

TECHNICAL NOTE

U. S. Department of Agriculture

Natural Resources Conservation Service

TN – Plant Materials – 1-1

August 2001

Glossary of Terminology Commonly Used In Mining and Reclamation Technology

Acid Mine Drainage:

Water mixed with sulfuric acid and having a pH of less than 6.0. This mixture can be discharging from an active mine or abandoned mine. Ore or other minerals containing sulfides (iron pyrite) oxidizes (when exposed to water, air, or other weathering processes) and forms sulfuric acid. The sulfuric acid mixes with water and flows out of the mine into surrounding areas as acid mine drainage.

Acid Spoil/Waste:

Spoil material containing sufficient pyrite so that weathering produces acid water and the pH of the soil determined by standard methods of soil analysis is between 4.0 and 6.9.

Adit:

A horizontal entrance to an underground mine

Angle of Repose:

The greatest angle to the horizontal that any loose or fragmented solid material will stand without sliding or come to rest when poured or dumped in a pile or on a slope.

Approximate Original Contour:

Backfilling and grading previously mined areas so that the mined area resembles the general surface configuration of the land and surrounding area prior to mining.

Biodiversity:

- (1) The total variability within and among species of living organisms and the ecological complexes they inhabit. Biodiversity has three levels – ecosystem, species, and genetic diversity – reflected in the number of different species, the different combination of species, and the different combinations of genes within each species.
- (2) The totality of genes, species, and ecosystems in a region or the world.



Biotype:

A group of individuals within a population occurring in nature, all with essentially the same genetic constitution. A species usually consists of many biotypes. (See ecotype).

Broadcast Seeding:

Process of scattering seed on the surface of the soil prior to natural or artificial means of covering the seed with soil.

Cabling/Chaining:

The use of a large cable pulled between two large tractors (usually crawler tractors) to pull down or uproot brush. Chaining uses a large ship anchor chain with each chain link weighing 80 to 100 pounds.

CERCLA:

Comprehensive Environmental Response, Compensation and Liability Act of 1980. This act created the Superfund program, which provided for identification and cleanup of hazardous sites nationally. CERCLA covers active and abandoned mine sites.

Certified Seed:

The progeny of Breeder, Foundation, or Registered seed that is so handled as to maintain satisfactory genetic identity and purity and that has been approved and certified by the certifying agency. Certified tree seed is defined as seed from trees of proven genetic superiority, as defined by the certifying agency, produced so as to assure genetic identity. See also “seed certification classes”.

Cold Stratification:

Keeping seed in a cool, moist environment for a period of time to simulate overwintering thereby reducing dormancy and increasing seed germination.

Compliance:

Conducting extraction and reclamation activities in accordance with the requirements of state and federal law.

Concentration/Concentrate:

A process for reducing the bulk ore to a smaller bulk in order to diminish the expense of shipping and treatment. Ore material that has most of the waste material eliminated. In the case of copper, where the % of mineral content has been increased from 0.6% to 27%. Concentrate is usually sent to smelters for further treatment.

Commercial Seed:

Seed produced by commercial industry; may or may not be recognized improved varieties of seed.

Common Seed:

Non-certified seed. Such seed may be a named variety but are not grown under the certification program. Also a term applied to seed that cannot be identified as to variety; sometimes used to denote local strains resulting from natural selection.

Cryptogam:

A plant in any of the groups Thallophytes, Bryophytes, Pteridiophytes – mosses, lichens, and ferns.

Cultivar:

Denotes an assemblage of cultivated plants that is clearly distinguished by any characters (morphological, physiological, cytological, chemical, or others) and when reproduced (sexually or asexually), retains its distinguishing characters. A named variety selected within a plant species.

Cyanide/Cyanidation:

A salt or ester of hydrocyanic acid which produces a chemical reaction, in leaching operations, to dissolve metal from ore for recovery. This practice consists of crushing the ore on a roller, tube, rod, or ball mill. The finely ground ore is then moved to leaching tanks where a solution of sodium or potassium cyanide is used to remove the precious metal (gold or silver) from the ore. The solution that contains the precious metal can then be retrieved in zinc boxes or other methods. The precipitate is then smelted and refined into bullion.

Desertification:

The process by which an area or region becomes more arid through loss of soil and vegetative cover. The process is often accelerated by excessive, continuous overstocking and drought.

Disturbed Area:

An area that has been disturbed by mining or other activities. This includes the area from which overburden, vegetation, topsoil, tailings, waste materials, minerals, or coal have been removed and placed. It also includes tailings ponds, waste dumps, roads, conveyor systems, leach dumps and all similar excavations or coverings that have resulted from mining operations.

Dump:

A pile or heap of waste rock material or other non-ore earthen materials.

Ecological Site:

A distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation.

Ecotype:

(1) A population of plants that has become genetically differentiated in response to the conditions of a particular habitat. The plants may vary in growth habit, maturity, and other characteristics such as pubescence and flower color.

- (2) A transition area of vegetation between two communities, having characteristics of both communities as well as its own.
- (3) Locally adapted population within a species that has certain genetically determined characteristics; interbreeding between ecotypes is not restricted.
- (4) A variety of strain within a given species that maintains its distinct identity by adaptation to a specific environment.
- (5) A locally adapted population of a species which has a distinctive limit of tolerance to environmental factors.
- (6) A variant type within an ecospecies.

Exotic:

- (1) A term describing an organism introduced from another country or continent.
- (2) An organism or species that is not native to the region in which it is found.

Gangue:

The worthless minerals that are associated with the valuable minerals in ore. Concentrating and smelting processes removed as much of these materials as possible.

Genetic Diversity:

The total amount of genetic variation present in a population or species. Having a heterogeneous constitution, reacting differently to diverse external condition. (Applied to a breeding population, variety, or species.). The genetic constitution of an individual or group.

Genotype:

The genetic constitution of an individual or group of plants. Individual plants may vary in appearance (phenotypically), but they must have the genetic characteristics of the genotype. The genetic constitution, latent or expressed, of an organism, as contrasted with the phenotype. The sum total of all genes present in an individual.

Germination:

The initiation of growth by the embryo and development of a young plant from seed.

Gob:

Rock or other coarse materials sorted out of coal either during mining or processing. Pea-gravel is similar to the consistency of Gob.

Hard Rock Mine:

Mining those extracts metallic minerals such as copper, lead, zinc, silver, and gold. And, mining taking place in rock that requires drilling and blasting in order to extract the ore.

Heap Leaching:

A process whereby valuable metals (usually gold, silver, and copper) are leached from a heap of coarsely crushed ore by solutions percolating down through the heap. The solutions are collected from a sloping, impermeable liner under the leach pad.

Historic Climax Plant Community:

The plant community that was best adapted to the unique combination of factors associated with the ecological site. It was in a natural dynamic equilibrium with the historic biotic, abiotic, climatic factors on its ecological site in North America at the time of European immigration and settlement.

Impoundment:

A closed basin, natural or artificial, which is dammed or excavated for retaining water, sediment or waste.

Introduced:

A species not part of the original fauna or flora of the area in question, but introduced from another geographical region through human activity. Syn.: exotic. Introduced is not synonymous and should not be confused with the term “invasive species”.

Invasive Species:

A species that demonstrates rapid growth and spread, invades habitats, and displaces other species. Species that are prolific seed producers, have high seed germination rates, easily propagated asexually by root or stem fragments, and/or rapidly mature predispose a plant to being an invasive. Example: The hybrid cattail (*Typha x glauca*), a cross between native cattails is extremely aggressive and out-competes its parents and other native species when established. Introduced species that are predisposed to invasiveness have the added advantage of being relatively free from predators (herbivores, parasites, and disease) and can therefore, expand more energy for growth and reproduction. Invasive species should not be confused with “Introduced Species”.

Leachate:

Liquid that has percolated through a medium and has extracted dissolved or suspended materials from it.

Leaching:

- (1) The removal, in solution, of the more soluble minerals from an ore by percolating water or other suitable solvent such as, sulfuric acid, hydrochloric acid, or cyanide, etc. A **leach pad** is prepared and covered by an impervious liner on which the ore is placed for leaching. The leaching solution, containing the selected minerals, is collected at the bottom of the leach pad for further processing.
- (2) Leaching is used to remove metals from their ores. In one procedure certain crushed ores of copper are placed into tanks and a solvent, such as sulfuric acid, is pumped into the tank, it dissolves the copper from the ore and the copper is removed from the solution by chemical or other treatment.

Local Native:

A genetically local source that originated at or within the same seed zone and elevation band as the project site (planned planting).

Local Population:

Groups of individuals of the same species growing near enough to each other to interbreed and exchange genes.

Mill:

A mineral processing facility that contains equipment for grinding, pulverizing, and extracting metals or producing a product. Mills may have rock crushers or grinders for ore, vats for mixing chemicals with the crushed ore, and machinery for capturing the desired product.

Mineral:

Any ore, rock, or substance (other than oil, gas, or uranium) that is taken from below the surface or from the surface of the earth for the purpose of milling, concentration, refinement, smelting, manufacturing, or other use or for stockpiling for future use.

Mining:

The process of obtaining useful minerals for the earth's crust including both underground and surface activities.

Native Species:

- (1) A species which is a part of the original fauna or flora of the area in question.
- (2) A native plant species is one that occurs naturally in a particular region, state, ecosystem, and habitat without direct or indirect human actions. Its presence and evolution in an area are determined by climate, soil, and biotic factors. Synonyms of native include indigenous, endemic, aboriginal.

Naturalized Species:

An introduced species that has become adapted to a new climate, different ecological site, or a different environment and can perpetuate itself in the community without cultural treatment.

Noxious Species:

A plant species that is undesirable because it conflicts, restricts, or otherwise causes problems under management objectives. Not to be confused with species declared noxious by laws concerned with plants that are weedy in cultivated crops and on range.

Noxious Weed:

An unwanted plant specified by Federal or State laws as being especially undesirable, troublesome, and difficult to control. It grows and spreads in places where it interferes with the growth and production of the desired crop.

National Pollutant Discharge Elimination System (NPDES):

Mandated by Congress under the Clean Water Act, the NPDES Storm Water Program is a comprehensive two-phased national program for addressing the non-agricultural sources of storm water discharges which adversely affect the quality of our nation's waters. The Program uses the National Pollutant Discharge Elimination System (NPDES) permitting mechanism to require the implementation of controls designed to prevent harmful pollutants from being washed by storm

water runoff into local water bodies. The regulated entities must obtain coverage under an NPDES storm water permit and implement storm water pollution prevention plans (SWPPPs) or storm water management programs (both using best management practices (BMPs)) that effectively reduce or prevent the discharge of pollutants into receiving waters.

Open Pit Mining:

- (1) Surface mining, a type of mining in which the overburden is removed from the product being mined and is dumped back after mining; or may specifically refer to an area from which the overburden has been removed and has not been filled.
- (2) A type of surface mining used to extract below ground metallic mineral deposits. This type of mining requires the excavation of massive amounts of earth creating an excavation that can be thousands of feet across and hundreds of feet deep. The metallic mineral deposits are removed by cutting benches in the walls of this broad, deep, funnel-shaped excavation.

Ore:

A mineral or mineral aggregate containing precious or useful metals and occurs in sufficient quantity, grade, and chemical combination to make extraction commercially profitable. An **ore body** is a solid and fairly continuous mass of ore, which may contain various grades of ore and waste materials. An **ore deposit** is a term applied to rocks containing minerals of current or potential economic value.

Ore Processing:

Milling, heap leaching, flotation, vat leaching, or other standard hard-rock mineral concentration processes.

OSM:

The U.S. Department of Interior's Office of Surface Mining Reclamation and Enforcement. This federal agency oversees the work of state agencies enforcing the federal coal mining and reclamation law.

Overburden:

This term is specific to hard rock mining. All of the earth and other materials that lie above a natural mineral deposit. The earth and other materials that are removed from their natural state in the process of mining.

Oxide:

The portion of a mineral deposit wherein sulfide materials have been oxidized, usually by surface weathering processes.

Pitting:

Making shallow pits or basins of suitable capacity and distribution on range to reduce overland flow from rainfall and snowmelt. Also used in seedbed preparation to aid in collecting water to aid in seed germination and plant establishment.

Propagule:

Any part of an organism produced sexually or asexually that is capable of giving rise to a new individual.

Post Mining Land Use:

A prescribed productive use(s) of the land after mining such as grazing, forestry, or wildlife habitat. This is generally the goal of reclamation.

Processed Mined Materials:

The material that remains after the valuable minerals have been removed from the ore. See tailings.

Pure Live Seed:

Purity and germination of seed expressed in percent; may be calculated by the formula: P.L.S. = %germination x % purity x 100. **Seed Purity** is the percentage of the desired species in relation to the total quantity, including other species, weed seed, and foreign matter.

Pyrite:

A yellow mineral which is a common iron sulphide occurring as native ore and serves as the principal source of sulphur in the formation of sulfuric acid in acid mine drainage.

Range Seeding/Reseeding:

The process of establishing vegetation by the artificial dissemination of seed.

Reclaim:

To make a site usable again for a particular land use or crop.

Reclamation:

- (1) The art and science of measures employed to return mined land to a level of productivity and ecological stability that meets the approved Post Mining Land Use. This includes the abatement and control of adverse environmental effects of mining and meets compliance standards.
- (2) Actions taken to restore mined land or to abate, control or prevent the adverse effects of mining to a post mining land use.
- (3) Creating a site that will support organisms in approximately the same percentage and number after the process is completed as it was before mining began.
- (4) The site will be habitable to organisms originally present in approximately the same composition and density after the reclamation process has been completed.
- (5) The process of reconverting disturbed lands to their former or other productive uses. However, the constructed conditions may not be identical to predisturbance conditions.
- (6) Restoration of a site or resource to a desired condition to achieve management or stated goals.

Rehabilitation:

- (1) The act of returning a disturbed site to a stable form and productivity level, in accordance to a predetermined land-use plan.
- (2) The disturbed site will be returned to a form and productivity in conformity with a prior use plan. It implies stability.
- (3) Implies that the land will be returned to a form and productivity in conformity with a prior land use plan, including a stable ecological state that does not contribute substantially to environmental deterioration and is consistent with surrounding aesthetic values.

Restoration:

- (1) Returning a disturbed site to precisely the same state it was prior to the disturbance. This may require rebuilding the soil, precise placement of trees and rocks, and use of only native plants and animals to repopulate the site.
- (2) The exact conditions of the site before disturbance will be replicated after the disturbance.
- (3) The process of restoring site conditions as they were before the land disturbance.

Note: restoration involves restoring a site to a specific point in time.

Revegetation:

- (1) Planting reclaimed land with grasses, flowers, shrubs, and trees.
- (2) The reestablishment or improvement of vegetation through management practices or chemical or mechanical means.
- (3) To provide a site with vegetation again. Implies that original amounts and types of vegetation of the site are not required.
- (4) Plants or growth, which replaces original ground cover, following land disturbance.
- (5) Establishing or re-establishing desirable plants in areas where the plant community is not adequate to meet management objectives by management techniques alone.

Scalping:

Removal of vegetation before mining.

Seed:

A fertilized ripened ovule of a flowering plant.

Seed, dormant:

Live seed in a nongerminative condition because of internal inhibitions in the seed; i.e., hard seed, or unfavorable environmental conditions.

Seed, hard:

Live seed in a physiological condition that prevents or delays germination, even when favorable environment exists.

Seedbank:

Seeds stored in the soil, generally as hard seed, that are viable and will germinate given the proper conditions. This seedbank is principally built up by seed produced by plants growing on

or adjacent to the site over many years. Species long gone may still be represented if their seed is especially long-lived.

Seedbed Preparation:

Soil treatment prior to seeding to: enhance soil surface layer for seed deposition and optimum opportunity for germination and seedling growth, reduce or eliminate existing vegetation, reduce the effective supply of weed seed, modify physical soil characteristics, and enhance temperature and water characteristics of the microenvironment.

Seed Certification:

A system whereby seed of plant cultivars (and pre-varietal releases) is produced, harvested and marketed under authorized regulation to insure seed of high quality and genetic purity.

Seed Certification Classes:

Classes of seed produced by a grower to ensure the purity of the genetic material. Seed, which undergoes the certification process, is typically inspected during the growing season or at harvest and the seed is tested. Certification classes include: Breeder, Foundation, Registered, Certified, and Common.

Seed Certifying Agency:

General term for the state or other agency responsible for the release and certification of crop varieties and for inspecting and approving seed produced under one of the seed certification classes. Most seed certification agencies are members of the Association of Official Seed Certifying Agencies (AOSCA).

Shaft:

A vertical entrance to an underground mine.

SMCRA:

The federal law called the Surface Mining Control and Reclamation Act of 1977, passed by Congress to establish minimum national standards for mining and reclamation, and to provide a funding source for the reclamation of abandoned mines. Applies only to coal mined land.

Smelting:

The chemical reduction of a metal from its ore and certain fluxes by melting at high temperatures. The non-metallic materials float on top of the heavier metallic constituents in the molten state and remains in that position when it cools and hardens (slag).

Spoil:

Overburden material disturbed or removed from its natural state, or non-ore material removed in gaining access to the ore or mineral material during the mining process. Spoil and mining waste materials are disposed of or piled in waste dumps and/or spoil piles. Spoil is specific to coal mining and Overburden to more specific to hard rock mining.

Sulfate:

A chemical compound containing the sulfate (SO₄) radical. Sulfates are salts or esters of sulfuric acid formed by replacing one or both of the hydrogens with a metal (e.g., sodium) or a radical (e.g., ammonium or ethyl). Sulfates are widely distributed in nature. Barium sulfate occurs as barite; calcium sulfate is found as gypsum, alabaster, and selenite; and Epsom salts is magnesium sulfate.

Sulfide:

A mineral compound characterized by the linkage of sulfur with a metal. Some examples of sulfides include galena (with lead), chalcopyrite (with copper), and pyrite (with iron).

Tacking/Tackifying:

The process of binding mulch fibers together by the addition of a sprayed natural or artificial chemical agent.

Tailings/Tailing Impoundment:

The refuse material resulting from washing, concentrating, or treating ground/crushed ore that is discharged from a mill. A **tailing pond/tailing dam** is a pond of water with a constraining wall or dam into which mill effluents (tailings) are deposited.

Topsoil:

The upper surface layer of soil, usually darker and richer than the subsoil that is naturally present and necessary for the growth and regeneration of vegetation on the surface of the earth.

Toxic Spoil/Waste:

See Acid Spoil. Includes acid spoil with pH below 4.0. Also refers to soil or water having amounts of toxic heavy metals in excess of EPA standards and usually have adverse effects on plant growth. Heavy metals include metals such as aluminum, arsenic, copper, lead, iron, and manganese.

Vesicular – Arbuscular Mycorrhizae Fungi (VAM) or Vesicular Mycorrhizae (VM):

These are symbiotic fungi that live within a plant's root system. The term "mycorrhiza" means fungus-root. Mycorrhizal fungi produce hyphae (small filament like tubes) that grow within plant roots and extend out into the soil. Also, the fungi produce spores that function as dispersal mechanisms and long term survival agents. The plant provides carbohydrates and other essential nutrients to the fungus that the fungus cannot produce and the fungus provides immobile nutrients such as phosphorus (P), iron (Fe), zinc (Zn) and copper (Cu) as well as mobile nutrients such as nitrogen (N) and calcium (Ca) to the plant.

Waste Rock Dump:

Waste rock that was mined and disposed in the vicinity of a mining operation.

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