CURRENT ARCHAEOLOGICAL HAPPENINGS IN OREGON

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CURRENT RESEARCH

OBSIDIAN RESEARCH AND THE PIPELINE EXPANSION PROJECT: A 1991 VIEW FROM THE PIPELINE

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Introduction

Since 1988, INFOTEC Research, Inc. (IRI) has been the prime contractor for cultural resource studies associated with the Pacific Gas and Electric (PG&E) and Pacific Gas Transmission Company (PGT) Pipeline Expansion Project (PEP). This project, one of the largest pipeline projects in recent years, involves the construction of 845 miles of natural gas pipeline along a transect extending from Alberta, Canada, to Fresno County, California (figure 1). Much of the project parallels an already existing natural gas pipeline dating to the 1960's.

A major archaeological component of the survey, testing, and data recovery activities carried out by IRI and subcontractors Biosystems Analysis and Far Western Anthropological Research Group has involved obsidian characterization and hydration studies of recovered artifacts. To date, over 6,000 artifacts have been characterized using x-ray fluorescence trace element methods by Richard Hughes (IRI) and BioSystems Analysis. Over 4,000 of these characterized artifacts were recovered during testing and data recovery efforts at Oregon sites in Gilliam, Sherman, Wasco, Jefferson, Deschutes, and Klamath counties. The remainder of the specimens were drawn from California sites in Modoc, Siskiyou, Shasta, Tehama, Colusa, Solano and Contra Costa counties. Tom Origer, Sonoma State University, has provided obsidian hydration measurements for a large proportion of these characterized artifacts.

Obsidian data for the PEP samples, are most complete for items recovered during the 1991 field season and analyzed in 1991 and 1992. The remainder of this short research report will focus on the results of the preliminary analysis of these artifacts.

Results of 1991 PEP Testing Activities

In 1991, over 1100 obsidian artifacts from Oregon and California sites were characterized and examined for hydration rims. Oregon obsidian-related efforts were concentrated at fourteen Deschutes County sites located in the Newberry Volcano region near Bend and at five Sherman County sites situated in the John Day Canyon. In California, eleven sites from Modoc, Shasta, Contra Costa, and Solano counties were sampled.

Oregon

A total of 884 obsidian artifacts from nineteen Sherman and Deschutes County archaeological sites were selected for XRF and obsidian hydration analysis as part of the 1991 Oregon Pipeline Expansion Project activities.

Fifty-four artifacts from five sites in the John Day drainage of north-central Oregon, representing a 100 percent sample of analyzable obsidian artifacts, were chosen for analysis. The most striking characteristic of the results for the John Day obsidian studies is the predominance of obsidian from unidentified geologic sources. Between four and six unknown sources accounted for 72 percent of the characterized artifacts. The low frequency of obsidian at the John Day sites (typically less than five percent) suggests parent obsidian sources located at some distance from the sites. Currently, we speculate that these sources may be located to the east or southeast of the John Day sites in the Ochoco and Malheur National Forests. With this problem in mind, numerous previously unexamined obsidian sources in north-central Oregon were sampled in 1992 by Richard Hughes. When completed, his geochemical analyses of the glasses may provide some resolution to the problem of the unidentified obsidian sources commonly recovered from north-central Oregon archaeological sites.

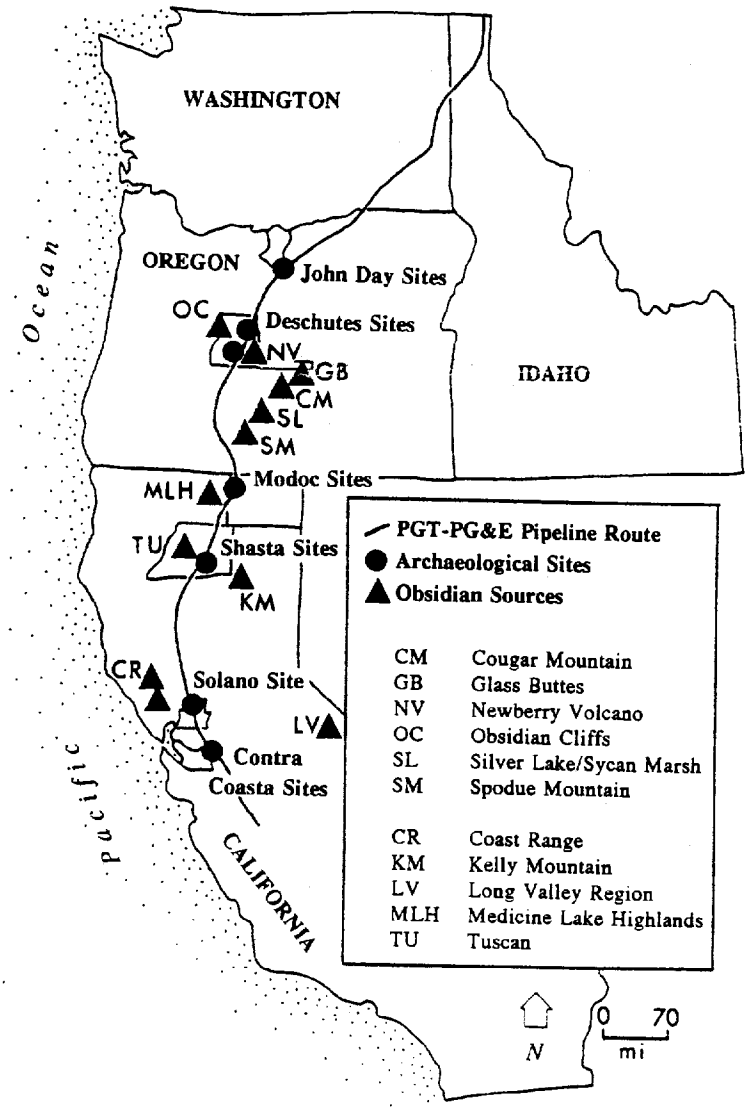
Deschutes County sites provided 830 artifacts for characterization and hydration studies. This sample comprised 3.7 percent of the more than 19,000 pieces of obsidian debitage recovered and 100 percent of all identified obsidian tools. A total of 13 identifiable sources or geochemical groups (not including several minor unknown sources) were assigned to the artifacts. Not surprisingly, Newberry Volcano, a major regional source of several pre- and post-Mazama obsidian flows and domes, was the major source area represented. Eighty-five percent of the artifacts originated from sources on the lower flanks of Newberry Volcano (McKay Butte and Quartz Mountain) or within the summit caldera. The remaining artifacts were correlated with sources in the central High Cascades (Obsidian Cliffs), the central Western Cascades (Inman Creek), the northwestern Great Basin (Cougar Mountain and Glass Buttes), and the Klamath Basin (Spodue Mountain and Silver Lake/Sycan Marsh). Fifty-four of the characterized artifacts were provisionally assigned to a provisional Unknown X group; it is not known yet whether this group represents unrecorded geochemical variation in the Newberry Caldera chemical group or whether it is a new source.

Preliminary analysis of the Deschutes County obsidian hydration data indicate heavy pre-Mazama use of materials from McKay Butte, the source of a visually distinctive glass located on the lower western slopes of Newberry Volcano. As evidenced by hydration measurements and the comparison of pre- and post-Mazama artifact samples, the use of McKay Butte glass decreased rapidly with the eruption of multiple post-Mazama obsidian flows in Newberry Caldera. Obsidian from these Newberry caldera sources rapidly displaced McKay Butte as the major regional obsidian source throughout the remainder of the Holocene. Although most of the caldera flows erupted shortly after the Mazama event, the most recent of the flows, the Big Obsidian Flow, was emplaced only 1300 ^{14}C years ago. Anomalously thick hydration rims from several artifacts correlated with the Big Obsidian Flow led to the recognition of a previously unsampled early Holocene obsidian flow within the caldera that was nearly completely buried by tephra from Mount Mazama and from local vents. This 10,000 year-old obsidian flow, aptly named the Buried Obsidian Flow, was found to be very similar in trace element composition to the Big Obsidian Flow. Further trace element studies of the Buried Obsidian Flow glass are being carried out in conjunction with Tom Connolly, Oregon State Museum of Anthropology, and will provide more details about the chemical similarities of the two sources.

Hydration measurements of artifacts from several of the Deschutes County sites were hampered by the presence of an acid-resistant encrustation on many of the artifacts. A surprisingly large percentage of artifacts, typically between 15 and 20 percent, failed to yield readable hydration rims. The encrustation was found to be somewhat elevated in titanium (Ti), and had to be physically removed from those artifacts for which this minor element was considered source-diagnostic.

The overall picture presented by the analyzed Deschutes County artifacts is that of the dominant use of local obsidian sources combined with a marked mid-Holocene temporal shift in source preference, the latter due to the appearance of several post-Mazama obsidian flows in Newberry Caldera. There is no compelling evidence for the presence of active exchange systems in this region - the spatial distribution of the characterized artifacts can be most easily explained with models of direct access local procurement, procurement embedded within seasonal subsistence activities, and the occasional curation of artifacts, particularly tools.

Figure 1. Map of the PGT-PG&E Pipeline Expansion Project, major obsidian sources, and obsidian-related archaeological site locations.



California

Two hundred and fifty nine artifacts from eleven northern California sites were selected for obsidian analysis. Natural glass from four Modoc County sites (N=87) was found to originate almost exclusively from multiple sources in the Medicine Lake Highlands. The East Medicine Lake and Grasshopper Flat/Lost Iron Well/Red Switchback chemical groups, the major sources represented among the Medicine Lake Highlands glasses, were responsible for 66 percent of the characterized artifacts. Six artifacts were found to originate from the 1100 year-old Glass Mountain obsidian flow. Like the mid to late Holocene flows at Newberry Volcano, this latter source is of particular interest because of its narrow chronological window of availability.

Obsidian studies at Shasta County sites (N=122) reveal a picture of local procurement from the widely-distributed Tuscan obsidian source (72 percent of the samples) along with significant longer-distance procurement (greater than 100 km) of obsidian from the Medicine Lake Highlands (23 percent). A single Kelly Mountain artifact was identified among the four Shasta sites.

Six artifacts from a small Solano County site (N=6) were found to originate from nearby Coast Range sources, primarily the Napa Valley source.

In the two Contra Costa County sites (N=43), Northern California Coast Range sources, particularly Napa Valley, dominate the collections with 32 samples. Small amounts of glass from Annadel and Borax Lake are also present. Trans-Sierran procurement of obsidian from the Long Valley Caldera region, a well-established pattern in central California sites, is indicated by the presence of four artifacts from the Casa Diablo, Bodie Hills, and Mono Glass Mountain sources.

1992 and Beyond

Obsidian-related research associated with the Pipeline Expansion Project is still very much a work in progress. In 1992, over 3,000 obsidian artifacts were selected for trace element and obsidian hydration analyses from Oregon sites in Jefferson, Deschutes, and Klamath counties and at California locations in Modoc, Siskiyou, Shasta, and Colusa counties. A significant collection of additional samples will also be processed in 1993. Trace element, obsidian hydration, and artifact data from the entire multi-year project are being gradually compiled into an extensive database that will be available for eventual analysis and interpretation. We anticipate that when the project is complete, this database will provide the largest single body of obsidian characterization and hydration data yet compiled from a single archaeological project. This body of information should offer us an unprecedented look into the obsidian procurement patterns and obsidian hydration chronologies of central Oregon and northern California.

PRE-MAZAMA OCCUPATIONS AT THE PAULINA LAKE SITE (35DS34), NEWBERRY CRATER, CENTRAL OREGON

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Project Background

From 1990 to 1992 the State Museum of Anthropology at the University of Oregon has conducted archaeological investigations in the caldera of Newberry Volcano in central Oregon. The research was done in connection with the proposed reconstruction of the approximately 5 mile long section of highway between Paulina Lake and East Lake within the caldera. The work involved two seasons of testing at fourteen sites, and formal data recovery excavations during the summer of 1992 at four sites.

Newberry Volcano is a large shield-type volcano, a broad, gently sloping cone covering over 600 square miles. The caldera of the volcano, measuring about five miles in diameter, is located 40 miles east of the crest of the Cascade Range in central Oregon. Volcanic activity has occurred within the Newberry caldera as well as on its flanks; over 400 cinder cones and fissure vents are present on the volcano outside the caldera, including such landmarks as McKay Butte and China Hat. Many of the flank's cinder cones are in regular linear arrays, indicating their alignment along cracks. The Newberry Volcano caldera, and a string of related volcanic