UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
BRIDGER, MONTANA

and

MONTANA AGRICULTURAL EXPERIMENT STATIONS
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA

and

DEER LODGE VALLEY CONSERVATION DISTRICT
DEER LODGE, MONTANA

and

MONTANA DEPARTMENT OF JUSTICE
NATURAL RESOURCE DAMAGE PROGRAM
UPPER CLARK FORK RIVER BASIN RESTORATION FUND
HELENA, MONTANA

and

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
RECLAMATION AND DEVELOPMENT GRANT PROGRAM
HELENA, MONTANA

and

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESTORATION AND DEVELOPMENT
MINE WASTE TECHNOLOGY PROGRAM
CINCINNATI, OHIO

NOTICE OF RELEASE OF OLD WORKS FUZZYTONGUE PENSTEMON SOURCE-IDENTIFIED CLASS OF NATURAL GERMPLASM

The Natural Resources Conservation Service-Bridger Plant Materials Center, Montana Agricultural Experiment Stations-Montana State University, Deer Lodge Valley Conservation District, Montana Department of Justice-Natural Resource Damage Program, Department of Natural Resources and Conservation-Reclamation and Development Grant Program, and the U.S. Environmental Protection Agency-Mine Waste Technology Program announce the release of a source-identified ecotype of fuzzytongue penstemon (*Penstemon eriantherus* Pursh var. *eriantherus*).

As a source-identified release this plant will be referred to as Old Works Germplasm fuzzytongue penstemon. It has been assigned the NRCS accession number 9081631. Old Works Germplasm is released as a source-identified class of certified seed (natural track).

This alternative release procedure is justified because there are no existing commercial sources of fuzzytongue penstemon. This native, drought tolerant forb species has immediate utility in the revegetation of degraded minelands, disturbed dry, coarse soils as well as xeriscape applications.

Collection Site Information: Old Works Germplasm was originally collected in Deer Lodge County, Montana (Township 5 North, Range 11 West, NW 1/4 of Section 35), on August 19, 1998, by Leslie Marty. The collection site is located within the Anaconda Smelter Superfund Site, approximately 1 mi (1.6 km) north of Anaconda at an elevation of 5,720 ft (1,743 m). The approximate latitude/longitude is North 46º08'30" West 112º57'00". Seed was collected from greater than 50 plants on a southwest-facing, ~17 percent slope on gravelly, sandy loam textured soil. . Other plants growing in the vicinity included bluebunch wheatgrass (*Pseudoroegneria spicata*), foxtail barley (*Hordeum jubatum*), redtop (*Agrostis gigantea*), blazing star (*Mentzilia decapetala*), needle-and-thread (*Stipa comata*), and cheatgrass (*Bromus tectorum*). Aerial emissions from past copper smelting operations have resulted in elevated levels of heavy metal and sulfur compounds in the soil at the collection site. Laboratory analyses of a soil sample taken at the collection site are presented in table 1. Precipitation in the area averages 12 to 14 in (305 to 356 mm) annually, with most of the precipitation occurring during the spring and summer months. The average annual maximum and minimum temperatures for Anaconda are 52ºF (11ºC) and 33ºF (0.6ºC), respectively.

Table 1. Laboratory analysis of a soil sample from the Old Works Germplasm collection site.

Sample No.	pH *S.U.*	As *mg/kg*	Cd *mg/kg*	Cu *mg/kg*	Pb *mg/kg*	Zn *mg/kg*	Conductivity *mmhos/cm*	Texture
Coll.-site-9	5.8	290	3	620	69	160	0.39	Sandy loam
Phytotoxic Criteria†	<5.0	136-315	5.1-20	236-750	94-250	196-240	>4.0	

† Phytotoxic levels accepted by EPA (CDM Federal 1997).

Ecotype Description: Old Works Germplasm fuzzytongue penstemon has the same general botanical and phenological attributes as the species. Fuzzytongue penstemon is a native perennial forb with a woody caudex and a heavy taproot. It has one to several stems, ~4 to 16 in (10 to 40 cm) tall, sometimes decumbent at the base. The entire or sharply toothed leaves are narrowly lance-shaped to oblanceolate to nearly linear, and glandular or finely pubescent. Flowers are lavender to pale purple with dark guidelines. The corolla is funnel-shaped, with a long-hairy, three-lobed lower lip and a smaller two-lobed upper lip. The petal lobes are well reflexed and the palate bearded with long yellow hairs. Four of the five stamens are fertile and lie against the upper portion of the corolla. The fifth stamen is sterile, and extends beyond the opening of the corolla. The inflorescence is a fairly narrow panicle of three to six well-spaced verticillasters with cymes two- to five-flowering on short peduncles. Flowers bloom from late spring into early summer. The 0.5 in (1.3 cm) long fruit capsule is filled with dark, angular

seeds. It is reported to withstand moderate to heavy grazing in cool moist areas, but not in areas where soils are dryer and warmer. Old Works Germplasm has an average of 358,038 seeds/lb (162,403 seeds/kg).

Method of Selection: Old Works Germplasm was tested in a greenhouse Comparative Evaluation Planting conducted from December 1, 2000, to March 1, 2001, at the Bridger Plant Materials Center. The study utilized soil from the Anaconda Smelter Superfund Site, approximately 2 mi (3.2 km) southeast of Anaconda. Laboratory analysis of four soil samples indicated an average pH of 4.55. Acid extractable levels of arsenic and zinc exceed EPA's upper range standard for phytotoxicity. Cadmium, copper, and lead levels exceed EPA's lower range for toxicity (table 2). Soil texture varied from sandy loam to sandy clay loam and organic matter ranged from 1 to 3 percent.

Table 2. Acid extractable heavy metal levels and pH of four soil samples of the greenhouse Comparative Evaluation Planting growing media.

Sample No.	pH *S.U.*	As *mg/kg*	Cd *mg/kg*	Cu *mg/kg*	Pb *mg/kg*	Zn *mg/kg*
GHCEP-1-11-15-00	4.5	436	10	643	197	432
GHCEP-2-11-15-00	4.5	445	10	596	228	399
GHCEP-3-11-15-00	4.6	422	11	582	201	378
GHCEP-4-11-15-00	4.6	403	9	633	208	408
$\xi \pm s_x$	4.55, 0.01	427, 14	10, 0.5	614, 24.5	208, 9.5	404, 15.75
Phytotoxic Criteria	< 5.0	136-315	5.1-20	236-750	94-250	196-240

† Phytotoxic levels accepted by the EPA (CDM Federal 1997).

The study was set up in a randomized complete block design replicated 20 times. The greenhouse was maintained at 75ºF day/65ºF night (24ºC/18ºC) temperatures. High-pressure sodium lights provided a 16-hour photoperiod. The replications were hand-irrigated approximately every other day or as needed to provide adequate water for plant growth. After 90 days, an evaluation was conducted recording height, vigor, and percent survival data. Height was measured in centimeters to the top of foliage. Vigor was rated on a scale of 1 to 5 (1 = best) based on visual observations. Percent survival was calculated by dividing the number of replications that survived to day 90 by the number of replications that germinated. To assess overall performance, the rank of the height, vigor, and percent survival parameters were summed and the resultant score used as a performance measure. Results from the study indicated that Old Works germplasm averaged a height of 1.4 in (3.45 cm), a vigor rating of 3.4, and a survival rate of 60 percent.

Ecological Considerations and Evaluation: Old Works Germplasm fuzzytongue penstemon is a selection of naturally occurring germplasm that has undergone minimal purposeful selection. Fuzzytongue penstemon is native to western North America and adapted to a wide range of soils. It reproduces from seed and was rated "OK to release" when evaluated through the "Worksheet for Documenting an Environmental Evaluation of NRCS Plant Releases."

Anticipated Conservation Use: Revegetation of sites having moderate heavy metal and acidic edaphic conditions. Excellent species for the restoration of dry open landscapes and for xeriscape gardens.

Potential Area of Adaptation: Old Works Germplasm performs well in loamy to sandy soils in the foothills of the Anaconda Smelter Superfund Site in 12 to 14 in (305 to 356 mm) average annual precipitation zones. It is expected to perform well on sites with similar soil, climate, and topographical conditions, such as in the foothills and intermountain valleys of the Northern Rocky Mountains. It may perform well in other regions where fuzzytongue penstemon is adapted. Fuzzytongue penstemon is commonly found in dry, open terrain from the prairies into the mountains from approximately 2,000 to 8,000 ft (610 to 2,743 m). It ranges from central Oregon and Washington, southern British Columbia and Alberta to North Dakota, Wyoming, and northern Colorado.

Availability of Plant Materials: The USDA-NRCS, Bridger Plant Materials Center maintains Foundation-quality (G_1) seed of Old Works Germplasm fuzzytongue penstemon. Seed will be distributed through the Seed Stocks Program, Department of Plant Sciences, P.O. Box 173150, Montana State University, Bozeman, MT 59717-3150.

References:

CDM Federal. 1997. Final baseline ecological risk assessment. Report prepared for US EPA, Region VIII, Montana Office, Helena, MT.

Strickler, Dee. 1997. Northwest penstemons. Flower Press, 192 Larch Lane, Columbia Falls, Montana 59912.

USDA, NRCS. 2000. The PLANTS database, Version 3.1. (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA USA.

USGS, Northern Prairie Wildlife Research Center. 2001. Native wildflowers of the North Dakota grasslands. (http://www.npwrc.usgs.gov).

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Signatures for release of:

Old Works Germplasm fuzzytongue penstemon (*Penstemon eriantherus*)

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