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Fwd: Follow-up to DOGM Vegetation Success Evaluation Inquiries

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—— Forwarded message ——

From: **Long, Alexis** <along1@osmre.gov>

Date: Thu, Dec 15, 2016 at 4:44 PM

Subject: Follow-up to DOGM Veg Inquiries

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All,

Please see the attached documents in response to our discussions last week.

Thanks,

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2 attachments



Response to DOGM on ACD Revision App (12.15.16).docx
24K



Response to DOGM Veg Diversity Question (12.15.16).docx
36K

Response to ACD Revision Inquiries

Alton Coal Development, LLC (ACD) recently submitted a permit revision application to the Utah Division of Oil Gas and Mining (DOGM), proposing to: (1) delete the Diversity column from Page 3-53 (revegetation success standards table), (2) alter living cover and production levels for areas that exhibited Pinyon-Juniper vegetation communities prior to mining, and (3) employ the MacArthur's Diversity Index to determine the diversity of vegetative cover. DOGM has asked the Office of Surface Mining Reclamation and Enforcement (OSMRE) to comment on the adequacy of ACD's proposed permit revisions. Each change is discussed below.

1. Deleting the Diversity Column, page 3-53

Vegetation diversity is a success standard which must be judged prior to final bond release. Under the Utah program, this requirement is found at Utah Code Ann. § 40-10-17(2)(s) and R645-301-353.110. Implementation of the diversity requirement is discussed in the 1992 and 2009 versions of the Vegetation Information Guidelines (VIG). By deleting the diversity column from the revegetation success standards table, ACD removes DOGM's ability to judge species diversity as a success standard at final bond release.

Requisite diversity levels should be set based upon the approved postmining land use (PMLU) and local conditions including climate, soils, topography, etc. Under DOGM's 1992 and 2009 VIG, cover by species / diversity are evaluated prior to disturbance and incorporated into revegetation success standards. Target diversity levels are therefore either established through use of a reference area after demonstrating that the reference area is statistically similar to the proposed disturbance area (where the reference area also represents the target vegetation community in reclamation), or through range conditions or baseline data collection within the area to be disturbed.

The purpose of setting revegetation success criteria is to establish the reclamation goals which a permittee must achieve in order to demonstrate that the reclaimed land is capable of supporting the approved PMLU and should be released from bond. Removing diversity standards contravenes the programmatic requirement to judge the diversity of vegetative cover as appropriate per the approved PMLU and local conditions. Removing diversity success standards from ACD's permit also contravenes DOGM's internal guidance document. Both the 1992 and 2009 versions of the VIG indicate that diversity will be characterized and used as a success standard. DFB recommends disapproval of ACD's request to remove vegetation diversity success standards.

2. Revising Living Cover and Production Levels

Total Living Cover

Purple text indicates proposed changes in the total living cover revegetation success standard; however, no strike-out text is available to see the existing numbers (presumed to be "Pinyon-Juniper reference area"). A footnote indicates that the proposed total living cover value of 49.75% was derived from the Pinyon-Juniper and Sagebrush-grass reference areas.

Reclamation success standards must be set based, in part, on demonstrating capability of supporting the approved PMLU. When applying for a permit, each permit applicant must provide premining land use information including a description of the land condition and capability. The permit applicant must also describe the PMLU(s) and how it/they will be achieved. Bond liability includes the actions a permittee must take under the permit including completion of the reclamation plan so that the land will be capable of supporting the approved PMLU. *See* R645-301-820.351. PMLU performance standards require

disturbed lands to be restored to conditions the lands were capable of supporting prior to disturbance *or higher or better uses*. See R645-301-413.100 through .120.

ACD's permit is somewhat unclear because the Revegetation Success Standards and Postmining Land Use table categorizes disturbed lands based upon the premining vegetative community. Approved PMLUs are identified via footnote. Reference areas were approved based upon premining vegetation communities even where the postmining vegetation community differs from the premining state. Where higher or better uses have been approved, such as domestic grazing on lands that were previously Pinyon-Juniper woodland, comparing reestablished vegetation to an approximation of the land's premining vegetative community is not an accurate measure of success in that it does not evaluate the land's capability of supporting the approved PMLU. However, premining land capability should inform postmining land capability.

ACD is proposing a total living cover success standard based upon an average of the cover data collected within reference areas representing the premining Pinyon-Juniper community and a Sagebrush-grass vegetation community. This is an overall improvement from setting vegetation cover success criteria solely upon the premining Pinyon-Juniper community because the Sagebrush-grass reference area more closely represents the species to be seeded under the reclamation plan in support of the PMLU of domestic grazing and wildlife habitat.

Because the established vegetative cover is programmatically required to be at least equal to the natural vegetation that existed prior to mining, basing revegetation cover success criteria on a combination of premining and postmining conditions would not represent a grievous error. However, it would also not be the most robust measure of whether the land is capable of supporting the approved PMLU. For this reason, DFB recommends that ACD's permit language be revised to clarify that the revegetation cover success criteria be based solely on the land's capability to support the higher and better PMLU of domestic grazing and wildlife habitat in order to alleviate the potential for confusion at the time of bond release or failure to function in the approved PMLU after bond release is granted.

Production

Purple text indicates a proposed change in the production success standard. The current value is not included, so the change is not clear (presumed to be "Pinyon-Juniper reference area"). The proposed revision indicates a production standard of 700 lbs/acre "as recommended by DOGM biologists and soil scientist."

Biomass production is a measure of the amount of ground cover and kind of plant species to be established based upon the capacity of soil to support vegetative growth. Production levels may be set by technical standard or through use of an appropriate reference area. Because different plant life forms (trees, shrubs, forbs, and grasses) will grow and produce biomass at different rates, reference areas are best suited to situations where the target vegetative communities include the same life forms as are found within the reference area (e.g. do not compare production levels in a grassland to those in a woodland).

Production levels should be set based upon the capacity of the soil to support vegetative growth and the plant life forms to be established on reclaimed lands. Without more information pertaining to how the 700 lbs/acre number was derived and soils data for the disturbance area, it is not possible to draw conclusions on the technical adequacy of the proposed revision.

3. MacArthur's Diversity Index

ACD proposes to add text under 353.110 of its approved permit indicating the "MacArthur's Diversity Index will be used to determine diversity." The MacArthur's Diversity Index is mentioned in the 2009 VIG under Baseline Data methods of establishing revegetation success standards but is not incorporated

into Appendix B, Acceptable Similarity / Diversity Indices. The 2009 version includes the Shannon's Diversity Index. DFB recommends use of indices approved in DOGM's internal guidance document.

The proposed language must be considered in conjunction with ACD's concurrent proposal to remove the diversity column from the revegetation success standards table on page 3-53. Characterizing the diversity of reestablished vegetation without a target diversity level would be a meaningless metric. It would not assist DOGM in making a determination of whether it should release bond because any level of species diversity would be acceptable so long as it were characterized using the stated index. Importantly, both the 1992 and 2009 versions of the Vegetation Information Guidelines require diversity characterizations to be used in setting success standards regardless of whether a reference area, Range / Ecological Site, or Baseline Data forms the basis of the success criteria.

DOGM should reconsider whether use of MacArthur's is appropriate and also ensure that the diversity index value obtained from the reclaimed vegetation community would be compared to some target value based on local conditions to judge the diversity of established vegetation prior to releasing performance bond.

Response to DOGM Vegetation Diversity Inquiry

ISSUE

During a teleconference held on December 5th, 2016, between the Division of Oil, Gas and Mining (DOGM) and the Office of Surface Mining Reclamation and Enforcement (OSMRE), a question was posed regarding how an operator must demonstrate that reestablished vegetative cover is *diverse*. Although establishing a vegetative cover that is diverse, effective, and permanent is a programmatic requirement, the Utah program does not explicitly require statistically valid sampling and analysis of vegetation species diversity.

Background

Establishing vegetative cover on reclaimed lands that is diverse, effective, and permanent is a statutory requirement under both SMCRA¹ and the Utah Code². That (diverse, effective, and permanent) cover must be at least equal to the natural vegetation that existed pre-mining; however, species other than those that existed before disturbance can be used to achieve an approved postmining land use (PMLU).

Allowing species other than those that existed on-site prior to disturbance to be used in reclamation, even when the post mining vegetation community is the same as the premining community, is consistent with the statutory objective of restoring affected lands to equal or higher and better PMLU.

The applicable federal requirements for surface and underground mining are outlined in 30 C.F.R. § 816.111 and 30 C.F.R. § 817.111. The applicable state requirements for surface and underground mining are outlined in R645-301-353. The state regulations closely mirror counterpart federal regulation language. Both programs state that vegetative cover will be diverse, effective, and permanent; comprised of native species to the area or introduced species desirable and necessary to achieve the approved PMLU; at least equal in extent of cover to the natural vegetation of the area; and capable of stabilizing the soil surface from erosion.

Regarding species selection, both programs require species to be compatible with the PMLU; possess the same seasonal characteristics of growth as the original vegetation; capable of self-regeneration and plant succession; compatible with plant and animal species in the area; and meet requirements of state and federal poisonous, noxious, and introduced species laws. Specific exemptions are allowed for cropland PMLU.

Statistical demonstrations for revegetation success are outlined in 30 C.F.R. § 816.116 for surface mining and 30 C.F.R. § 817.116 for underground mining. Under Utah's approved program, analogous regulations outlining standards for revegetation success are found at R645-301-356. In addition, DOGM has developed a technical guidance document entitled "Vegetation Information Guidelines." This internal

¹ SMCRA § 515(b)(19) [30 U.S.C. § 1265(b)(19)] "establish on the regraded areas, and all other lands affected, a diverse, effective, and permanent vegetative cover of the same seasonal variety native to the area of land to be affected and capable of self-regeneration and plant succession at least equal in extent of cover to the natural vegetation of the area; except, that introduced species may be used in the revegetation process where desirable and necessary to achieve the approved postmining land use plan;

² Utah Code Ann. § 40-10-17(2)(s)

"Establish on the regraded areas and all other lands affected, a diverse, effective, and permanent vegetative cover of the same seasonal variety native to the area of land to be affected and capable of self-regeneration and plant succession at least equal in extent of cover to the natural vegetation of the area; except that introduced species may be used in the revegetation process where desirable and necessary to achieve the approved postmining land use plan.

guidance document includes acceptable sampling methods for vegetation studies under Appendix A and acceptable similarity / diversity indices under Appendix B. Both the federal and state programs explicitly require statistical demonstrations for cover, production, and/or woody stem density (a.k.a. tree and shrub density) depending upon the approved PMLU. Species diversity is treated as a subset of species cover which should be judged as appropriate under the approved PMLU.

Discussion

In prior years, OSMRE has provided insight into the intent of SMCRA § 515(b)(19) in Proposed and Final Rule Notices for the implementing regulations at 30 C.F.R. §§ 816.111 and 817.111. In the 1982 Proposed Rule Notice, OSMRE defined “diverse” to mean

“[S]ufficiently varied amounts and types of vegetation to achieve ground cover and support the postmining land uses. The precise numbers required to achieve this diversity should be determined by regional climatic and soil conditions. However, the ultimate test will be the sufficiency of the plant communities to assure survival of adequate number and varieties to achieve the postmining land use and the required extent of ground cover. Diversity does not necessarily mean that every species or variety of premining grass, shrubs, or trees be reestablished in identical numbers and ratios after mining.”

47 Fed. Reg. 12596; (Mar. 23, 1982).

In the Final Rule Notice for implementing regulations at 30 C.F.R. 816 and 817, OSMRE notes that

“The purpose of § 816.116(a) is to set a *general basis* for determining revegetation success. This statement includes the effectiveness of the vegetation for the approved postmining land use, extent of cover, and other requirements of § 816.111. *Diversity of vegetative cover is therefore a success standard since it is required by § 816.111(a)(1).*”

48 Fed. Reg. 40140 (Sept. 2, 1983)(emphasis added).

OSMRE also discussed how species other than those found on the site prior to disturbance may be used to implement the reclamation plan, stating that “the new plant community is expected to contain species not found, or not found in identical numbers, on the site prior to mining. This interpretation of diversity is consistent with the statutory objective of restoring affected lands to higher and better postmining land uses.” 48 Fed. Reg. 40140 (Sept. 2, 1983). For this reason, evaluating the diversity of species against pre-mining conditions is unlikely to be an effective measure of revegetation success when the target vegetation community differs from the pre-mining community. However, when the target vegetation community is the same as the pre-mining community, it would be appropriate to compare re-vegetated lands to the pre-mining state or a reference area that represents those conditions.

Importantly, SMCRA links the establishment of vegetative cover to the PMLU. Revegetation plans must be reviewed and approved with the goal of establishing cover that is diverse, effective and permanent, but also appropriate to achieve the PMLU. OSMRE states that

“Standards for success are approved models or measures by which the properties of vegetation on reclaimed areas are compared for the purpose of determining the degree of success. *The applicable properties to be tested will depend upon the postmining land use and the method of evaluation. Inherent in this concept is a statement of the minimum level or value that is acceptable for ending the period of operator responsibility and release of performance bonds.*”

48 Fed. Reg. 40140 (Sept. 2, 1983)(emphasis added).

Both the federal requirements and the Utah program requires the success of vegetation to be “judged” on the effectiveness of the vegetation for the approved PMLU, the extent of cover compared to the reference area or other approved success standard, and the general requirements including that the cover be diverse, effective, and permanent among other things (e.g. stabilize the soil, capable of plant succession, etc.). Judging something is notably different from measuring it. Judging implies a qualitative evaluation rather than a mandatory quantitative demonstration. OSMRE retained its use of the term “judged” because “some requirements such as same seasonal characteristics of growth and capability of self-revegetation may not require a numerical evaluation.” (48 Fed. Reg. 40140 (Sept. 2, 1983)(emphasis added).

OSMRE rejected a comment suggesting that species diversity be a parameter which required statistical analysis under 30 C.F.R. § 816.116(a)(2), stating that the “evaluation of species diversity, regenerative capacity, and seasonal characteristics of growth required under § 816.116(a) by the reference to § 816.111 may not involve sampling and statistical testing. The regulatory authority will select appropriate methods to evaluate these parameters.” 48 Fed. Reg. 40140 (Sept. 2, 1983)(emphasis added).

In discussing how state regulatory authorities will set appropriate sampling techniques, OSMRE stated that

“Sampling techniques acceptable to the regulatory authority must be included in all regulatory programs. They may appear as a rule or may be in a guideline form that is incorporated into the regulatory program. These sampling techniques are subject to review and public comment. The literature cited in this preamble may be used by States as technical references on vegetation sampling.”

48 Fed. Reg. 40140 (Sept. 2, 1983)(emphasis added).

OSMRE initially approved (with exceptions) Utah’s Vegetation Information Guidelines in 1991. *See* 56 Fed. Reg. 41795 (Aug. 23, 1991). In 1992, OSMRE approved Utah’s subsequent required revisions to its Vegetation Information Guidelines. *See* 57 Fed. Reg. 41692 (Sept. 11, 1992). In 2006, OSMRE revised and clarified its requirements for state regulatory authorities to incorporate sampling techniques into its approved State program, and instead required that sampling standards and techniques be “described in writing and made available to the public.” 71 Fed. Reg. 51684 (Aug. 30, 2006). DOGM revised its Vegetation Information Guidelines in 2009, but has not made the revised document available to the public. While that issue is outside the scope of this informal discussion, there is some confusion regarding which version of the Vegetation Information Guidelines is current and being employed by DOGM.

Prior to approving a vegetation reference area for a specific permit, DOGM’s 1992 and 2009 Vegetation Information Guidelines require “cover by species” sampling to take place. This is a measure of diversity per DOGM’s definitions included therein. The permit applicant must also demonstrate similarity between the species found in the proposed disturbance area and the reference area. Using a similarity index in Appendix B, species composition between the sites should be 70% similar. Vegetation Information Guidelines at page 5. The similarity must be demonstrated by table and incorporated into the permit. *Id.* By employing a similarity index, DOGM requires the permittee to demonstrate that the reference area and the proposed disturbance area are comparable and that the reference area approximates the land capability and vegetative community which should be restored upon reclamation.

The 1992 Vegetation Information Guidelines include cover by species data collection requirements for range sites and baseline data methods. In both versions of the Vegetation Information Guidelines, cover by species data is collected to characterize species diversity, which is then used to establish a revegetation success standard. In addition to the cover by species requirements found in the 1992 version, the 2009 Vegetation Information Guidelines also requires “Ecological Sites” (called “Range Sites” in the 1992 version) and Baseline Data areas to be characterized using a diversity index. The diversity index value is then used to establish a revegetation success standard.

Appendix B of DOGM’s 1992 and 2009 Vegetation Information Guidelines includes three similarity indices. These may be used for two things. First, to demonstrate that a proposed reference area is comparable to area(s) proposed for disturbance prior to approval of the reference area for use in evaluating revegetation success. Second, similarity indices can be used to demonstrate that reestablished vegetation approximates established baseline, range, or reference conditions that are established as revegetation success criteria under the approved permit.

The use of similarity indices allows DOGM to compare the number of species (diversity) between two areas to determine if the communities are alike. Where a reference area represents the approved PMLU, characterizing the similarity between the communities in the reference area and the revegetated lands is an acceptable way to judge the diversity of the reestablished vegetative cover. The reference area represents the target diversity levels, and achieving similar levels of diversity represents successful reclamation.

The 2009 revisions to DOGM’s guidance include the addition of the Shannon’s Diversity Index under Appendix B. Shannon’s Diversity Index does not inherently compare diversity between two separate areas. Instead, it provides a characterization of the number of species and the relative evenness of species’ populations within one area. Index values from separate areas may then be compared. Because the Ecological Site and Baseline Data sections in the 2009 version require characterization of diversity using Shannon’s Diversity Index or MacArthur’s Diversity Index³, the cover by species and diversity as characterized by the specified indices would be used as a success standard for final bond release. Revegetated lands would be characterized using the same diversity index and having achieved the target diversity level (or higher) would represent successful reclamation.

Conclusions

Diversity of vegetation is a statutorily-required success standard which must be judged prior to approving release from revegetation liability and bond. The level of diversity necessary to deem revegetation efforts successful should be based upon local soil and climatic characteristics as well as the approved PMLU.

DOGM’s 1992 Vegetation Information Guidelines indicates that “cover by species” is used to establish vegetation diversity and that collected data is used to set success standards. The 2009 version includes additional characterization of diversity and use of a diversity index value as a success standard. The Vegetation Information Guidelines represents DOGM’s official interpretation of requirements for demonstrating revegetation success. In all instances (reference areas, range/ecological sites, or baseline data methods under the 1992 and 2009 versions), the permittee is required to characterize the diversity of undisturbed vegetation and submit the information to DOGM to be employed as a success standard.

Characterizing the diversity of re-established vegetation without any target based upon appropriate reference or baseline conditions would be contrary to DOGM’s internal guidance as well as the programmatic requirement to establish diverse vegetative cover. If the requirement were only to

³ Note: MacArthur’s Diversity Index is not incorporated into Appendix B, but is referenced on page 9.

characterize the level of diversity that has been achieved on reclaimed lands, then diversity would not be a success standard that could be judged as part of the decision to release the bond. It would simply be a requirement to characterize diversity prior to bond release, and any diversity value could be deemed acceptable. Diversity must be judged as part of a decision to release bond because it is a required success standard under the federal and Utah state programs.

Please contact the Denver Field Branch for additional information or discussion on this topic further.