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May 24, 2006

Pamela Grubagh-Littig
Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
P. O. Box 145801
Salt Lake City UT 84114-5801

RE: Request for input on proposed sampling design for a Class II inventory of the potential subsidence area of the Lila Canyon Extension

In reply, please refer to Case No.: 05-0305

Dear Pam:

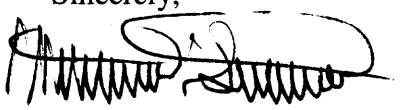
The Utah State Historic Preservation Office received your request for comment on the above referenced project on May 17, 2006. You provided a proposed sampling design that is intended to provide a first step in identification efforts for potential rockshelters and granaries within the potential subsidence area of the above referenced mine. You requested our input and comments on this design, per 36CFR800.4(a)(3).

We have reviewed the enclosed document and attached detailed comments. In summary, we agree that the proposed simple random sample of areas likely to contain rockshelters and granaries will be a valid first step towards completing reasonable and good faith efforts to identify a portion of the cultural resources in the project area that could be adversely affected by subsidence. We do not find the proposed opportunistic sample to be a scientifically defensible way to evaluate the results of the random sample. However, the random sample, in and of itself, should provide adequate data to determine if additional inventory for rockshelters/granaries is needed and help determine (if necessary) how best to conduct such additional evaluation.

We do note that your office has indicated to us that subsidence can potentially cause cracking in the ground surface. Such ground cracking, while having the potential to irrevocably damage rockshelters/granaries, also has the potential to adversely affect other archaeological and historical sites known from overviews to be present in the area. Therefore, as detailed in the attachment, we are open to considering additional identification efforts or a modification of the proposed identification efforts to define these resources. We are also open to alternative ways (such as a Programmatic Agreement or Memorandum of Agreement) to mitigate the potential for adverse effects to such other sites from cracking due to subsidence.

This letter serves as our comment at your request, within the consultation process specified in §36CFR800.4. If you have questions, please contact me at (801) 533-3555 or mseddon@utah.gov.

Sincerely,



Matthew T. Seddon, Ph.D., RPA
Deputy State Historic Preservation Officer-Archaeology

cc. Montgomery Archaeological Consultants; P.O. Box 147; 322 East 100 South; Moab UT 84532

Utah SHPO Comments on Patterson (2006)
and comments regarding identification efforts for the
potential subsidence area of Lila Canyon Extension Coal Mine
SHPO Case No.: 05-0305

This document provides detailed comment explaining our reasoning provided in a letter to the Utah Division of Oil, Gas, and Mining (UDOGM) regarding a proposal to conduct a sampling inventory for cultural resources in the potential subsidence area of the Lila Canyon Extension Coal Mine. We greatly appreciate UDOGM's careful consideration of what is a difficult issue, and we appreciate UDOGM's consideration of our comments. These comments are provided in the spirit of helping UDOGM comply with the National Historic Preservation Act (16 U.S.C. 470 with implementing regulations at 36CFR800) and Utah Code 9-8-404. We will discuss the general appropriateness of a sample survey, what we understand to be the overall goals of the sampling, the appropriateness of the proposed sampling strategy as a means of meeting these goals, specific issues with the proposal, and finally a discussion of other potential identification efforts.

The Use of Sample Surveys as Identification Methods under 36CFR800.4(b)(1)

Under 36CFR800.4(b)(1) a federal agency "shall make a reasonable and good faith effort to carry out appropriate identification efforts" to find cultural resources within a project Area of Potential Effects (APE). The regulations further stipulate that these can include "*sample* field investigation, and field survey" (36CFR800.4(b)(1); emphasis added). The regulations do not require that every cultural resource in the APE be identified, nor do they require a particular identification method, such as the Class III inventory popular in the intermountain west (c.f. King 2004:100). Generally the most appropriate identification efforts are considered relative both to the type of proposed action and it's potential effects on cultural resources and the types of resources present.

In our opinion, sampling inventories are not only appropriate under the regulations in general, but are appropriate in this particular instance. Firstly, *all* current cultural resource field inventories are sample inventories, including Class III inventories. Class III inventories will not find all cultural resources in the area, nor are they intended to find all resources. Sampling at other levels of intensity, such as a Class II inventory, are also appropriate means of identifying resources. We believe they are particularly appropriate in this case because (a) the area of potential subsidence is large, (b) the exact location of subsidence effects (if any) is not and cannot be known in advance, and (c) such effects will affect different types of resources in different ways. Therefore, in our opinion, targeted sampling is a valid means of identifying resources under 36CFR800.4(b)(1) in this case.

Goals of the Proposed Sampling Strategy

The appropriateness of any particular sampling strategy must be judged relative to the goals of the strategy (Drennan 1996; Flannery 1976; Orton 2000). As stated in the proposed strategy, the goals are to "locate and identify rockshelters, as well as standing structures such as granaries, prehistoric room blocks, historic cabins, and buildings" (Patterson 2006:1). These resources are

targeted because they are "likely to be adversely affected by ground subsidence" (Patterson 2006:2). Other known resources in the area (c.f. Spangler 2005) are implied to be less likely to be affected by subsidence as "the land moves, more or less, as a unit causing only minor alterations in subsurface contexts" (Patterson 2006:1).

We agree that rockshelters, granaries, prehistoric room blocks, historic cabins, and buildings (hereinafter referred to as "architectural sites"), if present, could be adversely affected by any form of subsidence. We agree that sag-subsidence, described by Wayne Western of UDOGM as "a gentle, gradual setline of the surface" (personal communication, 5/24/2006) is not likely to affect non-architectural sites. We do not agree that other resources known to be in the area, such as prehistoric camps, room blocks, historic cabins, etc. would not be adversely affected by other forms of subsidence. We note that in an email provided to us by Wayne Western of UDOGM, there is some known potential for "large surface cracks" (personal communication, 5/24/2006). Such cracks could potentially adversely impact architectural sites such as cabins and prehistoric room blocks by causing collapse of the structures. Cracking could adversely affect non-architectural sites by disturbing subsurface features (fire pits, storage pits), or altering the spatial relationships between artifacts and/or features on the camps (such spatial relationships are critical to archaeological interpretations of such sites).

Nevertheless, we wish to note that, in our opinion, the types of adverse effects that could occur from possible subsidence cracking are different for architectural and non-architectural sites. In the case of architectural sites, the results have the potential to be irrevocable, as rockshelters collapse and damage/bury sites, as prehistoric walls are altered or destroyed, and as historical cabins are damaged. In the case of non-architectural sites, cracking would adversely affect the site, but the effects are not irrevocable. Archaeological data recovery, for example, could mitigate the adverse effects of cracking.

These differences influence our overall comments. We believe the sampling strategy is a good one to use as a first step towards identifying a large portion of the most sensitive of the architectural sites (rockshelters and granaries). We will discuss this concurrence next. We will discuss possible alternatives within the Section 106 process that UDOGM could consider for addressing the potential adverse effects of cracking on non-architectural sites last.

The Proposed Class II Sampling Strategy

In our opinion, the proposed simple random sample is a valid, and even recommended, first step towards identifying rockshelters and granaries in the project area, and as such we concur with the author in that regard (Patterson 2006). The definition of potential rockshelter/granary areas is carefully and defensibly done. The use of a simple random sample is a well-supported means of gaining an estimation of the number and density of sits within a given sample area (Drennan 1996; Orton 2000; Plog 1976; Plog et al. 1978). The use of small (20 acre) quadrats, is a particularly well-supported technique (Orton 2000: Plog 1976; Plog et al. 1978). Both the proposed sample fraction (34%) and sample size (600 acres in 30 quadrats) are, in our opinion, robust and defensible. We believe that the simple random sample will provide a scientifically valid means of estimating the total number and general location of rockshelter/granary sites in

the project area, help determine if additional identification efforts for rockshelters/granaries are needed, and, if so, help determine how to efficiently conduct such efforts.

We do not believe that the "opportunistic sample," described as examining areas "as they are encountered" (Patterson 2006:4) will allow "for a reasonable approximation of design's (sic) utility in accurately estimating the number and density of rock shelters" (Patterson 2006:5). Although we admit that the literature on statistics is vast, we are not aware of any statistical technique that utilizes non-systematic samples as a means of judging the statistical validity of systematic samples. We are specifically not aware of a technique that utilizes an assessment of normal distributions (Patterson 2006:5) of differentially sampled subsets as a means of assessing sample accuracy. Furthermore, we are not certain that rockshelter density would be normally distributed. If the author can provide references that contradict our understanding as stated here, we will happily consider them. While we do not object to conducting the opportunistic sample, we do not consider it a valid way of evaluating the accuracy or statistical validity of the (excellent) random sample.

However, this observation does not obviate our opinion that the simple random sample is a valid first step towards identifying the potential density and locations of rockshelter/granary sites in the project area. We firmly believe that the simple random sample is sufficiently well designed and robust in size that it will provide good information regarding whether additional rockshelter/granary sites are likely to occur in the area. This information can then be used both to assess whether additional identification efforts for rockshelters/granaries are warranted and, how these efforts can most efficiently be addressed. We do wish to note, as does the author, that additional identification efforts (Patterson 2006:5), may result from the sample inventory. We would suggest that UDOGM consider the number, density, and distribution of any rockshelters/granaries identified in the sample survey (if any), rather than data from the opportunistic survey, in evaluating whether further identification efforts are necessary.

Other Potential Identification Efforts/Mitigation Strategies

As noted above, the sample inventory, as designed, will not identify resources other than rockshelters/granaries, such as historic cabins, prehistoric camps, Fremont Complex architectural sites, that are known to occur in the general region (Spangler 2005), have potential to be present in the project APE, and which could be adversely affected by subsidence cracking. We are open to a variety of identification methods to identify such resources, if considered appropriate by UDOGM. Such identification methods could utilize simple random sampling of the high probability areas identified by Spangler (2005:9-11) as a first step. Indeed, a slight modification of the proposed sampling area to include high probability areas beyond simply areas likely to contain rockshelters might accomplish enable UDOGM to assess the need for further inventory to identify resources other than rockshelters/granaries without a significant amount of additional survey area. We are willing to consider other proposed techniques that would enable an assessment of the full range (not simply rockshelters/granaries) of resources that could be adversely affected by subsidence cracking.

We are also open to addressing potential effects to such resources via other means. Spangler (2005) has identified the resources likely to be present and some of the distribution of these

resources. Because the impacts of cracking on resources such as prehistoric camps could be mitigated through archaeological data recovery, we are amenable to ideas, potentially addressed in a Programmatic Agreement or Memorandum of Agreement, such as monitoring of the project area for cracking, followed by archaeological inspection of cracking areas, evaluation of impacts to archaeological sites (if any), and data recovery to mitigate the impacts (if necessary). We are also open to other ideas to address this difficult issue.

Summary

In summary, we agree that the proposed simple random sample of areas likely to contain rockshelters and granaries will be a valid first step towards completing reasonable and good faith efforts to identify a portion of the cultural resources in the project area that could be adversely affected by subsidence. We do not find the proposed opportunistic sample to be a scientifically defensible way to evaluate the results of the random sample. However, the random sample, in and of itself, should provide adequate data to determine if additional inventory for rockshelters/granaries is needed and help determine (if necessary) how best to conduct such additional evaluation.

Because of the potential for ground cracking to adversely affect other archaeological and historical sites known from overviews to be present in the area, we are open to considering either additional identification efforts to define these resources or alternative ways (such as a Programmatic Agreement or Memorandum of Agreement) to mitigate the potential for adverse effects to such other sites from cracking due to subsidence.

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