




Self-Sustaining Ecosystem Guidelines: In the Context of the New Mexico Mining Act Rules

The New Mexico Mining Act, Chapter 69, Title 36 NMSA (“the Act”) and the New Mexico Mining Act Rules, Title 19, Chapter 10 NMAC (“the Rules”) requires that mined land be reclaimed to achieve a “Self-Sustaining Ecosystem” (“SSE”). All mining operations permitted under the Act are required to be reclaimed to the condition of a SSE, appropriate for the life zone of the surrounding areas following closure unless conflicting with the approved post-mining land use. *See* §19.10.3.303.E(6) (minimal impact existing mining operations); §19.10.5.506.J(3) (existing mining operations); §19.10.6.603, 606.B(1) NMAC (new mining operations). The purpose of these Guidelines is to inform stakeholders of the considerations that the Mining and Minerals Division of Energy, Minerals and Natural Resources Department (“MMD”) uses when it determines whether a closeout plan, reclamation plan, or reclamation activity meets the SSE standard. These guidelines discuss testing programs and methodologies that will help verify the establishment of a Self-Sustaining Ecosystem.

The Rules define an SSE as:

“Self-sustaining ecosystem”  means reclaimed land that is self-renewing without augmented seeding, amendments, or other assistance which is capable of supporting communities of living organisms and their environment. A self-sustaining ecosystem includes hydrologic and nutrient cycles functioning at levels of productivity sufficient to support biological diversity.

§19.10.1.7.S(2) NMAC. The following terms as defined in the Rules also inform consideration whether a proposal or reclamation work itself meets the SSE standard:

“Life Zone of the Surrounding Area” means the climate, elevation and topography of the undisturbed environment in the locality of lands disturbed by mining. §19.10.1.7.L(1) NMAC.

“Post-mining land use”: means a beneficial use or multiple uses which will be established on a permit area after completion of a mining project. The post-mining land use may involve active management of the land. The use shall be selected by the owner of the land and approved by the Director. The uses which may be approved as post-mining land uses may include agricultural, commercial, or ecological uses that would ensure compliance with Federal, State or local laws, regulations and standards and which are feasible. Approved post-mining land use categories include, but are not limited to:

1. cropland
2. pasture land or land occasionally cut for hay
3. grazing land
4. forestry
5. residential
6. industrial/commercial
7. recreation or tourism
8. wildlife habitat
9. developed water resources
10. scientific or educational [7-12-94, 2-15-96]

§19.10.1.7.P(5) NMAC.

"Reclamation" means the employment during and after a mining operation of measures designed to mitigate the disturbance of affected areas and permit areas and to the extent practicable, provide for the stabilization of a permit area following closure that will minimize future impact to the environment from the mining operation and protect air and water resources. §19.10.1.7.R(1) NMAC.

The Rules direct applicants and operators to achieve an SSE as follows:

"[R]eclaim [the permit area] to a condition that allows for re-establishment of a self-sustaining ecosystem appropriate for the life zone of the surrounding areas following closure[.]" §19.10.3.303.E(6) NMAC (minimal impact existing mining operations);

"[R]eclaim disturbed areas within the permit area to a condition that allows for the re-establishment of a self-sustaining ecosystem on the permit area following closure, appropriate for the life zone of the surrounding areas[.]" §19.10.5.506.J(3) NMAC (existing mining operations);

"The permit area will be reclaimed to achieve a self-sustaining ecosystem appropriate for the life zone of the surrounding areas following closure[.]" §19.10.6.603 NMAC (new mining operations).

It is noteworthy that the Rules establish criteria for measuring vegetative success in an SSE for new units of existing mining operations and for new mining operations. *See* §19.10.5.507.E(1), and §19.10.6.603.G NMAC, respectively.

Although "life zone of the surrounding area" is geographically limited to the "climate, elevation and topography of the undisturbed environment in the locality of lands disturbed by mining" (*See* §19.10.1.7.L(1) NMAC), it practically includes "its characteristic life forms (or describing areas with similar plant and animal communities)" *See* Merriam, C. Hart (1889).


The concept of biological diversity is identified as part of the definition of self-sustaining ecosystem and is a necessary consideration for developing site specific standards to measure the success of reclamation on a mine site. When considering biological diversity, MMD takes into account factors related to both macro and micro flora and fauna. Biodiversity has been defined in the literature as being composed of four major categories including genetic diversity, species diversity, community or ecosystem diversity, and landscape or regional diversity. *See West (1993)*. Because it is addressed as such in the Rules, MMD considers the community component of biodiversity. The ecosystem component of biodiversity may also be taken into account, when appropriate.



When evaluating diversity (above and below ground) at the community level, it is appropriate to evaluate and document the composition, structure, and the life form components. By “composition,” MMD means parameters such as: species frequency, richness, evenness, diversity, proportion of life forms, and similarity indices. The term “structure” includes substrate and soil variables, slope, aspect, biomass, density and key physical features. *See West (1993)*.


Based on the above discussion, the following items identify how MMD evaluates proposals and reclamation to the SSE standard for a mining operation’s closeout plan:

1. SSE will pertain mainly to PMLU’s such as: grazing land, forestry, and wildlife habitat. Other PMLU’s that SSE may pertain to include pastureland, crop land, residential, recreation and tourism, and scientific/educational land and are addressed on a case-by-case basis to determine whether the SSE standard is appropriate. SSE will not be applied to industrial/commercial post-mine land uses or developed water resources. Any PMLU that requires perpetual maintenance or other anthropological support will not be considered an SSE.
2. If the SSE standard is appropriate to a designated PMLU, then the complete 12-year waiting period must be met before such areas can be released under the Act. The 12-year waiting period will not apply to areas for which the SSE standard is not appropriate. The required 12-year waiting period is key to identifying plant community success. Section 69-36-7 R(1) of the Act states:

[A]nd provided further that for revegetated areas, the director shall retain the amount of financial assurance necessary for a third party to reestablish vegetation for a period of twelve years after the last year of augmented seeding, fertilizing, irrigation or other work, unless a post-mining land use is achieved that is inconsistent with the further need for revegetation.
3. In re-establishing an SSE, the life zone (plant, soil microbial, and animal communities) of the surrounding areas will be evaluated and used as a means of comparison to identify standards for success. For the vegetative and soil portion of the life zone a reference area or ecological/range site description may be used to identify site-specific standards for success. The surrounding area communities are characteristically at a late or mature

successional stage of development and are not typically representative of an early successional stage, of a recently reclaimed mine site. Closeout Plan success will typically be judged on re-establishing communities on the mine site having the characteristics of an early to mid-successional stage ecosystem showing a trajectory towards a mature ecosystem. Some identifying characteristics of an ecosystem with a trajectory towards a mature ecosystem are: a diverse plant community; a diverse, active microbial community, increasing soil organic matter; slow decomposition; mid to low annual production; high overall standing biomass; lack of a predominance of invasive or weedy species; narrow niche specialization, high stratification and spatial diversity. *See* Odum (1969). Some of these characteristics can be used to identify maturing and stable ecosystems on mine sites. In some instances, it may be impractical for a reclaimed mine site to reach a mid to late successional stage ecosystem within the 12-year waiting period. For these specific instances, which must be approved by MMD, the reclamation success will be evaluated based off the reclaimed area's trajectory towards a mid to late successional stage ecosystem.  *See* Ricklefs (1973). MMD will provide guidance to evaluate plant communities.

4. In order to develop standards for final reclamation success, reference areas should be established on undisturbed areas that are reasonably indicative of the original conditions at the disturbed site that represent the life zone and native soils for that area. Reference areas are not test plots. They are plots established to evaluate the condition and structure of existing plant communities and soil conditions. In addition, reference areas are not appropriate for communities that have been poorly managed or negatively impacted by man or domestic animals. MMD should be involved in the identification and location of reference areas and must ultimately approve the reference area in the permit. Refer to MMD's April 30, 1996 guidelines in regard to setting up reference areas. *See* MMD (1996) 
5. If reference areas are insufficient to establish reclamation standards, then test-plot programs  be developed by the operator to identify technical standards for reclamation and release. Test plots are preferred where mining-related disturbance has made reference areas an unreliable tool for determination of reasonable standards for reclamation success. However, reference areas may be useful for evaluating test plots or ecological/range site descriptions. Reference areas can be used as a means of evaluating test plot success and establishing interim revegetation standards. MMD approval of a test-plot program is necessary prior to implementation.
6. USDA Natural Resource Conservation Service Ecological/Range Site Descriptions are another tool for establishing reclamation standards. These Ecological/Range Site Descriptions should also inform determination of the suitability of a reference area or test-plot program.
7. Evidence of the reestablishment of communities that are approaching an early to mid-successional community is the basis for determination of reclamation success. In order to make this evaluation, MMD will be asking operators to identify what type of rangeland or

woodland condition a potential reference area is in. The condition of a particular reference area will be measured using NRCS or BLM methodology  with consideration being given to both above ground and below ground soil and vegetation characteristics. Reclamation success will be based on comparing reclaimed areas with rangeland or woodland sites in good or better condition.

8. Typically, the methods for measuring and comparing ecosystems in mined land reclamation involve the evaluation of plant communities. Soil conditions can be measured and compared. The comparison is made by locating and establishing reference areas on areas not impacted by mining, then comparing plant community and soil characteristics to those of the reclaimed areas on the mine site. If conditions are similar in both communities, the reclamation is considered to be a success. In addition, wildlife or animal populations indigenous to an area may be informative.
9. If sites are to be reclaimed to an SSE under the Act, operators are advised to follow MMD's guidelines addressing Soil and Topsoil Suitability and Revegetation. These guidelines discuss testing programs and methodologies that will help verify the establishment of a Self-Sustaining Ecosystem.

Glossary of Terms

1. **Community** - An assemblage of populations of plants, animals, bacteria, and fungi that live in an environment and interact with one another, forming together a distinctive living system with its own composition, structure, environmental relations, development, and function.
2. **Diversity** - A measure of the variety of species in a community that takes into account the relative abundance of each species.
3. **Early successional stage** - A stage within the successional sequence where the community structure is characterized by high overall production, low species diversity, low biochemical diversity, low or poorly organized stratification and spatial heterogeneity.
4. **Ecosystem** - Any unit that includes all of the organisms (i.e., “community”) in a given area interacting with the physical environment so that a flow of energy leads to clearly defined trophic structure, biotic diversity, and material cycles.
5. **Edaphic** - relating to the soil.
6. **Mature successional stage** - A stage within the successional sequence where the community structure is characterized by low overall production, high species diversity, high biochemical diversity, high or complex stratification and spatial heterogeneity, and high amounts of inorganic nutrients tied up in biomass.
7. **Production** - Amount of biomass produced per unit time (year).
8. **Succession** - Replacement of populations in a habitat through a regular progression to a stable state (Ricklefs, 1973).

References

1. Call, C.A. and Roundy B.A. 1991. *Perspectives and processes in revegetation of arid and semiarid rangelands*. Journal of Range Management 44(6), November 1991.
2. MMD. 1996. *Closeout Plan Guidelines for Existing Mines*. Mining Act Reclamation Bureau, Mining and Minerals Division, New Mexico Energy Minerals and Natural Resources Department.
3. Odum, E.P. 1971. *Fundamentals of Ecology*. W.B. Saunders Company.
4. Odum, E.P. 1969. *The strategy of ecosystem development*. Science 164: 262-270.
5. Ricklefs, R.E. 1973. *Ecology*. Chiron Press.
6. West, Neil.E. 1993. *Biodiversity of rangelands*. J. Range Management. 46: 2-13.
7. Merriam, C. Hart 1890. *Results of a biological survey of the San Francisco Mountains region and desert of the Little Colorado in Arizona*. Department of Agriculture, Div. Ornithology and Mammalogy. *North American Fauna* 3: 1-136. (definition of “Life Zone”).



New Mexico Mining Association

July 29, 2021

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Re: New Mexico Mining Association's Comments on "Self-Sustaining Ecosystem Guidelines: In the Context of the New Mexico Mining Act Rules" (April 2021 draft) Closeout Plan Costs" (July 2020 Draft)

Dear Mr. Shepherd:

This letter contains the New Mexico Mining Association's ("NMMA") comments on the above document (Draft Guidance), as invited in your email of May 10, 2021. NMMA appreciates the opportunity to comment on the Draft Guidance, which appears to update to the existing Guidance published by MMD and dated July 21, 1998 ("1998 Guidance"). Having clear and reasonable guidance, consistent with the rule requirements, is very important to our NMMA members. NMMA and its members would appreciate the opportunity to further comment on this draft. Given the number of substantial concerns, NMMA requests the opportunity to meet with you and your staff to discuss the comments and explore means of resolving the concerns.

General Comments

In general, NMMA believes that the 1998 Guidance is adequate and could remain in place without the need for the update proposed. The 1998 Guidance has been useful to the industry, and application of this guidance has resulted in approvals of numerous reclamation plans designed to meet the Mining Act's self-sustaining ecosystem (SSE) objectives as well as approval of successful reclamation and release of financial assurance.

NMMA members and consultants, in collaboration with representatives of Chevron Mining, have reviewed the changes made in the Draft Guidance and have a number of substantive concerns. NMMA notes, at the outset, that the Draft Guidance is not supported by any new science, as illustrated by the very dated references at the end of the document, which are the very same references cited in the 1998 Guidance. However, MMD's attempt to revise its 1998 Guidance only serves to propose more particular and unsupported technical regulatory requirements to reclamation plans under the guise of regulatory guidance. Consequently, NMMA is concerned that the changes made in the Draft Guidance are not a reflection of new science, but may simply reflect new legal positions on the part of MMD. Moreover, if MMD seeks to change the law or the regulations, that should not be done through guidance documents, but through legislation or rulemaking procedures. Indeed, as discussed below, the NMMA believes that some of the changes made in the Draft Guidance are not consistent with the Mining Act and the Mining Act Rules, and guidance that attempts to change legal requirements is not valid.

MMD's proposed changes to its 1998 Guidance continues to perpetuate the assumption that the only way to establish a "self-sustaining ecosystem" is via revegetation and that revegetation is synonymous with reclamation. This assumption is fundamentally flawed. The definition of "reclamation" contained in Section 19.10.1.7 of the Mining Act does not make any reference to "revegetation". Notably, the definitions cited in MMD's proposed new Guidance Document also make no references to revegetation. Most telling, the Mining Act contains no definition of "revegetation". Therefore, MMD's focus on revegetation as the only means to establish a self-sustaining ecosystem is inconsistent with the intent of the Mining Act and the Mining Act regulations. Revegetating a mined area is only one of many ways in which a self-sustaining ecosystem can be established or re-establish after mining has been completed. Attempting to establish "successful" revegetation criteria via publication of purported guidance document that "clarifies" the regulatory intent based on an assumption not contained in the Mining Act is fundamentally contrary to law.

Specific Comments

1. Draft Guidance Language Disqualifying Reclaimed Land from Achieving an SSE Conflicts with the Mining Act Rules and Is Inappropriate.

NMMA objects to the statement in the last sentence on page 3, item 1 of the Draft Guidance: "Any PMLU that requires perpetual maintenance or other anthropological support will not be considered an SSE." This statement is not contained in, or supported by, the Mining Act or the Mining Act Rules. The definition of "self-sustaining ecosystem" in 19.10.1.S(2) is very specific on this point, stating that a SSE "... means reclaimed land that is self-renewing without augmented seeding, amendments or other assistance ...". Seeding and amendments obviously refers to introduction of new seeds or to soil amendments, and under standard principles of construction, "other assistance" would be interpreted to mean similar kinds of assistance. Consequently, in our view, guidance that would disqualify a reclamation plan or release of financial assurance on the very broadly stated grounds that it would "require perpetual maintenance or other anthropological support" would conflict with the Mining Act Rules and

would be invalid. The adverse effect would be that a whole range of best reclamation practices would be discouraged rather than encouraged. By way of example only, although probably not MMD's intent, this language could be interpreted to prohibit any engineered structures, such as structures to handle water drainage and prevent erosion, as part of reclamation. NMMA's objection highlights MMD's erroneous assumption that revegetation is the only means by which to establish a SSE.

2. Current Guidance Relying on Establishment of a Plant Community Should Be Retained, and the Guidance Should Not Require Measurements Regarding Animal Communities.

The NMMA also objects to the changes implied in this guidance that could establish new standards to measure whether an SSE has been achieved. Under the current guidance, establishment of vegetation, including a plant community with reasonable diversity, is the key indicator whether the reclamation meets the SSE criteria. The draft guidance expands the criteria by referring not only to plant communities, but also to soil microbial and animal communities above and below the surface, suggesting that sampling for soil microbes and wildlife hereafter could be required. In the view of NMMA and consulting experts, establishment of a sustainable plant community implies—and is the best evidence—of a functional microbial system. Sampling for microbes directly is not only unconventional, given the paucity of established criteria for either sampling or measuring the results. Such direct sampling, moreover, would not add value. Wildlife will utilize reclaimed areas if suitable vegetation is successful, but including wildlife as an indirect metric adds little value to directly measuring the plant community itself. The lack of use by wildlife may be an indicator of issues not at all related to establishing a SSE.

For these reasons, the existing rules and guidance contemplate that the key performance indicator is plant community success. Consequently, NMMA objects to including soil microbes and animal communities as part of a performance standard for financial assurance release. Simple observations will reveal that wildlife are utilizing reclaimed surfaces and this has been demonstrated readily on existing reclaimed surfaces. MMD cites no scientific reference suggesting that measurement of animal communities is necessary or useful or establishing any methods for such measurement or criteria by which to conclude whether or not a SSE has been established. Including animal communities in a performance standard for financial assurance release is an unnecessary complication, and incorrect assumption, resulting increased costs without any meaningful change in outcome, other than uncertainty.

3. Measuring Vegetation Success Is Not Merely “Noteworthy,” It Is the Only Appropriate Approach.

On page 2 of the Draft Guidance, second paragraph, it states that measuring vegetation is “noteworthy.” This approach is much more than “noteworthy.” Measuring vegetation is the only scientific means to evaluate revegetation success with statistical rigor, and is all that is provided for in the Mining Act Rules. It appears MMD wishes to downplay this point when in fact it is central to MMD's regulatory mission (and what current law requires) to evaluate reclamation to a specified PMLU that more often than not includes revegetation.

4. The Draft Guidance Inappropriately Relies on Antiquated References.

NMMA notes that the only additional reference cited in the Draft Guidance is the 1890 report cited for its definition of “Life Zone.” This reference apparently is the sole basis for a statement in the last paragraph of page 2 of the Draft Guidance that would expand the definition of “life zone” so that it would include “its characteristic life forms” including similar plant and animal communities. Review of Merriam’s publication, however, nowhere reveals the quotation. The closest Merriam gets to this quotation is “characteristic forms of life” that is mentioned only twice without reference to plant and animal communities as cited.

More importantly, Merriam was published over 140 years ago and is no longer accepted in modern ecology with respect to defining a “life zone.” The Holdridge Life Zone System (Holdridge 1947, updated in 1967) is more precise and widely accepted by ecologists today. Holdridge’s system¹ is relatively simple and based on empirical climate data, namely heat, precipitation and atmospheric moisture indices. “Life zone” in the Rules is appropriately defined using abiotic factors of the undisturbed areas surrounding a particular mine. NMMA believes expanding the definition of Life Zone is unnecessary and unjustified. The new paragraph should be struck.

5. What is the Difference Between Community and Ecosystem Diversity?

NMMA needs an explanation of what MMD views as the difference between community and ecosystem diversity as discussed in the last two sentences of the first paragraph on page 3 of the Draft Guidance. In the third sentence of this paragraph, community and ecosystem biodiversity are used synonymously, but the guidance, as written, suggests MMD would consider them separately.

6. The Guidance Is Vague Regarding Criteria to Consider Macro and Micro Flora and Fauna.

In the first paragraph on page 3 of the Draft Guidance, it indicates that MMD plans to take “into account macro and micro flora and fauna” when considering biological diversity. The NMMA understands how macro flora (vegetation) is evaluated, but there is no specificity as to how the other three components of biodiversity would be evaluated. Again, the Rules only provide for quantitative vegetation surveys to evaluate revegetation success. NMMA disagrees that the other three components should be considered, but if they are, the Guidance is seriously lacking unless it explains the criteria of MMD’s evaluation of those components.

7. The Guidance Inadequately Explains How Structural Components of Biodiversity at the Community Level Would Be Evaluated Below Ground.

¹ Holdridge, L.R. 1967. Life zone ecology. rev. ed. 206 pp.

On page 3, third paragraph of the Draft Guidance, MMD's referenced list of structural indicators is a simplified and incomplete recounting of Table 1 in West (1993). West's community-level indicators are predominantly related to vegetation characteristics and patterns but also include physical components including cliffs, rock outcrops, water and snow cover in addition to soils as mentioned. West's paper references (and borrows heavily) from Noss (1990)² who defined structure with respect to biodiversity as:

“the physical organization or pattern of a system, from habitat complexity as measured within communities to the pattern of patches and other elements at a landscape scale.”

Noss's definition primarily focuses on variations and patterns in habitats and landscapes at an ecosystem or landscape scale. It is unclear whether and how this concept could be applied to below ground biological diversity particularly at this large scale or level of ecological organization. Additionally, West (and Noss) overwhelmingly concentrate on plant diversity, and make only passing references to soils and soil biology - neither author addresses belowground biological diversity with any substance.

8. The Guidance Does Not Adequately Explain Consideration of Successional States.

Page 3, paragraph 3 of the Draft Guidance, is confusing with regard to consideration of successional states and other factors. First, NMMA requires explanation of how a Natural Resources Conservation Service (NRCS) ecological/range site description would be used to develop site-specific standards for the soil portion of a life zone. Notwithstanding the discussion above regarding the life zone definition above, the NRCS's Ecological Site Descriptions provide high-level soils information, none of which would be useful for the development of a site-specific success standard for reclaimed soils.

Also, a close reading of Odum (1969) does not fully support how MMD portrays the “identifying characteristics of an ecosystem with a trajectory towards a mature ecosystem.” Specifically:

- a. Odum does not mention soil microbial populations anywhere in the publication nor does he relate their diversity/activity to a maturing ecosystem.
- b. Odum refers to increases in total organic matter (i.e., high standing biomass), not soil organic matter.
- c. Odum discusses slow mineral cycles, not slow decomposition as stated. He does discuss the importance of detritus in nutrient cycles in mature systems but also states that nutrients are intrabiotic (tied up in biomass) in mature ecosystems, not in soil organic matter.
- d. NMMA does not understand what MMD intends to be the meaning of “mid to low annual production” in this sentence.

MMD should consider removing or rewriting this insertion: “In some instances, it may be impractical for a reclaimed mine site to reach a mid to late successional stage ecosystem within

² Noss, R.F. 1990. Indicators for monitoring biodiversity: A hierarchical approach. *Conserv. Biol.* 4:355-364.

the 12-year waiting period. For these specific instances, which must be approved by MMD, the reclamation success will be evaluated based off the reclaimed area's trajectory towards a mid to late successional stage ecosystem." There is no reference in the Rules to succession or the successional status of an SSE. In almost all instances, reclaimed sites will not be close to a late successional stage ecosystem in 12 years and are technically between early- and mid-succession given the reclamation process. Revegetation success is based on standards proposed by an operator and approved by MMD - the successional state of a reclaimed area is irrelevant when determining reclamation success. While trajectory is a good indicator of progress (increasing canopy cover or increasing number of plants over time), the direction may not be toward an undisturbed mature ecosystem that exists locally due to other factors (e.g., wildlife herbivory, a reclamation substrate's physical or chemical composition, topography, soil depth, etc.). Compliance under MMD's suggested language would be highly subjective. There is no clear point at which a community transitions from early to mid to late successional stages and the pathway doesn't always proceed in a predictable manner. Consequently, competent ecologists could reasonably disagree on both successional stage and trajectory for a reclaimed community, making compliance problematic. MMD's language creates too much uncertainty to be useful guidance.

9. What Does MMD Mean by "Soil Conditions"?

Referencing the fourth paragraph of page 4 of the Draft Guidance, NMMA does not understand what MMD means by "soil conditions." Attachment #2 of MMD's 1996 guidance "Revegetation Standards and Sampling Methods" regarding establishment of a reference area is exclusively focused on vegetation and does not require an evaluation of "soil conditions."

10. Evaluation of Below Ground Soil and Vegetation Conditions

With reference to page 4, paragraph 4 of the Draft Guidance, NMMA requires explanation of how a rangeland condition assessment using NRCS or Bureau of Land Management methods would evaluate "below ground soil and vegetation conditions." Federal agency land condition assessments are typically a professional evaluation of native vegetation performance (e.g., vigor, diversity and plant composition, etc.) and comparing the existing plant community to a climax plant community described in an Ecological Site Description for the area. Observations of soils are limited to surface conditions and mainly relate to soil erosion. Evaluation of rangeland conditions does not normally include test pits to examine roots or any type of soil sampling. MMD should consider using established scientific methodology such as *Interpreting Indicators of Rangeland Health*³ to determine rangeland condition.

³ Pellant, M., P.L. Shaver, D.A. Pyke, J.E. Herrick, N. Lepak, G. Riegel, E. Kachergis, B.A. Newingham, D. Toledo, and F.E. Busby. 2020. *Interpreting Indicators of Rangeland Health*, Version 5. Tech Ref 1734-6. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO.

11. Measurement and Comparison of Soil Conditions

With reference to page 5, paragraph 8, NMMA requires an explanation of how soil conditions can be measured and compared. This sentence is too vague. What soil conditions are measured? Compared to what?

12. Use of MMD's Soil and Topsoil Suitability Ratings to Verify Establishment of a SSE

With reference to page 5, paragraph 9, NMMA requires explanation of how MMD's soil and topsoil suitability ratings can be used to verify the establishment of a SSE. The referenced guidelines provide soil physical and chemical testing methods and rating scales for laboratory test results to determine the suitability of soils or other potential overburden material that could be used as a soil cover. The guidelines do not describe, nor were they intended to be used as, a testing regime in the post-reclamation period to evaluate whether a SSE has been established. The NMMA understands that the MMD is revising the SSE guidance to require operators to evaluate soil biology. The Soil and Topsoil Suitability Ratings guidelines have no information on this topic. Moreover, insufficient scientific information exists on soil microbial communities, particularly in semiarid ecosystems, to enable informed interpretations of microbial analyses on reclaimed lands. The SSE guidance has no scientific review of the rangeland soil microbiology and speaks to the issue with no specificity. This paragraph should be rewritten to only focus on revegetation, consistent with the legal requirements.

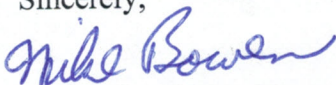
13. Glossary

The glossary references the term "edaphic," but this should be removed as it is not used in the text of the Guidance. Also, scientific references should be included for all the glossary terms. With respect to "production," the definition should include a unit area (*i.e.*, pounds per acre per year).

Conclusion

Once again, thank you for allowing NMMA to review and comment on this very important document. We look forward to meeting with you and your staff in hopes of resolving these comments before the proposed modified guidance is offered to supplant the existing, perfectly adequate guidance.

Sincerely,



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August 16, 2021

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RE: Comments on MMD's Draft Self-Sustaining Ecosystem Guidelines

Dear Mr. Shepherd:

The undersigned organizations hereby submit our comments on the April 2021 draft "Self-Sustaining Ecosystem Guidelines: In the Context of the New Mexico Mining Act Rules" ("Draft Guidance") prepared by the Mining and Minerals Division (MMD) of the New Mexico Energy, Minerals and Natural Resources Department. Thank you for the opportunity to comment on the Draft Guidelines.

1. Definition of Post-Mining Land Use

We have two comments on the discussion of the current definition of "Post-mining land use," as defined in the regulations at section 19.10.1.7.P(5) NMAC. First, we believe it would be helpful to clarify in the final Guidelines that mining is not an acceptable post-mining land use. While this may seem obvious, even tautological, it has been suggested that a renewed mining operation could be approved as a post-mining land use under the Mining Act and the Rules. It would be helpful to clarify that such "post-mining" land use would not be appropriate.

Second, one of the items listed in the regulatory definition as a possible post-mining land use (item 9) is "developed water resources." We are somewhat puzzled as to how this would be a "land use." Do the regulations envision, perhaps, a well field? Or a reservoir? We believe it would be helpful to include one or more examples of "developed water resources" in the Guidelines. In addition, we suggest that the final Guidelines make clear that any water development would need the approval of, and in most cases a permit from, the New Mexico Office of the State Engineer.

2. Rules Requiring Attainment of a Self-Sustaining Ecosystem

The Draft Guidance sets forth the three regulatory provisions requiring a self-sustaining ecosystem for different types of mining operations. We think it would be clearer to explain the type of mining operation to which each provision applies in the narrative, rather than a parenthetical in the citation. Thus, the final Guidelines might be rewritten as follows:

The Rules direct applicants and operators to achieve a self-sustaining ecosystem for three types of mining operations. For an existing minimal impact mining operation, the Rules provide that the owner/operator must:

“[R]eclaim [the permit area] to a condition that allows for re-establishment of a self-sustaining ecosystem appropriate for the life zone of the surrounding areas following closure.” § 19.10.3.303.E(6) NMAC.

For an existing mining operation that is not minimal impact, the Rules provide that the owner/operator must:

“[R]eclaim disturbed areas within the permit area to a condition that allows for the re-establishment of a self-sustaining ecosystem on the permit area following closure, appropriate for the life zone of the surrounding areas.” § 19.10.5.506.J(3) NMAC.

For a new mining operation, the Rules provide:

“The permit area will be reclaimed to achieve a self-sustaining ecosystem appropriate for the life zone of the surrounding areas following closure[.]” § 19.10.6.603 NMAC.

Somewhat confusingly, these provisions were written using slightly different wording. Existing mining operations and existing minimal impact mining operations must be reclaimed “to a condition that allows for *re-establishment* of a self-sustaining ecosystem,” while new mining operations must be “reclaimed to *achieve* a self-sustaining ecosystem.” We assume that the different wording does not signify an intended difference in meaning. The final Guidelines should make that clear.

3. Key Concepts Related to Self-Sustaining Ecosystem

The Draft Guidance discusses several key concepts related to a self-sustaining ecosystem. Specifically, it discusses “vegetative success,” “life zone of the surrounding area,” and “biological diversity.” While these are certainly important concepts, the Draft Guidance needs to more fully explain how these concepts will be interpreted and applied. The numbered paragraphs in the Draft Guidance touch on these concepts, but do not address them directly.

First, the Draft Guidance references the criteria in the Rules for measuring vegetative success in a self-sustaining ecosystem, which it says are “noteworthy.” But the Draft Guidance does not explain why the criteria are noteworthy, nor does it provide any indication of how the criteria are to be interpreted or applied.

Second, the next paragraph of the Draft Guidance briefly discusses the term “life zone of the surrounding area.” This paragraph is confusing and ungrammatical. It is not clear what point the paragraph is trying to make. We also think the final Guidelines should elaborate further on the

interpretation and application of this term. For example, how far from the mine site might the “surrounding area” extend? For another example, how closely must the mine site (subject to the self-sustaining ecosystem requirement) mimic the surrounding area? In some circumstances, it may be preferable to discourage certain species of wildlife, such as burrowing animals, deer, or elk that might damage engineered controls. Also, many life zones will change drastically due to changing climate. How will climate change be taken into account?

Third, the next paragraph of the Draft Guidance discusses biological diversity. We agree that biological diversity is a very important concept. The Draft Guidance lists four categories of biological diversity: genetic, species, community or ecosystem, and landscape. It then states that MMD will consider community biodiversity (there called a “component”) and, when appropriate, ecosystem biodiversity. But the prior sentence said that community and ecosystem biodiversity are the same thing. We believe MMD should consider all four categories (or components?) of biodiversity. The final Guidelines should explain these categories in greater detail, and explain how MMD will consider each of them in approving a self-sustaining ecosystem.

4. Application of Self-Sustaining Ecosystem Requirements

In the first numbered paragraph, the Draft Guidance lists several post-mining land uses that generally will be subject to self-sustaining ecosystem requirements, and those that will be subject to the requirements in appropriate cases. It identifies “developed water resources” as a post-mining land use that is *not* subject to the requirements, but it does not explain why. We believe that a former mining area in which a few production wells are drilled and associated underground infrastructure is installed can be reclaimed as a self-sustaining ecosystem. Similarly, a former mine site that is used as a reservoir for a municipal water supply or for irrigation can be reclaimed to a self-sustaining aquatic ecosystem. We believe this paragraph should be revised accordingly.

5. Twelve-Year Period for Financial Assurance

As noted in the Draft Guidance, under the second numbered paragraph, the Mining Act states:

[A]nd provided further that for revegetated areas, the director shall retain the amount of financial assurance necessary for a third party to reestablish vegetation for a period of twelve years after the last year of augmented seeding, fertilizing, irrigation or other work, unless a post-mining land use is achieved that is inconsistent with the further need for revegetation.

NMSA 1978, § 69-36-7.R(1). It is important that the final Guidelines explain how this provision is to be interpreted and applied. In particular, we urge MMD to clarify the following points.

First, section 69-36-7.R(1) of the Mining Act is meant to require the owner/operator to retain financial assurance for twelve years to cover the costs of additional revegetation work if the original revegetation fails. It does not mean that a self-sustaining ecosystem is necessarily established in twelve years, or that it is presumed to be established in twelve years. Based on

experience at many mine sites, achieving a “walk-away” self-sustaining ecosystem after twelve years is unlikely, and not a realistic or reasonable expectation.

Second, mine owner/operators should immediately repair revegetation or other reclamation if it is not working. For example, if erosion develops or a vegetative cover has not been established in a reasonable time, the owner/operator should implement remedial measures to address these deficiencies. The twelve-year period for maintaining financial assurance should begin again after these remedial measures have been implemented. Financial assurance must be maintained to ensure that the remedial measures are effective in achieving a self-sustaining ecosystem and that there are sufficient funds to conduct additional remedial measures if necessary. Financial assurance should be retained during the renewed twelve-year period.

Third, section 69-36-7.R(1) of the Mining Act does not allow a mine owner/operator to do nothing for twelve years if problems arise. It is critical that the mine owner/operator monitor revegetation and other reclamation work and address problems immediately as they arise.

Fourth, MMD should retain sufficient financial assurance to address any revegetation or other reclamation work that may reasonably be necessary during the twelve-year period, as it may be extended.

6. Evaluation of Plant Communities

In the third numbered paragraph, the Draft Guidance discusses the evaluation of plant and other biological communities to determine whether a self-sustaining ecosystem has been attained. The Draft Guidance says that “Closeout Plan success will typically be judged on re-establishing communities on the mine site having the characteristics of an early to mid-successional stage ecosystem showing a trajectory towards a mature ecosystem.” However, many approved seed mixes include non-native plant species. The final Guidelines should explain how MMD evaluate a “mid-successional stage ecosystem” or a “mature ecosystem” given the presence of non-native plants.

In addition, the Draft Guidance states that “MMD will provide guidance to evaluate plant communities.” But reclamation success – that is, attaining a self-sustaining ecosystem – is determined, in large part, by evaluating the health of plant communities. Members of the public thus cannot properly review this Draft Guidance without simultaneously reviewing the plant community guidance. We believe MMD should develop these two guidance documents in tandem.

7. Significance of Wildlife

In the fifth numbered paragraph, the Draft Guidance discusses the importance of wildlife in evaluating a self-sustaining ecosystem. The guidance says that “wildlife or animal populations indigenous to an area may be informative.” We agree that the return of native wildlife to a former mining site can be indicative of a self-sustaining ecosystem in some circumstances. Nevertheless, wildlife or animal populations indigenous to an area and their use of reclaimed areas can be ambiguous. At many mine reclamation sites wildlife use is not encouraged as it can

compromise early vegetation success. Wildlife can also be attracted to new, unnatural vegetation or water sources, disrupting their normal routine. While wildlife use may ultimately be an appropriate objective, the presence of wildlife during the initial phases of reclamation may not be indicative of long-term usage. We believe the final Guidelines should include more detail on how MMD will evaluate the presence of wildlife in reclaimed areas.

8. Abbreviations

Finally, we recommend that MMD refrain from using uncommon abbreviations such as SSE for “self-sustaining ecosystem” and PMLU for “post-mining land use.” Government agencies and other institutions tend to use such abbreviations much too frequently. They are unnecessary (especially given the “cut-and-paste” function of most word processing programs) and confusing to people not conversant in Mining Act jargon – which includes most of the general public.

We are available to discuss these comments with you and your staff as you proceed with developing the final Guidelines, as well as the guidance on evaluating plant communities.

Thank you for consideration of our comments.

Sincerely,

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