada Secretary of State, do hereby certify that I am, by the laws of said State, the custodian of the records relating to filings by corporations, non-profit corporations, corporation soles, limited-liability companies, limited partnerships, limited-liability partnerships and business trusts pursuant to Title 7 of the Nevada Revised Statutes which are either presently in a status of good standing or were in good standing for a time period subsequent of 1976 and am the proper officer to execute this certificate.

I further certify that the records of the Nevada Secretary of State, at the date of this certificate, evidence, **ALTON COAL DEVELOPMENT LLC**, as a limited liability company duly organized under the laws of Nevada and existing under and by virtue of the laws of the State of Nevada since **September 9, 2004**, and is in good standing in this state.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the Great Seal of State, at my office on March 8, 2005.

Dean Heller

DEAN HELLER
Secretary of State

By Jacqueline Ure

Certification Clerk

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ALTON COAL DEVELOPMENT LLC

PRI

Business Entity Information

Status:	Active on 12/9/2005	File Date:	9/9/2004
Type:	Domestic Limited-Liability Company	Corp Number:	LLC20627-2004
Qualifying State:	NV	List of Officers Due:	9/30/2006
Managed By:	Managers	Expiration Date:	9/4/2504

Resident Agent Information

Name:	CORPORATION TRUST COMPANY OF NEVADA	Address 1:	6100 NEIL ROAD
Address 2:	STE 500	City:	RENO
State:	NV	Zip Code:	89511
Phone:		Fax:	
Email:		Mailing Address 1:	
Mailing Address 2:		Mailing City:	
Mailing State:		Mailing Zip Code:	

View all business entities under this resident agent

Financial Information

No Par Share Count:	0	Capital Amount:	$ 0

No stock records found for this company

Officers

☐ Include Inactive Office

Managing Member - STONIE BARKER

Address 1:	714 BOB WHITE LANE	Address 2:	
City:	NAPLES	State:	FL
Zip Code:	34108	Country:	US
Status:	Active	Email:	

Manager - ALLEN P CHILDS			
Address 1:	570 NORTH MAIN ST	Address 2:	
City:	ORANGEVILLE	State:	UT
Zip Code:	84537	Country:	
Status:	Active	Email:	

Managing Member - BEVERLY HOLWERDA			
Address 1:	960 CAPE MARCO DRIVE	Address 2:	
City:	MARCO ISLAND	State:	FL
Zip Code:	34145	Country:	US
Status:	Active	Email:	

Managing Member - ROBERT C NEAD			
Address 1:	6602 ILEX CIRCLE	Address 2:	
City:	NAPLES	State:	FL
Zip Code:	34109	Country:	US
Status:	Active	Email:	

Managing Member - JAMES WAYLAND			
Address 1:	2841 CAPISTRANO WAY	Address 2:	
City:	NAPLES	State:	FL
Zip Code:	34105	Country:	USA
Status:	Active	Email:	

Actions\Amendments

Click here to view 3 actions\amendments associated with this company

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Business Entity Search

?Help

Name	Type	City	Status
ALTON COAL DEVELOPMENT LLC	Limited Liability Company	Huntington	Active

Business Name: ALTON COAL DEVELOPMENT LLC
Entity Number: 5856415-0161
Registration Date: 03/11/2005
State of Origin: NV

Address

195 N 100 W
Huntington, UT 84528

Status

Status: Active
Status Description: Good Standing
This Status Date: 05/02/2006
Last Renewed: 05/02/2006
License Type: LLC - Foreign
Delinquent Date: 03/11/2007

Registered Agent

Registered Agent: ALLEN P CHILDS
[Search BES] [Search RPS]
Address Line 1: 195 N 100 W
Address Line 2:
City: Huntington
State: UT
Zip: 84528

Additional Information

NAICS Code: 2121
NAICS Title: 2121-Coal Mining

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APPENDIX 1-2

Right of Entry Lease Documents

Lessor:

C. Burton Pugh
Surface and Mineral Lease, dated 9/10/04

Lessor:

Alecia Swapp Dame Trust
Surface and Mineral Lease, dated 4/29/05

EXHIBIT 1

C. Burton Pugh
Surface and Mineral Lease, dated 9/10/04

COAL MINING LEASE
between
C. BURTON PUGH
and
ALTON COAL DEVELOPMENT, LLC

THIS LEASE AGREEMENT is made and entered into, effective as of the 1st.day of August, 2004, by and between ***C. Burton Pugh***, a Utah resident, whose local mailing address is 533 N 650 E, Lindon, Utah 84042, hereafter referred to as " PUGH"; and ***Alton Coal Development, LLC***, a Nevada Limited Liability Company, with a principal address of 194 N 100W, Huntington, Utah 84528 hereafter referred to as "ALTON COAL".

ENTRY 124113 RECORDED BY ACD LLC FEE 71.00
DATE May 24, 2006 AT 1:00PM NJC KANE COUNTY RECORDER
BOOK 0303 PAGE 537-564
BY DEPUTY

WITNESSETH:

WHEREAS, PUGH owns that certain coal estate lying within certain tracts or parcels of real property lying and being located in Kane County, Utah and as more specifically set forth in attached Exhibit "1" Description of Tracts, hereafter described as the "LEASED PREMISES" ; and,

WHEREAS, PUGH has hereby and herewith agreed to lease unto ALTON COAL all of the coal contained within any seams of coal lying in or upon, subject in all respects to each and every term, covenant, provision, and condition set forth hereinbelow; and,

NOW, THEREFORE, that for and in consideration of ALTON COAL's proper and timely payment, observation, and performance of the hereinbelow described specified rents, royalties, terms, and conditions, on ALTON COAL's part to pay, honor, observe, and/or perform, PUGH, the parties do hereby agree to the following terms and conditions of the Coal Lease Agreement.

ARTICLE 1
GRANT OF LEASEHOLD

1.01 **Lease of Coal**. The PUGH hereby leases, lets and demises to ALTON COAL subject to and conditioned upon each and every term, covenant, provision, and condition hereof, and for, and during the specified Term and extensions; (i) the right and privilege to explore for and mine and remove all of the mineable and merchantable coal lying in or upon the LEASED PREMISES, as set out within Exhibit "1" which is attached to this Lease Agreement and incorporated herein by reference; and (ii) the right to conduct mining activities using all available methods for the extraction, mining and removal of coal, whether such techniques or equipment used for the extraction, mining and removal of the coal are now available or that may become available in the future, whether considered as a deep mining method or surface mining method, such as including but not limited to strip mining (including pit, drag line), auger mining, high wall

COPY

mining or mountain top removal; and (iii) the exclusive right and privilege to conduct the aforesaid mining upon and within the LEASED PREMISES and to use and affect as much as or all of the LEASED PREMISES as desired by ALTON COAL, without limitation, together with (iv) the right to market and sell said coal, all in accordance with the provisions of this LEASE AGREEMENT.

1.02 **Transportation and Access Rights.** In addition to the rights to explore for, excavate, mine, remove and sell the coal from the LEASED PREMISES, PUGH hereby leases, lets and demises to ALTON COAL; (i) the unfettered right to transport all coal recovered from the LEASED PREMISES across the surface or anywhere beneath the surface of the LEASED PREMISES; and (ii) the exclusive right, easement, and privilege to enter upon or within said premises and/or any appurtenant premises and perform all work, services, and related activities which may be necessary, convenient, or incidental to the mining operation, including the passage of people, vehicles, machinery, equipment, supplies or materials.

1.03 **Other Rights.** In addition to the rights to explore for, excavate, mine, remove and sell the coal from the LEASED PREMISES, PUGH hereby leases, lets and demises to ALTON COAL; (i) the exclusive right, easement, and privilege to construct, reconstruct, locate, and/or place any fill(s), hollow fill(s), sidehill fill(s), refuse disposal area(s), or other spoil upon the LEASED PREMISES and (ii) to do all construction, excavation, grading or earth moving as is deemed necessary by ALTON COAL in conjunction with the foregoing rights or any aspect of its Mining Operations.

1.04 **Superior Rights.** The rights granted by PUGH are and include (i) the exclusive DOMINANT AND SUPERIOR, right to exercise, utilize, and enjoy any and all of the aforesaid rights and all other rights, easements, and privileges leased, let, demised, granted, and/or conveyed to PUGH (and/or its affiliates, subsidiaries, agents, parent companies, successors, or assigns) under, pursuant to, or in accordance with any SURFACE RIGHTS AGREEMENTS, leases, agreements, subleases, deeds, or other instruments affecting the LEASED PREMISES and/or any other premises appurtenant, vicinal, or adjacent thereto, now owned, possessed or hereafter obtained by PUGH in relation to the LEASED PREMISES and (ii) the right to freely and fully utilize and exercise said mining rights, privileges, and easements as may be necessary, convenient, or incidental to ALTON COAL, its successors' or assigns' activities within any coal(s) reserved to it hereunder and/or any other coal(s) or on, in or upon the lands; and, (iii) PUGH hereby covenants, agrees, and stipulates that the aforesaid rights are SUPERIOR AND DOMINANT, IN ALL RESPECTS, to any rights, easements, privileges, estates, and/or covenants retained or belonging to PUGH.

ARTICLE 2
TERM

2.01 **Initial Term**. The initial Term of this Lease Agreement shall be the period of Ten (10) years from and including the date first above written.

2.02 **Renewal Terms**. In the event that ALTON COAL has not commenced Mining Operations at the conclusion of the Initial Term, ALTON COAL shall have the right, but not the obligation, to renew this Lease Agreement at the conclusion of the initial term, for a renewal term of ten (10) years upon the same terms and conditions.

2.03 **Continuation of Lease During Mining Operations**. Notwithstanding any terms that may appear to be to the contrary, so long as ALTON COAL is engaged in Mining Operations, the term of this Lease Agreement shall be extended by and be coterminous with the period of Mining Operations and ALTON COAL shall remain possessed of the leasehold rights granted herein throughout the life of the Mining Operations until such time as ALTON COAL ceases the Mining Operations or surrenders the Leased Premises to PUGH. The initial or renewal term of this Lease Agreement shall be extended until such time as (i) ALTON COAL has had sufficient time to extract, mine and remove all "mineable and merchantable coal" from the LEASED PREMISES; or (ii) ALTON COAL has had sufficient time to extract, mine and remove all "mineable and merchantable coal" from those areas encompassing any Logical Mine Unit (LMU) or where the lands of the LEASED PREMISES are being mined by ALTON COAL in conjunction with, or as part of the Mining Operations being conducted upon other lands, whichever occurs LATEST, unless this Lease Agreement is sooner hereunder cancelled or terminated.

2.04 **Additional Extension of Term**. The term of this Lease Agreement, as set forth within this Article 2, whether the Initial Term or any extension or continuation, shall be further extended for that additional period of time following the conclusion of Mining Operations, as necessary, for the purpose of and to (i) allow for the completion of all reclamation activity by ALTON COAL and (ii) for ALTON COAL to obtain release of all reclamation bonds on any permits covering, or including the LEASED PREMISES. ALTON COAL shall have all the rights as set out within this Lease Agreement in order to satisfactorily comply with all reclamation requirements, orders and regulations regarding the applicable permit(s) and Mining Operations. In that the reclamation of the LEASED PREMISES is an additional benefit to the PUGH, ALTON COAL shall not be required to pay any minimum royalties or any other additional royalties of any kind, fees or ground rent during the time that only reclamation activities are being conducted.

ARTICLE 3
ADVANCE MINIMUM ROYALTY

3.01 **Execution Royalty**. ALTON COAL, for and in consideration of the execution and delivery of this Lease Agreement, the receipt and sufficiency of which is hereby acknowledged, shall pay unto PUGH the sum of Five Dollars ($5.00) per acre (as described in Exhibit "1") simultaneously with the execution, hereof, as a single, lump sum execution fee, which is not recoupable for any purpose(s), hereunder.

3.02 **Advance Minimum Royalty**. ALTON COAL covenants and agrees to pay unto PUGH the sum of Five Dollars ($5.00) per acre (as described in Exhibit "1") as an annual "Advance Minimum Royalty" hereunder, irrespective of any tonnage(s) or amount(s) of coal mined and removed during any "Term Month(s)" or during any other period(s). The Advance Minimum Royalty will be payable each year on the anniversary date of the Lease Agreement. The Advance Minimum Royalty payments shall be subject to the terms and provisions of abandonment of areas encompassed with the LEASED PREMISES.

ARTICLE 4
TONNAGE ROYALTY

4.01 **Production Royalties**.
ALTON COAL covenants and agrees to pay the following royalties based upon the production of coal from the Leased Premises:
(a) A "Mineral Royalty" for all coal mined, removed and sold from the Leased Premises. ALTON COAL will pay to PUGH the amount of Eight Percent (8%) of the Gross Selling Price per ton for each and every ton of Two Thousand (2,000) pounds of coal which is mined and sold from the LEASED PREMISES; and

(b) A "Surface Use Royalty" for all coal mined, removed and sold from the Leased Premises. In addition to the Mineral Royalty, ALTON COAL will pay to the respective owners of the surface of the land a total amount of Four percent (4%) of the Gross Selling Price of the coal mined and sold from the LEASED PREMISES. In the event that PUGH owns the surface from which the coal is mined and sold, PUGH shall be paid the full amount of the "Surface Use Royalty", otherwise the surface royalty shall be paid proportionately to all respective owners of the surface based upon their interest of ownership in the surface. The Surface Use Royalty shall be in lieu of any other ground rent or compensation for surface damage to be paid to the surface owners.

4.02 **Gross Selling Price**. For the purposes of calculating the tonnage royalty provided for herein, whether Mineral Royalty or Surface Use Royalty, for all coal which is mined, removed and sold hereunder, the "gross selling price" of coal shall be that price actually charged to the "Arm's-length Purchaser" of said coal F.O.B. mine site. An Arm's Length Purchaser is any purchaser in which ALTON COAL does not have an economic interest, or with which ALTON COAL may be otherwise "affiliated", in any respect. In the case of any coal mined from the LEASED PREMISES pursuant to this Lease Agreement, not sold at arm's-length, or stored [for longer than 60 total days] and/or consumed on or off the LEASED PREMISES without any arm's length sale by ALTON COAL, the gross selling price of said coal for purposes of computing the aforesaid tonnage royalty shall be presumed to be equal to average gross realization for coal being received at _____ coal tipple near _____, Utah, at the time of ALTON COAL's removal of the subject coal from the LEASED PREMISES, or if stored or consumed on or off the LEASED PREMISES, at the time of placement in storage or consumption, as applicable. In the event(s), and as often such event(s) may occur, of any sale or transfer of coal mined from the LEASED PREMISES pursuant to this Lease Agreement not at arm's-length and the subsequent resale of said coal by such purchaser or transferee at arm's-length, the aforesaid tonnage royalty shall be based on the subsequent resale at arm's-length by such purchaser or transferee. For the purposes hereof, "affiliated" shall be construed as any person(s) or party(ies) related to, associated with, or otherwise connected with (in any manner(s), financially, and/or familiarly) to ALTON COAL and/or its agents, employees, families, officers, directors, shareholders, affiliates, subsidiaries, heirs, successors, assigns, associates, of either of them. Provided, that PUGH shall have the right and option, at any time or from time to time, to elect to receive the percentage royalty based upon the highest "gross selling price" defined hereunder, irrespective of the actual "gross selling price" of coal(s).

4.03 **Expenses and Commissions**. Notwithstanding the foregoing provisions regarding "gross selling price" as set out within §5.02, ALTON COAL shall be entitled to deduct from the amount of "gross selling price" as used for computation of the royalties due under §5.01, (i) the costs of processing, washing, cleaning and sizing the coal; (ii) the costs incurred in the storage, transfer, shipment and transportation of all coal mined and sold; and (iii) the costs incurred in the de-icing or spraying of any coal in rail cars or barges; and (iv) commissions paid to brokers or coal sales agents as expenses and commissions paid by ALTON COAL from the sale of the coal mined upon the LEASED PREMISES, to the extent that ALTON COAL must pay same or incur that expense or commission as a part of the "gross selling price" of the coal. To the extent that the coal is sold "raw" or ALTON COAL is paid for the coal at a rate quoted FOB mine site and the purchaser of the coal incurs all expenses, there will be no deduction of same from the "gross selling price" of the coal.

4.04 **Payment Dates**. Notwithstanding anything contained herein, to the contrary, all tonnage royalty payments due PUGH hereunder shall be paid by ALTON COAL on or before the Twentieth (20th) day of the month following the month in which such coal is mined from the LEASED PREMISES.

ARTICLE 5
TONNAGE DETERMINATION

5.01 **Tonnage Weights**. The quantity of coal mined from the LEASED PREMISES pursuant to this Lease Agreement shall be determined by the using the end user or Arm's Length Purchaser's weight determination for which ALTON COAL is paid. In the event that the coal is not sold, then volumetric measurement may be used if truck scales or tipple weights are not available. The volumetric measurements made by ALTON COAL, and/or its successors, or assigns, shall be final and binding, provided, in the event PUGH disputes in writing within Ten (10) days of receipt of ALTON COAL's volumetric tonnage estimate and/or disagrees with said volumetric measurements it may submit the same to arbitration, pursuant to and in accordance with the terms set out below.

5.02 **Tonnage Reports**. ALTON COAL covenants and agrees to supply PUGH on or before the Twentieth (20th) day of each month a true and accurate monthly tonnage account and statements of all coal mined and removed from the LEASED PREMISES during the preceding month. Such monthly tonnage statement shall specify: (i) the tonnage of coal mined pursuant to this Lease Agreement; (ii) the gross selling price received by ALTON COAL for coal mined pursuant to this Agreement; (iii) the tonnage royalty due on coal sold; and, (iv) all other information and in a form which PUGH may request from time to time.

5.03 **Right of Inspection**. PUGH shall have the right to inspect the records of ALTON COAL regarding the mining and sale of the coal from the LEASED PREMISES, if done so during reasonable business times and in a reasonable manner so as not to burden the operations of ALTON COAL nor to cause ALTON COAL undue expense. PUGH is authorized, and ALTON COAL hereby grants the necessary ingress and egress for PUGH and/or its agents or contractors (who are competent and certified to do so), from time to time, to make volumetric measurements of the LEASED PREMISES for the purpose of determining the actual amount of coal mined and removed therefrom on which tonnage royalty is payable unto PUGH pursuant to ARTICLE 5. The inspections of the site shall be at the sole risk to PUGH and PUGH agrees to indemnify ALTON COAL from any claims of injury or damage incurred by any agent or contractor of PUGH made against ALTON COAL, that occur or arise out of any visit to or inspection of the LEASED PREMISES. PUGH shall give ALTON COAL reasonable notice of PUGH's intent to visit or inspect.

5.04 **Right to Commingle Coal**. ALTON COAL shall have the right to co-mingle coal mined from the LEASED PREMISES with coal mined from other locations and ALTON COAL shall not be required to pay any royalties to PUGH on the amount of coal co-mingled from other properties. ALTON COAL shall keep accurate records of the amount of coal that is co-mingled with coal mined from the LEASED PREMISES.

ARTICLE 6
RIGHTS OF USE

6.01 **Grant of Rights**. PUGH, irrevocably binding itself and its successors, assigns, affiliates, subsidiaries, ALTON COALS, sub-ALTON COALS, agents, employees, officers, directors, and/or shareholders, and each of them forever, does hereby and herewith grant and convey unto ALTON COAL, its successors and assigns, the exclusive right, easement, and privilege to exercise, utilize, and/or otherwise enjoy, at any time or from time to time, during the continuance hereof, any and all rights, titles, estates, interests, easements, rights-of-way, leases, surface rights agreements, and/or other agreements in, to, and/or otherwise pertaining to any estates, surface or otherwise, which are located within the LEASED PREMISES during any term of this Lease Agreement.

6.02 **Improvements Upon the Leased Premises**. ALTON COAL shall have the right to construct in, on or upon the LEASED PREMISES and make sole and exclusive use of such improvements as may be necessary or incidental to the exploration for and the extraction, removal, storage, treatment, washing, processing, transportation or disposition of said coal. The rights to construct and use said improvements shall include but not be limited to buildings, structures, holding tanks, roadways, entry ways, fans, portals or outlets, parking lots, power lines, transformer stations, poles, beltways, tram ways, water lines, rail lines, roadways, dams, ponds, basins, hollow fills or any other improvements. ALTON COAL shall not be required to pay any additional ground rent or royalty arising from or related to the use of any improvements upon the LEASED PREMISES. All improvements shall belong to and remain the property of ALTON COAL.

6.03 **Subsurface, Subjacent and Adjacent Support**. PUGH, irrevocably binding itself and its successors, assigns, affiliates, subsidiaries, officers, agents, employees, shareholders, directors, operators, contractors, licensees, ALTON COALS, sub-ALTON COALS, and each of them forever, does, to extent it may lawfully do so, hereby release, relinquish, waive, transfer, and otherwise set-over unto ALTON COAL, its successors and assigns forever, any and all statutory or equitable rights or claims to vertical, lateral, subjacent and adjacent support of the LEASED PREMISES and, henceforth, PUGH hereby irrevocably binding itself and the aforespecified associated person(s) and party(ies) does hereby release, relinquish, waive, forego, transfer, and otherwise set over unto ALTON COAL, its successors and assigns forever, any and all claims, demands, disputes, causes of action, choses in action, rights, judgments, suits, and/or otherwise liabilities of any kind or nature which PUGH and/or any of the aforespecified associated person(s) or party(ies) may have by reason of any subsidence, failure, slumps, and/or slides of the LEASED PREMISES. It is specifically acknowledged and agreed by PUGH that ALTON COAL, and/or ALTON COAL's agent(s) or other ALTON COALS, intend to and shall conduct deep mining operations which will include full pillar extraction, and or long-wall operations which may damage or affect the surface and/or limit the use of the surface either during or following mining, including any post mining use that may be envisioned by PUGH, including but not limited to the erection or use of any structure thereupon.

6.04 **Transport and Stockpiling of Coal**. ALTON COAL shall have the right, by any means possible, to transport, hoist, move and/or stockpile coal across, through or upon the surface of the LEASED PREMISES mined by ALTON COAL from the LEASED PREMISES, or from other properties owned, controlled or mined by ALTON COAL. The right to transport and/or stockpile other coals also specifically includes the right to place or store spoil, overburden or waste, whether arising out of the operations conducted thereon or from operations being conducted by ALTON COAL at other locations. The right to mine, remove or transport the coal from other lands shall be across the surface, or through any openings, passageways, shafts, subsurface routes, or subterranean mine works.

6.05 **Non-Interference With Surface**. PUGH, irrevocably binding itself and its successors, assigns, affiliates, subsidiaries, officers, agents, employees, shareholders, directors, operators, contractors, licensees, ALTON COALS, sub-ALTON COALS, and each of them forever warrant that they shall not interfere with the Mining Operations of ALTON COAL nor impede any of the mining activities conducted by ALTON COAL.

ARTICLE 7
MODE OF DELIVERY/REPORTING

7.01 **Payments, Reports and Maps**. All tonnage royalty payments, tonnage reports, wheelage reports, maps, and all other reports, plans, and payments due PUGH pursuant to this Lease Agreement shall be mailed, without demand, as and when due to PUGH at its aforestated mailing address, or to such other mailing address(es) which PUGH may from time to time so designate in writing unto ALTON COAL.

ARTICLE 8
OPERATIONS

8.01 **Mining Standards**. ALTON COAL covenants and agrees that its operations on the LEASED PREMISES shall be conducted in a practical, skillful, workmanlike, and diligent manner as to expeditiously mine and remove the most Mineable and Merchantable coal leased hereby as is economically possible. Provided, ALTON COAL shall not be required to remove all coal and conduct mining operations which, by consideration of local conditions or thickness of seam or character of coal, cannot be mined at a profit. Notwithstanding anything implied hereunder to the contrary, ALTON COAL covenants and agrees to: (i) mine and remove all seams, leaders, riders, bands, and/or splits of coal regardless of quality if such seams can be mined at a profit to ALTON COAL; and, (ii) at PUGH'S discretion and option leave an underground face-up area including suitable adjacent and appurtenant rock storage area(s) in order to facilitate the efficient and economical subsequent backfilling and grading of said underground face-up area(s), as, when, and where requested by PUGH, which complies with all specifications of PUGH, or its agent(s), with respect thereto and is in compliance with all laws and regulations.

8.02 **Compliance With Laws**. ALTON COAL covenants and agrees to conduct its mining operations and all of its other activities upon and within the LEASED PREMISES at all times in full and complete compliance with all applicable statutes, regulations, rules, orders, and other governmental mandates which are currently in force or may be hereafter enacted by the United States of America, State of Utah, and/or other applicable governmental authority(ies). ALTON COAL covenants and agrees not to utilize or participate in any utilization of the LEASED PREMISES, in whole or in part, for any use(s) not specifically contemplated, hereunder.

8.03 **Permits**. ALTON COAL covenants and agrees to secure, maintain, and keep in full force and effect, at its sole cost and expense all: (i) surface disturbance, mining, and reclamation permits from the State of Utah, Division of Oil, Gas and Mining (DOGM) [and/or its governmental successor(s)] with respect to mining and removal of coal from the LEASED PREMISES as contemplated, hereunder to; (ii) all mine licenses from the United States of America Mine Safety and Health Administration (MSHA) and/or the State of Utah; and, (iii) any and all other necessary or incidental mine licenses or permits required to mine and remove coal hereunder in compliance with all of the laws and regulations of the State of Utah and/or United States of America. Furthermore, ALTON COAL shall diligently and in a workmanlike and timely fashion perform and satisfy all reclamation required under and pursuant to any Surface Disturbance Mining and/or Reclamation Permits with respect to the LEASED PREMISES and/or otherwise arising in connection with as a consequence of or in association with the mining and removal of coal as contemplated hereunder.

8.04 **Other Mining Operations**. The coal contained in or upon the LEASED PREMISES may be part of a seam or deposit of coal which extends through other lands onto or become part of the LEASED PREMISES. ALTON COAL may desire or find it advantageous to conduct Mining Operations upon the LEASED PREMISES in conjunction with Mining Operations being conducted by ALTON COAL upon other lands. ALTON COAL shall have the absolute right to conduct Mining Operations upon the LEASED PREMISES in conjunction with, part of, or associated with other Mining Operations being conducted by ALTON COAL, even if not those operations are not located upon the LEASED PREMISES. ALTON COAL shall have the right to include the LEASED PREMISES as part of a Logical Mine Unit (LMU), a common mine plan, or part of a permit encompassing other lands, where the lands of the LEASED PREMISES are being mined by ALTON COAL in conjunction with or as part of the Mining Operations being conducted upon other lands.

8.05 **Mineable and Merchantable Coal**. For all purposes under this Lease Agreement, the term "Mineable and Merchantable Coal" shall mean coal that can be mined at a profit by ALTON COAL, when reached in the ordinary course of mining, using modern and efficient mining methods, practices and equipment.

ARTICLE 9
RECLAMATION AND POST MINING LAND USE

9.01 **Reclamation Standards**. ALTON COAL shall reclaim all sites disturbed by ALTON COAL in accordance with all permit requirements, state and federal laws.

9.02 **Post Mining Use**. ALTON COAL may establish the standards for post mining land use to be pasture, grass lands, or grazing land, or to the extent allowed to be consistent with the standards established by the applicable regulations.

9.03 **Exclusive Control**. ALTON COAL shall have sole and exclusive access, use and control to and of all areas that are being reclaimed until (i) such time as all reclamation activity being conducted by ALTON COAL is completed, and (ii) ALTON COAL has received a full release of all reclamation bonds on any permits covering, or including the LEASED PREMISES. PUGH shall not itself, nor shall any of its contractors, agents, employees, guests, invitees or assigns interfere with or in any way hinder the reclamation activities of ALTON COAL. PUGH shall not itself, nor shall PUGH allow any contractors, agents, employees, guests, invitees or assigns to have access to any areas being reclaimed without the express permission of ALTON COAL, which permission ALTON COAL may in its sole discretion deny if the access to the area may hinder or interfere with the reclamation activities. ALTON COAL shall have the right to seek injunctive relief before a court of appropriate jurisdiction to enforce its rights to have access to the LEASED PREMISES, to conduct all reclamation activities and to deny access to all others to the areas being reclaimed.

9.04 **Indemnification**. PUGH shall indemnify and hold ALTON COAL harmless from any losses, claims, damages, expenses, fines, fees, levies or other expenses, including attorneys fees and court costs, incurred by ALTON COAL or suffered by ALTON COAL as result of any interference or hindrance of the reclamation activities of ALTON COAL by PUGH, its contractors, agents, employees, guests, invitees or assigns.

ARTICLE 10
RECORDS

10.01 **Record Keeping**. ALTON COAL covenants and agrees to keep, maintain, and preserve true and accurate records, books, and accounts of the amount of all coal mined, removed and the Gross Selling Price(s) received for coal mined and removed from the LEASED PREMISES pursuant to this Lease Agreement. All such sales price records, books, statements, and accounts shall be open to inspection by PUGH'S agents at all reasonable times. The provisions of this Paragraph (5.05) shall survive the expiration, cancellation, or sooner termination of this Lease Agreement.

10.02 **Maps**. ALTON COAL shall furnish to PUGH accurate mining maps of ALTON COAL's mining operations upon or within the LEASED PREMISES upon EXHIBIT MAP "A" on an annual basis within Thirty (30) days of the end of each and every calendar year. Such mining maps: (i) shall be prepared by a registered professional mining engineer; (ii) shall be on scales of One (1") Inch equals to One Hundred (100') Feet and One (1") Inch equals to Four Hundred (400') Feet; and, (iii) shall depict seam elevations, coal sections every One Hundred (100') Feet of pit length.

ARTICLE 11
TAXES

11.01 **Payment of Taxes by ALTON COAL**. ALTON COAL covenants and agrees to pay all taxes, fees, assessments, levies, and all other governmental charges which may be assessed, charged, or levied upon the improvements erected thereupon and/or therein of the LEASED PREMISES, by ALTON COAL and any and all of the personal property(ies) of ALTON COAL, the coal severed, mined, and produced pursuant to this Lease Agreement, ALTON COAL's rights, titles, or interests in this Lease Agreement, and the leasehold estate hereby created, and which may be assessed, charged, and/or levied in connection with ALTON COAL's mining operation and other activities conducted pursuant to or in connection with this Lease Agreement, including, without limitation, mineral severance taxes, unmined mineral taxes, gross receipts taxes, employment taxes, black lung taxes, and abandoned mine land taxes and fees as, when, to the extent(s), and in the amount(s) the same become due and payable, without demand by PUGH.

11.02 **Payment of Taxes by PUGH.** PUGH covenants and agrees to pay all taxes, fees, assessments, levies, and all other governmental charges which may be assessed, charged, or levied upon the improvements erected thereupon and/or therein of the LEASED PREMISES, by PUGH and any and all of the personal property(ies) of PUGH as well as the ad valorem taxes upon the LEASED PREMISES, when, to the extent(s), and in the amount(s) the same become due and payable, without demand by ALTON COAL. PUGH shall not allow or permit any portion of the leasehold estate to be levied upon, forfeited or sold on account of any unpaid tax, assessment or charge.

11.02 **Reimbursement.** In the event(s) any such taxes, assessments, levies, fees, and/or other governmental charges, in whole or in part set forth in §12.01 should be paid by PUGH, then ALTON COAL shall repay to PUGH such amount(s), in full, within Ten (10) days of PUGH'S sending to ALTON COAL a notice of a reimbursement request for the same. PUGH shall prepare and submit reports and/or payments on any unmined mineral taxes applicable to the LEASED PREMISES, however, ALTON COAL shall promptly reimburse PUGH for all unmined mineral taxes paid by PUGH to the extent such taxes are applicable to the LEASED PREMISES. In the event(s) any such taxes, assessments, levies, fees, and/or other governmental charges, in whole or in part set forth in §12.02 should be paid by ALTON COAL, then ALTON COAL shall have the right to offset or take as a credit against royalties any amount paid for or behalf of PUGH.

11.03 **Protest and Roll Backs.** ALTON COAL shall have the absolute right to protest or contest any tax, assessment or levy that may be in the name of PUGH but which is a tax, assessment or levy to be paid by ALTON COAL. In the event that the LEASED PREMISES are taxed as agricultural property and if that classification or characterization of said land is changed due to the Mining Operations of ALTON COAL, ALTON COAL shall pay the increased amounts due to the roll back or new assessment.

ARTICLE 12
LIENS/REMOVAL OF EQUIPMENT AND IMPROVEMENTS

12.01 **Liens**. ALTON COAL covenants and agrees to prevent any lien, assessment, attachment, and/or any other encumbrance, of whatsoever kind or nature, arising from the actions of ALTON COAL, or its agents or contractors, from being filed against or encumbering PUGH's title in and to the LEASED PREMISES.

12.02 **Payment by PUGH**. In the event, and as often as such event may occur, any third party(ies) perfects a legal right to encumber said LEASED PREMISES, in whole or in part, as a result of ALTON COAL's failure, in whole or in part, to pay such parties as herein provided, or as ALTON COAL may be otherwise legally obligated, PUGH, at its sole option and in addition to its other rights and remedies hereunder, including, but limited to, the remedies set out within this Lease Agreement, does and shall have the right to pay, in whole or in part, and settle with such parties directly. Provided, however, all such direct payments by PUGH shall be forthwith reimbursed by ALTON COAL to PUGH. This Paragraph and/or the payment of such direct payment sums, in whole or in part, by PUGH is not and shall not be construed as a waiver, alteration, or modification of any of the ALTON COAL's obligations assumed by it hereunder not of PUGH's rights hereunder; nor as a covenant by PUGH to perform the same.

12.03 **Payment Without Demand**. All rentals, royalties, taxes, levies, fees, and other payments herein agreed to be paid by ALTON COAL shall be paid as and when due, without demand, and all of the same shall be deemed and treated as rents reserved by PUGH; with PUGH, in addition to its other rights and remedies herein provided, reserving to itself all the rights and remedies of landlords under the present and future laws of the State of Utah for the collection and recovery of rents.

12.04 **Removal of Equipment and Improvements**. Upon the expiration, cancellation, or sooner termination, from whatever reason, of this Lease Agreement, ALTON COAL shall have the right within one hundred eighty (180) days, thereafter, to remove all of its (and, if applicable, caused removed its contractor's) personal property, machinery, equipment, improvements, and other apparatus from the LEASED PREMISES; provided ALTON COAL: (i) has paid the Advance Minimum Royalties, tonnage royalties, and all other monies due or to become due to PUGH hereunder; and, (ii) has otherwise faithfully and fully kept, performed, honored, and observed all other terms and conditions of this Lease Agreement on its part to keep, perform, honor, and/or observe. Notwithstanding the foregoing, ALTON COAL may maintain on site any equipment, materials, supplies or improvements necessary for the continued reclamation of the LEASED PREMISES.

12.05 **Removal of Trash and Rubbish**. Upon the expiration, cancellation, or sooner termination from whatever reason of this Lease Agreement, or upon the cessation of Mining Operations by ALTON COAL for any cause whatsoever, ALTON COAL shall leave the LEASED PREMISES, free from any accumulation of rubbish or trash.

ARTICLE 13
INDEMNIFICATION

13.01 **Indemnification by ALTON COAL**. ALTON COAL agrees to defend, indemnify, and forever hold PUGH harmless from and/or against any and all liabilities arising, directly, indirectly, out of and/or as a consequence of ALTON COAL's use, occupation, utilization, and/or mining operations and/or any other related work, services, or other activities conducted pursuant to or in connection with this Lease Agreement, together with all costs and expenses including, but not limited to, attorneys' fees and other litigation costs that may be incurred by said indemnified parties in connection therewith, so long as the aforesaid liabilities were caused by the negligence or fault of ALTON COAL.

ARTICLE 14
INSURANCE

14.01 **Coverage by ALTON COAL.** ALTON COAL covenants and agrees to obtain, keep, and maintain, in full force and effect, at all times, during the continuance of this Lease Agreement a comprehensive liability insurance covering ALTON COAL's mining operations and other activities conducted pursuant to or in connection with this Lease Agreement with the greater of (i) those minimum liability coverage limits required by law, or (ii) liability coverage limits of no less than One Million Dollars ($1,000,000) per occurrence / Two Million Dollars ($2,000,000) aggregate for the death and/or injury of person(s) and/or damage to any real or personal property(ies).

14.02 **Additional Coverages**. In addition to the aforespecified liability insurance, ALTON COAL covenants and agrees to obtain, keep, and maintain in full force and effect, at all times, coverage concerning Workmen's Compensation and Black Lung Claims, Unemployment Compensation Insurance, occupational disease insurance, employer liability insurance, and all insurance coverages concerning ALTON COAL's operations and other activities conducted pursuant to this Lease Agreement now and/or hereafter required by the United States of America, State of Utah, and/or all other applicable governmental authorities.

ARTICLE 15
ASSIGNMENT

15.01 **Assignment by ALTON COAL.** This Lease Agreement, the leasehold estate created hereby, and any rights, titles, interests, easements, and/or privileges leased hereby, may be assigned, mortgaged, conveyed, subleased, licensed, encumbered, contracted, permitted, or otherwise transferred or set over by ALTON COAL, in whole or in part, without the express, written consent of PUGH first had and obtained as necessary for the full and complete removal of all Mineable and Merchantable coal.

15.02 **Obligation of Assignee.** In the event of an assignment, mortgaging, conveyance, sublease, license, encumbrance, contract, or otherwise transfer of this Lease Agreement, the assignee shall be obliged to assume and fulfill all obligations of ALTON COAL as set out within this Lease Agreement.

ARTICLE 16
WARRANTY OF TITLE

16.01 **Warranty of Ownership.** PUGH hereby warrants and represents that PUGH is the fee simple title holder and sole owner of all rights, titles, estates, and/or interests in, to, pursuant to, or held in accordance with the LEASED PREMISES including all coal and the rights to mine and sell said coal from the LEASED PREMISES.

16.02 **No Defects.** PUGH hereby warrants and represents that the title to the LEASED PREMISES is free and clear of any lien or encumbrance of any kind and that PUGH has the unrestricted right to enter into this Lease Agreement with ALTON COAL, regarding the LEASED PREMISES and that there are no outstanding contractual arrangements or obligations, without limitation, that will diminish, restrict or inhibit the rights granted to ALTON COAL.

16.03 **Consideration for Warranty.** The Royalties payable to PUGH under the terms of this Lease Agreement are based upon and in consideration for the conveyance of the full, unrestricted and unencumbered rights granted to ALTON COAL and the right of ALTON COAL to mine and sell the coal from the LEASED PREMISES without the requirement to obtain any further rights regarding the LEASED PREMISES and the operations to be conducted thereon or to pay any additional fees, royalties or rents except as set out within this Lease Agreement to PUGH.

16.04 **Defect in Title**. In the event, the PUGH's title in and to the LEASED PREMISES, is defeated, in whole or in part, by the holder of superior title in and to the same, PUGH shall repay ALTON COAL any tonnage royalty(ies) paid on coal(s) mined from the area then in question, without interest to the extent and in the same proportion that the interest of PUGH is defective. Thereafter ALTON COAL's obligation and covenant to pay all monies due PUGH, hereunder, shall instead be payable to the proper owner of the interest in proportion to the interest or rights held and the amount paid to PUGH shall be reduced by the amounts paid to the proper owner of the interest. ALTON COAL may escrow all amounts subject to protect or contest until such time as the proper interest and proper owner is determined. The unpaid royalty shall there after be paid without interest.

16.05 **Costs of Defense**. PUGH shall reimburse ALTON COAL for any and all expense(s), cost(s), and attorneys' fees incurred in the defense of any civil actions, arising herefrom, IRRESPECTIVE OF THE OUTCOME THEREOF.

16.06 **Curative Measures by ALTON COAL**. ALTON COAL may initiate and take whatever steps are necessary to secure or obtain whatever disputed rights or interests that are necessary to provide clear title to ALTON COAL, or take whatever curative steps are necessary to remove the encumbrance or lien which restricts its rights granted hereunder. ALTON COAL may thereafter (i) seek reimbursement from PUGH for all of its costs and expenses incurred, or (ii) retain the interest obtained and reduce the amount of royalties paid to PUGH by the same proportionate amount.

ARTICLE 17
TERMINATION BY ALTON COAL

17.01 **Right of Termination-ALTON COAL.** ALTON COAL may terminate this Lease Agreement in its entirety at any time and from time to time during any tern or extension of term of this Lease Agreement. In lieu of terminating the Lease Agreement in its entirety, ALTON COAL may abandon, surrender or relinquish any portion of the LEASED PREMISES that are no longer needed by ALTON COAL for its operations.

17.02 **Notice to Abandon.** ALTON COAL shall give PUGH at least Thirty (30) days written notice of ALTON COAL's decision that it intends to abandon, surrender or relinquish any portion or any area within the LEASED PREMISES and that ALTON COAL intends not to mine coal from the same area, or that ALTON COAL intends to terminate this Lease Agreement in its entirety.

17.03 **Right of Continuation.** In the event that ALTON COAL gives notice of its intent to abandon, surrender or relinquish any portion of the LEASED PREMISES, or terminate this Lease Agreement in its entirety, PUGH shall have thirty (30) days following the notice by ALTON COAL, (i) to provide to ALTON COAL notice in writing of its intent to succeed to ALTON COAL for the entire permitted area and continue the Mining Operations, or (ii) that the areas sought to be affected by the notice to abandon, surrender or relinquish is in fact mineable and that PUGH will provide for the continued mining and reclamation of those areas. In the event that PUGH provides the written notification to ALTON COAL, then ALTON COAL shall not reclaim the site or abandon the area, subject to compliance with all laws, regulations and permit requirements, at the sole cost to PUGH until such time as PUGH fully transfers the mining permit and operations to PUGH.

17.04 **Effect of Surrender.** Upon any surrender of this Lease Agreement by ALTON COAL, ALTON COAL covenants and agrees to duly execute and deliver to PUGH, upon request, a Release Agreement, in recordable form, releasing all rights, titles, estates, and interests of ALTON COAL in and to any of the LEASED PREMISES. ALTON COAL and its respective heirs, successors, assigns, officers, directors, agents, shareholders, and each of them, forever will thereafter be released from any further liability, obligation, covenant or condition to perform under the terms of this Lease Agreement.

ARTICLE 18
TERMINATION FOR DEFAULT

18.01 **Terms of Default**. In the event that ALTON COAL fails, at any time or from time to time, to pay all sums due and payable unto PUGH, hereunder, as, when, and in the applicable amount when due and payable, or if ALTON COAL fails to perform any other obligation under the terms of this Lease Agreement, then PUGH may consider ALTON COAL as in default under the terms of this Lease Agreement.

18.02 **Notice of Default**. In the event that PUGH considers ALTON COAL as in default, as set out within §18.01, then PUGH shall provide ALTON COAL written notice, delivered to the address set out herein, of any such condition of default. The notice of default shall set forth each term, condition or provision constituting default and the specific provision of this Lease Agreement as it applies to the condition of default.

18.03 **Cure Period**. ALTON COAL shall have Sixty (60) days from and after the date of receipt of any notice of default within which to cure and remedy said default. In the event ALTON COAL fails to fully cure and remedy said default, PUGH shall and does have the right and option to terminate this Lease Agreement by declaring ALTON COAL in breach of the Lease Agreement. PUGH shall exercise its right of termination, hereunder, by sending written "NOTICE OF TERMINATION" to ALTON COAL, as set forth. Five (5) days following the delivery of the written "NOTICE OF TERMINATION" to ALTON COAL, without requirement of additional notice or action, PUGH may repossess and retake the LEASED PREMISES and all improvements and appurtenances thereunto belonging, either by act of re-entry and/or other legal action(s), without any liability for so doing.

18.04 **Extension of Time to Cure**. In the event that the condition of default cannot reasonable be cured by ALTON COAL within the sixty (60) day period (with the exception of monies due and owing to PUGH), then the time period for ALTON COAL to cure the condition of default shall be automatically extended by that amount of time reasonably necessary to cure the condition of default, where no irreparable loss or harm will be suffered by PUGH in the interim. ALTON COAL shall have the responsibility to use all good faith efforts to cure the condition of default in the least amount of time necessary to do so.

18.05 **Forbearance by PUGH**. Provided, any failure to exercise PUGH's right, hereunder, at any time, from time to time, or for any period of time to declare ALTON COAL in default, shall not be deemed a waiver, modification, or abrogation of the provisions of this Article, in whole or in part, and any such failure to exercise said rights shall not preclude or prevent PUGH from enforcing its rights under this Article, at any time or from time to time, thereafter upon any subsequent default.

ARTICLE 19
NOTICES

19.01 **Service**. All notices where provided for anywhere in this Lease Agreement, shall be deemed to have been served upon the receiving Party, if such notice is sent via U. S. Certified Mail, postage prepaid, by the sending Party to the receiving Party at the latter's mailing address as set out within this Lease Agreement. In the case of change of the mailing address of any Party, the Party so changing its mailing address shall give written notice to the other Party.

ARTICLE 20
CUMULATIVE REMEDIES AND ARBITRATION

20.01 **Cumulative Rights**. In addition to all other rights and remedies herein provided, the parties shall have the right to pursue any and all rights and remedies they may have under the law of the State of Utah or otherwise concerning any violation and/or default of any term, condition, provision, and agreement hereof.

20.02 **Binding Arbitration**. Disputes between the parties under the terms and conditions of this Lease Agreement shall be submitted to binding arbitration.

20.03 **Selection of Arbiters**. The party seeking arbitration shall provide written notice of its election to submit any dispute(s) to arbitration along with the name of One (1) disinterested person to serve on the arbitration panel. Thereafter, the other party shall nominate One (1) disinterested to serve on the arbitration panel and PUGH and ALTON COAL shall jointly petition the American Arbitration Association to appoint a third-party, uninterested registered Professional Mining Engineer in the State of Utah, to serve as the third and final member of the arbitration panel. The arbitration panel shall be selected and finally appointed within Twenty (20) days of the initiation of arbitration and shall set a date certain within Thirty (30) days of appointment of the third panel member to conduct the arbitration hearing.

20.04 **Conduct of Proceedings**. All arbitration proceedings shall be conducted in accordance with and pursuant to the rules and regulations of the American Arbitration Association; and, the final decision of the arbitration panel shall be: (i) rendered within Thirty (30) days of the arbitration hearing; and, (ii) shall be final and binding upon PUGH and ALTON COAL without any appeal, recourse, or right of trial of *de novo*, in any State Court and/or United States District Court.

20.05 **Costs**. The parties shall bear their own costs incurred in the arbitration.

ARTICLE 21
MISCELLANEOUS

21.01 **Choice of Law**. This Lease Agreement, in all respects, shall be governed, construed, and enforced in accordance with the substantive laws of the State of Utah.

21.02 **Merger**. This Lease Agreement constitutes the entire, integrated agreement by and between the Parties hereto with respect to the subject matters hereof and supersedes all, oral and written, prior and contemporaneous negotiations, representations, agreements, and undertakings of the Parties hereto relating to the subject matters, hereof.

21.03 **Modifications**. This Lease Agreement shall not be modified, altered, supplemented, or otherwise amended, in whole or in part, unless said modification, alteration, supplement, and/or otherwise amendment is in writing and mutually executed by the Parties hereto. No evidence of any such modification, alteration, supplement, or amendment of this Lease Agreement shall be received in any controversy arising out of or pursuant to the same unless it is in written and executed as specified.

21.04 **Severance for Partial Invalidity**. In the event any provision of this Lease Agreement shall be adjudged invalid by a Court having competent jurisdiction over the Parties hereto, such invalid provision shall be deemed deleted from this Lease Agreement and this Lease Agreement shall be construed as to give full force and effect to the remaining provisions hereof.

21.05 **Recording**. ALTON COAL may record this Lease Agreement, or a memorandum of the same, without the prior written consent of PUGH first had and obtained. Upon the expiration, cancellation, or sooner termination of this Lease Agreement and in the event these presents, or a memorandum hereof, have been previously recorded, upon PUGH's request ALTON COAL shall and binds itself to provide PUGH a recordable memorandum, of a form prescribed by PUGH, witnessing the expiration, cancellation, or sooner termination of this Lease Agreement.

21.06 **Survival**. All representations, warranties, obligations, agreements, stipulations, and covenants made herein or in connection herewith, notwithstanding any provisions of this Lease Agreement that may appear to the contrary, shall respectively survive the expiration, cancellation, or sooner termination for whatever reason of this Lease Agreement to the full extent and until such time as the representations, warranties, obligations, agreements, stipulations, and covenants are respectively fully kept, paid, honored, observed, and/or performed.

21.07 **Relationship of Parties**. The relationship between the Parties hereto is solely that of landlord and tenant, and such relationship shall not be interpreted or established as that of partners, joint venturers, cotenants, principal, and agent, or any relationship other than that of landlord and tenant. PUGH's right to review any of ALTON COAL's mining projections, plans, maps, and other data, and PUGH's right to inspect ALTON COAL's records or mines shall not be deemed, treated, or construed as anything more than PUGH's right to review same. PUGH has no right of management or control over any of the Mining Operations conducted by ALTON COAL. Nothing herein provided shall be construed as creating an employment relationship or a relationship other than that of landlord and tenant between PUGH and ALTON COAL.

21.08 **Captions** The captions appearing in this Lease Agreement are for identification purposes only and shall not be construed as affecting in any way the meaning of the provisions hereof.

21.09 **Inure and Binding Upon the Parties**. This Lease Agreement, and the conditions, provision, covenants, acknowledgments, stipulations, options, and agreements contained herein, shall inure to the benefit of and be of full and binding effect upon the Parties hereto and their respective successors, assigns, and transferees. Nothing set forth in this Lease Agreement confers or is intended to confer upon any person or entity other than the Parties hereto, and their respective successors, assigns, and transferees, any benefits, rights, or remedies under or by reason of this Lease Agreement, excepting solely as set forth herein.

IN WITNESS WHEREOF, the above described Parties as evidencing their agreement to the terms contained herein, have subscribed this Lease Agreement. This Lease Agreement having been executed in duplicate copies, each of which shall be treated and considered an original, this the date and year as set out.

LESSOR: C. BURTON PUGH

Date: 9/10/04

C. BURTON PUGH

LESSEE: ALTON COAL DEVELOPMENT, LLC

Date: 9-10-04

BY:

ITS: MANAGER

STATE OF UTAH }
}
COUNTY OF Utah }

The foregoing Lease Agreement was signed, sworn to, and acknowledged before me by C. BURTON PUGH, on this 10 day of Sept, 2004.

My Commission Expires: 7-29-07

NOTARY PUBLIC

NOTARY PUBLIC
BARBARA SPENCER
225 S Main
Pleasant Grove, UT 84062
My Commission Expires
July 29, 2007
STATE OF UTAH

STATE OF Utah }
}
COUNTY OF Utah }

The foregoing Lease Agreement was signed, sworn to, and acknowledged before me by Allen Childs acting on behalf of, under authority by and as Manager of ALTON COAL DEVELOPMENT, LLC on this 10 day of Sept, 2004.

My Commission Expires: 7-29-07

NOTARY PUBLIC

NOTARY PUBLIC
BARBARA SPENCER
225 S Main
Pleasant Grove, UT 84062
My Commission Expires
July 29, 2007
STATE OF UTAH

EXHIBIT 1

All that certain real property situated in Township 39 South, Range 5 West, SLB&M, Kane County, Utah, more particularly described as follows:

DESCRIPTION: TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 30: All of Sectional Lot #1 (NW¼NW¼); NE¼NW¼; N½NE¼; ALSO: BEGINNING 3.50 chains West of the East Quarter corner of Said Section 30, and running South 34° 34' West 22.64 chains to the 1/16 section line; thence West 2.64 chains to the Southwest corner of the NE¼SE¼ of Said Section 30; thence North 40.00 chains; thence East 20.00 chains; thence South 14.69 chains; thence southwesterly to the point of beginning

...containing 217.64 acres, more or less.

DESCRIPTION: TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 29: BEGINNING at the Northwest corner of Said Section 29, and running thence South 34.69 chains; thence North 33° 22' East 35.50 chains; thence North 40° West 0.58 chains; thence North 37° 30' East 12.30 chains; thence West 22.23 chains to the point of beginning.

...containing 36.04 acres, more or less.

DESCRIPTION: TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 19: SW¼SE¼, E½SE¼, SE¼NE¼

...containing 160.00 acres, more or less.

DESCRIPTION: TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 20: S½SW¼, N½S½, SE¼NE¼, SW¼NW¼

...containing 320.00 acres, more or less.

COAL OWNERSHIP	MINERAL INTEREST
C. Burton Pugh 533 N 650 E Lindon, Utah 84042-1567	40.50%
Roger M. Pugh, Attorney in Fact & Power of Attorney for Verna H. Pugh 116 South 100 West Kanab, UT 84741	37.00%
Margaret Moyers Kanab, Utah	22.50%

SURFACE OWNERSHIP:

C. Burton Pugh
533 N 650 E
Lindon, Utah 84042-1567

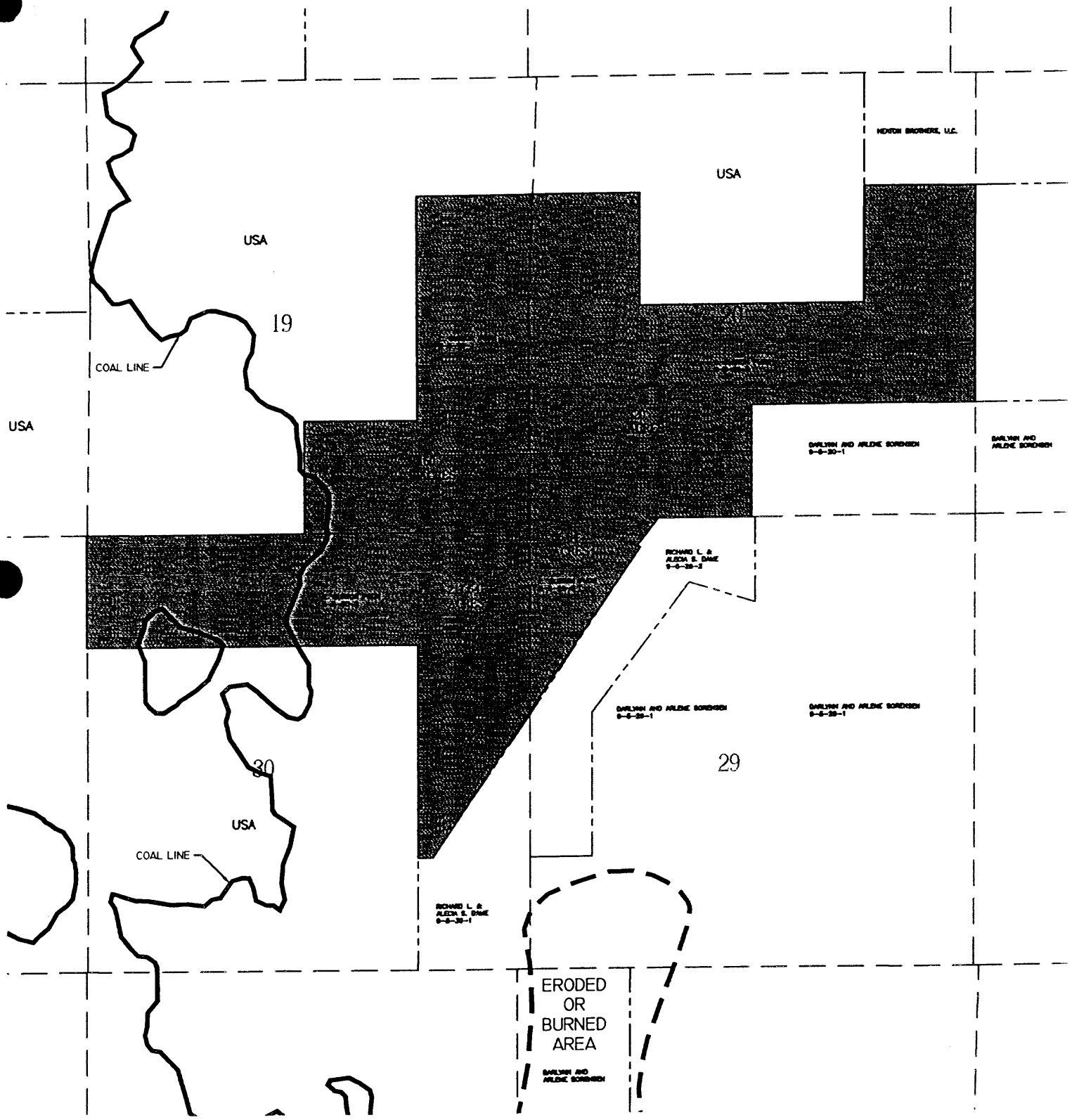
USA
USA
19
COAL LINE
USA
USA
NEWTON BROTHERS, L.L.C.
DARLYNN AND ARLENE SORENSEN
9-6-30-1
DARLYNN AND ARLENE SORENSEN
RICHARD L. &
ALECIA S. DAME
9-6-30-2
DARLYNN AND ARLENE SORENSEN
9-6-29-1
DARLYNN AND ARLENE SORENSEN
9-6-29-1
29
30
USA
COAL LINE
RICHARD L. &
ALECIA S. DAME
9-6-30-1
ERODED
OR
BURNED
AREA
DARLYNN AND
ARLENE SORENSEN

EXHIBIT 2

Alecia Swapp Dame Trust
Surface and Mineral Lease, dated 4/29/05

COAL MINING LEASE
between
THE ALECIA SWAPP DAME TRUST
and
ALTON COAL DEVELOPMENT, LLC

THIS LEASE AGREEMENT effective as of the 29th day of April, 2005, is by and between ***The Alecia Swapp Dame Trust, by and through Richard Dame, Trustee, on behalf of the Trust***, whose mailing address is 1620 Georgia Ave., Boulder Co. 84716 and is hereafter referred to as "DAME"; and, ***Alton Coal Development, LLC*** a Nevada Limited Liability Company, with a principal address of P.O. Box 1230 Huntington, Ut. 84528 hereafter referred to as "ALTON COAL"

WITNESSETH:

WHEREAS, DAME owns that certain coal estate lying within certain tracts or parcels of real property lying and being located in Kane County, Utah and as more specifically set forth in attached Exhibit "1" Description of Tracts, hereafter described as the "Leased Premises" ; and,

WHEREAS, DAME has hereby and herewith agreed to lease unto ALTON COAL all of the coal contained within any and all seams of coal lying in or upon, subject in all respects to each and every term, covenant, provision, and condition set forth hereinbelow; and,

NOW, THEREFORE, that for and in consideration of ALTON COAL's proper and timely payment, observation, and performance of the hereinbelow described specified rents, royalties, terms, and conditions, on ALTON COAL's part to pay, honor, observe, and/or perform, the parties do hereby agree to the following terms and conditions of this Coal Lease Agreement.

ENTRY 129391 RECORDED BY ACD LLC FEE 56.00
DATE May 17 2006 AT 11:55AM JJC KANE COUNTY RECORDER
BOOK 0303 PAGE 263 - 286

ARTICLE 1
GRANT OF LEASEHOLD

1.01 **Lease of Coal.** The DAME hereby leases, lets and demises to ALTON COAL subject to and conditioned upon each and every term, covenant, provision, and condition hereof, and for, and during the specified Term and extensions or renewals; (i) the right and privilege to explore for and mine and remove any and all of the Mineable and Merchantable coal lying in or upon the Leased Premises, as set out within Exhibit "1" which is attached to this Lease Agreement and incorporated herein by reference; and (ii) the right to conduct mining activities using all available methods for the extraction, mining and removal of coal, whether such techniques or equipment used for the extraction, mining and removal of the coal are now available or that may become available in the future, whether considered as a deep mining method or surface mining method, such as including but not limited to strip mining (including pit, drag line), auger mining, high wall mining or mountain top removal;

and (iii) the exclusive right and privilege to conduct the aforesaid mining upon and within the Leased Premises and to use and affect as much as or all of the Leased Premises as desired by ALTON COAL, without limitation, together with (iv) the right to market and sell said coal, all in accordance with the provisions of this Lease Agreement.

1.02 **Transportation and Access Rights.** In addition to the rights to explore for, excavate, mine, remove and sell the coal from the Leased Premises, DAME hereby leases, lets and demises to ALTON COAL; (i) the unfettered right to transport all coal recovered from the Leased Premises across the surface, or anywhere beneath the surface of the Leased Premises; and (ii) the exclusive right, easement, and privilege to enter upon or within said premises and/or any appurtenant premises and perform all work, services, and related activities which may be necessary, convenient, or incidental to the mining operation, including the passage of people, vehicles, machinery, equipment, supplies or materials.

1.03 **Other Rights**. In addition to the rights to explore for, excavate, mine, remove and sell the coal from the Leased Premises, DAME hereby leases, lets and demises to ALTON COAL; (i) the exclusive right, easement, and privilege to construct, reconstruct, locate, and/or place any fill(s), hollow fill(s), sidehill fill(s), refuse disposal area(s), or other spoil storage site upon the Leased Premises, whether temporary or permanent and (ii) to do all construction, excavation, grading or earth moving as is deemed necessary by ALTON COAL in conjunction with the foregoing rights or any aspect of its Mining Operations.

1.04 **Superior Rights.** The rights granted by DAME are and include (i) the exclusive DOMINANT AND SUPERIOR, right to exercise, utilize, and enjoy any and all of the aforesaid rights and all other rights, easements, and privileges previously or subsequently leased, let, demised, granted, and/or conveyed to DAME (and/or its affiliates, subsidiaries, agents, parent companies, successors, or assigns) under, pursuant to, or in accordance with any surface rights agreements, leases, agreements, subleases, deeds, or other instruments affecting the Leased Premises and/or any other premises appurtenant, vicinal, or adjacent thereto, now owned, possessed or hereafter obtained by DAME in relation to the Leased Premises and (ii) the right to freely and fully utilize and exercise said mining rights, privileges, and easements as may be necessary, convenient, or incidental to ALTON COAL, its successors' or assigns' activities within any coal(s) reserved to it hereunder and/or any other coal(s) or on, in or upon the lands; and, (iii) DAME hereby covenants, agrees, and stipulates that the aforesaid rights are SUPERIOR AND DOMINANT, IN ALL RESPECTS, to any rights, easements, privileges, estates, and/or covenants retained by or belonging to DAME.

264

ARTICLE 2
TERM

2.01 **Initial Term**. The initial Term of this Lease Agreement shall be the period of Ten (10) years from and including the date first above written.

2.02 **Renewal Terms**. In the event that ALTON COAL has not commenced Mining Operations at the conclusion of the Initial Term, ALTON COAL shall have the right, but not the obligation, to renew this Lease Agreement at the conclusion of the initial term, for a renewal term of ten (10) years upon the same terms and conditions.

2.03 **Continuation of Lease During Mining Operations**. For purposes of this Lease Agreement, the term "Mining Operations" shall be broadly construed to include but not necessarily be limited to the actual removal of coal; the working of or preparation of any face, bench, pit or site for the mining or removal of coal; placement of or advancement of entryways, shafts, portals, ventilation, conveyors, or long walls; core drilling or active exploration for coal; and operations conducted in conjunction with the washing, sizing, processing, storage, or transportation of coal. Notwithstanding any terms that may appear to be to the contrary, so long as ALTON COAL is engaged in Mining Operations, the term of this Lease Agreement shall be extended by and be coterminous with the period of Mining Operations and ALTON COAL shall remain possessed of the leasehold rights granted herein throughout the life of the Mining Operations until such time as ALTON COAL ceases the Mining Operations or surrenders the Leased Premises to DAME. The initial or renewal term of this Lease Agreement shall be extended until such time as (i) ALTON COAL has had sufficient time to extract, mine and remove all "Mineable and Merchantable Coal" from the Leased Premises; or (ii) ALTON COAL has had sufficient time to extract, mine and remove all "Mineable and Merchantable Coal" from those areas encompassing any Logical Mine Unit (LMU), or where the lands of the Leased Premises are being mined by ALTON COAL in conjunction with, or as part of the Mining Operations being conducted upon other lands, whichever occurs LATEST, unless this Lease Agreement is sooner hereunder cancelled or terminated.

2.04 **Additional Extension of Term**. The term of this Lease Agreement, as set forth within this Article 2, whether the Initial Term or any extension, renewal or continuation, shall be further extended for that additional period of time following the conclusion of Mining Operations, as necessary, for the purpose of and to (i) allow for the completion of all reclamation activity by ALTON COAL from the Leased Premises or from those areas encompassing any Logical Mine Unit (LMU) including the Leased Premises, or where the lands of the Leased Premises are being mined by ALTON COAL in conjunction with, or as part of the Mining Operations being conducted upon other lands, and (ii) for ALTON COAL to obtain release of all reclamation bonds on any permits covering, or including the Leased

2605

Premises. ALTON COAL shall have all the rights as set out within this Lease Agreement in order to satisfactorily comply with all reclamation requirements, orders and regulations regarding the applicable permit(s) and Mining Operations. In that the reclamation of the Leased Premises is an additional benefit to he DAME, ALTON COAL shall not be required to pay any minimum royalties or any other additional royalties of any kind, fees or ground rent during the time that only reclamation activities are being conducted.

ARTICLE 3
ADVANCE MINIMUM ROYALTY

3.01 **Execution Royalty**. ALTON COAL, for and in consideration of the execution and delivery of this Lease Agreement, the receipt and sufficiency of which is hereby acknowledged, shall pay unto DAME the sum of Two Hundred Dollars ($200.00) per acre (as described in Exhibit "1") simultaneously with the execution, hereof, as a single, lump sum execution fee, which is not recoupable for any purpose(s), hereunder.

3.02 **Advance Minimum Royalty**. ALTON COAL covenants and agrees to pay unto DAME the sum of Two Hundred Dollars ($200.00) per acre (as described in Exhibit "1") as an annual "Advance Minimum Royalty" hereunder, irrespective of any tonnage(s) or amount(s) of coal mined and removed during any "Term Month(s)" or during any other period(s). The Advance Minimum Royalty will be payable each year on the anniversary date of this Lease Agreement. The Advance Minimum Royalty payments shall be subject to the terms and provisions of abandonment of areas encompassed with the Leased Premises.

ARTICLE 4
TONNAGE ROYALTY

4.01 **Production Royalties**. ALTON COAL covenants and agrees to pay the following royalties based upon the production of coal from the Leased Premises:

(a) A "Mineral Production Royalty" for all coal mined, removed and sold from the Leased Premises. ALTON COAL will pay to DAME the amount of Eight Percent (8%) of the Gross Selling Price per ton for each and every ton of Two Thousand (2,000) pounds of coal which is mined and sold from the Leased Premises, owned by DAME, otherwise the Mineral Production Royalty shall be paid proportionately to all respective owners of the surface based upon their interest of ownership in the surface; and

(b) A "Surface Use Royalty" for all coal mined, removed and sold from the Leased Premises. In addition to the Mineral Royalty, ALTON COAL will pay to the respective owners of the surface of the land a total amount of Four and one-half percent (4½%) of the Gross Selling Price of the coal mined and sold from the Leased Premises. In the event that DAME owns the surface from which the coal is mined and sold, DAME shall be paid the full amount of the "Surface Use Royalty", otherwise the Surface Use Royalty shall be paid proportionately to all respective owners of the surface

266

based upon their interest of ownership in the surface. The Surface Use Royalty shall be in lieu of any other ground rent or compensation for surface damage to be paid to the surface owners.

4.02 **Gross Selling Price**. For the purposes of calculating the tonnage royalty provided for herein, whether Mineral Royalty or Surface Use Royalty, for all coal which is mined, removed and sold hereunder, the "Gross Selling Price" of coal shall be that price actually charged to the "Arm's-length Purchaser" of said coal F.O.B. mine site. An Arm's Length Purchaser is any purchaser in which ALTON COAL does not have an economic interest, or with which ALTON COAL is not otherwise "affiliated", in any respect. In the case of any coal mined from the Leased Premises pursuant to this Lease Agreement, not sold at arm's-length, or stored [for longer than 60 total days] and/or consumed on or off the Leased Premises without any arm's length sale by ALTON COAL, the Gross Selling Price of said coal for purposes of computing the aforesaid tonnage royalty shall be presumed to be equal to average gross realization for the same specification of coal being received at the coal tipple nearest the mine site, at the time of ALTON COAL's removal of the subject coal from the Leased Premises, or if stored or consumed on or off the Leased Premises, at the time of placement in storage or consumption, as applicable. In the event(s), and as often such event(s) may occur, of any sale or transfer of coal mined from the Leased Premises pursuant to this Lease Agreement not at arm's-length and the subsequent resale of said coal by such purchaser or transferee at arm's-length, the aforesaid tonnage royalty shall be based on the subsequent resale at arm's-length by such purchaser or transferee. For the purposes hereof, "affiliated" shall be construed as any person(s) or party(ies) related to, associated with, or otherwise connected with (in any manner(s), financially, and/or familiarly) to ALTON COAL and/or its agents, employees, families, officers, directors, shareholders, affiliates, subsidiaries, heirs, successors, assigns, associates, of either of them. Provided, that DAME shall have the right and option, at any time or form time to time, to elect to receive the percentage royalty based upon the highest "Gross Selling Price" defined hereunder, irrespective of the actual "Gross Selling Price" of coal(s).

4.03 **Expenses and Commissions**. Notwithstanding the foregoing provisions regarding "Gross Selling Price" as set out within §5.02, ALTON COAL shall be entitled to deduct from the amount of "Gross Selling Price" as used for computation of the royalties due under §5.01, (i) the costs of processing, washing, cleaning and sizing the coal; (ii) the costs incurred in the storage, transfer, shipment and transportation of all coal mined and sold; and (iii) the costs incurred in the de-icing or spraying of any coal in rail cars or barges; and (iv) commissions paid to brokers or coal sales agents as expenses and commissions paid by ALTON COAL from the sale of the coal mined upon the Leased Premises, to the extent that ALTON COAL must pay same or incur that expense or commission as a part of the "Gross Selling Price" of the coal. To the extent that the coal is sold "raw" or ALTON COAL is paid for the coal at a rate quoted FOB mine site and the purchaser of the coal

incurs all expenses, there will be no deduction of same from the "Gross Selling Price" of the coal.

4.04 **Payment Dates**. Notwithstanding anything contained herein, to the contrary, all tonnage royalty payments due DAME hereunder shall be paid by ALTON COAL on or before the Twentieth (20th) day of the month following the month in which such coal is mined from the Leased Premises.

ARTICLE 5
TONNAGE DETERMINATION

5.01 **Tonnage Weights**. The quantity of coal mined from the Leased Premises pursuant to this Lease Agreement shall be determined by the using the end user or Arm's Length Purchaser's weight determination for which ALTON COAL is paid. In the event that the coal is not sold, then volumetric measurement may be used if truck scales or tipple weights are not available. The volumetric measurements made by ALTON COAL, and/or its successors, or assigns, shall be final and binding, provided, in the event DAME disputes in writing within Ten (10) days of receipt of ALTON COAL's volumetric tonnage estimate and/or disagrees with said volumetric measurements it may submit the same to arbitration, pursuant to and in accordance with the terms set out below.

5.02 **Tonnage Reports**. ALTON COAL covenants and agrees to supply DAME on or before the Twentieth (20th) day of each month a true and accurate monthly tonnage account and statements of all coal mined and removed from the Leased Premises during the preceding month. Such monthly tonnage statement shall specify: (i) the tonnage of coal mined pursuant to this Lease Agreement; (ii) the Gross Selling Price received by ALTON COAL for coal mined pursuant to this Agreement; (iii) the tonnage royalty due on coal sold; and, (iv) all other information and in a form which DAME may request from time to time.

5.03 **Right of Inspection**. DAME shall have the right to inspect the records of ALTON COAL regarding the mining and sale of the coal from the Leased Premises, if done so during reasonable business times and in a reasonable manner so as not to burden the operations of ALTON COAL nor to cause ALTON COAL undue expense. DAME is authorized, and ALTON COAL hereby grants the necessary ingress and egress for DAME and/or its agents or contractors (who are competent and certified to do so), from time to time, to make volumetric measurements of the Leased Premises for the purpose of determining the actual amount of coal mined and removed therefrom on which tonnage royalty is payable unto DAME pursuant to ARTICLE 5. The inspections of the site shall be at the sole risk to DAME and DAME agrees to indemnify ALTON COAL from any claims of injury or damage incurred by any agent or contractor of DAME made against ALTON COAL, that occur or arise

268

out of any visit to or inspection of the Leased Premises. DAME shall give ALTON COAL reasonable notice of DAME's intent to visit or inspect.

5.04 **Right to Commingle Coal**. ALTON COAL shall have the right to co-mingle coal mined from the Leased Premises with coal mined from other locations and ALTON COAL shall not be required to pay any royalties to DAME on the amount of coal co-mingled from other properties. ALTON COAL shall keep accurate records of the amount of coal that is co-mingled with coal mined from the Leased Premises.

ARTICLE 6
RIGHTS OF USE

6.01 **Grant of Rights**. DAME, irrevocably binding himself and his heirs, successors, assigns, affiliates, subsidiaries, lessees, sub-lessees, agents, employees, officers, directors, and/or shareholders, and each of them forever, does hereby and herewith grant and convey unto ALTON COAL, its successors and assigns, the exclusive right, easement, and privilege to exercise, utilize, and/or otherwise enjoy, at any time or from time to time, during the continuance hereof, any and all rights, titles, estates, interests, easements, rights-of-way, leases, surface rights agreements, and/or other agreements in, to, and/or otherwise pertaining to any estates, surface or otherwise, which are located within the Leased Premises during any term of this Lease Agreement.

6.02 **Improvements Upon the Leased Premises**. ALTON COAL shall have the right to construct in, on or upon the Leased Premises and make sole and exclusive use of such improvements as may be necessary or incidental to the exploration for and the extraction, removal, storage, treatment, washing, processing, transportation or disposition of said coal. The rights to construct and use said improvements shall include but not be limited to buildings, structures, holding tanks, roadways, entry ways, fans, portals or outlets, parking lots, power lines, transformer stations, poles, beltways, tram ways, water lines, rail lines, roadways, dams, ponds, basins, hollow fills or any other improvements. ALTON COAL shall not be required to pay any additional ground rent or royalty arising from or related to the use of any improvements upon the Leased Premises. All improvements shall belong to and remain the property of ALTON COAL.

6.03 **Subsurface, Subjacent and Adjacent Support**. DAME, irrevocably himself and his heirs, successors, assigns, affiliates, subsidiaries, lessees, sub-lessees, agents, employees, officers, directors, and/or shareholders and each of them forever, does, to extent he may lawfully do so, hereby releases, relinquishes, waives, transfers, and otherwise sets-over unto ALTON COAL, its successors and assigns forever, any and all statutory or equitable rights or claims to vertical, lateral, subjacent and adjacent support of the Leased Premises and, henceforth, DAME hereby irrevocably binding itself and the

aforespecified associated person(s) and party(ies) does hereby release, relinquish, waive, forego, transfer, and otherwise set over unto ALTON COAL, its successors and assigns forever, any and all claims, demands, disputes, causes of action, choses in action, rights, judgments, suits, and/or otherwise liabilities of any kind or nature which DAME and/or any of the aforespecified associated person(s) or party(ies) may have by reason of any subsidence, failure, slumps, and/or slides of the Leased Premises. It is specifically acknowledged and agreed by DAME that ALTON COAL, and/or ALTON COAL's agent(s) or other ALTON COALS, may conduct deep mining operations which will include full pillar extraction, and or long-wall operations which may damage or affect the surface and/or limit the use of the surface either during or following mining, including any post mining use that may be envisioned by DAME, including but not limited to the erection or use of any structure thereupon.

6.04 **Transport and Stockpiling of Coal**. ALTON COAL shall have the right, by any means possible, to transport, hoist, move and/or stockpile coal across, through or upon the surface of the Leased Premises mined by ALTON COAL from the Leased Premises, or from other properties owned, controlled or mined by ALTON COAL. The right to transport and/or stockpile other coals also specifically includes the right to place or store spoil, overburden or waste, whether arising out of the operations conducted thereon or from operations being conducted by ALTON COAL at other locations. The right to mine, remove or transport the coal from other lands shall be across the surface, or through any openings, passageways, shafts, subsurface routes, or subterranean mine works.

6.05 **Non-Interference**. DAME, irrevocably binding himself and his heirs, successors, assigns, affiliates, subsidiaries, lessees, sub-lessees, agents, employees, officers, directors, and/or shareholders and each of them forever warrant that they shall not interfere with the Mining Operations of ALTON COAL nor impede any of the Mining Operations conducted by ALTON COAL.

ARTICLE 7
MODE OF DELIVERY/REPORTING

7.01 **Payments, Reports and Maps**. All tonnage royalty payments, tonnage reports, wheelage reports, maps, and all other reports, plans, and payments due DAME pursuant to this Lease Agreement shall be mailed, without demand, as and when due to DAME at its aforestated mailing address, or to such other mailing address(es) which DAME may from time to time so designate in writing unto ALTON COAL.

ARTICLE 8
OPERATIONS

8.01 **Mining Standards**. ALTON COAL covenants and agrees that its operations on the Leased Premises shall be conducted in a practical, skillful, workmanlike, and diligent manner as to expeditiously mine and remove the most "Mineable and Merchantable" coal leased hereby as is economically possible. Provided, ALTON COAL shall not be required to remove all coal and conduct mining operations which, by consideration of local conditions or thickness of seam or character of coal, cannot be mined at a profit. Notwithstanding anything implied hereunder to the contrary, ALTON COAL covenants and agrees to: (i) mine and remove all seams, leaders, riders, bands, and/or splits of coal regardless of quality if such seams can be mined at a profit to ALTON COAL; and, (ii) at DAME's discretion and option leave an underground face-up area including suitable adjacent and appurtenant rock storage area(s) in order to facilitate the efficient and economical subsequent backfilling and grading of said underground face-up area(s), as, when, and where requested by DAME, which complies with all specifications of DAME, or its agent(s), with respect thereto and is in compliance with all laws and regulations.

8.02 **Compliance With Laws**. ALTON COAL covenants and agrees to conduct its mining operations and all of its other activities upon and within the Leased Premises at all times in full and complete compliance with all applicable statutes, regulations, rules, orders, and other governmental mandates which are currently in force or may be hereafter enacted by the United States of America, State of Utah, and/or other applicable governmental authority(ies). ALTON COAL covenants and agrees not to utilize or participate in any utilization of the Leased Premises, in whole or in part, for any use(s) not specifically contemplated, hereunder.

8.03 **Permits**. ALTON COAL covenants and agrees to secure, maintain, and keep in full force and effect, at its sole cost and expense all: (i) surface disturbance, mining, and reclamation permits from the State of Utah, Division of Oil, Gas and Mining (DOGM) [and/or its governmental successor(s)] with respect to mining and removal of coal from the Leased Premises as contemplated, hereunder to; (ii) all mine licenses from the United States of America Mine Safety and Health Administration (MSHA) and/or the State of Utah; and, (iii) any and all other necessary or incidental mine licenses or permits required to mine and remove coal hereunder in compliance with all of the laws and regulations of the State of Utah and/or United States of America. Furthermore, ALTON COAL shall diligently and in a workmanlike and timely fashion perform and satisfy all reclamation required under and pursuant to any Surface Disturbance Mining and/or Reclamation Permits with respect to the Leased Premises and/or otherwise arising in connection with as a consequence of or in association with the mining and removal of coal as contemplated hereunder.

8.04 **Other Mining Operations**. The coal contained in or upon the Leased Premises may be part of a seam or deposit of coal which extends through other lands onto or become part of the Leased Premises. ALTON COAL may desire or find it advantageous to conduct Mining Operations upon the Leased Premises in conjunction with Mining Operations being conducted by ALTON COAL upon other lands. ALTON COAL shall have the absolute right to conduct Mining Operations upon the Leased Premises in conjunction with, part of, or associated with other Mining Operations being conducted by ALTON COAL, even if not those operations are not located upon the Leased Premises. ALTON COAL shall have the right to include the Leased Premises as part of a Logical Mine Unit (LMU), a common mine plan, or part of a permit encompassing other lands, where the lands of the Leased Premises are being mined by ALTON COAL in conjunction with or as part of the Mining Operations being conducted upon other lands.

8.05 **Mineable and Merchantable Coal**. For all purposes under this Lease Agreement, the term "Mineable and Merchantable Coal" shall mean coal that can be mined at a profit by ALTON COAL, when reached in the ordinary course of mining, using modern and efficient mining methods, practices and equipment.

ARTICLE 9
RECLAMATION AND POST MINING LAND USE

9.01 **Reclamation Standards**. ALTON COAL shall reclaim all sites disturbed by ALTON COAL in accordance with all permit requirements, state and federal laws. To the extent economically feasible, consistent with the comprehensive mining plan and in accordance with all applicable laws and regulations, as well as the mining permit, ALTON COAL shall reclaim the mined areas located on the Leased Premises within one year of completion of mining.

9.02 **Post Mining Use**. ALTON COAL may establish the standards for post mining land use to be pasture, grass lands, or grazing land, or to the extent allowed to be consistent with the standards established by the applicable regulations. To the extent economically feasible, ALTON COAL shall reclaim the mined areas to a standard suitable for cultivation, supported by a standard sprinkler irrigation system. ALTON COAL shall not have any requirement to provide for or erect the sprinkler system.

9.03 **Exclusive Control**. ALTON COAL shall have sole and exclusive access, use and control to and of all areas that are being reclaimed until (i) such time as all reclamation activity being conducted by ALTON COAL is completed, and (ii) ALTON COAL has received a full release of all reclamation bonds on any permits covering, or including the Leased Premises. DAME shall not himself, nor shall any of his contractors, agents, employees, guests, invitees or assigns interfere with or in any way hinder the reclamation activities of

ALTON COAL. DAME shall not himself, nor shall DAME allow any contractors, agents, employees, guests, invitees or assigns to have access to any areas being reclaimed without the express permission of ALTON COAL, which permission ALTON COAL may in its sole discretion deny if the access to the area may hinder or interfere with the reclamation activities. ALTON COAL shall have the right to seek injunctive relief before a court of appropriate jurisdiction to enforce its rights to have access to the Leased Premises, to conduct all reclamation activities and to deny access to all others to the areas being reclaimed.

9.04 **Indemnification**. DAME shall indemnify and hold ALTON COAL harmless from any losses, claims, damages, expenses, fines, fees, levies or other expenses, including attorneys fees and court costs, incurred by ALTON COAL or suffered by ALTON COAL as result of any interference or hindrance of the reclamation activities of ALTON COAL by DAME, its contractors, agents, employees, guests, invitees or assigns.

9.05 **Access Road.** As a personal obligation to DAME and not to be an obligation that "runs with the land", ALTON COAL shall provide to and for the benefit of DAME, an "all weather" roadway for access to and from the ranch house and ranch located upon the Leased Premises. The installation of the road will be done as soon as is practical and as part of Mining Operations, but no later than upon conclusion of Mining Operations. The roadway shall be constructed in similar fashion as other "all weather" roads constructed by and used by ALTON COAL for passenger vehicle traffic. ALTON COAL shall not have a continuing obligation to upgrade, improve or maintain the roadway, except to the extent that it is also used by ALTON COAL, or damaged during the course of Mining Operations by ALTON COAL.

9.06 **Telephone and Utility Service Line.** As a personal obligation to DAME and not to be an obligation that "runs with the land", ALTON COAL shall lay or install for the benefit of DAME, a (i) standard residential telephone line to the ranch house located upon the Leased Premises; and (ii) a standard, single phase, residential, electric utility service line leading to a "masthead" at the ranch house located upon the Leased Premises. The installation of the telephone line and electric service line will be done as soon as is practical and as part of Mining Operations, but no later than upon conclusion of Mining Operations. Both the telephone service line and the electric utility service line shall be constructed in similar fashion as other service lines used for single family residential purposes. ALTON COAL shall not have any obligation to upgrade, improve or maintain either line, except to the extent that it is also used by ALTON COAL, or damaged during the course of Mining Operations by ALTON COAL. ALTON COAL shall have no obligation to supply telephone service or electric current to DAME and ALTON COAL shall have no obligation to connect the telephone line or electric service line to the residence and no responsibility or liability for its correct and proper incorporation into or link to the telephone system, electrical system, meter or service box for the residence. DAME, at his sole expense, shall have the full responsibility to arrange for, provide for and contract for any telephone and electrical service or hookup as well as connection of the telephone and electric service line to any telephone and electric provider or regulated utility.

9.07 **Water.** ALTON COAL shall not impede the ability of cattle to gain access to the water sources on the Leased Premises or ALTON COAL may provide to and for the benefit of DAME, a two inch (2") water line from the ranch spring designated by the Parties to the cattle water troughs as designated by DAME or ALTON COAL may provide limited and controlled access to springs for the cattle to water during surface mining periods. In addition, ALTON COAL agrees to comply with all water quality standards set forth in any mining permit and to monitor the ranch spring for quality and flow on a monthly basis, during mining and for a period of five (5) years following conclusion of Mining Operations on the Leased Premises. ALTON COAL will keep the records of spring flow and compile the data in a suitable format for future reference. In the event that there is a diminution in spring flow in excess of fifteen percent (15%) attributable to Mining Operations, ALTON COAL will have the obligation to correct the defect or to drill a replacement well to provide water to the ranch in amounts sufficient to replace the amount of lost flow.

ARTICLE 10
RECORDS

10.01 **Record Keeping.** ALTON COAL covenants and agrees to keep, maintain, and preserve true and accurate records, books, and accounts of the amount of all coal mined, removed and the Gross Selling Price(s) received for coal mined and removed from the Leased Premises pursuant to this Lease Agreement. All such sales price records, books, statements, and accounts shall be open to inspection by DAME'S agents at all reasonable times. The provisions of this Paragraph (5.05) shall survive the expiration, cancellation, or sooner termination of this Lease Agreement.

10.02 **Maps.** ALTON COAL shall furnish to DAME accurate mining maps of ALTON COAL's mining operations upon or within the Leased Premises upon EXHIBIT MAP "A" on an annual basis within Thirty (30) days of the end of each and every calendar year. Such mining maps: (i) shall be prepared by a registered professional mining engineer; (ii) shall be on scales of One (1") Inch equals to One Hundred (100') Feet and One (1") Inch equals to Four Hundred (400') Feet; and, (iii) shall depict seam elevations, coal sections every One Hundred (100') Feet of pit length.

ARTICLE 11
TAXES

11.01 **Payment of Taxes by ALTON COAL.** ALTON COAL covenants and agrees to pay all taxes, fees, assessments, levies, and all other governmental charges which may be assessed, charged, or levied upon the improvements erected thereupon and/or therein of the Leased Premises, by ALTON COAL and any and all of the personal property(ies) of ALTON COAL, the coal severed, mined, and produced pursuant to this Lease Agreement,

ALTON COAL's rights, titles, or interests in this Lease Agreement, and the leasehold estate hereby created, and which may be assessed, charged, and/or levied in connection with ALTON COAL's mining operation and other activities conducted pursuant to or in connection with this Lease Agreement, including, without limitation, mineral severance taxes, unmined mineral taxes, gross receipts taxes, employment taxes, black lung taxes, and abandoned mine land taxes and fees as, when, to the extent(s), and in the amount(s) the same become due and payable, without demand by DAME.

11.02 **Payment of Taxes by DAME**. Except for improvements erected or used by ALTON COAL, DAME covenants and agrees to pay all taxes, fees, assessments, levies, and all other governmental charges which may be assessed, charged, or levied upon the improvements erected thereupon and/or therein of the Leased Premises, and any and all of the personal property(ies) of DAME as well as the ad valorem taxes upon the Leased Premises, when, to the extent(s), and in the amount(s) the same become due and payable, without demand by ALTON COAL. DAME shall not allow or permit any portion of the leasehold estate to be levied upon, forfeited or sold on account of any unpaid tax, assessment or charge.

11.03 **Reimbursement**. In the event(s) any such taxes, assessments, levies, fees, and/or other governmental charges, in whole or in part set forth in §11.01 should be paid by ALTON COAL, then DAME shall repay to ALTON COAL such amount(s), in full, within Ten (10) days of ALTON COAL sending a notice of a reimbursement request for the same. DAME shall prepare and submit reports and/or payments on any unmined mineral taxes applicable to the Leased Premises, however, ALTON COAL shall promptly reimburse DAME for all unmined mineral taxes paid by DAME to the extent such taxes are applicable to the Leased Premises. In the event(s) any such taxes, assessments, levies, fees, and/or other governmental charges, in whole or in part set forth in §11.02 should be paid by ALTON COAL, then ALTON COAL shall have the right to offset or take as a credit against royalties any amount paid for or behalf of DAME.

11.04 **Protest and Roll Backs**. ALTON COAL shall have the absolute right to protest or contest any tax, assessment or levy that may be in the name of DAME but which is a tax, assessment or levy to be paid by ALTON COAL. In the event that the Leased Premises are taxed as agricultural property and if that classification or characterization of said land is changed due to the Mining Operations of ALTON COAL, ALTON COAL shall pay the increased amounts due to the roll back or new assessment.

ARTICLE 12
LIENS/REMOVAL OF EQUIPMENT AND IMPROVEMENTS

12.01 **Liens**. ALTON COAL covenants and agrees to prevent any lien, assessment, attachment, and/or any other encumbrance, of whatsoever kind or nature, arising from the actions of ALTON COAL, or its agents or contractors, from being filed against or encumbering DAME's title in and to the Leased Premises.

12.02 **Payment by DAME**. In the event, and as often as such event may occur, any third party(ies) perfects a legal right to encumber said Leased Premises, in whole or in part, as a result of ALTON COAL's failure, in whole or in part, to pay such parties as herein provided, or as ALTON COAL may be otherwise legally obligated, DAME, at his sole option and in addition to its other rights and remedies hereunder, including, but limited to, the remedies set out within this Lease Agreement, does and shall have the right to pay, in whole or in part, and settle with such parties directly. Provided, however, all such direct payments by DAME shall be forthwith reimbursed by ALTON COAL to DAME. This Paragraph and/or the payment of such direct payment sums, in whole or in part, by DAME is not and shall not be construed as a waiver, alteration, or modification of any of the ALTON COAL's obligations assumed by it hereunder not of DAME's rights hereunder; nor as a covenant by DAME to perform the same.

12.03 **Payment Without Demand**. All rentals, royalties, taxes, levies, fees, and other payments herein agreed to be paid by ALTON COAL shall be paid as and when due, without demand, and all of the same shall be deemed and treated as rents reserved by DAME; with DAME, in addition to its other rights and remedies herein provided, reserving to himself all the rights and remedies of landlords under the present and future laws of the State of Utah for the collection and recovery of rents.

12.04 **Removal of Equipment and Improvements**. Upon the expiration, cancellation, or sooner termination, for whatever reason, of this Lease Agreement, ALTON COAL shall have the right within one hundred eighty (180) days, thereafter, to remove all of its (and, if applicable, caused removed its contractor's) personal property, machinery, equipment, improvements, and other apparatus from the Leased Premises; provided ALTON COAL: (i) has paid the Advance Minimum Royalties, tonnage royalties, and all other monies due or to become due to DAME hereunder; and, (ii) has otherwise faithfully and fully kept, performed, honored, and observed all other terms and conditions of this Lease Agreement on its part to keep, perform, honor, and/or observe. Notwithstanding the foregoing, ALTON COAL may maintain on site any equipment, materials, supplies or improvements necessary for the continued reclamation of the Leased Premises.

12.05 **Removal of Trash and Rubbish**. Upon the expiration, cancellation, or sooner termination from whatever reason of this Lease Agreement, or upon the cessation of Mining Operations by ALTON COAL for any cause whatsoever, ALTON COAL shall leave the Leased Premises, free from any accumulation of rubbish or trash.

ARTICLE 13
INDEMNIFICATION

13.01 **Indemnification by ALTON COAL.** ALTON COAL agrees to defend, indemnify, and forever hold DAME harmless from and/or against any and all liabilities arising, directly, indirectly, out of and/or as a consequence of ALTON COAL's use, occupation, utilization, and/or mining operations and/or any other related work, services, or other activities conducted pursuant to or in connection with this Lease Agreement, together with all costs and expenses including, but not limited to, attorneys' fees and other litigation costs that may be incurred by said indemnified parties in connection therewith, so long as the aforesaid liabilities were caused by the negligence or fault of ALTON COAL.

ARTICLE 14
INSURANCE

14.01 **Coverage by ALTON COAL.** ALTON COAL covenants and agrees to obtain, keep, and maintain, in full force and effect, at all times, during the continuance of this Lease Agreement a comprehensive liability insurance covering ALTON COAL's Mining Operations and other activities conducted pursuant to or in connection with this Lease Agreement with the greater of (i) those minimum liability coverage limits required by law, or (ii) liability coverage limits of no less than One Million Dollars ($1,000,000) per occurrence / Two Million Dollars ($2,000,000) aggregate for the death and/or injury of person(s) and/or damage to any real or personal property(ies).

14.02 **Additional Coverages**. In addition to the aforespecified liability insurance, ALTON COAL covenants and agrees to obtain, keep, and maintain in full force and effect, at all times, coverage concerning Workmen's Compensation and Black Lung Claims, Unemployment Compensation Insurance, occupational disease insurance, employer liability insurance, and all insurance coverages concerning ALTON COAL's operations and other activities conducted pursuant to this Lease Agreement now and/or hereafter required by the United States of America, State of Utah, and/or all other applicable governmental authorities.

ARTICLE 15
ASSIGNMENT

15.01 **Assignment by ALTON COAL**. This Lease Agreement, the leasehold estate created hereby, and any rights, titles, interests, easements, and/or privileges leased hereby, may be assigned, mortgaged, conveyed, subleased, licensed, encumbered, contracted, permitted, or otherwise transferred or set over by ALTON COAL, in whole or in part, without the express, written consent of DAME first had and obtained as necessary for the full and complete removal of all Mineable and Merchantable coal.

15.02 **Obligation of Assignee**. In the event of an assignment, mortgaging, conveyance, sublease, license, encumbrance, contract, or otherwise transfer of this Lease Agreement, the assignee shall be obliged to assume and fulfill all obligations of ALTON COAL as set out within this Lease Agreement.

ARTICLE 16
WARRANTY OF TITLE

16.01 **Warranty of Ownership**. DAME hereby warrants and represents that DAME is the fee simple title holder and sole owner of all rights, titles, estates, and/or interests in, to, pursuant to, or held in accordance with the Leased Premises including all coal and the rights to mine and sell said coal from the Leased Premises.

16.02 **No Defects**. DAME hereby warrants and represents that the title to the Leased Premises is free and clear of any lien or encumbrance of any kind and that DAME has the unrestricted right to enter into this Lease Agreement with ALTON COAL, regarding the Leased Premises and that there are no outstanding contractual arrangements or obligations, without limitation, that will diminish, restrict or inhibit the rights granted to ALTON COAL.

16.03 **Consideration for Warranty**. The Royalties payable to DAME under the terms of this Lease Agreement are based upon and in consideration for the conveyance of the full, unrestricted and unencumbered rights granted to ALTON COAL and the right of ALTON COAL to mine and sell the coal from the Leased Premises without the requirement to obtain any further rights regarding the Leased Premises and the operations to be conducted thereon or to pay any additional fees, royalties or rents except as set out within this Lease Agreement to DAME.

16.04 **Defect in Title**. In the event, the DAME's title in and to the Leased Premises, is defeated, in whole or in part, by the holder of superior title in and to the same, DAME shall repay ALTON COAL any tonnage royalty(ies) paid on coal(s) mined from the area then in

question, without interest to the extent and in the same proportion that the interest of DAME is defective. Thereafter ALTON COAL's obligation and covenant to pay all monies due DAME, hereunder, shall instead be payable to the proper owner of the interest in proportion to the interest or rights held and the amount paid to DAME shall be reduced by the amounts paid to the proper owner of the interest. ALTON COAL may escrow all amounts subject to protect or contest until such time as the proper interest and proper owner is determined. The unpaid royalty shall there after be paid without interest.

16.05 **Costs of Defense**. DAME shall reimburse ALTON COAL for any and all expense(s), cost(s), and attorneys' fees incurred in the defense of any civil actions, arising herefrom, IRRESPECTIVE OF THE OUTCOME THEREOF.

16.06 **Curative Measures by ALTON COAL**. ALTON COAL may initiate and take whatever steps are necessary to secure or obtain whatever disputed rights or interests that are necessary to provide clear title to ALTON COAL, or take whatever curative steps are necessary to remove the encumbrance or lien which restricts its rights granted hereunder. ALTON COAL may thereafter (i) seek reimbursement from DAME for all of its costs and expenses incurred, or (ii) retain the interest obtained and reduce the amount of royalties paid to DAME by the same proportionate amount.

ARTICLE 17
TERMINATION BY ALTON COAL

17.01 **Right of Termination-ALTON COAL**. ALTON COAL may terminate this Lease Agreement in its entirety at any time and from time to time during any term or extension of term of this Lease Agreement. In lieu of terminating the Lease Agreement in its entirety, ALTON COAL may abandon, surrender or relinquish any portion of the Leased Premises that are no longer needed by ALTON COAL for its operations.

17.02 **Notice to Abandon**. ALTON COAL shall give DAME at least Thirty (30) days written notice of ALTON COAL's decision that it intends to abandon, surrender or relinquish any portion or any area within the Leased Premises and that ALTON COAL intends not to mine coal from the same area, or that ALTON COAL intends to terminate this Lease Agreement in its entirety.

17.03 **Right of Continuation**. In the event that ALTON COAL gives notice of its intent to abandon, surrender or relinquish any portion of the Leased Premises, or terminate this Lease Agreement in its entirety, DAME shall have thirty (30) days following the notice by ALTON COAL, (i) to provide to ALTON COAL notice in writing of its intent to succeed to ALTON COAL for the entire permitted area and continue the Mining Operations, or (ii) that the areas sought to be affected by the notice to abandon, surrender or relinquish is in fact

mineable and that DAME will provide for the continued mining and reclamation of those areas. In the event that DAME provides the written notification to ALTON COAL, then ALTON COAL shall not reclaim the site or abandon the area, subject to compliance with all laws, regulations and permit requirements, at the sole cost to DAME until such time as DAME fully transfers the mining permit and operations to DAME.

17.04 **Effect of Surrender**. Upon any surrender of this Lease Agreement by ALTON COAL, ALTON COAL covenants and agrees to duly execute and deliver to DAME, upon request, a Release Agreement, in recordable form, releasing all rights, titles, estates, and interests of ALTON COAL in and to any of the Leased Premises. ALTON COAL and its respective heirs, successors, assigns, officers, directors, agents, shareholders, and each of them, forever will thereafter be released from any further liability, obligation, covenant or condition to perform under the terms of this Lease Agreement.

ARTICLE 18
TERMINATION FOR DEFAULT

18.01 **Terms of Default**. In the event that ALTON COAL fails, at any time or from time to time, to pay all sums due and payable unto DAME, hereunder, as, when, and in the applicable amount when due and payable, or if ALTON COAL fails to perform any other obligation under the terms of this Lease Agreement, then DAME may consider ALTON COAL as in default under the terms of this Lease Agreement.

18.02 **Notice of Default**. In the event that DAME considers ALTON COAL as in default, as set out within §18.01, then DAME shall provide ALTON COAL written notice, delivered to the address set out herein, of any such condition of default. The notice of default shall set forth each term, condition or provision constituting default and the specific provision of this Lease Agreement as it applies to the condition of default.

18.03 **Cure Period**. ALTON COAL shall have Sixty (60) days from and after the date of receipt of any notice of default within which to cure and remedy said default. In the event ALTON COAL fails to fully cure and remedy said default, DAME shall and does have the right and option to terminate this Lease Agreement by declaring ALTON COAL in breach of the Lease Agreement. DAME shall exercise its right of termination, hereunder, by sending written "NOTICE OF TERMINATION" to ALTON COAL, as set forth. Five (5) days following the delivery of the written "NOTICE OF TERMINATION" to ALTON COAL, without requirement of additional notice or action, DAME may repossess and retake the Leased Premises and all improvements and appurtenances thereunto belonging, either by act of re-entry and/or other legal action(s), without any liability for so doing.

18.04 **Extension of Time to Cure**. In the event that the condition of default cannot reasonable be cured by ALTON COAL within the sixty (60) day period (with the exception of monies due and owing to DAME), then the time period for ALTON COAL to cure the condition of default shall be automatically extended by that amount of time reasonably necessary to cure the condition of default, where no irreparable loss or harm will be suffered by DAME in the interim. ALTON COAL shall have the responsibility to use all good faith efforts to cure the condition of default in the least amount of time necessary to do so.

18.05 **Forbearance by DAME**. Provided, any failure to exercise DAME's right, hereunder, at any time, from time to time, or for any period of time to declare ALTON COAL in default, shall not be deemed a waiver, modification, or abrogation of the provisions of this Article, in whole or in part, and any such failure to exercise said rights shall not preclude or prevent DAME from enforcing its rights under this Article, at any time or from time to time, thereafter upon any subsequent default.

ARTICLE 19
NOTICES

19.01 **Service**. All notices where provided for anywhere in this Lease Agreement, shall be deemed to have been served upon the receiving Party, if such notice is sent via U. S. Certified Mail, postage prepaid, by the sending Party to the receiving Party at the latter's mailing address as set out within this Lease Agreement. In the case of change of the mailing address of any Party, the Party so changing its mailing address shall give written notice to the other Party.

ARTICLE 20
CUMULATIVE REMEDIES AND ARBITRATION

20.01 **Cumulative Rights**. In addition to all other rights and remedies herein provided, the parties shall have the right to pursue any and all rights and remedies they may have under the law of the State of Utah or otherwise concerning any violation and/or default of any term, condition, provision, and agreement hereof.

20.02 **Binding Arbitration**. Disputes between the parties under the terms and conditions of this Lease Agreement shall be submitted to binding arbitration.

20.03 **Selection of Arbiters**. The party seeking arbitration shall provide written notice of its election to submit any dispute(s) to arbitration along with the name of One (1) disinterested person to serve on the arbitration panel. Thereafter, the other party shall nominate One (1) disinterested to serve on the arbitration panel and DAME and ALTON COAL shall jointly petition the American Arbitration Association to appoint a third-party,

uninterested registered Professional Mining Engineer in the State of Utah, to serve as the third and final member of the arbitration panel. The arbitration panel shall be selected and finally appointed within Twenty (20) days of the initiation of arbitration and shall set a date certain within Thirty (30) days of appointment of the third panel member to conduct the arbitration hearing.

20.04 **Conduct of Proceedings**. All arbitration proceedings shall be conducted in accordance with and pursuant to the rules and regulations of the American Arbitration Association; and, the final decision of the arbitration panel shall be: (i) rendered within Thirty (30) days of the arbitration hearing; and, (ii) shall be final and binding upon DAME and ALTON COAL without any appeal, recourse, or right of trial of *de novo*, in any State Court and/or United States District Court.

20.05 **Costs**. The parties shall bear their own costs incurred in the arbitration.

ARTICLE 21
CONFIDENTIALITY

21.01 **Covenant of Confidentiality**. DAME agrees that all information about this Lease Agreement; the terms and conditions of this Lease Agreement; the Mining Operations; mining plans; nature of seams or formations; leases; properties; finances; buyers of coal; or price of coal sold (collectively "Information") is proprietary to ALTON COAL regarding these coal properties and operations. DAME acknowledges the sensitive and confidential nature of all Information provided to DAME by ALTON COAL or that DAME learns and DAME agrees and covenants with ALTON COAL to receive all Information as confidential. In addition, DAME warrants that he will maintain the confidentiality of all Information as only between the parties to this agreement and will not disclose, reveal or convey any Information, whether intentionally, unintentionally or accidentally to any person or entity without the express written consent of ALTON COAL. DAME warrants that he will not directly or indirectly disclose any Information, whether in whole or any part of it, to any person or entity, unless that person or entity is (1) a party to this Lease Agreement or, (2) is a party to a separate Confidentiality and Non-disclosure Agreement with ALTON COAL, or (3) without the express written consent of ALTON COAL.

21.02 **No Competition**. DAME warrants that he will not utilize any of the Information for any purpose other than as set out in this agreement. None of the Information shall be used by DAME in any manner to compete with ALTON COAL nor in any way to diminish any rights that ALTON COAL shall have, obtain or acquire. DAME may not directly or indirectly incorporate, use, act upon or in any manner appropriate for its own use or use by others, any Information into any other investment, acquisition, mining or development in competition with ALTON COAL, without the express written consent by ALTON COAL.

21.03 **Information Reviewed By DAME**. Except for the financial and tonnage reports supplied to DAME, all other Information reviewed by DAME, remains the property of ALTON COAL. DAME agrees to return to ALTON COAL, on demand, any and all Information so furnished, as well as any copies or reproductions of any material produced by or created for or by DAME. DAME will not retain any copies or reproductions of any Information.

21.04 **Injunctive Relief**. In the event of any violation of the provisions of this Article 21, including but not limited to any actual or suspected unauthorized dissemination, release, or use of Information by DAME, then ALTON COAL shall be entitled to obtain injunctive relief as well as monetary damages. DAME agrees to indemnify ALTON COAL for any losses it may suffer from the release or disclosure of Information by any person or entity not a party to this agreement, if such release or disclosure is as a direct or indirect result of any action, inaction or omission by DAME.

ARTICLE 22
MISCELLANEOUS

22.01**Choice of Law**. This Lease Agreement, in all respects, shall be governed, construed, and enforced in accordance with the substantive laws of the State of Utah.

22.02 **Merger**. This Lease Agreement constitutes the entire, integrated agreement by and between the Parties hereto with respect to the subject matters hereof and supersedes all, oral and written, prior and contemporaneous negotiations, representations, agreements, and undertakings of the Parties hereto relating to the subject matters, hereof.

22.03 **Modifications**. This Lease Agreement shall not be modified, altered, supplemented, or otherwise amended, in whole or in part, unless said modification, alteration, supplement, and/or otherwise amendment is in writing and mutually executed by the Parties hereto. No evidence of any such modification, alteration, supplement, or amendment of this Lease Agreement shall be received in any controversy arising out of or pursuant to the same unless it is in written and executed as specified.

22.04 **Severance for Partial Invalidity**. In the event any provision of this Lease Agreement shall be adjudged invalid by a Court having competent jurisdiction over the Parties hereto, such invalid provision shall be deemed deleted from this Lease Agreement and this Lease Agreement shall be construed as to give full force and effect to the remaining provisions hereof.

22.05 **Recording**. ALTON COAL may record this Lease Agreement, or a memorandum of the same, without the prior written consent of DAME first had and obtained.

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Upon the expiration, cancellation, or sooner termination of this Lease Agreement and in the event these presents, or a memorandum hereof, have been previously recorded, upon DAME's request ALTON COAL shall and binds itself to provide DAME a recordable memorandum, of a form prescribed by DAME, witnessing the expiration, cancellation, or sooner termination of this Lease Agreement.

22.06 **Survival**. All representations, warranties, obligations, agreements, stipulations, and covenants made herein or in connection herewith, notwithstanding any provisions of this Lease Agreement that may appear to the contrary, shall respectively survive the expiration, cancellation, or sooner termination for whatever reason of this Lease Agreement to the full extent and until such time as the representations, warranties, obligations, agreements, stipulations, and covenants are respectively fully kept, paid, honored, observed, and/or performed.

22.07 **Relationship of Parties**. The relationship between the Parties hereto is solely that of landlord and tenant, and such relationship shall not be interpreted or established as that of partners, joint venturers, cotenants, principal, and agent, or any relationship other than that of landlord and tenant. DAME's right to review any of ALTON COAL's mining projections, plans, maps, and other data, and DAME's right to inspect ALTON COAL's records or mines shall not be deemed, treated, or construed as anything more than DAME's right to review same. DAME has no right of management or control over any of the Mining Operations conducted by ALTON COAL. Nothing herein provided shall be construed as creating an employment relationship or a relationship other than that of landlord and tenant between DAME and ALTON COAL.

22.08 **Captions** The captions appearing in this Lease Agreement are for identification purposes only and shall not be construed as affecting in any way the meaning of the provisions hereof.

22.09 **Inure and Binding Upon the Parties**. This Lease Agreement, and the conditions, provision, covenants, acknowledgments, stipulations, options, and agreements contained herein, shall inure to the benefit of and be of full and binding effect upon the Parties hereto and their respective successors, assigns, and transferees. Nothing set forth in this Lease Agreement confers or is intended to confer upon any person or entity other than the Parties hereto, and their respective successors, assigns, and transferees, any benefits, rights, or remedies under or by reason of this Lease Agreement, excepting solely as set forth herein.

{EXECUTION ON FOLLOWING PAGE}

IN TESTIMONY WHEREOF, the Parties hereto have hereunto subscribed this Lease Agreement, these presents having been executed in duplicate copies, each of which shall be treated and considered an original, this the date and year first above written.

LESSOR: **THE ALECIA SWAPP DAME TRUST** Date: 5-17-06

By: _____

RICHARD L. DAME

ITS: Trustee

LESSEE: **ALTON COAL DEVELOPMENT, LLC** Date: _____

BY: _____

ITS: _____

STATE OF Utah }

COUNTY OF Kane }

The foregoing Lease Agreement was signed, sworn to, and acknowledged before me by RICHARD L. DAME, acting on behalf of, under the authority by and as Trustee of The Alecia Swapp Dame Trust, on this 17th day of May, 2006.

_____

NOTARY PUBLIC

My Commission Expires: 12-21-08

STATE OF Utah }

COUNTY OF Kane }

The foregoing Lease Agreement was signed, sworn to, and acknowledged before me by Richard L. Dame acting on behalf of, under authority by and as Alton Parker CEO of ALTON COAL DEVELOPMENT, LLC on this day of May, 2006.

My Commission Expires: 12-21-08

_____

NOTARY PUBLIC

My Commission Expires: 12-21-08

IN TESTIMONY WHEREOF, the Parties hereto have hereunto subscribed this Lease Agreement, these presents having been executed in duplicate copies, each of which shall be treated and considered an original, this the date and year first above written.

LESSOR: **THE ALECIA SWAPP DAME TRUST** Date: 4-29-05

BY: R Dame

RICHARD DAME

ITS: Trustee

LESSEE: **ALTON COAL DEVELOPMENT, LLC** Date: 4-29-05

BY:

ITS: MANAGER

STATE OF NEVADA }

COUNTY OF CLARK }

The foregoing Lease Agreement was signed, sworn to, and acknowledged before me by RICHARD DAME, acting on behalf of, under authority by and as Trustee of The Alecia Swapp Dame Trust, on this 29 day of APRIL, 2005.

NOTARY PUBLIC

My Commission Expires: 2/25/2008

STATE OF NEVADA }

COUNTY OF CLARK }

The foregoing Lease Agreement was signed, sworn to, and acknowledged before me by RICHARD DAME acting on behalf of, under authority by and as ALLEN PARKER COLDS of ALTON COAL DEVELOPMENT, LLC on this 29 day of APRIL, 2005.

KRIS ANDREASON
Notary Public State of Nevada
No. 00-61037-1
My appt. exp. Feb. 25, 2008

NOTARY PUBLIC

My Commission Expires: 2/25/2008

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EXHIBIT 1
DESCRIPTION OF TRACTS
THE LEASED PREMISES

Coal Ownership and Leasehold Status

STATE: Utah
COUNTY: Kane
DATE: July 26, 2004

TRACT: **9-5-30-1**
PROSPECT: Talon

The following information has been obtained from a careful search of the Kane County, Utah Register of Deeds, Clerk of Court and County Assessor records insofar as the same pertains to the subject lands from inception of title through the above indicated date.

DESCRIPTION: TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M

Section 30: BEGINNING at a point 5.31 chains North of the E¼ corner of Said Section 30, and running thence South 45.31 chains; thence West 20.00 chains; thence North 20.00 chains; thence East 2.64 chains; thence North 34° 34' East 22.64 chains to the 1/16th section line; thence North 33° 22' East to the point of beginning.

...containing 61.96 acres, more or less.

COAL OWNERSHIP	MINERAL INTEREST	NET ACREAGE	LEASEHOLD STATUS
Alecia Swapp Dame Trust 1620 Georgia Avenue Boulder City, Nevada 89005-3643	100.00%	61.96 61.96	APPEARS UNLEASED

SURFACE OWNERSHIP:
Alecia Swapp Dame
Trust
1620 Georgia Avenue
Boulder City, Nevada 89005-3643

TAXES: Paid and current through 2004.

 ae RJH AC

286

KANE COUNTY RECORDER
76 N. MAIN ST.
KANAB, UTAH 84741

CASH RECEIPT

Date MAY 17, 2006 001372

Received From ALTON COAL DEV. LLC

Address PO BOX 1230 HUNTINGTON, UT 84528-1230

FIFTY SIX DOLLARS AND NO/00 Dollars $ 56.00

For RECORDING (1) COAL MINING LEASE - DAME/ACD LLC

ACCOUNT			HOW PAID		
AMT. OF ACCOUNT	56	00	CASH		
AMT. PAID	127	00	CHECK #	1127	✓
BALANCE ~~DUE~~	71	00	MONEY ORDER ☐ CREDIT CARD ☐		

By VJ Caruso

TOWARDS ANOTHER LEASE

CRB 111-2

APPENDIX 3-6

DWR Raptor Survey (2006)
Coal Hollow

Data Spread Sheet
Net number-date-species

Raptor Survey Drawing (2006)

2006 Raptor Survey
Alton Coal Field-Coal Hollow Mine
DWR 2006 Raptor Survey Program

DWR- Nathan Sill
Alton Coal Development- Allen Childs

NEST NO	X UTM NAD8	Y UTM NAD8	DATE	SPECIES	TYPE	STATUS 06	EGGS	YNG	AGE	COMMENTS06
1583	368872	4139928	05/30/06	Red-tailed Hawk	Tree	Inactive				
1584	372965	4143290	05/30/06	Red-tailed Hawk	Cliff	Inactive				
1585	376483	4143352	05/30/06	Falcon	Cliff	Active	0	0		
1586	376349	4142363	05/30/06	Golden Eagle	Cliff	Inactive				
1587	376846	4142691	05/30/06	Golden Eagle	Cliff	Inactive				

APPENDIX 4-1

Cultural Resource Inventory (Coal Hollow)

Paleontological Survey (Coal Hollow)

Geologic Report of the Impacts of Bedrock
Surficial Units on the Disturbance of Cultural Resources
(Coal Hollow)

Data Recovery Plan & Research Design
For Sites within the Permit Area
(Coal Hollow)

APPENDIX 4-1

CULTURAL RESOURCE INVENTORY OF ALTON COAL DEVELOPMENT'S SINK VALLEY-ALTON AMPHITHEATER PROJECT AREA, KANE COUNTY, UTAH

By: Montgomery Archaeological Consultants, Inc.

Chapter 4
May 15, 2006

CULTURAL RESOURCE INVENTORY OF ALTON COAL DEVELOPMENT'S SINK VALLEY-ALTON AMPHITHEATER PROJECT AREA, KANE COUNTY, UTAH

Patricia Stavish

CULTURAL RESOURCE INVENTORY OF ALTON COAL DEVELOPMENT'S SINK VALLEY-ALTON AMPHITHEATER PROJECT AREA, KANE COUNTY, UTAH

By:

Patricia Stavish

With Contributions by:

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Prepared For:

Utah Division of Oil, Gas & Mining
Salt Lake City

Prepared Under Contract With:

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Submitted By:

Keith R. Montgomery, Principle Investigator
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MOAC Report No. 05-95

March 10, 2006

United States Department of Interior (FLPMA)
Permit No. 05-UT-60122

State of Utah Antiquities Project (Survey)
Permit No. U-05-MQ-0346p

ABSTRACT

A cultural resource inventory was conducted by Montgomery Archaeological Consultants, Inc. (MOAC) in June 2005 for Alton Coal Development, LLC. The project area is located in the Sink Valley area in the Alton Amphitheater. This is a multiple year proposal in which the company proposes to develop an open pit coal mine south of the town of Alton, Kane County, Utah. This report covers the first phase of the development located on private property. The inventory was implemented at the request of Mr. Allen Childs, Talon Resources, Huntington, Utah. Approximately 433 acres were inventoried, all of which are on private property. The fieldwork was performed between June 2 and 19, 2005 under the supervision of Keith Montgomery, assisted by Meg Thornton, Patricia Stavish, and Andre Jendresen. The inventory was conducted under the auspices of U.S.D.I. (FLPMA) Permit No. 05-UT-60122 and State of Utah Antiquities Project (Survey) No. U-05-MQ-0346p.

The inventory resulted in the documentation of one previously recorded historic/prehistoric site (42Ka2068), five previously recorded prehistoric sites (42Ka1313, 42Ka2041, 42Ka2042, 42Ka2043, and 42Ka2044), and nine new prehistoric sites (42Ka6104, 42Ka6105, 42Ka6106, 42Ka6107, 42Ka6108, 42Ka6109, 42Ka6110, 42Ka6124, and 42Ka6126). The previously recorded historic/prehistoric site (42Ka2068) is recommended as eligible for nomination to the NRHP under Criterion D as both the prehistoric and historic components are likely to contribute to historic and prehistoric research topics of the area. The five previously recorded prehistoric sites (42Ka1313, 42Ka2041, 42Ka2042, 42Ka2043, and 42Ka2044) were initially unevaluated by the recorders. These sites along with the eight new recorded sites (42Ka6104, 42Ka6105, 42Ka6106, 42Ka6107, 42Ka6108, 42Ka6109, 42Ka6110, and 42Ka6126) are recommended eligible to the NRHP under Criterion D because they are likely to contribute to such prehistory of the region. None of these sites meet the requirements defined in Criteria A, B or C. These sites include four prehistoric temporary camps (42Ka1313, 42Ka2042, 42Ka6110 and 42Ka6126) which exhibit diversity of cultural materials, spatial patterning, fire-cracked rock features, and in several cases temporal diagnostics. Cultural traditions represented at these sites include Early and Middle Archaic (42Ka1313), Anasazi (42Ka1313, 42Ka6126), and Protohistoric/Contact or Southern Paiute (42Ka1313, 42Ka6126). Specific research objectives which these sites could address include site function, site structure, chronology, subsistence, technology, spatial organization, land use patterns, and extra-regional relationships.

Nine prehistoric sites in the inventory area are categorized as lithic scatters (42Ka2041, 42Ka2043, 42Ka2044, 42Ka6104, 42Ka6105, 42Ka6106, 42Ka6107, 42Ka6108, and 42Ka6109). These sites display several classes of chipped stone tools with lesser amounts of ground stone implements and ceramic artifacts. Cultural traditions represented at some of the sites include Early Archaic (42Ka2044, 42Ka6108), General Archaic (42Ka6104), Anasazi/Pueblo (42Ka2041), and Protohistoric/Contact or Southern Paiute (42Ka2041, 42Ka2043, 42Ka6105). All of these sites occur in depositional environments (e.g., alluvial) that are likely to yield subsurface cultural remains. Research topics which could be addressed at these sites include site function, chronology, subsistence, technology, and spatial organization, land use patterns, and extra-regional relationships.

Site 42Ka6124, a lithic scatter of unknown cultural affiliation, exhibits a limited artifact assemblage, lacks temporal indicators and has minimal potential for subsurface cultural materials. Therefore, it is recommended as not eligible to NRHP because the site is unlikely to yield information relevant to the research domains of the area.

The paleontological survey performed by Alden H. Hamblin within the Sink Valley-Alton Amphitheater coal lease project area resulted in the documentation of one fossil site (42Ka1252I) found in the Cretaceous Tropic shale formation. The legal description is the E ½, NW 1/4 of Section 30 Township 39 South Range 5 West (Appendix B). Paleontological locality 42Ka1252I is an invertebrate locality that includes of bivalves, gastropods, and cephalopods. The site is evaluated as important because it is likely to produce common, abundant fossils for stratigraphic or population variability studies. No further recommendations are provided at this time in terms of treatment.

The cultural resource inventory of Alton Coal Development's Sink Valley area of the Alton Amphitheater resulted in the location of 15 prehistoric or prehistoric/historic sites of which 14 sites (42Ka1313, 42Ka2041, 42Ka2042, 42Ka2043, 42Ka2044,42Ka2068 42Ka6104, 42Ka6105, 42Ka6106, 42Ka6107, 42Ka6108, 42Ka6109, 42Ka6110, and 42Ka6126) are considered eligible for nomination to the NRHP under Criterion D. All except two sites (42Ka2068 and 42Ka6108) will be avoided by this phase of the coal development project. The following recommendations are put forth regarding the eligible sites in this project area.

1. All eligible sites except for sites 42Ka2068 and 42Ka6108 will be avoided by the undertaking. Additionally, temporary fencing should be erected around the boundaries of all these eligible sites to facilitate avoidance.

2. It is recommended that a qualified archaeologist should monitor the removal of the topsoil during surface mining activities.

3. The two eligible sites, 42Ka2068 and 42Ka6108, which cannot be avoided by the undertaking will require a data recovery treatment plan.

TABLE OF CONTENTS

ABSTRACT i
TABLE OF CONTENTS iii
LIST OF FIGURES iii
LIST OF TABLES iii
INTRODUCTION 1
DESCRIPTION OF PROJECT AREA 2
Environmental Setting 2
Cultural Overview 4
SURVEY METHODOLOGY 11
INVENTORY RESULTS 12
Archaeological Sites 13
NATIONAL REGISTER OF HISTORIC PLACES EVALUATION 18
MANAGEMENT RECOMMENDATIONS 19
REFERENCES CITED 20
APPENDIX A: INTERMOUNTAIN ANTIQUITIES COMPUTER SYSTEM (IMACS) SITE FORMS 24
APPENDIX B: Alton Coal Field Paleontological Survey Sections 12, 13, 24 and 25 T 39 S R 6 W and Sections 7, 18, 19, 30 and 31 T39 S R 5W 155
APPENDIX C: Geologic Report of the Impacts of Bedrock and Surficial Units on the Distribution of Cultural Resources at the Alton Coal Field, Kane Co. Utah 164

LIST OF FIGURES

1. Cultural Resource Inventory of the Proposed Sink Valley Parcel in Alton Amphitheater for Alton Coal Development showing Archaeological Sites 3

LIST OF TABLES

1. Site Type and NRHP Eligibility of Archaeological Sites 12

INTRODUCTION

A cultural resource inventory was conducted by Montgomery Archaeological Consultants, Inc. (MOAC) in June 2005 for Alton Coal Development, LLC. This is a multiple year proposal in which the company proposes to develop an open pit coal mine within their lease south of the town of Alton, Kane County, Utah. This report covers the first phase of the development located on private property. The inventory was implemented at the request of Mr. Allen Childs, Talon Resources, Huntington, Utah. Approximately 433 acres was inventoried within the Sink Valley area of the Alton Amphitheater.

The objective of the inventory was to locate, document, and evaluate any cultural resources within the project area in order to attain compliance with a number of federal and state mandates, including the National Historic Preservation Act of 1966 (as amended), the National Environmental Policy Act of 1969, the Archaeological and Historic Conservation Act of 1972, the Archaeological Resources Protection Act of 1979, the American Indian Religious Freedom Act of 1978, and the Utah State Antiquities Act of 1973 (amended 1992).

The fieldwork was performed between June 2 and 19, 2005 under the supervision of Keith Montgomery, assisted by Meg Thornton, Patricia Stavish, and Andre Jendresen. The inventory was conducted under the auspices of U.S.D.I. (FLPMA) Permit No. 05-UT-60122 and State of Utah Antiquities Project (Survey) No.U-05-MQ-0346p.

A record search for previous projects and cultural resources was conducted at the Utah State Historic Preservation Office, Salt Lake City on March 25, 2005 by Ms. Marty Thomas. Intensive cultural resource investigations have taken place in the area since the 1980s; however, numerous archaeological sites have been recorded since the 1970s. The majority of the 11 identified inventories were conducted by the Museum of Northern Arizona or Bureau of Land Management and are mostly related to proposed mining activities.

In 1974, the Museum of Northern Arizona (MNA) performed clearance investigations of 48 drilling locations and access routes on the Skutumpah Terrace in Kane County; 19 drilling locations and access routes in the Alton Ampitheater in Kane County; and four meteorological tower sites in Kane County (Davidson, et al. 1974; Project No. U-74-NI-0037bps). Thirty-six archaeological sites were documented during the investigations. One of the sites, 42Ka1313, is located in the current project area. Site 42Ka1313 is a lithic scatter containing chipped stone tools, ground stone implements, and debitage. Interpreted as a knapping station and hunting camp, the site is evaluated as eligible to the NRHP under Criterion D.

In 1979-1980, the Museum of Northern Arizona (MNA) conducted inventories for Utah International, Inc.'s coal mining lease area situated on the Skutumpah Terrace and Alton Amphitheater (Halbirt and Gualtieri 1981; Project No. U-81-NI-0254b and U-80-NM-007). The four surveyed parcels were designated Alton East and Alton West, the coal preparation plant site, and major road routes. A total of 107 archaeological sites, most of which were of prehistoric affiliation were documented dating from the Archaic to Late Prehistoric. A portion of the Alton West parcel is located within the current project area and includes previously documented sites 42Ka2041 through 42Ka2044, and 42Ka2068. These sites consist of lithic scatters, lithic/ceramic scatters, and prehistoric temporary camps, and a lithic scatter with a historic habitation. The original documentation of the sites listed them as unevaluated to the NRHP.

In 1980, the Bureau of Land Management (BLM) Kanab Field Office performed a Class III inventory of Engineers International, Inc. seismic testing areas (McFadden 1980; Project No. U-80-BL-0162b). No cultural resources were located in the project area. The BLM performed a cultural resource inventory in 1981 of a tract allotment for Heaton Brothers (McFadden 1981; Project No. U-81-BL-0230b). No archaeological sites were documented during the project. The Cone allotment chaining area was surveyed by the BLM in 1982, resulting in a finding of no cultural resources (McFadden 1982; Project No. U-82-BL-0178b).

In 1986, the Museum of Northern Arizona (MNA) performed cultural resource inventories of 43 drill locations and access roads within the Alton Coal Field for Utah International, Inc. (Weaver 1986; Project No. U-86-NI-0279bp). Two new archaeological sites, located outside of the current project area, were documented. Also in 1986, the Museum of Northern Arizona (MNA) performed survey and monitoring of nine test pit locations and access routes for Utah International, Inc. (Weaver and Hurley 1986; Project No. U-86-NI-0864b). No new cultural resources were discovered.

A paleontological literature review was completed by Alden H. Hamblin at the office of the State Paleontologist, Utah Geological Survey (April 2005). This consultation indicated that no paleontological localities have been documented in the current Sink Valley project area. However, there are exposures of the Cretaceous Dakota formation (Sections 19 and 30, T39S R5W) and the Tropic Shale (Sections 19, 20, 29 and 30, T39S R5W) within the current project area. Therefore, it was recommended that a paleontological consultant examine the project area. A paleontological survey was conducted by Alden H. Hamblin during September and October 2005 for the Alton Coal Development project (Appendix B).

DESCRIPTION OF THE PROJECT AREA

The project area is situated in the western portion of Sink Valley within the Alton Amphitheater, Kane County, Utah. This area lies a few miles east of US 89 just south of the town of Alton, Kane County, Utah. The legal description for the current inventory is Township 39 South, Range 5 West, Sections 19, 20, 29, and 30 (Figure 1).

Environmental Setting

The study area lies within the Grand Staircase Section physiographic subdivision of the Colorado Plateau (Stokes 1986). This area is characterized by a series of cliffs and terraces that rise from the Grand Canyon in Arizona to the summit of the High Plateaus in Utah. This section is bounded on the east by the East Kaibab Monocline, on the west by the Hurricane Fault, on the north by the edges of the various high plateaus, and on the south by the Grand Canyon of Arizona. Harder rock layers create cliffs and accompanying benches and tablelands, whereas the softer rock units have eroded into slopes and badlands. Specifically, the project area is located along the western edge of the Paunsaugunt Plateau. The Alton Coal Field is comprised of relatively horizontal bedrock units of Mesozoic age (see Lamm, Appendix C). Within portions of the project area, bedrock units are exposed as low hills and along the incised drainage of Kanab Creek. From the oldest to youngest: the Winsor member of the Carmel formation (Jurassic), the Dakota formation (Cretaceous), and the Tropic shale (Cretaceous). The horizontal deposition of the geologic formations coupled with the impact of water and wind erosion has reduced much of the area to flat ridges and benches which are dissected by long alluvial drainages and tributaries. Drainages often widen to form meadows, such as Sink Valley and the Alton Amphitheater.

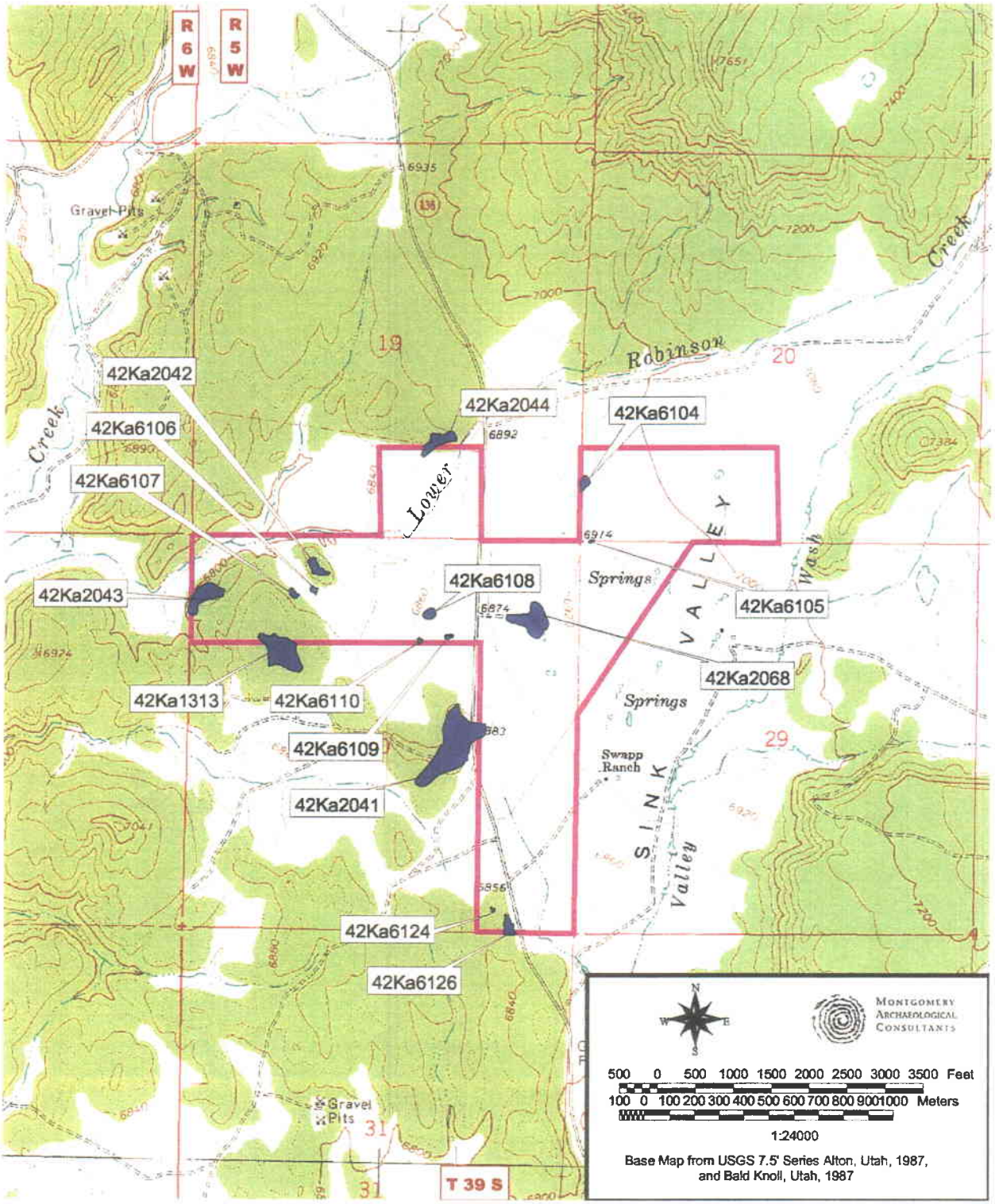

Figure 1. Cultural Resource Inventory of the Proposed Sink Valley Parcel in Alton Amphitheater for Alton Coal Development showing Archeological Sites.

Alluvial valley fill, derived from weathered bedrock, is extensive throughout the project area along the broad, open areas of cultivation and valley floor. Characteristics of the alluvial valley fill include the location of low, relatively level areas of the project including cultivated fields and the presence of incised arroyos and drainages. According to Lamm (Appendix B), total depth of the alluvial valley fill is not known and likely varies across the project area. Soils in the drainages have some agricultural potential as a result of their sand, gravel and silt composition and the presence of limestone and arkosic minerals (Gregory 1951:12). Today less than 2% of the area is under cultivation and products consist of primarily of alfalfa, potatoes, and cold weather vegetables which demand different growing conditions than the prehistoric corn-based agriculture (Halbirt and Gualtieri 1981:6). Major drainages in the project area are Kanab Creek , Sink Hole Valley Wash and Lower Robinson Creek. Kanab Creek flows from north to south through the project area forming an incised canyon, and eventually empties into the Colorado River byway of the Virgin River. In addition, water resources are manifested as geologic aquifers or springs. Most of the springs are perennial and are derived from the Tropic Shale formation.

Elevation in the project area ranges from 6800 ft (2079 m) to 7200 ft (2202 m). Climatic patterns are based on a 59 year record (1915 to 1974) from the Alton, Utah, weather station (Halbirt and Gualtieri 1981:8). The average monthly temperatures are generally mild and follow a modal distribution with a low of 26 degrees F during January and a high of 65 degrees F during July. The number of consecutive frost-free days average between 84 to 104 days (Gregory and Moore 1931). This period is shorter than the necessary 100 to 120 frost-free days required to mature modern hybrid corn, and more time is needed under dry conditions (Crosswhite 1981). The vegetation over most of the study area is a pinyon-juniper and sagebrush community. Pinyon-juniper with oakbrush associations occur on the tops and slopes of ridges, while a sagebrush community exists within alluvial flood plains, draws, and meadows. Other plant species which may have been utilized by ethnographic and prehistoric groups in the area include barberry, canyon grape, cattail, currant, goosefoot, onion, prickly pear cactus, sedge, squawbush, sunflower, and yucca (Ibid:10). Modern impacts of the landscape include ranching, agriculture, coal mining, and roads.

Cultural Overview

Human occupation in the region represents the PaleoIndian, Archaic, Formative, Protohistoric, and Historic cultural stages. The first Native American occupation of the general study area probably occurred during the Paleoindian stage at the late glacial Pleistocene-Holocene boundary (ca. 11,500 B.P. to 9000 B.P.). Early Paleoindian artifact assemblages are typified by large, lanceolate projectile points, spurred end scrapers, gravers and borers, and crescents (Frison 1978:78), indicating the exploitation of megafaunal and floral resources. On the basis of projectile point typologies and subsistence strategies, the early portion of the PaleoIndian stage is commonly divided into two cultural complexes referred to as the Clovis (ca. 11,500 - 11,000 B.P.), and the Folsom (ca. 11,000 - 10,000 B.P.). Aikens and Madsen (1986) postulate that PaleoIndian people migrated into the eastern portion of the Great Basin following the recession of Lake Bonneville (10,500 B.P.). Several surface fluted projectile points have been reported from Garfield County (Copeland and Fike 1988) and Washington County (Kohl 1991) as well as northeastern Arizona (Geib 1995). Late Paleoindian or Plano projectile points have been found on the Kaiparowits Plateau and classified as large stemmed or concave base points (Geib, Collette and Spurr 2001:191-192).

The Archaic stage (7800 to 500 B.C.) is generally viewed as a hunting-gathering lifeway that is represented by subsistence practices more labor-intensive than those of Paleoindians with many more smaller animal and plant species being intensively exploited. Several cultural sequences for the Archaic stage are proposed on the basis of regional differences. Jennings (1978) provides a concept of the western Archaic, or Desert Culture, based on diverse resource exploitation, diagnostic artifacts including cordage and basketry, and artifactual variability in various regions such as the California-Nevada axis and Utah-Oregon axis. Matson (1991) presents a four-period sequence model incorporating data from the Greater Southwest: Early (7800 - 4000 B.C.), Middle (4000 - 2000 B.C.), Late (2000 - 1000 B.C.), and Terminal (1000 B.C. to roughly A.D. 700). South of the study area, the Early Archaic period is labeled the Desha Complex known for its crudely made, shallow, side-notched lanceolate points. In the Glen Canyon region excavations from Sand Dune and Dust Devil Cave provide a radiocarbon date of 5050 to 6050 B.C. Early Archaic component from the former site (Lindsay et al. 1968). About a dozen projectile points were recovered from the lower layer in Sand Dune Cave including Pinto Series, Jay, and varieties of side-notched points (later classified as Sand Dune Side-notched) (Matson 1991:147). Faunal remains recovered from the Desha Complex include those of mountain sheep, cottontail, pack rat, and lesser numbers of jackrabbit, gopher, squirrels, skunk, and bison (one bone). At Dust DevilCave, the earliest Archaic component (Stratum IV) provided a date from a yucca-lined pit of ca. 8793 B.C. along with an abundance of prickly pear cactus (*Opuntia*) extracted from human feces (Ambler 1996:42). Significant materials recovered from this cave included 25 Archaic sandals, classified into three basic types; open-twined, fine warp-faced, and coarse warp-faced (Ibid 44). On the northern Colorado Plateau the earliest Archaic component is dated at Cowboy Cave (42Wn420) between 7430-7100 B.C. although no artifacts were found in this stratum (Schroedl and Coulam 1994:11). The upper Early Archaic component (Stratum III 5250 to 4350 B.C.), however, contained 11 projectile points (Pinto, Northern Side-notched, and Elko Corner-notched), faunal remains (cottontails, jackrabbits, porcupine, and *Canis* sp.), and floral remains (sunflower, sand dropseed, chenopods, cactus, juniper and bugseed) (Jennings 1980). The most significant features from Stratum III were a number of depressions referred to as "scooped out troughs" by Jennings (1975:9). More recently these features have been redefined by Schroedl and Coulam (1994:6-7) as pitstructures which were repeatedly cleaned-out and reoccupied during the Early Archaic. In the Alton West Coal leasehold previous investigations have documented several Early Archaic projectile points types (Pinto Series, Humboldt, and Northern Side-notched) from sites which include later Formative and Late Prehistoric temporal components (e.g. 42Ka2045 and 42Ka2056) (Halbirt and Gualtieri 1981).

During the Middle Archaic period (4000 - 2000 B.C.) there was a decrease in the occupation of the Colorado Plateau, presumably caused by the Altithermal climate, which may have been a two drought event (Matson 1991:165-166). Many of the previously mentioned sites (Dust Devil Cave and Cowboy Cave) exhibit a reduced intensity of occupation during the Middle Archaic period. Recent radiocarbon data from the Glen Canyon region are filling the Middle Archaic gap (e.g. 1,000 years) as proposed by Berry and Berry (1986) for the Colorado Plateau indicating that the hunter-gatherers of the area may have not completely abandoned the area 6,000 years ago (Geib 1996:32). Middle Archaic settlement patterns most likely reflect the response to a probable protracted drought by populations shifting residential camps to water-rich lowlands and especially higher elevation settings (above 8,000 ft). Common projectile points at Middle Archaic sites include Sudden Side-notched, San Rafael Side-notched, Hawken Side-notched and Elko Series. Previous investigations in the Alton West Coal leasehold have identified similar point types as listed above along with earlier and later temporal components at sites categorized as residential camps and processing stations (Halbirt and Gualtieri 1981).

The Late Archaic period began around 4,000 years ago and corresponds to a noticeable increase in radiocarbon dates in the region and is temporally correlated with an increase of effective moisture what is termed as the sub-boreal interval (Berry and Berry 1986). This period is marked by a heavy reoccupation of Cowboy Cave starting at about 1750 B.C. and is characterized by the inhabitants engaging in broad-scale hunting and gathering with an increased emphasis on mountain sheep and chenopods/amaranths (Matson 1991:171). Gypsum projectile points comprised approximately 30 percent of the total identifiable collection from Cowboy and adjacent Walters Cave (Jennings 1980:36). These stemmed points are among the most common type of point found in southeastern Utah and appeared on the northern Colorado Plateau sometime after 2550 B.C. (Holmer 1986:105). Split-twig figurines are another important diagnostic of the Late Archaic period, best known from Cowboy Cave, but occur over a broad territory centered on the Colorado River and it tributaries. Further south in the Glen Canyon region, Late Archaic occupations are less represented, although a few Gypsum points were recovered from Dust Devil Cave (Geib and Ambler 1991). On the Kaiparowits Plateau, Late Archaic sites are represented primarily by residential camps situated in the higher elevations with access to ample water, fuel wood, large and small game, and plant resource diversity, whereas, the limited activity camps and reduction loci are prevalent in the lower elevations that contained a greater abundance of economic grasses (Geib, Collette and Spurr 2001:367). Investigations at the Arroyo Site (42Ka3976), situated in The Grand Staircase-Escalante National Monument, revealed a potential pitstructure (dated circa 1850 B.C.) exposed in a trench below a Formative age horizon which was interpreted as a semi-permanent occupation in the floodplain environment (McFadden 2000:15). In the Alton West Coal leasehold several Late Archaic Gypsum projectile have been recorded at open sites with other older and more recent prehistoric temporal components (42Ka2047 and 42Ka2059) (Halbirt and Gualtieri 1981).

The Terminal Archaic (1000 B.C. to roughly A.D. 700) is marked on the northern Colorado Plateau by the presence of arrow points and shafts along with the introduction of corn. The Archaic-Formative transition at Cowboy Cave is found in two separate episodes of occupation beginning about A.D. 100 during a period of high effective moisture (Schroedl and Coulam (1994:23). This relatively intense occupation (Stratum Vb) appeared to have represented a late summer/early fall seed processing locale based on the coprolite evidence (Hogan 1980). A corn cache as well as corn kernels were found in this horizon revealing that the pre-Formative occupants were growing this domesticate, although the extent of agricultural dependency is unknown. It is well established that corn dates to at least 1200 B.C. across much of the southern portion of the Colorado Plateau with later dates derived from sites further north (Geib 1996:54). Even if the populations within this geographical area were not actively involved with farming by around the Christian era, they were likely in contact with farmers or were a least experiencing changes resulting from the presence of nearby farmers. At Hog Canyon Dune (42Ka2574) located at the junction of Hog and Kanab creeks (about two miles north of Kanab) charred corn kernels were recovered from a pitstructure in association with a hearth and a burial that yielded two dates: 910-390 B.C. and A.D. 60-640 (Janetski 1993:229). The dating of bow-and-arrow introduction to the eastern Great Basin and Utah has been an issue of continuing debate. Past evidence from the lithic technologies between the terminal Archaic Proto-Fremont and BM II populations indicates that by ca. A.D. 100 the bow and arrow was employed by the ancestral Fremont, while the ancestral Anasazi continued to employ the atlatl. In the northern portion of the region, at Cowboy Cave, arrow points come from preceramic Stratum V deposited about A.D. 100-600 (Schroedl and Coulam 1994). To the south, the Sunny Beaches site (42Ka2751) in the Glen Canyon Recreational Area is somewhat of an anomaly. A number of Rose Spring Corner-notched points, which are accepted markers of bow-and-arrow technology dated earlier (e.g. around A.D. 100) than the established chronology for BM II aceramic occupations. In the Alton Coal leasehold previous inventories have

documented Rose Spring Corner-notched arrow points from several sites. At site 42Ka2056 both Early Archaic Pinto Series points and Rose Spring Corner points were found, but in two separate lithic assemblage loci (Halbirt and Gualtieri 1981:85).

The Formative stage began about A.D. 500 when ceramics were in general use on the Colorado Plateau, and continued until A.D. 1300, with the Anasazi abandonment of Four Corners region. Within the region, this stage encompasses two different cultures: the Anasazi (Ancestral Pueblo) and the Fremont. The project area is within the occupation zone of the Anasazi which is divided into two recognizable branches: Virgin Anasazi, primarily occupying the Arizona Strip, southwestern Utah, and southernmost Nevada; and Kayenta Anasazi, occupying a large portion of northern Arizona and far southeastern Utah. The Fremont are considered a separate entity, found primarily at sites in Utah north of the Anasazi region. Artifactual evidence in the study area indicates primarily a Virgin Anasazi cultural tradition, although both Kayenta Anasazi and Fremont ceramics have been identified.

The Virgin Anasazi occupied the area from Basketmaker II through early Pueblo III times, and apparently adapted horticultural practices to a variety of environmental conditions (Thompson and Thompson 1978; Walling and Thompson 1988). Investigations in the Grand Staircase area east of Kanab Creek indicate it was occupied continuously from at least Basketmaker III times (ca. A.D. 300) through late Pueblo II (ca. A.D. 1200). Virgin Anasazi residential units are characterized by an architectural sequence from pithouse residences with separate cist storage facilities, through intermediate stages of room block development, and eventually to substantial surface masonry pueblos incorporating both storage and habitation functions (Talbot 1990). According to McFadden (1996:24), the quantity of storage space per residential unit did not vary significantly which is indicative of a continuity of subsistence practices. In the Grand Staircase region, Virgin Anasazi sites located adjacent to cultivable fields were fully residential with large storage capacities (Ibid 7). Furthermore, residential mobility may have been part of an adaptive strategy that allowed the Virgin Anasazi to engage in agriculture in an environment in which a variety of short-term environmental fluctuations needed to be accommodated. In contrast the Kolob/Skutumpah Terrace area, where the present study area resides (above 6,400 ft), is characterized by a short growing season (less than 120 days at Alton), hence prehistoric agricultural potential was risky. Several studies in this area (Christensen et al. 1983; Halbirt and Gualtieri 1981; Keller 1987:87) indicate that the vast majority of the prehistoric sites are limited activity locales or camps related to hunting and gathering. Documented sites represent Archaic, Virgin or Western Anasazi, and Southern Paiute groups which engaged in hunting and gathering activities most likely on a seasonal basis (Keller 1987). For the entire Alton Coal leasehold, Keller (1987:87) estimates that 23% of the sites date from Basketmaker III to Pueblo II. Data compiled by McFadden (1996:17) from this area, as well as the Grand Staircase and Upper Virgin River, suggests that Virgin Anasazi residential sites are virtually always associated with agricultural potential, while hunting/gathering sites are more common in the elevated zones where agriculture is not feasible. Ceramic types identified in the Alton Coal leasehold are dominated by Virgin Anasazi North Creek Gray, North Creek Corrugated, Shinarump Brown, and St George Black-on-Gray. To a lesser extent Kayenta Anasazi Tusayan Black-on-Gray and Fremont Great Salt Lake Gray have been reported in the area adjacent to Kanab Creek (Halbirt and Gualtieri 1981:35).

In the Grand Staircase physiographic section, the adaptive strategy of the Virgin Anasazi is summarized by McFadden (1996:30) as an occupation of multiple "homesteads" located in a variety of different agricultural niches, each with different characteristics, but all suitable for agriculture. Furthermore, shifts in residence would occur periodically in response to short-term climatic fluctuations, but also as a result of local environmental deterioration. A comparison of site types from the lower elevation study areas and the Kolob and Skutumpah Terrace suggests that given frequent residential moves, the farmsteads themselves could have served as base camp/processing stations with this upland functioning as a hunting-gathering component.

Protohistoric occupation of the project area is attributed to the Southern Paiute, members of the Numic population. Several models address the migration of Numic populations to the Great Basin. Some theorize that Numic expansion from the southwestern Great Basin eastward occurred approximately 1,000 years ago (Madsen 1982:219). Other models view the expansion taking place several thousand years ago (see Bettinger 1994). On the basis of the co-occurrence of Southern Paiute and Virgin Anasazi ceramics in stratigraphic context, it is theorized that entry into the southwestern Utah area by Numic speakers occurred during the late occupational period of the Virgin Anasazi (Westfall et al. 1987). Fowler (1994) compares the material culture of the Southern Paiute to that of the Virgin Anasazi, noting similarities such as clay figurine styles, certain features of coiled basketry, and one type of sandal, and concludes that these similarities suggest interaction between the groups. Besides pottery or perishable materials, the other common diagnostic is the Desert Side-notched projectile point. Although Desert Side-notched points should be considered horizon marker rather than ethnic markers, Southern Paiute use of the study area is well documented (Kelley 1964), and appeared to have constituted the primary post-A.D. 1300 indigenous occupation. Cottonwood Triangular points may not be useful diagnostics of Numic occupations if they are unfinished items broken in production; such tools might have been intended as Desert Side-notched points or Bull Creek points or some other arrow point type (Geib et al. 2001:392). Southern Paiute Brown Ware found in southwest Utah is characterized as conical-bottomed vessels exhibiting undulating surfaces on its thick walls. Decoration is limited to some surface incising, corrugation or fingernail impressions, and/or clapboarding of coils, the former often over the entire surface of the vessel (Baldwin 1950). Temper tends to be visible and coarse and fall into two types for the area: 1) abundant very fine rounded to subangular particles that are generally clear and appear to be frosted suggesting that they originate from eolian and alluvial deposits; 2) large angular to subangular particles most of which are white and very fine grained as if derived from a crushed quartzite or other aphanitic particles (Westfall et al. 1987:70).

The Southern Paiute were hunter-gatherers and part-time horticulturists, with domesticates playing a minor role in their subsistence strategy (Fowler and Fowler 1971, 1981; Steward 1938). This cultural tradition is characterized by the use of rockshelters, and open camp sites containing wickiup dwellings, rock-filled roasting pits, fire hearths, conical-bottomed brownware ceramics, rabbit fur blankets, basketry hats and containers, digging sticks, milling stones, and stone tools (Euler 1966; Westfall et al. 1987). Social organization revolved around bands of multiple family units, cooperating and joining forces when necessary to ensure the survival of the community (Steward 1938). At least 16 major bands, or 35 smaller groups, have been identified in Utah. The area adjacent to the present town of Alton was the summer home of one of the seven socio-economic groups that comprised the Kaibab Band of the Southern Paiute (Kelley 1964). The organization of these groups was largely economic in character; however, some attention was allotted to social residence. It appears that the group inhabiting the Alton area was a small patrilocal aggregate. Evidence exists that other groups visited the area occasionally to gather seeds and berries yet there seems to have been minimal economic cooperation between groups

(Kelley 1964). The Alton group was controlled by a chief who directed the seasonal movements of camps, and was in most instances in charge of deer hunting (Ibid 27). According to Kelley (Ibid 6), campsite location was determined by the presence of springs which fell under the jurisdiction of the local economic group. Subsistence activities varied according to seasonality, with the occupants of a spring "....tending to share the same seasonal cycle" (Ibid 8). During the winter, the group resided in Kanab Canyon were camps were semi-permanent in the sense that the occupants returned to them following hunting and foraging trips. Resources utilized during this period included seeds and rabbits, the latter hunted in large scale drives consisting of perhaps 25 individuals from different households (Ibid 24). Periodically, deer and pinyon nut forays were also conducted along the top of the Vermillion cliffs. When snows receded in the spring, the group moved north to the Alton area and subsisted until summer on stores of food previously cached in caves (Ibid 16). The group remained in Alton for most of the summer collecting a wide variety of seeds and berries as well as hunting deer, marmot, and rabbit (Halbirt and Gualtieri 1981:15). At some point during this period the group returned briefly to the Kanab area to gather seeds and cache them for the succeeding winter occupation (Kelly 1964:16). Deer hunting and the gathering of "plateau" seeds was emphasized during the late summer to fall months. It is during this period that deer begin to congregate in small migratory groups.

The first documented entry of European Americans into Kane County was the expedition of Fathers Francisco Atanasio Dominguez and Silvestre Velez de Escalante in the autumn of 1776 to establish an overland route between settlements in Santa Fe and Los Angeles. Because of a snowstorm near Milford, the expedition halted the attempt to reach California, and instead followed a route to the southeast to return to Santa Fe. Along this route they named Sulphur Creek (later renamed the Virgin River), Rio de Pilar (later known as Ash Creek), and Hot Sulphur Springs (Alder and Brooks 1996; Bradley 1999). Another early explorer, Jedediah Smith, followed parts of the Dominguez and Escalante Old Spanish Trail, of which various portions were later referred to as the California Trail, through Washington County in 1826 and 1827. His route created a new pathway for pioneers traveling from the East to California, and was widened to an actual wagon road in 1849. Other explorers to follow in these footsteps include John C. Fremont in 1844 and Mormon pioneer leaders from Salt Lake City in 1847 (Alder and Brooks 1996).

Important to the Mormon colonization effort was the organization of an Indian mission in Harmony in early 1854. Jacob Hamblin, a Mormon explorer and settler of Kane County, led the effort to establish harmonious relationships with key Native American leaders. His knowledge of the area also facilitated government exploration and mapping projects in the area, including a Colorado River voyage with John Wesley Powell in 1871 that documented the landscape of Glen Canyon and the present-day city of Kanab. While Kanab is the principal settlement in Kane County, small towns in Long Valley are important centers of agriculture and stock-raising. In 1862, John and William Berry first led a team of ranchers into the Long Valley area in search of rangeland for their cattle. The area was called Long Valley due literally to its length (a long narrow valley situated between high mountain walls), fertile land, and proximity to water. The first settlement in the valley was probably that of Berryville (later renamed Glendale), established by the Berry brothers in 1864. Berryville was abandoned in June 1866 due to conflicts between the Mormon settlers and Paiute and Navajo tribes in the area. This pattern of settlement was common to many of the small towns in Long Valley throughout the late 1800s. On January 16, 1864, the Utah Territorial Legislature approved an act that officially created Kane County. Its boundaries were defined on the west to include the upper Virgin River area, including Virgin City, the principal town in the new county at the time (Bradley 1999:56-59). Kane County remained isolated because of its challenging landscape, its relatively small population, and its lack of connection to railroad lines.

The town of Alton is a small ranching community located near the head of Long Valley. It originally developed from Upper Kanab. It was first settled by Lorenzo Wesley Roundy when he brought his family to Upper Kanab Creek in 1865. Historically, this area had tall grass, good fodder for their animals, streams of clear water, abundant wildlife in the nearby mountains, berries and other wild fruit,and timber for homes and fences (Bradley 1999:65). The settlement was first called Roundy's Station and the immigrants built two log cabins that first summer. In 1865, the Mormon Church ordered inhabitants of Upper Kanab and other small settlements to go to Kanab, Dixie, and larger towns in the area to help fortify them against Pauite raids (Ibid 65-66). Settlers did not return to Upper Kanab until 1870, when Lorenzo Roundy's nephew, Byron Donalvin Roundy, and his wife settled there. Byron and his brother William Roundy organized a cattle company called the Canaan Cooperative Stock Company, headquartered in St. George. In 1882, Edwin D. Woolley and Daniel Seegmiller also brought their families to settle in Upper Kanab. Two buildings, a schoolhouse and a recreation hall, were erected in 1885 at the head of the Virgin River. During the late 1880s, when the federal government began to crack down on the polygamists of Utah territory, many Mormon men fled to the area to escape marshals (Ibid 143-149). In 1887, the communities of Ranch, Upper Kanab, and Sink Valley joined together to form a LDS ward. In 1908, the town acquired its present-day name of Alton during a May Day celebration drawing. Charles R. Pugh, who had been reading a book about the Alton Fjord in Norway, suggested the name. The population of the town peaked at 350 in the 1930s (Ibid 210). In the post-World War II years, coal reserves were discovered near Alton, and the Smirl-Alton coal mines extracted an average of 40 tons daily in 1949. Today, Alton is home to fewer than 100 people, and its main sources of livelihood stem from the timber industry and its potential for coal mining.

Navajos occupied areas of the Skutumpah Terrace during the post WW-II period (about 1945 to 1970) while cutting and installing cedar fences for local ranchers (Halbirt and Gualtieri 1981:56). Physical remains from the Navajo occupation primarily east of the project area fall into one of the four following categories: 1) forked-stick hogans composed of interlocking poles and a corbelled roof entrance; 2) palisade hogan composed of a corbelled roof supported by four corner posts and a seriers of stringers which lean against the roof; 3) brush hogan roughly square in plan view and partially supported by two living pinyon trees which provided the superstructure firm support; 4) sweat lodge consisting of three interlocking poles with stringers leaning against the frame and packed with mud daub (Bradley 1999:56).

Today, most traffic through the area is generated by tourists headed to attractions such as Bryce Canyon National Park, Zion National Park, and Grand Staircase-Escalante National Monument. Bryce Canyon, the southern part of which lies in Kane County, was designated a national monument by President Warren G. Harding in 1923, and elevated to National Park status in 1928. Originally, the boundary of Zion National Park ended at the Washington-Kane County State line. In 1930, it was expanded to include part of Kane County, which was made accessible by the Zion-Mt. Carmel tunnel and road (Bradley 1996:218). Grand Staircase-Escalante National Monument was established by President Bill Clinton on September 17, 1996. The monument comprises approximately 1.7 million acres in Kane and Garfield Counties. These major tourist destinations are all accessible via US Highway 89, which bisects Long Valley and proceeds through every town in Kane County except Alton (Ibid 8).

SURVEY METHODOLOGY

An intensive pedestrian survey was performed for this project which is considered 100% coverage. The project area was examined for cultural resources by the archaeologists walking parallel transects spaced no more than 10 m (30 ft) apart. Ground visibility was considered good. Approximately 433 acres were inventoried on private property.

Cultural resources were recorded as archaeological sites or isolated finds of artifacts. Archaeological sites are defined as spatially definable areas with ten or more artifacts and/or features. Sites were documented by the archaeologists walking transects across the site, spaced no more than 3 m (10 ft) apart and marking the locations of cultural materials with pinflags. This procedure allowed clear definition of site boundaries and artifact concentrations. At the completion of the surface inspection, a handheld GEO XT Trimble GPS unit was employed to point-provenience diagnostic artifacts and other relevant features in reference to the site datum, a steel rebar stamped with a temporary site number. A judgmental lithic analysis sample unit (a 2x2 meter count grid) was utilized for archaeological sites with dense lithic debitage assemblages. Also, where lithic densities were variable within the site, judgmental sample units were employed to reflect such density changes. Archaeological sites were plotted on a 7.5' USGS quadrangle, photographed, and documented with site data entered on an Intermountain Antiquities Computer System (IMACS, 1990 version) inventory form (Appendix A).

INVENTORY RESULTS

The inventory resulted in the documentation of one previously recorded historic/prehistoric site (42Ka2068), five previously recorded prehistoric sites (42Ka1313, 42Ka2041, 42Ka2042, 42Ka2043, and 42Ka2044), and nine new prehistoric sites (42Ka6104, 42Ka6105, 42Ka6106, 42Ka6107, 42Ka6108, 42Ka6109, 42Ka6110, 42Ka6124, and 42Ka6126) (Table 1).

Table 1. Site type and NRHP eligibility of sites located in the Sink Valley-Alton Amphitheater.

MOAC Site Number	State Site Number	Site Type	Cultural Affiliation	NRHP Eligibility
05-95-6	42Ka1313	Temporary Camp	Archaic, Anasazi, Protohistoric/Contact	Eligible
N/A	42Ka2041	Lithic Scatter	Anasazi, Southern Paiute	Eligible
N/A	42Ka2042	Temporary Camp	Unknown	Eligible
N/A	42Ka2043	Lithic Scatter	Protohistoric/Contact	Eligible
N/A	42Ka2044	Lithic Scatter	Archaic	Eligible
N/A	42Ka2068	Historic Habitation and Prehistoric Lithic Scatter	Unknown Prehistoric Euro-American	Eligible
05-95-14	42Ka6104	Lithic Scatter	Archaic	Eligible
05-95-15	42Ka6105	Lithic Scatter	Protohistoric/Contact	Eligible
05-95-9	42Ka6106	Lithic Scatter	Unknown	Eligible
05-95-8	42Ka6107	Lithic Scatter	Unknown	Eligible
05-95-10	42Ka6108	Lithic Scatter	Early Archaic	Eligible
05-95-13	42Ka6109	Lithic Scatter	Unknown	Eligible
05-95-11	42Ka6110	Temporary Camp	Unknown	Eligible
05-95-19	42Ka6124	Lithic Scatter	Unknown	Not Eligible
05-95-18	42Ka6126	Temporary Camp	Anasazi, Southern Paiute	Eligible

Archaeological Sites

Smithsonian Site No.: 42Ka1313
Temporary Site No.: MOAC 05-95-6
Legal Description: T 39S, R 5W, Sec. 30
NRHP Eligibility: Eligible under Criterion D
Description: This is an extensive prehistoric temporary camp which exhibits a broad occupational span (Early and Middle Archaic, Pueblo II, and Protohistoric/Contact). It is situated on the top and southern slope of a ridge in the Alton Amphitheater. A two track bisects the site northwest to southeast. The site measures 227 by 136 meters and is situated in a pinyon-juniper woodland. Cultural materials include ceramics (n=2), ground stone implements (n=2), chipped stone tools (n=52), and debitage. Ceramics consist of two Tusayan Dogoszhi Black-on-White sherds which date to the Pueblo II period. Ground stone implements are two miscellaneous ground fragments (Tools 2 and 28). Temporally diagnostic chipped stone artifacts include a Hawken Side-notched projectile point (Tool 33), a Northern Side-notched projectile point (Tool 31) and two Desert Side-notched projectile points (Tools 11 and 17). Other chipped stone tools include 13 unknown projectile points, 24 bifaces, two cores, and nine utilized flakes. Lithic debitage (n=998) is dominated by tertiary flakes manufactured from various chert, quartzite, and obsidian materials. Feature A is a concentration of 40-50 fire-cracked sandstone rocks within a one meter diameter area which lacks evidence of dark soil.

Smithsonian Site No.: 42Ka2041
Temporary Site No.: None
Legal Description: T 39S, R 5W, Sec. 30
NRHP Eligibility: Eligible under Criterion D
Description: This is a lithic and ceramic scatter with two cultural components (Anasazi and Protohistoric/Contact) located on a slight rise in an otherwise flat area of Alton Amphitheater. The site measures 120 by 360 meters and lies in a pinyon-juniper woodland. A county road bisects the easternmost portion of the site and another road bisects the site in the south. Cultural materials consist of ceramics, chipped stone tools, an unknown ground stone implement, and lithic debitage. Ceramics consist of one undetermined Virgin Series sherd and a Southern Paiute Utility Ware sherd. Chipped stone tools include two Desert Side-notched projectile points (Tools 5 and 13), five unknown projectile points fragments, one utilized flake, five bifaces, three cores, and a worked piece of glass. The lithic debitage (n=274) is dominated by tertiary flakes manufactured from several chert, quartzite, and obsidian material types. No features were found at this sitehowever, the site has good potential for subsurface cultural materials.

Smithsonian Site No.: 42Ka2042
Temporary Site No.: None
Legal Description: T 39S, R 5W, Sec. 30
NRHP Eligibility: Eligible under Criterion D
Description: This is a prehistoric temporary camp of unknown cultural affiliation located on the top and slope of a knoll in Alton Amphitheater. The site measures 35 by 90 meters and is in a pinyon-juniper woodland. Cultural materials consist of a ground stone implement (Tool 1), chipped stone tools, and lithic debitage. Chipped stone tools are one utilized flake (Tool 4), three bifaces (Tools 3, 6, and 7), two cores (Tools 2 and 8), and a hammerstone (Tool 5). Lithic debitage (n=171) is dominated by tertiary reduction flakes manufactured from several chert, quartzite, and obsidian materials. Feature A is a concentration of fire-cracked rock and lithic debitage located on a slope near a small drainage system. The concentration of fire-cracked rock is within an area of darkened soil and measures 7 m in diameter.

Smithsonian Site No.: 42Ka2043
Temporary Site No.: None
Legal Description: T 39S, R 5W, Sec. 30
NRHP Eligibility: Eligible under Criterion D
Description: This is a Protohistoric/Contact period lithic scatter located on a ridge top in Alton Amphitheater. The site measures 65 by 155 meters and is in a pinyon-juniper woodland. Cultural materials consist of a ground stone trough metate, chipped stone tools, and lithic debitage. Chipped stone tools include a Desert Side-notched projectile point (Tool 8), five unknown projectile point fragments, 12 utilized flakes, five bifaces, and one core. The lithic debitage (n=241) is dominated by tertiary reduction flakes and shatter manufactured from several chert material types. No features were found at this site; however, the site has good potential for subsurface cultural materials.

Smithsonian Site No.: 42Ka2044
Temporary Site No.: None
Legal Description: T 39S, R 5W, Sec. 19
NRHP Eligibility: Eligible under Criterion D
Description: This is an Archaic temporary camp located on the top of a low ridge in Alton Amphitheater. The site measures 40 by 160 meters and is in a pinyon-juniper woodland. Cultural materials consist of chipped stone tools and lithic debitage. Diagnostic artifacts include a Rocker Side-notched projectile point (Tool 3), a utilized flake, and a core. Lithic debitage (n=149) is dominated by shatter manufactured from chert, quartzite, and obsidian materials. The site also contains three collectors' piles of 100+ flakes in total. Feature A is a semicircle of fire-cracked rock associated with a quartzite core (Tool 2) and a heat treated flake. The soil does not appear to be discolored, however the soil does appear to be disturbed by rodent activity.

Smithsonian Site No.: 42Ka2068
Temporary Site No.: None
Legal Description: T 39S, R 5W, Sec. 30
NRHP Eligibility: Eligible under Criterion D
Description: The site consists of a prehistoric lithic scatter of unknown cultural affiliation and an abandoned historic farming/ranching habitation. It is located in the valley of the Alton Amphitheater on a small rise and the surrounding slope and undulating field. The historic component partially overlaps the prehistoric component; however, portions of the aboriginal occupation still retains integrity. The historic habitation measures 170 by 150 meters and the prehistoric lithic scatter measures 110 by 40 meters. Both sites are situated in an agricultural field with low sagebrush and small bunch grasses.

Prehistoric cultural material include chipped stone tools and lithic debitage. Diagnostic artifacts consist of a projectile point midsection (Tool 1) and one biface fragment (Tool 2). Lithic debitage (n=74) is dominated by shatter manufactured from various chert and obsidian types. No prehistoric cultural features were observed at this site.

The historic component represents an abandoned farming/ranching habitation and contains several structures, both architectural and landscape, as well as artifacts. The property was patented by James Swappe on August 9, 1889 under the Homestead Act of 1862. Mr. C. Butron Pugh, a historic informant, stated that his grandfather purchased the ranch in 1908 from the Robinson family (personal communication, 2006). This site was previously recorded in 1983 and was described as containing a barn, a shed, a bunkhouse and a corral. Mr. Pugh stated that in addition to the currently visible structures (granary, corral, and cellar) other structures located on

the ranch included a small three room house, a large barn with a stone/rock foundation, a blacksmith shop, a bunk house, a washhouse, a springhouse, two outhouses (used consecutively), and "rip-gut" or pitchpole fencing to the north.

The current survey documented a granary, a corral, a cellar, several fences, and historic artifacts. The granary is constructed of lumber, log, and stone and was divided into two rooms with storage above. The granary is slightly elevated from the ground surface by log stilts, a stone foundation, possible ditching around the stone foundation; perhaps as a measure to avoid flooding and/or rodent infestations. This structure is constructed with large log cross beams, and V-shaped log construction, and lumber paneling and floorboards. The roof has collapsed into the building and the door frames are partially collapsed and the two doors are blocked. Mr. Pugh stated that the door hinges for the granary were made at the on-site blacksmith shop. One room contained several hooks and some leather strapping, while the other room is completely open and a half swing door connects the two rooms. The storage area above has remnants of hay.

The corral is constructed from a series of log fences and upright log supports. The shoot is made of milled lumber with a couple log beams at main support locations. The corral has been reinforced with wire and some metal fencing and has been used into the 1980's according to the original investigator and Mr. Pugh. The corral also contains an old dodge shoot that was used to separate the sheep herds.

The masonry cellar is approximately 120 cm deep with the uppermost level of stone collapsing. The walls are otherwise still in good condition. The log beams that would have supported the ceiling for the cellar are partially burnt and caved in. The cellar depression is partially filled with various debris including glass jars and bottles, metal cans, and some plastic bottles with materials dating between 1920 and 1980s. Mr. Pugh stated that the cellar was used to store and to age cheese made by his grandmother.

Three fences surround the site area: one lines the two-track drive; one fence marks a field boundary on the north side of the two-track; and one fence marks a field boundary on the south side of the two-track. Landscape features include the agricultural field around the granary and corral and the oak trees. To the east of the granary there is also a stand of live oaks and rip-gut fencing with a large quantity of cultivated wild rose bushes. Mr. Pugh stated that much of the rip-gut fencing is in good condition, however, several of the uprights were replaced in the 1950's due to rotting.

Historic artifacts include glass, ceramic, and other domestic items. Glass consists of several hundred brown and clear fragments, and lesser amounts of amethyst and aqua-colored glass. A significant amount of the container fragments are likely from canning jars, although few metal canning rings were found. None of the glass artifacts had manufacture's trademarks which would have aided in temporality. Most of the ceramics occurred where the large house was said to have been. The most prevalent type of ceramic was the hard paste porcelain "Boyd's Genuine Porcelain Lined Cap" canning lid. In addition a Flow Blue vessel sherds (est.1820-1870), decal decorated sherds, and plain whiteware fragments were observed. Most of the tin cans were deposited in the open cellar. These include four "Punch Here" milk cans, a Spam meat can, an internal friction cocoa can, and four oil cans.

Smithsonian Site No.: 42Ka6104
Temporary Site No.: MOAC 05-95-14
Legal Description: T 39S, R 5W, Sec. 20
NRHP Eligibility: Eligible under Criterion D
Description: The site is an Archaic-affiliated sparse lithic scatter located on the slope of a low north-south trending ridge in Sink Valley. It measures 66 by 41 meters and is in a pinyon-juniper woodland with low sagebrush. Cultural materials include chipped stone tools and lithic debitage. Diagnostic artifacts consist of a heat treated Elko projectile point (Tool 5), an unknown projectile point fragment (Tool 2), three bifaces (Tools 1, 4, and 6), a utilized flake (Tool 3), and a core (Tool 7). Lithic debitage (n=29) is dominated by shatter manufactured from various types of chert and quartzite material types. No features were found at this site;however, the site has good potential for subsurface cultural materials.

Smithsonian Site No.: 42Ka6105
Temporary Site No.: MOAC 05-95-15
Legal Description: T 39S, R 5W, Sec. 20
NRHP Eligibility: Eligible under Criterion D
Description: This is a low density lithic scatter of Protohistoric/Contact affiliation located at the bottom of a southwest facing slope in Sink Valley. The site measures 22 by 9 meters and is in a low sagebrush community. Cultural materials include chipped stone tools and lithic debitage. Diagnostic artifacts consist of a chert Desert Side-notched projectile point (Tool 3) and two chert bifaces (Tools 1 and 2). The lithic debitage (n=18) is dominated by shatter manufactured from various chert, quartzite, and obsidian material types. No features were found at this sitehowever, the site has good potential for subsurface cultural materials.

Smithsonian Site No.: 42Ka6106
Temporary Site No.: MOAC 05-95-9
Legal Description: T 39S, R 5W, Sec. 30
NRHP Eligibility: Eligible under Criterion D
Description: The site consists of a sparse prehistoric lithic scatter of unknown cultural affiliation. It is located at the base of a southwest facing slope in Sink Valley. The site measures 29 by 27 meters and is in a low sagebrush community. Cultural materials include chipped stone tools and lithic debitage. Diagnostic artifacts consist of an untyped chert projectile point and a chert awl/drill. Lithic debitage (n=18) is dominated by shatter manufactured from various chert and obsidian material types. No features were found at this site; however, the site has good potential for subsurface cultural materials.

Smithsonian Site No.: 42Ka6107
Temporary Site No.: MOAC 05-95-8
Legal Description: T 39S, R 5W, Sec. 30
NRHP Eligibility: Eligible under Criterion D
Description: The site is a prehistoric lithic scatter of unknown cultural affiliation. It is located near three drainages at the bottom of a northeast facing slope in the Alton Amphitheater. The site measures 50 by 21 meters and occur in pinyon-juniper woodland with low sagebrush. Cultural materials include chipped stone tools (utilized flakes) and lithic debitage. Debitage (n=34) is dominated by shatter manufactured from various chert, quartzite, and obsidian material types. No features were found at this site; however, the site has good potential for subsurface cultural materials.

Smithsonian Site No.: 42Ka6108
Temporary Site No.: MOAC 05-95-10
Legal Description: T 39S, R 5W, Sec. 30
NRHP Eligibility: Eligible under Criterion D
Description: This is an Early Archaic-affiliated dense, lithic scatter located on a small rise and slope along the west side of Sink Valley. The site measures 53 by 40 meters and is in a pinyon-juniper woodland with low sagebrush. Cultural materials consist of chipped stone tools (n=19) and lithic debitage. Diagnostic artifacts consist of a chert Hawken Side-notched projectile point (Tool 1), an unknown projectile point fragment, 10 utilized flakes, and seven bifaces. Lithic debitage (200+) is dominated by shatter manufactured from various chert and obsidian material types. Two historic artifacts were observed, a hole-in-top milk can and an earthenware vessel sherd. No features were found at this site; however, the site has good potential for subsurface cultural materials.

Smithsonian Site No.: 42Ka6109
Temporary Site No.: MOAC 05-95-13
Legal Description: T 39S, R 5W, Sec. 30
NRHP Eligibility: Eligible under Criterion D
Description: The site is a sparse lithic scatter of unknown aboriginal affiliation located along the western edge of Sink Valley. It measures 33 by 19 meters and is in an area of low sagebrush. The cultural materials consist of chipped stone tools and lithic debitage. The chipped stone tools consist of a stage 4 chert biface (Tool 1) and a stage 2 chert biface fragment (Tool2). Lithic debitage (n=50) is dominated by shatter manufactured from various chert material types. No features were found at this site; however, the site has good potential for subsurface cultural materials.

Smithsonian Site No.: 42Ka6110
Temporary Site No.: MOAC 05-95-11
Legal Description: T 39S, R 5W, Sec. 30
NRHP Eligibility: Eligible under Criterion D
Description: This is a prehistoric temporary camp of unknown cultural affiliation located on a slight rise along the western margin of Sink Valley. The site measures 23 by 19 meters and is in a pinyon-juniper woodland with low sagebrush. Cultural materials consist of chipped stone tools and lithic debitage. Diagnostic artifacts consist of two unknown chert projectile point fragments. Lithic debitage (100-150) is dominated by shatter manufactured from various quartzite and chert material types. Feature A is an oblong concentration of fire-cracked sandstone rocks, with no discernible change in the soil color surrounding it, although there is potential for cultural fill.

Smithsonian Site No.: 42Ka6124
Temporary Site No.: MOAC 05-95-19
Legal Description: T 39S, R 5W, Sec. 30
NRHP Eligibility: Not Eligible
Description: The site is a concentrated lithic scatter of unknown prehistoric cultural affiliation located on a wooded ridge top in the Alton Amphitheater. The site measures 22 by 14 meters and is in a pinyon-juniper woodland. Cultural materials consist of chipped stone tools and lithic debitage. Diagnostic artifacts include one chert untyped projectile point fragment (Tool 1), a chert biface (Tool 2), and one obsidian biface fragment (Tool 3). Lithic debitage (n=10) is dominated by shatter manufactured from obsidian, chert, and quartzite material types. No features were found on this site.

Smithsonian Site No.: 42Ka6126
Temporary Site No.: MOAC 05-95-18
Legal Description: T 39S, R 5W, Sec. 30
NRHP Eligibility: Eligible under Criterion D
Description: The site is a prehistoric temporary camp representing Anasazi/Pueblo and Southern Paiute cultural traditions. The site is at the base of an east-facing slope in the Alton Amphitheater. The site measures 90 by 50 meters and is in a pinyon-juniper woodland. Cultural materials include chipped stone tools, lithic debitage and ceramics. Diagnostic stone tools include an obsidian Elko Series projectile point (Tool 9) and a chert Cottonwood Triangular projectile point (Tool 10). Other chipped stone tools include three unknown projectile point fragments, two utilized flakes, one core, a biface, and one utilized core. Lithic debitage (50-100) is dominated by shatter manufactured from various chert and quartzite material types. Ceramic artifacts consist of four Virgin Anasazi whiteware sherds and three Southern Paiute Utility Ware sherds. Feature A is a small concentration of 15-20 fire-cracked sandstone rocks, which measures approximately 50 cm in diameter. The feature does not exhibit any discernible change in the soil color.

NATIONAL REGISTER OF HISTORIC PLACES EVALUATION

The National Register Criteria for Evaluation of Significance and procedures for nominating cultural resources to the NRHP are outlined in 36 CFR 60.4 as follows:

> The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of State and local importance that possess integrity of location, design, setting, material, workmanship, feeling, and association, and that they:
>
> a)...are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> b)...are associated with the lives of persons significant to our past; or
>
> c)...embody the distinctive characteristics of a type, period, or method of construction; or that represents the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> d)...have yielded or may be likely to yield information important in prehistory or history.

The inventory resulted in the documentation of one previously recorded historic/prehistoric site (42Ka2068), five previously recorded prehistoric sites (42Ka1313, 42Ka2041, 42Ka2042, 42Ka2043, and 42Ka2044), and nine new prehistoric sites (42Ka6104, 42Ka6105, 42Ka6106, 42Ka6107, 42Ka6108, 42Ka6109, 42Ka6110, 42Ka6124, and 42Ka6126). The previously recorded historic/prehistoric site (42Ka2068) is recommended as eligible for nomination to the NRHP under Criterion D as both the prehistoric and historic components are likely to contribute to historic and prehistoric research topics of the area. The prehistoric component of site 42Ka2068 is a lithic scatter of unknown cultural affiliation that exhibits spatial integrity, a diversity of lithic artifacts, and the potential for additional subsurface cultural remains. The historic component, an abandoned farming/ranching habitation, is also considered significant because of its information potential concerning spatial patterning, trash disposal patterns, consumer behavior, and socioeconomic status.

The five previously recorded prehistoric sites (42Ka1313, 42Ka2041, 42Ka2042, 42Ka2043, and 42Ka2044) were initially unevaluated by the recorders. These sites along with the eight new recorded sites (42Ka6104, 42Ka6105, 42Ka6106, 42Ka6107, 42Ka6108, 42Ka6109, 42Ka6110, and 42Ka6126) are recommended eligible to the NRHP under Criterion D because they are likely to contribute to such prehistory of the region. None of these sites meet the requirements defined in Criteria A, B or C. These sites include four prehistoric temporary camps (42Ka1313, 42Ka2042, 42Ka6110 and 42Ka6126) which exhibit diversity of cultural materials, spatial patterning, fire-cracked rock features, and in several cases temporal diagnostics. Cultural traditions represented at these sites include Early and Middle Archaic (42Ka1313), Anasazi (42Ka1313, 42Ka6126), and Protohistoric/Contact or Southern Paiute (42Ka1313, 42Ka6126). Specific research objectives which these sites could address include site function, site structure, chronology, subsistence, technology, spatial organization, land use patterns, and extra-regional relationships.

Nine prehistoric sites in the inventory area are categorized as lithic scatters (42Ka2041, 42Ka2043, 42Ka2044, 42Ka6104, 42Ka6105, 42Ka6106, 42Ka6107, 42Ka6108, and 42Ka6109). These sites display several classes of chipped stone tools with lesser amounts of ground stone implements and ceramic artifacts. Cultural traditions represented at some of the sites include Early Archaic (42Ka2044, 42Ka6108), General Archaic (42Ka6104), Anasazi/Pueblo (42Ka2041), and Protohistoric/Contact or Southern Paiute (42Ka2041, 42Ka2043, 42Ka6105). All of these sites occur in depositional environments (e.g., alluvial) that are likely to yield subsurface cultural remains. Research topics which could be addressed at these sites include site function, chronology, subsistence, technology, and spatial organization, land use patterns, and extra-regional relationships.

Site 42Ka6124, a lithic scatter of unknown cultural affiliation, exhibits a limited artifact assemblage, lacks temporal indicators and has minimal potential for subsurface cultural materials. Therefore, it is recommended as not eligible to NRHP because the site is unlikely to yield information relevant to the research domains of the area.

MANAGEMENT RECOMMENDATIONS

The cultural resource inventory of Alton Coal Development's Sink Valley area of the Alton Amphitheater resulted in the location of 15 prehistoric or prehistoric/historic sites of which 14 sites (42Ka1313, 42Ka2041, 42Ka2042, 42Ka2043, 42Ka2044,42Ka2068 42Ka6104, 42Ka6105, 42Ka6106, 42Ka6107, 42Ka6108, 42Ka6109, 42Ka6110, and 42Ka6126) are considered eligible for nomination to the NRHP under Criterion D. All except two sites (42Ka2068 and 42Ka6108) will be avoided by this phase of the coal development project. The following recommendations are put forth regarding the eligible sites in this project area.

1. All eligible sites except for sites 42Ka2068 and 42Ka6108 will be avoided by the undertaking. Additionally, temporary fencing should be erected around the boundaries of all these eligible sites to facilitate avoidance.

2. It is recommended that a qualified archaeologist should monitor the removal of the topsoil during all surface mining activities because of the potential for subsurface cultural remains..

3. The two eligible sites, 42Ka2068 and 42Ka6108, which cannot be avoided by the undertaking will require a data recovery treatment plan.

REFERENCES CITED

Aikens, C.M. and D.B. Madsen
1986 Prehistory of the Eastern Area. In *Great Basin*, Volume 11, Handbook of North American Indians, edited by Warren L. D'Azevedo. Smithsonian Institution, Washington.

Alder, D.D. and K.F. Brooks
1996 A History of Washington County: From Isolation to Destination. Utah Centennial County History Series. Utah State Historical Society, Salt Lake City.

Ambler, J.R.
1996 Dust Devil Cave and Archaic Complexes of the Glen Canyon Area, pp. 15-35. In Glen Canyon Revisied. *University of Utah Press Anthropological Papers Number* 119.

Baldwin, G.C.
1950 The Pottery of the Southern Paiute. *American Antiquity* 16:50-56.

Berry, C.F., and M.S. Berry
1986 Chronological and Conceptual Models of the Southwestern Archaic. In *Anthropology of the Desert West: Essays in Honor of Jesse D. Jennings*, edited by C.J. Condie and D.D. Fowler, pp. 253-327. Anthropological Papers No. 110. University of Utah Press, Salt Lake City.

Bettinger, R.L.
1994 How, When, and Why Numic Spread. In *Across the West*, edited by David B. Madsen and David Rhode, pp. 44-56. University of Utah Press, Salt Lake City.

Bradley, M.S.
1999 *A History of Kane County*. Utah Centennial County History Series. Utah State Historical Society, Salt Lake City.

Christensen, D., S.M. Chandler, K. Kreutzer, and J. Jennings
1983 Results of the 1982 Class II Archaeological Survey of the Alton and Kolob Tracts in Northwestern Kane County, Utah. Nickens & Associates for the Kanab Resource Area, Bureau of Land Management.

Copeland, J.M., and R.E. Fike
1988 Fluted Projectile Points in Utah. *Utah Archaeology 1988* 1 (1): 5-28.

Crosswhite, F.S.
1981 Desert Plants, Habitat and Agriculture in Relation to the Major Pattern of Cultural Differentiation in the O'odham People of the Sonoran Desert. *Desert Plants* 3(2):47-76.

Euler, R.C.
1966 Southern Paiute Ethnohistory. *University of Utah Anthropological Papers 78, Glen Canyon Series 28.* Salt Lake City.

Fowler, C.S.
1982 Settlement Patterns and Subsistence Systems in the Great Basin: The Ethnographic Record. In *Man and Environment in the Great Basin*. David B. Madsen and James F. O'Connell, Eds., pp. 121-139.

1994 Material Culture and the Proposed Numic Expansion. In *Across the West*. David B. Madsen and David Rhode, Eds., pp 103-114. University of Utah Press, Salt Lake City.

Fowler, C.S. and D.D. Fowler
1971 Notes on the History of the Southern Paiutes and Western Shoshonis. *Utah Historical Quarterly* 39 (2): 96-113.

1981 The Southern Paiute: A.D. 1400-1776. In The Protohistoric Period in the North American Southwest; A.D. 1450-1700. Davis R. Wilcox and W. Bruce Masse, Eds. *Arizona State Univerisity Anthropological Research Papers* 24: 129-162.

Frison, G.C
1978 *Prehistoric Hunters of the High Plains*. Academic Press, New York.

Geib, P.R.
1995 Two Fluted Points from Kaibito Plateau, Northeastern Arizona. *Kiva* 61(1):89-97.

1996 Glen Canyon Revisited. *University of Utah Anthropological Papers No.* 119. University of Utah Press, Salt Lake City.

Geib, P.R., and J.R. Ambler
1991 Sand Dune Side-notched: An Early Arcahic Projectile Point Type of the Northern Colorado Plateau. *Utah Archaeology 1991* 4:17-23.

Geib, P.R., J.H. Collette, and K. Spurr
2001 Kaibabitsinungwu: An Archaeological Sample Survey of the Kaiparowits Plateau. Cultural Resource Series No. 24. *Grand Staircase-Escalante National Monument Special Publication* No. 1.

Gregory, H.E.
1951 The Geology and Geography of the Paunsaugunt Region, Utah. *United States Geological Survey Professional* Paper 226.

Gregory, H.E., and R.C. Moore
1931 The Kaiparowits Region: A geographic and geological Reconnaissance of Parts of Utah and Arizona. *United States Geological Survey Professional* Paper 164.

Halbirt, C.D. and C.A. Gualtieri
1981 Archaeological Investigations Utah International, Inc., San Francisco, Alton Coal Field Survey, Federal, State, and Private Lands, Kane County, Utah. Museum of Northern Arizona, Department of Archaeology. Project No. U-81-NI-0254b.

Hogan, P.E.
1980 The Analysis of Human Coprolites from Cowboy Cave. Appendix IX in Cowboy Cave, pp. 201-211. In Cowboy Cave. *Anthropological Papers No.* 104. University of Utah Press, Salt Lake City.

Holmer, R.N.
1986 Common Projectile Points of the Intermountain West. In Anthropology of the Desert West: Essays in Honor of Jesse D. Jennings, pp. 89-115. *Anthropological Papers No.* 110. Universtiy of Utah Press, Salt Lake City.

Janetski, J.C.
1993 The Archaic to Formative Transition North of the Anasazi: A Basketmaker Perspective. In Anasazi Basketmaker: Papers from the 1990 Wetherill-Grand Gulch Symposium. *BLM Cultural Resource Series No.* 24, Salt Lake City.

Jennings, J.D.
1957 Danger Cave. *University of Utah Anthropological Papers No.* 27. Salt Lake City.

1975 *Preliminary Report: Excavation of Cowboy Cave.* Department of Anthropology, University of Utah, Salt Lake City.

1978 Prehistory of Utah and Eastern Great Basin. *University of Utah Anthropological Papers* 98. The University of Utah Press, Salt Lake City.

1980 Cowboy Cave. *Anthropological Papers No.* 104. University of Utah Press, Salt Lake City.

Keller, D.R.
1987 A Report of Archaeological Resources on the Alton Coal Project. Report prepared for Kanab Resource Area, Bureau of Land Management as part of Utah Internationals Mine Permit Application.

Kelly, I.T.
1964 Southern Paiute Ethnography. *University of Utah Anthropological Papers No.* 69.

Kelly, I.T., and C.S. Fowler
1986 Southern Paiute. *In Handbook of North American Indians, Volume II, Great Basin*, edited by W.L. D Azevedo, pp. 368-397. Smithsonian Institution, Washington, D.C.

Kohl, R.B.
1991 Fluted Projectile Points in Southwestern Utah. *Utah Archaeology 1991*10 (1): 31-44.

Madsen, D.B.
1982 Eastern Great Basin Prehistory. *In Man and Environment in the Great Basin*, edited by David B. Madsen and James F. O'Connell, pp. 207-226. *SAA Paper No. 2.*

Martin, S.L.
1999 Virgin Anasazi Diet as Demonstrated through the Analysis of Stable Carbon and Nitrogen Isotopes. *Kiva* 64 (4).

Matson, R. G.
1991 *The Origins of Southwestern Agriculture.* University of Arizona Press, Tucson.

McFadden, D.A.
1980 Garkane Powerline Right-of-Way - Escalante. Bureau of Land Management, Kanab Field Office. Project No. U-80-BL-0158b.

McFadden, D.A.
1981 Isolated Tract Allotment. Bureau of Land Management, Kanab Field Office. Project No. U-81-BL-0230b.

1982 Cone Allotment Chaining. Bureau of Land Management, Kanab Field Office. Project No. U-82-BL-0178b.

1984 Syler Knoll Chaining. Bureau of Land Management, Kanab Field Office. Project No. U-84-BL-0679b.

1996 Virgin Anasazi Settlement and Adaptation on the Grand Staircase. *Utah Archaeology 1996* 9 (1): 1-34.

2000 Formative Chronology and Site Distribution on the Grand Staircase-Escalante National Monument. Draft report on file, USDI Bureau of Land Management, Kanab Resource District, Cedar City, Utah.

Schroedl, A.R., and N.J. Coulam
1994 Cowboy Cave Revisited. *Utah Archaeology 1994* 7 (1):1-34.

Steward, Julian H.
1938 Basin-Plateau Aboriginal Sociopolitical Groups. *Bureau of American Ethnology Bulletin* 120. Washington, D.C.

Stokes, William L.
1986 *Geology of Utah.* Utah Museum of Natural History. University of Utah, Salt Lake City.

Talbot, R.K.
1990 Virgin Anasazi Architecture: Toward a Broader Perspective. *Utah Archaeology 1990* 3 (1): 19-42.

Thompson, R.A. and G.B. Thompson
1978 An Archaeological Survey of the Eastern End of the Warner Valley, Washington County, Utah. *Western Anasazi Reports* 1 (2): 129-142. Cedar City, UT.

Walling, B.A. and R.A. Thompson
1988 *Archeology of the Dead Raven Site.* Report prepared for the Kane County Commission. Intersearch, Cedar City, Utah.

Westfall, D.A., W.E. Davis, and E. Blinman
1987 Green Spring: An Anasazi and Southern Paiute Encampment in the St. George Basin of Utah. *Bureau of Land Management-Utah Cultural Resource Series Number* 21.

APPENDIX A

INTERMOUNTAIN ANTIQUITIES COMPUTER SYSTEM (IMACS)
SITE FORMS
(42Ka1313, 42Ka2041 through 42Ka2044, 42Ka2068,
42Ka6104 through 42Ka6110, 42Ka6124, and 42Ka6126)

On File At:

Utah Division of State History
Salt Lake City, Utah

APPENDIX B

ALTON COAL FIELD
PALEONTOLOGICAL SURVEY
SECTIONS 12, 13, 24, AND 25, T 39 S, R 6 W AND
SECTIONS 7, 18, 19, 30 AND 31, T 39 S, R 5 W

ALTON COAL FIELD

PALEONTOLOGICAL SURVEY

Sections 12, 13, 24, and 25, T 39 S, R 6 W and

Sections 7, 18, 19, 30 and 31, T 39 S, R 5 W

For

Montgomery Archaeological Consultants
Box 147, 322 East 100 South
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By

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February 8, 2006

INTRODUCTION

This is a paleontology field survey report for the Alton Coal Field covering sections12, 13, 24, and 25, T 39 S, R 6 W and sections 7, 18, 19, 30 and 31, T 39 S, R 5 W. This area is south and east of the town of Alton, Utah. An earlier report covered a literature and file search on a slightly larger area than the present study (Hamblin, 2005).

The earlier report discussed the paleontology of five geological formations: Dakota Formation, Tropic Shale, Straight Cliff Formation, Wahweap Formation, and Claron Formation. The project boundaries of the present study only contained areas with the Dakota Formation and Tropic Shale.

The survey was conducted during September and October 2005. Formation outcrops of the Dakota Formation and Tropic Shale were identified using the Geologic Map of Kane County (Doelling and Davis, 1989) and the Coal and geology map, Alton Quadrangle in Doelling and Graham (1972). The survey was conducted by selecting spots or areas in formation outcrops and hiking around looking for fossil material.

SURVEY RESULTS

Three fossil localities had been recorded in or near the present study area during a survey by DeCourten (1987). These localities were Ka270I, Ka271V, and Ka272V and included mollusk fragments and turtle shell bone. The present survey identified 77 additional fossil sites in the study area. These were combined into 30 recorded paleontology localities (Ka1243 – Ka1272). Paleontology Data Sheets on these 30 localities are included in the appendix of this report. Figure 1 is a map of the fossil locations in and near the study area. Figure 2 shows example of fossils in the study area.

Tropic Shale

The study area is highly fossiliferous with common, well known invertebrate fossils of Cretaceous Age. Almost anywhere one walks in the Tropic Shale in this area one can find invertebrate fossils, mostly bivalves, but also gastropods, and cephalopods. Most of the recorded localities are in the Tropic Shale. The fossils generally occur in clay beds, but many seem to be associated with the occurrence of nodules or concretions in the clay beds. Bivalves and gastropods were also found in sandstones in the higher layers of the Tropic Shale in the hills on the east side of the study area. The most common fossil observed was that of the oyster *Pycnodonte newberryi*. The cephalopod *Baculites* sp. is also fairly common. The marine fossils of the Tropic Shale record the transgression and regression of the last Cretaceous seaway in this area.

Dakota Formation

The Tropic Shale was deposited over the Dakota Formation which contains the coal deposits of the Alton Coal Field. Fossils are also found in the Dakota Formation. These tend to be less marine oriented and there is a greater potential for finding terrestrial vertebrate fossils in the Dakota Formation. Turtle shell fragments are the only vertebrate fossil recorded in the study area, but other reptiles including lizards, crocodiles, and dinosaurs are known from the Dakota Formation in other areas. Plant imprints, petrified wood, one possible turtle shell fragments and one possible dinosaur track were recorded in the Dakota Formation during the survey (Ka1250T, Ka1251IPV, Ka1260P, Ka1261IP).

PALEONTOLOGICAL SIGNIFICANCE

The following field classification system was used to define the sensitivity of paleontological localities recorded during the field survey (Raup, 1987, p.174):

Class 1. Critical - reference locality for holotype or critical paleontological material, or any type section of geological strata needed for future study

Class 2. Significant - any locality that produces rare, well-preserved, or critical fossils usable for taxonomic, evolutionary, stratigraphic, paleoenvironmental, or paleoecological studies.

Class 3. Important - any locality that produces common, abundant fossils useful for stratigraphic or population variability studies.

Class 4. Insignificant - any locality with poorly preserved, common, or stratigraphically unimportant fossil material.

Class 5. Unimportant - any locality intensively surveyed and determined to be of minimal scientific interest.

The paleontology of the Tropic Shale and Dakota Formation have been extensively studied over the years and now quite well known. These fossils have been important to understanding this part of the earth's geologic history. Most of the material recorded during the survey falls in or between the categories of insignificant to important. This is because the fossils found are well known and are very plentiful invertebrates. However, they can be useful for stratigraphic or population studies.

Generally, development in formations with common, abundant invertebrate fossils does not highly impact the paleontological resources, but there is always a potential for discovery of new or rare fossils in these formations. Critical and significant fossils are occasionally discovered as is evident from recent finds of vertebrates in the Tropic Shale (Albright, Gillette, and Titus, 2002; and Gillette, Albright, Titus, and Graffam 2002).

REFERNCES

Albright, L.B., Gillette, D.D., and Titus, A.L., 2002, New records of vertebrates from the Late Cretaceous Tropic Shale of Southern Utah, *in* Abstracts with Programs, Rocky Mountain Section GSA, v. 34, n. 4.

DeCrouten, F., 1987, Assessment of the effects of the Alton Coal Project upon paleontological resources. Report in paleontology files at State Paleontologist Office, Utah Geological Survey.

Doelling, H.H., and Graham, R.L., 1972, Southwestern Utah coal fields: Alton Kaiparowits Plateau and Kolob-Harmony: Utah Geological and Mineral Survey Monograph Series, no. 1, 333p.

Doelling, H.H., and Davis, F.D., 1989, The Geology of Kane County, Utah; Utah Geological and Mineral Survey Bulletin 124 and Map 121, 192 p.

Gillette, D.D., Albright, L.B., Titus, A.L., and Graffam, M.H., 2002, Discovery and excavation of a Therizinosaurid dinosaur from the Upper Cretaceous Tropic Shale (Early Turonian, Kane County, Utah, *in* Abstracts with Programs, Rocky Mountain Section GSA, V. 34, n. 4, p.A5.

Hamblin, A.H., 2005, Literature/File search of T39S, R5W, Sections 7, 8,17, 18, 19, 20, 29, 30, 31 and T39S, R6W, Sections 11, 12, 13, 24, 25, Kane County, Utah for Montgomery Archaeological Consultants, Moab, Utah.

Raup, D.M., 1987, Paleontological Collecting Committee Guideline, National Academy of Science, Academy Press, Washington, D.C.

Permit and License numbers: Utah Paleontological Permit # 04-339, BLM Paleontological Resources Permit # UT-S-05-002, Utah Professional Geologist License– 5223011-2250.

Figure 2. Examples of fossils found (Tropic Shale).

Top row: *Pycnodonte newberryi* and other bivalves.
Middle row: Ammonites.
Bottom row: Gastropod and *Baculites* sp.

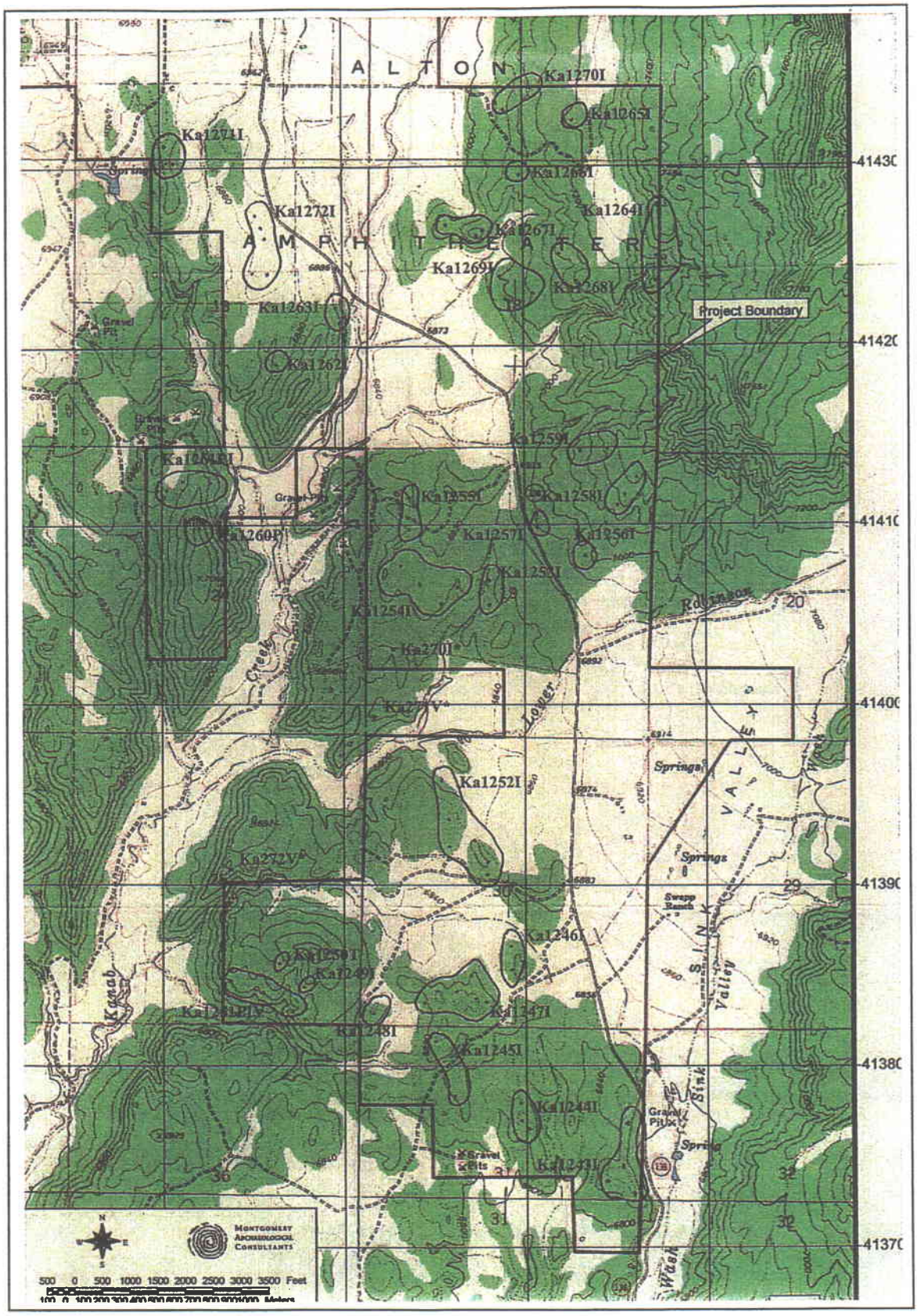


Figure 1. Fossil localities identified in the Alton Coal Field Study Area.
* Localities identified during earlier survey (DeCourten, 1988).

APPENDIX

PALEONTOLOGY LOCALITY DATA SHEETS

Paleontology Locality
Data Sheet

State Locality No. 42Ka1252I .
Agency No. _____.
Temporary No. 21, 22, 23, 24, 25, 26.

1. Type of Locality: Invertebrate [X] Plant [ ] Vertebrate [ ] Trace [ ] Other [ ]

2. Formation/Horizon/Geologic Age: Tropic Shale, Cretaceous.

3. Description of geology and Topography: In the Alton Amphitheater with low hills and round bottom valleys or draws draining to Kanab Creek. Mountains on east and west sides of the larger valley.

4. Location of Outcrop: Three miles south, southeast of the Town of Alton, Utah.

5. Map Ref.: U.S.G.S. Quad. Alton, Utah ,Scale 7.5 Min., Edition 1966.

East ½ of NW ¼ Section 30 , T. 39 S, R. 5 W, Meridian : S.L.B. & M.

UTM Grid Zone: 12 , (21) 370792 m E 4139064 m N, (22) 370792 m E 4139134 m N,
(23) 370718 m E 4139249 m N, (24) 370580 m E 4139211 m N,
(25) 370574 m E 4139362 m N, (26) 370574 m E 4139585 m N.

6. County: Kane , BLM/USFS District: Cedar City/Kanab BLM.

7. Specimens Observed/Collected: Bivalves, gastropods, cephalopods (Baculites and fragments of partially coiled one (22) - *Allocrioceras* sp.?).

8. Collector: _____ Date: _____.

9. Repository/Accession No.s: NA.

10. Ownership: PRIV[X+] STATE[ ] BLM[X] USFS[ ] NPS[ ] IND[ ] MIL[ ] OTHER[ ]

11. Recommendations for Further Work or Mitigation: _____.

12. Type of Map made by Recorder: Attached.

13. Disposition of Photos/Negatives: _____.

14. Published References: _____.

15. Remarks: _____.

16. Sensitivity: Critical [ ] (Class 1) Significant [ ] (Class 2) Important [X] (Class 3) Insignificant [ ] (Class 4) Unimportant [ ] (Class 5)

17. Recorded by: Alden H. Hamblin Date: September 30, 2005.

18. Permit and License numbers: Utah Paleontological Permit # 04-339, BLM Paleontological Resources Permit # UT-S-05-002, Utah Professional Geologist License– 5223011-2250.

A.H. Hamblin Paleontological Consulting, 3793 North Minersville Highway, Cedar City, Utah 84720 (435) 867-8355

APPENDIX C

GEOLOGIC REPORT OF THE IMPACTS OF BEDROCK AND SURFICIAL UNITS ON THE DISTRIBUTION OF CULTURAL RESOURCES AT THE ALTON COAL FIELD, KANE COUNTY UTAH

Geologic Report of the Impacts of Bedrock and Surficial Units on the Distribution of Cultural Resources at the Alton Coal Field, Kane County Utah

Prepared for:

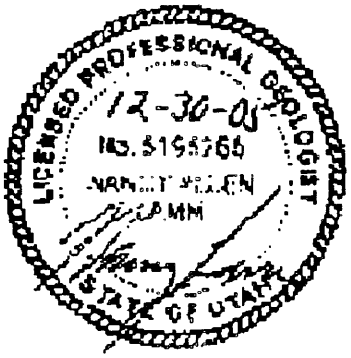
Montgomery Archaeological Consultants
Moab, Utah

Prepared by:

Nancy B. Lamm

Licensed Professional Geologist #5195265
State of Utah

December 30, 2005



Introduction

At the request of Montgomery Archaeological Consultants a geologic invesigation was made of the Alton Coal Field, south of the Town of Alton in Kane County, Utah, for the purpose of determining how the regional geology impacts the distribution of cultural resources present in the project area. The site investigation was conducted on July 14 and 15, 2005. Concurrent with the field investigation, Montgomery Archaeological Consultants personnel were present, completing the survey phase of the cultural resource inventory of the area.

The project area is approximately five square miles in area and consists largely of open, cultivated fields surrounded by low hills. Kanab Creek runs through the project area, flowing from north to south and forms an incised canyon to the west of the southern end of the project area. Lower Robinson Creek extends across a small portion of the southern end of the project area and flows into Kanab Creek west of the project area. An improved gravel road extends south from the Town of Alton through the center of the project area and a number of unimproved roads extend out to the east and west from this central road. Current land use consists of ranching and farming. Historically coal has been mined in several locations on the west side of the project area and several active gravel quarry operations are present in the south portion of the project area.

Procedure

Prior to the field investigation phase, published geologic information of the project area was obtained and plotted onto the U. S. G. S. Alton 7 ½' quadrangle map for verification in the field. In addition, stereo air photos of the project area were obtained and reviewed prior to the field investigation. Landforms noted on the stereo air photographs were plotted on the topographic map. This preliminary information was verified in the field by walking a series of sweeps in areas accessed by unimproved roads. Project constraints precluded a detailed site investigation but a set of descriptive criteria to assist in cultural resource management decisions was constructed for both bedrock and unconsolidated units. This report provides an overview of the project area geology and outlines the criteria determined in the field.

Project Area Geology

The Alton Coal Field is comprised of relatively horizontal bedrock units of Mesozoic age. To the immediate west of the project area between the Town of Alton and Highway 89, these bedrock units are broken and displaced by the Sevier Fault Zone, extending in a northeast-southwest direction just east of Highway 89 and the Virgin River. Displacement of bedrock units is apparent in the low mountains extending along the trace of this fault zone just west of the project area. Within the project area, bedrock units are exposed as low hills and along the incised drainage of Kanab Creek. Bedrock units exposed in the project area are, from oldest to youngest: the Winsor member of the Carmel formation (Jurassic), the Dakota formation (Cretaceous), and the Tropic shale (Cretaceous) (Sable and Hereford 1990).

Bedrock is deeply weathered and few unweathered outcrops are present within the project area. Bedrock units form topographic highs and are mantled with weathered sandstone and shale sediments. Alluvial valley fill, derived from weathered bedrock, fills topographically low areas. In the northeast portion of the project area an extensive landslide deposit extends downslope from the east. Primary unconsolidated deposits in the project area are, from oldest to most recent: the mass wasting deposits in the northeast

portion of the project area, alluvial valley fill, and slope wash deposits mantling topographic highs and feathering out across valley fill from adjacent slopes.

Each geologic unit reflects distinct characteristics and criteria that impact the provenance of cultural resources. Figures 1and 2 show the location of these units within the project area boundaries. A discussion of the potential impacts to cultural resource distribution follows the geologic description.

Bedrock Units

Winsor member of the Carmel formation: The Winsor member of the Carmel formation has a limited distribution of less than twenty acres within the project area. The geologic base map (Sable and Hereford 1990) indicates that the Carmel formation is exposed along a drainage on the southwest slope of a low mountain in the SE/4 of Section 25, T 39 S, R 6 W in the southwest corner of the project area. The Winsor member of the Carmel formation is a fine to medium grained sandstone of coastal plain origin (Sable and Hereford 1990). Due to project constraints, limited surface exposure, and general accessibility, the presence of this bedrock unit was not verified in the field investigation.

Dakota formation: Exposures of the Dakota formation are limited to the western portion of the project area, outcropping along the lower slopes of low mountains along the Kanab Creek drainage. The Dakota formation is described as interbedded claystone, sandstone, and carbonaceous mudstone with minor beds of coal, conglomerate, and ironstone. Regional thickness of the Dakota formation in the vicinity of the Alton Coal Field ranges from 75 meters (250 feet) to 230 meters (750 feet), increasing in thickness from east to west (Sable and Hereford 1990).

The stratigraphy of the Dakota formation is varied and reflects an environment of deposition that includes fluvial, lagoonal, shoreline, and marine depositional environments. Coal units present are up to 1.5 meters (5 feet) thick. The sandstone is light-gray to yellowish gray, resistant and lenticular. The mudstone is gray to very dark gray and non-resistant. The contact of the Dakota formation with the overlying Tropic shale is set at the upper coal zone in the Dakota formation (Sable and Hereford 1990).

Bedrock exposures of the Dakota formation are limited within the project area since slope wash sediments from the overlying Tropic shale largely mantle hillslopes. Several criteria are present, however, to identify the presence of the Dakota formation in the field:

- The location of coal mining activity. Two abandoned coal mines are present within the project area and are located on Figure 1. Exposures of coal seams are concealed by slope wash deposits but the presence of the mines reflects the approximate contact of the Dakota formation with the overlying Tropic shale.

- The presence of orange to brick red ironstone. The ironstone bed noted by Sable and Hereford (1990) is present in the project area as brick red to orange siltstone to fine grained sandstone. This deposit is quarried in several locations in the vicinity of the project area which are noted on Figures 1 and 2. In addition, a gentle topographic rise in the SW/4 of Section 30, T 39 S, R 5 W is capped with this distinctive deposit weathering out as an angular gravel and indicating the presence of the Dakota formation. Since this unit is locally quarried for gravel, however, the brick red ironstone appears as road base and fill within the project area. Presence of the gravel

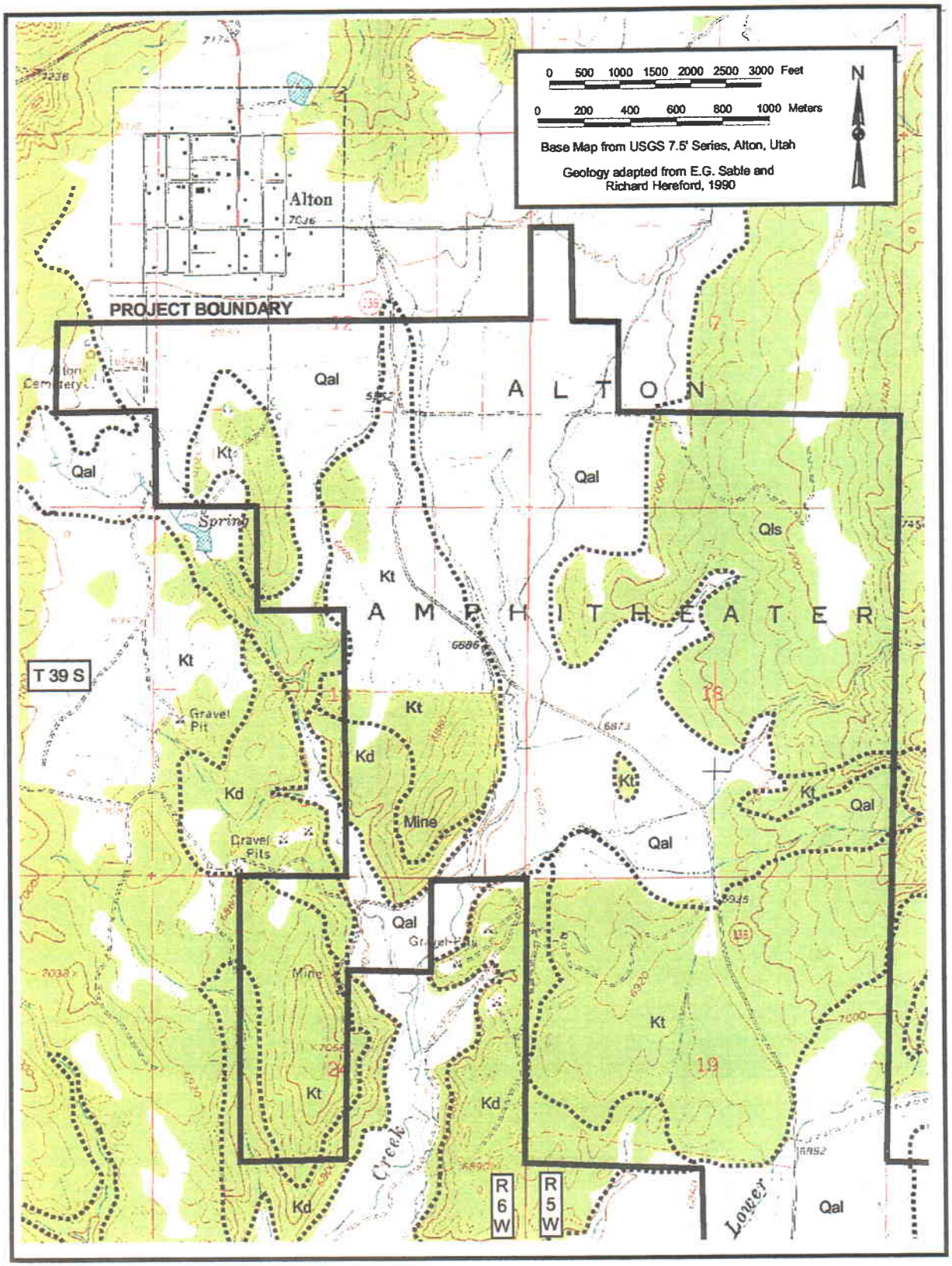


Figure 1. Geologic map of Alton Coal Field, north half, after Sable and Hereford (1990). Legend appears on Figure 2.

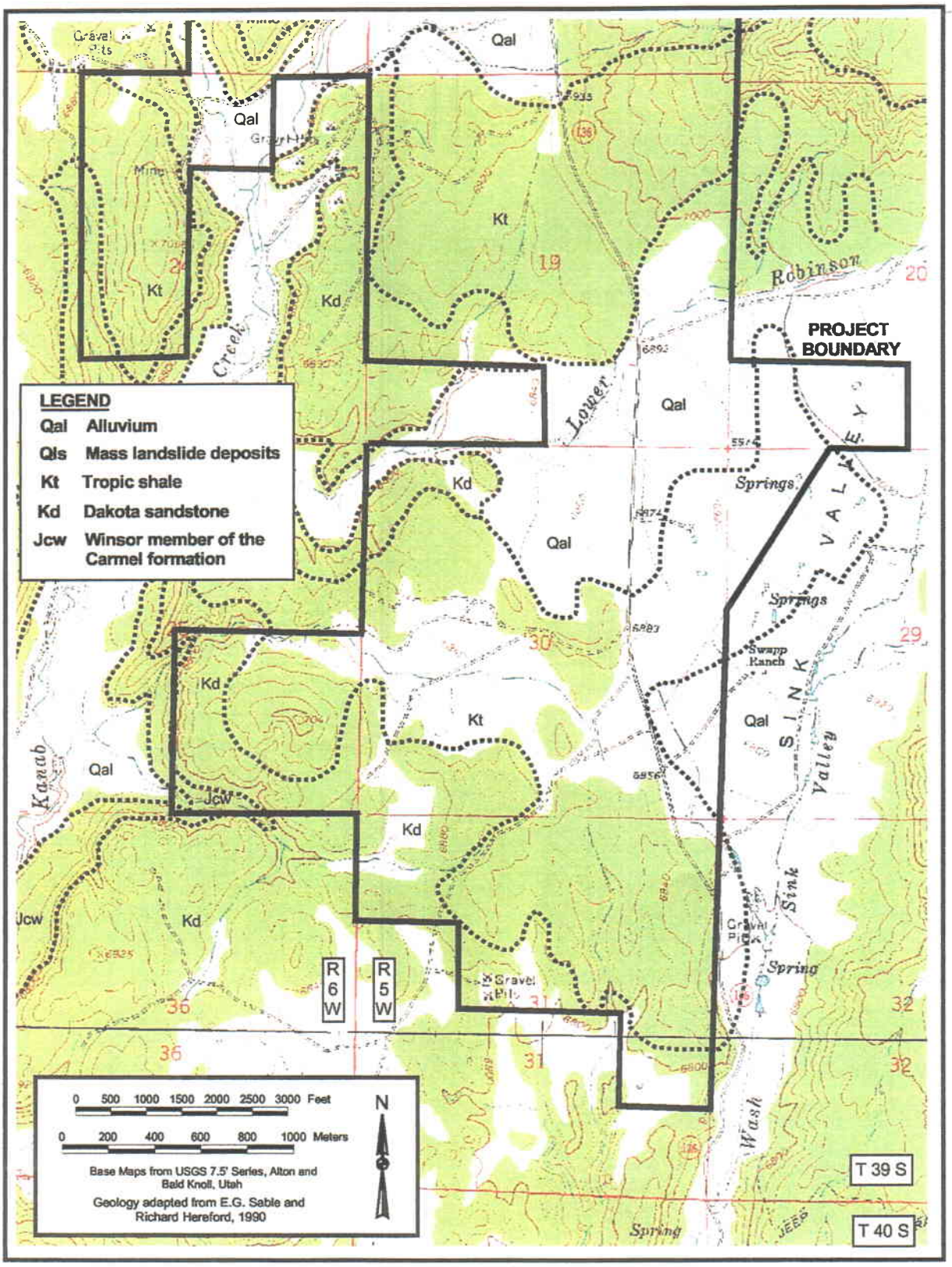


Figure 2. Geologic map of Alton Coal Field, south half, after Sable and Hereford (1990).

alone should not be used as sole criteria for the presence of the Dakota formation.

Resistant sandstone units of the Dakota formation form benches along hillslopes and along Kanab Creek. Sandstone exposures were also noted along the west side of the low mountain in the SE/4 of section 13, T 39 S, R 6 W. The eroded sandstone units are similar in appearance to sandstone exposed in the overlying Tropic shale. In general, the Dakota sandstone exposures are mantled by slope wash from the overlying Tropic shale, are associated with gravel quarry locations in the vicinity of the project area, and are located along the lower slopes of topographic highs in the southwest portion of the project area.

Cultural resources located on relatively level exposures of the Dakota formation should be stable and limited to the ground surface and soils formed in situ. Slope wash, described in detail later in this report, is a problem on steeper slopes, especially in exposures of the mudstone units.

Tropic shale: The Tropic shale is the most wide spread bedrock unit within the project area. Again, distinct bedrock exposures are limited but the Tropic shale comprises the low hills extending across the southern portion of the project area in Sections 30 and 31, T 39 S, R 5 W, the low divide between Lower Robinson Creek and Kanab Creek in Section 19, T 39 S, R 5 W and the low hills west of the irrigated land in Sections 12 and 13, T 39 S, R 6 W. To the east of the project area in Section 29, T 39 S, R 5 W, the outcrop of the Tropic shale is associated with the occurrence of a number of springs in Sink Valley. It is likely that shallow ground water is seeping down gradient in the alluvial valley fill of Lower Robinson Creek and Sink Valley Wash. Where the alluvial valley fill thins over the outcrop of the less permeable Tropic shale, the ground water daylights as a series of springs.

The Tropic shale is described as slope-forming, drab shale and mudstone with interbedded sandstone and limestone. The shale and mudstone weather to olive gray and yellowish gray. The yellowish-gray sandstone units are cliff forming in places. The mode of deposition of the Tropic shale is largely marine offshore grading to shallow shoreline. Regionally the thickness of the Tropic shale ranges from 90 meters (300 feet) to 305 meters (1000 feet), increasing to the east (Sable and Hereford 1990).

The most widespread exposures of the Tropic shale are along hillslopes mantled with gray sediments. Four low mountains along the western portion of the project area are formed by resistant sandstone horizons in the Tropic shale. Here, hillslopes are steep and mantled with slope wash deposits of eroded gray mudstone along with gravel to cobble size fragments of eroded yellowish sandstone. In the NW/4 of Section 30, T 39 S, R 5 W, angular gray limestone pebbles are eroding out onto the ground surface. Slope wash from the Tropic shale comprises the bulk of alluvial valley sediments making the distinction between eroded shale deposits and alluvial valley fill problematic.

The Tropic shale, with the greatest exposure within the project area, also has the greatest impact to the integrity of cultural resources due to the easily eroded nature of the mudstone and shale that comprise much of the formation. Erosion of sediments is pronounced even in areas with extensive tree growth. In addition, vertical erosion or "piping" of sediments formed in situ on exposures of the Tropic shale may also distort the integrity of buried cultural resources.

Unconsolidated Surficial Units

Landslide deposits: Sable and Hereford (1990) map extensive landslide deposits in the northeast portion of the project area. Extensive forest and vegetative growth obscure this deposit but examination of the

area by stereo air photography confirms the presence of hummocky landforms reflecting extensive mass wasting. This slope failure complex formed on slopes of the Tropic shale and consists of sediments derived from gray shale along with sandstone and other bedrock debris (Sable and Hereford 1990). No clearly defined scarps or areas of active slumping were noted in the field. The landslide deposits are likely Pleistocene in age and appear to be metastable under the current land use of limited ranching.

Alluvial valley fill: Alluvial valley fill is extensive throughout the project area along the broad, open areas of cultivation and valley floor. Sediments are primarily a drab gray silt derived from the surrounding bedrock shale and mudstone units outcropping within the drainage basin. Occasional lens of coarser grained material are present in cutbank exposures. Drainage incision in the alluvial valley fill is pronounced. A drainage scarp in the vicinity of the mass wasting deposits in the NW/4 of Section 18, T 39 S, R 5 W reaches a depth of approximately 9 meters (30 feet) and is nearly vertical. Incision in other areas of alluvial valley fill is also pronounced with scarps ranging from near vertical to sloping. Vertical piping of fine grain sediments is also present in the relatively flat lying alluvial sediments, especially in irrigated areas.

The alluvial valley fill is primarily a fine grained unconsolidated gray silt to silty sand throughout the project area. Characteristics of the alluvial valley fill include the location in low, relatively level areas of the project area including cultivated fields and the presence of sharply incised arroyos and drainages. Total depth of the alluvial valley fill is not known and likely varies across the project area.

Slope wash deposits: Slope wash deposits are located on hillslopes and as a low wedge along the interface of topographic highs and the alluvial valley fill. Slope wash deposits reflect localized transport of eroded bedrock sediments downslope. Contact of slope wash deposits with alluvial valley fill is gradational as the deposits interfinger with and feather out across the surface of the alluvial deposits.

The stratigraphy of slope wash deposits reflects the bedrock unit eroded and can range from fine grained sediments to small boulders. On hillsides, slope wash deposits are located as mounds on the upslope side of trees and vegetation. In shallow drainages, slope wash may be present as low lobes where eroded sediments were washed downslope during episodes of precipitation. Along the contact with the alluvial valley floor, finer grained sediments are washed out across the valley floor while coarser grained material is deposited along the break in slope. Thickness of slope wash deposits varies across the project area but are most likely relatively shallow. Slope wash deposits were not shown on Figures 1 and 2 due to the limited and intermittent distribution of these deposits.

Geologic Processes Affecting Distribution of Cultural Resources

The geologic setting of the Alton Coal Field area has the potential to impact the distribution of cultural resources by displacement from gravity and/or runoff. There is also the potential for burial and subsequent erosion of cultural resources in the alluvial valley fill. The potential for impact to site integrity is directly related to the topography of the site combined with the bedrock and surficial units identified on Figures 1 and 2. Following is an outline of geologic processes in the Alton Coal Field that have the potential to impact the distribution of cultural resources and the criterial for identification in the field.

Disturbance by gravity:

pipes occur in the vicinity of incised arroyos and increase in density and size with proximity to the drainage. Pipes and fissures are created as fine grained sediments swell upon wetting and shrink upon drying, forming cracks in the ground surface. During subsequent precipitation events, the fine grained sediments along the sides of the cracks are washed deeper into the fissure. During subsequent drying episodes, the fine grain sediments dry and shrink with the effect of enlarging the fissure. Repeated cycles of wetting and drying result in the formation of pronounced vertical fissures adjacent to drainages. Horizontal seepage of water within the sediment creates connected lateral 'pipes', which collapse, and form tributary drainages. Over time the network of pipes and vertical fissures can extend laterally from the primary drainage for several meters and continue to erode up gradient. The channels of incised drainages are widened as tributary pipes undercut the arroyo walls and collapse.

Piping or collapsing soils are recognized by the presence of vertical cracks in finer grained sediments. These cracks can form from normal precipitation events but are enhanced by flood irrigation practices. The integrity of sites can be impacted by the vertical displacement of artifacts. The alluvial valley fill (Qal on Figures 1 and 2) is comprised primarily of fine grained sediments derived from the surrounding Tropic shale and are subject to piping and/or vertical collapse of sediments. Relatively level exposures of deeply weathered shales of the Tropic shale are also subject to piping to a lesser degree. When cultural resources are located in an area exhibiting vertical fissures in finer grained sediments, some vertical and lateral displacement of artifacts are possible.

Entrenching of drainages is the extension of vertical erosion described above on the drainage system. Major drainages in the project area are incised from 6 to 15 meters (20 to 50 feet) with steep to vertical walls. As in the erosion of weathered bedrock, the incision pattern begins down gradient and migrates up the drainage channel. Piping and collapse of arroyo walls continuously extends the pattern up the drainage basin. The interval of entrenching is likely recent and is associated with a pattern of incision occurring across the southwest dating from the 1880's (Sable and Hereford, 1990).

Cultural resource sites located adjacent to modern arroyo channels are likely compromised by the significant erosion resulting from the drainage entrenchment.

Burial of cultural resources:

Prior to the episode of incision beginning in the 1880's, the channels of Kanab Creek, Lower Robinson Creek, and their tributaries were likely aggrading their channels based on regional depositional patterns. Sable and Hereford (1990) cite regional depositional intervals beginning at 6,320, 5650 to 5,390, 4,330, 2,145, and 340 years before present for drainages located to the south and east of the Alton Coal Field (Sable and Hereford 1990). A similar pattern of Holocene age stream aggradation is likely. The age of the alluvial valley fill in the project area is not specifically known but is likely at least Holocene in part. The possibility for buried cultural resources exists within the distribution of the alluvial valley fill.

Burial of cultural resources is also possible, albeit, to a lesser degree, in the mass landslide deposits in the northeast portion of the project area. Slope failure may result in the displacement or burial of cultural resources.

Summary

The impact of the geology on the distribution of cultural resources present in the project area is summarized in Table 1. The primary surficial and bedrock units shown on Figures 1 and 2 are listed along

with primary characteristics that may impact the distribution of cultural resources. Impacts are, however, dependent on a number of criteria including degree of slope, vegetation cover, thickness of sediment, current and previous land use, and type of sediment present. Conditions and resultant impacts can and will vary from place to place.

Table 1. Summary of Impacts of Surficial and Bedrock Units on the Distribution of Cultural Resources in the Alton Coal Field Project Area.

Geologic Unit	Map Symbol	Possible Impact to Distribution of Cultural Resources
Alluvial valley fill	Qal	Localized slope failure/collapse of arroyo walls Piping of finer grained sediments Entrenching of drainages Potential for buried cultural resources
Landslide deposits	Qls	Mass and localized slope failure, disturbance to sites Potential for buried cultural resources
Tropic shale	Kt	Localized slope failure Surficial creep on steeper slopes Slope wash on steeper slopes Erosion of weathered bedrock slopes on steep to gentle slopes Piping of finer grained sediments weathered in situ
Dakota formation	Kd	Localized slope failure; one occurrence at abandoned coal mine Surficial creep on steeper slopes Slope wash on steeper slopes Erosion of weathered bedrock slopes on steep to gentle slopes
Winsor member of the Cutler formation	Jcw	Not addressed due to limited distribution in the project area

References

1990 Sable, E. G. and Richard Hereford
Preliminary Geologic Map of the Kanab 30' By 60' Quadrangle, Utah and Arizona; USGS Open File Report Number90-542.

Disturbance by gravity is defined as the process by which gravity is the primary agent of disturbance with water as a secondary factor . The three major categories of gravity disturbances present in the Alton Coal Field are mass landslide deposits, small localized slope failures, and surficial creep of soils.

Mass landslide deposits in the project area are defined by Sable and Hereford (1990) as:

> "large coherent blocks of rock in a matrix of clay and smaller clasts, locally exhibiting landslide scarps, sag areas, and downslope creep surface textures" (Sable and Hereford, 1990).

Criterial for recognition of active mass landslide deposits include a hummocky topography, poor drainage including areas of small ponds, seeps and springs, exposed scarps, pistol butting of trees (tree growth on a slope in which the base of the tree curves back into the slope), fences out of alignment, and concave slope failure fractures. The occurrence of the mass landslide deposit in the project area is shown on Figure 1.

The specific impact of mass landslide deposits to the distribution of cultural resources is varied and will depend on site specific conditions. In areas of slope failure, the stratigraphy of cultural resource sites would be compromised and artifacts may be displaced. Sites located on relatively stable portions of the mass landslide deposit will likely be unaffected. The age of the mass landslide deposits is believed to be Pleistocene and Holocene. While older areas of slope failure likely predate occupation and appear to be largely stabilized under current land use, the potential exists for buried and/or disturbed cultural resources in the mass landslide deposits.

Localized slope failure is defined as slope failure on a smaller scale. In the project area slope failure can occur in bedrock units or along the arroyo walls of unconsolidated alluvial deposits. Slope failure along arroyo walls in the alluvial valley fill is largely a result of undercutting of the arroyo walls and will be discussed later in the report.

In bedrock units slope failure results from steep slopes combined with interbedded sandstone and easily eroded mudstone and shale. This potential for slope failure in bedrock increases with changes in land use such as cut and fill excavation, loading at the head of slopes, undercutting at the toe of slopes, and increase in water application. One area of localized slope failure in bedrock in the project area is at the cut face of the coal mine at the NE/4 NW/4 section 24, T 39 S, R 6 W. Here a large scarp, excavated at the contact of the Dakota sandstone with the overlying Tropic shale to provide mine access, has failed. Although the potential for slope failure in the Tropic shale and Dakota sandstone exists in the project area, the minimal impact of current land use has not significantly compromised the distribution of cultural resources.

Surficial creep is the gradual downslope migration of sediments as a response to gravity. Surficial creep occurs in weathered sediments mantling bedrock deposits on steeper slopes. Creep can be recognized by low lateral ridges along exposed hillslopes, accumulation of sediments on the uphill side of trees, and "pistol-butting" of trees, where the base of the tree is curved back laterally toward the hillslope.

Surficial creep occurs predominantly along exposures of the Tropic shale but can occur in the mudstone exposures of the Dakota sandstone as well. Surficial creep was noted on the steeper slopes of the topographic highs on the western side of the project area. The impact to cultural resources is limited to sites located on steeper slopes and would include displacement of artifacts downslope.

Disturbance by running water:

Disturbance by running water encompasses a range of processes that shift as the degree of slope decreases. Four categories of disturbance by running water have been defined in the project area: slope wash, erosion of weathered bedrock, piping, and entrenchment.

Slope wash is a gradational process that spans surficial creep, described above, where sediments are transported by gravity to water borne erosion of sediments, described below, where sediments are transported by running water. Slope wash occurs where unconsolidated surficial sediments and rock derived from weathered bedrock units are transported downslope by a combination of gravity, runoff from snow melt and precipitation events, and by freeze-thaw cycles in the sediments. This movement is slight and sporadic but over time results in the distribution of sediments and rock debris down the face of steeper slopes and out in a low wedge at the base of slopes.

On steeper slopes, slope wash can be recognized by dispersion of rock fragments below eroding bedrock ledges, by the accumulation of sediments on the upslope side of trees, and by channelizing of rock debris. At the break in slope at the base of the hill, finer grained sediments are washed out in a low wedge. This wedge can be as pronounced as a series of coalescing fans of sediments transported down steep drainages or can be a subtle change in slope gradient from the relatively level valley floor to the base of hillslopes. Where slope wash occurs along the edge of aggrading alluvial sediments, the slope wash deposits interfinger with alluvial sediments. Where recent slope wash occurs along the edge of a stable stream terrace, the margin of the slope wash deposits feathers out across the surface of the terrace. Within the project area, slope wash is occurring along the steeper hillslopes and is more pronounced in areas underlain by the Tropic shale.

The primary impact of slope wash to cultural resources in the project area is downslope displacement of artifacts located on steeper slopes.

Erosion of weathered bedrock slopes is the incision of drainage channels along the outcrop of bedrock units, primarily the Tropic shale although erosion of the mudstone units of the Dakota sandstone is also occurring. Areas of pronounced erosion are identified by incised drainages associated with pedestaled vegetation and concentrations of rock and vegetative debris along incised channels. In the NW/4 of Section 19, T 39 S, R 5 W, in a gently sloping wooded area underlain by the Tropic shale, drainages were incised approximately 10 meters (30 feet) from the surrounding forest floor with one meter (3 foot) vertical sides at the drainage channel itself.

Erosion of weathered bedrock is pronounced in areas of moderate slopes and occurs in areas of forestation. The presence of vegetation tends to lend a mitigating effect to extensive erosion by securing surficial sediments with a root system resulting in the pedestaled vegetation when the surrounding ground surface is eroded.

The impact of erosion of weathered bedrock to cultural resources will vary depending on the degree of erosion occurring in the vicinity of the site. Incision begins at downslope exposures and migrates upslope with drainages extending out in a dendritic pattern. At the head of the drainage pattern, the impact will be slight but increases down gradient as the degree of erosion becomes more pronounced. In areas of heavy erosion cultural resources are likely to be displaced downslope and may be concentrated along drainages. Features may be compromised or destroyed altogether. Given the pedestaled nature of the pinyon-juniper trees along with a regional pattern of erosion dating from the 1880's, the age of the erosional cycle is likely recent.

Piping of finer grained sediments is defined as the formation of vertical fissures and cracks in fine grained alluvial sediments as well as sediments formed in situ on weathered shales and mudstones. These

DATA RECOVERY PLAN AND RESEARCH DESIGN FOR SITES 42KA2042, 42KA2068, 42KA6104, 42KA6105, 42KA6106, 42KA6107, AND 42KA6108 KANE COUNTY, UTAH

Patricia Stavish

DATA RECOVERY PLAN AND RESEARCH DESIGN FOR SITES 42KA2042, 42KA2068, 42KA6104, 42KA6105, 42KA6106, 42KA6107, AND 42KA6108 KANE COUNTY, UTAH

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TABLE OF CONTENTS

TABLE OF CONTENTS i
LIST OF FIGURES ii
INTRODUCTION 1
ENVIRONMENTAL CONTEXT 1
ARCHAEOLOGICAL BACKGROUND 2
Previous Archaeological Work 2
Cultural-Historical Overview 4
SITE DESCRIPTIONS 11
42Ka2042 11
42Ka2068 11
42Ka6104 16
42Ka6105 16
42Ka6106 16
42Ka6107 20
42Ka6108 20
DATA RECOVERY FRAMEWORK 23
Prehistoric Framework 23
Historic Framework 25
RESEARCH GOALS AND QUESTIONS 27
Prehistoric Sites 27
Goal 1 27
Goal 2 27
Goal 3 28
Historic Site 29
Goal 1 29
Goal 2 29
Goal 3 31
FIELD METHODS 32
LABORATORY METHODS 34
Lithic Artifacts 34
Ground Stone Artifacts 36
Ceramics Artifacts 36
Faunal Remains 36
Ancillary Studies 37
ANALYSIS 37
Descriptive Analysis of Artifact Classes 37
Historic Artifact Analysis 37
REPORTING RESULTS AND DISSEMINATION 38
CURATION 38
REFERENCES 39
APPENDIX A: Curriculum Vitae for Key Personnel 49
APPENDIX B: Level and Artifact Recording Forms 64

LIST OF FIGURES

1 Location of Sites 13
2. 42Ka2042 Site Map 14
3. 42Ka2068 Site Map 15
4 42Ka6104 Site Map 17
5. 42Ka6105 Site Map 18
6. 42Ka6106 Site Map 19
7. 42Ka6107 Site Map 21
8. 42Ka6108 Site Map 22

INTRODUCTION

In 2005, Montgomery Archaeological Consultants, Inc (MOAC) conducted a cultural resource inventory of the proposed Alton Coal Development's Coal Hollow (Sink Valley-Alton Amphitheater) project area (Stavish 2006). This survey resulted in the documentation of one previously recorded historic/prehistoric site (42Ka2068), five previously recorded prehistoric sites (42Ka1313, 42Ka2041, 42Ka2042, 42Ka2043, and 42Ka2044), and nine new prehistoric sites (42Ka6104, 42Ka6105, 42Ka6106, 42Ka6107, 42Ka6108, 42Ka6109, 42Ka6110, 42Ka6124, and 42Ka6126). Of the 15 documented sites, one site is not eligible to the NRHP (42Ka2124) and seven of the sites will be avoided by the undertaking (42Ka1313, 42Ka2041, 42Ka2043, 42Ka2044, 42Ka6109, 42Ka6110, and 42Ka6126). The remaining sites (42Ka2042, 42Ka2068, 42Ka6104, 42Ka6105, 42Ka6106, 42Ka6107, and 42Ka6108) cannot be avoided by the undertaking and are all eligible to the NRHP under Criterion D.

Briefly, the sites included in the data recovery plan include a prehistoric temporary camp of unknown cultural affiliation (42Ka2042), a historic homestead and prehistoric lithic scatter (42Ka2068), a lithic scatter of Archaic temporal affiliation (42Ka6104), a lithic scatter of protohistoric/contact period temporal affiliation (42Ka6105), two lithic scatters of unknown cultural or temporal affiliation (42Ka6106 and 42Ka6107), and a lithic scatter of Early Archaic temporal affiliation (42Ka6108). These sites are situated in the western portion of Sink Valley within the Alton Amphitheater and many of the sites exhibit integrity, spatial patterning, and good potential for intact subsurface cultural remains. These sites are recommended eligible to the NRHP under Criterion D, as the sites are likely to yield information important to the history and prehistory of the area and could address such research topics as site function, chronology, subsistence, material culture, and spatial organization.

The purpose of this data recovery plan is threefold. First, the data recovery plan serves as a research design to direct the archaeological investigations. This includes the identification and development of relevant research questions and examining the methods and techniques necessary to address these questions. Second, the plan outlines the methods and techniques that will be used during mitigation, in the laboratory, and during analysis of the data collected. Third, the data recovery plan addresses public participation, curation, and dissemination parameters for all phases of the project. Additionally, data recovery at these seven sites, as proposed in this research design, may provide information that will allow for better, more informed management of surrounding cultural resources for future undertakings in the Alton Amphitheater and Sink Valley regions

ENVIRONMENTAL CONTEXT

The study area lies within the Grand Staircase Section physiographic subdivision of the Colorado Plateau (Stokes 1986). This area is characterized by a series of cliffs and terraces that rise from the Grand Canyon in Arizona to the summit of the High Plateaus in Utah. This section is bounded on the east by the East Kaibab Monocline, on the west by the Hurricane Fault, on the north by the edges of the various high plateaus, and on the south by the Grand Canyon of Arizona. Harder rock layers create cliffs and accompanying benches and tablelands, whereas the softer rock units have eroded into slopes and badlands. Specifically, the project area is located along the western edge of the Paunsaugunt Plateau. The Alton Coal Field is comprised of relatively horizontal bedrock units of Mesozoic age (see Stavish 2007:Appendix B). Within portions of the project area, bedrock units are exposed as low hills and along the incised drainage of Kanab Creek

From the oldest to youngest: the Winsor member of the Carmel formation (Jurassic), the Dakota formation (Cretaceous), and the Tropic shale (Cretaceous). The horizontal deposition of the geologic formations coupled with the impact of water and wind erosion has reduced much of the area to flat ridges and benches, which are dissected by long alluvial drainages and tributaries. Drainages often widen to form meadows, such as Sink Valley and the Alton Amphitheater. Alluvial valley fill, derived from weathered bedrock, is extensive throughout the project area along the broad, open areas of cultivation and valley floor. Characteristics of the alluvial valley fill include the location of low, relatively level areas, often used for cultivation, and incised arroyos and drainages. According to Lamm (see Stavish 2007:Appendix B), total depth of the alluvial valley fill is not known and likely varies across the project area. Soils in the drainages have some agricultural potential as a result of their sand, gravel and silt composition and the presence of limestone and arkosic minerals (Gregory 1951:12). Today less than 2% of the Alton Coal project area is under cultivation and products consist primarily of alfalfa, potatoes, and cold weather vegetables, which require different growing conditions than the prehistoric corn-based agriculture (Halbirt and Gualtieri 1981:6). Major drainages in the project area are Kanab Creek, Sink Hole Valley Wash, and Lower Robinson Creek. Kanab Creek flows from north to south through the project area forming an incised canyon, and eventually empties into the Colorado River by way of the Virgin River. In addition, water resources are manifested as geologic aquifers or springs. Most of the springs are perennial and are derived from the Tropic Shale formation.

Elevation in the project area ranges from 6800 ft (2079 m) to 7200 ft (2202 m). Climatic patterns are based on a 59 year record (1915 to 1974) from the Alton, Utah, weather station (Halbirt and Gualtieri 1981:8). The average monthly temperatures are generally mild and follow a modal distribution with a low of 26°F during January and a high of 65°F during July. The number of consecutive frost-free days average between 84 to 104 days (Gregory and Moore 1931). This period is shorter than the necessary 100 to 120 frost-free days required to mature modern hybrid corn, and more time is needed under dry conditions (Crosswhite 1981). The vegetation over most of the study area is a pinyon-juniper and sagebrush community. Pinyon-juniper with oakbrush associations occur on the tops and slopes of ridges, while a sagebrush community exists within alluvial flood plains, draws, and meadows. Other plant species which may have been utilized by ethnographic and prehistoric groups in the area include: barberry, canyon grape, cattail, currant, goosefoot, onion, prickly pear cactus, sedge, squawbush, sunflower, and yucca (Ibid:10). Modern impacts of the landscape include ranching, agriculture, coal mining, and roads.

ARCHAEOLOGICAL BACKGROUND

Previous Archaeological Work

A record search for previous projects and cultural resources was conducted at the Utah State Historic Preservation Office, Salt Lake City on March 25, 2005 by Ms. Marty Thomas. Intensive cultural resource investigations have taken place in the area since the 1980s; however, numerous archaeological sites have been recorded since the 1970s. The majority of the eleven identified inventories were conducted by the Museum of Northern Arizona or Bureau of Land Management and are mostly related to proposed mining activities.

In 1974, the Museum of Northern Arizona (MNA) performed clearance of 48 drilling locations and access routes on the Skutumpah Terrace in Kane County; 19 drilling locations and access routes in the Alton Amphitheater in Kane County; and four meteorological tower sites in Kane County (Davidson, Foster and Ackerly 1974; Project No. U-74-NI-0037bps). Thirty-six archaeological sites were documented during the investigations None of the sites are located in the project area.

In 1979-1980, MNA conducted inventories for Utah International, Inc.'s coal mining lease area situated on the Skutumpah Terrace and Alton Amphitheater (Halbirt and Gualtieri 1981; Project No. U-81-NI-0254b and U-80-NM-007). The four surveyed parcels were designated Alton East and Alton West, the coal preparation plant site, and major road routes. A total of 107 archaeological sites, most of which were of prehistoric affiliation, were documented dating from the Archaic to Late Prehistoric. None of the sites occur within the project boundary.

In 1980, the Bureau of Land Management (BLM) Kanab Field Office performed a Class III inventory of Engineers International, Inc. seismic testing areas (McFadden 1980; Project No. U-80-BL-0162b). No cultural resources were located in the project area. The BLM performed a cultural resource inventory in 1981 of a tract allotment for Heaton Brothers (McFadden 1981; Project No. U-81-BL-0230b). No archaeological sites were documented during the project. The Cone allotment chaining area was surveyed by the BLM in 1982, resulting in a finding of no cultural resources (McFadden 1982; Project No. U-82-BL-0178b).

In 1984, the BLM surveyed the Syler Knoll chaining area for cultural resources (McFadden 1984; Project No. U-84-BL-0679b). Previously recorded site 42Ka2045, a large lithic scatter containing diagnostic artifacts, was located within the project area. Because 42Ka2045 was previously evaluated as not significant (for eligibility to the NRHP), clearance was recommended for the chaining activities.

In 1986, MNA performed cultural resource inventories of 43 drill locations and access roads within the Alton Coal Field for Utah International, Inc. (Weaver 1986; Project No. U-86-NI-0279bp). Two new archaeological sites, located outside of the current project area, were documented. Also in 1986, MNA performed survey and monitoring of nine test pit locations and access routes for Utah International Inc. (Weaver and Hurley 1986; Project No. U-86-NI-0864b). No new cultural resources were documented.

In 1986, MNA returned to the Alton Coal Leasehold to survey another 12,500 acres, resulting in the documentation of 103 additional sites, none of which occur in the present project area (Keller 1987).

In 1987, the Museum of Northern Arizona (MNA) surveyed 22 auger borings and 27 backhoe test pits for Utah International, Inc. (Weaver and Hurley 1987; Project No. U-87-NI-0856b). In 1993 and 1994, Nielson Consulting Group and Timpanogos Research Associates performed cultural resource inventories and site evaluations of several abandoned mines in central and southern Utah (Hughes, Nielson, and Sulz 1994; Project No. U-93-NP-0712). None of the mines are located in the current project area

In June and July 2005, MOAC conducted a cultural and fossil resource inventory of Alton Coal Development's project area in the Alton Amphitheater, south of the town of Alton, Utah (Stavish 2007). The inventory resulted in the documentation of 31 previously recorded archaeological sites and 60 new archaeological sites. The previously recorded archaeological sites include one historic site (Alton Cemetery); three multi-component prehistoric/historic sites; and 27 prehistoric sites that consist of temporary camps, artifact scatters, and lithic scatters. The new archaeological sites include two historic sites (a corral and a bridge); two multi-component prehistoric/historic sites; and 56 prehistoric sites that consist of temporary camps, artifact scatters, and lithic scatters. The inventory also resulted in the documentation of 30 new paleontological localities and three previously documented paleontological localities (Stavish 2007). In August 2005, MOAC completed a survey of six coal seam drill sites for Alton Coal Development; no cultural resources were found (Thornton and Montgomery 2005).

Cultural-Historical Overview

Human occupation in the region represents the Paleoindian, Archaic, Formative, Protohistoric, and Historic cultural stages. The first Native American occupation of the general study area probably occurred during the Paleoindian stage at the late glacial Pleistocene-Holocene boundary (ca. 11,500 B.P. - 9000 B.P.). Early Paleoindian artifact assemblages are typified by large, lanceolate projectile points, spurred end scrapers, gravers and borers, and crescents (Frison 1978:78), indicating the exploitation of megafaunal and floral resources. On the basis of projectile point typologies and subsistence strategies, the early portion of the Paleoindian stage is commonly divided into two cultural complexes referred to as the Clovis (ca. 11,500 - 11,000 B.P.), and the Folsom (ca. 11,000 - 10,000 B.P.). Aikens and Madsen (1986) postulate that Paleoindian people migrated into the eastern portion of the Great Basin following the recession of Lake Bonneville (10,500 B.P.). Several surface fluted projectile points have been reported from Garfield County (Copeland and Fike 1988) and northeastern Arizona (Geib 1995). Late Paleoindian or Plano projectile points have been found on the Kaiparowits Plateau and classified as large stemmed or concave base points (Geib, Collette and Spurr 2001:191-192).

The Archaic stage (7800 - 500 B.C.) is generally viewed as a hunting-gathering lifeway that is represented by subsistence practices more labor-intensive than those of Paleoindians with a greater number of smaller animal and plant species being intensively exploited. Several cultural sequences for the Archaic stage are proposed on the basis of regional differences. Jennings (1978) provides a concept of the western Archaic, or Desert Culture, based on diverse resource exploitation, diagnostic artifacts including cordage and basketry, and artifactual variability in various regions such as the California-Nevada axis and Utah-Oregon axis. Matson (1991) presents a four-period sequence model incorporating data from the Greater Southwest: Early (7800 - 4000 B.C.), Middle (4000 - 2000 B.C.), Late (2000 - 1000 B.C.), and Terminal (1000 B.C. to roughly A.D. 700).

South of the study area, the Early Archaic period is labeled the Desha Complex known for its crudely made, shallow, side-notched lanceolate points. In the Glen Canyon region excavations from Sand Dune and Dust Devil Cave provide a radiocarbon date of 5050 to 6050 B.C. (Lindsay et al. 1968). About a dozen projectile points were recovered from the lower layer in Sand Dune Cave including Pinto Series, Jay, and varieties of side-notched points (later classified as Sand Dune Side-notched) (Matson 1991:147). Faunal remains recovered from the Desha Complex include those of mountain sheep, cottontail, pack rat, and lesser numbers of jackrabbit, gopher, squirrels, skunk, and bison (one bone). At Dust Devil Cave, the earliest Archaic component (Stratum IV) provided a date from a yucca-lined pit of ca. 8793 B.C. along with an abundance of prickly pear cactus (*Opuntia*) extracted from human feces (Ambler 1996:42). Significant materials recovered from this cave included 25 Archaic sandals, classified into three basic types; open-twined, fine warp-faced, and coarse warp-faced (Ibid 44). On the northern Colorado Plateau the earliest Archaic component is dated at Cowboy Cave (42Wn420) between 7430 and 7100 B.C. although no artifacts were found in this stratum (Schroedl and Coulam 1994:11). The upper Early Archaic component (Stratum III 5250 - 4350 B.C.), however, contained 11 projectile points (Pinto, Northern Side-notched, and Elko Corner-notched), faunal remains (cottontails, jackrabbits, porcupine, and *Canis* sp.), and floral remains (sunflower, sand dropseed, chenopods, cactus, juniper and bugseed) (Jennings 1980). The most significant features from Stratum III were a number of depressions referred to as "scooped out troughs" by Jennings (1975:9), more recently redefined by Schroedl and Coulam (1994:6-7) as pitstructures which were repeatedly cleaned out and reoccupied during the Early Archaic. In the Alton West Coal leasehold previous investigations have documented several Early Archaic projectile points types (Pinto Series, Humboldt, and Northern Side-notched) from sites which include later Formative and Late Prehistoric temporal components (e.g. 42Ka2045 and 42Ka2056) (Halbirt and Gualtieri 1981).

During the Middle Archaic period (4000 - 2000 B.C.) there was a decrease in the occupation of the Colorado Plateau, presumably caused by the Altithermal climate, which may have been a two drought event (Matson 1991:165-166). Many of the previously mentioned sites (Dust Devil Cave and Cowboy Cave) exhibit a reduced intensity of occupation during the Middle Archaic period. Recent radiocarbon data from the Glen Canyon region are filling the Middle Archaic gap (e.g. 1,000 years) as proposed by Berry and Berry (1986) for the Colorado Plateau indicating that the hunter-gatherers of the area may have not completely abandoned the area 6,000 years ago (Geib 1996:32). Middle Archaic settlement patterns most likely reflect the response to a probable protracted drought by populations shifting residential camps to water-rich lowlands and especially higher elevation settings (above 8,000 ft). Common projectile points at Middle Archaic sites are Sudden Side-notched, San Rafael Side-notched, Hawken Side-notched and Elko Series. Previous investigations in the Alton West Coal leasehold have identified such point types as Sudden Side-notched from sites which include other Archaic periods and later temporal components which appear to represent residential camps and processing camps (Halbirt and Gualtieri 1981).

The Late Archaic period began around 4,000 years ago and corresponds to a noticeable increase in radiocarbon dates in the region and is temporally correlated with an increase of effective moisture what is termed as the sub-boreal interval (Berry and Berry 1986). This period is marked by a heavy reoccupation of Cowboy Cave starting at about 1750 B.C. and is characterized by the inhabitants engaging in broad-scale hunting and gathering with an increased emphasis on mountain sheep and chenopods/amaranths (Matson 1991:171). Gypsum projectile points comprised approximately 30 percent of the total identifiable collection from Cowboy and adjacent Walters Cave (Jennings 1980:36). These stemmed points are among the most common type of point found in southeastern Utah and appeared on the northern Colorado Plateau sometime after 2550 B.C.

(Holmer 1986:105). Split-twig figurines are another important diagnostic of the Late Archaic period, best known from Cowboy Cave, but occur over a broad territory centered on the Colorado River and it tributaries. Further south in the Glen Canyon region, Late Archaic occupations are less represented, although a few Gypsum points were recovered from Dust Devil Cave (Geib and Ambler 1991). On the Kaiparowits Plateau, Late Archaic sites are represented primarily by residential camps situated in the higher elevations with access to ample water, fuel wood, large and small game, and plant resource diversity whereas the limited activity camps and reduction loci are prevalent in the lower elevations that contained a greater abundance of economic grasses (Geib, Collette and Spurr 2001:367). Investigations at the Arroyo Site (42Ka3976) situated in The Grand Staircase-Escalante National Monument revealed a potential pitstructure exposed in a trench below a Formative horizon and dated circa 1850 B.C. may attest to a semi-permanent occupation of the floodplain environment (McFadden 2000:15). In the Alton West Coal leasehold several Late Archaic Gypsum projectile were recorded at open sites with other older and more recent prehistoric temporal components (42Ka2047 and 42Ka2059) (Halbirt and Gualtieri 1981).

The Terminal Archaic period (1000 B.C. to roughly A.D. 700) is marked on the northern Colorado Plateau by the presence of arrow points and shafts along with the introduction of corn. The Archaic-Formative transition at Cowboy Cave is found in two separate episodes of occupation beginning about A.D. 100 during a period of high effective moisture (Schroedl and Coulam (1994:23). This relatively intense occupation (Stratum Vb) appeared to have represented a late summer/early fall seed processing locale based on the coprolite evidence (Hogan 1980). A corn cache as well as corn kernels were found in this horizon revealing that the pre-Formative occupants were growing this domesticate, although the extent of agricultural dependency is unknown. It is well established that corn dates to at least 1200 B.C. across much of the southern portion of the Colorado Plateau with later dates derived from sites further north (Geib 1996:54). Even if the populations in the study area were not actively involved with farming by around the Christian era, they were likely in contact with farmers or were a least experiencing changes resulting from the presence of nearby farmers. At Hog Canyon Dune (42Ka2574), located at the junction of Hog and Kanab creeks about two miles north of Kanab, charred corn kernels were recovered from a pitstructure in association with a hearth and a burial yielding two dates: 910 - 390 B.C. and A.D. 60-640 (Janetski 1993:229). The dating of bow and arrow introduction to the eastern Great Basin and Utah has been an issue of continuing debate. Past evidence from the lithic technologies between the terminal Archaic Proto-Fremont and Basketmaker II populations indicates that by ca. A.D. 100 the bow and arrow was employed by the ancestral Fremont, while the ancestral Anasazi continued to employ the atlatl. In the northern portion of the region, at Cowboy Cave, arrow points come from preceramic Stratum V deposited about A.D. 100-600 (Schroedl and Coulam 1994). To the south, the Sunny Beaches site (42Ka2751) in the Glen Canyon Recreational Area is somewhat of an anomaly. A number of Rose Spring Corner-notched points, which are accepted markers of bow and arrow technology dated earlier (e.g. around A.D. 100) than the established chronology for Basketmaker II aceramic occupations. In the Alton Coal Leasehold previous inventories have documented Rose Spring Corner-notched arrow points from several sites. At site 42Ka2056 both Early Archaic Pinto Series points and Rose Spring Corner-notched points were found, but in two separate lithic assemblage loci (Halbirt and Gualtieri 1981:85).

The Formative stage began about A.D. 500 when ceramics were generally used on the Colorado Plateau, and continued until A.D. 1300, with the Anasazi abandonment of Four Corners region. Within the region, this stage encompasses two different cultures: the Anasazi (Puebloan) and the Fremont. The project area is within the occupation zone of the Anasazi which is divided into two recognizable branches: The Virgin Anasazi, primarily occupying the Arizona Strip,

southwestern Utah, and southernmost Nevada; and the Kayenta Anasazi, occupying a large portion of northern Arizona and far southeastern Utah. The Fremont are considered a separate entity, found primarily at sites in Utah north of the Anasazi region. Artifactual evidence in the study area indicates primarily a Virgin Anasazi cultural tradition, although both Kayenta Anasazi and Fremont ceramic types have been identified.

The Virgin Anasazi occupied the area from Basketmaker II through early Pueblo III times, and apparently adapted horticultural practices to a variety of environmental conditions (Thompson and Thompson 1978; Walling and Thompson 1988). Investigations in the Grand Staircase area east of Kanab Creek indicates it was occupied continuously from at least Basketmaker III times (ca. A.D. 300) through late Pueblo II (ca. A.D. 1200). Virgin Anasazi residential units are characterized by an architectural sequence from pithouse residences with separate cist storage facilities, through intermediate stages of room block development, and eventually to substantial surface masonry pueblos incorporating both storage and habitation functions (Talbot 1990). According to McFadden (1996:24) the quantity of storage space per residential unit did not vary significantly over time indicative of a continuity of subsistence practices.

In the Grand Staircase region Virgin Anasazi sites located immediately adjacent to cultivable fields were fully residential with large storage capacities (Ibid 7). Furthermore residential mobility may have been part of an adaptive strategy that allowed the Virgin Anasazi to engage in agriculture in an environment in which a variety of short-term environmental fluctuations needed to be accommodated. In contrast the Kolob/Skutumpah Terrace area where the present study area resides (above 6,400 ft) is characterized by a short growing season (less than 120 days at Alton), hence prehistoric agricultural potential was risky. Several studies in this area (Christensen et al. 1983; Halbirt and Gualtieri 1981; Keller 1987:87) indicated that the vast majority of the prehistoric sites are limited activity sites or camps related to hunting and gathering behavior. Documented sites reflect Archaic, Virgin or Western Anasazi, and Southern Paiute groups which engaged in hunting and gathering activities most likely on a seasonal basis (Keller 1987). For the entire Alton Coal leasehold, Keller (Ibid.:87) estimates that 23 percent of the total sites date from Basketmaker III to Pueblo II. Data compiled by McFadden (1996:17) from this area, as well as the Grand Staircase and Upper Virgin River suggests that Virgin Anasazi residential sites are virtually always associated with agricultural potential, while hunting/gathering sites are more common in the elevated zone where agriculture is not feasible. Ceramic types identified in the Alton Coal leasehold are dominated by mainly Virgin Anasazi North Creek Gray, North Creek Corrugated, Shinarump Brown, and St George Black-on-Gray. To a lesser extent Kayenta Anasazi (Tusayan Black-on-Gray) and Fremont Great Salt Lake Gray have been reported in the area adjacent to Kanab Creek (Halbirt and Gualtieri 1981:35).

In the Grand Staircase physiographic section the adaptive strategy of the Virgin Anasazi is summarized by McFadden (1996:30) as an occupation of multiple "homesteads" located in a variety of different agricultural niches, each with different characteristics but all suitable for agriculture. Furthermore, shifts in residence would occur periodically in response to short term climatic fluctuations, but also as a result of local environmental deterioration. A comparison of site types from the lower elevation study areas and the Kolob and Skutumpah Terrace area suggests that given frequent residential moves, the farmsteads themselves could have served as base camp/processing stations with this upland functioning as a hunting-gathering component.

Protohistoric occupation of the project area is attributed to the Southern Paiute, members of the Numic population. Several models address the migration of Numic populations to the Great Basin. Some theorize that Numic expansion from the southwestern Great Basin eastward occurred approximately 1,000 years ago Other models view the expansion taking place several thousand years ago. On the basis of the co-occurrence of Southern Paiute and Virgin Anasazi ceramics in stratigraphic context it is theorized that entry into the southwestern Utah area by Numic speakers occurred during the late occupational period of the Virgin Anasazi (Westfall, Davis, and Blinman 1987) Fowler (1994) compares the material culture of the Southern Paiute to that of the Virgin Anasazi, noting similarities such as clay figurine styles, certain features of coiled basketry, and one type of sandal, and concludes that these similarities suggest interaction between the groups. Besides pottery or perishable materials, the other common diagnostic is the Desert Side-notched projectile point. Although Desert Side-notched points should be considered horizon marker rather than ethnic markers, Southern Paiute use of the study area is well documented (Kelley 1964), and appeared to have constituted the primary post-A.D. 1300 indigenous occupation. Cottonwood Triangular points may not be useful diagnostics of Numic occupations if they are unfinished items broken in production; such tools might have been intended as Desert Side-notched points or Bull Creek points or some other arrow point type (Geib, Collette and Spurr 2001:392). Southern Paiute Brown Ware found in southwest Utah is characterized as conical-bottomed vessels exhibiting undulating surfaces on their thick walls. Decoration is limited to some surface incising, corrugation or fingernail impressions, and/or clapboarding of coils; the former often over the entire surface of the vessel (Baldwin 1950). Temper tends to be visible and coarse and fall into two types for the area: 1) abundant very fine rounded to subangular particles that are generally clear and appear to be frosted suggesting that they originate from eolian and alluvial deposits; 2) large angular to subangular particles most of which are white and very fine grained as if derived from a crushed quartzite or other aphanitic particles (Westfall, Davis, and Blinman 1987:70).

The Southern Paiute were hunter-gatherers and part-time horticulturists, with domesticates playing a minor role in their subsistence strategy (Fowler and Fowler 1971, 1981; Steward 1938). This cultural tradition is characterized by the use of rockshelters, and open camp sites containing wickiup dwellings, rock-filled roasting pits, fire hearths, conical-bottomed brownware ceramics, some decorated with fingernail incisions, rabbit fur blankets, basketry hats and containers, digging sticks, milling stones, and stone tools (Euler 1966; Westfall, Davis, and Blinman 1987). Social organization revolved around bands of multiple family units, cooperating and joining forces when necessary to ensure the survival of the community (Steward 1938). At least 16 major bands, or 35 smaller groups, have been identified in Utah.

The area adjacent to the present town of Alton was the summer home of one of the seven socio-economic groups that comprised the Kaibab Band of the Southern Paiute (Kelley 1964). The organization of these groups was largely economic in character, however, some attention was allotted to social residence. It appears that the group inhabiting the Alton area was a small patrilocal aggregate. Evidence exists that other groups visited the area occasionally to gather seeds and berries yet there seems to have been minimal economic cooperation between groups (Ibid.). The Alton group was controlled by a chief who directed the seasonal movements of camps, and who was in most instances in charge of deer hunting (Ibid 27). According to Kelley (Ibid 6), campsite location was determined by the presence of springs which fell under the jurisdiction of the local economic group. Subsistence activities varied according to seasonality, with the occupants of a spring "...tending to share the same seasonal cycle" (Ibid 8). During the winter, the group resided in Kanab Canyon were camps were semi-permanent in the sense that the occupants returned to them following hunting and foraging trips. Resources utilized during this period included

seeds and rabbits, the latter hunted in large scale drives consisting of perhaps 25 individuals from different households (Ibid 24). Periodically, deer and pinyon nut forays were also conducted along the top of the Vermillion cliffs. When snows receded in the spring, the group moved north to the Alton area and subsisted until summer on stores of food previously cached in caves (Ibid 16). The group remained in Alton for most of the summer collecting a wide variety of seeds and berries as well as hunting deer, marmot, and rabbit (Halbirt and Gualtieri 1981:15). At some point during this period the group returned briefly to the Kanab area to gather seeds and cached them for the succeeding winter occupation (Kelly 1964:16). Deer hunting and the gathering of "plateau" seeds was emphasized during the late summer to fall months. It is during this period that deer begin to congregate in small migratory groups.

Navajos occupied areas of the Skutumpah Terrace during the post World War II period (about 1945 to 1970) while cutting and installing cedar fences for local ranchers (Halbirt and Gualtieri 1981:56). Physical remains from the Navajo occupation primarily east of the project area fall into one of the four following categories: 1) forked-stick hogans composed of interlocking poles and a corbelled roof entrance; 2) palisade hogan composed of a corbelled roof supported by four corner posts and a seriers of stringers which lean against the roof; 3) brush hogan roughly square in plan view and partially supported by two living pinyon trees which provided the superstructure firm support; 4) sweat lodge consisting of three interlocking poles with stringers leaning against the frame and packed with mud daub (Bradley 1999:56).

The first documented entry of European Americans into Kane County was the expedition of Fathers Francisco Atanasio Dominguez and Silvestre Velez de Escalante in the autumn of 1776 to establish an overland route between settlements in Santa Fe and Los Angeles. Because of a snowstorm near Milford, the expedition halted the attempt to reach California, and instead followed a route to the southeast to return to Santa Fe. Along this route they named Sulphur Creek (later renamed the Virgin River), Rio de Pilar (later known as Ash Creek), and Hot Sulphur Springs (Alder and Brooks 1996; Bradley 1999). Another early explorer, Jedediah Smith, followed parts of the Dominguez and Escalante Old Spanish Trail, of which various portions were later referred to as the California Trail, through Washington County in 1826 and 1827. His route created a new pathway for pioneers traveling from the East to California, and was widened to an actual wagon road in 1849. Other explorers to follow in these footsteps include John C. Fremont in 1844 and Mormon pioneer leaders from Salt Lake City in 1847 (Alder and Brooks 1996).

Important to the Mormon colonization effort was the organization of an Indian mission in Harmony in early 1854. Jacob Hamblin, a Mormon explorer and settler of Kane County, led the effort to establish harmonious relationships with key Native American leaders. His knowledge of the area also facilitated government exploration and mapping projects in the area, including a Colorado River voyage with John Wesley Powell in 1871 that documented the landscape of Glen Canyon and the present-day city of Kanab. While Kanab is the principal settlement in Kane County, small towns in Long Valley are important centers of agriculture and stock-raising. In 1862, John and William Berry first led a team of ranchers into the Long Valley area in search of rangeland for their cattle. The area was called Long Valley due literally to its length (a long narrow valley situated between high mountain walls), fertile land, and proximity to water. The first settlement in the valley was probably that of Berryville (later renamed Glendale), established by the Berry brothers in 1864. Berryville was abandoned in June 1866 due to conflicts between the Mormon settlers and Pauite and Navajo tribes in the area. This pattern of settlement was common to many of the small towns in Long Valley throughout the late 1800s. On January 16, 1864, the Utah Territorial Legislature approved an act that officially created Kane County. Its boundaries were defined on the west to

include the upper Virgin River area, including Virgin City, the principal town in the new county at the time (Bradley 1999:56-59). Kane County remained isolated because of its challenging landscape, its relatively small population, and its lack of connection to railroad lines.

The town of Alton is a small ranching community located near the head of Long Valley. It originally developed from Upper Kanab. It was first settled by Lorenzo Wesley Roundy when he brought his family to Upper Kanab Creek in 1865. Historically, this area had tall grass, good fodder for their animals, streams of clear water, abundant wildlife in the nearby mountains, berries and other wild fruit, and timber for homes and fences (Bradley 1999:65). The settlement was first called Roundy's Station and the immigrants built two log cabins that first summer. In 1865, the Mormon Church ordered inhabitants of Upper Kanab and other small settlements to go to Kanab, Dixie, and larger towns in the area to help fortify them against Pauite raids (Ibid 65-66). Settlers did not return to Upper Kanab until 1870, when Lorenzo Roundy's nephew, Byron Donalvin Roundy, and his wife settled there. Byron and his brother, William Roundy, organized a cattle company called the Canaan Cooperative Stock Company, headquartered in St. George. In 1882, Edwin D. Woolley and Daniel Seegmiller also brought their families to settle in Upper Kanab. Two buildings, a schoolhouse and a recreation hall, were erected in 1885 at the head of the Virgin River. During the late 1880s, when the federal government began to crack down on the polygamists of Utah territory, many Mormon men fled to the area to escape marshals (Ibid 143-149). In 1887, the communities of Ranch, Upper Kanab, and Sink Valley joined together to form a LDS ward. In 1908, the town acquired its present-day name of Alton during a May Day celebration drawing. Charles R. Pugh, who had been reading a book about the Alton Fjord in Norway, suggested the name. The population of the town peaked at 350 in the 1930s (Ibid 210). In the post World War II years, coal reserves were discovered near Alton, and the Smirl-Alton coal mines extracted an average of 40 tons daily in 1949. Today, Alton is home to fewer than 100 people, and its main sources of livelihood stem from the timber industry and its potential for coal mining.

Today, most traffic through the area is generated by tourists headed to attractions such as Bryce Canyon National Park, Zion National Park, and Grand Staircase-Escalante National Monument. Bryce Canyon, the southern part of which lies in Kane County, was designated a national monument by President Warren G. Harding in 1923, and elevated to National Park status in 1928. Originally, the boundary of Zion National Park ended at the Washington-Kane County State line. In 1930, it was expanded to include part of Kane County, which was made accessible by the Zion-Mt. Carmel tunnel and road (Bradley 1999:218). Grand Staircase-Escalante National Monument was established by President Bill Clinton on September 17, 1996. The monument comprises approximately 1.7 million acres in Kane and Garfield Counties. These major tourist destinations are all accessible via US Highway 89, which bisects Long Valley and proceeds through every town in Kane County except Alton (Ibid 8).

SITE DESCRIPTIONS

42Ka2042

The site is a prehistoric temporary camp located on the top and slope of a knoll (Figure 1, Figure 2). The site contains 171 flakes and eight tools. The lithic tools include one utilized flake, three bifaces, two cores, one ground stone and one hammerstone. Tool 1 is a chert ground stone. Tool 2 is a quartzite core. Tool 3 is a Stage 1 chert biface. Tool 4 is a utilized chert flake. Tool 5 is a sandstone hammerstone. Tool 6 is a Stage 3-4 chert biface fragment. Tool 7 is a Stage 3 chert biface. Tool 8 is a chert core fragment. Secondary and tertiary flakes are common in the debitage, while primary flakes and shatter are rare. The lithic debitage material types include chert, obsidian and quartzite. Feature A is a concentration of fire cracked rock and lithic debitage located within an area of darkened soil. The concentration measures 7 m in diameter. Feature A is located on a sloped area near a small drainage system. This is an extensive temporary camp with a several types of lithic tools, a fire-cracked rock feature, and additional potential for subsurface cultural remains. The site is evaluated as eligible under Criterion (D) because it could contribute to such research topics as site function, chronology, subsistence, spatial organization and material culture

42Ka2068

Originally recorded in 1980, this site contains both a prehistoric and historic component. The historic component partially overlaps the prehistoric component, however, portions of the aboriginal occupation still retains integrity (Figure 3). Prehistoric diagnostic artifacts include one projectile point midsection and one biface fragment. Tool 1 is the point midsection and measures 1.3 x 1.8 x 0.4 cm. This tool was manufactured from a white chert and has snap fractures at both the proximal and distal ends. Tool 2 is a red mottled Stage 2 or 3 biface. Debitage is dominated by shatter (flake fragments, broken flakes, and angular debris) along with lesser amounts of tertiary, secondary and primary flakes. Lithic materials include a wide range of colored cherts (white common) and one piece of obsidian. No cultural features were observed on the surface; however, the site retains good depth potential.

The historic component represents an abandoned farming/ranching habitation and contains several structures, both architectural and landscape, as well as artifacts. The property was patented by James Swappe on August 9, 1889 under the Homestead Act of 1862. Mr. C. Butron Pugh, a historic informant, stated that his grandfather purchased the ranch in 1908 from the Robinson family (personal communication, 2006). This site was previously recorded in 1983 and was described as containing a barn, a shed, a bunkhouse and a corral. Mr. Pugh stated that in addition to the currently visible structures (granary, corral, and cellar) other structures located on the ranch included: a small three room house, a large barn with a stone/rock foundation, a blacksmith shop, a bunk house, a washhouse, a springhouse, two outhouses (used consecutively), and "rip-gut" or pitchpole fencing to the north.

The documented historic features include a granary, a corral, a cellar, several fences, as well as historic artifacts. The granary is constructed of lumber, log, and stone and was divided into two rooms with storage above. The granary is slightly elevated from the ground surface by log stilts and a stone foundation with possible ditching around the foundation; perhaps as a measure to avoid flooding and/or rodent infestations. This structure is constructed with large log cross beams, and V-shaped log construction, with lumber paneling and floorboards. The roof has collapsed into

the building and the door frames are partially collapsed and the two doors are blocked. Mr. Pugh stated that the door hinges for the granary were made at the on-site blacksmith shop. One room contained several hooks and some leather strapping, while the other room is completely open and a half swing door connects the two rooms. The storage area above has remnants of hay.

The corral is constructed with a log fences and log upright beams and the chute is made of milled lumber with a couple log beams at main support locations. The corral has been reinforced with wire and some metal fencing and was used into the 1980s according to the original investigator and the historical informant, Mr. Pugh. The corral also contains an old dodge chute that was used to separate the sheep herds. The masonry cellar is approximately 120 cm deep with the uppermost level of stone collapsing. The walls are otherwise still in good shape. The log beams that would have supported the ceiling for the cellar are partially burnt and caved in. The cellar depression is partially filled with various debris including glass jars and bottles, metal cans, and some plastic bottles with materials dating between 1920 and the 1980s. Mr. Pugh stated that the cellar was used to store and age cheese made by his grandmother. Three fences surround the site area: one lines the two-track drive; one fence marks a field boundary on the north side of the two-track; and one fence marks a field boundary on the south side of the two-track. Landscape features include the agricultural field around the granary and corral and the oak trees. To the east of the granary there is also a stand of live oaks and rip-gut fencing with a large quantity of wild rose bushes that appear to be planted in rows and maintained. Mr. Pugh stated that much of the rip-gut fencing is in good condition, however several of the uprights were replaced in the 1950s due to rotting.

Historic artifacts include glass, ceramic, and other domestic item. Glass consists of several hundred brown and clear fragments and lesser amounts of amethyst and aqua colored glass. Most likely a significant amount of the container fragments are from canning jars, although few metal canning rings were found. None of the glass artifacts had manufacture's trademarks which would have aided in temporality. Most of the ceramics occurred at the location where the large house was said to have existed. The most prevalent type of ceramic was the hard paste porcelain "Boyd's Genuine Porcelain Lined Cap" canning lid. In addition sherds from a Flow Blue vessel (est.1820-1870), decal decorated sherds, and plain whiteware fragments were observed. Most of the tin cans were disposed of in the open cellar. These include four "Punch Here" milk cans, a Spam meat can, an internal friction cocoa can, and four oil cans.

Although the prehistoric component has been disturbed by the later historic occupation, it still retains integrity of location and setting, a diversity of lithic artifacts and material types, as well as potential for subsurface cultural remains (Criterion D). The historic component is also considered significant because of its potential to provide additional information concerning spatial patterning, trash disposal patterns, consumer behavior, and socioeconomic status. The structural features (granary, cellar, corral) fail to embody the distinctive characteristics of a type, period, or method of construction (Criterion C) nor is the property associated with any person(s) or event(s) that have made a significant contribution to national, state, or local history (Criteria A and B). Hence, 42Ka2068 is recommended eligible to the NRHP under Criterion D because it is likely to yield important information about the history and prehistory of the area.

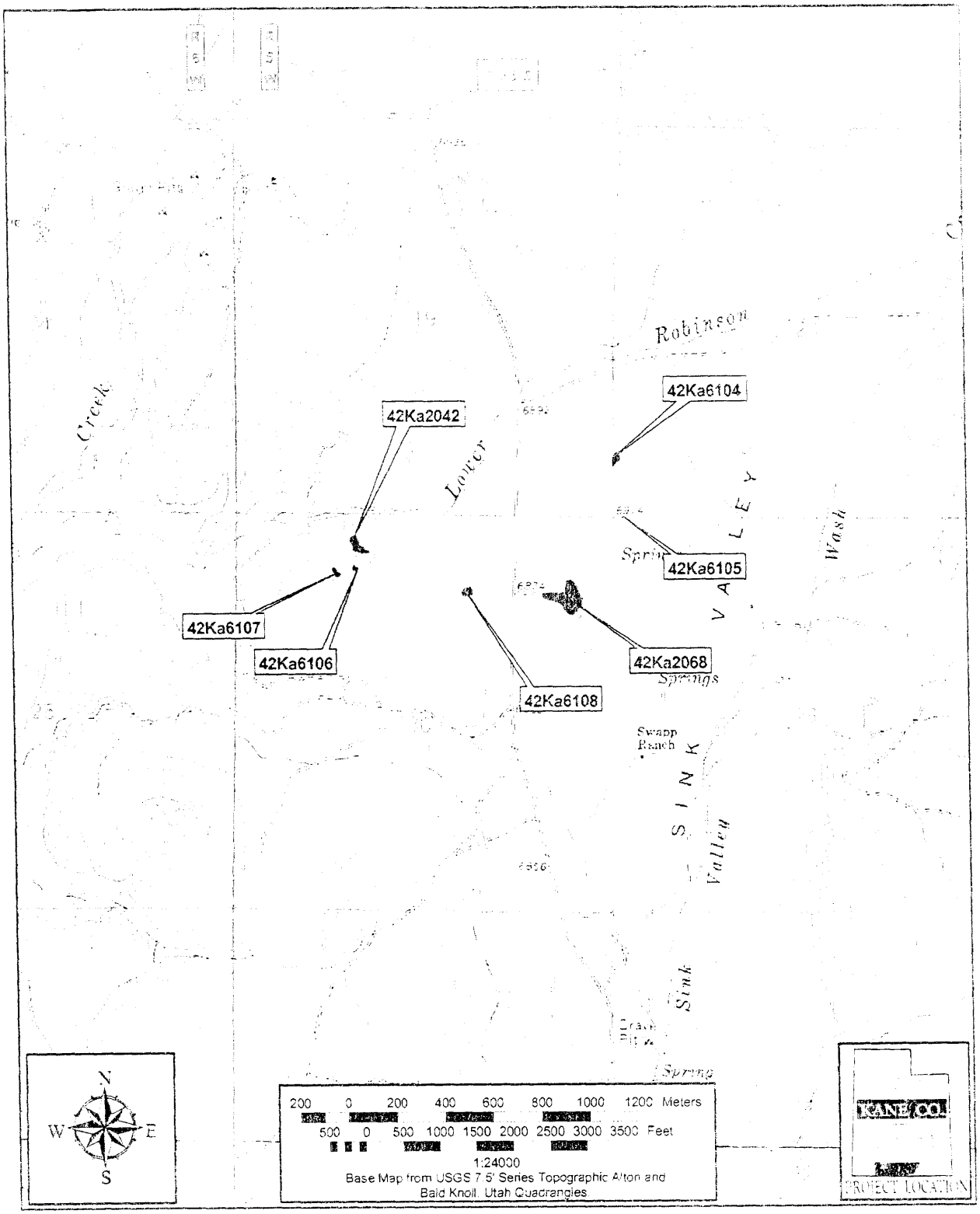

Figure 1. Location of Sites 42Ka2042, 42Ka2068, 42Ka6104, 42Ka6105, 42Ka6106, 42Ka6107, and 42Ka6108, Kane County, Utah.

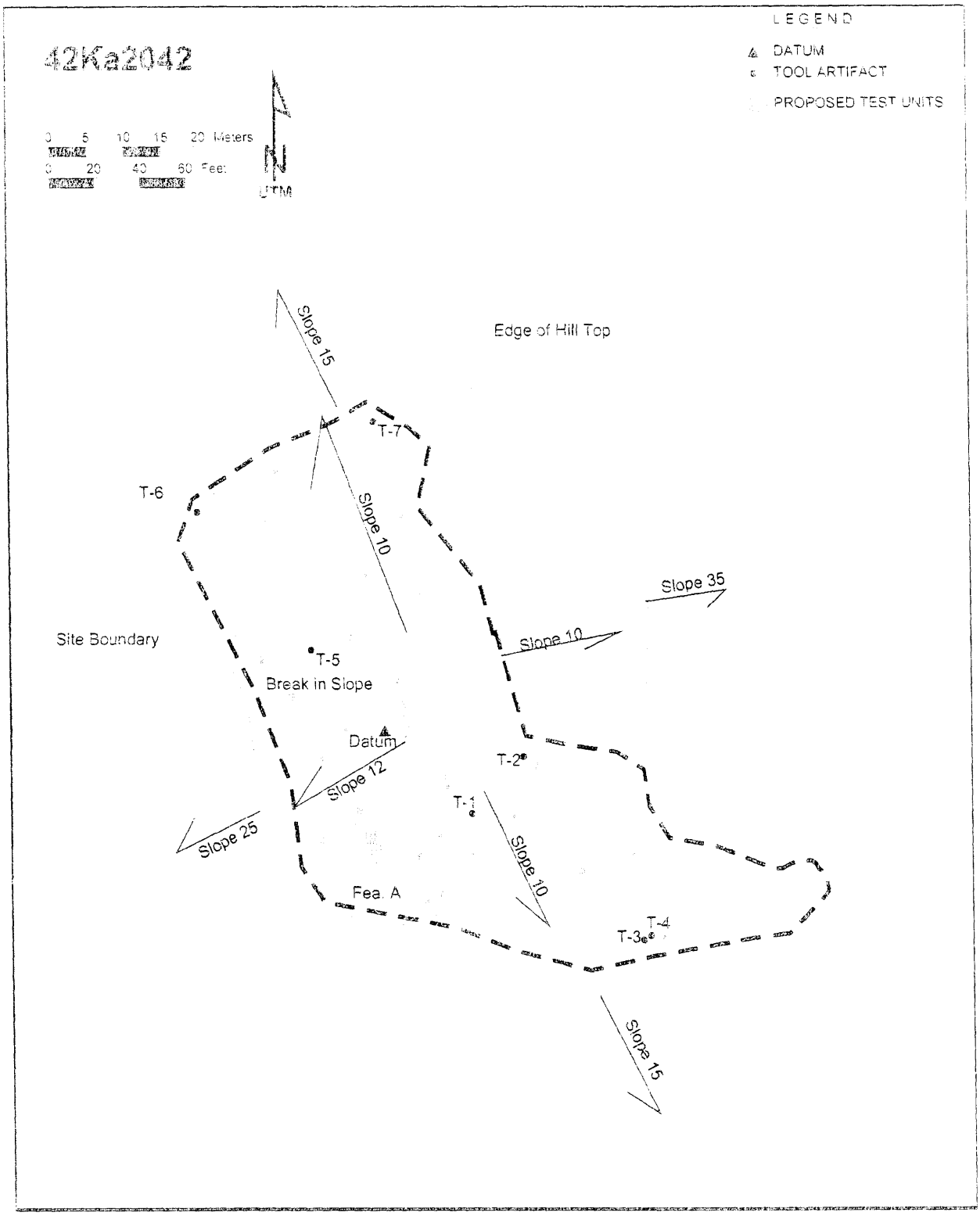

Figure 2 Site Map of 42Ka2042

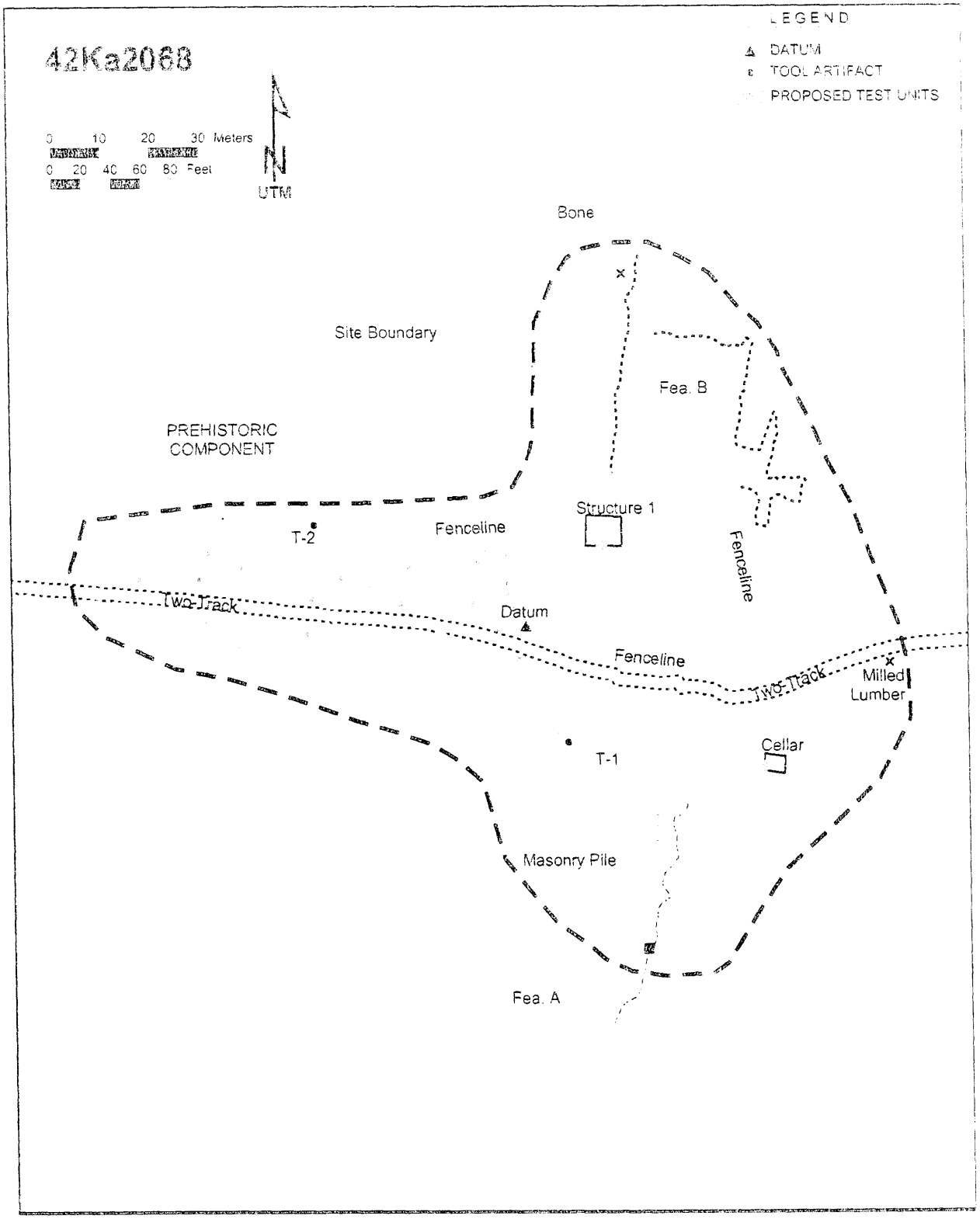

Figure 3. 42Ka2068 Site Map

42Ka6104

This is a sparse lithic scatter situated on the slope of a low north-south trending ridge in Sink Valley (Figure 4). The site contains 29 flakes and seven tools. The tools includes two projectile points, three bifaces, a utilized flake, and a core. Tool 1 is a Stage 2-3 chert biface. Tool 2 is a chert projectile point tip. Tool 3 is a utilized chert flake. Tool 4 is a Stage 3-4 biface fragment that may have been heat treated. Tool 5 is an Elko projectile point that is broken at the notches, only the base with one notch remains. It is possible that it has been heat treated. Tool 6 is a Stage 5 obsidian biface. Tool 7 is a quartzite core that may have been utilized. The debitage is dominated by shatter, while tertiary and secondary flakes are common, primary flakes and cores are rare. The material types include chert, quartzite, and obsidian. This is a low density lithic scatter affiliated with the Archaic Stage which contains several classes of lithic artifacts. The site retains integrity of location and setting, spatial patterning, and good potential for subsurface cultural remains. The site is evaluated as eligible under Criterion D, as it is likely to contribute to such research topics as site function, chronology, subsistence, material culture, spatial organization and lithic procurement.

42Ka6105

This is a low density lithic scatter of Protohistoric/Contact affiliation located at the bottom of a southwest facing slope in Sink Valley (Figure 5). Cultural materials include 18 flakes and three tools, which includes a projectile point and two bifaces. Tools 1 and 2 are Stage 1-2 chert bifaces. Tool 3 is a chert Desert Side-notched projectile point. The debitage is dominated by shatter, while tertiary flakes are common, secondary flakes and primary flakes are rare. The material types include chert, quartzite, and obsidian. The site retains integrity of location and setting, spatial patterning, and good potential for subsurface cultural remains. The site is evaluated as eligible under Criterion D, as it is likely to contribute to such research topics as site function, chronology, subsistence, material culture, spatial organization and lithic acquisition.

42Ka6106

The site consists of a sparse lithic scatter located at the bottom of a southwest-facing slope in Sink Valley (Figure 6). The site contains 18 flakes and two tools, which includes a chert projectile point mid-section and a chert awl/drill. The debitage is dominated by shatter and contains very few secondary or tertiary flakes and no primary flakes. The material types include chert and obsidian. Although the site exhibits a limited assemblage size, it lies in an area of alluvial deposition with good potential for subsurface cultural remains. Therefore, it is recommended eligible to the NRHP under Criterion D because it is likely to yield additional information relevant to the history of the area.

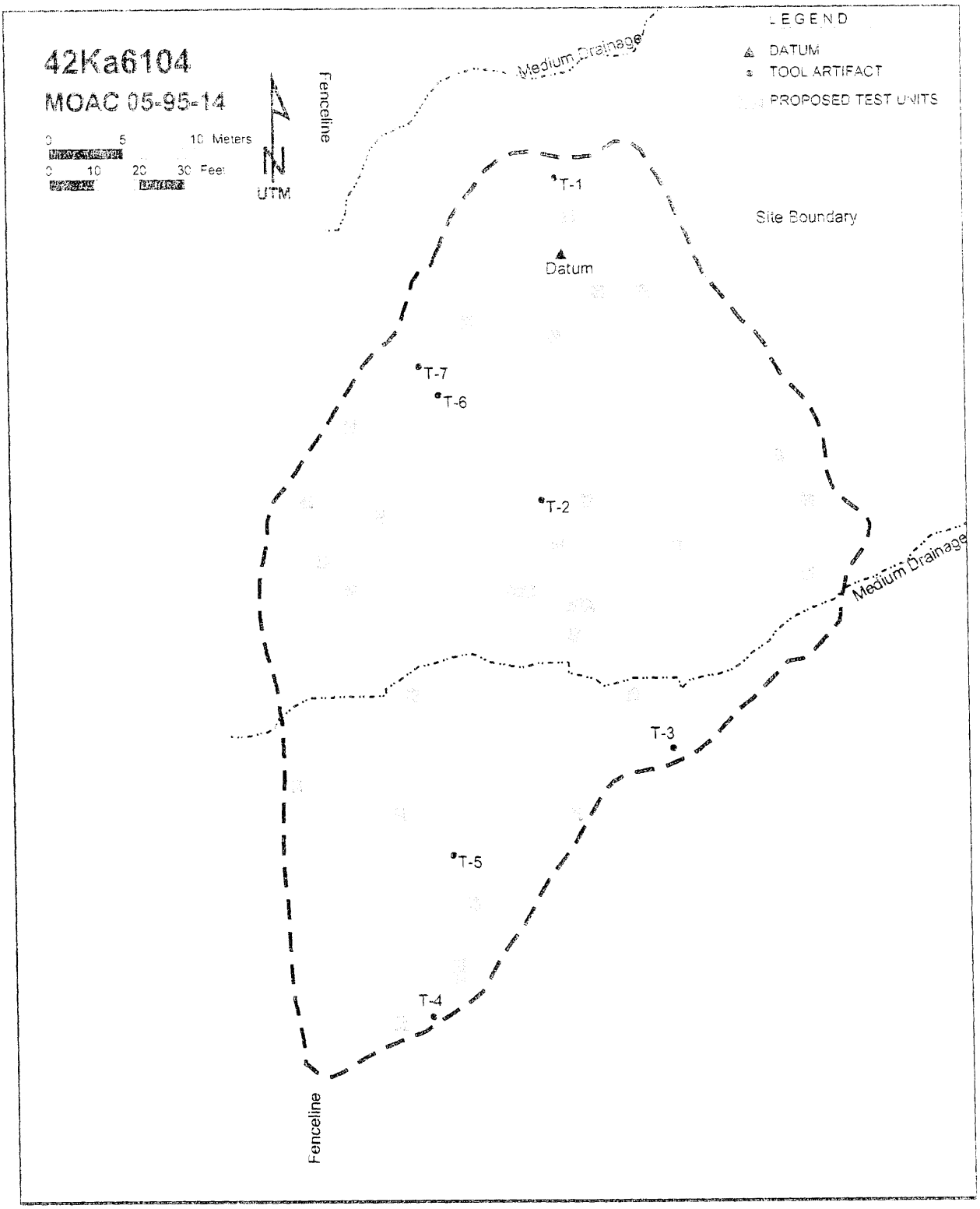

Figure 4. 42Ka6104 Site Map.

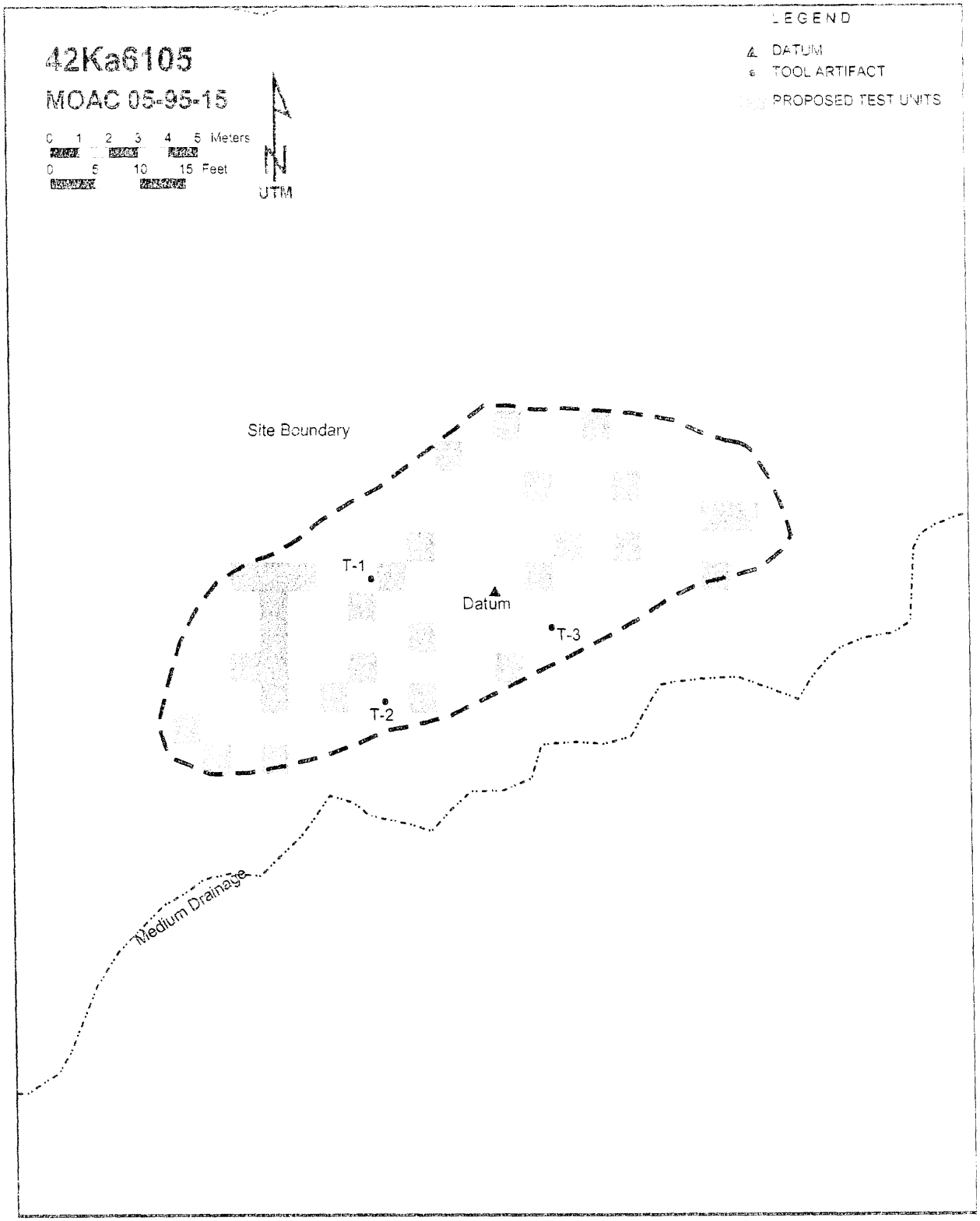

Figure 5. 42Ka6105 Site Map.

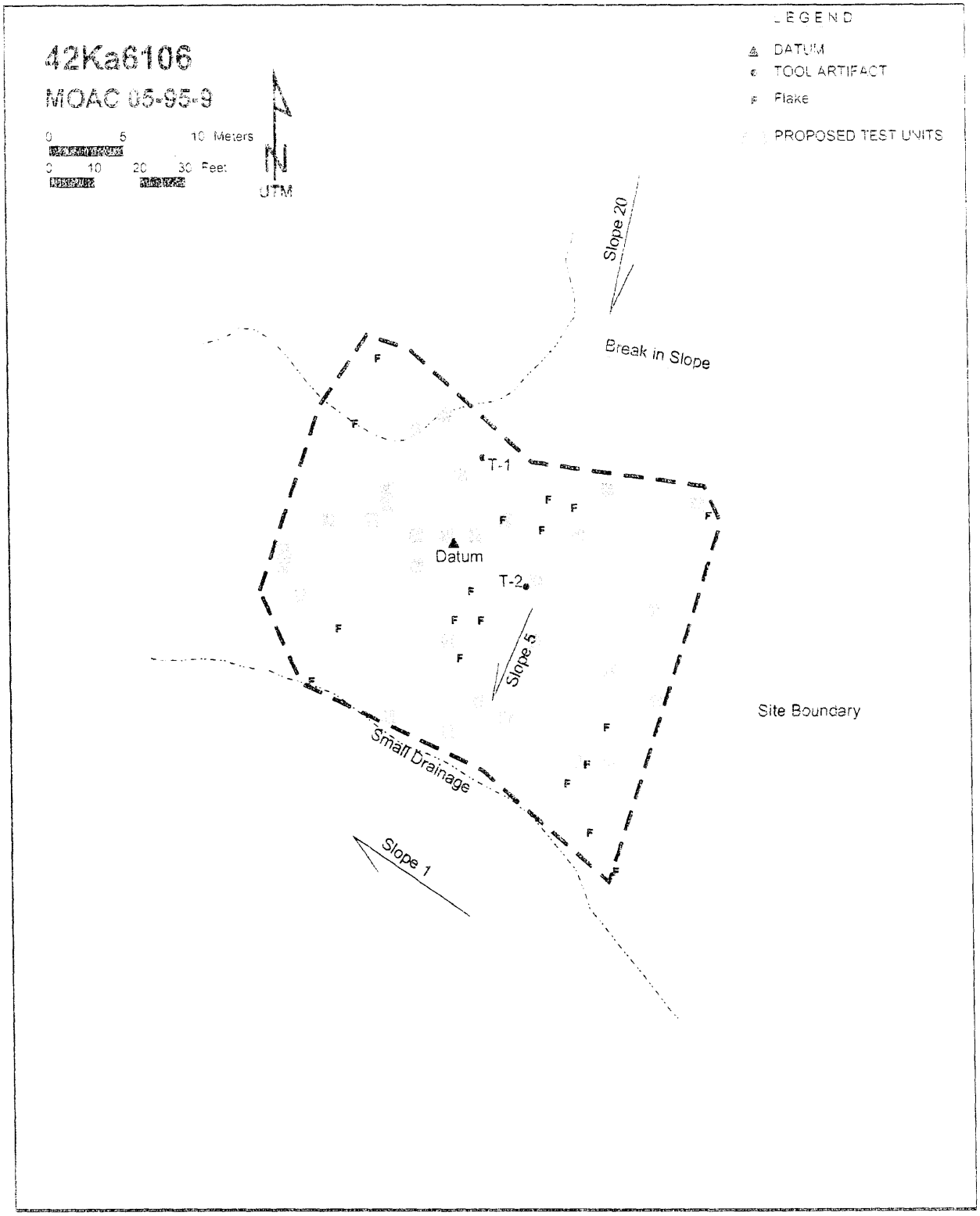

Figure 6. 42Ka6106 Site Map.

42Ka6107

The site is a lithic scatter that is located in and around three drainages at the bottom of a northeast facing slope (Figure 7). Cultural materials consist of 34 flakes and two tools, which are both utilized flakes. The debitage is dominated by shatter, tertiary flakes are common, secondary flakes are rare, and primary flakes are nonexistent. The material types include chert, quartzite, and obsidian. Although the site exhibits a limited assemblage size, it possess integrity of location and setting and lies in alluvial deposits with good potential for subsurface cultural remains. Therefore it was recommended eligible to the NRHP under Criterion D because it is likely to yield additional information relevant to the history of the area.

42Ka6108

The site is a dense lithic scatter that is located on a small rise and slope along the west side of Sink Valley (Figure 8). The site contains more than 200 flakes and 19 tools. Two lithic concentrations were noted indicating spatial patterning. The chipped stone tools documented at the site consist of ten utilized flakes (Tools 2, 4, 8, 10, 11, 13, 14, 15, 18, and 19), seven bifaces (Tools 3, 5, 6, 7, 9, 16, and 17), a Hawken Side-notched projectile point (Tool 1), and a projectile point tip of unknown type (Tool 12). The debitage is dominated by shatter, tertiary flakes are common, secondary flakes are rare, and primary flakes are nonexistent. The material types include chert and obsidian. In addition, two historic artifacts were observed, a hole-in-top milk can and an earthenware vessel sherd. This Early Archaic site exhibits an assemblage size and diversity that could contribute to such research topics as site function, chronology, subsistence, material culture, lithic acquisition and spatial organization. Hence, the site is recommended as eligible to the NRHP under Criterion D.

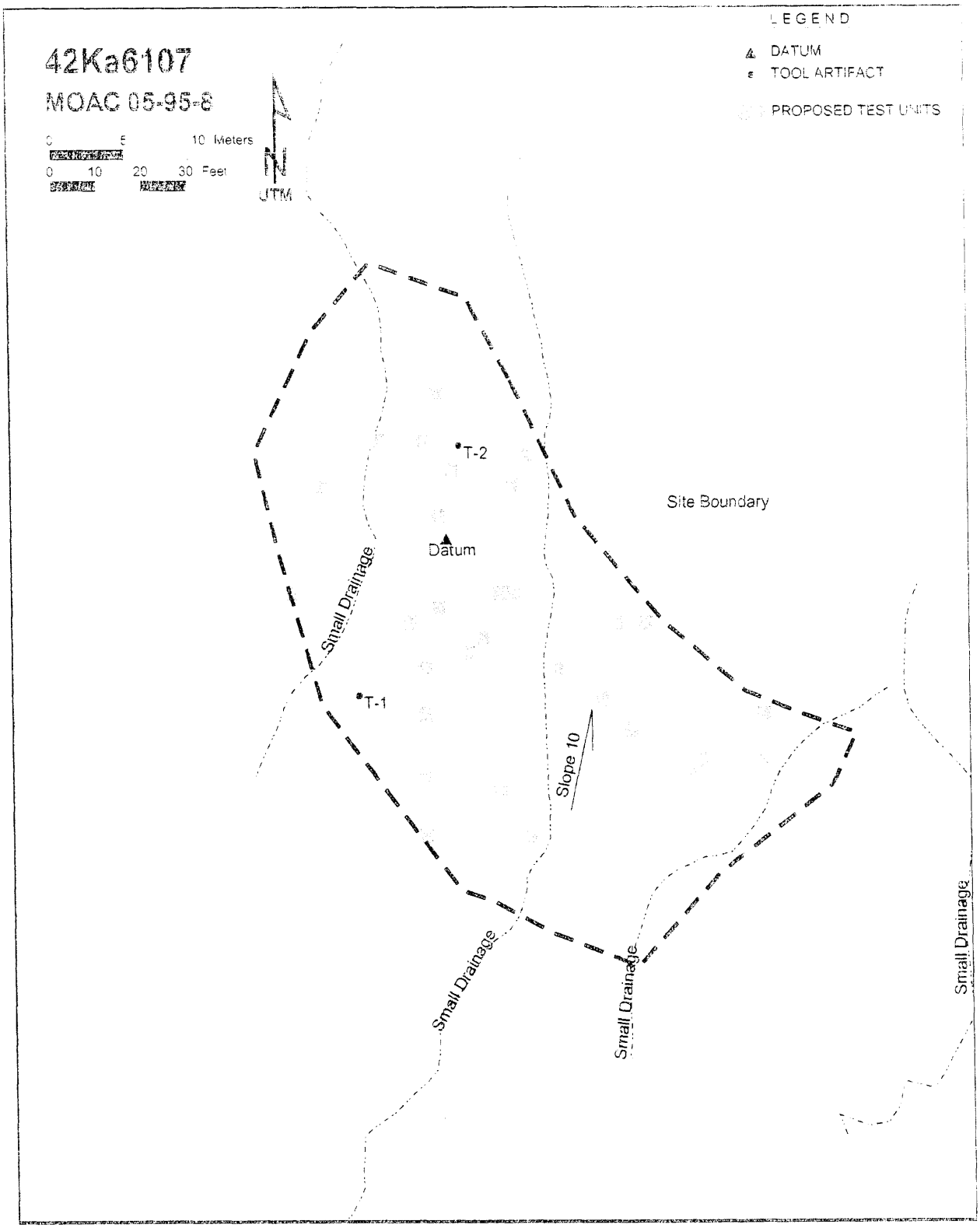

Figure 7. 42Ka6107 Site Map

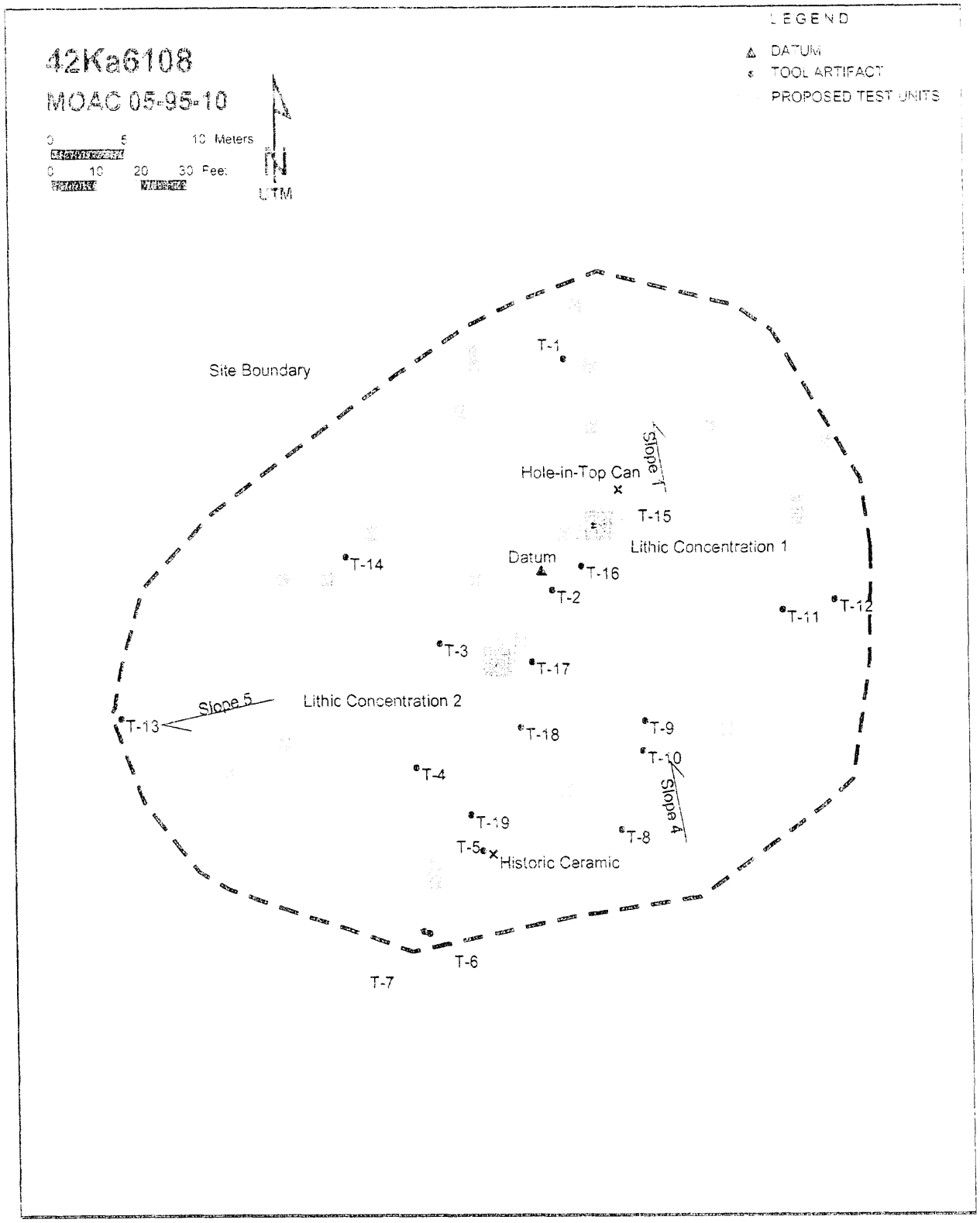

Figure 8. 42Ka6108 Site Map

DATA RECOVERY FRAMEWORK

Prehistoric Framework

Inevitably research programs, whether academic or mitigation, are guided by some general or specific theoretical framework. In the case of many mitigation efforts in Utah, an emphasis is placed on a series of research domains which include cultural affiliation and chronology, site function, site structure, technology, subsistence, interaction, settlement, site formation processes and ideology (e.g., Ahlstrom, Roberts, and Flenniken 1999; Firor, Greubel, and Reed 1998; Montgomery, Montgomery, and Nunn 2001; Tipps 1995; Tipps, LaFond, and Birnie 1996; Westfall 1987; Westfall, Davis, and Blinman 1987; among others). With possible exceptions of interaction (Trigger 1989) and site formation processes, these domains, or certain aspects of them, are implicitly synonymous with cultural subsystems within a systems theory framework, minus the nomological, Hempelian pretense. The systemic approach, introduced to archaeology by Binford (1965), conceptualizes different components, or subsystems, of a society and analyzes them separately and then as part of the entire system using a feedback method (Trigger 1989). Following Plog (1975), the systemic approach encompasses many different, but conceptually linked, theories, methods, and modes of analyses centered around the interplay between components of a complex system. Despite criticisms (Trigger 1989), systemic approaches are common in archaeology. As applied in the realm of cultural resource management, the systemic approach is not typically used as a theory-building paradigm or for "revolutionary" science (see Kelly and Hanen 1988), but as "normal" science, or the elaboration of the existing knowledge base.

Within the systemic framework exist a number of middle range theories or theories that attempt to link low-level observations with high-level theories (see Bettinger 1987 for multiple definitions of the concept). Most such theories that attempt to explain hunter-gatherer behavior, from an archaeological standpoint, are limited and often take the form of dichotomies (e.g., forager-collector, traveler-processor). These dichotomies have been criticized as unidimensional, lacking the power to account for the variability observed in the archaeological record (Chatters 1987). As Coltrain and Stafford (1999:60) correctly point out, "it remains difficult to distinguish temporary camps resulting from the activity of full-time foragers from those left by farmers foraging logistically or during periods of shortfall." As such, instead of using a model that fails to account for variability, we opt to use a framework that initially sets out to identify the variability.

Before continuing, a distinction must be drawn between middle range theory and middle range approaches, as the two are not necessarily one and the same. Theory, as used here, maintains certain sets of principles, ideas, and supported hypotheses, that form a generality that explains, or attempts to explain, some portion of the patterning identified in the archaeological record. Middle range theory, then, is a theory-building process that attempts to link "low order" empirical observation with the higher order processes that account for the observations. Middle range approaches, on the other hand, consist of the means in which we attempt to do this, commonly with a general uniformitarianism foundation. For our purposes here we can lump the theory and approaches under the heading of middle range research. Inherently, using middle range approaches suggests the use of middle range theory; however this need not be the case. Many common procedures that archaeologists use today are technically middle range approaches though generally not considered as such; the consequential example being radiocarbon dating. This technique, which is an *empirical observation* of the amount of ^{14}C remaining in an organic sample, is used to link the static remains of archaeological record with the dynamic events responsible for its deposition and alteration. Rarely are radiocarbon dates used *explicitly* within a middle range framework.

Taphonomy has been described as one of the sister disciplines of archaeology (Gifford 1981) because it involves the formation of the archaeological record and forms the basis for understanding not only how cultural materials become buried, but how those items are altered (Binford and Ho 1985; Gifford 1981, Lyman 1994). Studying the formation of the archaeological record takes into account not just archaeology but geomorphology, climatology, and other related disciplines. Experimental studies also come into play to demonstrate how artifacts, features, and the like are modified through time as a result of post-depositional processes, both natural and cultural. The relevance of taphonomy to this project can not be overstated, as the contexts of buried artifacts is questioned. Are artifacts in buried contexts from occupations of the site location different from those occupations represented on the surface? Or are the artifacts in the subsurface context the result of mixing, sorting, or some other form of vertical displacement? Numerous archaeologists have been concerned with vertical displacement of artifacts, whether through the soils and sediments or downslope displacement (Baker 1977; Baker 1978; Gifford-Gonzalez et al. 1985; Harris 1979, Hofman 1986; Rick 1976; Rowlett and Robbins 1982; Schiffer 1976). Discerning the variability between the surface and subsurface artifact assemblages, or lack thereof, may allow for extrapolations to be made about other previously recorded sites in the surrounding area. According to Redman and Watson (1970), these types of relationships are generally assumed, either positively or negatively. If it is possible to determine that the surface assemblage accurately reflects all the types of activities that occurred at the sites, generalizations concerning inter-site relationships, land use, mobility, and subsistence organization (Chatters 1987; Cowen 1999; Kuhn 1994; Sullivan 1995) can be addressed.

Most of the archaeological information we have pertaining to the sites in and around Alton Amphitheater comes through CRM related surveys with the main objectives of locating cultural resources and determining the eligibility of the sites for inclusion to the National Register of Historic Places. These surveys identified numerous prehistoric sites consisting chiefly of lithic artifacts, no discernible structures, and very few features. The lack of features may be due to the nature of the site recording, as indications of features may not be visible on the surface. Another possibility is that features do not exist or traces of them have vanished as a result of time and geomorphic processes. What survey projects have revealed, however, is a relatively long and continuous use of the Alton Amphitheater by various indigenous populations including Archaic, Fremont, Anasazi, and Ute peoples. A stratified probability sample inventory of the Kaiparowits Plateau was conducted in 1998 and was designed to provide information on the density, distribution, and diversity of cultural resources in the region (Geib, Collette, and Spurr 2001). This survey identified prehistoric remains dating from the early Archaic through the Protohistoric, including Archaic, Fremont, Anasazi, and Late Prehistoric (likely Southern Paiute). While Archaic sites were numerous across the survey area with abundant cultural remains, small Late Prehistoric sites containing few cultural remains were identified to have the greatest density. Sites attributed to the Archaic period are dominated by hunting camps. Importantly, the author notes that many Archaic sites on the Kaiparowits Plateau appear to be mainly surface phenomena and appear to have little potential for buried cultural remains (Ibid :7-5). Residential and hunting camps were identified with equally high frequency for the Fomative period, and together represent more than half of the identified Formative period sites. Of the identified Late Prehistoric site types on the Kaiparowits Plateau, hunting camps were identified with the greatest frequency (Geib, Collette, and Spurr 2001).

Historic Framework

Domestic archaeological sites include the remains of residential occupations that include dwellings, wells, privies, gardens, middens, and sheet refuse deposits. Additionally, homesteads include barns, outbuildings, and agrarian landscape features. Common issues addressed by archaeological research on domestic sites include consumer behavior patterns and modernization (Hardesty and Little 2000:120). The Homestead Act of 1862 granted free land parcels to settlers in exchange for their agreement to live on the land, build a house, and make agricultural improvements. The archaeological remains of such homesteads date from the 1860s and well into the twentieth century.

Historical archaeologists often use the concept of a historical context as a method of structuring research and ordering data. Bowers (1998:1) defines a historical context as: "How a particular community theme is expressed at a particular time and place...based upon the major changes to the community, which have been influenced by such factors as: exploration, settlement, urbanization, commerce and economic development, transportation, disasters, and community permanence." Specific historical contexts are derived primarily from established histories of the town, county, or region under investigation, and serve as an interpretive framework with which to investigate archaeological data at various scales of analysis. For example, at a regional scale of analysis, Hardesty (1991) developed an approach that identifies several interpretive themes applicable to the entire Inter-mountain West. They are:

1. Evolution of hydraulic societies (control of water)
2. Uncertain enterprises and the boom-bust cycle
3. The evolution of conquest society
4. Frontier urbanism
5. Dependency on the Federal government

According to Hardesty, as a "geographical place with a distinctive regional culture" (Ibid.:29), the Inter-mountain West is defined by these several major themes or historical contexts. Therefore, these themes have direct relevance to an archaeological investigation, as all are expected to have had a major impact on settlement patterns, economic and social organization, and ideology. For example, as "hydraulic societies", many communities in the Inter-mountain West "created not only a massive network of dams, reservoirs, canals, and irrigation ditches but also a new social order with an administrative bureaucracy, a new settlement pattern, and the emergence of a new agrarian middle class" (Ibid.:31). Hardesty (1991) argues that the archaeological record may be a particularly good source of information about all of these major themes and, as a result "all of these topics can form the foundations for middle range theory building that can be tested with hypotheses using historical archaeological data" (Reed and Horn 1994:233).

Additionally Stein (1990 30-34) has put forth several research themes and questions for developing a homestead context in Arizona. These include

- To what extent were homesteads economically self-sufficient?
- To what extent was agriculture practiced?
- What was the role of women?
- What were the patterns of land use?
- How did the social mores of particular groups evolve in response to life on the frontier?
- What were the long-range goals, or motives, of homesteaders in staking claims in Arizona and how successfully were these goals met?
- What factors contributed to the success of a homestead, as measured by the conveyance of a title patent from the government to the claimant?

Such research themes have been successfully addressed in archaeological investigations at the Brown Homestead in Yavapai County, Arizona (Ayres and Seymour 1993). Here, archaeological excavations were designed to address research topics that relate to subsistence and food behavior that were applied to the understanding of the economic viability of the homestead, the sociocultural interaction of the homestead's occupants with neighboring homesteaders, and investigations into the vernacular architecture to explore issues of economic and social status

In short, identifying historical contexts at a particular scale of analysis (national, regional, local) provides a conceptual and analytical background that serves to structure an archaeological investigation. The challenge for the archaeologist is to not only determine how, and the extent to which, these processes are reflected in the archaeological record of the particular site or sites under investigation, but to examine the inherent assumptions and generalizations underlying the identified historic contexts In this way, an archaeological analysis contributes to a more complete understanding of the past by determining the relevance and/or validity of the established historical themes to a particular community or region.

RESEARCH GOALS AND QUESTIONS

Beyond the mitigation goals of the project this research will focus on several goals in order to gain an insight into prehistoric activities and resource utilization in the Alton Amphitheater region and insight into early historic homesteading in the region. The prehistoric research goals include identifying cultural and/or temporal affiliation, identifying variability between surface and subsurface assemblages and identifying site function and resource utilization In accordance with these research goals the overall goal of this research it to collect baseline data concerning deposition, environment, occupation and seasonality of use, subsistence strategies and technological organization The historic research goals include identifying intra-site spatial and functional patterning, identifying consumer behavior patterns associated with homesteading, and identifying the function or activities associated with the remaining log structure, referred to as the granary.

Prehistoric Sites

Goal 1

The first goal is to determine cultural affiliation and/or temporal affiliation for sites 42Ka2042 42Ka2068 (prehistoric component), 42Ka6104, 42Ka6105, 42Ka6106, 42Ka6107, and 42Ka6108 Sites 42Ka2042, 42Ka2068 (prehistoric component), 42Ka6106, and 42Ka6107 have no culturally or chronologically diagnostic artifacts on the surface but there is potential for buried cultural remains and excavation might reveal datable features and artifacts. Site 42Ka6104 contained a single Elko projectile point attributed to the Archaic period, during initial surface documentation Surface documentation at site 42Ka6105 located a single Desert Side-notched projectile point attributed to the protohistoric/contact period At site 42Ka6108, a single Hawken side-notched projectile point was located during surface documentation and was attributed to the Early Archaic period. These three sites (42Ka6104, 42Ka6105, and 42Ka6108) also exhibit good potential for buried cultural remains, which during excavation may reveal further datable features and artifacts.

Efforts will be made to place site components within previously defined cultural units as appropriate. If possible component data will be compared to more specific units as phases or temporal periods defined for the area Data recovery at the seven sites will focus on obtaining chronological data from cultural horizons and features that may provide further insight into cultural or temporal affiliation. Relative and absolute dating techniques, including stratigraphy and ^{14}C dating, may be employed to examine the relationship of features and diagnostic artifacts (projectile points and ceramics), and compare them to the known chronologies and cultural traditions of the region Recovered projectile points will be identified according to the morphological classifications of Holmer (1986) and Holmer and Weder (1980).

Goal 2

The second goal is to determine if differences exist between surface and subsurface assemblages at sites 42Ka2042, 42Ka2068 (prehistoric component), 42Ka6104, 42Ka6105, 42Ka6106, 42Ka6107, and 42Ka6108 If there is no difference between surface and subsurface assemblages, or if it is shown that subsurface artifacts are displaced from the surface/subsurface by various site formation processes, it is possible to extrapolate with some confidence that the surface assemblages at many of the known sites in the Alton Amphitheater and Sink Valley localities are representative of artifact types, frequencies, and activities

Hypothesis There is no significant difference between surface and subsurface assemblages

Alternative Hypothesis There is a significant difference between surface and subsurface assemblages

To determine if surface and subsurface assemblages are different or similar, we will use independent sample t-tests or their nonparametric equivalent (in the event that data other than ratio level data is used) Samples to be used in testing the hypothesis include artifact frequencies, material type frequencies and tool type frequencies. If necessary, because of multiple comparison problems resulting from the addition of more samples, an analysis of variance test (ANOVA) supplemented with Bonferonni post hoc tests will be used where multiple data sets can be tested together. Additional samples may result from more than one subsurface artifact assemblage or the addition of unexpected frequency data; however, both these instances are unlikely

Goal 3

The third goal involves identifying site function and resource utilization through identifying activities that occurred at the sites. This goal requires three steps. First, activities need to be identified through the application of use wear analysis of chipped-stone tools and debitage analysis These analyses will allow us to infer what types of activities occurred at the site and the determination of activity areas Ascertaining activities at the sites will aid in assigning site function (e.g. resource processing, collecting station, short-term camp with multiple activities, etc.). The way the site functions leads to insights into the way the occupants utilized resources in the area.

Hypothesis: Common activities at the sites centered around hunting and processing wild game

Chipped-stone tools identified at the site consist mostly of bifaces and projectile points that are generally associated with hunting-related activities. Use wear analysis of chipped-stone tools should reflect these types in the form of use indicative of primary and/or secondary butchering of animal carcasses and the processing of secondary animal products such as hides. Furthermore, debitage should consist of tool maintenance related waste. There is also the high probability that informal or expedient tools would be common Contrasting this hypothesis is that the activities at the sites reflect the collection and processing of plant resources. If this is the case, the use wear on stone tools should be indicative of these behaviors. Ancillary studies including the analysis of pollen, macrofossils, and blood residue will also aid in elucidating site activities A good possibility also exists that artifactual materials at the sites reflect multiple activities

Hypothesis The sites served as temporary hunting camps.

If the chipped-stone tool assemblages consist of tools utilized to collect and process animal resources, as does evidence from blood residue studies, it is likely that the sites served as hunting camps. If the sites served more as hunting stands, it is expected that activities at the site would not include processing related activities such as hide scraping Hunting stand activities would revolve around tool maintenance and possibly primary carcass processing Evidence of activities related to the collection and processing of plant resources would automatically make it necessary to reject this hypothesis. Furthermore, the presence of certain features, such as storage pits, would also require the rejection of this hypothesis

Historic Site (42Ka2068)

Goal 1

The first goal of the historic component of this project is to determine if there is intra-site spatial or functional patterning. The remaining standing structures on the site, a log granary and stone cellar, as well as information provided by an informant, suggest specific use or activities areas such as residential, domestic food preparation and/or storage, and areas associated with livestock and farming. Remaining structural elements and trash disposal patterns may help to elucidate intra-site patterning and particular sets of cultural behaviors.

Hypothesis 1: There are differences in trash disposal patterns within the historic component of site 42Ka2068.

Alternate Hypothesis 1: There are no differences in trash disposal within the historic component of site 42Ka2068.

Hypothesis: Differences in trash disposal patterns reflect their association or proximity to activities attributed to remaining standing structures and/or structural elements.

Alternate Hypothesis: Differences in trash disposal patterns are not associated with remaining standing structures and/or structural elements.

Historic artifacts identified at the site consist mostly of glass, ceramics, tin cans, and other domestic items. The disposal location of such items, as well as other artifacts associated with agriculture and animal husbandry, may indicate what activities were performed. Artifact distributions and derived artifact groups are likely to demonstrate the functional parallels of structurally based interpretations (see Groover 1994) or interpretations based on information provided by historical informants. Alternatively, a lack of patterning in refuse disposal may reflect the self-sufficiency of early homesteaders. Such that, areas delineated by structural remains or structural elements held little functional classification for the homesteaders and all manner of activities were performed across the site.

Goal 2

The second goal is to determine to what extent the homestead was self-sufficient and whether the data reflect a shift from self-sufficiency to consumer culture. Specific household data help to refine broader community data regarding consumer behavior patterns, as the household is the primary unit of analysis and serves as the unit of economic consumption and production (see LeeDecker 1994). To determine the level of self-sufficiency it will be necessary to look at the frequencies of canning jars or canning jar lid inserts versus sanitary tin cans and varying frequencies of artifact types (specifically tin can types and their associated contents), frequencies of ceramic vessels and vessel forms (based on rim sherd). A lack of sanitary food cans, meat tins, and evaporated milk cans may indicate a reliance on food products produced at the homestead. Conversely, a higher frequency of consumable goods versus durable goods is likely to indicate a more consumer driven culture. A shift from self-sufficiency to a consumer culture will only be evident, if present, if the site refuse exhibits either stratigraphically distinct deposit levels or if two (or more) disposal events can be identified based on temporally diagnostic artifacts.

Goal 3

Hypothesis: The standing log structure functioned solely as a granary or outbuilding.

Alternative Hypothesis: The standing log structure had two (or more) functions, likely consecutively. The log structure functioned as an early residence and then as a granary/outbuilding.

The remaining standing structure at site 42Ka2068 is a granary constructed with a masonry foundation, large log cross beams, and V-shaped log construction with lumber paneling and floorboards. The granary appears to be the oldest structure remaining on the site. Log outbuildings are relatively rare within the region and its log construction is particularly intriguing as milled lumber would have been available (nearest saw mill in Orderville) at the time of the Pugh family's purchase of the land and residence. Therefore, it is possible that the log structure was a residence for the initial homesteader, James Swapp (land patented on August 9, 1889 under the Homestead act of 1862), and later reused as an outbuilding. To test the above hypothesis it will be necessary to more closely examine the construction and construction methods of the log structure by dismantling the structure and documenting construction techniques and methods. Additionally, excavations in the floor and entrance ways of the structure may reveal artifactual evidence of activities associated with the structure. The presence of artifacts classified as domestic (such as canning jars, items associated with food preparation, ceramics, etc.) in association with the structure would require the rejection of the hypothesis.

FIELD METHODS

In order to collect the necessary data to address the proposed hypotheses, field and laboratory methods must be compatible with one another, as well as with previous work conducted in the Grand Staircase, if larger research questions are to be answered. Additionally, data recovery at these seven sites, as proposed in this research design, will be used for future management of the surrounding cultural resources (see Stavish 2007) in the Alton Amphitheater and Sink Valley regions. As such, the following field and laboratory methods will be used throughout this project.

The first task at each site will be to produce a detailed planimetric map consisting of site boundaries, surface artifacts, features, landscape features, etc. All prehistoric surface artifacts will be collected and point provenienced with a Trimble. To the extent possible the grid will be oriented to true North. The grid system will consist of a master grid datum located at or near the northwest corner of the site. Radiating from the datum will be an east-west and north-south baseline. Grid units (2-x-2-m), are designated by the number of meters east and south of the grid datum. As such the unit designations will resemble 16S/24E or 02S/32E. Individual grid datums are designated as the NW corner of each unit, unless it is obstructed in some fashion. Once the grid is established, surface "pinch samples" for controls in pollen analysis will be collected and the surface of the site will be surveyed and artifacts will be plotted on the planimetric map.

The location of excavation units were selected using a simple random sampling strategy. At each site, a grid system was overlaid onto the site sketch map (as described above) and a random sample of units, without replacement, was generated using ArcView software. The purpose of this simple random or probabilistic sampling strategy is to maximize the chance of accuracy for making inferences about the population. In simple random sampling, each individual element (1-x-1-m grid unit) in the population (site) has an equal chance of selection, such that each unit is independent and does not effect the selection of other units. The assumptions necessary for simple random sampling are minimum (Redman 1975:150), and include the boundary of the population (site boundary as defined during the cultural resource inventory and documentation), the sampling frame (1-x-1-m grid units), and the sampling fraction (n=30 m^2). This sampling strategy allows us to collect a representative sample of the subsurface artifact assemblage and is necessary for addressing differences between surface and subsurface artifact assemblages. Importantly, simple random sampling also provides a basis for estimating how likely our inferences about the population are wrong, as well as how much confidence we can place in these inferences (Drennan 1996).

Excavation will consist of excavation units (1-x-1-m, 1-x-2-m, and 2-x-2-m), which may be expanded into larger block areas if necessary. The units will be excavated by natural layers using the control of arbitrary levels of 10 cm. All subsurface measurements will be made from the unit grid datum located in the NW corner and eventually plotted on the planview map. Excavations will cease once bedrock is encountered or one has excavated through 10-20 cm of sterile fill. Excavation will be done by trowel or shovel with the material removed being screened through 1/4" mesh screen.

At sites 42Ka6104, 42Ka6105, 42Ka6106, and 42Ka6107, we propose excavating a variety of 1-x-1-m and 1-x-2-m units placed randomly across each site, as no artifact concentrations or features were observed during surface documentation. A minimum of 30 m^2 will be excavated at each of the sites.

At site 42Ka6108, we propose excavating a variety of 1-x-1-m, 1-x-2-m, and 2-x-2-m units. A minimum of 30 m^2 will be excavated. A 2-x-2-m unit will be placed in each of the lithic concentrations (Lithic Concentration 1 and 2) and the remaining units will be randomly placed across the site.

At site 42Ka2042, we propose excavating a variety of 1-x-1-m, 1-x-2-m, and 2-x-2-m units. A minimum of 30 m^2 will be excavated. At least one 2-x-2-m unit will be place in Feature A, a firecracked rock concentration with soil staining, and the remaining units will be randomly placed across the site.

At site 42Ka2068, we propose excavating a variety of 1-x-1-m, 1-x-2-m, and 2-x-2-m units. A minimum of 30 m^2 will be excavated. At least one 2-x-2-m unit will be place in or next to Structure 1, the log granary, and at least one 2-x-2-m unit will be placed in or next to the cellar. Additional units will be placed randomly across the site, in both the prehistoric component and historic component of the site.

Once excavation is complete at each site, the site will be scraped to identify features missed by excavation. The heavy machinery that will be employed for this process is a paddle-wheel scraper, which is able to remove about three inches of soil in a lift. Any features encountered during this procedure will be documented in a manner consistent with those identified through manual excavation.

Prehistoric artifacts recovered in situ will be three-point provenienced. If the artifact is not laying level a dip angle measurement will also be taken. If an artifact is large, such as a metate, additional provenience measurements will be taken. Tools, large sherds, vessels, articulated faunal remains, artifact concentrations, etc. will be photographed and drawn in situ. If lithic debitage or small sherd fragments are extremely numerous it may be necessary, because of time constraints, to provenience these materials by quadrant, layer, and level rather than with three point plotting. Artifacts recovered from the screens will be provenienced by grid, layer, and level. Artifacts will be given field specimen numbers at the end of each days work.

Historic artifacts documented during the cultural resource inventory at this site (pieces of glass, tin cans, and ceramic sherds) are common to historic sites in the area. Additionally, a collection of these artifacts is bulky, making long term curation problematic. Hence, a detailed, in-field recording program of all historic artifacts within the excavation area of the total site area will be utilized to collect information. No collection of historic artifacts is proposed, unless a rare, unique, or particularly diagnostic historic artifact is encountered.

Any features uncovered during excavations will be examined, described, drawn, and photographed following recording procedures established by MOAC. Samples of soils, charcoal, bulk matrix, etc. will be taken where appropriate. If it is necessary to trace out a feature that extends into an adjacent unit, excavation of the unit, or a portion thereof, will begin immediately, following the standard excavation techniques described above, to reveal the full extent of the feature. The newly opened unit will be excavated in tandem with the original unit until sterile fill or bedrock is encountered.

Photographs will be taken prior to, during, and after excavation at the sites and excavation units. Photographs will be taken using color print, black and white print, and color slide film. Excavation unit photographs will be taken prior to excavation and a final excavation photo will be taken of at least one unit wall. Photographs will be taken of features prior to and after excavation.

Upon the complete excavation of a given unit, at least one wall will be profiled. The wall to be profiled will be determined by a number of considerations including, but not limited to, unique characteristics of the profile, clearly discernable stratigraphy, evidence of post-depositional processes, and cross-sections of cultural strata. The soil profile will consist of soil descriptions, Munsell color designations, information concerning the depositional environment, and the structure of the matrix.

In the event that human remains are encountered during excavation, all digging activity in that grid and the immediate vicinity will cease immediately. The county sheriff will be notified, followed by the Utah State Archaeologist.

LABORATORY METHODS

It is anticipated that lithic artifacts will make up the bulk of the materials recovered during excavation at sites 42Ka2042, 42Ka2068, 42Ka6104, 42Ka6105, 42Ka6106, 42Ka6107, and 42Ka6108; however, it is probable that faunal remains will also be encountered. There is also a slight chance of recovering other organic artifacts such as basket fragments, wood (both natural and cultural), beads, etc. No historic artifacts will be collected during the mitigation process. Most of the laboratory work for the historic component of site 42Ka2068 will be conducted on site. This involves the measurement by weight and volume of artifacts and artifact classes, recording typological descriptions, and photography or illustrated of diagnostic historic artifacts.

Lithic Artifacts

In order to address the hypotheses, it is necessary to collect both qualitative and quantitative data on the lithic debitage and tools. General debitage analysis will consist of collecting the following variable characteristics for each artifact: material type and color, percent of dorsal cortex and type, platform type, artifact condition, the presence or absence of thermal alteration, the presence or absence of use wear, the technological artifact type, dorsal scar count, and size class.

The analysis design provides the means to collect the necessary information for determining principle reduction strategies represented at the site under investigation. Specifically, the lithic analysis will incorporate the following aspects:

1. Composition of the lithic assemblages with respect to raw materials.
2. Frequency of artifact categories including core reduction debitage, both pressure and percussion biface thinning debitage, other specialized debitage (i.e., projectile points, notching flakes, fluting or channel flakes, etc.), undiagnostic debitage and angular debris, cores and core tools, and expedient and formal tools, including tool-producing tools (i.e., hammerstones, anvils, etc.)
3. Morphological and metric attributes of formal and informal chipped-stone tools for classification, typology, and function determination.

Where applicable, individual concentrations, or spatially discrete units, will serve as the basic units of analysis (see Analysis Section). Analysis of artifacts from sites 42Ka2042, 42Ka2068, 42Ka6104, 42Ka6105, 42Ka6106, 42Ka6107, and 42Ka6108 will center on identifying specific flake types based on studies and debitage typologies devised by Ahler (1989) and Flenniken (1978, 1981). The modified typology includes the following classification scheme:

Debitage Core reduction includes three distinct levels including primary, secondary, and tertiary reduction. Primary flakes are defined based on a percentage of 90% or higher dorsal surface cortex cover and either a cortical or single faceted platform. Secondary core reduction flakes are defined as those flakes exhibiting cortex covering between 5% and 90% of the dorsal surface and having at least one flake scar. Cortical and single faceted platforms are common and in some instances multifaceted platforms occur. Finally tertiary reduction flakes lack any cortex, have single and multifaceted platforms, but more obtuse platform angles, and a dorsal surface with several flake removal scars (two or more), generally running parallel with the long axis of the flake. The flake curvature becomes more pronounced at this stage. In all three stages of core reduction there is generally little evidence of platform preparation.

Biface thinning debitage breaks down into three categories: edge preparation, percussion biface thinning flakes, and pressure biface thinning flakes. Edge preparation flakes typically exhibit a triangular outline relative to the platform location, making them wider than they are long. Removal of these flakes generally occurs as a preliminary step in preparing the edge of a flake blank (i.e. tertiary core reduction flake) or biface blank for additional biface reduction. Characteristics of percussion biface thinning flakes include multifaceted platforms generally with some abrasion, acute platform angles, and a definite dorsal curvature. In some instances, platforms may show signs of crushing and collapsing. Pressure biface thinning flakes exhibit irregular dorsal topography, steep platform angles with lipping, pronounced dorsal curvature, and are thin and small relative to percussion biface thinning flakes. All non-diagnostic flaking debris (flake fragments, angular debris, etc.) will be grouped into a single category.

Cores: Artifacts exhibiting one or more negative bulb scars and that do not appear to have come from another material are classified as cores. Cores include three subcategories: tested nodules or cobbles, unprepared cores, and prepared cores, which display a prepared platform from which flakes are removed.

Flaked Stone Tools. For the purposes of this analysis, a lithic tool is any artifact exhibiting use-wear. As such, it is necessary to group tools into two major groups: formal and informal, or expedient, tools. The formal category includes tools formed through biface reduction, or other reduction techniques, that dramatically alter the appearance of the original flake blank. Expedient tools include used flakes and retouched flakes where neither the use nor the retouch significantly alters the shape of the blank. As used here, use-wear includes microflaking, polish, striations, battering, edge rounding, abrasion, and edge frosting. Microflaking is generally the most evident form of use-wear and one of the only forms of attrition visible to the unaided eye. Identification of striations generally requires the aid of stereo microscopes (>200 x magnification), or even scanning electron microscopes.

The analysis of utilized and retouched tools will involve assessments of type and extent of use-wear, material preferences, and the relationship between use-wear and core or biface reduction stage. Following Frison and Bradley (1980), biface production stages will be determined. Briefly, the stage reduction sequence includes biface production starting from a blank (Stage I), moving through general stages of shaping and thinning (Stages II and III) to systematic thinning and shaping (Stage IV) to the final retouching and shaping into the desired form (Stages V and VI). Bifaces need not necessarily pass through all six stages before becoming a tool. In some cases it may be necessary to repeat particular stages if the blank or preform breaks during manufacture and some stages may be omitted altogether. Classified as either blanks (Stages I-IV) or preforms (Stages V and VI), these bifaces show no evidence of use. Only those bifaces exhibiting some form of attrition are classified as tools.

Ground Stone Artifacts

Ground stone encountered will be collected and bagged. Once in the laboratory, the ground stone artifacts will be examined and their attributes recorded. Because of the possibilities of obtaining pollen and traces of various residues (proteins, stable isotopes, etc.) the artifacts, particularly the use surfaces, will not be cleaned. Attributes that will be recorded for each piece of ground stone will include material type, color, manufacturing technique (if any), condition, number of use surfaces, size of use surfaces (length, width, and where applicable, depth), attrition of use surfaces (polish, pecking, battering, striations), general cross-section, function, and size (length, width, and thickness).

Ceramics Artifacts

Information collected from ceramic artifacts includes a variety of data that, with additional statistical manipulation, should allow for the hypotheses proposed herein to be addressed. Data collected from sherds will include pottery type, temper, vessel construction, finishing technique, surface manipulation, colors, vessel form, rim diameter (for rim sherds), hardness, firing atmosphere, and weight of all ceramics of a particular type per grid unit.

Faunal Remains

Despite the lack of remains encountered during the cultural resource inventory at these sites, it is assumed that more rigorous field investigation may result in the identification of faunal remains. As such, the following laboratory analysis program is designed to collect the data necessary to address the hypotheses proposed in this research design.

First, the bone materials will be lightly cleaned by brush to remove detritus that may obscure potentially diagnostic characteristics that may aid in the determination of genus or species. After cleaning, all bone elements will be examined and recorded by laboratory personnel. More specifically, attributes that will be recorded for each element include the most specific taxon possible, the element present, the side of the element, the portion of the element present, its apparent age, evidence of cultural and natural impacts to the element, and any additional comments deemed necessary.

Ancillary Studies

Various samples of artifacts, soils, and organics, will be sent to outside labs for analysis. Samples of charred wood will be sent to Beta Analytical for ^{14}C dating. Soil samples will be sent to Paleo Research Institute for pollen identification and counts and macrofossils. A selection of stone tools will also be sent to Paleo Research Institute for protein residue analysis. If needed, pollen washes from groundstone will also be sent there.

ANALYSIS

Descriptive Analysis of Artifact Classes

Data collected from each artifact sub-assemblage (lithics, ceramics, faunal materials, etc.) will be subjected to a descriptive statistical analysis to define its basic parameters. The descriptive analysis will consist of determining counts and percentages of various artifact types, among type

variability and general descriptions. Of course, each class of artifacts has unique characteristics that require additional analysis. The results of the descriptive analysis will be examined in regards to the hypotheses proposed in this research design, as well as any other patterning evident.

Historic Artifact Analysis

In order to address the specific research questions, it is necessary to collect qualitative and quantitative data on the artifacts comprising the trash dumps and to organize this data by means of a method that allows a standardized procedure for both characterizing and establishing a context of association with a period, property and event.

There are three basic kinds of data that can be derived from an analysis of historic artifacts. They are:

1. Maker marks and trademarks
2. The technology of the artifact
3. Aspects of local and national history

Williams and Higgs (1998, Appendix 2) have conveniently summarized the information that historic artifacts provide:

> **Maker marks** inform us about an artifact's manufacturer, while **trademarks** usually describe the contents of a container or the technology of manufacture. Both types of marks provide information on function, and date and city of manufacture. While some companies registered formal trade marks, others served as internal identifications (production plant codes, dates of manufacture, or unique company marks) or as advertising. The **technology of the artifact** can also provide clues about date and place of manufacture. Artifacts often reflect **local and national history** and governmental regulations, including local place or store names, events affecting industry, or laws regulating use or labeling.

By classifying the artifacts that comprise a historic trash dump or scatter in a standardized manner, basic information about date and place of manufacture is obtained, facilitating further analysis. Furthermore, a means of establishing association with a parent structure is obtained based on any temporal, functional and also spatial affiliation. In this instance, the scatters are characterized by functional and temporal diversity, and a spatial proximity to the town site. Therefore, it is most likely that they represent community-level discard expected for a landfill or dump site.

According to Sprague (1980: 252), "function is the highest and most productive basis for site analysis." With this in mind, Sprague (1980) developed an artifact typology that has been widely employed in the artifact classification of western U.S. historic sites. Within this typology, artifacts are assigned to one of eight major classes of items: Personal Items; Domestic Items; Architectural Items; Transportation-related Items; Commerce and Industry-related Items; Group Services; Group Ritual Items; and Unknown/Unclassified.

Once the individual artifacts have been ascribed a functional and/or temporal affiliation, the data is then analyzed to determine how the assemblage of items relate to one another, that is, moving from an individual artifact typology to an assemblage characterization. As Gould (1998) states: "Since the Sprague scheme is originally centered upon a notion of a single artifact's functional attributes, it does make sense that when considered at the assemblage level, aggregated activities are identified."

The premise here is that similarities and differences in behavior, spatial configuration and/or temporal affinity results in corresponding similarities or difference in the frequencies of classified items. Therefore, one is essentially linking particular configurations of artifacts with particular aspects of behavior that are, in turn, determined by particular cultural or social influences.

REPORTING RESULTS AND DISSEMINATION

A draft report detailing the project, the analyses, and conclusions will be submitted to Utah Divison of Oil, Gas, and Mining (DOGM) for review. Upon receiving review and comments from DOGM, a final report will be prepared incorporating any changes. A final document will be produced and submitted to DOGM and the State Historic Preservation Office.

CURATION

All archival and cultural materials collected or produced during the project's data recovery program will be submitted to the Utah Museum of Natural History, University of Utah, Salt Lake City, Utah.

REFERENCES

Ahler, S.
1989 Mass Analysis of Flaking Debris. in Alternative Approaches to Lithic Analysis edited by D. Haury and G. Odell. *Archaeological Paper of the American Anthropological Association No. 1.*

Ahlstrom, R.V.N., H. Roberts, and J.J. Fienniken
1999 Phase I Report and Phase II Data Recovery Plan for 16 Archaeological Sites in the Coral Canyon Development, Washington County, Utah. HRA, Inc., Las Vegas, Nevada. Copy in possession of author.

Aikens, C.M. and D.B. Madsen
1986 Prehistory of the Eastern Area. In *Great Basin*, Volume 11, Handbook of North American Indians, edited by Warren L. D'Azevedo. Smithsonian Institution, Washington.

Alder, D.D. and K.F. Brooks
1996 A History of Washington County: From Isolation to Destination. Utah Centennial County History Series. Utah State Historical Society, Salt Lake City.

Ambler, J.R.
1996 Dust Devil Cave and Archaic Complexes of the Glen Canyon Area, pp. 15-35. In Glen Canyon Revisited. *University of Utah Press Anthropological Papers Number* 119.

Ayres, J.E. and G.R. Seyomur
1993 Life on a 1930s Homestead: Historical Archaeological Investigations of the Brown Homestead on the Middle Agua Fria River, Yavapai County, Arizona. *SWCA Anthropological Research Paper No. 2.* SWCA, Inc., Flagstaff and Tucson, Arizona.

Baker, C.M.
1978 The Size Effect: an Explanation of Variability in Surface Artifact Assemblage Content. *American Antiquity* 42:288-293.

Baker, P.
1977 *Techniques of Archaeological Excavation.* Batsford, London.

Baldwin, G.C.
1950 The Pottery of the Southern Paiute. *American Antiquity* 16:50-56.

Berry, C.F. and M.S. Berry
1986 Chronological and Conceptual Models of the Southwestern Archaic. In *Anthropology of the Desert West: Essays in Honor of Jesse D. Jennings*, edited by C.J. Condie and D.D. Fowler, pp. 253-327. Anthropological Papers No. 110, University of Utah Press, Salt Lake City.

Bettinger, R.L.
1987 Archaeological Approaches to Hunter-Gatherers. *Annual Review of Archaeology* 16:121-142.

Binford, L.R.
1965 Archaeological Systematics and the Study of Cultural Process. *American Antiquity* 47(3):485-503.

Binford, L.R. and C.K. Ho
1985 Taphonomy at a Distance: Zhoukoudian, "The Cave of Beijing Man"? *Current Anthropology* 26(4):413-442.

Bowers, Peter M.
1998 2.2 Historical Contexts. In *Historical Development of the Chena River Waterfront Fairbanks, Alaska: An Archaeological Perspective*, edited and compiled by Peter M. Bowers and Brian L. Gannon. CD-ROM. Alaska Department of Transportation and Public Facilities, Fairbanks.

Bradley, M.S.
1999 *A History of Kane County*. Utah Centennial County History Series. Utah State Historical Society, Salt Lake City.

Chatters, J.C.
1987 Hunter-Gatherer Adaptations and Assemblage Structure. *Journal of Anthropological Archaeology* 6:336-375.

Christensen, D., S.M. Chandler, K. Kreutzer, and J. Jennings
1983 Results of the 1982 Class II Archaeological Survey of the Alton and Kolob Tracts in Northwestern Kane County, Utah. Nickens & Associates for the Kanab Resource Area, Bureau of Land Management.

Coltrain, J.B. and T.W. Stafford, Jr.
1999 Stable Carbon Isotopes and Salt Lake Wetlands Diet: Towards an Understanding of the Great Basin Formative. In *Prehistoric Lifeways in the Great Basin Wetlands: Bioarchaeological Reconstruction and Interpretation*, edited by B.E. Hemphill and C.S. Larsen, pp. 55-83. University of Utah Press, Salt Lake City.

Copeland, J.M., and R.E. Fike
1988 Fluted Projectile Points in Utah. *Utah Archaeology 1988* 1 (1): 5-28.

Cowen, F.L.
1999 Making Sense of Lithic Scatters: Lithic Technological Strategies and Mobility. *American Antiquity* 64(4):593-607.

Crosswhite, F.S.
1981 Desert Plants, Habitat and Agriculture in Relation to the Major Pattern of Cultural Differentiation in the O'odham People of the Sonoran Desert. *Desert Plants* 3(2):47-76.

Davidson H.M., J.W. Foster and N.W. Ackerly
1974 Final Report for Drill Hole and Access Road Clearance in the Alton Amphitheater and Skutumpah Terrace. Ms. Department of Anthropology, Museum of Northen Arizona.

Drennan, R.D.
1996 *Statistics for Archaeologists: A Commonsense Approach*. Springer, New York.

Euler, R.C.
1966 Southern Paiute Ethnohistory. *University of Utah Anthropological Papers 78. Glen Canyon Series 28*. Salt Lake City.

Flenniken, J.J.
1978 Reevaluations of the Lindenmeier Folsom: A Replication Experiment in Lithic Technology. *American Antiquity* 43: 473-480.

1981 Replicative Systems Analysis: A Model Applied to the Vein Quartz Artifacts from the Hoko River Site. *Reports of Investigations*, Laboratory of Anthropology, Washington State University, Number 59. Pullman.

Firor, J., R.A. Greubel, and A.D. Reed
1998 Archaeological Data Recovery at Four Anasazi Sites on White Mesa Along US 191 in San Juan County, Utah. Alpine Archaeological Consultants, Montrose, Colorado. Project No. U-95-A1-386.

Fowler, C.S.
1994 Material Culture and the Proposed Numic Expansion. In *Across the West*. David B. Madsen and David Rhode, Eds., pp 103-114. University of Utah Press, Salt Lake City.

Fowler, C.S. and D.D. Fowler
1971 Notes on the History of the Southern Paiutes and Western Shoshonis. *Utah Historical Quarterly* 39 (2): 96-113.

1981 The Southern Paiute: A.D. 1400-1776. In The Protohistoric Period in the North American Southwest; A.D. 1450-1700. Davis R. Wilcox and W. Bruce Masse, Eds. *Arizona State Univerisity Anthropological Research Papers* 24: 129-162.

Frison, G.C.
1978 *Prehistoric Hunters of the High Plains*. Academic Press, New York.

Frison, G.C. and B.A. Bradley
1980 *Folsom Tools and Technology at the Hansen Site, Wyoming*. University of New Mexico Press, Albuquerque.

Geib, P.R.
1995 Two Fluted Points from Kaibito Plateau, Northeastern Arizona. *Kiva* 61(1):89-97.

1996 Glen Canyon Revisited. *University of Utah Anthropological Papers No. 119*. University of Utah Press, Salt Lake City.

Geib, P.R., and J.R. Ambler
1991 Sand Dune Side-notched: An Early Archaic Projectile Point Type of the Northern Colorado Plateau. *Utah Archaeology 1991* 4:17-23.

Geib, P.R., J.H. Collette, and K. Spurr
2001 Kaibabitsinungwu: An Archaeological Sample Survey of the Kaiparowits Plateau. Cultural Resource Series No. 24. *Grand Staircase-Escalante National Monument Special Publication* No. 1.

Gifford, D.P.
1981 Taphonomy and Paleoecology: A Critical Review of Archaeology's Sister Disciplines. In *Advances in Archaeological Method and Theory* vol. 4, M.B. Schiffer ed. pp. 365-438. Academic Press, New York.

Gifford-Gonzales, D.P., D.B. Damrocsh, D.R. Damrosch, J. Pryor, and R.L. Thurnen
1985 The Third Dimension in Site Structure: An Experiment in Trampling and Vertical Dispersal. *American Antiquity* 50:803-818.

Gould, R.T.
1998 5.1 Delimiting the Scale of Behavioral Inferences: Moving from Frequencies of Classified Items to Inferences about the Past. In *Historical Development of the Chena River Waterfront, Fairbanks, Alaska: An Archaeological Perspective*, edited and compiled by Peter M. Bowers and Brian L. Gannon. CD-ROM. Alaska Department of Transportation and Public Facilities, Fairbanks.

Gregory, H.E.
1951 The Geology and Geography of the Paunsaugunt Region, Utah. *United States Geological Survey Professional* Paper 226.

Gregory, H.E., and R.C. Moore
1931 The Kaiparowits Region: A geographic and geological Reconnaissance of Parts of Utah and Arizona. *United States Geological Survey Professional* Paper 164.

Groover, M.D.
1994 Evidence for Folkways and Cultural Exchange in the 18th-Century South Carolina Backcountry. *Historical Archaeology* 28(1):41-64.

Halbirt, C.D., and C.A. Gualtieri
1981 Archaeological Investigations Utah International, Inc., San Francisco, Alton Coal Field Survey, Federal, State, and Private Lands, Kane County, Utah. Museum of Northern Arizona, Department of Archaeology. Project No. U-81-NI-0254b.

Hardesty, D.L.
1991 Toward an Historical Archaeology of the Intermountain West. *Historical Archaeology* 25(3): 29-35.

Hardesty, D.L., and B.J. Little
2000 *Assessing Site Significance: A Guide for Archaeologists and Historians*. New York: Altamira Press.

Harris, E
1979 *Principles of Archaeological Stratigraphy*. Academic Press, London.

Hofman, J L
1986 Vertical Movement of Artifacts in Alluvial and Stratified Deposits. *Current Anthropology* 27(2) 163-171

Hogan, P E
1980 The Analysis of Human Coprolites from Cowboy Cave. Appendix IX in Cowboy Cave, pp. 201-211. In Cowboy Cave. *Anthropological Papers No.* 104. University of Utah Press. Salt Lake City

Holmer, R.N
1986 Common Projectile Points of the Intermountain West. In Anthropology of the Desert West: Essays in Honor of Jesse D. Jennings, pp. 89-115. *Anthropological Papers No.* 110. Universtiy of Utah Press. Salt Lake City.

Holmer, R.N. and D.G. Weder
1980 Common Post-Archaic Projectile Points of the Fremont Area. *Antiquities Section Selected Papers*. Division of State History, Utah. 7(16): 55-68.

Hughes, Nielson, and Sulz
1994 A Cultural Resource Invetory of Smirl Mine, Prospect 2A Mine, and the Alton Mine, Central and Southern Utah. Nielson Consulting Group and Timpanogos Research Associates. Report No. U-93-NP-0712. On file at the Division of State History, Utah.

Janetski, J C
1993 The Archaic to Formative Transition North of the Anasazi: A Basketmaker Perspective. In Anasazi Basketmaker: Papers from the 1990 Wetherill-Grand Gulch Symposium. *BLM Cultural Resource Series No.* 24, Salt Lake City.

Jennings, J D
1975 *Preliminary Report: Excavation of Cowboy Cave*. Department of Anthropology, University of Utah, Salt Lake City.

1978 Prehistory of Utah and Eastern Great Basin. *University of Utah Anthropological Papers* 98. The University of Utah Press, Salt Lake City

1980 Cowboy Cave. *Anthropological Papers No.* 104. University of Utah Press, Salt Lake City

Keller, D.R.
1987 A Report of Archaeological Resources on the Alton Coal Project. Report prepared for Kanab Resource Area, Bureau of Land Management as part of Utah Internationals Mine Permit Application

Kelly, I T.
1964 Southern Paiute Ethnography. *University of Utah Anthropological Papers No.* 69.

Kelly J.H and M.P Hanen
1988 *Archaeology and the Methodology of Science*. University of New Mexico Press. Albuquerque

Kuhn S.L
1994 A Formal Approach to the Design and Assembly of Mobile Tool Kits *American Antiquity* 59(3):426-442

LeeDecker C.H
1994 Discard Behavior on Domestic Historic Sites: Evaluation of Contexts for the Interpretation of Household Consumption Patterns. *Journal of Archaeological Method and Theory* 1(4): 345-375.

Lindsay A.J. Jr J.R. Ambler, M.A. Stein, and P.M. Hobler
1968 Survey and Excavations North and East of Navajo Mountain, Utah. 1959-1962. *Museum of Northern Arizona Bulletin* 45. *Glen Canyon Series No. 8*. Flagstaff.

Lyman, R.L
1994 *Vertebrate Taphonomy*. Cambridge University Press. Cambridge.

Matson, R. G
1991 *The Origins of Southwestern Agriculture*. University of Arizona Press. Tucson.

McFadden, D.A
1980 Garkane Powerline Right-of-Way - Escalante Bureau of Land Management. Kanab Field Office. Project No. U-80-BL-0158b

1981 Isolated Tract Allotment Bureau of Land Management, Kanab Field Office. Project No. U-81-BL-0230b

1982 Cone Allotment Chaining Bureau of Land Management. Kanab Field Office. Project No. U-82-BL-0178b

1984 Syler Knoll Chaining Bureau of Land Management, Kanab Field Office. Project No. U-84-BL-0679b

1996 Virgin Anasazi Settlement and Adaptation on the Grand Staircase. *Utah Archaeology 1996* 9 (1). 1-34.

2000 Formative Chronology and Site Distribution on the Grand Staircase-Escalante National Monument. Draft report on file. USDI Bureau of Land Management Kanab Resource District. Cedar City Utah

Montgomery K.R. J.A Montgomery and G Nunn
2001 Archaeological Data Recovery at a Prehistoric Lithic Procurement Locality (42Be2126) in the Mineral Mountains. Beaver County. Utah Montgomery Archaeological Consultants Moab. Utah Report No U-01-MQ-0083

Plog, F. T.
1975 Systems Theory in Archaeological Research. *Annual Review of Anthropology* 4 207-224

Redman, C. L.
1975 Productive Sampling Strategies for Archaeological Sites. In *Sampling in Archaeology*, edited by J. W. Mueller, pp. 147-154. The University of Arizona Press, Tucson.

Redman, C. L. and P. Watson
1970 Systematic, Intensive Surface Collection. *American Antiquity* 35(3):279-291.

Reed, A. D. and Horn, J. C.
1994 Future Research Directions. In *Grand Resource Area Class 1 Cultural Resource Inventory*, edited by J.C. Horn and S.M. Chandler, pp. 211-241. Alpine Archaeological Consultants, Montrose, Colorado.

Rick, J. W.
1976 Downslope Movement and Archaeological Intrasite Spatial Analysis. *American Antiquity* 41:133-144.

Rowlett, R. M. and M.C. Robbins
1982 Estimating Original Assemblage Content to Adjust for Post-Depositional Vertical Artifact Movement. *World Archaeology* 14:73-83.

Schiffer, B.
1976 *Behavioral Archaeology*. Academic Press, New York.

Schroedl, A. R., and N.J. Coulam
1994 Cowboy Cave Revisited. *Utah Archaeology 1994* 7 (1):1-34.

Sprague, R.
1980 A Functional Classification for Artifacts from 19th and 20th Century Historical Sites. *North American Archaeologist* 2:251-261.

Stavish, P.
2006 Cultural Resource Inventory of Alton Coal Development's Sink Valley-Alton Amphitheater Project Area, Kane County, Utah. Montgomery Archaeological Consultants, Moab, Utah. Report No. U-05-MQ-0346p.

2007 Cultural Resource Inventory of Alton Coal Development's Project Area, Kane County, Utah. Montgomery Archaeological Consultants, Moab, Utah. Report No. U-05-MQ-1568b,p.

Stein, P.
1990 *Homesteading in Arizona, 1862-1940: A Guide to Studying, Evaluating, and Preserving Historic Homesteads*. State Historic Preservation Office, Arizona State Parks, Tucson.

Steward J.H.
1938 Basin-Plateau Aboriginal Sociopolitical Groups. *Bureau of American Ethnology Bulletin* 120. Washington, D.C.

Stokes, W.L.
1986 *Geology of Utah*. Utah Museum of Natural History, University of Utah, Salt Lake City.

Sullivan, A.P.
1995 Artifact Scatters and Subsistence Organization. *Journal of Field Archaeology* 22:49-64.

Talbot, R.K.
1990 Virgin Anasazi Architecture: Toward a Broader Perspective. *Utah Archaeology 1990* 3 (1): 19-42.

Thompson, R.A. and G.B. Thompson
1978 An Archaeological Survey of the Eastern End of the Warner Valley, Washington County, Utah. *Western Anasazi Reports* 1 (2): 129-142. Cedar City, Utah.

Thornton, M. and K. Montgomery
2005 Cultural Resource Inventory of the Coal Hollow Project Coal Seam Drill Sites in the Alton Amphitheater, Kane County, Utah. Montgomery Archaeological Consultants, Moab, Utah. Project No. U-05-MQ-0346b,p.

Tipps, B.L.
1995 Holocene Archaeology Near Squaw Butte, Canyonlands National Park, Utah. Selections from the Division of Cultural Resources No. 7. National Park Service, Denver.

Tipps, B.L., A.D. LaFond, and R.I. Birnie
1996 *Cultural Resource Investigations near White Crack, Island-in-the-Sky District, Canyonlands National Park, Utah*. Cultural Resource Selections No. 11. National Park Service, Denver.

Trigger, B.
1989 *A History of Archaeological Thought*. Cambridge University Press, Cambridge.

Walling, B.A. and R.A. Thompson
1988 *Archeology of the Dead Raven Site*. Report prepared for the Kane County Commission. Intersearch, Cedar City, Utah.

Weaver, D.E.
1986 An Archaeological Survey of 10 Proposed Exploratory Water Well Drill Hole Locations on the Wygaret Terrace, Kane County, Utah. Museum of Northern Arizona, Department of Anthropology, Arizona. Report No. U-86-NI-279bp.

Weaver D.E. and Hurley
1986 An Archaeological Survey and Monitoring of Nine Test Pit Locations and Access Routes for Utah International Inc. Alton Coal Field. Kane County. Utah. Museum of Northern Arizona. Department of Anthropology. Arizona. Report No. U-86-NI-0864b.

1987 An Archaeological Survey of Auger Borings and Backhoe Test Pits for Utah International. Inc.. Alton Coal Field. Kane County. Utah. Museum of Northern Arizona. Department of Anthropology. Arizona. Report No. U-87-NI-0856b.

Westfall D.A.
1987 The Pinenut Site. Virgin Anasazi Archaeology on the Kanab Plateau of Northwestern Arizona. Cultural Resources Series No. 4. Bureau of Land Management. Phoenix. Arizona.

Westfall D.A. W.E. Davis. and E. Blinman
1987 Green Spring. An Anasazi and Southern Paiute Encampment in the St. George Basin of Utah. *Bureau of Land Management-Utah. Cultural Resource Series Number* 21.

Williams. C.M. and Higgs. A.S.
1998 Appendix 2: Barnette Project Trademark/Maker Mark Catalog. In Historical Development of the Chena River Waterfront, Fairbanks, Alaska: An Archaeological Perspective. edited and compiled by Peter M. Bowers and Brian L. Gannon. CD-ROM. Alaska Department of Transportation and Public Facilities. Fairbanks.

APPENDIX A
Curriculum Vitae for Key Personnel

NAME Keith R. Montgomery

ADDRESS P.O. Box 219
Moab, Utah 84532
(435) 259-5764
kmontgomry@montarch.com

EDUCATION 1974 A.A. Edmonds Community College
1976 B.A. Western Washington University (Anthropology)
1979 M.A. Western Washington University (Archaeology/Anthropology)

PROFESSIONAL ORGANIZATIONS Utah Professional Archaeological Council
Society for American Archaeology

PROFESSIONAL EXPERIENCE

1996 - Present Principal Investigator, Montgomery Archaeological Consultants, Moab, Utah
In charge of writing technical proposals, and initiating and directing all cultural resource projects. Responsible for ensuring that all projects conducted by the company meet required standards for compliance with federal and state legislature pertaining to cultural resources. To date, he has directed over 500 projects to completion on state, federal, and private lands.

1983-1996 Consulting Project Archaeologist, Sagebrush Archaeological Consultants, Ogden, Utah.
Permitted under Sagebrush to conduct cultural resource investigations (survey, testing, and excavation) on federal and state lands in the Great Basin (Utah and Nevada) and Colorado Plateau (Utah, Colorado, and Arizona). Responsible for project planning and coordination, supervision of field crews, site recordation, NRHP assessments, data analysis, and report preparation.

1984-1996 Consulting Project Archaeologist, Abajo Archaeology, Bluff, Utah.
Permitted under Abajo to perform cultural resource investigations (survey, testing, excavation) on federal and state lands in the Utah, western Colorado, and northern Arizona. Responsible for project planning and coordination, technical proposals, supervision of field crews, site recordation and NRHP assessments, data analysis, and report preparation.

1981-1983 Staff Archaeologist, Archeological Environmental Research.
Corporation (AERC) Bountiful, Utah. Permitted (federal and state) to supervise cultural resource investigations (survey and excavation) in the Great Basin and Colorado Plateau (Fremont and Anasazi) geographical/cultural areas.

Selected Projects with Technical Reports and Publications:

Montgomery, K.
2005 Cultural Resource Inventory of EOG Resources, Inc.'s Five Proposed Wells: CWU #662-6, CWU #663-6, and East Chapita #1-5, #2-5, and #5-5 in Uintah County, Utah

Montgomery, K.
2004 Cultural Resource Inventory of Bill Barrett Corporation's Proposed Tumbleweed Units #14-17-15-21, #16-17-15-21, #9-18-15-21 and #1-19-15-21 Well Locations, Uintah County, Utah

Montgomery, K.R., and D.L. Shank
2004 Cultural Resource Inventory for Utah Department of Transportation's SR 56 Bridge (Structure OC -307) Rehabilitation Project, East of Modena, Iron County, Utah

Montgomery, K., and S. Kinnear-Ferris
2004 Cultural Resource Survey of Bill Barrett Corporation's Cedar Camp3D Seismic Project, Uintah and Grand Counties, Utah

Elkins, M., and K. Montgomery
2004 Cultural Resource Block Inventory of Ute Tribal Lands in Sections 19, 30, and 31 of T5S R5W for UTE FNR LLC, Duchesne County, Utah

Mrstik, J., and K. Montgomery
2004 Cultural Resource Inventory of Division of Wildlife Resources Consumers Road Parcels, Carbon County, Utah.

Whitefield, A., and K. Montgomery
2004 Cultural and Fossil Resource Inventory Along US Highway 89 and State Route 14 Near Long Valley Junction, Kane County, Utah, STP-0089(86)104

Elkins, M. and K.R. Montgomery
2003 Cultural Resource Inventory For the Utah Department of Transportation's US 6 Helper Interchange, Carbon County, Utah, Report No. U-03-MQ-0320s

2003 Class 1 Existing Data Review of Encana Oil and Gas Corporation's Proposed Oil and Gas Development Area in the Kennedy Wash Region of Uintah County, Utah, Report No. U-03-MQ-752b,s,p

Montgomery, J.A. and K.R. Montgomery
2003 Utah Department of Transportation's State Route 10 Muddy Creek Bridge Replacement Cultural Resource Inventory, Emery County, Utah

Elkins, M. and K.R. Montgomery
2002 Cultural Resource Inventory of UP&L Pacificorp Camp Williams To Four Corners 345kv Power Line, San Juan County, Utah

Elkins, M. and K.R. Montgomery
2002 Cultural Resource Inventory of Seven Seismic Lines for the Veritas Uintah Seismic Project, Uintah County, Utah

2002 Cultural Resource Inventory of the Emery Telecom's Fiber Optic Line Between the Towns of Price and Helper, Carbon County, Utah

Kinnear-Ferris, S. and K.R. Montgomery
2002 Cultural Resource and Fossil Inventory of Utah Department of Transportation's SR-95 Westwater Canyon Realignment, San Juan County, Utah.

Montgomery, J. and K.R. Montgomery
2002 Utah Department of Transportation's State Route 10 Muddy Creek Bridge Replacement Cultural Resource Inventory, Emery County, Utah

Montgomery, K.R. and S. Ball
2002 Cultural Resource Inventory of Inland Resources 760-Acre Parcel in Township 8S, Range 16E, Section 24 and Township 8S, Range 17E, Section 19, Duchesne County, Utah.

Raney, A. and K.R. Montgomery
2002 Cultural Resource Inventory of the Dixie Escalante 138kV Power Line Project, Washington County, Utah

Montgomery, K.R.
2001 Cultural Resource Inventories of 400 Acres in the Wells Draw and Pariette Bench Localities for Inland Production Company, Duchesne County, Utah. Montgomery Archaeological Consultants.

2001 Cultural Resource Inventories of 20 Well Locations, Access and Pipeline Routes in the Wonsits Valley Oil and Gas Field, Uintah County, Utah. For Shenandoah Energy, Inc. Montgomery Archaeological Consultants.

Montgomery, K.R. and S. Ball
2001 Cultural Resource Inventory of the Moore Road (County Road 1612) Emery County, Utah. Preapred for the Utah Department of Transporation under contract with JBR Environmental Consultants. Montgomery Archaeological Consultants.

2001 Cultural Resource Inventory of the Garkane Powerline Between Mount Carmel Junction and Zion National Park, Kane County, Utah. Montgomery Archaeological Consultants.

Montgomery, J.A. and K.R. Montgomery
2001 Cultural Resource Inventory of Bonnevilee Fuels Corporation's Willow Creek Pipeline, Uintah County, Utah. Montgomery Archaeological Consultants.

Elkins, M. and K.R. Montgomery
2001 Cultural Resource Inventory of Citizen Communications' Fiber Optic Line Along SR 174, Millard County, Utah. Montgomery Archaeological Consultants.

Elkins, M. and K.R. Montgomery
2001 Cultural Resource Inventory for the Utah Department of Transportation's US 89 Intersection Improvement Near Big Water, Kane County, Utah. Montgomery Archaeological Consultants

Patterson, J.J. and K.R. Montgomery
2001 Cultural Resource Inventory of the Quitchupah Coal Haul Road, Emery and Sevier Counties, Utah. Montgomery Archaeological Consultants.

Montgomery, K.R.
2000 Archaeological Data Recovery at a Prehistoric Quarry (Site 5RB790/42Un1669) In Hells Hole Canyon Rio blanco County, Colorado Montgomery Archaeological Consultants.

Montgomery, K.R. and S. Ball
2000 Cultural Resource Inventory of Marathon Oil Company's 2000 Drilling Program in Castle Valley, Carbon County, Utah Montgomery Archaeological Consultants

Montgomery, K.R. and J.A. Montgomery
2000 Utah Department of Transportation's Interstate 70 to Price State Route 10 Passing Lanes Cultural Resource Inventory, Emery and Carbon Counties, Utah. Montgomery Archaeological Consultants.

2000 Cultural Resource Inventory and Evaluative Testing of Utah Department of Transportation's U.S. 191 White Mesa Amended Right-of-Way Access Project, San Juan County, Utah. Montgomery Archaeological Consultants.

Montgomery, K.R.
1999 Cultural Resource Inventory of the Plateau's Willow Creek Mine Pipeline Gathering System, Carbon County, Utah. Montgomery Archaeological Consultants.

1999 Cultural Resource Inventory of Coastal Oil and Gas Corporation's Ten Well Locations in the Park Mountain Area, Rio Blanco County, Colorado. Montgomery Archaeological Consultants.

Montgomery, K.R. and J.A. Montgomery
1999 Cultural Resource Inventory Along Salina's Main and State Streets, Sevier County, Utah. Montgomery Archaeological Consultants.

Montgomery, K.R., J.A. Montgomery, and S.Kinnear-Ferris
1999 Cultural Resource Inventory of the Emery Telephone Fiber Optic Line Ferron to Emery, Emery County, Utah. Montgomery Archaeological Consultants.

Montgomery, J.A., and K.R. Montgomery
1999 Eligibility Testing at Site 42Cb1302, Carbon County, Utah. Montgomery Archaeological Consultants.

Montgomery, K.R.
1998 Cultural Resource Inventories of Coastal Oil and Gas Corporation's Douglas Creek Unit Wells #67, #69, and #70, Rio Blanco, Colorado. Montgomery Archaeological Consultants.

Montgomery, K.R.
1998 Data Recovery at Site 42Em2423.1 for the Proposed Cottonwood Creek Water Treatment Plant in Emery County, Utah. Montgomery Archaeological Consultants.

Montgomery, K.R., and J.A. Montgomery
1998 Cultural Resource Inventory of the Bryce Canyon Foster's Development Parcel, Garfield County, Utah. Montgomery Archaeological Consultants.

1998 Cultural Resource Investigations of the Joe Wilson Canyon Pipeline, San Juan County, Utah. Montgomery Archaeological Consultants.

1998 Cultural Resource inventory of the Goblin Valley Materials Pit, Emery County, Utah. Montgomery Archaeological Consultants.

Montgomery, J.A., and K.R. Montgomery
1998 Cultural Resource Inventory of the Jack Spring Water Line Project, San Juan County, Utah. Montgomery Archaeological Consultants.

1998 Cultural Resource Inventory of the Wellington Canal Irrigation and Water Conservation Project, Carbon County, Utah. Montgomery Archaeological Consultants.

Montgomery, K.R., and J.A. Montgomery
1997 Cultural Resource Inventory and Site Testing of the Cottonwood Creek Water Project, Emery County, Utah. Montgomery Archaeological Consultants.

Montgomery, K.R. and J.A. Montgomery
1997 Cultural Resource Inventory and Evaluative testing for the Wilson Arch Power Line Project. San Juan County, Utah. Montgomery Archaeological Consultants.

1997 Cultural Resource Inventory of the Emery Telephone Company's Green River to Crescent Junction Fiber Optic Line. Grand County, Utah. Montgomery Archaeological Consultants.

1997 Cultural Resource Inventory of the Moab Airport to Crescent Junction Fiber Optic Line. Grand County, Utah. Montgomery Archaeological Consultants.

Montgomery, K.R., and J.A. Montgomery
1996 Cultural and Paleontological Resource Inventory of Utah Department of Transportation's U.S. 191 Lane Addition and Drainage Easement for the Kane Springs Wash Bridge Replacement Project. San Juan County, Utah. Abajo Archaeology.

1996 Cultural Resource Inventory and Evaluation of Utah Department of Transportation's Mormon Tank Wash Bridge Replacement Project Along U.S. 191, San Juan County, Utah. Abajo Archaeology

Montgomery, K.R.
1996 Evaluative Testing of Site 42Gr2556 along Tusher Canyon Road (CR126). Grand County, Utah. Abajo Archaeology.

W.E. Davis and K.R. Montgomery.
1996 Site 42Sa22396: A Prehistoric Hoe Procurement Site on Big Bench, Southern San Juan County, Utah. Utah Archaeology 1996.

Montgomery, K.R., and J.A. Montgomery
1995 Cultural Resource Inventory of Pacificorp/Utah Power's Proposed 345 kV Transmission Line Green River to Grand Junction Section, Grand County, Utah and Mesa County, Colorado. Volumes I and II. Abajo Archaeology.

Montgomery, K.R.
1995 Cultural Resource Inventory and Evaluative Testing for Utah Department of Transportation's State Route 18: St. George to Snow Canyon, Washington County, Utah. Abajo Archaeology.

Montgomery, K.R., and J.A. Montgomery
1994 Cultural Resource Inventory and Evaluation of Utah Department of Transportation's Mormon Tank Wash Bridge Replacement Project along U.S. 191, San Juan County, Utah. Abajo Archaeology

1994 Cultural Resource Inventory and Historical Reconnaissance Survey for Utah Department of Transportation's SR-260, Sevier County, Utah. Abajo Archaeology.

Montgomery, K.R.
1994 Cultural Resource Inventory of Utah Departments of Transportation's La Sal Junction road improvement project along U.S. 191 and SR-46, San Juan Co., Utah. Abajo Archaeology.

Montgomery, K.R., and J.A. Montgomery
1993 Utah Department of Transportation's State Route 31 Huntington Canyon Project: Archaeological Excavations at Site 42Em2109 and 42Em2095, Emery County, Utah. Abajo Archaeology

Montgomery, K.R.
1993 Cultural Resource Inventory and Site Testing for White Mesa Sanitary Landfill in San Juan County, Utah. Abajo Archaeology

Montgomery, K.R., and J.A. Montgomery
1992 Cultural Resource Inventory and Evaluation of the Utah Department of Transportation's State Route 14 Corridor between Mileposts 0.6 and 8.5, Iron County, Utah. Abajo Archaeology.

Montgomery, K.R., and J.A. Montgomery
1992 Cultural Resource Inventory and Evaluation of Garfield County's Johns Valley Road Improvement Project, State Road 22 Survey Corridor between Mileposts 12.00 and 16.58, Garfield County, Utah. Abajo Archaeology.

Montgomery, K.R.
1992 Cultural Resource Inventories of Utah Department of Transportation's Circleville to Junction State Route 89 and State Route 62 Project Areas, Piute County, Utah. Abajo Archaeology.

Montgomery, K.R.
1990 Cultural Resource Survey of a Gold Mine Near Soup Rock, San Juan County, Utah. Sagebrush Archaeological Consultants.

1989 Cultural Resource Inventory of the Proposed Utah Department of Transportation's Dubinkey Road Materials Pit, Grand County, Utah. Abajo Archaeology.

Montgomery, K.R.
1989 Cultural Resource Inventories and Evaluations of the Utah Department of Transportation's Information/View Localities along State Route 313, Grand County, Utah. Abajo Archaeology.

1988 Cultural Resource Inventory of the Proposed Utah Department of Transportation's Sagebrush Bench Materials Pit, Emery County, Utah. Abajo Archaeology.

Montgomery, K.R., and J.A. Montgomery
1988 The Archaeology of the Recapture Dam Pipeline Project, Phase I, San Juan County, Utah. Abajo Archaeology.

1988 Archaeological Testing for Utah Department of Transportation at Site 42Em1876: Interstate Highway 70, Castle Valley to Beyond Muddy Creek Segment, Emery County, Utah. Abajo Archaeology.

1988 Archaeological Testing at Sites 42Sa10636, 42Sa18241 and 42Sa20040 Along U.S. Highway 191, Grand and San Juan Counties, Utah. Abajo Archaeology.

Montgomery, K.R.
1987 Cultural Resource Inventory of the Utah Department of Transportation's Ferron Creek Bridge and Highway Improvement Project in Emery County, Utah. Abajo Archaeology.

Montgomery, K.R., and J.A. Montgomery
1987 Cultural Resource Inventory of the State of Utah's Horse Pasture No. 2 Chaining Program, Grand County, Utah. Abajo Archaeology.

Montgomery, K.R.
1986 Intensive Cultural Resource Inventory of the Proposed Utah Department of Transportation Cat Canyon Materials Pit, Carbon County, Utah. Abajo Archaeology.

Montgomery, K.R., and J.A. Montgomery
1986 Cultural Resource Inventory and Avoidance Recommendations for the Alkali Road Improvement Project, San Juan County, Utah. Abajo Archaeology.

Montgomery, K.R., and J.A. Montgomery
1985 Cultural Resource Inventory and Avoidance on Seven Seismographic Transects for Champlin Petroleum Alkali Prospect, San Juan County, Utah. Abajo Archaeology

Montgomery, K.R.
1983 Cultural Resource Survey of Five Seismic Lines in San Juan County, Utah. Environment Consultants Inc., Dallas, Texas

Montgomery, J.A., K.R. Montgomery, D. Weder, and F.R. Hauck
1982 Archaeological Investigations in the Ten Mile Potash Project Area in Grand County, Utah. AERC Paper No. 35. Archaeological Environmental Research Corporation, Salt Lake City.

Montgomery, K.R.
1981 Archaeological Reconnaissance of Seismic Corridors and Access Roads in the Cottonwood Canyon, Tank Mesa, Montezuma Canyon, Cedar Peak, and Little Ruin Canyon Localities of San Juan County, Utah. Archeological Environmental Research Corporation.

Montgomery, K.R.
1979 Prehistoric Settlements of Sumas Valley, Washington. Masters's Thesis, Department of Anthropology, Western Washington University.

Montgomery, K.R.
1978 "A Preliminary Report of Archaeological Research of the Sumas Area." Paper Presented to the 31st Annual Northwest Anthropological Conference.

Patricia M. Stavish
Curriculum Vitae 2007

EDUCATION:

2003-2005 Masters of Science in Anthropology with a focus in Archaeology. Dec. 2005
University of Wisconsin-Milwaukee. Milwaukee, WI. Thesis. Women and Children First. The Distribution of Grave Goods at the La Tene cemetery Munsingen-Rain.

1998-2002 Bachelor of Arts Degree with a major in Anthropology
University of Minnesota-Twin Cities. Minneapolis. MN.

PROFESSIONAL ORGANIZATIONS:

Archaeological Institute of America (AIA)

PROFESSIONAL EXPERIENCE:

April-Sept 2005
Feb 2006 to Present Staff Archaeologist. Montgomery Archaeological Consultants. Moab. Utah. Responsibilities include fieldwork (survey and mitigation); documentation of cultural resources; site eligibility assessments; laboratory analysis of artifacts technical and research design reports. Skilled in a number of software packages including Microsoft Word, Excel, GPS Pathfinder and ArcView; and is proficient with the use of GPS units and related software (e.g. Trimble GeoExplorer II and III).

2004 Archaeological Crew Member, Bad Duerrnberg, Hallein, Austria. Excavation of Iron Age settlement. Tasks included retrieval of artifacts and identification of settlement features; use of total station and theodolite to record artifacts and; laboratory analysis.

2002-2004 Archaeological Field Technician: Foth and Van Dyke. Eagan, MN. Phase I, II and III archaeological survey and excavation in Minnesota and Iowa. Operation of archaeological and survey equipment.

2000 Archaeological Assistant. Minnesota Historical Society. St. Paul, MN. Excavation of the Mill City ruins (historical urban site). Collection and documentation of archaeological data; creation of scaled drawings of historic structures; operation of survey and GPS equipment.

2000 University of Minnesota-Twin Cities Field School. Excavation of historical fur trading site in Mendota Minnesota. Skills acquired: survey methods, site mapping, excavation of test units, mapping unit floors, profiles and features.

Utah Fieldwork (Montgomery Archaeological Consultants)

2005 Archaeological Technician. Cultural Resource inventory of Alton Coal Development Kane County Utah (2 months) Cultural Area Anasazi

2005 Archaeological Technician. HDR Engineers Central Railroad Project. Sevier County. Utah (2 weeks) Cultural Area: Great Basin

2005 Archaeological Technician. Utah Department of Transportation s Data Recovery at Sites 42Sa25619. 42Sa25664, and 42Sa25664. San Juan County, Utah (1 month). Cultural Area. Anasazi

2005 Archaeological Technician. Cultural Resource Inventory of Bill Barrett Corporation's Seismic Project Near Pine Ridge, San Juan County, Utah. (1.5 months). Cultural Area: Anasazi

2005 Archaeological Technician. Cultural Resource Inventory for the Santa Clara River Bridge on Shivwits Tribal Land. Washington County. Utah (2 weeks). Cultural Area: Anasazi

2005 Archaeological Technician Cultural Resource Inventory of 13 EOG Resources well locations. Uintah County, Utah (1 week). Cultural Area: Great Basin

2005 Archaeological Technician. Cultural Resource Inventory of 5 EOG Resources well locations. Uintah County, Utah (3 days). Cultural Area: Great Basin

2005 Archaeological Technician. Cultural Resource Inventory of Veritas Geophysical Integrity's Seep Ridge 3D seismic prospect, Uintah County, Utah (3 weeks). Cultural Area: Great Basin.

2006 Archaeological Technician. Cultural Resource Inventory of Consol Coal's Hidden Valley development parcels, Emery County, Utah (1 week). Cultural Area: Great Basin

2006 Archaeological Technician. Cultural Resource Inventory of Delta Petroleum's three well locations. Grand County, Utah (1 week). Cultural Area: Great Basin

2006 Archaeological Technician. Cultural Resource Inventory of Tidewater's four well locations. Grand County, Utah (1 week). Cultural Area: Great Basin

2006 Archaeological Technician. Cultural Resource Inventory of the Adam s mineral claims. Grand County. Utah (2 weeks) Cultural Area: Great Basin

2006 Archaeological Technician. Cultural Resource Inventory of Kerr-McKee's Ouray compressor to Bridge station pipeline. Uintah County. Utah (5 days). Cultural Area: Great Basin.

2006 Archaeological Technician. Cultural Resource Inventory of Kerr-McKee s proposed State 921-33M well location, Uintah County. Utah (4 days). Cultural Area: Great Basin.

Utah Fieldwork (Montgomery Archaeological Consultants)

2006 Archaeological Technician Cultural Resource Inventory of Kerr-McKee s proposed State 921-33M well location. Uintah County, Utah (4 days). Cultural Area: Great Basin

2006 Archaeological Technician. Cultural Resource Inventory of Kerr-McKee's proposed State 1021-36L well location. Uintah County, Utah (4 days). Cultural Area: Great Basin.

2006 Archaeological Technician. Cultural Resource Inventory of EOG Resources well Locations North Duck Creek 320-27, 321-27, 322-27, 323-27, 324-27, 318-33, 319-33 on Ute Tribal Lands. Uintah County, Utah (1 week). Cultural Area: Great Basin.

2006 Archaeological Technician. Cultural Resource Inventory of Kerr-McKee NBU 1021-10P well location. Uintah County, Utah (5 days). Cultural Area: Great Basin.

2006 Archaeological Technician. Cultural Resource Inventory of Kerr-McKee NBU 1021-7B well location. Uintah County, Utah (5 days). Cultural Area: Great Basin.

2006 Archaeological Technician. Cultural Resource Inventory of Enduring Resources' 10 Southam Canyon well locations. Uintah Co., Utah (1 week). Cultural Area: Great Basin.

2006 Archaeological Technician. Cultural Resource Inventory of Questar E & P 13 well locations in the Wonsits Valley on Ute Tribal Lands, Uintah Co. Utah (1 week). Cultural Area: Great Basin.

2006 Archaeological Technician. Cultural and Fossil Inventory of Utah Department of Transportation's Hurricane State Route 9 / 600 North Project NH-0009(11)10E. Washington Co., Utah (2 weeks). Cultural Area: Anasazi.

2006 Archaeological Technician. Additional Cultural Resource Inventory for the Southern Corridor Project, Phase I, Interstate 15 to River Road. Addendum to: Cultural and Fossil Inventory of Utah Department of Transportation's Southern Corridor Project, Washington Co., Utah (1 week). Cultural Area: Anasazi.

2006 Archaeological Technician. Cultural and Fossil Resource Inventory for Utah Department of Transportation's US-89 Kanab to Kanab Creek Bridge Project, Kane Co., Utah (4 weeks). Cultural Area: Anasazi.

2006 Archaeological Technician. Cultural and Fossil Resource Inventory for Utah Department of Transportation's SR-11 Ranchos Road to Landfill Road Project. Kane Co., Utah (2 days). Cultural Area: Anasazi.

2007 Archaeological Technician. Data Recovery and Monitoring for Sites 42Sa20727, 42Sa21484, 42Sa21485, 42Sa24113, and 42Sa24114, San Juan Co, Utah. Utah Department of Transportation's US 191 Blanding to Moab Passing Lanes Improvement Project. (5 weeks). Cultural Area: Anasazi.

LABORATORY WORK

2004 Lab Volunteer. Old World section in the Archaeology laboratory at the University of Wisconsin-Milwaukee. Digitizing field drawing from excavations in Germany.

2002-2003
Archaeological Lab Technician. Forth and Van Dyke, Eagan MN. Washed and cataloged artifacts, including both prehistoric and historical remains from surveys and excavations.

TEACHING EXPERIENCE

Fall 2005 Teaching Assistant. Introduction of Anthropological Statistics. University of Wisconsin-Milwaukee.

Spring 2005 Teaching Assistant. Introduction of Cultural Anthropology. University of Wisconsin-Milwaukee.

Fall 2004 Teaching Assistant. Introduction of Anthropological Statistics. University of Wisconsin-Milwaukee.

RESEARCH EXPERIENCE

2004 Part of a graduate student team involved in digitizing excavation drawings from the UWM "Landscape of Ancestors" project in Germany (http://www.uwm.edu/~barnold/arch/). Mortuary contexts, including burials, from two early Iron Age mounds digitized using Canvas software.

2002 Research assistant to Professor Greg Laden, Dept. Of Anthropology; University of Minnesota-Twin Cities, Minneapolis, MN. Library research on various topics of Biological Anthropology and Archaeology.

2001-2002
Research Assistant to Professor Robert Blanchette, Department of Plant Pathology; University of Minnesota-Twin Cities, Minneapolis, MN. Identification of archaeological wood samples using light microscope and digital imaging equipment.

PRESENTATIONS

December
2005 American Anthropological Association: 104th Annual Meeting, Washington, DC. Session: Materialization of Social Identity. Presentation of paper "Women and Children First: An Analysis of Grave Goods and Gender in the Iron Age Cemetery at Munsingen-Rain."

November
2004 Chacmool Gender Conference: Qu(e)erring Archaeology, Calgary, Alberta, Canada. Session: Expressions of Gender Identity in Mortuary Context. Presentation of paper "Women and Children First: The Distribution of Grave Goods at the La Tene cemetery Munsingen-Rain."

TECHNICAL PUBLICATIONS (Montgomery Archaeological Consultants)

Stavish, P. and K. Montgomery
2005 Cultural Resource Inventory of EOG Resources' Proposed 3 CWU Wells: #684-1, #677-6 and #680-6 in Uintah County, Utah. Project No. U-05-MQ-0783b

Cultural Resource Inventory of EOG Resources' Proposed 4 CWU Wells: #1039-18, #1034-19, #1035-19 and #692-20 in Uintah County, Utah. Project No. U-05-MQ-0780b.

Cultural Resource Inventory of EOG Resources' Proposed 5 Chapita Wells Units in Sections 29 and 30 of Township 9 South, Range 23 East in Uintah County, Utah. Project No. U-05-MQ-0781b.

Cultural Resource Inventory of EOG Resources' Proposed 4 CWU Wells: #1039-18, #1034-19, #1035-19 and #692-20 in Uintah County, Utah. Project No. U-05-MQ-0780b.

Cultural Resource Inventory of EOG Resources' Proposed 2 East Chapita Wells Units in Section 5 of Township 9 South, Range 23 East in Uintah County, Utah. Project No. U-05-MQ-0779b.

Cultural Resource Inventory of EOG Resources, Inc.'s Proposed Chapita Wells Unit #1065-3 (Previous #597-3), #1066-3 (Previous #543-3), and #1067-3 (Previous #542-3) in Uintah County, Utah. Project No. U-05-MQ-0778b.

Cultural Resource Inventory of EOG Resources, Inc.'s Proposed Chapita Wells Unit #1041-22 (Previous #237-22) and #1042-28 (Previous #401-28F) in Uintah County, Utah. Project No. U-05-MQ-0777b.

Cultural Resource Inventory of EOG Resources, Inc.'s Proposed Chapita Wells Unit #1036-13 (Previous #236-13), #1037-13 (Previous #338-13), and #1038-24 (Previous #328-24F) in Uintah County, Utah. Project No. U-05-MQ-0776b.

Cultural Resource Inventory of Westport Oil & Gas NBU #922-34 D, K, M and 0 Well Locations, Uintah County, Utah. Project No. U-05-MQ-0782b.

Cultural Resource Inventory of EOG Resources, Inc.'s 13 Proposed Well Locations: North Chapita #225-33, #284-6, #287-5, Stagecoach #97-8, #98-8, #99-8, #100-8, #106-8, #107-8, #108-8, CWU #982-9, #983-9, #985-9 in Uintah County, Utah. Project No. U-05-MQ-0795i.

Cultural Resource Monitoring of Westport Resources Pipeline Corridor, Carbon County, Utah. Montgomery Archaeological Consultants, Moab, Utah. BLM, Vernal Field Office. Permit No. U-05-MQ-041lb Part 2 of 2.

Cultural Resource Inventory of Portions of the Grey Wolf Parcel for the State of Utah, Division of Wildlife Resources, Duchesne County, Utah. Project No. U-05-MQ-0802s.

Cultural Resource Inventory of EOG Resources, Inc.'s Proposed Stagecoach Wells #109-7, #104-17, #80-20 and CWU #1016-16, Uintah County, Utah. Project No. U-05-MQ-0786i.

Stavish, P.

2006 Cultural Resource Inventory of Newfield Exploration's 40 Acre Parcel in Township 9S, Range 16E, Section 15, Duchesne, Utah. Project No. U-06-MQ-0349b.s.

Cultural Resource Inventory of Kerr-McGee Oil & Gas Onshore LP'S Proposed Ouray Compressor to Bridge Station Pipeline and Power Line in Uintah County, Utah. Project No. Project No. U-06-MQ-0348i.

Cultural Resource Inventory of Kerr-McGee Oil & Gas Onshore LP's Proposed State #921-33M Well Location, Uintah County, Utah. Project No. U-06-MQ-488s.

Cultural Resource Inventory of Kerr-McGee Oil & Gas Onshore LP's Proposed Well Locations State #1021-36L and #1021-36M Uintah County, Utah. Project No. Project No. U-06-MQ-0325b.s.

Cultural Resource Inventory of EOG Resources Inc s Proposed Well Locations North Duck Creek 320-27 321-27 322-27, 323-27, 324-27, 318-33, 319-33 on Ute Tribal Lands, Uintah County, Utah. Project No. U-06-MQ-0324i

Cultural Resource Inventory of the Delta Petroleum Corporation Energy's Proposed Greentown Federal #33-12 and #35-12 Well Locations Grand County Utah. Project No U-06-MQ-0288b.

Cultural Resource Inventory of Alton Coal Development's Sink Valley-Alton Amphitheater Project Area Kane County Utah. Project No U-05-MQ-0346b,p.

Cultural and Fossil Inventory of Utah Department of Transportation's Hurricane State Route 9 / 600 North Project NH-0009(11)10E, Washington Co., Utah Report No U-06-MQ-1443b,p.

Additional Cultural Resource Inventory for the Southern Corridor Project, Phase I, Interstate 15 to River Road. Addendum to: Cultural and Fossil Inventory of Utah Department of Transportation's Southern Corridor Project. Washington Co., Utah. Report No. U-06-MQ-0946s.

Cultural and Fossil Resource Inventory for Utah Department of Transportation's US-89 Kanab to Kanab Creek Bridge Project, Kane Co., Utah. Report No. U-06-MQ-1700b,p,s.

Cultural and Fossil Resource Inventory for Utah Department of Transportation's SR-11 Ranchos Road to Landfill Road Project. Kane Co., Utah. Report No. U-06-MQ-1701p.

Stavish, P.
2007 Cultural Resource Inventory of Alton Coal Development's Project Area Kane County, Utah. Report No. U-05-MQ-1568b,p

APPENDIX B
Level and Artifact Recording Forms

MONTGOMERY ARCHAEOLOGICAL CONSULTANTS TESTING FORM

PROJECT: SITE:
EXCAVATORS DATE:
TEST UNIT NUMBER: Screen mesh size:
Unit Size: Unit Orientation: Datum Corner:

Unit Description: _____

General Surface Planview:

North

Is the depth below datum or MGS?
Level Number (Depth)/Description: _____

Level Number (Depth)/Description: _____

Lithic Analysis Form

Site _____ AU# _____ Analyst _____ Date _____ Page ___ of ___

Cat.	Grid	Sec	Layer	Level	Mat.	Color	% Cortex	Cortex Type	Platform	Cond.	HT	Use	mm of Use	# Dors. Scars	Tech. Type	tFunc. Type	Size Class

Ground Stone Analysis Form

Site _____ AU# _____ Analyst _____ Date _____
Page __ of __

Cat #	Prov	Mat.	Color	Manufacture	# Use Surface	Size of surface	Attrition	X-section	Function	Size

Ceramic Analysis Form

Site _____ Acc# _____ Analyst _____ Date _____

Page__ of __

Cat #	Prov	Type	Color	Finish	Hardness	Form	Rim Dia.	# of Sherds	Weight	Comments

Faunal Analysis Form

Site _____ AU# _____ Analyst _____ Date _____

Page__ of __

Cat #	Prov.	Taxon	Element	Side	Portion	Sex	Age	C-Forms	N-Forms	Comment

ADDRESS ALL CORRESPONDENCE TO:
COMMERCIAL TESTING & ENGINEERING CO.
4665 PARIS STREET, SUITE B-200
DENVER, CO 80239
TEL: (303) 373-4772
FAX: (303) 373-4791

January 18, 2006

TALON RESOURCES, INC.
PO BOX 1230
195N 100W
HUNTINGTON UT 84528

Sample identification by
TALON RESOURCES, INC.

SAMPLE ID: CH-5
Coal Hollow
Head Sample Split

Kind of sample reported to us: COAL

Sample taken at: xxxxx

Sample taken by: TALON RESOURCES, INC.

Date sampled: ------

Date received: December 29, 2005

Analysis Report No. 72-521785

PROXIMATE ANALYSIS

	As Received	Dry Basis
% Moisture	15.72	xxxxx
% Ash	6.60	7.83
% Volatile	33.75	40.05
% Fixed Carbon	43.93	52.12
	100.00	100.00
Btu/lb	10513	12474
% Sulfur	0.78	0.92
MAF Btu		13534
SO_2 lb/mill. Btu @ 100%	1.48	
Alk. as Sodium Oxide	0.27	0.32

ULTIMATE ANALYSIS

	As Received	Dry Basis
% Moisture	15.72	xxxxx
% Carbon	60.30	71.55
% Hydrogen	4.23	5.02
% Nitrogen	1.10	1.30
% Sulfur	0.78	0.92
% Ash	6.60	7.83
% Oxygen(diff)	11.27	13.38
	100.00	100.00

FUSION TEMPERATURE OF ASH, (°F)

	Reducing	Oxidizing
Initial Deformation (IT)	2254	2315
Softening (ST)	2293	2337
Hemispherical (HT)	2325	2391
Fluid (FT)	2440	2575

GRINDABILITY INDEX = 55 at 7.60 % Moisture
FREE SWELLING INDEX = 0.0

MEMBER ACIL

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Kristi Bills

Denver Laboratory

SGS

ADDRESS ALL CORRESPONDENCE TO:
COMMERCIAL TESTING & ENGINEERING CO.
4665 PARIS STREET, SUITE B-200
DENVER, CO 80239
TEL: (303) 373-4772
FAX: (303) 373-4791

January 18, 2006

TALON RESOURCES, INC.
PO BOX 1230
195N 100W
HUNTINGTON UT 84528

Sample identification by
TALON RESOURCES, INC.

SAMPLE ID: CH-5
Coal Hollow
Head Sample Split

Kind of sample reported to us: COAL

Sample taken at: xxxxx

Sample taken by: TALON RESOURCES, INC.

Date sampled: ------

Date received: December 29, 2005

Analysis Report No. 72-521785

ANALYSIS OF ASH	WEIGHT %, IGNITED BASIS
Silicon dioxide	49.84
Aluminum oxide	21.44
Titanium dioxide	1.14
Iron oxide	4.54
Calcium oxide	9.64
Magnesium oxide	2.09
Potassium oxide	0.23
Sodium oxide	3.99
Sulfur trioxide	6.50
Phosphorus pentoxide	0.18
Strontium oxide	0.19
Barium oxide	0.20
Manganese oxide	0.02
Undetermined	0.00
	100.00

Silica Value = 75.39
Base:Acid Ratio = 0.28
T_{250} Temperature = 2577 °F

Type of Ash = LIGNITIC
Fouling Index = 3.99
Slagging Index = 2281.40

MEMBER ACIL

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO

Kristi Bulls

Denver Laboratory

ADDRESS ALL CORRESPONDENCE TO:
COMMERCIAL TESTING & ENGINEERING CO.
4665 PARIS STREET, SUITE B-200
DENVER, CO 80239
TEL: (303) 373-4772
FAX: (303) 373-4791

January 18, 2006

TALON RESOURCES, INC.
PO BOX 1230
195N 100W
HUNTINGTON UT 84528

Sample identification by
TALON RESOURCES, INC.

SAMPLE ID: CH-5
Coal Hollow
Head Sample Split

Kind of sample reported to us COAL

Sample taken at xxxxx

Sample taken by TALON RESOURCES, INC.

Date sampled ------

Date received December 29, 2005

Analysis Report No. 72-521785

APPARENT SPECIFIC GRAVITY = 1.32

MEMBER ACIL

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO

Kristi Bull

Denver Laboratory

SGS

TALON RESOURCES
P.O. BOX 1230
195N 100W
HUNTINGTON, UT 84528

Sample ID: CH-5 Coal Hollow
Lab No. 72- 521785

1/18/2006

As Received Weight: 17.4 lb

FLOAT & SINK ANALYSIS
DRY BASIS

1	2	3	4	5	6	7	8	9	10	11	12	13	14
SPECIFIC GRAVITY		FRACTION ANALYSIS DRY BASIS				CUMULATIVE RECOVERY (Float)				CUMULATIVE REJECT (Sink)			
Sink	Float	%Wt.	%Ash	%Sul.	Btu/lb	%Wt.	%Ash	%Sul.	Btu/lb	%Wt.	%Ash	%Sul.	Btu/lb
-	1.40	93.1	6.72	1.35	12593	93.1	6.72	1.35	12593	100.0	8.18	1.40	12382
1.40	1.50	2.7	15.87	1.31	11359	95.8	6.98	1.35	12558	6.9	27.84	2.10	9531
1.50	1.60	2.6	29.46	1.12	9265	98.4	7.57	1.34	12471	4.2	35.54	2.61	8356
1.60	-	1.6	45.41	5.04	6879	100.0	8.18	1.40	12382	1.6	45.41	5.04	6879

Respectfully submitted,
SGS NORTH AMERICA INC.

Denver Laboratory

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SGS North America Inc. | Minerals Services Division
4665 Paris Street, Suite B-200, Denver, CO 80239 t (303) 373-4772 f (303) 373-4791 www.sgs.com

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DENVER, CO 80239
TEL: (303) 373-4772
FAX: (303) 373-4791

February 20, 2006

TALON RESOURCES, INC.
PO BOX 1230
195N 100W
HUNTINGTON UT 84528

Sample identification by
TALON RESOURCES, INC.

SAMPLE ID: CH-1
Coal Hollow
Head Sample Split
Zone: 60.5' - 72.5'

Kind of sample reported to us: COAL

Sample taken at: xxxxx

Sample taken by: TALON RESOURCES, INC.

Date sampled: ------

Date received: February 8, 2006

Analysis Report No. 72-524038

PROXIMATE ANALYSIS

	As Received	Dry Basis
% Moisture	15.65	xxxxx
% Ash	7.52	8.91
% Volatile	34.40	40.78
% Fixed Carbon	42.43	50.31
	100.00	100.00
Btu/lb	10340	12259
% Sulfur	1.02	1.21
MAF Btu		13458
SO_2 lb/mill. Btu @ 100%	1.97	
Alk. as Sodium Oxide	0.05	0.06

ULTIMATE ANALYSIS

	As Received	Dry Basis
% Moisture	15.65	xxxxx
% Carbon	59.15	70.12
% Hydrogen	4.09	4.85
% Nitrogen	0.91	1.08
% Sulfur	1.02	1.21
% Ash	7.52	8.91
% Oxygen(diff)	11.66	13.83
	100.00	100.00

FUSION TEMPERATURE OF ASH, (°F)

	Reducing	Oxidizing
Initial Deformation (IT)	2349	2355
Softening (ST)	2373	2412
Hemispherical (HT)	2409	2472
Fluid (FT)	2564	2600

GRINDABILITY INDEX = 55 at 7.80 % Moisture
FREE SWELLING INDEX = 0.0

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COMMERCIAL TESTING & ENGINEERING CO.

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DENVER, CO 80239
TEL: (303) 373-4772
FAX: (303) 373-4791

February 20, 2006

TALON RESOURCES, INC.
PO BOX 1230
195N 100W
HUNTINGTON UT 84528

Sample identification by
TALON RESOURCES, INC.

SAMPLE ID: CH-1
Coal Hollow
Head Sample Split
Zone: 60.5' - 72.5'

Kind of sample reported to us: COAL

Sample taken at: xxxxx

Sample taken by: TALON RESOURCES, INC.

Date sampled: ------

Date received: February 8, 2006

Analysis Report No. 72-524038

ANALYSIS OF ASH	WEIGHT %, IGNITED BASIS
Silicon dioxide	45.46
Aluminum oxide	24.85
Titanium dioxide	1.42
Iron oxide	6.41
Calcium oxide	10.53
Magnesium oxide	2.70
Potassium oxide	0.16
Sodium oxide	0.53
Sulfur trioxide	7.53
Phosphorus pentoxide	0.13
Strontium oxide	0.14
Barium oxide	0.10
Manganese oxide	0.04
Undetermined	0.00
	100.00

Silica Value = 69.83
Base:Acid Ratio = 0.28
T_{250} Temperature = 2572 °F

Type of Ash = LIGNITIC
Fouling Index = 0.53
Slagging Index = 2373.60

MEMBER ACIL

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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FAX: (303) 373-4791

February 20, 2006

TALON RESOURCES, INC.
PO BOX 1230
195N 100W
HUNTINGTON UT 84528

Sample identification by
TALON RESOURCES, INC.

SAMPLE ID: CH-1
Coal Hollow
Head Sample Split
Zone: 60.5' - 72.5'

Kind of sample reported to us: COAL

Sample taken at: xxxxx

Sample taken by: TALON RESOURCES, INC.

Date sampled: ------

Date received: February 8, 2006

Analysis Report No. 72-524038

APPARENT SPECIFIC GRAVITY = 1.34

MEMBER ACIL

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Denver Laboratory

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TALON RESOURCES
P.O. BOX 1230
195N 100W
HUNTINGTON, UT 84528

Sample ID : CH-1
Zone : 60.50' - 72.50'
Lab No. : 72-524038

2/22/2006

As Received Weight : 6.2 lb

FLOAT & SINK ANALYSIS
DRY BASIS

COPY

1	2	3	4	5	6	7	8	9	10	11	12	13	14
SPECIFIC GRAVITY		FRACTION ANALYSIS DRY BASIS				CUMULATIVE RECOVERY (Float)				CUMULATIVE REJECT (Sink)			
Sink	Float	%Wt.	%Ash	%Sul.	Btu/lb	%Wt.	%Ash	%Sul.	Btu/lb	%Wt.	%Ash	%Sul.	Btu/lb
	1.40	87.2	6.23	1.18	12681	87.2	6.23	1.18	12681	100.0	8.80	1.38	12311
1.40	1.50	6.5	20.93	1.20	10560	93.7	7.25	1.18	12534	12.8	26.27	2.73	9787
1.50	1.60	2.8	24.15	1.52	10103	96.5	7.74	1.19	12463	6.3	31.79	4.30	8989
1.60	-	3.5	37.90	6.53	8098	100.0	8.80	1.38	12311	3.5	37.90	6.53	8098

Respectfully submitted,
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FAX. (303) 373-4791

February 20, 2006

TALON RESOURCES, INC.
PO BOX 1230
195N 100W
HUNTINGTON UT 84528

Sample identification by
TALON RESOURCES, INC.

SAMPLE ID: CH-6
Coal Hollow
Head Sample Split
Zone: 63.0' - 78.5'

Kind of sample reported to us: COAL

Sample taken at: xxxxx

Sample taken by: TALON RESOURCES, INC.

Date sampled: ------

Date received: February 8, 2006

Analysis Report No. 72-524039

PROXIMATE ANALYSIS

	As Received	Dry Basis
% Moisture	15.18	xxxxx
% Ash	8.95	10.55
% Volatile	33.93	40.00
% Fixed Carbon	41.94	49.45
	100.00	100.00
Btu/lb	10244	12077
% Sulfur	1.18	1.39
MAF Btu		13501
SO_2 lb/mill. Btu @ 100%	2.30	
Alk. as Sodium Oxide	0.34	0.40

ULTIMATE ANALYSIS

	As Received	Dry Basis
% Moisture	15.18	xxxxx
% Carbon	58.40	68.85
% Hydrogen	4.02	4.74
% Nitrogen	0.88	1.04
% Sulfur	1.18	1.39
% Ash	8.95	10.55
% Oxygen(diff)	11.39	13.43
	100.00	100.00

FUSION TEMPERATURE OF ASH, (°F)

	Reducing	Oxidizing
Initial Deformation (IT)	2268	2368
Softening (ST)	2302	2386
Hemispherical (HT)	2324	2424
Fluid (FT)	2412	2507

GRINDABILITY INDEX = 56 at 8.00 % Moisture
FREE SWELLING INDEX = 0.0

MEMBER ACIL

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Denver Laboratory

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DENVER, CO 80239
TEL: (303) 373-4772
FAX: (303) 373-4791

February 20, 2006

TALON RESOURCES, INC.
PO BOX 1230
195N 100W
HUNTINGTON UT 84528

Sample identification by
TALON RESOURCES, INC.

SAMPLE ID: CH-6
Coal Hollow
Head Sample Split
Zone: 63.0' - 78.5'

Kind of sample reported to us: COAL

Sample taken at: xxxxx

Sample taken by: TALON RESOURCES, INC.

Date sampled: ------

Date received: February 8, 2006

Analysis Report No. 72-524039

ANALYSIS OF ASH	WEIGHT %, IGNITED BASIS
Silicon dioxide	48.83
Aluminum oxide	23.01
Titanium dioxide	1.33
Iron oxide	7.24
Calcium oxide	8.96
Magnesium oxide	1.97
Potassium oxide	0.38
Sodium oxide	3.56
Sulfur trioxide	4.16
Phosphorus pentoxide	0.17
Strontium oxide	0.18
Barium oxide	0.20
Manganese oxide	0.01
Undetermined	0.00
	100.00

Silica Value = 72.88
Base:Acid Ratio = 0.30
T_{250} Temperature = 2545 °F

Type of Ash = LIGNITIC
Fouling Index = 3.56
Slagging Index = 2299.20

MEMBER ACIL

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO

Denver Laboratory

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DENVER, CO 80239
TEL: (303) 373-4772
FAX: (303) 373-4791

February 20, 2006

TALON RESOURCES, INC.
PO BOX 1230
195N 100W
HUNTINGTON UT 84528

Sample identification by
TALON RESOURCES, INC.

SAMPLE ID: CH-6
Coal Hollow
Head Sample Split
Zone: 63.0' - 78.5'

Kind of sample reported to us: COAL

Sample taken at: xxxxx

Sample taken by: TALON RESOURCES, INC.

Date sampled: ------

Date received: February 8, 2006

Analysis Report No. 72-524039

APPARENT SPECIFIC GRAVITY = 1.36

MEMBER ACIL

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Denver Laboratory

SGS

TALON RESOURCES
P.O. BOX 1230
195N 100W
HUNTINGTON, UT 84528

Sample ID : CH-6
Zone : 63.00' - 78.50'
Lab No. : 72-524039

2/22/2006

As Received Weight : 16.8 lb

FLOAT & SINK ANALYSIS
DRY BASIS

COPY

1	2	3	4	5	6	7	8	9	10	11	12	13	14
SPECIFIC GRAVITY		FRACTION ANALYSIS DRY BASIS				CUMULATIVE RECOVERY (Float)				CUMULATIVE REJECT (Sink)			
Sink	Float	%Wt.	%Ash	%Sul.	Btu/lb	%Wt.	%Ash	%Sul.	Btu/lb	%Wt.	%Ash	%Sul.	Btu/lb
-	1.40	89.2	6.80	1.17	12525	89.2	6.80	1.17	12525	100.0	9.91	1.40	12062
1.40	1.50	3.0	19.99	1.55	10570	92.2	7.23	1.18	12461	10.8	35.62	3.33	8242
1.50	1.60	3.3	27.15	1.38	9475	95.5	7.92	1.19	12358	7.8	41.63	4.01	7346
1.60	-	4.5	52.25	5.94	5785	100.0	9.91	1.40	12062	4.5	52.25	5.94	5785

Respectfully submitted,
SGS NORTH AMERICA INC.

Denver Laboratory

MEMBER ACIL

APPENDIX 6-1

COAL QUALITY – COAL HOLLOW
(2005-2006)

SGS/COMMERICAL TESTING & ENGINEERING

August 03 2006

Talon Resources, Inc.
PO Box 1230
195N 100W
Huntington, UT 84528
USA

Client Sample ID:	CH-3	**Sample Type :**	-2" Moist
Date Received:	07/21/2006		
Matrix:	Coal		
Net Sample Weight:	1758.70		

SGS Sample ID: 072-20812-001

	As Received
% Moisture, Total	10.46

Analyte	Result
Antimony	<1 ug/g
Barium	41 ug/g
Beryllium	<0.2 ug/g
Cadmium	<0.2 ug/g
Cobalt	1 ug/g
Chromium	3 ug/g
Copper	6 ug/g
Lithium	31 ug/g
Manganese	12 ug/g
Molybdenum	3 ug/g
Nickel	2 ug/g
Lead	2 ug/g
Silver	<0.2 ug/g
Strontium	120 ug/g
Thallium	<1 ug/g
Tin	1 ug/g
Vanadium	6 ug/g
Zinc	<1 ug/g
Zirconium	16 ug/g
Boron	100 ug/g
Bromine, Dry	ug/g
Chlorine, Dry	<100 ug/g
Fluorine, Dry	77 ug/g
Arsenic	<1 ug/g

August 03, 2006

Talon Resources, Inc.
PO Box 1230
195N 100W
Huntington, UT 84528
USA

Client Sample ID:	CH-3	**Sample Type :**	-2" Moist
Date Received:	07/21/2006		
Matrix:	Coal		
Net Sample Weight:	1758.70		

SGS Sample ID: 072-20812-001

Analyte	Result
Selenium	<1 ug/g
Mercury	0.03 ug/g