

# Determining Significance in NEPA Compliance (Newsletter)\*

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The US Congress passed the National Environmental Policy Act (NEPA) in 1970 recognizing that federal actions might have significant effects on the human environment. Whether such action would, or could be expected to, have significant effects determines if an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) will be used to comply with the law. This is all very nice, but how does the lead agency (such as the BLM) determine significance, since it is a vague and imprecise concept? Regardless of what has been done to assess significance, this newsletter presents a procedure to quantify it in a way that is technically sound and legally defensible.

There are two steps to an objective measure of significance: separating the subjective concept into its component parts, then measuring each component and aggregating the result. While 40 CFR 1508.27 defines “significantly” as having context and intensity, there is no guidance on how to measure either.

An impact may be beneficial, neutral, or harmful; direct, indirect, or cumulative. The impact’s significance has eight components:

1. Likelihood of occurrence (low, slight, moderate, high, certain).
2. Direction and magnitude (positive, neutral, negative; low, moderate, heavy, severe).
3. Distribution (areal extent or volume covered).
4. Duration (temporary or permanent, intermediate or continuous).
5. Reversibility (yes, somewhat, no).
6. Mitigation potential (for negative impact; none, some, moderate, high).
7. Timing (when it occurs relative to project duration).
8. Geographic scale (local, regional, national, global).

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The best way to measure these components is with inclusive sets. Inclusive sets differ from the more familiar exclusive sets by allowing degrees of membership rather than all or nothing. Inclusive sets applied to the first component might state that the likelihood of occurrence being slight is 0.42 (on a scale of 0 to 1) and of being moderate is 0.58. This provides a representation of reality accommodating the beliefs of various people in the likelihood of an impact's occurrence.

When values have been established for each of the eight components, the robust mathematics of multi-value logic allows us to combine the components in a meaningful way. There may be several "meaningful ways". It is determined by experts (or the public, if desired) asked to participate by the lead agency. The approach will vary with project and location; that is, by the context in which it is proposed. Multi-valued logic allows infinite choices between classical logic's none or all. Rather than an impact being definitely significant (all eight components highly ranked), or definitely not significant, it can be significant to a degree. The higher the degree, the greater the significance.

Separating the subjective concept of "significant" into components, assigning relative values to each component, and aggregating them using degrees of AND and OR has practical benefits for NEPA compliance. It helps the lead agency determine if an EA is adequate, or an EIS is needed. It provides one quantitative approach to incorporating cumulative impacts into an assessment to better inform the decision. And it is transparent and readily explained to stakeholders and the public with an interest in the project and its impact assessment.