NEVADA BUREAU OF LAND MANAGEMENT
WATER RESOURCE DATA AND ANALYSIS GUIDE
FOR MINING ACTIVITIES

The following guidelines are provided to facilitate the implementation of the Nevada Bureau of Land Management (BLM) Water Resource Data and Analysis Policy for Mining Activities and the Bureau Acid Rock Drainage Policy for mining activities conducted under 43 CFR Subparts 3802 and 3809 - Surface Management Regulations. The guidance document is intended as a flexible document, and all sections of this guide may not apply to every mining operation. For example, there may be projects where the mining will not intercept the water table. In such an instance, some of the information elements from this guide may not be necessary. If there is any indication of potential mine operation/water resource conflicts, specific water-resource data-collection, testing and modeling efforts should be evaluated by the BLM, in coordination with the State and the mining company.

Up-front coordination with the public (operators, other agencies, special interest groups and general public) on all water-related issues concerning plans of operations and associated National Environmental Policy Act (NEPA) analyses is an important component to successfully implementing the Nevada BLM Water Resource Data and Analysis Policy for Mining Activities and the elements of this guide. This policy and guide should be made available to the public as part of up-front and ongoing coordination and analysis procedures.

This guide contains six sections, Baseline Water Resource Data, Preliminary Plan of Operations Review, Geochemical Testing and Groundwater Flow Modeling, Geologic Hazards, Monitoring, and Nevada Laws and Regulations. The appropriateness of the individual discussions in this guide will depend on the issues being addressed in the specific mining/NEPA document. This guide should be used in conjunction with Nevada Manual Handbook Supplement H-3801-1 - Surface Management of Mining Operations and the Nevada Cyanide Management Plan.

Baseline Water Resource Data

Since the development of the baseline water resource data is an intensive, costly and time-consuming process, the BLM should make an initial determination as to the scope and nature of the required baseline water resource inventory. Past experience has shown that a baseline water resource inventory will take longer to develop than the required cultural resource evaluation. To expedite the inventory effort, mining companies should be counseled on gathering baseline water resource data as part of their exploration program and mining operation. Such efforts should follow available guidelines identifying the proper procedures for collecting baseline data to ensure adequacy of the data. Every effort should be made to ensure that the collection of baseline water resource data is coordinated with the State of Nevada Water Pollution Control Permit. The required baseline work should be documented in the Preparation Plan for the proposed project's NEPA documentation. At that time, the BLM should include a determination as to the boundary of the Hydrologic Study Area. The following baseline water resource information would normally be collected, analyzed and reported.

I. Geology/Hydrogeology

A. Vertical and Lateral Aquifer Definition

B. Saturated Thickness of the Aquifer

C. Aquifer Hydraulic Characteristics

D. Geologic Map

II. Spring, Streams and Well Inventory

A. Location

B. Flow, Production, Springs, Streams, Wells
1. Perennial (to include historical flows)
2. Intermittent
3. Well Production

C. Quality (Chemistry)

D. Temperature

E. Well Drilling Log or Geologic Log

F. Water Rights

G. Jurisdictional Waters

H. Habitat Types
1. Extent of riparian areas

III. Hydrologic System

A. Meteorology

B. Recharge
1. Type
2. Distribution

C. Discharge
1. Type
2. Distribution

D. Potentiometric Surface or Water Table

E. Groundwater Flow

1. Gradient
2. Velocity

F. Hydraulic Boundary Conditions/Hydrologic Divides
1. Type
2. Distribution

IV. Hydrologic Budget

V. Conceptual Groundwater Model

A. Ground and Surface Water Systems
(Based on available pre-field data)

B. Project Hydrogeologic Setting

Preliminary Plan of Operations Review

When reviewing the plan of operations to identify areas of potential environmental effects, the following checklist of subject areas should be considered and may need to be evaluated as part of a preliminary review.

I. Waste Rock Dumps

A. Water Quality
1. Acid Rock Drainage/Generation
a. Background pH Level
b. Leachate
c. Neutralization Potential, e.g. Carbonates

2. Storm Water Runoff
a. Sediment Control
b. Erosion Control

B. Potential Resource Conflicts
1. Surface Water Resources
2. Ground Water Resources
3. Threatened, Endangered, Candidate or Sensitive Species
4. Wildlife
5. Fisheries
6. Vegetation/Riparian
7. Habitat
8. Other

II. Mill/Processing Facilities

A. Water Quality

1. Acid Rock Generation
2. Storm Water Runoff

B. Potential Resource Conflicts
   1. Surface Water Resources
   2. Ground Water Resources
   3. Threatened, Endangered, Candidate or Sensitive Species
   4. Wildlife
   5. Fisheries
   6. Vegetation/Riparian
   7. Habitat
   8. Other

III. Tailings and Heaps

A. Water Quality
   1. Acid Rock Generation Potential
   2. Process Water Drainage Potential
   3. Storm Water Runoff

B. Potential Resource Conflicts
   1. Surface Water Resources
   2. Ground Water Resources
   3. Threatened, Endangered, Candidate or Sensitive Species
   4. Wildlife
   5. Fisheries
   6. Vegetation
   7. Habitat
   8. Other

IV. Dewatering

A. Lowering the Water Table
   1. Drawdown Area (cone of depression)
   2. Reduction in Base flow
      a. Springs
      b. Streams
   3. Recovery Period/Level
   4. Impact to Aquifers
   5. Subsidence Potential
   6. Ground water flow balance into and out of Pit

B. Potential Resource Conflicts
   1. Surface Water Resources
   2. Ground Water Resources
   3. Threatened, Endangered, Candidate or Sensitive Species
   4. Wildlife

5. Fisheries
6. Vegetation
7. Habitat
8. Other

V. Water Disposal

A. Surface Discharge
1. Water Quality
2. Interbasin Transfer
3. Flood Capacity
4. Siltation
5. Erosion
6. Infiltration Rates
7. Proposed receptacle for discharge water
8. Fluvial Geomorphology

B. Infiltration/Reinjection
1. Reinjection Well Design
2. Infiltration Basin Design
3. Efficiency of Method
4. Water Quality
5. Interbasin Transfer
6. Evaporative Loss
7. Surface Disturbance
8. Increase in Base flow
9. Rate of Saturation/Mounding

C. Other Disposal Methods
1. Irrigation
2. Agriculture/Livestock
3. Wetlands/Jurisdictional Waters
4. Commercial/Industrial

D. Potential Resource Conflicts
1. Surface Water Resources
2. Ground Water Resources
3. Threatened, Endangered, Candidate or Sensitive Species
4. Wildlife
5. Fisheries
6. Vegetation
7. Habitat
8. Other

VI. Pit Infilling/Lake Development/Backfilling

A. Water Quality
   1. Pre-Mining
   2. Post-Mining

B. Evaporative Loss (Pit Lake Water Budget)

C. Potential for Down Gradient Impacts

D. Recharge

E. Consumption
   1. Livestock
   2. Wildlife
   3. Human (drinking water)

F. Potential Resource Conflicts
   1. Surface Water Resources
   2. Ground Water Resources
   3. Threatened, Endangered, Candidate or Sensitive Species
   4. Wildlife
   5. Fisheries
   6. Vegetation
   7. Habitat
   8. Other

VII. Potential Cumulative Effects

A. Water Resources
B. Ecological Risk
C. Other

VIII. Leaks and Spills

A. Hazardous Substances
   1. Prevention Measures
   2. Contingency Plan
   3. Clean-up/Disposal

B. Non-Hazardous Substances

IX. Federal/State Requirements

A. State Permitting
   1. Mining Water (Water Pollution Control, Etc.)
   2. Groundwater
   3. Underground Injection

4. National Pollutant Discharge Elimination System (NPDES) (Clean Water Act)
5. Storm Water
6. Rapid Infiltration Basins

B. Federal Laws and Regulations
1. Clean Water Act
2. Safe Drinking Water Act
3. Endangered Species Act
4. Other

C. NEPA Review

D. Bonding/Mitigation
1. Pre-Patent
2. Post-Patent

E. Water Rights

X. Coordination

A. Federal Agencies
1. Fish and Wildlife Service
2. Environmental Protection Agency
3. Army Corps of Engineers
4. Other Agencies

B. Tribal Agencies

C. Nevada State Agencies
1. Division of Environmental Protection
    a. Bureau of Water Pollution Control
    b. Bureau of Mining Regulation and Reclamation
2. Division of Water Resources
3. Division of Health, Bureau of Health Protection Services
4. Division of Wildlife

D. Other Affected Parties

Geochemical Testing and Water Resource Modeling

Based on the review of the plan of operations and baseline data, including the water resources inventory, the BLM will be able to assess the extent of the potential mine operations/water resource conflicts and any geochemical testing and water resources information needs. This evaluation should include a determination of whether the existing geochemical testing and water resources modeling, and/or those being proposed by the mine company, are adequate. Specifically, this review should determine if the geochemical testing program and water resources modeling meets or exceeds all standards required by the appropriate regulatory agencies and are generally accepted by the scientific community. A meeting should be held with the mining company and Nevada Division of Environmental Protection (NDEP), if possible, to discuss the data and to determine additional geochemical testing and/or water resources modeling is necessary.

The geochemical testing and conceptual water resources modeling requirements should be included in a work plan and be documented in the preparation plan if the BLM anticipates such an effort will be needed. However, plans for the geochemical testing and conceptual water resources modeling should be developed in a broad fashion to allow for changing requirements as the baseline water resource data and other data and analytic needs are identified. Analysis of surface water data, including any modeling efforts, is currently based on State of Nevada, NDEP, permitting standards and BLM 43 CFR 3809 regulations.

Geochemical Data Requirements

Developing an appropriate geochemical testing program starts with a sound, scientific approach to the sampling effort. Samples of geologic materials should be collected that represent interburden, overburden, and ore zone. Additionally, if a pit lake will occur as a result of the mining operation, samples should be collected that represent the ultimate pit surface or pit wall. The proponent should provide a sampling plan, as part of the Environmental Impact Statement (EIS) Preparation Plan, identifying the proposed sampling locations and geologic unit or materials classification. Specific data-collection methods and related data standards are not defined in this guide document. However, references on this topic are appended in Attachment 2 of this document.

Geochemical Testing

Static Testing - For any plan of operations that the interdisciplinary team determines has any acid-generating potential, a static test will be required. A static test attempts to predict acid-producing potential based on the acid-generating and acid-neutralizing minerals present in the sample. Although static testing is generally a fairly quick process (less than 1 week), the test results may determine or indicate the need for additional tests, such as kinetic testing. As such, static tests should be conducted early in the process. The following are the five major static tests that could be utilized. In consultation with the BLM, the operator should determine which test to conduct. Examples of geochemical static testing methods are:

- Acid/Base Accounting (ABA)
- Modified Acid/Base Accounting
- British Columbia Research Initial Test
- Net Acid Production
- Alkaline Production

For the static tests, acid-generating values are expressed as acidification potential (AP), and neutralizing values are expressed as neutralization potential (NP). The net neutralization potential (NNP) equals the NP minus the AP. Hence, a negative NNP test result demonstrates that acid-producing potential exceeds acid-neutralizing potential. A simplifying assumption in the static test is that all acid-generating and acid-neutralizing minerals will be available. This assumption adds uncertainty to the test results. To deal with the uncertainties of the static test, the BLM requires a kinetic test if the NNP does not exceed +20 and/or the NP value is not at least three times greater than the AP value.

Leaching Tests

Leaching tests should be conducted on representative samples of waste rock, tailings, and ore zone materials to determine the potential types of residual water quality that may result from meteoric and infiltrating waters contacting and moving through these materials. The results of leach testing can be used to aid in the engineering design, materials handling plan, and the final closure plan. Appropriate leach test protocol is defined under American Society for Testing and Materials (ASTM), Criteria and (US Environmental Protection Agency) EPA Guidance.

Kinetic Testing - If the static test results indicate the potential for acid generation or if there is an indication of high metal content, a kinetic test should be conducted. Kinetic tests are used to attempt to duplicate in the laboratory how the geologic units will behave in the weathering environment. These tests provide an indication of the rate that metals and other elements may leach out of the material and a further prediction of the acid-generation potential. The results of the kinetic test can also be directly placed into the geochemical modeling to determine the potential pit-water quality or the type(s) of potential leachates from tailings impoundments, dumps, and heaps.

Kinetic testing requires a fairly long period of time to conduct (20 weeks or longer). As such, the need for testing and the type(s) of kinetic tests to conduct should be determined early in the process. The following are the five major kinetic tests that could be run. In consultation with the BLM, the operator should determine which tests(s) to conduct. Some examples of kinetic test methods used in Nevada are:

- British Columbia Research, Confirmation
- Humidity Cells ("Shoe Box" and Cylindrical)
- Shake Flask
- Soxhlet Extraction Test
- Column Test

Water Resource Modeling

Groundwater Flow Modeling

Groundwater flow modeling is an analytical tool utilized for predicting a number of hydrologic dynamics, including quantity, rates and flow level. Specifically, this predictive tool have been used in Nevada to estimate the hydrologic effects associated with proposed mining operations. Several different types of groundwater flow model codes are available that can provide information concerning groundwater flow. Because of the different groundwater model code applications and data requirements, the BLM should consult a hydro geologist or hydrologist experienced in groundwater modeling before determining which modeling efforts will be required.

Modeling effort should include the following steps and information:

- Determine what type is needed.
- Collect all available geologic and hydrologic information and create a conceptual model of the system of interest.
- Select a computer code to be used that has undergone a code verification process as defined by ASTM protocol.
- Develop a model design, where such items as model grid, boundary conditions, and initial conditions are selected.
- The model must be calibrated through appropriate techniques as defined under ASTM protocols.
- A verification process must be conducted on the model.
- There must be a demonstration of the range of uncertainty of the model; this can be accomplished through a sensitivity analysis and a confidence determination.
- The final results should be presented in a orderly and comprehensive report.

Groundwater models are routinely used to predict and evaluate conditions associated with proposed mining operations, ongoing mine operations, and mine closure activities. Groundwater models can be used to study and assess pit dewatering, dewatering of underground workings, water disposal options, and long-term water resource impacts, as well as, cumulative impacts. Examples of groundwater models routinely used to evaluate mining operations are: MODFLOW, VS2DH, and TWODAN to name but a few.

The American Society for Testing and Materials (ASTM) has developed standards for ground-water modeling. They are as follows:

D-5447 Standard Guide of Application of a Ground-Water model to a Site Specific Problem.
D-5490 Standard Guide for Comparing Ground-Water Flow Simulations to Site-Specific Information.
D-5609 Standard Guide for Defining Boundary Conditions in Ground-Water Flow Modeling.
D-5610 Standard Guide for Initial Conditions in Ground-Water Modeling.

D-5611 Standard Guide for Conducting a Sensitivity Analysis for a Ground-Water Flow Model Application.
D-5618 Standard Guide for Documenting a Ground-Water Flow Application.
D-5880 Standard Guide for Subsurface Flow and Transport Modeling.
D-5981 Standard Guide for Calibrating a Ground-Water Flow Model Application.

Vadose Zone Modeling

Characteristics of the vadose zone, the unsaturated zone between the land surface and the saturated zone or water table, may affect the discharge in many ways. Physical properties of the vadose zone, such as higher permeability layers and geologic structural control (e.g., faults, shear zones, fracture zones), can facilitate movement of discharge to groundwater. In addition, chemical and geochemical reactions within the vadose zone as a result of contacts with discharge water may increase, decrease, or modify to some degree the original quality of the discharge water. Attenuation of chemical constituents in the soil or rock materials within the vadose zone should be considered. If attenuation is to be considered for vadose zone materials receiving discharge waters then the following processes need to be evaluated:

- Physical mechanisms such as filtration, dispersion, dilution.
- Physiochemical mechanisms are dependent on both physical and chemical conditions and can include adsorption and fixation.
- Chemical mechanisms are dependent on chemical reaction of an element or mineral with soil or pore water and includes solution and precipitation of compounds and could result in an increase or reduction in toxicity of a constituent.
- Biological mechanisms include biodegradation of a chemical into the basic oxidation product, bacterial consumption of the cellular uptake.

Other data used to characterize the vadose zone are:

- Lithologic logs or borings or well logs that identify rock type, grain-size distribution, stratigraphy, mineral grain cementing, and thickness of geologic units.
- Structural geologic information that includes faults, fractures, jointing systems, folds, and bedding orientation.
- Geologic maps and cross-sections which show stratigraphic or formation contacts, and structural geology.
- Borehole geophysical logs.
- Surface geophysical surveys.

- Physical properties such as horizontal and vertical permeability, dispersivity, and porosity (secondary and primary).

- Chemical analysis for pH, electrical conductivity (EC), neutralization potential, inorganic and organic analyses.

- Results of batch or column tests showing quality of discharge after reacting with the vadose zone.

- Materials property tests for grain size analyses, moisture content, Atterberg Limits, and maximum density.

- Analyses of fluid movement and chemical transport through the vadose zone. Measurement and testing data for analyzing fluid movement and chemical transport within the vadose zone can be obtained by utilizing lysimeters, neutron log measurements, observation wells, packer tests, and analytical or numerical simulations. Also refer to the IM guidance document for “Hardrock Mining Reclamation and Closure Activities”.

Mathematical models can be used to quantify the rate of soil-water movement due to infiltration. The use of vadose zone models for evaluating soil-water interaction has increased in recent years because of new mine designs and the need to protect water resources. There are numerous references that address mathematical models for the vadose zone, one of the most helpful in terms of selection, application, and usability is the document(s) “Estimates of Infiltration Rate in the Vadose Zone: Compilation of Simple Mathematical Models, Volumes I and II, U.S. E.P.A., National Risk Management Research Laboratory, EPA/600/R-97/128a and 128b, 1998”.

Numerical models can also be utilized to evaluate engineering designs, expected performance, assess water movement in the unsaturated zone, and predict contaminant loading. Additionally, numerical models can be used to compare design alternatives for cover systems on heaps, dumps, and tailings impoundments. One should keep in mind that appropriate use, and the understanding of assumptions and limitations of such models is key to proper application. These models allow technicians to assess and modify a design concept until specific performance criteria are obtained. An example of numerical models used in recent times to evaluate unsaturated conditions for design and performance at mine operations are: HYDRUS-2D, HELP, UNSAT-H, SEEP, and VS2DT to name but a few.

Geologic Hazards

During the process of mine site and surrounding area characterization and design development for the Plan of Operations (POO) and NEPA process, engineering geology and hydrogeology studies should be performed to identify and evaluated geologic hazards. Geologic hazards are processes that are capable of producing large ground movements as compared to those related to routine analysis of structure settlements and deformations. Hazards that may compromise the structural integrity mine features or operations such as dumps, heaps, impoundments, monitoring wells, water discharge processes, etc., include landslides, subsidence, liquefaction, and other induced ground failure and collapsing soils.

Landslides

Landslides sometimes occur on step terrain or hill slopes and can be capable of reactivation by excavation at the toe, additional loading to a landslide mass, changes to surface drainage control systems, fluctuations in the water table, or earthquake induced ground acceleration.

It is advisable to avoid locating well(s) (ground water monitoring, infiltration, injection, production, discharge) or other water discharge control systems in areas likely to exhibit landslide potential.

Subsidence and Settlement

Groundwater declines of as much as 1000 feet in alluvial basins in Nevada are known to have caused subsidence of as much as 1-20 feet at mines. If the cause of subsidence is localized (e.g., dewatering of an areally extensive and uniform aquifer) and the movement occurs at about the same rate beneath the mine operation, there may be no impact on the mine operation and structures. If subsidence is not uniform at a mine operation or adjacent areas, different rates of subsidence can result in horizontal or vertical strains that can compromise the integrity or functioning of the mine operation components such as wells, piping systems, and engineered structures.

Settlement can occur from loads placed on the surface such as dumps, heaps, or tailings impoundments. Settlement due to loading can result in horizontal or vertical strains in the subsurface similar to subsidence. Evaluation of settlement may be necessary if wells used for dewatering, infiltration, discharge, or re-injection are located in an area subject to significant loading.

The subsidence and settlement residuals and resultant horizontal movement, horizontal strains and potential earth fissuring can be assessed by empirical methods, simplified elastic methods, and finite element methods (refer to references in Appendices). If a potential exists for settlement or subsidence to occur at a mine site or adjacent areas to a mine operation then these potential hazards must be considered under NEPA and the POO.

Earth fissures have been identified at numerous mine sites in Nevada. Earth fissures appear as surface cracks, a series of small potholes, or linear depressions. Earth fissures can be hairline to tens of feet in width and have been observed to extend tens of feet into the subsurface. Earth fissure development can intensify because of the introduction of surface water either through precipitation or other surface water exposure. It is important to conduct field and remote sensing studies in basins where earth fissure potentials exist. These studies should be conducted as part of the NEPA process, and if such fissure environments were found to exist in the area(s) of the proposed mine operation, then appropriate plans and monitoring should be developed to address this issue.

Monitoring

Monitoring of hydrologic baseline conditions, mining operations, mitigation requirements, and reclaimed areas are important elements of the BLM's responsibilities related to water resource protection. Monitoring is intended to assist the BLM in meeting its responsibilities to manage public lands during and after mining operations. Existing guidance dealing with monitoring can be found in BLM Manual Handbook H-3042-1 - Solids Minerals Reclamation Handbook, BLM National Environmental Policy Act Handbook - H1790-1, and Nevada Cyanide Management Plan. Several good examples of monitoring requirements were recently developed in the field, in coordination with the State, operator and other interested parties, such as the Barrick Goldstrick Plan and EIS, and the Cortez Pipeline Gold Integrated Monitoring Plan.

Monitoring requirements should be discussed with the operator as part of the up-front coordination, plan of operations and NEPA analysis, inspection procedures and closure. The BLM, in coordination with the State and the operator, need to consider long-term effects of mining. Monitoring should be considered for all aspects of the ecosystem, especially the impact on an area's hydrology and the effect on fisheries and wildlife habitat. Specific attention needs to be paid to pit lakes and the management and monitoring of such features.

Wherever possible, monitoring should tier on other regulatory agency requirements, most significantly the States Division of Environmental Protection. Such a coordinated approach will help avoid duplication of effort and ensure both State and Federal agencies are utilizing similar data.

Monitoring can be accomplished by the operator, other agencies and/or the BLM. Each field office should ensure that there is a process in place to assure monitoring is carried out and monitored data is analyzed and reviewed to meet the stated plan objectives. In addition, monitoring requirements should be coordinated, as necessary, with mine closure and bond release.

Nevada Laws and Regulations

The State of Nevada requires a number of permits and actions associated with the planning and development of a mine or mill in the State. The following list identifies the State requirements that may be associated with the use and protection of water resources.

Permit to Appropriate the Public Waters - Nevada Division of Water Resources (NDWR) requires a permit prior to construction. The operator must submit required information, including the location of point of diversion and place of use; what the water will be used for; and an estimate of the annual consumption of water. Legal authority - NRS Chapter 533 and 534.

Mineral Exploration Hole Plugging – Prior to plugging a hole, the operator must notify the NDWR. Legal authority – Nevada Administrative Code (NAC) 534.

State Ground Water Permit – The (NDEP), Bureau of Water Pollution Control (BWC), requires a permit prior to construction. The operator must provide a site plan; plan and specifications for wastewater treatment plant; geology, soil, hydrology, and flood-plain and drainage area information; chemical analysis of ground water; assessment discharge fluids; drinking-water sources in the area; in addition to other specific site information. Legal authority NRS 445.131 through 445.354 and NAC 445.07-0 through 445.241.

NPDES Permit – Prior to construction, the NDEP, BWPC, requires a permit and information concerning a site plan; plan and specifications; soil information; flood-plain and drainage area; and drinking-water sources in the area. Legal authority – NRS 445.131 through 445.354 and NAC 445.070 through 445.241.

Underground Injection Control Permit – Prior to drilling an injection well, the NDEP, BWPC, requires a permit. The operator must provide a site plan; plan and specifications for the facility; geology, hydrology, soil and flood-plain and drainage information; chemical analysis of ground water and any discharge fluids; information regarding drinking-water sources and wells in the area; verification of financial responsibility; and other site and process information. Legal authority – NRS 445.131 through 445.354 and NAC 445.422 through 445.4278.

Water Pollution Control Permit – Prior to initiation of construction of a process component, the NDEP, Bureau of Mining Regulations and Reclamation, requires a permit and information concerning legal structure of applicant; annual production; area of review assessment; meteorological report; engineering design report; draft operating plans; and other information. Legal authority – NRS 445.131 through 445.354 and NAC 445.242 through 445.24388.

Endangering Wildlife – The Nevada Division of Wildlife (NDOW) needs to make a determination prior to construction whether or not the mining operations would endanger wildlife, including fish habitat. Legal authority – NRS 445, 501.181 and NAC 504.520.

Dredging Permit – Prior to operation, the NDOW requires a permit. Legal authority – NRS 503.425.

Industrial Artificial Pond Permit – The NDOW requires a permit prior to operation of an artificial pond. Legal authority – NRS 502.390 and NAC 502.460 through 502.495.

Permits for Sanitation Facilities – The Nevada Division of Health, Bureau of Consumer Health Protection Services, requires drinking-water and sewage system permits prior to construction. Legal authority – NRS 444, 445, 446, 439.200 and 278.