APPENDIX E
NDEP GUIDELINE WTS-1B FOR PREPARING AN EMP

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WTS-1B: GENERAL CRITERIA FOR PREPARING AN EFFLUENT MANAGEMENT PLAN

GENERAL NOTES:

The Nevada Division of Environmental Protection (NDEP) must be contacted whenever the use of reclaimed water is planned in order to determine the appropriate regulatory oversight requirements. NDEP shall also be available to assist the applicant in preparing the effluent management plan (EMP).

The Nevada Division of Water Resources (775) 687-4380 must be notified of the plan to use reclaimed water in order to address requirements for secondary water rights. Also, the Nevada State Health Division (775) 687-4754 should be consulted to ensure the use of reclaimed water is consistent all water supply protection requirements. Finally, please be aware that the local government and water purveyor may have rules on reclaimed water usage and should be consulted.

GUIDANCE INTRODUCTION:

Pursuant to NAC 445A.275.1(b), NDEP must issue a discharge permit for the use of reclaimed water. As part of this permitting process, NAC 445A.275.1(a) states that an EMP must be submitted and approved prior to the use of reclaimed water. This guidance was prepared to assist the permittee in preparing a satisfactory EMP. Please be aware that the extent of information and content for each individual EMP will vary for the different types of reclaimed water use, so not all portions of this guidance may apply to your particular EMP.

This guidance was organized to cover only existing usages of reclaimed water in Nevada. Items that the Division deems a requirement are so marked in the document and items that are simply recommendations are so marked. Information on any guidance referenced in WTS-1B may be gathered by contacting this Bureau.

Past guidance documents for reclaimed water use (WTS-1, WTS-9, and the outline format), are now effectively replaced by this guidance and WTS 1A (General Design Criteria for Reclaimed Water Irrigation Use). This Guidance is considered a dynamic document, and revisions may be made in the future as changes in reclaimed water usage regulations dictate.

Thanks is given to the Reuse Nevada Committee for their assistance in helping NDEP prepare this guidance.

The EMP is intended for use by the reuser (golf course superintendent, farmer, park maintenance worker, industrial worker, etc.) so it should be written in a user friendly format. The use of illustrative figures, maps, and tables throughout the EMP is highly recommended. The EMP should be bound in a loose leaf binder to facilitate updates. The date of printing for the EMP and all subsequent revisions must be shown on the title page of the EMP.

This document does not replace best professional judgement in reuse system management and NDEP reserves the right to require further information and review additional factors as needed.

TABLE OF CONTENTS

KEYWORDS

AIR GAP:

Generally, the safest method of back flow prevention control. For this document, it is defined to be an unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe conveying potable water to the flood level rim of any container with treated effluent. The Uniform Plumbing Code details the requirements for Air Gaps and enforcement is the role of the local water purveyor and/or health authority.

BUFFER ZONE:

NAC 445A.076 defines a buffer zone to be the shortest distance between the boundary of the site being irrigated with reclaimed water and either; **one**, the property line boundary of the site; **two**, a posted public warning sign, or; **three**, any point where the property is open to public access, whichever is least. NAC 445a.276 lists the various buffer zones for spray irrigation sites based on reclaimer water quality and type of site being irrigated.

DMR: Discharge Monitoring Report. A table-formatted report where results from permit sampling and monitoring are recorded for submittal to NDEP.

FECAL COLIFORM:

Bacteria from feces of mammals which is used as an indicator of pathogenic organisms.

RECLAIMED WATER:

Domestic Wastewater that has been treated to secondary treatment standards and disinfected to levels necessary (per NAC 445A.276, 277, and 278) for the chosen method of reuse. Other terms for this water include Treated Effluent, Reuse Water, and Recycled Water.

SAR : Sodium adsorption Ratio, a ratio determined from the concentration (milliequivalents/liter) of sodium, calcium, and magnesium in water. It is used as an indicator of potential soil problems.

$$\mathbf{SAR} = \frac{Na}{[(Ca + Mg)/2]^{1/2}}$$

A modification of this ratio, termed the adjusted SAR, considers the changes in calcium solubility in soil water. The procedure for determining this ratio is listed in Wastewater Engineering Treatment, Disposal and Reuse. 1991.

SOIL LEACHING:

Irrigation practice of applying water to soils in an effort to drive salts beyond the crop root zone. The rate is a function of crop salinity tolerance and salt level in irrigation water.

SPRAY IRRIGATION:

For purposes of this guidance, spray irrigation is categorized into three types; solid set (golf courses), move-stop (wheel lines), and constant move (center pivot) systems.

SURFACE IRRIGATION:

Surface irrigation is categorized as either flood irrigation or drip irrigation. Flood irrigation is further subdivided into ridge/furrow systems and graded borders.

GENERAL ITEMS FOR ALL EMP'S

REQUIREMENTS:

A. Overview of Project

A comprehensive overview of the reclaimed water application for the project. Outline the distribution system, application site, application method, and permit responsibilities. Use figures to illustrate the general system layout.

B. Staff Listing

A listing of supervisors and key responsible staff at the reuse site, including a description of their accompanying responsibilities. This list shall include each person's phone number, cell phone number, mailing address, and e-mail address (if available).

C. Discharge Permit

A complete copy of the active ground water discharge permit issued by this Division shall be inserted into the EMP.

D. Reuse Provider - User Agreement (If Applicable)

A copy (if applicable) of the reuse agreement between the reclaimed water supplier and the user/permit holder. This agreement should include an updatable copy of the reclaimed water quality analysis and special restrictions that may be in place on the reuse.

E. Communication Procedure

The communication procedure(s) between all parties involved in the transfer of reclaimed water, storage of reclaimed water, and use of reclaimed water shall be outlined in the EMP.

F. Hygiene

A brief document describing the proper hygiene of working with reclaimed water. This document should be written in English and any other languages deemed appropriate for the site. (Sample documents are provided in Appendix 4)

G. Reclaimed Water Run-Off Control Plan

1. Identification of areas where a release off the site may occur and how it will be detected (daily rounds, pressure readouts, etc.).

2. Steps that will be taken to control the release.

3. Phone numbers for key personnel involved in the release response plan and persons who are responsible for reporting the release to NDEP.

G. Reclaimed Water Run-Off Control Plan (continued)

4. Description of the permit requirements for reporting a release to NDEP. This includes notification by phone, at (775) 687-4670, ext 3143, as soon as the release is identified and controlled (within 24 hours). Also, a written report on the release (discharge) and the methods used to mitigate the release must be submitted to the NDEP within five days. This report shall list:

   i. the time and date of the discharge;
   ii. exact location and estimated amount of discharge;
   iii. flow path and bodies of water which the discharge reached;
   iv. the specific cause of the discharge; and
   v. the preventive and/or corrective actions taken.

H. Cross Connection and Back Flow Prevention (If applicable)

Summarize the cross connection control plan and back flow prevention plan that has been accepted by the Health Authority and/or water purveyor. Reference all figures that show these controls.

I. Discharge Monitoring Reports (DMR'S)

Outline of the procedure for completing the permit required DMR from field readings and laboratory data sheets. This section shall include a sample DMR to guide the reuser.

RECLAIMED WATER IRRIGATION - GENERAL ITEMS

A. Irrigation Plan

Provide a summary of the irrigation plan for the site(s). This summary shall detail the times of irrigation, the application rates, and flow measuring procedures. Critical focus shall be given to preventing run-off of reclaimed water from the site(s) and reducing reclaimed water ponding. For sites using automated or computer controlled irrigation systems, please include a brief description of how the system operates.

Depending upon the site type and physical location, several items that should be addressed in the irrigation plan are:

1. A plan to avoid irrigation during or just after significant precipitation events.

2. A plan to provide sufficient drying time for soils (after irrigation) before allowing animal grazing. It's recommended that the grazing periods be limited, to the best extent possible, to reduce soil compaction.

3. Plans to harvest crop(s) annually (if applicable).

4. A plan to prevent irrigation on frozen soils or saturated soils.

B. Site Maps

A detailed site map for the irrigation site(s). This map shall delineate the surrounding water courses, storm water controls, buffer zones (if applicable), prevailing wind direction, surrounding dwelling units, and any wells within 250 feet of the reuse site boundary.

C. Irrigation System

Schematic or scaled map of the reuse site that shows the conveyance system and components for the reclaimed water. This includes details on the location of control valves, drain valves, air gaps, flow meters, pumps, and other key components that the reuser will operate and maintain.

D. Ponds

Operation and maintenance plan for the reclaimed water storage ponds (if applicable). Items to address could include water level recording devices and storage volume estimates, algae control, odor control, reclaimed water transfer procedures, free board requirements, berm inspection, weed and rodent maintenance, flow recirculation, notification signage, and mechanical aeration (Note: the generation of aerosols from aeration equipment should be minimized to limit drift).

E. Treatment Systems

The operation and maintenance plans for treatment units that are required to meet permit limits are to be included in the EMP. This may include such units as sand filters, disinfection systems, or any chemical treatment systems.

F. Crop/Turf Management Plan

It is recommended that management plans addressing maintenance of a healthy crop be summarized in the manual. Items relevant to this pursuit include soil leaching practices, soil amendment applications, soil chemistry monitoring, and other specific procedures for the site's crop. Please contact the local agricultural agency for guidance.

G. Storm Water

Storm water control structure maintenance. This shall include a maintenance program for diversion berms, conveyance ditches, and pump systems (if applicable).

H. Sampling

Sampling plans required by the permit must be outlined in the EMP. The proper QA/QC for sample preservation, sample holding times, sample containers, and chain of custody

This includes the procedures for collecting a ground water sample from a monitoring well and reclaimed water samples. A groundwater sampling protocol guidance is available from the Division.

I. Water Balance

Completion of a water balance is required by reuse permits. The procedures for completing the water balance summary for the site(s) must be clearly outlined in the EMP. Completed worksheet "1-B" from Appendix One, or a comparable form, should be included to present the design assumptions and to provide guidance for filling out subsequent reporting forms. Blank worksheets should also be included. Sample forms are attached in Appendix One. Information from these worksheets can be used by the permittee in completing the Annual Report which is typically required to be submitted with the fourth quarter DMR.

J. Nitrogen Balance

Completion of a nitrogen balance is required by reuse permits. The procedures for computing the total amount of nitrogen applied to the site(s) must be clearly outlined in the EMP. This shall include the mass of nitrogen applied from the reclaimed water and fertilizers. Completed Worksheet "2-B" from Appendix Two, or a comparable form, should be included to present the design assumptions and to provide guidance for filling out subsequent reporting forms (Worksheet "2-C" and DMR forms). Blank worksheets should also be included. Sample forms are attached in Appendix Two. Information from these worksheets can be used by the permittee in completing the Annual Report which is typically required to be submitted with the fourth quarter DMR.

K. Signage

Any site using reclaimed water for irrigation shall post a notice warning the general public to avoid contact with the reclaimed water (NAC 445A.275.3). Signage examples are included in Appendix Five for reference. Score cards at golf courses are one option for providing notification to the public that reclaimed water is being used for irrigation.

ADDITIONAL RECLAIMED WATER IRRIGATION ITEMS FOR:

SPRAY IRRIGATION

A. Run-Off Containment Berms

Maintenance plan for containment berms that serve to prevent the surface flow of reclaimed water off the site boundary (NAC 445A.275.6) if there is a significant line break or other failure. These berms are site specific requirements and therefore may not apply to your site.

B. Freezing Weather Protection

Depending upon the site location, necessary maintenance items to prevent freezing and damage to the distribution system should be included. Items to address are piping insulation, drains, or valve enclosures.

C. Drinking Water Fountain Protection and Food Serving Areas

Plans to cover drinking water fountains located on the reuse site prior to the start of irrigation shall be included. Additionally, plans to shield areas where food is handled should be presented.

NOTE:

Reclaimed water meeting a 30-day geometric mean **total coliform limit** of 2.2 mpn (cfu)/100 ml and a daily max of 23 mpn (cfu)/100ml has no buffer zone or public access control restrictions (NAC 445A.277). Please refer to Appendix Six for the regulation.

The following items (D thru F) apply **only** to Category A, A(1), B, and C waters as listed in NAC 445A.276.

D. Buffer Zone Controls

Describe the required buffer zones for the quality of reclaimed water used (see table on next page). Also, list procedures for maintaining spray irrigation within these zones. The irrigation plan should control the drifting of aerosols beyond the buffer zones (NAC 445A.275.5).

E. Irrigation Scheduling

Irrigation under Category B and C criteria (see regulations) shall be conducted during the nighttime hours and the public shall be restricted from entering the site during the irrigation period.

Treated effluent irrigation for golf courses shall only take place during times after the course is closed and shall cease one hour before the course opens for play in the morning. The irrigation system can be operated briefly during daylight hours when golfers are not present or approaching provided the operator ensures that the public are not exposed to effluent spray or wet grass. Daytime irrigation system operation shall be supervised at the site of irrigation by course personnel at all times.

Specific areas within the site that are first accessed (example: first few holes on golf course) by the public should be irrigated during the initial stages of the watering cycle to allow drying time before the public is permitted to enter.

F. Spray Irrigation with Reclaimed Water Under Category A, A(1), B, and C:

1. Plans to control public *access* to the irrigation site during times of reclaimed water application are required. Relevant items include fencing, adherence to the required buffer zones, and notification of reclaimed water usage. The quality of reclaimed water will dictate the level of access controls (see Table Below) .

2. Plans to control public *contact* with reclaimed water at the site are required. Relevant items include prevention of ponded water, notification signage, irrigation scheduling (ex. night time irrigation), and notification of reclaimed water usage on scorecards, signage or other related documents available to the public. Quality of reclaimed water will dictate level of contact controls required (see Table Below).

Category A	Category A(1)	Category B	Category C
Public Access is prohibited during irrigation periods. No human contact due to site isolation.	Public Access is prohibited during irrigation periods. No human contact due to site isolation.	Public Access is Controlled. Human contact with reclaimed water does not occur.	Public Access is Controlled. Human contact with reclaimed water cannot reasonably be expected to occur.
Pasture Lands, other agricultural uses	Pasture Lands, other agricultural uses	Golf courses, green belts, cemetery, and other areas	Areas covered in all categories, plus parks, playgrounds, commercial lawns, and residential lawns.
800 ft. Buffer Zone	**400 ft. Buffer Zone**	**100 ft. Buffer Zone**	**0 ft. Buffer Zone**
30 day Fecal Coliform Geometric Mean equal to or less than: no limit,	**30 day Fecal Coliform Geometric Mean equal to or less than: 200 mpn (cfu)/100ml. Daily Max: 400 mpn (cfu) /100ml**	**30 day Fecal Coliform Geometric Mean equal to or less than: 23 mpn (cfu)/100ml. Daily Max: 240 mpn (cfu)/100 ml**	**30 day Fecal Coliform Geometric Mean equal to or less than: 2.2 mpn (cfu)/100ml. Daily Max: 23 mpn (cfu)/100 ml**

ADDITIONAL RECLAIMED WATER IRRIGATION ITEMS FOR:

SURFACE IRRIGATION

A. **FLOOD IRRIGATION**:

1. Irrigation Methodology

   Operational plan(s) for flow distribution. Relevant items to address include promoting even spreading of reclaimed water over the site(s), reducing soil erosion at the distribution points, and operation of the tailwater recovery system operation (if applicable).

2. Containment Berms and Detention Areas

   A maintenance plan and inspection schedule for containment berms and detention areas (NAC 445A.275.6) that are in place to prevent the run-off of the reclaimed water from the site(s) is required.

B. **DRIP IRRIGATION**

1. Irrigation Methodology

   Operational plan for flow distribution. Relevant items include site inspections (checking for line breaks, etc.) and emitter line maintenance (clogging controls).

CONSTRUCTION USAGE

A. DUST CONTROL

1. Fecal Coliform Levels

   The typical minimum fecal coliform limits for this application are 23 mpn (cfu)/100 ml for the 30 day geometric mean and 240 mpn (cfu)/100 ml for a daily maximum. However, each facility's permit will specify the permissible fecal coliform limit.

2. Application Items

   Plans for controlling the application rate shall address the prevention of ponded reclaimed water. Also, a plan to control the generation of aerosols and the migration of aerosols from the site(s) should be developed. Methods to prevent the application of reclaimed water near water courses (rivers, streams, and lakes) must be presented.

3. Tank Trucks

   Tank trucks and other equipment which hold reclaimed water shall be properly identified with notification signs. **Tank trucks that carry reclaimed water shall not be used to carry potable water**. It is recommended that the tanks be cleaned and disinfected after the project is complete. Please consult the State or local health authority on rules that may be in place for this criteria.

INDUSTRIAL USAGE

A. COOLING WATER

1. Fecal Coliform Level

   The typical minimum fecal coliform limits for this application are 23 mpn (cfu)/ 100 ml for a 30 day geometric mean and 240 mpn (cfu)/100 ml for a daily maximum. However, each facility's permit will specify the permissible fecal coliform limit.

2. Application Items

   List operational controls to reduce aerosol drift.

   NDEP recommends that facilities institute operational methods for treatment (lime addition, alum, etc.) to handle scaling, corrosion, fouling, and biological growth throughout the system. This will help reduce line clogging and other system problems. Also, if algae growth is a concern, chlorine can be used to control algae growth provided the water is not discharged to a water course. This should also help reduce the formation of Legionella.

OTHER USES OF RECLAIMED WATER

A. Site specific management plans for the use of reclaimed water will be considered on a case by case basis with appropriate controls and requirements determined by the NDEP.

WTS-1B: APPENDIX ONE

PLANT CONSUMPTIVE USE WORKSHEET

The consumptive use equation for determining the crop's water requirement takes into account precipitation, evapotranspiration, the efficiency of the irrigation system, and the salt tolerance of the plant species. The salt tolerance of the plant species is used to calculate the leaching requirement (Lr) to remove excess salts from the root zone. Excess salts within the soil cause the plant cells to expend more energy adjusting the salt concentration within the plant tissues, and therefore, less energy is available for vigorous plant growth. The hydraulic loading rate and the TDS to ECw conversion equation included below are derived from Wastewater Engineering: Treatment, Disposal, and Reuse, (Metcalf and Eddy, 1991), the equation for the leaching requirement is from the Nevada Irrigation Guide, (USDA, Soil Conservation Service, 1981).

$$Lw_{(c)} = \frac{(ET-P)}{[E \times (1-Lr)]} \qquad Lr = \frac{ECw}{[(5 \times ECe)-ECw]}$$

where:

- $Lw_{(c)}$ = Allowable Hydraulic Loading Rate Based on Crop Water Needs (in/yr);
- ET = Evapotranspiration Rate (in/yr);
- P = Precipitation Rate (in/yr);
- Lr = Leaching Requirement (%, expressed as a fraction);
- E = Efficiency of Irrigation System (%, expressed as a fraction)
  For example: 75% = 75/100 = 0.75; example efficiencies are included below;
- ECe = Salinity Tolerance of Plant Crop (mmho/cm or dS/m)[1];
- ECw = Salinity of Applied Effluent (mmho/cm); If TDS is supplied by the laboratory, see conversion below; and
- TDS = Average Total Dissolved Solids in Applied Effluent (mg/l).

"ET" - Evapotranspiration

Evapotranspiration is defined as the "loss of water from the soil both by evaporation and by transpiration from the plants growing thereon" (Websters Dictionary, 1990). Since different plants transpire at different rates, a crop coefficient (Kc) can be used to modify the potential ET for a particular area. Values for Kc vary depending upon the geographical location of the crop, and the species grown. If a crop coefficient can be determined, when multiplied by the potential ET rate, the result is a more accurate estimate of ET for an irrigation site. The Division recommends that reusers contact local agriculture representatives identified in Appendix Five for further crop-specific and regional information.

"E" - Irrigation Efficiency

The irrigation system efficiency is related to how effective the method is in delivering the irrigation water equally to all parts of the crop. Example values for efficiency are[4]:

Sprinkler Irrigation Type	Application Efficiency	Surface Irrigation Type	Application Efficiency
Solid Set	0.70 - 0.80	Narrow Graded Border (< 15' wide)	0.65 - 0.85
Portable Hand Move		Wide Graded Border (<100' wide)	0.65 - 0.85
Wheel Roll		Level Border	0.75 - 0.90
Center Pivot or Traveling Lateral		Straight or Graded Contour Furrows	0.70 - 0.85
Traveling Gun		Drip	0.70 - 0.85

"Ece" - Salinity Tolerance of Plant Crop

The plant salt tolerance is crop-specific, and can be obtained from the local Extension Service, literature, or other reputable sources. The low end of the range identifies the ECe value which would result in a 0% reduction of crop yield. The upper end of the range identifies the ECe value which could result in a 25% reduction of crop yield[4].

Example ECe's:

Annual Ryegrass[2]	=	3 to 6 mmho/cm or dS/m
Perennial Ryegrass[2,4]	=	5.6 to 8.9 mmho/cm or dS/m
Bermudagrass[2,4]	=	6.9 to 10.8 mmho/cm or dS/m
Tall Fescue[2,4]	=	3.9 to 8.6 mmho/cm or dS/m
Alfalfa[3,4]	=	2.0 to 5.4 mmho/cm or dS/m

"ECw" - Salinity of Applied Effluent

Direct measurement of ECw is typically preferred. However, if the laboratory has supplied the reuser with a concentration of TDS, an approximate conversion[4] is ECw ≈ TDS ÷ 640. This conversion is considered accurate within 10%. The value for ECw or TDS is obtained from the treatment plant supplying the effluent. For site design, an average value can be used. For completion of the required annual balance report, the actual analytical results from Discharge Monitoring Reports should be used.

(1) For clairty in this document, the unit for electrical conductivity (EC) is expressed as mmho/cm. However, EC can also be expressed in decisiemens per meter, dS/m.
1 mmho/cm = 1 dS/m

(2) Wastewater Reuse for Golf Course Irrigation, US Golf Association, 1994.

(3) Nevada Irrigation Guide, USDA Soil Conservation Service, 1981.

(4) Wastewater Engineering: Treatment, Disposal, and Reuse, (Metcalf and Eddy, 1991)

Worksheet 1-A

CONSUMPTIVE USE REQUIREMENT WORKSHEET:
Maximum Loading Rate Based on Plant Water Use Requirements

Page _____ of _____ Crop Type = _____

$Lw_{(c)} = \frac{(ET-P)}{[E \times (1-Lr)]}$; $Lr = \frac{ECw}{[(5 \times ECe)-ECw]}$; $ECw \approx TDS \div 640$

(A) Annual Evapotranspiration (ET, in/yr) = _____
(Multiply by Crop Coefficient (Kc) if value is known)

(B) Annual Precipitation (P, in/yr) = _____

(C) (A) - (B) = _____ (in/yr)

(D) Salinity of Applied Effluent (ECw, mmho/cm) <u>or</u> ≈ (TDS, mg/l) ÷ 640 = _____
(Indicate which method was used to determine ECw, Direct Measurement or Approximation by Calculation.)

(E) Salinity Tolerance of Plant Crop (ECe, mmho/cm) = _____

(F) 5 x (E) = _____ (mmho/cm)

(G) (F) - (D) = _____ (mmho/cm)

(H) Leaching Requirement (Lr, %, expressed as a fraction) = (D) ÷ (G) = _____

(I) 1 - (H) = _____

(J) Efficiency of Irrigation System (E, %, expressed as a fraction) = _____

(K) (J) x (I) = _____

(L) (C) ÷ (K) = $Lw_{(c)}$ = _____ (inches/year)

If the water use rate calculated in ("L") above is the lowest application volume calculated between the annual Consumptive Use Limit (This Worksheet) and the Nitrogen Limit (Worksheet 2-A), then fill out Worksheet 1-B to estimate the planned maximum daily flow for the site.

Worksheet 1-B

CONSUMPTIVE USE REQUIREMENT WORKSHEET:
Maximum Loading Rate Based on Plant Water Use Requirements

Page _____ of _____ Crop Type = _____

$Lw_{(c)} = \frac{(ET-P)}{[E \times (1-Lr)]}$; $Lr = \frac{ECw}{[(5 \times ECe)-ECw]}$; $ECw \approx TDS \div 640$

Monthly values for evapotranspiration are dependent on the crop type and regional area of the site, as well as the crop coefficient if known. Monthly precipitation is also regional. The values for ET and P can be obtained from the local extension service, literature, or other reputable source. Please see the explanation in the "WTS-1B: Appendix One" text for futher discussion of crop coefficients.

To calculate the monthly value for $Lw_{(c)}$, perform the calculation for each month as outlined in Worksheet 1-A, and input the result in the table below. Since this form is crop-specific, a value of zero is acceptable when the crop is not in season; however, use of a zero should be explained.

Million Gals/Mo = $Lw_{(c)}$ in/mo x _____ ac ÷ 12 in/ft x 43,560 ft^2/ac x 7.481 gals/ft^3 ÷ 1,000,000
(Enter and use the number of acres for the crop type being irrigated)

MGD (Million gallons/day) = M Gallons/mo ÷ Days/mo

Month	Days/Mo	ET (in/mo)	P (in/mo)	$Lw_{(c)}$ (in/mo)	M Gals/Mo	MGD
Jan	31					
Feb	28					
Mar	31					
Apr	30					
May	31					
Jun	30					
Jul	31					
Aug	31					
Sep	30					
Oct	31					
Nov	30					
Dec	31					
Totals (in/yr):					Note: These totals should approximate the annual values calculated in Worksheet 1-A	

WTS-1B: APPENDIX TWO

NITROGEN LOADING LIMIT WORKSHEET

The nitrogen loading equation takes into account precipitation, evapotranspiration, plant nitrogen uptake, nitrogen content of the applied effluent, nitrogen denitrification and volitilization in the soils, and allowable percolate nitrogen concentration. The equation included below is from Wastewater Engineering: Treatment, Disposal, and Reuse, (Metcalf and Eddy, 1991)

$$Lw_{(n)} = \frac{[(Cp, mg/l) \times (P\text{-}ET, in/yr)] + [(U, lb/acre\text{-}yr) \times (4.4)]}{[(1\text{-}f) \times (Cn, mg/l)] - (Cp, mg/l)}$$

where:

$Lw_{(n)}$ = Allowable Hydraulic Loading Rate Based on Nitrogen Loading rate (in/yr);
Cp = Total Nitrogen Concentration in Percolating Water (mg/l);
ET = Evapotranspiration Rate (in/yr);
P = Precipitation Rate (in/yr);
U = Nitrogen Uptake Rate by Crop (lb/acre-yr);
4.4 = Combined Conversion Factor;
Cn = Total Nitrogen Concentration in Applied Wastewater (mg/l); and
f = Fraction of Applied Total Nitrogen Removed by Denitrification and Volatilization.

"Cp" - Nitrogen in Percolating Water

A conservative value for Total N in the water that percolates past the root zone (Cp) is 7 mg/l, which is the first "red flag" value for Nitrate as N in monitoring well samples. Setting the Cp limit at a constant value aids in obtaining an hydraulic nitrogen loading rate ($Lw_{(n)}$) which should be protective of groundwater resources. The drinking water standard for Nitrate as N is 10 mg/l, which would be the maximum allowable value for Cp.

"ET" - Evapotranspiration

Evapotranspiration is defined as the "loss of water from the soil both by evaporation and by transpiration from the plants growing thereon" (Websters Dictionary, 1990). Since different plants transpire at different rates, a crop coefficient (Kc) can be used to modify the potential ET for a particular area. Values for Kc vary depending upon the geographical location of the crop, and the species grown. If a crop coefficient can be determined, when multiplied by the potential ET rate, the result is a more accurate estimate of ET for an irrigation site. The Division recommends that reusers contact local agriculture representatives identified in Appendix Five for further crop-specific and regional information.

"U" - Crop Nitrogen Uptake

Plant nitrogen uptake rates (U) are crop-specific, and can be obtained from the local Extension Service, literature, or other reputable sources. Using the accepted value for U in this equation assumes that the harvested portion of the crop is removed from the site. If plant cuttings are not removed from the area, then the amount of nitrogen removed by uptake should be offset by the amout of nitrogen returned to the soil by decomposing cutting materials. If alfalfa, or another legume, is the site's crop, then similar considerations should be made for atmospheric nitrogen which is fixed into the soil by alfalfa. A discussion with the local agricultural extension service is recommended prior to finalizing a "U" value.

"Cn" - Nitrogen in Applied Wastewater

The total nitrogen in the applied effluent water (Cn) can be obtained from the treatment plant that is supplying the effluent. For site design, an average value can be used. For completion of the required annual balance report, the actual analytical results from Discharge Monitoring Reports shall be used.

"f" - Nitrogen lost to Denitrification and Volatilization

The amount of nitrogen lost to denitrification and volatilization varies depending upon the nitrogen characteristics of the applied wastewater and the microbial activity in the soil. Microbial denitrification, in soils with a sufficient carbon source for the biological activity, may account for as much as 15 to 25 percent of the applied nitrogen during warm, biologically active months. Volatilization of ammonia may be as much as 10 percent, depending upon the ammonia fraction in the total nitrogen applied. (Metcalf & Eddy, 1991) For arid climates, such as Nevada, the value typically used for the "f" term is 0.2.

Nitrogen Addition by Chemical Fertilizers

If the allowable reuse water application volume is limited by plant consumptive use (Worksheet 1-A), nitrogen may need to be added by commercial fertilizer. In the design of a reuse site, and preparation of an EMP, this should be estimated to provide the site operator with a guideline for fertilizer application, in addition to the nitrogen being applied via the treated effluent. **The application of fertilizer must then be incorporated into the required annual report to demonstrate that the application of commercial nitrogen and effluent nitrogen did not exceed the plant crop's uptake rate.**

Worksheet 2-C is designed to be used to provide the Division with the required annual report of effluent and fertilizer usage. Reuse permits require that the annual evaluation of the effluent application include, "the total nitrogen in the applied wastewater, nitrogen from fertilizer applications, nitrogen uptake by plant materials, evapotranspiration rate, precipitation rate, and fraction of applied nitrogen removed by denitrification and volatilization." While Worksheet 2-C does not take precipitation and evapotranspiration into account, the permittee should compare each year's P and ET rates to those that were used during the site design and EMP preparation phases to ensure that the original assumptions remain valid.

Worksheet 2-C can also be utilized as a site management tool to *estimate* the amount of commercial fertilizer which may be required in an upcoming month. However, use of the worksheet in this manner does not preclude the responsible use of good irrigation and nutrient management practices.

Worksheet 2-A

WATER REQUIREMENT DESIGN WORKSHEET:
Maximum Hydraulic Loading Rate Based On Annual Nitrogen Balance Evaluation

Page _____ of _____ Crop Type = _____

$$Lw_{(n)} = \frac{[Cp \times (P\text{-}ET)] + (U \times 4.4)}{[(1\text{-}f) \times Cn] - Cp}$$

(A) Total Nitrogen in Percolating Water (Cp, mg/l) = _____

(B) Annual Precipitation (P, in/yr) = _____

(C) Annual Evapotranspiration (ET, in/yr) = _____

(Multiply by Crop Coefficient (Kc) if value is known)

(D) (B) - (C) = _____ (in/yr)(Note: In Nevada, P is less that ET; therefore a negative number is correct to use in this worksheet.)

(E) (A) x (D) = _____

(F) Crop Nitrogen Uptake (U, lb/ac-yr) = _____

(G) (F) x 4.4 = _____

(H) (E) + (G) = _____

(I) Fraction of Applied Total Nitrogen Lost to Denitrification and Volatilization (f) = _____

(J) 1- (I) = _____

(K) Total Nitrogen in Applied Effluent (Cn, mg/l) = _____

(L) (J) x (K) = _____

(M) (L) - (A) = _____

(N) (H) ÷ (M) = $Lw_{(n)}$ (inches/year) = _____

If the Water Use Rate calculated in ("N") above is the lowest application volume calculated for the annual Consumptive Use Limit (Worksheet 1-A) or the Nitrogen Limit (This Worksheet), then fill out Worksheet 2-B to estimate the planned maximum daily flow for the site.

Worksheet 2-B

WATER REQUIREMENT DESIGN WORKSHEET:
Maximum Hydraulic Loading Rate Based On Annual Nitrogen Balance Evaluation

Page _____ of _____ Crop Type = _____

$$Lw_{(n)} = \frac{[Cp \times (P-ET)] + (U \times 4.4)}{[(1-f) \times Cn] - Cp}$$

Monthly values for evapotranspiration are dependant on the crop type and regional area of the site, as well as the crop coefficient if known. Monthly precipitation is also regional. The values for ET and P can be obtained from the local extension service, literature, or other reputable sources. Please see the explanation in the "WTS-1B: Appendix Two" text for futher discussion of crop coefficients.

The monthly value of the crop nitrogen uptake (U) can be calculated according to the equation included on the Table. Please see the discussion in the "WTS-1B: Appendix Two" text regarding "U" values for alfalfa crops or sites that do not remove crop cuttings. If a different distribution of monthly "U" is used, due to circumstances such as germination or dormancy periods, then provide documentation explaining the difference.

To calculate the monthly value for $Lw_{(n)}$, perform the calculation for each month as outlined in Worksheet 2-A, using the monthly values for "U", "P", "ET", and "Cn", and input the result in the table below. Since this form is crop-specific, a value of zero is acceptable when the crop is not in season; however, use of a zero should be explained.

Monthly U (lb/ac-mo) = U (lb/ac-yr) x ET(in/mo) ÷ ET (total in/yr)

Million Gallons Per Month = $Lw_{(c)}$ in/mo x _____ # acres (ea. crop type) ÷ 12 in/ft x 43,560 ft^2/ac x 7.481 gallons/ft^3 ÷ 1,000,000

MGD (Million gallons/day) = M Gallons/mo ÷ Days/mo

Month	Days/Mo	P (in/mo)	ET (in/mo)	U (lb/ac-mo)	$Lw_{(n)}$ (in/mo)	M Gals/Mo	MGD of Reclm'd Water
Jan	31						
Feb	28/29						
Mar	31						
Apr	30						
May	31						
Jun	30						
Jul	31						
Aug	31						
Sep	30						
Oct	31						
Nov	30						
Dec	31						
	Totals:					Note: The totals for P, ET and $Lw_{(n)}$ should approximate the annual values used or calculated in Worksheet 2-A	

Worksheet 2-C: *Regardless of the limiting hydraulic loading rate that was defined during the design phase, Worksheet 2-C is designed to be used to provide the Division with the required annual report of effluent and fertilizer usage.*

Effluent N Applied = _____ x _____ (mg/l) x 8.34 x _____ ÷ _____ x _____
(lb/ac-mo) MGD Applied Effluent N Conc. # days/mo # Acres (1 -"f") (i.e. 0.2.)

Fertilizer N Applied = _____ Monthly Fertilizer used (lbs/mo) x _____ % N in Fertilizer (as a fraction) ÷ _____ acres
(lb/ac-mo)

Crop Name and Nitrogen Uptake Requirement = _____ (lbs/ac-yr)

Month	Days/Mo	Million Gallons Applied (mo)	MGD of Irrigation Water Applied	Effluent N Concentration (mg/l)	Effluent N Applied (lb/ac-mo)	Fertilizer N Applied (lb/ac-mo)	Total N Applied (Effl. N + Fert. N) (lb/ac-mo)
Jan	31						
Feb	28/29						
Mar	31						
Apr	30						
May	31						
Jun	30						
Jul	31						
Aug	31						
Sep	30						
Oct	31						
Nov	30						
Dec	31						
						Total** =	

** The Total N Applied to the crop should be less than the crop's Nitrogen Uptake Requirement. Please see your permit for directions if it is not.

APPENDIX THREE

WORKER HYGIENE FACT SHEETS

This project area uses reclaimed wastewater for irrigation. This reclaimed wastewater comes from the sewage treatment plant and meets the standards required for this level of reuse. Potential risks of disease transmission from the use of the reclaimed water is low, however, some general guidelines (listed below), should be followed protect you from becoming ill when working with reclaimed water:

1. Do not drink the reclaimed water or use the reclaimed water for washing.

2. Always wash hands and face with clean water and soap before eating, smoking, or drinking.

3. Wear rubber gloves when working on the irrigation system.

4. Try to keep the irrigation water off your skin and clothes as much as possible.

5. Always treat cuts immediately before continuing with work on the irrigation system.

6. Make sure the area is clear of people that may get sprayed before running the irrigation system.

7. Report any problems to your supervisor that you feel could pose a risk.

APPENDIX FIVE

REUSE REFERENCE LISTS

Literature References For Reclaimed Water Use Management

1. "Guidelines for Using Disinfected Recycled Water", Awwa California-Nevada Section, 1997 & 1984.

2. "Guidelines for Water Reuse", U S Environmental Protection Agency, 1992.

3. "Land Treatment of Municipal Wastewater", U S Environmental Protection Agency, 1981.

4. "Nevada Irrigation Guide", US Department of Agriculture, Soil Conservation Service, 1981.

5. Wastewater Reuse For Golf Course Irrigation, US Golf Association, 1994, Lewis Publishers.

6. Water Reuse Manual of Practice, Water Environment Federation 1989.

7. Wastewater Engineering Treatment, Disposal and Reuse, Metcalf & Eddy, 1991, Mcgraw-hill Publishers.

8. Irrigation with Reclaimed Municipal Wastewater- A guidance manual. G.S. Pettygrove and T. Asano, 1985, Lewis Publishers.

Contacts for Technical and Regulatory Guidance

1. **Nevada Division of Environmental Protection, Bureau of Water Pollution Control**
   333 West Nye Lane, Carson City, NV, 89706 . . . . . (775) 687-4670

2. **Nevada Divsion of Water Resources**
   123 West Nye Lane, Carson City, NV 89705 . . . . . (775) 687-4380

3. **Nevada Division of Health**
   505 East King Street, Carson City, NV 89710 . . . . . (775) 687-4750

4. **Desert Research Institute**
   7010 Dandini Boulevard, Reno, NV 89506 . . . . . (775) 673-7300

5. **Natural Resource Conservation Service (NRCS)**
   1528 U.S. Highway 395, Minden, NV 89410 . . . . . (775) 883-2623

   5301 Longley Lane, Building F, Room 201, Reno, NV 89511 . . . . . (775) 784-5875

6. **University of Nevada Cooperative Extension**
   2345 Redrock Street, Suite 100, Las Vegas, NV 89146-3160 . . . . . (702) 222-3130

7. **U.S. Agriculture Department**
   920 Valley Road, Reno, NV 89512 . . . . . (775) 784-6057

8. **Center for Urban Water Conservation - UNLV Dept. of Biology**
   Las Vegas, Nevada 89157-4004 . . . . . (702) 895-3853

APPENDIX SIX

NEVADA ADMINISTRATIVE CODE - REUSE REGULATIONS

Use of Treated Effluent for Irrigation

445A.275 General requirements and restrictions.

1. A person shall not use treated effluent for irrigation unless he has:
   (a) Submitted to the division and has received the approval of the division of a plan for the management of effluent; and
   (b) Obtained a permit pursuant to NAC 445A.228 to 445A.263, inclusive.

2. A person using treated effluent for irrigation by flooding or sprinklers shall use effluent that has received at least secondary treatment. As used in this subsection:
   (a) "Secondary treatment" means that the biological oxidization of the sewage to a point where the sewage has a 5-day inhibited biochemical oxygen demand concentration of 30 milligrams per liter or less.
   (b) "Five-day inhibited biochemical oxygen demand" means the amount of dissolved oxygen in milligrams per liter required during stabilization of the carbonaceous decomposable organic matter by aerobic bacterialaction at 20 degrees centigrade for 5 days.

3. Any person using treated effluent for irrigation shall post a notice at the site of irrigation warning the general public to avoid contact with the treated effluent.

4. Except as otherwise provided in this subsection, a person shall not use treated effluent to irrigate crops for human consumption. A person may use treated effluent for surface irrigation of fruit bearing trees and nut bearing trees.

5. A person using treated effluent to irrigate by sprinklers shall conduct the irrigation in a manner which inhibits the treated effluent from drifting or carrying outside the buffer zone.

6. A person shall not allow treated effluent used in irrigation to run off the site being irrigated.

(Added to NAC by Environmental Comm'n, eff. 9-13-91)--(Substituted in revision for NAC 445.176)

Reviser's Note.

The regulation of the state environmental commission filed with the secretary of state on September 13, 1991, the source of NAC 445A.275 to 445A.280, inclusive, became effective on that date and contains the following provisions not included in NAC:

"Notwithstanding the provisions of sections 2 to 8, inclusive, of this regulation, a person who:

1. Is using treated effluent for irrigation on the effective date of this regulation without having obtained a permit pursuant to NAC 445A.228 to 445A.263, inclusive; and

2. Has submitted to the state department of conservation and natural resources a completed application for obtaining a permit pursuant to NAC 445A.228 to 445A.263, inclusive, within 180 days after the effective date of this regulation,

may continue to use treated effluent for irrigation without having obtained a permit until the state department of conservation and natural resources takes action upon the application for a permit."

445A.276 Spray irrigation: Requirements for bacteriological quality and buffer zone limitations.

1. Treated effluent being used for spray irrigation must meet the following requirement for bacteriological quality and buffer zone limitations:

	Fecal Coliform			
	c.f.u or mpn/100 ml			
Reuse Permitted	A	A(1)	B	C
30-day geometric mean	No limit	200	23	2.2
Maximum daily number	No limit	400	240	23
Minimum Buffer Zone (Feet)	800	400	100	0

2. As used in this section:

(a) Category "A" means irrigation with treated effluent of land used for:

(1) Pasture; or

(2) Other agricultural purposes except growing crops for human consumption, where public access to the site being irrigated is prohibited.

Treated effluent being used for activities falling within category A must meet the requirements for bacteriological quality and buffer zone limitations identified in subsection 1 as applicable to category A or meet the requirements for bacteriological quality and buffer zone limitations identified in subsection 1 as applicable to category A(1).

(b) Category "B" means irrigation with treated effluent for land used for:

(1) A golf course, cemetery or greenbelt where public access to the site being irrigated is controlled and human contact with the treated effluent does not occur;

(2) An impoundment where all activities are prohibited and human contact with the treated effluent does not occur; or

(3) Any combination of a use listed in paragraph (a) and a use listed in subparagraph (1) or (2) of this paragraph.

Treated effluent being used for activities falling within category B must meet the requirements for bacteriological quality and buffer zone limitations identified in subsection 1 as applicable to category B.

(c) Category "C" means irrigation with treated effluent of land used for:

(1) A cemetery, highway median, greenbelt, park, playground or residential or commercial lawn where public access to the site being irrigated is controlled and human contact with the treated effluent cannot reasonably be expected;

(2) Impoundments where full body contact with the treated effluent cannot reasonably be expected;

(3) Any other purpose not included in category A or B; or

(4) Any combination of an activity listed in paragraph (a) or (b) and an activity listed in subparagraph (1), (2) or (3) of this paragraph.

Treated effluent being used for activities falling within category C must meet the requirements for bacteriological quality and buffer zone limitations identified in subsection 1 as applicable to category C.

(d) "C.f.u. or mpn/100 ml" means colony forming units or most probable number per 100 milliliters of the treated effluent.

(Added to NAC by Environmental Comm'n, eff. 9-13-91)--Substituted in revision for NAC 445.1765)

445A.277 Exceptions to requirements for buffer zone and control of public access. A buffer zone and control of public access is not required where treated effluent is used for irrigation of land used for a cemetery, golf course, greenbelt, impoundment where full body contact can reasonably be expected, park, playground or commercial or residential lawn, if the treated effluent:

1. Has a total coliform concentration of 2.2, or less, per 100 milliliters of the treated effluent as a 30 day geometric mean; and
2. Has a total coliform concentration of 23, or less, per 100 milliliters of the treated effluent as a maximum daily number.

(Added to NAC by Environmental Comm'n, eff. 9-13-91)--(Substituted in revision for NAC 445.177)

445A.278 Drip or surface irrigation of landscape: Minimum level of disinfection. The minimum level of disinfection for drip irrigation of landscape and surface irrigation of landscape with treated effluent in areas where public access is controlled is 200 fecal coliform per 100 milliliters of the treated effluent as a 30 day geometric mean and 400 fecal coliform per 100 milliliters of the treated effluent as a maximum daily number.

(Added to NAC by Environmental Comm'n, eff. 9-13-91)--(Substituted in revision for NAC 445.1775)

445A.279 Determining quality of effluent: Storage reservoirs excluded from treatment process. For the purpose of determining the quality of effluent, storage reservoirs do not constitute part of the treatment process.

(Added to NAC by Environmental Comm'n, eff. 9-13-91)--(Substituted in revision for NAC 445.178)

445A.280 Waiver or modification of requirements. The director may waive compliance with or modify any requirement of NAC 445A.275 to 445A.280, inclusive, for a specific project of irrigation upon his determination that because of the size, type or location of the project of irrigation, the wavier or modification is consistent with the policy set forth in NRS 445A.305.

(Added to NAC by Environmental Comm'n, eff. 9-13-91)--(Substituted in revision for NAC 445.1785)

APPENDIX F
EXISTING NONPOINT SOURCE PROGRAMS, FROM NDEP'S
STATE MANAGEMENT PLAN – NONPOINT SOURCE MANAGEMENT PROGRAM, 1999

VI. Existing Nonpoint Source Programs

A number of federal, state and local programs exist which address nonpoint source pollution, many of which offer financial, technical and/or programmatic assistance to address water pollution. This section describes these programs as required by section 319(b)(2)(B) of the Clean Water Act and the "Nonpoint Source Program and Grants Guidance for Fiscal Year 1997 and Future Years". For some programs, water quality may not be the primary focus, but water quality improvements may be an indirect benefit. A brief description of some of the more pertinent programs follows.

A. Federal Programs

A.1. U.S. EPA Regulatory Authority

The Federal Water Pollution Control Act, 1987 Amendments, commonly known as the Clean Water Act (CWA), provides the framework for nationwide water pollution control and water quality management in the United States. The goal of the Act is to restore and maintain the integrity of the nation's waters and to provide water quality sufficient for the "protection and propagation of fish, shellfish and wildlife and provision of recreation in and on the water".

Research, Investigations, Training and Information
Section 104(a) - Mandates the U.S.EPA to establish national programs for the prevention, reduction and elimination of pollution.

Grants for Research and Development
Section 105(b) - "The Administrator is authorized to make grants to any State or States or interstate agency to demonstrate, in river basins or portions thereof, advanced treatment and environmental enhancement techniques to control pollution from all sources, within such basins or portions thereof, *including nonpoint sources*, together with in-stream water quality improvement techniques."

Grants for Pollution Control Programs
Section 106(a) - The U.S.EPA is authorized to appropriate funds for grants to States and interstate agencies to assist them in administering programs for the prevention, reduction and elimination of pollution, including enforcement.

Section 201(g)(1)(B) - In 1981, states were provided discretion in funding wastewater facilities through the addition of the Governor's 20 percent set-aside (section 201(g)(1)(B)) to the CWA. Under section 201(g)(1)(B) states are authorized to spend up to 20% of their section 201 allotment on projects otherwise ineligible for funding under the section 212 construction grants program. In the 1987 Amendments to the CWA, the scope of section 201(g)(1)(B) funding was broadened to include section 319 activities. Conditions for use of section 201(g)(1)(B) for section 319 projects are the same as those established under sections 319(i) and (h) (see section 319 discussion), including matching requirements. The CWA does not require that 201(g)(1)(B) funds be used for NPS management program implementation but does establish the availability of the funds. Use of the funds is a matter of state policy.

Section 205(j)(5) - Added to the CWA in the 1981 Amendments, section 205(j)(2) allows states to receive federal funding for basic water quality management planning activities after the loss of funds provided for in section 208 of the CWA. In the 1987 Amendments, section 205(j)(5) was added to the CWA. This section provides states an additional one-percent set-aside of construction grant funds or $100,000 annually, whichever is greater, for the purpose of carrying out activities identified in section 319 of the CWA. Section 205(j)(5) funds may be used for: 1) NPS assessment report, management program and data management system development; and 2) NPS management program implementation. No state matching funds are required for development activities. Grants for NPS management program implementation activities must meet the matching requirements of sections 319(h) (40% non-federal match) and 319(i) (50% non-federal match). Section 205(j)(5) loans to individuals are limited to demonstration projects.

Area-wide Waste Treatment Management

Section 208(b)(2)(F) - "a process to (i) identify, if appropriate, agriculturally and silviculturally related *nonpoint sources* of pollution, including return flows from irrigated agriculture and their cumulative effects, runoff from manure disposal areas and from land used for livestock and crop production and (ii) set forth procedures and methods (including land use requirements) to control to the extent feasible such sources; ...) Plans are also required to control pollutant discharges related to mine runoff, construction activity, land disposal, subsurface excavations and dredged or fill material.

Section 208 of the CWA provides for the development of water quality management plans by states and designated water quality management agencies. These plans address both point and nonpoint sources of pollution. For control of NPS pollution, designated management agencies are established and BMPs developed. In Nevada, under section 208, area wide water quality management agencies were designated for four geographic regions. In western Nevada, the Truckee Meadows Regional Planning Agency is responsible for water quality planning in Washoe County and is also the designated 208 planning agency. The Tahoe Regional Planning Agency (TRPA) is the management agency for the Tahoe Basin and is also the designated 208 planning agency. The Carson River Basin Council of Governments (CRBCOG) was the 208 planning agency for the multi-county area within the Carson River Basin. Upon the loss of the 208 funding, CRBCOG ceased to function as the water quality planning agency for the region and NDEP became the management agency. In southeastern Nevada, the Clark County Comprehensive Planning agency served as the 208 planning agency for the Clark County area and remains the water quality management agency today. The Nevada Division of Environmental Protection is responsible for water quality planning in the 208 non-designated areas, which encompasses the rest of the State.

Water Quality Standards and implementation plans

Section 303 - Under the CWA, U.S.EPA is required to review and approve state water quality standards to ensure consistency with provisions of the Act. States are required to establish water quality standards, assess the quality of the waters in the State, identify all waters not meeting the prescribed standards and develop total maximum daily loads (TMDLs) for such waters.

Water quality standards affect all pollution control programs including nonpoint source programs. Best management practices are the primary mechanisms through which NPS

management programs achieve water quality standards. Accordingly, BMPs must be designed to meet water quality standards and their effectiveness in attaining water quality standards must be demonstrable. If BMPs cannot protect water quality standards, the state must revise BMPs, review water quality standards or reevaluate the pollution causing activity.

Information and Guidelines

Section 304(f) - EPA is required to issue guidelines for identifying and evaluating the nature and extent of *nonpoint sources* of pollution. **Section 304(k)(1)** states EPA must also enter into agreements with other federal entities to ensure "maximum utilization of other federal laws and programs for the purpose of achieving and maintaining water quality through appropriate implementation of plans approved under section 208 of this Act and nonpoint source pollution management programs approved under section 319 of this Act."

Water Quality Inventory

Section 305(b)(1)(E) - "a description of the nature and extent of *nonpoint sources* of pollutants, and recommendations as to the programs which must be undertaken to control each category of such sources, including an estimate of the costs of implementing such programs."

Nonpoint Source Management Programs

Section 319(a) - States are required to prepare assessment reports which identify "those navigable waters which without additional action to control nonpoint sources of pollution cannot reasonably be expected to attain or maintain applicable water quality standards". In addition, assessments must identify the categories of nonpoint source pollution and describe the process for identifying BMPs or other measures to control each category of pollution. Section 319(b) requires implementation of a statewide management program which specifies BMPs to control and reduce pollutant loadings to surface and groundwater. Section 319(h) describes the grant program available to fund nonpoint source projects.

Certification

Section 401 - Provides states with the authority to review permits or license applications for activities which may generate discharge of pollutants into navigable waters and violate of water quality standards.

National Pollutant Discharge Elimination System (NPDES)

Section 402 - Provides a mechanism to control the pollutant discharges from several activities. NPDES permits can be general and individual. General permits are developed for a category of activity and the individual permits are developed for all municipal sewage treatment plants and "major industrial dischargers". Specific applications of NPDES permits are: 1) Wastewater Discharge; 2) Stormwater Pollution, which applied originally to cities over 100,000 people and over time applies to more and more cities; 3) Construction Sites, which applied originally to sites larger than 5 acres and now smaller sites are also being regulated; 4) Animal Feedlot Operations, which applies to large-scale feedlots; and 5) Mining, which applies to current operations and abandoned mines.

Permits for Dredged or Fill Material (refer to Section A.4. of this chapter - U.S. Army Corps of Engineers)

Section 404 - Establishes a permit program to allow for the discharge of dredged or fill material into navigable waters at specified disposal sites. **Section 404(f)(2)** states "Any discharge of dredged or fill material into the navigable waters incidental to any activity having as its purpose bringing an area of the navigable waters into a use to which it was not previously subject, where the flow or circulation of navigable waters may be impaired or the reach of such waters be reduced, shall be required to have a permit under this section." The primary purpose of the 404 permitting process is to protect wetlands from impairment of their habitat, flood control or water quality functions.

Water Pollution Control Revolving Loan Funds
Section 603 - The CWA provides a mechanism for low-interest loans for communities, individuals, citizen's groups, non-profit organizations and others to improve water quality through the implementation of a wide-range of projects. States may apply for this program, if they so choose. Management programs under section 319 are eligible.

Reservation of Funds for Planning
Section 604(b) - Funds allotted to carry out plans under sections 205(j) and 303(e). Section 205(j)(2)(a) states sums shall be used to make grants for " identifying most cost effective and locally acceptable facility and nonpoint measures to meet and maintain water quality standards". Section 303(e) requires each state to have a continuing planning process for items such as effluent limitations, TMDLs and schedules of compliance.

National Environmental Policy Act (NEPA) - This law requires environmental impact statements for land use projects that involve all federally managed lands, including BLM, USFS, etc. The projects include hydroelectric power, mining, ground water withdrawals and resource management plans (e.g. - grazing).

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) - commonly known as Superfund, requires the U.S.EPA to identify, investigate and clean-up uncontrolled hazardous waste sites not regulated by the Resource Conservation and Recovery Act (RCRA) or the Toxic Substance Control Act (TSCA). The law also includes a mechanism for natural resource trustees to receive compensation from the polluter to cover the costs of restoring lost or degraded natural resources. The Superfund program is financed by taxes on chemical and petroleum products and is reimbursable to the extent that EPA is able to take legal action to recover clean-up costs from parties responsible for the release of hazardous wastes. In many cases, uncontrolled hazardous waste sites are NPS pollution problems. Placing a site on the National Priority makes it eligible for funding through the Superfund program.

Federal Insecticide, Fungicide, Rodenticide Act (FIFRA or Pesticide Control Act, 1977) - provides a mechanism for registration of pesticides and regulation of their application to minimize risks of environmental contamination or human health hazards. The program is administered by EPA, with primary enforcement authority given to states for local administration. The major provisions of the Act include registration of pesticides with adequate test data, labeling to provide applicators with proper guidance for product use, applicator certification and record maintenance requirements.

Clean Water Action Plan - Emphasizes the importance of the Watershed Approach - all parts of the landscape must be managed to prevent pollution. Also promotes enhanced protection of public health from water pollution and more effective control of contaminated runoff.

A.2. U.S. Department of the Interior

a) U.S. Fish & Wildlife Service (USFWS)

Endangered Species Act & Section 7 Consultations - All federal agencies must consult with the USFWS when any federal activity may beneficially or adversely affect a listed species or modify designated critical habitat.

Environmental Contaminants Program - This program recommends ways to avoid, minimize, or compensate the public for harmful contaminant impacts on fish and wildlife. Some of the important tasks of this program include: 1) identify sources of pollution; 2) investigate pollution effects on fish and wildlife and their habitat; 3) investigate fish and wildlife die-offs; 4) respond to oil and hazardous material spills or releases, develop response plans for potential releases, and collect information to secure compensation for lost or degraded resources related to spills; 5) restore habitats and resources degraded by pollution; 6) provide advice to minimize the use of pesticides; 7) provide technical expertise to other federal agencies, states, industry, and agricultural interests on contaminant issues; 8) review proposals for federally funded, permitted, or licensed projects with pollution potential, to avoid or minimize harmful effects on fish and wildlife. The program also participates in the National Irrigation Water Quality Program (see U.S. Geological Survey below) and may participate as a natural resource trustee on CERCLA cases.

North American Wetlands Conservation Act of 1989 - This law encourages voluntary partnerships between the public and private sectors for the purpose of restoration, management and/or enhancement of a wetland ecosystem for wildlife habitat. Funding is provided through a grants program.

Migratory Bird Treaty Act - This Act establishes a Federal prohibition, unless permitted by regulations, to pursue, hunt, take, capture, kill, attempt to take, capture or kill, etc. any migratory bird.

Partners for Fish and Wildlife - This voluntary program offers financial and technical assistance to private, non-federal landowners who wish to restore habitat for fish and wildlife on their property.

Fish and Wildlife Coordination Act - This Act authorizes USFWS to provide assistance to and cooperate with Federal and State agencies to protect fish and wildlife resources, and to study the effects of pollutants on wildlife. The Act also requires consultations with USFWS where waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted or otherwise controlled by any agency under a Federal permit or license, to prevent loss or damage to wildlife resources.

b) U.S. Geological Survey (USGS)

As a federal agency with water quality and quantity concerns, USGS has the capability to assist federal, state and local agencies through a variety of support programs, in such areas as technical, coordination and management, financial, and data management. For example, presently, USGS, in cooperation with other federal agencies, is participating in two other projects which address the effects of irrigation runoff from the Newlands Project on the Stillwater Wildlife Management Area. USGS is working with the Groundwater Section of NDEP on a wellhead protection demonstration project in the Carson River Basin. In addition, USGS has developed a water quality database management and Geographic Information System (GIS) capabilities with NDEP.

National Water Quality Assessment Program (NAWQA) - Evaluates historical, current and future water quality conditions in representative river basins and aquifers nationwide. Nutrients and pesticides are the priority contaminants. Initial studies have estimated NPS loadings for approximately 90 watersheds. Early results indicate NPS loads vary widely and are strongly influenced by precipitation and runoff. (See Appendix 2, #12)

Toxic Substances Hydrology Program - Provides information about the behavior of toxic materials in several geologic or hydrologic environments. Data are used to avoid human exposure, develop clean-up strategies and prevent further contamination.

National Irrigation Water Quality Program - Addresses water quality problems associated with the Department of the Interior irrigation projects in the west. This program evolved because of the selenium poisoning of waterfowl which occurred at the Kesterson National Wildlife Refuge in California. The program is managed jointly by the USGS, the Bureau of Reclamation, the Bureau of Indian Affairs and US Fish and Wildlife Service. Reconnaissance studies were conducted at the Stillwater Wildlife Management Area and the Humboldt Wildlife Management Area, and field screening studies were conducted in areas associated with the Walker River Indian Reservation and at Indian Lakes. A detailed study was conducted at the Stillwater and Fernley Wildlife Management Areas. Three years of monitoring data were collected at the Stillwater National Wildlife Refuge and Carson Lake to provide background information for remedial planning.

c) U.S. Bureau of Reclamation (BOR)

The agency works under the **Government Performance and Results Act** to manage water quantity and quality. The primary purpose of BOR has been, since its inception in 1902, to develop irrigation projects for enhancement of agriculture in the western Unites States. BOR administers approximately 635,400 acres in Nevada (1.03% of total surface area in Nevada), including the Newlands Irrigation Project in the Lahontan Valley. The Bureau of Reclamation manages a variety of programs which provide financial and technical assistance to irrigation districts for project operation and management improvements.

The Soil and Moisture Conservation Program (S&MC) provides financial assistance for controlling sediment and related erosion problems on Bureau irrigation project lands. The Land Resource Management Program (LRM) focuses on the management of federal lands around BOR reservoirs. Funds from S&MC and LRM can be used for a variety of NPS pollution problems and control measures. The Reclamation Reform Act requires that water conservation plans be submitted for BOR approval by irrigation districts with repayment or water service contracts. The Bureau offers guidance and assistance for water conservation plan development. Through the Rehabilitation and Betterment Program (R&B), BOR can provide loans and design assistance for improvements and replacement of inadequate and antiquated components of irrigation projects.

In addition to the programs described above, BOR can provide financial and technical assistance to state and federal agencies for basic water quality investigations, monitoring and planning, particularly in relation to irrigation return flow water quality.

d) U.S. Bureau of Land Management (BLM)

Of the total surface area in Nevada (70,745,600 acres), 47,840,569 acres are under BLM jurisdiction. This makes BLM the major land management agency in Nevada, with 67.6% of the total surface area. All Bureau policies and procedures must be consistent with the Federal Land Policy and Management Act of 1976 (FLPMA) and all other laws which regulate use of public lands, including the NEPA requirements.

e) Bureau of Surface Mining and Reclamation

Clean Streams Initiative - A collaborative effort by government, industry and citizen to pool resources and clean-up streams contaminated by acid mine drainage.

Surface Mining and Control and Reclamation Act of 1977 (SMCRA) - Mandates protection of the environment during surface coal mining operations. Includes provisions for reclamation after mining is completed.

A.3. U.S. Department of Agriculture

a) U.S. Forest Service (USFS)

As with BLM, USFS is required to maintain an ongoing land use planning process and to evaluate the environmental impacts of proposed activities in its Land and Resource Management Plans.

In Nevada, the USFS manages approximately 5,800,000 acres or 8.2% of the total surface area, for a variety of uses. Many of these lands contain streams and creeks of pristine quality.

The National Forest Management Act (NFMA, 36 CFR 219) - Requires USFS to develop Land and Resources Management Plans (LRMPs) and to manage National forests and grasslands

for multiple use and sustained yield. Decision making is also guided through NEPA compliance (40 CFR 1500.2 c), which allows interested parties to seek changes in Forest Service management.

b) Natural Resources Conservation Service (NRCS) - Relies on many partners to help set conservation goals, work with people on the land, and provide assistance. Its partners include conservation districts, state and federal agencies, NRCS Earth Team volunteers, agricultural and environmental groups, and professional societies.

Emergency Watershed Protection (EWP) - Provides financial and technical assistance to protect life and property from flooding and severe erosion hazards. Funding is provided for stream bank stabilization, debris-clearing and revegetation. Compensation is also available to eligible agricultural producers who are willing to offer private land for floodplain easements.

Environmental Quality Incentive Program (EQIP) - Created by the Federal Agriculture Improvement Act of 1996 (1996 Farm Bill). Targets financial, technical and education assistance for the most severe resource problems on private lands identified by a community-based watershed management effort. EQIP requires a Conservation Plan be prepared which addresses impacts beyond the farm or ranch boundary. Fifty percent of the funding authorized by Congress for the fiscal years 1997-2002 must be used to solve resource problems related to livestock production. In addition, EQIP can be used to meet the nonpoint source pollution requirements mandated by the Clean Water Act.

Swampbuster - The 1985 and 1990 Farm Bills contained provisions for wetland conservation requiring agricultural producers to protect wetlands found on their land if they wish to be eligible for USDA farm program benefits. The law is intended to discourage farmers and ranchers from draining wetlands and converting them to agricultural use. The 1996 Farm Bill mandated a number of changes to the original Swampbuster provisions. These changes included expanding the areas where mitigation can be used and accepting Section 404 permits authorizing wetland conversion as long as the activity was adequately mitigated.

Wetlands Reserve Program (WRP) - Voluntary program which provides financial and technical support to private landowners who wish to protect, restore or enhance wetlands found on their property.

Wildlife Habitat Incentives Program (WHIP) - Voluntary program which also provides funding and technical assistance for improving habitat on private lands.

Rural Abandoned Mine Program (RAMP) - Authorized by the Abandoned Mine Reclamation Act of 1991 (amendment to SMCRA) to reclaim soil and water resources of rural lands damaged by past coal mining practices. The voluntary program provides technical and financial assistance to land users who want to reclaim up to 320 acres of land.

Backyard Conservation Program - Public education program to encourage homeowners and city residents to use conservation practices such as backyard wetlands, nutrient management and composting to protect the environment.

c) Farm Service Agency (FSA)

Conservation Reserve Program (CRP) - This program encourages farmers to convert environmentally sensitive acreage or highly erodible cropland to vegetative cover in order to reduce soil erosion, improve water quality, create habitat and protect the Nation's ability to produce food and fiber. Financial assistance is provided.

d) Cooperative Extension Service (CES) - Has a mandate to work with both urban and rural communities to provide educational programs that address pressing needs in the areas of natural resources, families and communities. Cooperative Extension also has a well established educational system, many of the required technical capabilities and the linkages to acquire and translate information from the research community. National initiatives have directed CES to address surface water and ground water quality issues. CES educates the public about water quality issues including contaminant sources and movement, relationships between land-use practices and water pollution, water conservation, Best Management Practices and other issues. CES is uniquely suited to deliver integrated programs for public education.

e) Resource Conservation and Development Councils (RC&DC) - Local RC&D Councils are grass-roots community leaders working collectively in behalf of conservation and sustainable development.

A.4. U.S. Army Corps of Engineers (U.S.ACOE)

Jurisdiction under the Clean Water Act
Section 404 Permits - USACOE has jurisdiction to control the discharge of dredge and fill material into the waters of the United States, but EPA maintains the authority to veto Corps' permits. Water of the United States include all navigable waters, streams, lakes, intermittent streams, many ephemeral channels and wetlands. The issuance of the 404 permits is coordinated with several agencies - USFS, USEPA, USFWS and NDEP. All agencies' issues and concerns have to be addresses and public notice and review is also required. The Corps can issues three types of permits: 1) Individual permits (33 CFR 325) are required for projects which may cause significant impact and applications must undergo a public notice and review process; 2) Regional general permits {323.2(h) & 325.2(e)(2)} are issued for activities that are similar in nature, and cause only minimal impact in a specified geographical area; and 3) Nationwide general permits (33 CFR 330) can authorize a category of activities throughout the nation that have minimal impacts on the waters of the United States. Activities that can be regulated by a nationwide permit include stream bank stabilization, riparian restoration or creation, utility line placement and minor road fills.

B. State Programs

The State Environmental Commission (SEC) is a quasi-judicial and quasi-legislative body with the responsibility of developing and promulgating rules, regulations and standards for controlling air and water pollution and solid and hazardous waste management; it also levies penalties for air quality violations. The SEC's rules and regulations are enforced through the Department of Conservation and Natural Resources, Division of Environmental Protection.

B.1. Nevada Department of Conservation and Natural Resources (NDCNR)

a) Division of Environmental Protection (NDEP)

Bureau of Water Quality Planning (BWQP)

- Oversees the state Nonpoint Source Program as mandated by section 319 of the CWA
- Performs water quality monitoring of selected/priority rivers, streams, reservoirs and lakes
- Establishes water quality standards and issues water quality certifications as mandated by the CWA sections 106 and 401
- Maintains the Comprehensive Ground Water Protection Program and Wellhead Protection Program under the Safe Drinking Water Act
- Develops TMDLs, as mandated under section 303 of the CWA

Bureau of Water Pollution Control (BWPC)

- Prepares NPDES (including storm water), ground water discharge, effluent reuse and Rolling Stock permits
- Reviews subdivision plans for adequate wastewater disposal services or septic system density
- Oversees the Underground Injection Control permit program
- Enforces violations of permit conditions
- Provides technical assistance/reviews designs
- Administers SRF loan program

Bureau of Mining Regulation and Reclamation (BMR&R)

- Oversees the design, construction, operation and closure of mining facilities
- Normally requires a zero-discharge permit for each facility
- Permit requirements include surface/groundwater monitoring, routine characterization of waste rock and process solutions, spill or release reporting

Bureau of Corrective Actions (BCA)

- Oversees investigation and remediation activities of sites where contamination has occurred
- Responsible for the Underground Storage Tank (UST) Program - adopted 40 CFR 280
- Financial assistance provided to UST owners/operators through State Petroleum Fund
- Primarily concerned with releases of hydrocarbons, PCBs, heavy metals, pesticides, solvents

Bureau of Federal Facilities (BFF)

- Regulates remediation of contamination from historical operations on certain DOD/DOE sites (any new releases are regulated by the Bureau of Corrective Actions)

Bureau of Waste Management (BWM)

- Oversees the Hazardous and Solid Waste Program
- Management Plans provide mechanism to inventory sources, types and quantities of hazardous waste and to manage solid waste
- State has adopted federal regulations related to hazardous waste treatment, storage and disposal
- Grant program initiated to help businesses reduce hazardous waste generation
- Provides assistance to local waste collection/disposal/recycling efforts
- Provides controls for solid waste landfills

NDEP Water Quality Related Regulations and Authorities.

Bureau Branch Applicable Section of Regulations	**Nevada Administrative Code (NAC)**	**Nevada Revised Statutes (NRS)**
Bureau of Water Pollution Control		
Discharge Permitting - Water Pollution Control	445A.070 - 445A.348	445A.300 - 445A.730
General Provisions	445A.070 - 445A.117	
Discharge Permits	445A.228 - 445A.263	
General Permits	445A.266 - 445A.272	
Use of Treated Effluent for Irrigation	445A.275 - 445A.280	
Treatment Works	445A.283 - 445A.292	
Zones of Mixing	445A.295 - 445A.302	
Subdivision Review		
Subdivision of Land	278.010 - 278.530, 445A.342	278.335 - 278.377
Underground Injection Control Permitting	445A.810 - 445A.925	445A.465 - 445A.470
General Provisions and Definitions	445A.810 - 445A.862	
Permits for Underground Injection	445A.865 - 445A.901	
Construction, Operation, Monitoring and Abandonment	445A.905 - 445A.925	
Bureau of Water Quality Planning		
Water Quality Standards		445A.300 - 445A.730
Water Pollution Control - General Provisions	445A.070 - 445A.117	
Standards for Water Quality	445A.119 - 445A.225	
Water Quality Monitoring		
Water Quality Laboratory Certification	445A.055 - 445A.066	445A.425 - 445A.430, 445A.660
Ground Water Protection and Nonpoint Source		
Diffuse Sources	445A.305 - 445A.340	445A.300 - 445A.730

Bureau Branch Applicable Section of Regulations	Nevada Administrative Code (NAC)	Nevada Revised Statutes (NRS)
Bureau of Mining Regulation and Reclamation		
Mining Facility Regulation	445A.350 - 445A.447	445A.300 - 445A.730
General Provisions	445A.350 - 445A.388	
Permits for Facilities	445A.390 - 445A.420	
Operation and Design of Facilities	445A.424 - 445A.447	
Mining Reclamation	519A.010 - 519A.415	519A.010 - 519A.240 519A.260 - 519A.280
General Provisions	519A.010 - 519A.115	
Permits and Fees	519A.120 - 519A.240	
Reclamation of Land	519A.245 - 519A.345	
Provision of Surety	519A.350 - 519A.390	
Enforcement	519A.395 - 519A.405	
Miscellaneous Provisions	519A.410 - 519A.415	
Bureau of Waste Management	444.570 - 444.7499	444.440 - 444.645
Solid Waste Mgmnt - Disposal of Solid Waste	444.570 - 444.639	
General Provisions	444.640 - 444.6765	
Provisions Applicable to Solid Waste Management Systems	444.6769 - 444.7025	
Class I Sites	444.704 - 444.728	
Class II Sites	444.731 - 444.747	
Class III Sites	444.748	
Appeals and Requests for Variance	444.7481 - 444.7499	
Ground Water Monitoring and Corrective Action	444A.005 - 444A.470	444A.010 - 444A.110
Recycling		
Hazardous Waste Program	444.842 - 444.8482	459.400 - 459.600
Facilities for Management of Hazardous Waste	444.842 - 444.8486	
General Provisions	444.847 - 444.8482	
Variances	444.850 - 444.8746	459.400 - 459.600
Disposal of Hazardous Waste	444.850 - 444.861	
General Provisions	444.8632 - 444.8688	
Standards of Practice	444.8693 - 444.8696	
Variances	444.8752 - 444.8746	
Administrative Penalties	444.8752 - 444.8788	459.400 - 459.600
Program to Reduce & Recycle Hazardous Waste		
Polychlorinated Biphenyl	444.940 - 444.9555	459.400 - 459.600
Limits on Hazardous Waste Facility Permits	444.960	459.400 - 459.600
Disposal of Asbestos	444.965 - 444.976	459.400 - 459.600
Chemical Accident Prevention	459.952 - 459.9542	459.380 - 459.3874
Highly Hazardous Substances		
Bureau of Corrective Actions		
UST/LUST - Petroleum Fund		
Storage Tanks	459.9921 - 459.999	459.800 - 459.856
Cleanup of Petroleum Discharges	590.700 - 590.790	590.700 - 590.920
Site Assessment		
Notification of Release of a Pollutant	445A.345 - 445A.348	
Consultant Certification	459.970 - 459.9729	459.500, 459.535
Action Levels for Contaminated Sites	445A.226 - 22755	

b) Division of Water Resources (DWR) - Appropriates surface and ground water for beneficial uses. It also determines if adequate water rights are available to serve a proposed sub-division development.

Well Construction/Abandoned Wells - In order to protect Nevada's ground water quantity and quality, DWR regulates and sets standards for the drilling, plugging and abandonment of wells. Also establishes licensing procedures for well drillers.

c) State Lands

Programs and activities conducted by the Division of State Lands which are applicable to NPS pollution control include review and comment on programs and proposals which affect public land, developing appropriate land management policies for federal lands, assisting local governments in their land planning and land use regulation functions, acquiring environmentally sensitive lands in the Tahoe Basin, and obtaining irrigable agricultural land for settlement under the Carey Act. Administers Tahoe Bond Act of 1996 (and 1999?)

Activity Applications - The agency holds title to land underlying certain waters of the state, typically up to the ordinary and permanent high water mark, except at Lake Tahoe where the boundary is at an elevation of 6223 feet. Work which requires authorization includes bank stabilization, bridges, floating structures, dams, outfall structures, dredging, sand and gravel bar removal, utility crossings and pipelines. A legal description of the land, Site plans, maps, supporting documentation and proof of financial responsibility must be submitted with an application. A permit fee and a public notice process may also be required.

d) Division of Forestry (NDF)

The Division of Forestry is charged with protecting 8.7 million acres of non-federal forest, range and watershed land from fire and serious environmental degradation. The Division provides technical assistance to landowners on forest management, and administers a nursery program from which trees are supplies for greenbelts, environmental restoration and other conservation projects. The Division, through the Department of Prisons Conservation Camp Program supplies crews for a variety of activities including resource conservation and restoration projects.
Stream Zone Variance - Required for work near streams, in forested areas on non-federal lands. This includes channels with only intermittent flow. NDF also conducts threatened and endangered species reviews for federally-funded watershed projects on private land.

Permits - Requires Burn permits for the disposal of slash and debris. Certificates must be obtained for converting timberland resources to some other use. All logging permits require the use of best management practices to prevent or reduce nonpoint source pollution.

Seedbank Program - maintains supply of native and adapted seeds for revegetation efforts, especially for fire rehabilitation.

e) Division of Water Planning (NDWP)

State Water Plan - Guide to the development, management and use of the state's water resources.

Water Education for Teachers - Oversees the state's activities for this national program which provides water resource training for teachers.

Conservation Grant Program - The 1999 Legislature created a program within the Division of Water Planning fro the granting of funds for water conservation projects for all types of use, including agricultural and municipal. Increased water use efficiencies resulting from this program could reduce nonpoint source pollution contributions.

f) Division of Conservation Districts

The Division and the State Conservation Commission (SCC) assist the State's 29 local conservation districts in the development and implementation of their programs for the conservation and development of renewable natural resources. In addition, the collaborating entities conduct resource inventories and appraisals, evaluate existing resource programs, and develop alternative proposals for future resource programs; new programs include providing assistance to the Tahoe Bond Act Program and taking and active role in riparian area management.

The Division of Conservation Districts provides leadership in the implementation of Nevada's Coordinated Resource Management and Plan (CRMP) Memorandum of Understanding, which was signed by the heads of five federal and five state resource agencies. It also assists local conservation districts in the implementation of Nevada's regulations to control water pollution from diffuse sources. Agricultural conservation plans are continually revised to include the best management practices for controlling pollution on each farm and ranch. Assistance is also given to local communities in the development of ordinances and other techniques to control soil erosion and water pollution resulting from storm runoff. The emphasis of conservation districts programs is on voluntary compliance and individual technical assistance. The Division of Conservation Districts has worked with the Nevada Division of Environmental Protection to update the Nevada Handbook of Best Management Practices.

g) Division of Wildlife (NDOW)

The Division of Wildlife was established to preserve, protect, manage and restore the wildlife resources of Nevada. NDOW consists of six divisions and three regions. The Board of Wildlife Commissioners was created to establish policies and regulations for the protection, propagation, restoration, transplanting , introduction and management of wildlife in the state. The goals of NDOW are to: 1) maintain all species of the State's wildlife and their habitats for their intrinsic and ecological values as well as their direct and indirect benefits to man, 2) provide for the diversified recreational use of the State's wildlife resource, 3) provide for an economic contribution from the wildlife resources in the best interests of the people consistent with the

long-term welfare of these resources, and 4) provide for scientific, educational and aesthetic uses of the State's wildlife resources.

Environmental pollution, including nonpoint source pollution of water, degrades wildlife habitat and restricts production and propagation and is, therefore, inconsistent with the goals and objectives of NDOW. NDOW can offer technical, financial, legal and educational assistance in NPS pollution management programs and projects.

B.2. Nevada Department of Agriculture (NDOA)

Pesticides - NDOA has authority to regulate pesticide use in Nevada through the mandates of the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and the Nevada Pesticides Act. Ground water monitoring has been in place since 1991 and focuses on established agricultural areas. The draft State Pesticide Groundwater Management Plan was published in April 1999.

B.3. Nevada Department of Human Resources (NDHR)

a) Health Division

Bureau of Health Protection Services

- Permits the construction of individual septic systems with capacities less than 5000 gallons/day
- Subdivision review
  - evaluates historical land use and current zoning
  - evaluates soils if septic systems are to be installed
  - requires monitoring if groundwater is to be used as water supply
- Source Water Assessment Program

B.4. Nevada Department of Transportation (NDOT)

The goals of NDOT are to assure a comprehensive, energy efficient, multi-modal transportation system consistent with social, economic and environmental objectives and one which provides mobility and service for citizens of the State of Nevada, the public and consumers. The achievement of these goals requires monumental efforts in planning, construction and maintenance of roadways in the state. While these activities are extremely important to the economic development of the state, construction and maintenance activities, and mere existence of such extensive structures have impacts on the surrounding environment. As with all major construction activities, NDOT is required to implement best management practices designed to control runoff and the release of pollutants to surface water and groundwater of the state. NDOT's environmental section ensures that Department projects comply with state, federal and local environmental regulations and evaluate the environmental impacts of Department activities. NDOT is active in major wetland creation and enhancement projects to mitigate the effects of highway construction on wetland areas of the state.

C. *Local and Regional Programs*

C.1. Nevada Ecosystem Advisory Team (NEAT)

NEAT was formed in 1993 to improve communication and collaboration among various groups and agencies concerned with natural resources in the State. By teaming up, participants are able to share information, staff, funding and other resources for more efficient management of Nevada's ecosystem. The Vision for NEAT is: "To provide for coordinated ecosystem-based leadership among federal, state, and local organizations, with local leadership and education, to enhance and sustain Nevada natural and economic resources."

NEAT includes members from the following agencies: Nevada Division of Environmental Protection, Nevada Division of Conservation Districts, Natural Resources Conservation Service, Nevada Association of Conservation Districts, Nevada Division of Water Planning, US Bureau of Reclamation, US Bureau of Land Management, Nevada Division of Water Resources, Tahoe Regional Planning Agency, Nevada Cooperative Extension, Nevada Division of Forestry, Nevada Farm Bureau, Nevada Biodiversity Initiative, US Fish and Wildlife Service, US Forest Service, Nevada Division of Agriculture, US Environmental Protection Agency, Nevada Division of Wildlife, Rural Economic Community Development Service, Nevada-Tahoe Conservation District, US Army Corps of Engineers, USDA Agricultural Research Service, US Bureau of Indian Affairs.

Examples of the activities in which the group is involved:
1) *Environment Education Resource Directory* -- a guide to agencies and groups in Nevada which promote conservation education.
2) *Nevada Biodiversity Initiative* -- NEAT collaborates with the University of Nevada's Biological Resources Research Center to provide data about ecosystem-related projects throughout Nevada.
3) *Grants and Funding* -- the group reviews 319(h) proposals in conjunction with NDEP.
4) *Permits* -- NEAT works as a forum to assist individuals and groups with information concerning projects affecting Nevada's watersheds. NEAT is also working to develop documents explaining permit requirements, sources of funding and technical assistance availability.

C.2. Utah Nevada Arizona Water Quality Forum (UNA)

In November 1997, Nonpoint Source Program representatives from the states of Utah, Nevada and Arizona met with BLM personnel in St. George, Utah to discuss coordinated watershed management in northern Arizona and adjacent portions of the Colorado River basin in Utah and Nevada. Monthly meetings continued and the participants list grew to include representatives from other federal agencies, local government entities and one Indian tribe. The group is currently working toward accomplishing an action plan developed around several goals and its mission statement: to provide a forum for stakeholders of the Colorado River and its tributaries from Lake Powell to Lake Havasu, to promote partnering based water quality efforts to support holistic watershed management.

C.3. Conservation Districts

Conservations Districts are legal sub-divisions of state government that administer programs to conserve natural resources. They are self-governed by locally elected supervisors who establish priorities and set policy. They promote implementation of demonstration projects, Best Management Practices and public out-reach and educational programs. They also enter in partnerships with NDEP in the development and establishment of Coordinated Resource Management Plans (CRMPs) and hiring watershed coordinators. Conservation Districts are currently sponsoring several CRMP/watershed management plans in the State, such as the Walker River CRMP, the Steamboat Creek Watershed Restoration Plan, the Upper Carson CRMP and the Middle Carson Watershed Restoration Plan. Currently, there are 28 Conservation District in the State.

C.4. Lake Tahoe Basin

The Tahoe Regional Planning Agency (TRPA) is the regional land use and environmental resource planning and regulatory agency for the Tahoe Region, operating under the authority of the Tahoe Regional Planning Compact (94 Stat. 3233). It regulates all activities in the Lake Tahoe Region which may affect attainment and maintenance of the nine environmental threshold carrying capacities. Threshold areas include water quality, air quality, soils, wildlife, fisheries, vegetation, scenic quality, recreation, and noise.

TRPA is also a designated area-wide planning agency under section 208 of the Clean Water Act. Programs in the Regional Plan include the Individual Parcel Evaluation System (IPES), Soils and Land Coverage, and Stream Environment Zones (SEZ). Amendments to the 1981 Tahoe 208 Plan are certified by the State of Nevada and California and approved by EPA; the plan was updated November 30, 1988 primarily to include the IPES program.

TRPA is charged with the management of water quality in an environmentally sensitive and highly used area. As a result, TRPA has developed numerous innovative programs addressing NPS pollution, employs a variety of implementation mechanisms, and coordinates with cooperating federal, state and local government agencies and public/private interest groups.

TRPA is developing the Environmental Improvement Program for the Lake Tahoe region (EIP), which evolved from the two main capital improvement programs in the 208 plan, the Capital Improvement Program (CIP) for erosion and runoff control and the SEZ Restoration Program. The EIP strategy is to achieve the environmental threshold carrying capacity standards required by Public Law 96-551 and adopted for the Tahoe Region in 1982 by TRPA. It is designed to accomplish, maintain or exceed multiple environmental goals through an integrated proactive approach. The strategy relies on partnerships with all sectors of the community: private, local government, state government and federal government. The EIP contains sections on participating entities, project capital needs, cost estimates, and project, program and study descriptions for each environmental threshold area, including water quality. A finance plan for the EIP is currently being completed. TRPA's objective is to move EIP toward an electronic format with GIS capabilities and real-time user access.

In addition to regulatory and non-regulatory programs, the 208 plan provides for a monitoring program to evaluate water quality in the Basin and the effectiveness of the Regional Plan. The monitoring program calls for scientific monitoring of water quality and programs designed to protect and restore water quality, establishing a science advisory panel, annual reporting on the implementation of the monitoring program and overall monitoring results and a five-year comprehensive review of the monitoring program, performance targets achievements, and program effectiveness. Revisions to the program are to be made to ensure attainment and maintenance of water quality standards.

NDEP considers the NPS pollution control programs and policies, implementation mechanisms and schedule, and monitoring and review programs set forth in TRPA's 208 Plan to be a comprehensive, well coordinated and implementable program for effectively managing NPS pollution in the Tahoe Basin. In order to avoid unnecessary duplication of effort, NDEP hereby adopts by reference elements of the Water Quality Management Plan for the Tahoe Region pertaining to NPS pollution control and management. NDEP acknowledges that the Plan is of high quality and intends to continue to maintain an active, cooperative and supportive role in regulatory and monitoring programs in the Tahoe Basin.

Preparation for the 1997 presidential visit to Lake Tahoe required the formation of numerous partnerships among the states of Nevada and California, and various federal and local agencies and non-government entities. The Nevada NPS Program was active during the preparations leading up to the president's visit, including participation in the Water Quality Issues Workshop held on June 18, 1997. The NPS Program currently participates in several interstate partnerships which grew out of the presidential forum including the Tahoe Bond Act Technical Advisory Committee, the Tahoe Water Quality Working Group, the Tahoe Source Water Assessment and Protection Program and the Lake Tahoe Basin Watershed Assessment. A central theme unifying virtually every natural resource-related partnership in the Tahoe Basin is the implementation of the Tahoe Regional Planning Agency's Environmental Improvement Program.

C.5. Truckee River Watershed

The Washoe County 208 Water Quality Management Plan was originally approved in 1978 and has undergone three revisions. Under an agreement dated April 9, 1991, Washoe County and the Cities of Reno and Sparks established that Washoe County should perform the duties of coordinating and managing services related to wastewater treatment, water supply, flood control and storm drainage and the protection of the Truckee River water quality. In 1991, Washoe County commissioned a study of water supply, waste treatment and water quality. The results of this study are the basis for the third (and current) revision. Some of the main issues addressed in the third revision are: 1) identification of the needs of the population for wastewater treatment, sewer service boundaries and effluent disposal; 2) adoption of the final Total Maximum Daily Loads (TMDLs) and Waste Load Allocations (WLAs) for the Truckee River; and 3) improvement of water quality conditions of the Truckee River system by reduction of urban point and nonpoint source pollutant loadings. Another issue addressed in the plan is the implementation of best management practices related to stormwater pollution runoff into the Truckee River.

The Truckee River and its tributaries provide water for numerous uses including municipal and industrial supplies in the Reno/Sparks area, irrigated agricultural and urban lands, power generation, and spawning for Lahontan Cutthroat Trout and Cui-ui. In addition, water from the Truckee River is diverted from the basin through the Truckee Canal to Lahontan Reservoir in the Carson River Basin, where it serves the Newlands Irrigation Project. Pyramid Lake, on the Pyramid Lake Paiute Indian Reservation, is the terminus of the Truckee River and is a major sport fishery. Water quality of the lake is intimately related to the quality of the Truckee River. Water quality and quantity issues in the Truckee River Basin are both controversial and complex, and involve diverse interested parties including several federal agencies, the States of Nevada and California, Washoe County, the cities of Reno and Sparks, the Pyramid Lake Paiute Tribe, Sierra Pacific Power Co., Newlands Project irrigators and individual users and consumers.

The State and 13 other parties are involved in the resolution and implementation of the Truckee River Operating Agreement (TROA). The proposed agreement, when resolved, will address, among other provisions, the protection of the endangered species of Cui-ui Lakesucker (*Chasmistes cujus*) and the improvement of water quality in the lower Truckee River and Pyramid Lake. The proposed agreement is also serving as a catalyst for the development of several watershed-wide activities: a comprehensive monitoring program, the development of TMDLs, and a greater integration of nonpoint source concerns in the overall planning for the watershed.

In 1995, the Nevada Legislature passed legislation which created the Regional Water Planning Commission. This Commission developed the 1995-2015 Comprehensive Regional Water Management Plan for Washoe County. The purpose of the Regional Water Plan is to provide the region with an outline of how water will be managed to meet the needs of citizens into the future. Major components of the plan are identification of future water supply and wastewater facilities, regional flood control and drainage projects, and development of a conservation program.

C.6. Carson River Watershed

The Carson River 208 Water Quality Management Plan (March 1982) provides an assessment of the Carson River by river segment and related recommendations for addressing pollution problems. There are discussions on several topics: land use patterns, population distribution, water quality impairments, etc. This document was developed by NDEP and provides a basis for the three Carson River Sub-Watershed Management Plans.

For several years, the Nevada Division of Environmental Protection has supported watershed management in each of the three sub-watersheds which comprise the Carson River basin. Conservation District-led CRMP groups are active and working toward implementation of their respective restoration goals. In 1996, the Upper Carson group, in coordination with NDEP and stakeholders, developed the *Upper Carson River Watershed Management Plan* which provides guidance for its efforts. It contains a comprehensive list of watershed issues in addition to goals and recommended actions to address each issue. The other groups are working with more streamlined plans.

In 1998 a coalition of interested parties held a two-part conference to explore the possibility of integrating watershed management efforts throughout the entire Carson River basin. Conference results indicated that a broad-based, locally-led watershed management team approach was desirable. The Carson Water Sub-conservancy District (CWSD) stepped forward and offered to lead the effort. To date, the CWSD has convened a steering committee, developed a purpose statement for integrated watershed management, held one stakeholder meeting to identify issues, and established several working groups to address the stakeholder's issues. One main goal of the CWSD and the steering committee is to develop an integrated watershed management plan for the entire Carson River basin.

C.7. Clark County

The Clark County 208 Water Quality Management Plan (March 1997) was developed in two parts: one addresses the rural areas of Clark County and the other addresses Las Vegas Valley, where larger communities are located. The main thrust of the rural area document is the disposal of waste water - individual septic systems, waste water treatment facilities or disposal of waste water; the document also includes recommendations. Several areas were assessed by the Clark County Sanitation District.

The Las Vegas Valley document (March 1997) is a revised version of the 1990 208 Water Quality Management Plan and it addresses the following issues: 1) the effects of regional growth and development on waste water flow projections and in waste water treatment needs; 2) revision of the storm water permit to a more inclusive nonpoint source contribution; 3) the development and implementation of the Las Vegas Wash Wetlands Park; and 4) integrate and coordinate the planned projects and activities to ensure that water resources are protected.

The Clark County Wetlands Park Master Plan was develop by Clark County Parks and Recreation, Clark County Comprehensive Planning and a consortium of consulting groups, and federal, state, local and private entities. Construction of the park will be phased over the next 10 to 15 years to include several erosion control improvements to arrest severe erosion, provide water quality treatment and create or enhance wetlands habitat along the Las Vegas Wash.

Due to water quality concerns in both the Las Vegas Wash and Lake Mead, NDEP established the Lake Mead Water Quality Forum (LMWQF) in early 1997 to create an open and public forum for he discussion of water quality related issues. The Forum's mission is to support the protection of human health and the environment and to preserve and improve the water quality of the Las Vegas Wash , Bay and Lake Mead.

In 1998, the Water Quality Citizens Advisory Committee, established by the Southern Nevada Water Authority (SNWA), recommended that SNWA serve as the coordinating entity to identify and bring together stakeholders to develop a comprehensive management plan for the Las Vegas Wash. The Las Vegas Wash Coordinating Committee (LVWCC) was formed in response to that recommendation. The LVWCC then established several study teams to help accomplish its mission of evaluating all facts, issues and concerns regarding the Las Vegas Wash in order to develop and implement a practical, comprehensive approach for managing the Wash in a timely

manner. The LVWCC interacts freely with the LMWQF and plays a key role in implementing the Wetlands Park Master Plan.

C.8. Walker River Watershed

NDEP sponsored watershed management group, implementing erosion control projects, weed management projects, and other nonpoint source problems. The group is under the leadership of a watershed coordinator. Several efforts are being coordinated in this watershed, besides the projects mentioned above: development of water quality standards for the Walker Lake, revision of water quality standards for the river, TMDLs (only nonpoint sources in this watershed), water quality issues in the lake, which a terminal lake for the watershed and serious erosion problems throughout the watershed.

The Walker River Basin Technical Network is sponsored by the Division of Water Planning. It is organized to share information between government agencies, environmental groups and local stakeholders and to identify the most effective methods to solve basin resource problems.

C.9. Non-Designated Area

Non-Designated Area 208 Water Quality Management Plan (May 1992): the remainder of the State (excluding Carson River basin, Washoe and Clark Counties and Lake Tahoe basin) is classified, for planning purposes, as a "non-designated area". Although this area is the geographical majority of the State, it includes a small portion of the population, and two main rivers: the Humboldt and the Walker. Although the northern portion of the Colorado River is included here, it is scarcely populated. As a consequence, for planning purposes, only the Snake Basin, and the Humboldt and Walker rivers are addressed as separate entities within the 208 plan. NDEP is in the process of updating the Humboldt and the Walker rivers NPS assessment reports.

The State has identified the following potential future water quality problems in the non-designated area of the State:

-- overgrazing of riparian areas which significantly contributes to erosion and elevated levels of TSS, TDS, turbidity and TP;
-- mining and construction storm water runoff practices which subject soils to accelerated rain and wind erosion;
-- petrochemical surface and ground water releases and the possible impacts to surface waters;
-- septic system failures and possible impacts to surface and ground waters;
-- discharges from sewage treatment facilities and potential impacts to surface and ground waters;
-- underground injection of contaminants and potential impacts to surface and groundwater;
-- exportation and importation of ground and surface waters within the State;
-- eutrophication and increasing salinity of lakes and ponds;
-- recovery of threatened and endangered aquatic and riparian organisms;
-- reclamation of wetlands and riparian sites.

D. Private and Non-profit Organizations (involved in nonpoint source and water quality issues):

1) Twenty to One - range and habitat rehabilitation in Central Nevada
2) Ducks Unlimited - partner in the Las Vegas Wetlands Park Project, other involvement in habitat preservation
3) Truckee River Yacht Club - advocates water quality protection and proper land uses for the Truckee River; activities include tree plantings, cleanups, river restoration, lobbying on behalf of the river and public education .
4) League to Save Lake Tahoe
5) Sierra Club
6) Nevada Land Conservancy
7) Great Basin Land and Water
8) Elko Community