Mr. Patrick Baird, Tribal Historic Preservation Officer
Nez Perce Tribe
P.O. Box 365
Lapwai, Idaho 83540

Re: Request for Comment on Treatment Plan for Archaeological Site 24DW0560, Dawson County, Montana

Dear Mr. Baird,

In accordance with Stipulation V.C.4.c of the Keystone XL Project Programmatic Agreement, the Department of State (Department) submits the attached treatment plan entitled, “Data Recovery Plan for 24DW0560,” for your review and comment. Archaeological site 24DW0560 is a prehistoric campsite located in Dawson County, Montana, that will be adversely affected by construction related to the Keystone XL pipeline. Please provide your comments within the 45-day comment period.

If you have any questions, please contact me.

Sincerely,

Ms. Jill E. Reilly
Acting NEPA Coordinator
Department of State
(202) 647-9798
ReillyJE@state.gov
TransCanada Keystone Pipeline, L.P.
Keystone XL Pipeline

Data Recovery Plan for 24DW560, Dawson County, Montana

Project Number:
TAL-00050388-60

Prepared By:
Ethnoscience, Inc.
4140 King Avenue East
Billings, MT 59101
T: 406.252.7945
F: 406.252.9483
www.ethnosciense.com

Submitted By:
EXP Energy Services Inc.
1300 Metropolitan Blvd.
Tallahassee, FL 32308
T: 850.385.5441
F: 850.385.5523
www.exp.com

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<td>Lynelle A. Peterson</td>
<td>Erin Salisbury</td>
<td>Erin Sallisby</td>
<td>Richard Gale</td>
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Legal Notification

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1.0 Introduction

On behalf of TransCanada Keystone Pipeline, L.P. (Keystone), EXP Energy Services Inc. (EXP) contracted Ethnoscience, Inc. (Ethnoscience) to conduct cultural resource investigations for the Keystone XL Project (Project) in Montana. The Project is a proposed interstate crude oil pipeline. Within Montana, the Project will cross through land under the jurisdiction of the Bureau of Land Management, U.S. Army Corps of Engineers, and State of Montana, as well as privately owned land. The Department of State is the lead federal agency for this undertaking because the pipeline originates in Canada, and crosses the U.S.A. border in Phillips County, Montana. In Montana, the pipeline route extends from the United States/Canadian crossing to the southeast corner of Fallon County. On March 24, 2017, the Project received a Presidential permit to "construct, connect, operate, and maintain at the border of the United States pipeline facilities for the import of crude oil from Canada to the United States" (DOS 2017). Construction of the pipeline will impact a small number of historic properties in Montana, including 24DW0560 in Dawson County.

Site 24DW0560 is a prehistoric culture material scatter within an area measuring 139 meters northwest-southeast by 52 meters southwest-northeast. Approximately half of the site is located on the edge of a ridge overlooking a drainage of Upper Sevenmile Creek to the west (Figure 1); the rest of the site is defined by artifacts that are eroding down the ridge. The soil within the site is associated with "Subwell-Peerless loams with 0 to 4 slopes" (USDA n.d.). This frigid Typic Haplustoll contains 5 to 10 percent gravels at its surface, which increases with depth. The soils support vegetation dominated by bluebunch wheatgrass, little bluestem, plains muhly, needleandthread, and western wheatgrass (USDA n.d.), which limits ground surface visibility to 10 percent. In addition to erosion, grazing cattle are impacting the site.

SWCA originally identified the site while conducting a Class III cultural resource inventory of the pipeline corridor (Boyer et al. 2013). During the inventory they identified a fire-cracked rock feature eroding from the ridge edge, a Grade 1 (G1) [greater than 25 millimeters] size gray porcellanite biface, 10 flakes, and 7 randomly scattered fire-cracked rock. The fire-cracked feature consists of granite and quartzite cobbles that are eroding down the slope. It measures 1.2 meters north-south by 2.9 meters east-west. The flaking debris is made of gray basalt, clear/tan chalcedony, petrified wood, tan/gray chert, red chert and white quartzite. They tested the site with eight shovel probes measuring 30 square centimeters and extended to a maximum depth of 60 centimeters below surface. Two of the probes (ST3, ST7) were placed near the fire-cracked rock concentration, and one shovel probe (ST4) was placed 30 meters to the northwest. Shovel Test 3 yielded five burned petrified wood fragments in Level 2 (10-20 centimeters below surface), three fire-cracked rock cobbles/fragments and a flake from Level 3 (20-30 centimeters below surface) and two flakes from Level 4 (30-40 centimeters below surface). Shovel Test 4 yielded two flakes from 30 to 40 centimeters below surface. Shovel Test 7 contained 14 pieces of fire-cracked siltstone from 0 to 30 centimeters below surface. Based on the identification of a fire-cracked rock feature, as well as the flaking debris observed within three shovel tests, the site was recommended as National Register of Historic Places-eligible under Criterion D.

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Figure 1: Site Map of 24DW560 showing the original and expanded site boundaries, as well as the location of shovel probes and test units
SWCA returned to the site in 2013 to examine a possible reroute to avoid the site (Kromarek et al. 2013). Ground surface visibility was limited, and the only artifacts that were found on the surface were a brown chert biface fragment, six chert flakes and three fragments of fire-cracked rock along the eroded slope. Six additional shovel probes (ST9- ST14) were excavated approximately 15 to 50 meters southeast of the original site boundaries (see Figure 1). The shovel probes were excavated from 50 to 60 centimeters below surface, and the soils contained abundant rock and gravel. Four of the shovel probes (Shovel Tests 11-14) yielded cultural materials. Shovel Test 11 yielded four chert flakes from 0 to 30 centimeters below surface. Shovel Test 12 yielded four chert flakes and a quartzite fire-cracked rock fragment between 20 and 40 centimeters below surface. Shovel Test 13 yielded one chert flake from 25 to 30 centimeters below surface and Shovel Test 14 contained a chert flake at 30 centimeters below surface. They expanded the site boundaries to encompass the shovel probe, but it is likely that the site continues to the southeast. Based on the results of the shovel probes, the proposed reroute was abandoned.

In a letter dating June 3, 2013, Stan Wilmoth stated 24DW560 would require treatment if it cannot be avoided. On behalf of TransCanada, EXP Energy Services contracted Ethnoscience to develop and implement a data recovery plan to mitigate the impacts of pipeline construction at this site. The following outlines the research questions that will be addressed and the methods that will be employed to complete this strategy.

## 2.0 Research Design

Data recovery will provide information that can address or contribute to research topics pertinent to archaeological investigations of Dawson County. Based on testing results, four research questions have been formulated and are relevant to this investigation.

### 2.1 Temporal Questions

The primary goal of archaeology is to examine changes in human behavior through time. For instance, Frison et al. (1996:27) note the number of sites observed in the northwest plans increase between AD 1200 and 1300, and decrease after AD 1300, which they attribute to a change in population size potentially associated with climate changes. Ahler (1993:80-81) also document changes in population size and site structure among Plains Village populations in North Dakota. Diagnostics within Dawson County indicates there are three Paleoindian, two Oxbow, one McKean complex, one Pelican Lake, four Besant, and three Late Period sites, including a Plains Village site (Aaberg et al. 2006). Currently there are only 15 sites in Dawson County that have had radiocarbon dates, and two of these sites are not associated with cultural material (Aaberg et al. 2006: Appendix A). Furthermore, many of the dates were collected in the 1970s and 1980s and are not as accurate as modern radiocarbon dating methods. Fine-grained dates of habitation can contribute to our understanding of past occupations patterns in the region.

The presence of a concentration of fire-cracked rock, as well as several randomly distributed fire-cracked rock demonstrates the site has the potential for hearths, which can contribute to our understanding of when the site was occupied.

### 2.2 Lithic Technology

The most common artifact found in the Northern Plains is chipped stone. They represent both tools and the debris left behind during the manufacture or refurbishing of chipped stone. Although all chipped stone is the result of reducing cryptocrystalline material through hard-hammer percussion, soft-hammer percussion, or pressure flaking to make a tool, differences can occur between people and through time.
What is the lithic technology represented at 24DW0560 and how is it influenced by the quality of the material and its abundance?

Several investigations (Andrefsky 1991, 2005; Bamforth 1991, Henry 1989; Parry and Kelly 1987) note Archaic sites tend to have higher percentages of bifaces than do Late Prehistoric sites. Parry and Kelly (1987) attribute this technological shift to decreased mobility of more sedentary Late Prehistoric populations. In contrast, Andrefsky (1994, 2005) argues that it is the quality of the material and its availability that influences the types of tools that will be manufactured (Table 1). This model suggests formal tools will occur in areas where lithic quality is high. Expedient tools will be created in areas where the quality of the raw material is poor, or where high-quality material is abundant.

Table 1: Model of anticipated tool manufacture based on raw material quality and abundance (Adapted from Andrefsky 1994, 2005).

<table>
<thead>
<tr>
<th>Lithic Quality</th>
<th>High</th>
<th>Low</th>
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</thead>
<tbody>
<tr>
<td>High</td>
<td>Formal and Expedient Tool Production</td>
<td>Primarily Expedient Tool Production</td>
</tr>
<tr>
<td>Low</td>
<td>Primarily Formal Tool Production</td>
<td>Primarily Expedient Tool Production</td>
</tr>
</tbody>
</table>

Site 24DW560 contains a variety of materials including gray basalt, chalcedony, petrified wood, chert, quartzite and porcellanite. Chalcedony, petrified wood, chert and porcellanite are considered high quality material. In contrast, gray basalt and quartzite are typically of poor quality. These materials could be related to Flaxville gravel and porcellanite outcrops that occur in the landscape; however, an examination of the Geologic Map of Montana (Vuke et al. 2007) indicates that these formations are not located within the immediate site area. Although the exact source of the materials may not be ascertained, it may be possible to ascertain the nearest likely source of these materials.

The types of data needed to address this question include the presence of tools and an identification of their likely source. The variety of materials observed at 24DW560 demonstrates the site has the potential to address this research question.

2.3 Diet and Subsistence

Examining subsistence strategies is an integral part of reconstructing past lifeways. Therefore, an examination of the plant and animal remains at 24DW560 is necessary to understand the dietary habits of people who occupied the site.

How was flora utilized in the past?

In most hunting and gathering societies, plants constitute a major component of the diet; however, consumption and the poor preservation remove many plant remains from the archaeological record (Gasser and Adams 1981). Furthermore, 25 years of archaeological investigations in collaboration with the PaleoResearch Institute has found that the mixing of modern and archaeological soils due to soil desiccation, freeze-thaw cycles and rodent activity in shallow sites make pollen analysis problematic. As such, the importance of plants and the role they placed in prehistoric lifeways remains poorly represented.

The types of data needed to address this question include intact plant processing features, hearths or other features suitable for flotation studies. Residue of cooked food and lipid analysis can also provide information clues to culturally utilized plants.
Fire-cracked rock is present at 24DW560. This demonstrates potential for hearths within the site; hearths often contain plant materials that can be used to address this research question. Fire-cracked rock may also contain lipids that can be analyzed for plant and animal food residue.

The types of data needed to address this question include intact plant processing features, hearths or other features suitable for flotation studies. Fire-cracked rock is present at 24DW560. This demonstrates potential for hearths within the site; hearths often contain plant materials that can be used to address this research question.

2.4 External Relations and Exchange

Trade relationships were important to prehistoric economies. These relationships enabled groups to diversify their subsistence base beyond the resources available in their home territory. However, more information is needed on the interaction ranges and their place in time.

Do the lithics observed at 24DW560 represent material that was brought to the site from a distant location? What does that say about the population's range of interaction?

Lithic raw materials have the potential to contribute to our understanding of how prehistoric populations interacted with the landscape either through direct movement or trade. For instance, the preference for Knife River flint in the Besant complex is well documented, even for sites located hundreds of miles away (Peck and Hudecek-Cuffe 2003:73). Davis and others (1995: 51) notes that Obsidian Cliff (in Wyoming) dominates the obsidian artifacts in southern Montana and Northern Wyoming, while Bear Gulch obsidian is more likely to occur in Southern Alberta. McDonald (2014) used the sources of non-local raw material to argue that populations from the Plains, the Basin and the Rocky Mountains to the north utilized different areas of Yellowstone Lake in northwest Wyoming. Based on the presence of non-local materials within sites, Thomas and Peterson (2010) speculate a corridor existed from Malad, Idaho to Obsidian Cliff and down the Yellowstone and Missouri rivers to sites in central North Dakota.

Site 24DW560 contains a variety of materials including gray basalt, chalcedony, petrified wood, chert, quartzite and porcellanite. Although these materials could be associated with Flaxville gravel or within scoria outcrops associated with the Tongue River formation, these materials do not appear in the immediate vicinity of the site. If these materials are not local, this site may be able to contribute to our understanding of the interaction sphere of the people who occupied the site.

The types of data needed to address this question include the presence of non-local materials that can be identified to potential sources. The variety of materials observed at 24DW560 demonstrates the site has the potential to address this research question.

3.0 Data Recovery Strategy

Three stages of investigation are recommended to mitigate the impacts to this site through data recovery. This includes a geophysical investigation, data recovery and analysis.

Stage 1 will consist of a magnetic gradient survey of the site. The primary purpose of this investigation will be to identify the presence or absence of hearths. A grid will be established on top of the ridge, within the area of impact. Field crew personnel will stake the grid corners and collect UTM coordinates. Utilizing a magnetic gradiometer, the grid will be surveyed in 0.5-meter transects. The data will be immediately downloaded and analyzed in the field. All anomalies will be examined with a ¼-inch soil probe. If charcoal is identified, it will be assumed to be the remains of a hearth. If rock was encountered, but no charcoal is found, the results will be considered inconclusive. If no charcoal or rock is identified, the results will be considered negative.

During Stage 2, up to five positive or inconclusive locations will be examined with 1x1-meter excavation units. If one or more hearths are identified a minimum of five and a maximum of 50 square meters will be used to expand the investigation around the feature(s). If no hearth is found, a minimum of five and a maximum 50 square meters will be used to expand the excavation near ST3 and near ST4. If at any time
after the minimum number of excavation units are dug, the artifact density drops below 15 artifacts per square meter, the excavation of that location will stop because the area lacks sufficient materials to address the research questions.

4.0 Standard Field Methods

The southwest corner of the first unit excavated in any block area will be datum and the unit will be designated as "0." All subsequent unit designations will be based on distance and direction from datum (Figure 2). For instance, a unit with its southwest corner situated two meters to the north of datum and three meters to the east of datum will be designated "2N3E." All units will be oriented to magnetic north. Excavation will use shovels and trowels. Vertical provenience will be maintained through the excavation of arbitrary 10-centimeter levels.

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<th>3N2W</th>
<th>3N1W</th>
<th>3N</th>
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Figure 2: Example of Provenience Designations

Excavated soils will be passed through ½-inch mesh except for a 0.33- by 0.33-meter sample from each unit that will be screened through ¼-inch mesh. The sample will typically be placed in the center of the unit; however, it may be moved to avoid buried features or large rocks. These samples provide a representative sample of G4 flaking debris used to facilitate the identification of activity areas and reduction sequences. Site 24DW560 appears to be a buried site. If the excavation of five units within a block area is determined to have sterile overburden, the upper levels may be removed without screening.

If applicable, samples will be collected of feature fill, select stone tools, fire-cracked rock concentrations, bone, and pottery for special analysis.
All cultural materials identified in the field will be placed in tinfoil, and/or plastic or paper bags, marked with the site number, feature number (if any), unit number, level, artifact type, excavators, and date. Excavation progress will be documented through level forms, drawings, and photographs. Level forms will be kept for each unit excavated, noting the provenience, artifact counts, and other pertinent data. All visible features and relevant profiles will be drawn and photographed. When possible, a DJI phantom quadcopter will be used to produce aerial imagery of individual features and document excavation progress.

5.0 Standard Laboratory Methods

Initially, all recovered materials will be divided into artifact classes. For this project, this will likely include hearth matrices, lithics, stone tools, and fire-cracked rock; however, other materials may also be found. With the exception of special sample analysis, Ethnosciene will conduct the artifact analysis at their laboratory in Billings, Montana. A discussion of the analysis to be conducted is provided below.

5.1 Lithic Analysis

For the purposes of this investigation, lithics are divided into two primary categories: non-tool and tool. Within these categories are several sub-categories. Lithics will be either examined individually, or placed into aggregates based on provenience and raw material.

At a minimum, for each lithic artifact/aggregate size the following attributes will be documented: provenience, raw material, size grade, count, weight, presence or absence of cortex, presence or absence of patination, and the presence or absence of heat-treated/crazed material.

Size grading is a process by which artifacts, or artifact aggregates, are passed through U.S. Standard Sieve screens (Figure 3). The following provides the analytical size designation and mesh size:

- Grade 1 (G1): 25 millimeters (1 inches) mesh
- Grade 2 (G2): 12 millimeters (1/2 inch) mesh
- Grade 3 (G3): 5.6 millimeters (1/4 inch) mesh
- Grade 4 (G4): 2.8 millimeters (1/8 inch) mesh

5.2 Non-Tools

5.2.1 Manuports

Manuports are unmodified rocks that were brought to the site from another location. This can include cryptocrystalline rock that could be flintknapped, or non-cryptocrystalline rock. In most cases, this will represent a material that is not available on the landform upon which the site is situated.
5.2.2 Fire-Cracked Rock

Fire-Cracked Rock are rocks that have been purposefully exposed to heat from a man-made feature, such as a hearth or roasting pit. The rocks are made of quartzite, sandstone or granite, and rarely, cryptocrystalline. At a minimum the rocks will show evidence of heat alteration, but may also be broken from thermal shock. An examination of the rock can sometimes provide information regarding the heat of the feature, and the method of cooling (gradual cooling versus water cooling).

5.2.3 Unmodified Heat-Treated Nodules

Unmodified Heat-Treated Nodules are artifacts that have been heat-treated, but otherwise exhibit no evidence of deliberate flake removal. In some cases, thermal shock may remove flakes, or pot lids. Thermal flakes can exhibit ripples, but they are often more exaggerated than flaked nodules, and the ripples are often more random in direction.

5.2.4 Tested Raw Materials

Tested Raw Materials includes nodules that exhibit one to three flake removals and/or a lateral snap or bend break to ascertain the suitability of the material for tool manufacture (Ahler 1986, 2002). In an archaeological context, the presence of a tested cobble generally indicates the raw material was determined unsuitable and subsequently discarded.
5.2.5 Cores

Cores are nodules that have more than three flakes removed from its surface (Ahler 1986, 2002). This can include core tools or the source material for flakes. For the purposes of this investigation, the latter definition is used exclusively. Under this definition, cores are in, and of themselves, not tools. Cores are divided into unidirectional versus multidirectional, and freehand hard hammer versus bipolar categories. In some cases, core shape (i.e. polyhedral) is documented.

5.2.6 Chipped Stone Flaking Debris

Chipped Stone Flaking Debris consists of the pieces of stone that are detached during the manufacture of a stone tool and discarded without further modification or use. The chipped stone flaking debris collected during excavation was analyzed using mass-analysis as outlined by Ahler (1986).

5.3 Stone Tools

The stone tool category is composed of flake tools, tabular tools, bifaces, projectile points, scrapers, and hammerstones. Artifacts within this category were discarded due to breakage during use, exhaustion, or were no longer needed. Although not technically a tool, this category also includes artifacts that the flintknapper may have intended to be used as a tool, but was rejected because it broke, or was otherwise determined unsuitable during manufacture. Attributes of these artifacts will consist of size (i.e., length, width, thickness if discernable), material type, count, weight, heat treatment, patina, cortex, evidence of use-wear and tool type.

5.3.1 Flake Tools

Flake tools are culturally modified flakes used as tools. Evidence of cultural modification can be use-wear that develops as a byproduct of use, or it can be the result of intentional modification such as retouch or chipping (Andrefsky 2005). In some cases, the tool may no longer possess its original flake characteristics.

5.3.2 Tabular Tools

Tabular tools consist of naturally thin tabular nodules that exhibit patterned flaking along one or more margin and no irregular edge damage (Ahler 2002; Ahler 1975a, 1975b; Metcalf and Ahler 1995).

5.3.3 Bifaces

Bifaces are tools that that exhibit flaking on both faces. Flaking is typically used to form an acute angle (Andrefsky 2005). The current study organizes biface reduction sequences into six stages. These stages include early stage reduction, Stage 2 edging, Stage 3 thinning, Stage 4 secondary thinning, Stage 5 shaping, and Stage 6 preparation for hafting. Callahan's (1974, 1979) biface production model was used to assist in the categorization of Stage 2 though Stage 5 of this tool type.

Early discards represent cobbles that exhibit three or more flake removals, but were discarded early in the reduction phase, either because the nodule could not be appropriately thinned or was naturally flawed. This usually occurs due to step fractures, hinge flakes, or the inability of flakes to extend sufficiently to remove cortex or otherwise thin the cobble for further reduction.

Stage 2 bifaces have gone through the initial edging process. The edges are sinuous in outline, and the biface is generally not bilaterally or bifacially symmetrical.

Stage 3 bifaces have gone through the primary thinning process and in cross section become more regular, lenticular, and thinner in relation to width in comparison to Stage 2.

Stage 4 bifaces are secondarily thinned. In this stage, the cross section of the tool is flattened and the edges are usually very regular and even. Edge preparation in the form of pressure flaking and intentional grinding may be visible.
Stage 5 bifaces have entered the shaping process and are prepared for hafting. Maximum attention is paid to form, evenness, and symmetry of the bifacial edge.

5.3.4 Projectile Points

Projectile Points are a class of tools that includes spear points, atlatl dart points, and arrow points. Typically, projectile points are lanceolate, triangular, or ovate in form and are bifacially thinned with bifacial marginal retouch. Some form of notching or shouldering of the stem is usually present which implies the tool was hafted. Digital metric calipers will be used to measure notch width, stem width, base width, blade width, blade length, and haft length (Figure 4).

![Figure 4: Projectile Point Measurements](image)

5.3.5 Scrapers

Scrapers are unifaces with one or more edges that exhibit steep unifacial retouch. The presence of polish or step fractures along the working edge can provide clues as to whether it was used on hard or soft materials.

5.3.6 Hammerstones

Hammerstones are a class of tools that consist of unshaped cobbles of glacial origin, which have been used as hammers in percussion operations (Ahler 1986). Hammerstones display minor to extensive battering along one or more corners or ends and are thought to have been used in freehand percussion flaking.

5.4 Fanual Analysis

All recovered bone will be weighed, counted, and size graded. When possible, bone will be identified to element, side, genus, and species. Measurements of skeletal elements will be taken of select bones to obtain sex and age information. Notations will be made if butchering or cultural modifications are found.

5.5 Ceramic Analysis

All ceramics will be individually analyzed. They will be categorized by element (i.e., rim, lip, shoulder, body or neck), temper, surface treatment, color, decoration, and the technique used to apply decorative features. In addition to these attributes, individual sherds will be size graded and measurements pertaining to thickness, as well as the width and spacing of design elements, will be recorded.
6.0 Specialized Analysis Submissions

Selected artifacts, and bulk soil samples will be submitted to specialists for expert analysis. A brief discussion of each sample and method of collection is discussed below.

6.1 Fourier Transform Infrared Spectroscopy (FTIR)

FTIR is relatively new to archaeology. It uses infrared spectroscopy to create an absorbance signature of organic compounds. Based on the signature of the compounds it is possible to distinguish whether the artifact was exposed to meat and/or plants. In some cases, the analysis can distinguish the types of plants used. Up to five samples will be collected from pottery or from rock associated with a hearth for analysis.

6.2 Macroflora Analysis

When hearths are identified, the feature matrix will be collected and placed in gallon bags. If small fragments of charcoal are found, they will typically be placed within tinfoil prior to being placed in a paper bag. If multiple samples are collected, the most promising sample will be submitted for analysis. Bulk samples not submitted for analysis will be screened through a ¼-inch wire mesh.

Macroflora analysis consists of processing the soil samples using water floatation and examining the remains for evidence of seeds, charcoal, wood, and other plant parts. In addition to providing information regarding plant utilization, the analysis is useful in selecting charcoal samples for radiocarbon dating. Up to five samples will be submitted for analysis.

6.3 Obsidian Sourcing

If obsidian larger than a ¼-inch in size is found it will be submitted for source analysis. The analysis consists of determining the chemical composition of the obsidian using an energy dispersive x-ray fluorescence spectrometer. The chemical composition is compared to the chemical composition of known parent geological sources of obsidian to identify the original source of the raw material associated with the artifact. Up to two samples will be submitted for analysis.

6.4 Protein Residue Samples

Up to 15 tools will be submitted for protein residue analysis. The tools must exhibit use-wear or represent the last stage of manufacture. Tools that were discarded during manufacture will not be submitted. When possible, soil samples associated with the tool will be included. The analysis obtains protein antigens processed from the tool and soil samples and exposed to a library of antibodies from various animal resources. When the results are positive, it can provide evidence of past animal processing.

6.5 Radiocarbon Analysis

Up to five samples will be collected for radiocarbon analysis. This includes samples gathered from hearths, bone, random charcoal, or pottery that exhibit residue. When possible a macroflora analysis of the materials will be conducted first and the charcoal representing the shortest lifespan will be used.

7.0 Final Disposition of Artifacts

After documentation of the site is completed and approved, Ethnoscience will return the artifacts to the private landowner. Accompanying the artifacts will be a letter that thanks the landowner for allowing work to be conducted on their property, a copy of the technical data recovery report, and a brief non-technical description of the site.
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