ATTACHMENT 4
MONITORING PROTOCOL, MITIGATION PROCEDURES

Monitoring Protocol:

A comprehensive monitoring program is the key to sustainable groundwater management. The only true way to ensure that a basin is not over drafted while utilizing groundwater resources is to closely monitor hydrologic conditions from the hydrographic basin. This is best achieved through a comprehensive monitoring program that includes collecting groundwater and surface water levels annually and comparing them to previous data. Assessment of water quality trends is equally as important. Specific constituents should be monitored annually to track potential changes in water quality.

Training:

Employee training is an investment that has short-term and long-term benefits to a countywide groundwater-monitoring program. The immediate benefits allow confidence that the work is being performed correctly, accurately and in a timely manner. The long-term benefits ensure that technically competent personnel are bringing value to the monitoring and mitigation program. Because work in the scientific arena is receiving increased scrutiny, the qualifications/training of the technical personnel relative to the data collected must be well documented. Personnel training documents with annual refreshers will help to ensure that all data are collected in a manner consistent with the protocol and procedures, set forth in this document. All field technicians collecting groundwater data will be required to be trained on this manual, by a qualified person and receive annual refresher training. This will ensure consistency of the data collected. The initial training and refreshers will be documented in the employee's personnel files, in the event that the data collected is ever scrutinized or questioned. No personnel will be allowed to collect field data who have not been properly trained on all the procedures set forth in this monitoring and mitigation program.

Monitoring of Spring, Wetlands, and Riparian Areas

Sub-irrigated, wetland, and riparian vegetation typically is quite different than plant communities on adjacent uplands. Encroachment of upland and invasive species is an indication of changing or declining riparian environments. One efficient way to monitor the same representative areas is to take annual photographs. The following procedure has been established for the monitoring of identified sensitive locations involving springs and riparian environments. At a minimum, the monitoring of these areas will be conducted on an annual schedule.

- If this is not the first field visit to a specific site, a brief review should be conducted of the previous years photographs and notes to become familiar with the conditions observed at the last field visit.
- If this is the first field visit, establish a few photographic viewpoints easily accessible, recognizable and with permanent landmarks from which to shoot yearly photo's. Be sure to GPS the site and record the new data in the field notebook, designated for that site. The annual visits to the sites should be scheduled within a few weeks from the pervious year's field visit. Review of the previous year's monitoring photographs and field notes should be conducted prior to all scheduled field visits.

- Supplement the photographic data by providing notes on observations of the conditions and trends of riparian vegetation, stream banks, and stream channels. If justified, install measuring-devices in designated locals of the springs and riparian areas that can be photographed annually to help identify more subtle changes that may occur yearly.

- Enter the digital photographs and notes into the Arc View GIS database, immediately upon returning from the field. If a new GPS coordinate was taken during the field visit, be sure to enter that data also. Always allow enough time in the same day that the data was collected, to enter the data in the database. This is key to ensuring that the data entered are fresh in the mind of the technician and will be accurately entered. Take the field notes from the day and place the originals in a designated binder, being sure to verify that all the dates, times, and name of the technician person is correctly documented on the field forms. Back up digital data with hard copies on file. This will help to eliminate lost data or misplaced data.

Over time, the data records will clearly begin to reveal any changes (either positive or negative) around sensitive springs and/or riparian locations.

Groundwater Monitoring

Ground Water Level Measurements

Groundwater levels will be measured according to the USGS protocol as outlined in this program. If discrepancies exist between this document and the USGS protocol, a review of the procedures by competent County personnel will be conducted to determine the best course of action to resolve any discrepancies. Discrepancies will be brought to the attention of the Water Advisory Committee with recommendations for a resolution. The objective of utilizing the USGS protocol is to provide quality control and consistency of the procedures used to measure water levels in the wells. To ensure the consistency, comparability, and repeatability of the collected data, all electronic water level metering devices must be identified, calibrated, maintained and operated in an appropriate manner. The following is a delineation of the protocol including equipment, procedures, and frequency of measurements.

Equipment:

The equipment to be used to measure groundwater levels will be an electrical water level meter. The equipment will be selected to provide consistent measurements by staff and volunteers and will contain a polyethylene tape with units measured in feet. The polyethylene tape will contain permanent markings with 1/100-foot increments. The electronic probe at the end of the polyethylene tape will be of a type that reduces or eliminates problems associated with cascading water. All electronic water level meters will be designated with an I.D. number that will be recorded and documented whenever the instrument is undergoing maintenance, used in the field, or calibrated. Maintenance and calibration records will be kept in files labeled with the instruments I.D. number and located in a place designated by the County Officials.

Calibration and Testing of Equipment:

The type of water level meter identified in the monitoring equipment only requires limited calibration. The main procedure prior to operation of the water level meter is to check the conductivity or circuitry of the probe. This is to ensure that the meter is operating properly prior to using the equipment in the field.

To perform this test, turn the meter on using the sensitivity dial, rotating the dial clockwise. The sensitivity dial should always be switched to the highest sensitivity position before testing the meter. Submerge the electrode (probe) in tap water to activate the alarm. The alarm contains a high frequency pitch and indicator light next to the dial. If the alarm continues after removing the probe from water, adjust the sensitivity as required and repeat until the alarm shuts off when removed from water. Once the water level meter has been tested and calibrated for sensitivity, the meter is ready to be used to collect water level data. The calibration test should be performed and documented in the field instrument's I.D. file. This will ensure that good records are documented.

Collection of Water Level from a Well:

Verify the well location before beginning. If this is the first time to a well site, collect a GPS coordinate for the well location. Turn on the water level meter to the sensitivity level identified during the calibration and testing procedure. Press the test button indicator to verify that the water level meter is operating properly. Verify the measuring point on the well as described and photographed from previous visits to the well. If this is a new well location that is being measured for the first time, identify a measuring point on the wellhead and mark the spot with a white grease pen. Take a photo of the location to ensure a reference point for future soundings. If this is a well that has been measured historically, remark the measuring point with a white grease pen.

Soundings taken at domestic or municipal wells used as a source of drinking water require sterilization of the tape and probe, immediately prior to taking the measurement. This is easily accomplished by placing the probe and anticipated length of tape into a weak chlorine solution. Approximately ¼ cup of 5% chorine (regular bleach from a supermarket) in five gallons of water is adequate. Soak the tape and probe for about one minute before taking the measurement. Do not attempt to dry the unit before taking the sounding.

Begin lowering the probe down the well until the probe reaches the water level (as indicated by the alarm on the sounding device). When the alarm sounds, align the measuring tape with the measuring point identified for the wellhead and read the footage (to the 1/100-foot) on the embossed electrical conductor polyethylene tape. The conductor tape is marked in increments of 1/100-foot increments. Record the following information on the appropriate form:

- Date measurement was taken;
- Time measurement was taken;
- Water level measurement recorded to within 0.01 of a foot;
- Adjustment, if needed;
- Initials of technician;

- Instrument identification (I.D.) number;
- Calibration due date;
- Comment as to whether sterilization was required or not;
- Comments of unusual events, if any, in the comment column;
- Any security observations.

After completing water level measurement and recorded data, reel the probe to the surface and clean and rinse equipment with fresh water in preparation for next well.

MITIGATION PROCEDURES:

Level 1:

Two consecutive years (or eight consecutive quarters) of groundwater level data and/or spring and riparian areas in a basin or portion of a basin indicating a negative impact.

- Increase the monitoring data collected in the basin or portion of the basin by installing submersible digital data logger devices in all of the affected wells. The continuous data collected from these devices will be uploaded monthly into a field data receiver and then downloaded into the database that has been setup in the ARC View GIS software program. Selection of the continuous logging device and procedure for calibration and data collection will need to be addressed at the time of action and incorporated into the Monitoring and Mitigation Program.

- Review the precipitation data from the weather stations hyperlinked in the database for the associated basin or watershed of interest, to see if there has been a pattern of decreased precipitation for the last two or more years. Also, review all the precipitation data available for each of the weather stations to identify any cyclic weather patterns (i.e. drought and wet year cycles that may be normal).

- Supplement the data being collected by either acquiring additional data points (new well to monitor) or requesting the information from local government entities and/or ranchers in the area.

- Review the data from other Federal and State Agencies monitoring programs in the same basin to see if their datasets are consistent with the County's datasets, showing a negative impact to the basin, watershed, and/or aquifer(s).

- Begin requesting "mandatory" pumping data (flow rates and total duties) from all entities extracting groundwater from the basin, watershed, and/or aquifer(s). This should be collected quarterly either by the entities providing the data to the County or collecting it from the users through County personnel. The County will have to determine what will be the acceptable method(s) for receiving quarterly pumping reports (i.e. hour meters and flow rates and/or flow meter reports of the pumping data).

- Document these tasks and bring the data, with a brief report of the findings and recommendations, to the attention of the White Pine County Water Advisory Board. The Water Advisory Committee can determine the next course of action (i.e. bring to the attention of the County Board of Commissioners).

Level–2:
Implementation of the mitigation measures outlined in the level-1 triggering mechanism and at least one to two more additional years (three to four years total of aquifer over-drafting) of well monitoring and/or spring and riparian area data validating the negative impacts to the basin, watershed, and/or aquifer(s).

- Analysis of the pumping data collected during the prior year, incorporating increased monitoring of the basin, watershed, and/or aquifer(s).

- Evaluate all of the data available and provide a report on the analysis to the

- Notify the State Engineers Office through the proper protocol that the basin, watershed, and/or aquifer(s) in question may be undergoing over-drafting due to pumping.

- Notify all of the appropriated water right holders in the affective area of the County's concerns based on the data and analysis to date. Inform the water right holders of what the next level of mitigation will be, by the county and/or State Engineer's Office, and how it could affect their water use.

Level–3:
The conclusions from the hydrogeologist's groundwater report along with at least one more year of depleting groundwater levels in the basin, watershed, and/or aquifer(s) suggests that excessive pumping is creating the negative impact.

- White Pine County Water Advisory Committee will need to take steps in one or more of the following courses of action:

    1. Establish in ordinance form requirements for augmentation programs to either supplement the over-drafting of the aquifers or artificial recharge the aquifers through reuse water (rapid infiltration basins or injection wells) or imported water. This could include the development of a conjunctive use program for the region or basin. The junior water right users will fund all feasibility studies and implementation of approved projects if they want to keep withdrawing groundwater from the basin (possibly at a reduced production rate).

    2. Maintain inventories of well levels. Evaluate the need for alternative pumping schedules to allow a portion of the aquifer/basin to recharge if the diversion rate in a portion of the basin appears to be excessive. This may involve the drilling of replacement wells in other areas of the basin spaced farther apart.

    3. Request a "Call" to the State Engineer's Office to either reduce or stop production from junior water rights uses.

    4. Using existing data collected to date, determine if the aquifer system is being stressed too heavily in one portion of the basin or if the basin as a whole is being over-drafted.

    5. Drill strategically located monitoring wells in the basin and/or aquifer(s) that appear to be impacted the greatest. Continue to add continuous submersible

digital data loggers to the wells and collect and download the data on a regular schedule (i.e. monthly). Junior water right users should be responsible for assuming the financial liability.

6. Require the junior water right users to mitigate the effects of their groundwater pumping through one or more of the following: (1) deepen the affected wells of the senior water right users, (2) drilling replacement wells, (3) providing water from the junior water rights users infrastructure to the "place of use" of the senior water right users, (4) a financial settlement to the senior water right users. These are all temporary solutions to help mitigate the negative affects to the senior water right users.

- Have the Water Advisory Committee bring the issues to the County Board of Commissioners attention for approval of the Committee's recommendations or additional recommendations.

- Continue to monitor closely the effects of any approved augmentation or supplementation projects for positive impacts.

- Make a request to the State Engineer's Office to have the perennial yield in the basin reduced or generate sub-basins within the basin that does not allow any further appropriations.

Requirements for Export Water Supply Wells (Inter-County or Intra-County Inter-Basin Transfers:

The setback distances and monitoring requirements for any water exporter from a basin of origin in White Pine County serve as a guide for the location of water supply wells used for the inter-basin transfer of water.

1. Minimum of one-mile setback distance from all existing underground water rights and water supply wells. Monitor water withdrawals, pumping levels, and static water levels at all existing wells within two miles of the point of diversion. Reduce pumping rate if a water level decline of 10 feet is detected within two miles.

2. Minimum of three-mile setback distance from all springs, riparian areas, streams, and wetlands. Monitor spring discharges and stream flows within five miles of the point of diversion. Reduce pumping rates if a decline in spring discharge rates is detected.

3. Minimum of five-mile setback distance from all State and Federal Wildlife Refuges, State and National Park boundaries, Native American reservations, and all public water supply systems. Monitor all water withdrawals and water levels as required by State or Federal agencies and tie pumping rates to trigger levels for draw down and surface water flows.

In addition to these requirements, the water exporter must meet the following conditions prior to water withdrawals:

a. Develop a monitoring plan that specifies the points of diversion that will be used for exportation, all land and water right owners within the distances specified above, the locations of sites that will be monitored, and the frequency of monitoring.

b. Conduct monthly monitoring of springs and water levels for one year prior to the operation of any water supply wells used for exportation. These data will establish the baseline pre-pumping conditions.

c. Enter into a cooperative agreement with White Pine County and Nevada Division of Water Resources, and U.S.G.S., regarding data reporting, roles and responsibilities, permit conditions, and dispute resolution.