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Technical Memorandum

To: Kevin Pylka

From: Daniel W. Jones

Subject: Summaries of Sensitive Species Surveys conducted by MNRI and Additional Sensitive Species Locations from the MNDNR NHIS Database

Date: November 17, 2011

Project: 23691077.00

c: Cheryl Feigum, Jess Butler

Introduction

We have recently been compiling the results of sensitive plant species surveys conducted by various botanists on the PolyMet Mine Site and adjacent areas, dating back to 2004. Our review of the reports and memoranda prepared for the various surveys identified only one survey that had not previously been formally written up for your review and information. This survey was conducted by Scott Milburn and Otto Gockman of Midwest Natural Resources, Inc. (MNRI) in August 2008 as part of the effort to identify listed species in the land exchange parcels immediately adjacent to the Mine Site. Similar work that I had done on Northshore Mining property along the north edge of One Hundred Mile Swamp was reported in a November 7, 2007 memo to Jim Scott. The information presented below regarding the MNRI work, together with my November 2007 memo, provides a complete assessment of sensitive plant species known to exist in the parcels northeast of the Mine Site.

Following the summary of the MNRI work, I have also summarized in this memorandum the MN DNR Natural Heritage Information System (NHIS) records for nine locations of sensitive plant species that are on the Mine Site but that had not previously been included in the compilation of past survey results. It is not clear why these points had not been previously included in the overall results. They all date back to work done in 2004 by Gary Walton, Deb Pomroy and Cindy Johnson-Groh. The notes that they entered in the NHIS database suggest that they made only a few general database entries applicable to all of the sites they visited, which may explain why we didn't have a point for each of their reported locations. In

any event, the compiled sensitive plant species survey results are now complete to the best of our knowledge and verification.

The compiled sensitive plant species survey results dating back to 2004, including the locations discussed in this memo, are shown on Figure 1 as yellow triangles. The MNRI survey results are indicated with a purple square behind the yellow triangle. The NHIS additions are shown with a green square behind the yellow triangle.

Summary of Botanical Surveys Conducted by MNRI

Botanical surveys were conducted by MNRI on August 27, 2008 in portions of One Hundred Mile Swamp north of the proposed PolyMet Mine Site. These surveys identified four Minnesota special concern plant species, in a total of 38 locations. All four special concern species identified are also U.S. Forest Service Region 9 Sensitive Species. The surveys also identified 24 locations of a species currently tracked by the MN DNR for potential listing.

Survey schedule

Surveys were conducted by Scott Milburn and Otto Gockman of Midwest Natural Resources, Inc. (MNRI). Both are on the MN DNR general list of botanists approved for sensitive species work, and on the list of botanists qualified to search for *Botrychium* species. Survey methods involved walking intuitive meander search routes, looking for listed species. Populations of listed species were recorded with a Garmin Rino 530HCx GPS unit, photographed and documented in the botanists' field notes.

Results

No State- or federally-listed endangered or threatened species were identified during the botanical survey. The following Minnesota DNR-listed special concern species were identified:

- *Juncus stygius* var. *americanus* (bog rush)
- *Platanthera clavellata* (club-spur orchid)
- *Pyrola minor* (small shinleaf)
- *Sparganium glomeratum* (clustered bur-reed)

In addition, the MN DNR-tracked species, *Arethusa bulbosa* (dragon's mouth), was also identified. The number of locations and approximate number of individuals found for each species are summarized in Table 1.

Table 1. Summary of Results of MNRI Sensitive Plant Species Survey, August 2008

Scientific Name	Common Name	Number of Locations	Approximate Number of Individuals
Juncus stygius var. *americanus*	Bog rush	18	67
Platanthera clavellata	Club-spur orchid	15	66
Pyrola minor	Small shinleaf	1	4
Sparganium glomeratum	Clustered bur-reed	4	>1000
Arethusa bulbosa	Dragon's mouth	24	30

All but two of the special concern (SC) and tracked species locations are outside of the proposed Mine Site. The majority of the locations (55 of the recorded locations) were found in a cluster of points in the southwest quarter section of Township 59, Range 13, Section 4 (See Figure 1, yellow triangles on purple squares). This is northwest of the Mine Site, in the south central portion of One Hundred Mile Swamp. Two locations with *Sparganium glomeratum* (clustered bur reed) were identified approximately 0.7 mile northeast of the main cluster of points. One *Pyrola minor* (small shinleaf) and two *Arethusa bulbosa* (dragon's mouth) points were identified southeast of Mud Lake.

The only two points that were identified by MNRI on the proposed Mine Site are *Sparganium glomeratum* populations. One of these had an estimated count of over 1000 individuals. The site was in a transitional area between upland fire dependent forest and acid peatland[1], dominated by *Typha* sp. (cattails), with *Equisetum fluviatile* (water horsetail), *Equisetum maculatum* (Joe-pye weed) and *Alnus incana* (speckled alder). The other *Sparganium glomeratum* site identified on the proposed Mine Site had one individual, and was located in a wet marsh dominated by cattail, *Calla palustris* (wild calla), speckled alder and water horsetail.

Both of the *Sparganium glomeratum* locations that are on the proposed Mine Site will be removed as part of the project activities.

Descriptions of native plant community types and/or associated species for the other special concern and tracked species identified by MNRI are as follows:

***Juncus stygius*, SC (Bog rush) –** in acid peatland with *Platanthera clavellata* (club-spur orchid), *Sarracenia purpurea* (pitcher plant), *Carex tenuiflora* (sparse-flowered sedge), *Carex chordorrhiza* (creeping sedge), *Andromeda glaucophylla* (bog rosemary) and *Platanthera lacera* (ragged fringed orchid).

***Platanthera clavellata*, SC (Club-spur orchid) –** in acid peatland with *Salix pedicellaris* (bog willow), *Kalmia polifolia* (bog laurel), *Chamaedaphne calyculata* (leatherleaf), *Andromeda glaucophylla* (bog rosemary), *Pogonia ophioglossoides* (rose pogonia), *Arethusa bulbosa* (dragon's mouth) and *Malaxis unifolia* (green adder's mouth).

***Pyrola minor*, SC (Small shinleaf) –** in acid peatland on Sphagnum hummocks, with *Ledum groenlandicum* (Labrador tea), *Andromeda glaucophylla* (bog rosemary), *Chamaedaphne calyculata*

[1] Descriptions of vegetative cover types are based on the MN DNR Ecological Classification System (ECS) for Minnesota native plant communities.

(leatherleaf), *Larix laricina* (tamarack), *Picea mariana* (black spruce) and *Vaccinium oxycoccos* (small cranberry).

Sparganium glomeratum, SC (Clustered bur reed) – described above.

***Arethusa bulbosa*, tracked (Dragon's mouth) –** in wet conifer swamp, with *Carex intumescens* (bladder sedge), *Symphyotrichum puniceum* (red-stem aster), *Iris versicolor* (northern blue flag), *Cicuta bulbifera* (bulb-bearing water hemlock), *Calla palustris* (wild calla) and *Potentilla palustris* (marsh cinquefoil). Also in acid peatland with *Carex lasiocarpa* (wiregrass sedge), *Myrica gale* (sweet gale), *Potentilla palustris* (marsh cinquefoil), *Chamaedaphne calyculata* (leatherleaf), *Pogonia ophioglossoides* (rose pogonia), *Calopogon tuberosus* (grass pink), *Utricularia cornuta* (horned bladderwort) and *Lycopus uniflorus* (northern bugleweed).

Additions to the Compiled Records Based on NHIS Database Records

As noted above, during the review and compilation of botanical surveys that have been conducted in the proposed Mine Site since 2004, nine additional sensitive species locations from the MN DNR NHIS database were added to the compiled listed species locations. These records did not appear on earlier mapping of surveyed sensitive species locations. Eight of the additional species locations are in the genus *Botrychium*; the other is *Eleocharis nitida* (neat spike rush). The NHIS additions to the compiled sensitive plant species locations are detailed in Table 2 below. They are shown in Figure 1 as yellow triangles on green squares.

Due to incomplete and/or generalized notes from the 2004 botanical surveyors, we are not able to definitively establish the number of species present at the various added sites for the following reasons:

- All *Botrychium simplex* sites reported by Deb Pomroy and Cindy Johnson-Groh have an NHIS entry for the number of plants present that reads "Plants observed at 12 sites in various-sized populations of from 1-450 plants." We have no way of knowing whether one of their *Botrychium simplex* locations has one or 450 plants present. A conservative approach to determining a

number of plants present would be to use a midpoint of 225 plants per site. Using this approach, there would be approximately 2,700 total *Botrychium simplex* plants found by Pomroy and Johnson-Groh.

- The two *Botrychium matricariifolium* sites recorded by Gary Walton, Deb Pomroy and Cindy Johnson-Groh have an NHIS entry for the number of plants present that reads "368 plants total observed in 1998 and 2004 at several sites." Again, a conservative approach would be to split the reported total between the two sites and estimate 184 plants at each site.

- Gary Walton's NHIS entry for the number of *Eleocharis nitida* plants present reads "In 2004, plants observed at 11 sites in various sized patches." Therefore, there must be at least 11 individuals. *Eleocharis nitida* is a small, short, fine-stemmed clumping plant. It is difficult to distinguish individual plants. If Walton observed 11 sites, then there are at least eleven individuals. However, because of the size and growth form of the plant, a conservative estimate of the number of individuals at 11 sites is at least 100.

The determination of the number of plants present is not critical for *Botrychium simplex* (SC) and *B. matricariifolium* (tracked), since neither of these species is protected under Minnesota rules on taking of endangered or threatened species. However, in the event that any of the *Eleocharis nitida* is removed, we would need to estimate a number of individuals for the takings permit application.

With the additions of these nine NHIS records and the MNRI survey results, the compilation of all known sensitive plant species identified during surveys completed between 2004 and 2011 is complete. Please contact me with any questions about the MNRI results, the additional NHIS record additions or general questions and comments on the compilation of survey results.

Table 2: Additional Sensitive Species from PolyMet Mine Site in NHIS Database

Common Name	Scientific Name	Source/Botanist(s)	Current MN Status	Proposed Status	USFS Region 9 Status	UTM_X	UTM_Y	Date	Global rank	Count
Least Grape Fern	*Botrychium simplex*	NHIS/Deb Pomroy and Cindy Johnson-Groh	Special Concern	Special concern	Sensitive	577255	5274367	July 23, 2004	G5	1-450[1]
Least Grape Fern	*Botrychium simplex*	NHIS/Gary Walton and Cindy Johnson-Groh	Special Concern	Special concern	Sensitive	574865	5272315	July 6, 2004	G5	40
Prairie moonwort	*Botrychium campestre*	NHIS/Deb Pomroy	Special Concern	Special concern	Not Listed	577084	5273133	July 23, 2004	G3G4	1
Least Grape Fern	*Botrychium simplex*	NHIS/Deb Pomroy and Cindy Johnson-Groh	Special Concern	Special concern	Sensitive	577127	5273134	July 23, 2004	G5	1-450[1]
Least Grape Fern	*Botrychium simplex*	NHIS/Deb Pomroy and Cindy Johnson-Groh	Special Concern	Special concern	Sensitive	577163	5274293	July 23, 2004	G5	1-450[1]
Matricary Grapefern	*Botrychium matricariifolium*	NHIS/Gary Walton, Cindy Johnson-Groh, Deb Pomroy	Tracked	Not Listed	Not Listed	574946	5272307	July 23, 2004	G5	368[2]
Matricary Grapefern	*Botrychium matricariifolium*	NHIS/Gary Walton, Cindy Johnson-Groh, Deb Pomroy	Tracked	Not Listed	Not Listed	578935	5274036	July 23, 2004	G5	368[2]
Least Grape Fern	*Botrychium simplex*	NHIS/Gary Walton, Cindy Johnson-Groh, Deb Pomroy	Special Concern	Special concern	Sensitive	578935	5274036	July 23, 2004	G5	7
Neat Spike-rush	*Eleocharis nitida*	NHIS/Gary Walton, Foth & Van Dyke	Threatened	Special concern	Sensitive	578980	5274048	July 17, 2004	G4	11+[3]

[1] Pomroy and Johnson-Groh used the same NHIS entry for several locations of *Botrychium*, stating "Plants observed at 12 sites in various-sized populations of from 1-450 plants."
[2] Walton, Pomroy and Johnson-Groh used the same NHIS for the *Botrychium matricariifolium* locations, stating "368 plants total observed in 1998 and 2004 at several sites."
[3] Walton's NHIS record states "In 2004, plants observed at 11 sites in various sized patches." Therefore, there must be at least 11 individuals. Given the small size and the growth form of *Eleocharis nitida*, a conservative estimate of the number of individuals at 11 sites is ~200.

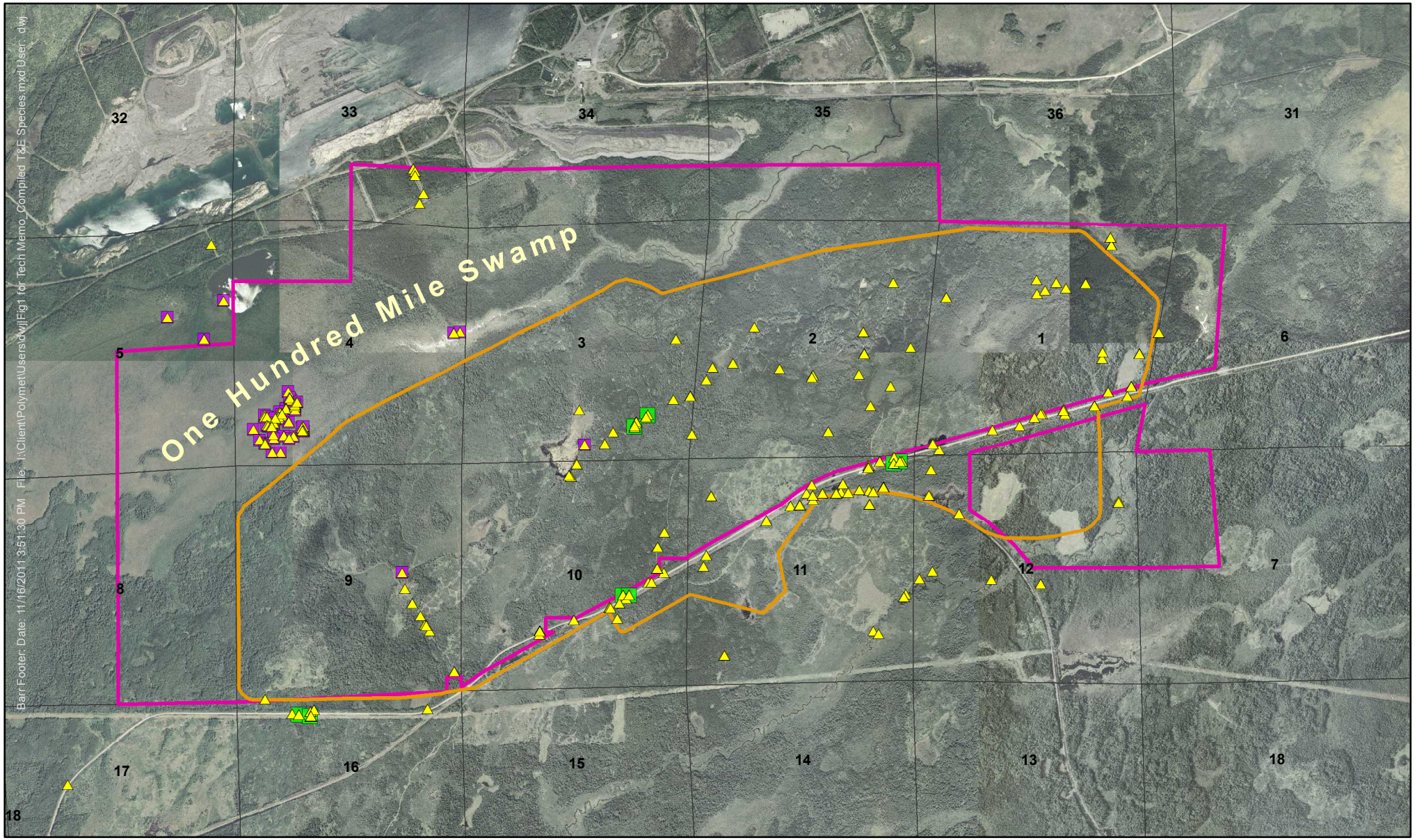

Figure 1. Summary of Sensitive Plant Species Locations from Surveys Conducted 2004-2011

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