a) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) would not result in habitat modifications that would affect sensitive, candidate, or special status species. All four well sites are located on land owned and currently utilized by MVWD. No habitat currently exists that would support sensitive, candidate, or special status species, and no new land would be acquired for the proposed project; therefore, no impacts would occur.

b) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) would not result in modifications to riparian habitat or other sensitive natural communities identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service. All four well sites are located on land owned and currently utilized by MVWD. No riparian habitat or other sensitive natural communities exist on the four MVWD well locations, and no new land would be acquired for the proposed project that consists of riparian habitat or habitat for sensitive communities; therefore, no impacts would occur.

c) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) would not result in affects to wetlands. No wetland conditions exist at, or immediately adjacent to, the four MVWD well locations, and no new land would be acquired for the proposed project; therefore, no impacts would occur.

d) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) would not interfere with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. All well locations are currently utilized by MVWD, are fenced off, and no new land would be acquired for the proposed project; therefore, no impacts would occur.

e) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) would not interfere with any local policies or ordinances protecting biological resources. At the Well MV-12 location, one mature does exist, and at the Well MV-4 location, landscaping around the perimeter is in place. However, well improvements at these two sites are not anticipated to affect the tree or landscaping in any way. Therefore, no impacts would occur.

f) **No Impact:** According to planners with the City of Montclair and the City of Ontario, implementation of any of the three build alternatives (Alternatives 2, 3 and 4) would not interfere with any adopted Habitat Conservation Plans, Natural Community Plans, or other approved local, regional, or state habitat conservation plans. All well locations are currently utilized by MVWD, not subject to any habitat conservation plans, and no new land would be acquired for the proposed project; therefore, no impacts would occur.

The general impacts to cultural resources of the Chino Basin groundwater management program, of which the proposed project is a part, are discussed in Section 4.14, on pages 4-425 through 4-435, of the OBMP Program EIR and has been included here.

Impacts Associated with the Groundwater Recharge Feasibility Project

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
V. **CULTURAL RESOURCES** – Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☑	☐	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☑	☐	☐
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☑	☐	☐
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☑	☐	☐

a-d) **Less Than Significant Impact with Mitigation:** Construction activities associated with the groundwater recharge facilities improvements for Alternatives 3 and 4 do have the potential to result in significant impacts to historical, archaeological, or paleontological resources and human remains. For Alternatives 1 and 2, no improvements to the four existing wells would occur; therefore, no impacts would result. Implementation of Alternative 4 would require rehabilitating the existing Well MV-1, Well MV-9 and Well MV-12; therefore no impacts would occur. However, with Alternatives 3 and 4, new wells would be drilled immediately adjacent to the existing Well MV-9 and Well MV-12. Implementing either one of these alternatives would have the potential to disturb cultural resources during drilling activities. However, implementation of Mitigation Measures 4.14-1 through 4.14-5, as detailed in the OBMP Program EIR would reduce any significant cultural resources impacts to less than significant levels in the event that Alternatives 3 or 4 are chose as the preferred alternative. These mitigation measures include:

4.14-1 Inventory: A required basic archaeological inventory should encompass the following guidelines:

a. **Literature and Records Search:** Existing maps, site reports, site records, and previous EIRs in the region of the subject area should be researched to identify known archaeological sites and works completed in the region. All maps, EIRs, historical maps and documents, and site records should be cited in text and references. Local historical societies should also be contacted and referenced. State Information Centers will provide the bulk of this information. The San Bernardino County Archives or the Eastern Information Center at UC Riverside should be contacted.

b. **Field Reconnaissance:** Conduct a surface survey to obtain comprehensive examination of current status of the area and gather general understanding of the kinds of cultural and related phenomena present. At a minimum, all ground surface chosen for survey should be walked over in such a way that every foot of ground can be visually scanned. All previously recorded cultural resources should be revisited to determine their current status, and all newly discovered sites should be recorded on either State Form 422 or 523 and supplements, as appropriate. Trinomial designations will be obtained from the Information Center. For the inventory process, a compilation of all historical resources, including archaeological and historic resources older than 50 years, using appropriate State record forms, following guidelines in the California Office of Historic Preservation's handbook should be completed for all new discoveries. Two copies should be submitted to the San Bernardino County Archaeological Information Center for the assignment of trinomials if discovered within San Bernardino County. Otherwise, the appropriate comparable agency in Riverside County shall be the recipient of these reports.

c. **Report:** A technical report should be prepared which fully describes both the methods and results of all efforts. Research sources should be listed, and the information summarized. The field work should be presented in detail, with all appropriate maps and graphics. Any areas not inspected with full intensity should be specified, preferably using clear, easily understood maps, and the reasons for the deficiency presented. Site records should be prepared for all new discoveries, and amendments prepared to update old forms should be provided in the separable appendix, but the sites should be described in the main text. Each resource description should include a professional opinion of significance, with reference to the qualities or research potential which make it worthy of further consideration. Archaeological sites which need test excavation to confirm significance, integrity, and boundaries should be identified and a sampling program recommended.

4.14-2 Assessment

Properties shall be evaluated using a well-understood cultural context that describes the cultural development of an area and identifies the significant patterns that properties represent. This same historic context is used to organize all identification, registration, and preservation decisions within the planning framework. To be useful in subsequent stages of the planning process, evaluation decisions must make clear the significance of the property with the historic context. Potential preservation treatments should not influence the evaluation of significance (National Park Service n.d.:35)

The nature and type of assessment will depend on the particular resource(s) and level of information for a particular region. Consequently, it is not possible to prescribe specific methods to be utilized. However, there are certain basic elements that should be included an are as follows:

a. Preparation of a Research Design – Archaeological documentation can be carried out only after defining explicit goals and a methodology for reaching them. The goals of the documentation effort directly reflect the goals of the preservation plan and the specific needs identified for the relevant historic contexts.

b. Field Studies – The implementation of the research design in the field must be flexible enough to accommodate the discovery of new or unexpected data classes or properties, or changing field conditions. An important consideration in choosing methods to be used in the field studies should be assuring full, clear, and accurate description of all field operations and observations, including excavation and recording techniques and stratigraphic or inter-site relationships.

c. Report – The assessment report should evaluate the significance and integrity of all historical resources within the project area, using criteria established in Appendix G of the CEQA Guidelines for important archaeological resources and/or CFR 60.4 for eligibility for listing on the National Register of Historic Places. The report should contain the following information and should be submitted to the San Bernardino County Archaeological Information Center or to the Eastern Information Center at UC Riverside for permanent archiving:

(1) Description of the study area;

(2) Relevant historical documentation/background research;

(3) The research design;

(4) The field studies as actually implemented, including any deviation from the research design and the reason for the change;

(5) All field observations;

(6) Analysis and results, illustrated as appropriate with tables, maps and graphs;

(7) Evaluation of the study in terms of the goals and objectives of the investigation, including discussion of how well the needs dictated by the planning process were served;

(8) Information on where recovered materials are curated and the satisfactory condition of those facilities to protect and to preserve the

artifacts and supporting data. The County of San Bernardino requests that historical resource data and artifacts collected within this project area be permanently curated at a repository within the County.

d. In the event that a prehistoric or historic artifact over 50 years in age is encountered within the project area, especially during construction activities, all land modification activities in the immediate area of the finds should be halted, and an onsite inspection should be performed immediately by a qualified archaeologist. This professional will be able to assess the find, determine its significance, and make recommendations for appropriate mitigation measures. Further, if human remains of any kind are encountered on the property, the San Bernardino or Riverside County Coroner's Office must be contacted within 24 hours of the find, and all work should be halted until a clearance is given by that office and any other involved agencies.

4.14-3 Monitoring

In situations where resources are potentially subject to direct or indirect impact and testing or data recovery is not proposed, an archaeological monitor and Native American observer/consultant should be present during subsurface work. One circumstance under which this might occur would be if a known resource was close to an area of impact and the site boundaries were ambiguous. Monitors help insure that exposed data or materials are collected and that if potentially significance cultural materials or features are encountered, they will be preserved either by realignment of the proposed facilities or by prompt evaluation and recommendations for any necessary mitigation measure.

4.14-4 Data Recovery

If an archaeological resource is found to be significant and no other preservation option is possible, mitigation of adverse effects by scientific data recovery, including analysis and reporting is the method of last resort. Such a mitigation program is usually only developed after an assessment test has been completed to identify physical parameters and cultural complexity, and formulate a research design. Each specific program would have to be developed in response to the site and potential impact, with the concurrence of the appropriate agencies and in consultation with Native American representatives.

4.14-5 Future Project Siting

Future project siting shall be located, whenever possible or feasible, outside of the highly sensitive cultural resource areas depicted in Figures 4.14-1 in the OBMP Program EIR. Before any projects are located, and before any construction activities begin, any proposed project that will result in ground disturbance to any area that does not have a complete cultural resource survey on record with either the AIC or the EIC offices will conduct a site specific cultural resource evaluation and report prior to any ground breaking activity. Further, if cultural resources have been identified on the site, a qualified archaeologist or paleontologist will be retained to devise an excavation and/or curation plan for the resources, and a qualified cultural resource monitor will be present onsite during all construction-related activities that could potentially uncover previously undiscovered resources. This monitor will examine excavated soils and have the authority to cease construction activities if resources are unearthed.

The general impacts to geology and soils from the Chino Basin groundwater management program, of which the proposed project is a part, are discussed in Section 4.4, on pages 4-42 through 4-70, of the OBMP Program EIR and has been included here.

Impacts Associated with the Groundwater Recharge Feasibility Project

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
VI. GEOLOGY AND SOILS – Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☐	☑
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☑
ii) Strong seismic ground shaking?	☐	☐	☐	☑
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☑
iv) Landslides?	☐	☐	☐	☑
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☑
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☐	☑
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☑
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☑

a) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) would not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death. Drilling new and/or rehabilitating existing wells and operating four injection and extraction wells would not result in any adverse geology and soils impacts.

b) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) would not result in soil erosion or loss of topsoil. All well improvements would occur below ground, and improvements above ground to well heads and perimeter walls, fencing and landscaping would not create conditions that would cause soil erosion or loss of topsoil. Therefore, no impacts would occur.

c-d) **No Impact:** According to planners with the City of Montclair and the City of Ontario, there are no known unstable geologic units, unstable soils, or expansive soils in the vicinity of the four well sites. Drilling and/or rehabilitation of the well sites would not occur on unstable soils; therefore, no impacts would occur.

e) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) would not affect soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems. Therefore, no impacts would occur.

The general impacts to hazards and hazardous materials from the Chino Basin groundwater management program, of which the proposed project is a part, are discussed in Sections 4.5.3, 4.7.3, 4.7.4, and 4.4.10, on pages 4-128 through 4-139, 4-304 through 4-306, and 4-347 through 4-365 of the OBMP Program EIR and has been included here.

Impacts Associated with the Groundwater Recharge Feasibility Project

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
VII.HAZARDS AND HAZARDOUS MATERIALS – Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☑	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☑	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☑	☐
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☑	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☑
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☑
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☑
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☑

a-c) **Less Than Significant Impact:** Drilling new wells and rehabilitating existing wells under Alternatives 2, 3, and 4 of the Groundwater Recharge Feasibility Project would not create any hazards for the public, neighboring schools, or the environment through the routine transport, use, or disposal of hazardous materials. Operations activities at the four well sites would involve the daily use of liquid sodium hypochlorite for disinfection purposes. The chemical would be injected into the water to provide a chlorine residual to prevent bacterial growth in the water distribution system. The sodium hypochlorite would be transported by truck and stored in vented, closed fiberglass sheds with secondary containment at each of the proposed well sites. Approximately 200 gallons of liquid sodium hypochlorite would be stored at each of the four sites. Transportation of sodium hypochlorite would follow transportation routes established in the City of Montclair and the City of Ontario General Plans for the transportation of hazardous materials. The amount of sodium hypochlorite used for disinfection at each well site would be regulated to prevent accidental spills. With these safety precautions in place, no health hazards would result.

d) **Less Than Significant Impact:** Two of the four well sites that would be utilized in Alternatives 2, 3 and 4 are listed within hazardous materials databases. According to the January 27, 2003 EDR site reports prepared for each of the four well sites, Wells MV-9 and MV-12 are not listed on any hazardous materials lists. Well MV-1 is listed on the "CA HAZNET" list and "CA San Bern. Co. Permit" list. "CA HAZNET" means that the site is listed within the Hazardous Waste Information System, and "CA San Bern. Co. Permit" means that MVWD has obtained a permit to operate as a hazardous material handler at the site. Well MV-4 is also listed on the "CA San Bern. Co. Permit" list.

e) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) would occur outside of an airport land use plan and would be outside the two mile radius of the closest airport, the Ontario International Airport. Therefore, no impacts would occur.

f) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) would not occur in the vicinity of a private use airport. Therefore, no impacts would occur.

g) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) would not impair implementation of or physically interfere with, an adopted emergency response plan or emergency evacuation plan. The proposed well rehabilitations and improvements would all occur on property currently owned, utilized, and enclosed by MVWD. The sites are not currently part of an emergency response plan; therefore, no impacts would occur.

h) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) would not result in an increase in wildland fires. All well improvements would occur below ground, and improvements above ground to well heads and perimeter walls, fencing and landscaping would not create conditions that would increase wildland fire potential in the urbanized areas of Montclair and Ontario. Therefore, no impacts would occur.

The general impacts to hydrology and water quality of the Chino Basin groundwater management program, of which the proposed project is a part, are discussed in Section 4.5, on pages 4-87 through 4-166 of the OBMP Program EIR and has been included here.

Impacts Associated with the Groundwater Recharge Feasibility Project

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
VIII.HYDROLOGY AND WATER QUALITY – Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☐	☑
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☑	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☐	☑
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☐	☑
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☑
f) Otherwise substantially degrade water quality?	☐	☐	☑	☐
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☑
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☑
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☑
j) Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☑

a) **No Impact:** Implementation of Alternatives 2, 3 or 4, would not violate any water quality standards. Treated water provided to MVWD by Metropolitan Water District (MWD) would be injected into the groundwater basin for extraction at a future time. Before being processed through the water system, all extracted groundwater would be disinfected with sodium hypochlorite. In addition, nitrate concentrations in the extracted water quality would be monitored to determine if blending would be needed to maintain nitrate levels below the maximum levels allowed by the State of California. Therefore, no water quality violations would occur.

b) **Less Than Significant Impact:** Implementation of the MVWD Groundwater Recharge Facilities Program would not substantially deplete groundwater supplies or interfere with groundwater recharge. Instead, the intent of the Program is to more closely balance recharge and injection in Management Zone 1 with extraction activities by MVWD. Table 1-1 shows the modeled extraction, injection and recharge values annually for each of the four alternatives.

c-d) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) for the injection and extraction well improvements would not alter the existing drainage patterns in the vicinity of any of the four well locations. For each alternative, groundwater levels would temporarily rise during injection, and then upon extraction of the groundwater, water levels would drop slightly. Therefore, no impacts would occur.

e) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) for the injection and extraction well improvements would not create or contribute runoff water to the existing stormwater drainage systems. Therefore, no impacts would occur.

f) **Less Than Significant Impact:** The Groundwater Recharge Facilities Program is designed to improve groundwater quality over time. Short-term water quality would not be compromised for the long-term improvement, and less than significant impacts would occur. Water quality impacts as a result of Alternatives 1, 2, 3, and 4 are presented in detail under Appendix B.

g-h) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) for the injection and extraction well improvements would occur at existing MVWD well locations and would not place any housing or structures in 100-year flood hazard areas. Therefore, no impacts would occur.

i) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) for the injection and extraction well improvements would occur at existing MVWD well locations and would not expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam. Therefore, no impacts would occur.

j) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) for the injection and extraction well improvements would occur at existing MVWD well locations and would not increase the potential for, or be subject to, inundation by seiche, tsunami, or mudflow. Therefore, no impacts would occur.

The general impacts to land use and planning of the Chino Basin groundwater management program, of which the proposed project is a part, are discussed in Section 4.2, on pages 4-3 through 4-26 of the OBMP Program EIR and has been included here.

Impacts Associated with the Groundwater Recharge Feasibility Project

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
IX.LAND USE AND PLANNING - Would the project:				
a) Physically divide an established community?	☐	☐	☐	☑
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☑
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☑

a) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) for the injection and extraction well improvements would occur at existing MVWD well properties that are fenced/walled off to the general public and would not physically divide an established community. Therefore, no impacts would occur.

b) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) for the injection and extraction well improvements would occur at existing MVWD well locations and would not conflict with an adopted land use plan, policy or regulation. The proposed project is consistent with, and a component of, the Inland Empire Utilities Agency's previously approved Chino Basin OBMP. Therefore, no land uses inconsistencies would occur.

c) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) for the injection and extraction well improvements would occur at existing MVWD well locations and would not conflict with any with adopted conservation plans. The proposed project would not be located within the boundaries of any habitat conservation plans or natural community plans. Therefore, no impacts would occur.

The general impacts to mineral resources of the Chino Basin groundwater management program, of which the proposed project is a part, are discussed in Section 4.4.2.2, on pages 4-49 through 4-51 of the OBMP Program EIR and has been included here.

Impacts Associated with the Groundwater Recharge Feasibility Project

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
X. MINERAL RESOURCES -- Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☑
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☑

a-b) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) for the injection and extraction well improvements would occur at existing MVWD well locations and would not affect any mineral resources that might exist in the project area. The only mineral resources identified within the vicinity of the project are aggregate reserves (sand and gravel). Well drilling and rehabilitation activities would not disturb these resources. Therefore, no impacts would occur.

The general impacts to noise of the Chino Basin groundwater management program, of which the proposed project is a part, are discussed in Section 4.11, on pages 4-378 through 4-392 of the OBMP Program EIR and has been included here.

Impacts Associated with the Groundwater Recharge Feasibility Project

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
XI. NOISE: Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☑	☐	☐
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☑	☐
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☑	☐
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☑	☐	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☑
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☑

a) **Less Than Significant Impact with Mitigation:** According the noise discussions in the municipal codes for the City of Montclair and the City of Ontario, the maximum allowable base ambient exterior noise levels, as shown in Tables 2-1 and 2-2, apply for each of the cities.

Table 2-1

City of Montclair Base Ambient Exterior Noise Levels

	7:00 am – 10:00 pm	10:00 pm – 7:00 am
Residential	55 dB	45 dB
Commercial	65 dB	55 dB
Industrial	70 dB	60 dB

Table 2-2

City of Ontario Base Ambient Exterior Noise Levels

	7:00 am – 10:00 pm	10:00 pm – 7:00 am
Residential (except M-F)	65	45
M-F Residential & Mobile Home Parks	65	50
Commercial	65	60
Light Industrial	70	70
Heavy Industrial	70	70

Within the City of Montclair, construction work is allowed in any land use area, and is not subject to exterior noise level maximums, as long as construction is limited to the hours of 7:00 am through 8:00 pm.

Construction activities associated with Alternatives 2, 3 and 4 would cause a short-term increase in noise due to heavy equipment operations and paving activities. Noise levels at well drilling sites are typically 60 to 65 dB at 200 feet from soundproofing. Noise generated from well drilling and construction would be short-term, and, with the exception of well drilling, project construction would not occur between the hours of 8:00 pm and 7:00 am.

For Alternatives 2, 3 and 4 of the Groundwater Recharge Facilities Program, sensitive receptors would be exposed to noise associated with well drilling and rehabilitation. Well MV-9 is located adjacent to Buena Vista Elementary School and Vernon Middle School, and across the street from single-family residences. Well MV-12 is located across single-family residences at both Benson Avenue and G Street in the City of Ontario.

Base ambient exterior noise level guidelines for the City of Montclair and the City of Ontario are expected to be exceeded at all well sites during well drilling. Though well-drilling would occur 24 hours per day, ground drilling activities would occur primarily during the hours of 7:00 am and 8:00 pm.

Impacts from construction and drilling activities associated with Alternatives 2, 3 and 4 of the proposed Groundwater Recharge Facilities Program were anticipated and accounted for in the OBMP Program EIR. Mitigation measures 4.11-1 through 4.11-8 in the OBMP Program EIR were identified to reduce significant impacts associated with construction noise. For the proposed project, implementation of these measures, in combination with an additional mitigation measure, 4.11-9, would reduce impacts to less than significant levels.

4.11-1 Construction shall be limited to the hours of 7 a.m. to 7 p.m. on Monday through Friday, and between 9 a.m. to 6 p.m. on Saturday, and shall be prohibited on Sundays and federal holidays.

4.11-2 All construction vehicles and fixed or mobile equipment shall be equipped with properly operating and maintained mufflers.

4.11-3 All employees that will be exposed to noise levels greater than 75 dB over an 8-hour period shall be provided with adequate hearing protection devices to ensure no hearing damage will result from construction activities.

4.11-4 If equipment is being used that can cause hearing damage at adjacent noise receptor locations (distance attenuation shall be taken into account), portable noise barriers shall be installed that are demonstrated to be adequate to reduce noise levels at receptor locations below hearing damage thresholds.

4.11-5 All production wells or booster pumps shall have their noise levels attenuated to 50 dBA CNEL at 50 feet from the well head.

4.11-6 Project design will include measures which assure adequate interior noise levels as required by Title 25 (California Noise Insulation Standards).

4.11-7 Require that all parking for desalter uses adjacent to residential areas be enclosed within a structure or separated by a solid wall with quality landscaping as a visual buffer.

4.11-8 Desalters shall be constructed and operated so that noise levels from operations do not exceed 50 dB during night hours and 65 dB averaged over the 12 hours of day time when located adjacent to existing or future sensitive land uses. This can be achieved by siting desalters a sufficient distance from sensitive noise receptors; by incorporating attenuation features in the facility or designing attenuation features at the boundary of the property.

4.11-9 Sound blankets shall be used at all of the well sites during well drilling to decrease noise levels.

b) **Less Than Significant Impact:** Construction and operations associated with drilling new and/or rehabilitating existing wells under Alternatives 2, 3 and 4 are not anticipated to generate excessive groundborne vibration or groundborne noise.

c) **Less Than Significant Impact:** During well drilling/rehabilitation activities, a short-term noise increase is anticipated. However, normal use/operation of Wells MV-1, MV-9 and MV-12 under Alternatives 2, 3 and 4 are not anticipated to result in a substantial permanent increase in ambient noise levels. Well MV-4 is already in use and no new noise impacts will result if this well is reequipped for groundwater injection and extraction purposes.

d) **Less Than Significant Impact with Mitigation:** Construction and drilling activities for the proposed Groundwater Recharge Facilities Program are anticipated to generate substantial temporary increases in ambient noise levels. Well drilling under Alternatives 2, 3 and 4 would occur 24 hours per day over a 30-day period at each site. These impacts were considered in the OBMP Program EIR, and implementation of mitigation measures 4.11-1 through 4.11-9 above would reduce impacts to less than significant levels.

e-f) **No Impact:** The well improvements proposed for Alternatives 2, 3 and 4 would not be located within a two-mile radius of a public use or private airport or within an airport land use plan area.

The general impacts to population and housing of the Chino Basin groundwater management program, of which the proposed project is a part, are discussed in Section 4.3, on pages 4-33 through 4-41 of the OBMP Program EIR and is included here.

Impacts Associated with the Groundwater Recharge Feasibility Project

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
XII. POPULATION AND HOUSING -- Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☑	☐
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☑
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☑

a) **Less Than Significant Impact:** Implementation of the Groundwater Recharge Facilities Program is not anticipated to directly or indirectly induce growth in the City of Chino Hills and the City of Montclair. Instead, this groundwater injection and extraction program is intended to account for the forecast population growth as discussed in the OBMP Program EIR and more closely balance groundwater recharge and injection with extraction activities in the long-term. Therefore, less than significant impacts would occur.

b) **No Impact:** Installation and operation of the proposed groundwater injection and extraction wells for any of the five alternatives would not displace any housing and would not require the construction of replacement housing. Therefore, no impacts would occur.

c) **No Impact:** Installation and operation of the proposed injection and extraction wells for any of the five alternatives would not displace any people and would not require the construction of replacement housing. Therefore, no impacts would occur.

The general impacts to public services of the Chino Basin groundwater management program, of which the proposed project is a part, are discussed in Section 4.12, on pages 4-406 through 4-409 and in Section 4.2, on page 4-18 of the OBMP Program EIR, and is included here.

Impacts Associated with the Groundwater Recharge Feasibility Project

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
XIII. PUBLIC SERVICES				
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?	☐	☐	☐	☑
Police protection?	☐	☐	☐	☑
Schools?	☐	☐	☐	☑
Parks?	☐	☐	☐	☑
Other public facilities?	☐	☐	☐	☑

a) **No Impact:** Implementation of the Groundwater Recharge Facilities Program would occur at existing MVWD well locations and would not require any additional fire protection, police protection, increased school demand, or increased park demand than what is currently generated by the well locations; therefore, no impacts would occur.

The general impacts to recreation of the Chino Basin groundwater management program, of which the proposed project is a part, are discussed in Section 4.2, on page 4-18 of the OBMP Program EIR, and is included here.

Impacts Associated with the Groundwater Recharge Feasibility Project

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
XIV. RECREATION –				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☑
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☑

a) **No Impact:** Implementation of any of the three build alternatives (Alternatives 2, 3 and 4) for the injection and extraction well improvements would occur at existing MVWD well locations and would not increase the need for, or use of, neighborhood or regional park lands. Therefore, no impacts would occur.

b) **No Impact:** Implementation of the Groundwater Recharge Facilities Program would occur at existing MVWD well locations and would not include any recreational components; therefore, no impacts would occur.

The general impacts to transportation and traffic of the Chino Basin groundwater management program, of which the proposed project is a part, are discussed in Section 4.7, on pages 4-296 through 4-307 of the OBMP Program EIR, and included here.

Impacts Associated with the Groundwater Recharge Feasibility Project

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
XV. TRANSPORTATION/TRAFFIC -- Would the project:				
a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?	☐	☐	☑	☐
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?	☐	☐	☑	☐
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☑
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☑
e) Result in inadequate emergency access?	☐	☐	☐	☑
f) Result in inadequate parking capacity?	☐	☐	☐	☑
g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	☐	☐	☐	☑

a) **Less Than Significant Impact:** Construction of the proposed injection and extraction wells would result in increased traffic and employee vehicle trips during the short construction period. Operation of the injection and extraction wells would not result in significant increases in traffic. One vehicle trip per day would be required for maintenance activities at each operational well site. Therefore, less than significant impacts would occur.

b) **Less Than Significant Impact:** Construction of the proposed injection and extraction well improvements under Alternatives 2, 3 and 4 would result in a temporary increase in construction truck traffic and employee vehicle trips on roadways during well drilling and rehabilitation activities. However, well sites are not located in areas, or at intersections, that are subject to roadway congestion within the City of Montclair and the City of Ontario. During operation of the injection and extraction wells, the only vehicle traffic that would result from the project would be one maintenance vehicle on the roadway to provide daily service/maintenance at each well site.

c) **No Impact:** The proposed injection and extraction wells would be at or below the ground surface and would not result in an increase of air traffic; therefore, no impacts would occur.

d) **No Impact:** The proposed injection and extraction wells would not affect roads or design features for roadways. Therefore, no increases in hazards would occur as a result of the project.

e) **No Impact:** The proposed injection and extraction wells would be located on sites already owned by MVWD and in urbanized areas. Rehabilitating existing wells and/or drilling new wells would not affect emergency access in any way since improvements would occur off of roadways and emergency access pathways. Therefore, no impacts would occur.

f) **No Impact:** The proposed injection and extraction wells would not displace any parking and would not generate an increased demand in parking; therefore, no parking capacity issues would occur as a result of the proposed project.

g) **No Impact:** The proposed injection and extraction wells would not conflict with, or affect, any adopted policies, plans, or programs supporting alternative transportation. Therefore, no impacts would occur.

The general impacts to utilities and service systems of the Chino Basin groundwater management program, of which the proposed project is a part, are discussed in Section 4.5, on pages 4-87 through 4-166 of the OBMP Program EIR, and is included here.

Impacts Associated with the Groundwater Recharge Feasibility Project

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
XVI.UTILITIES AND SERVICE SYSTEMS -- Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☑
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☑
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☑
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☑	☐
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the projects projected demand in addition to the providers existing commitments?	☐	☐	☐	☑
f) Be served by a landfill with sufficient permitted capacity to accommodate the projects solid waste disposal needs?	☐	☐	☑	☐
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☑	☐

a) **No Impact:** For each of the build alternatives (Alternatives 2, 3 and 4), the four new and/or rehabilitated wells would be utilized for groundwater injection and extraction and would not generate any wastewater through construction and/or operation; therefore, no wastewater treatment requirements would be exceeded.

b) **No Impact:** For each of the build alternatives (Alternatives 2, 3 and 4), the four new and/or rehabilitated wells would be utilized for groundwater injection and extraction and would not generate the need for additional water or wastewater treatment facilities. Therefore, no impacts would occur.

c) **No Impact:** For each of the build alternatives (Alternatives 2, 3 and 4), the four new and/or rehabilitated wells would not generate additional storm water runoff; therefore no additional storm water facilities would be required and no impacts would occur.

d) **Less Than Significant Impact:** For each of the build alternatives (Alternatives 2, 3 and 4), the water injection phase of each injection/extraction cycle is dependent upon water provided to MVWD by the MWD. Based upon the amount of water provided by MWD for each injection phase, the accompanying amount of water extracted from the ground during the extraction phase would be adjusted and remain balanced, within reason. Consistent with the goal of the project, to avoid over drafting the available supply of groundwater, each injection/extraction cycle would remain relatively balanced. Therefore, less than significant impacts would occur.

e) **No Impact:** For each of the build alternatives (Alternatives 2, 3 and 4), the four new and/or rehabilitated wells would not generate any wastewater through construction and/or operation; therefore, no impacts to wastewater capacity would occur.

f-g) **Less Than Significant Impact**: Drilling and rehabilitating the proposed injection and extraction wells would generate small amounts of solid wastes. This solid waste would be disposed of in accordance with Federal, State and local solid waste regulations. Therefore, less than significant impacts would occur.

Impacts Associated with the Groundwater Recharge Feasibility Project

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
XVII. MANDATORY FINDINGS OF SIGNIFICANCE –				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☐	☑
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulativelyconsiderable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☐	☑
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☑	☐	☐

a) **No Impact:** For any of the three build alternatives (Alternatives 2, 3 and 4), injection and extraction well improvements would occur at existing MVWD well locations and would not have the potential to degrade the quality of the environment, reduce the habitat or population of fish or wildlife species, eliminate or threaten to eliminate a plant or animal community, reduce the number or restrict the range of rare or endangered plants or animals, or eliminate important examples of California history or pre-history.

b) **No Impact:** For any of the three build alternatives (Alternatives 2, 3 and 4), injection and extraction well improvements would occur at existing MVWD well locations and would not result in impacts that are considered cumulatively considerable. All impacts associated with the project alternatives are localized and short term.

c) **Less Than Significant Impact with Mitigation Incorporation:** For any of the three build alternatives (Alternatives 2, 3 and 4), injection and extraction well improvements would occur at existing MVWD well locations and would not result in significant adverse effects on human beings, either directly or indirectly. Any impacts to humans, specifically related to construction noise, are short-term and localized, and can be reduce to less than significant levels through mitigation.

Section 3
List of Acronyms

CEQA	California Environmental Quality Act
EIR	Environmental Impact Report
IEUA	Inland Empire Utilities Agency
MVWD	Monte Vista Water District
MWD	Metropolitan Water District
MWDSC	Metropolitan Water District of Southern California
OBMP	Optimum Basin Management Program
RWQCB	Regional Water Quality Control Board

Section 4
List of Documents and Individuals Consulted

Carol Fraizer-Burton, Planner, City of Montclair; 4 March 2003.

City of Montclair, General Plan, Chapter 4.

EDR Site Report, Monte Vista Water District, 10575 Central Avenue; 27 January 2003

EDR Site Report, Monte Vista Water District, Benson Avenue/G Street; 27 January 2003

EDR Site Report, Well MV-9, 5617 San Bernardino Street; 27 January 2003

EDR Site Report, Monte Vista Water District MV-4, 5501 Arrow Highway; 27 January 2003

Inland Empire Utilities Agency; Findings of Consistency of the Chino Groundwater Basin Dry-Year Yield Program, December 2002.

Inland Empire Utilities Agency; Final Program Environmental Impact Report for the Optimum Basin Management Program, July 2000.

Luis Batres, Planner, City of Ontario; 30 January 2003

Monte Vista Water District; Groundwater Recharge Facilities Program Feasibility Study, April 2003.

Ontario Engineering Department, 6 February 2003

Tiffany Williams, Planner, City of Ontario, 30 January 2003

Appendix A
Groundwater Modeling

A.1 Introduction and Model Objectives

An analysis was conducted that included groundwater modeling to assess the relative impacts of the recharge management alternatives on existing groundwater flow and water quality conditions in the westerly portion of the Chino Basin. These management alternatives include recharge operations using combinations of existing wells, new replacement wells, and use of existing spreading basins to increase recharge in Management Zone 1. Specific modeling objectives include the following:

- Assessment of water level, gradient and flow direction changes resulting from implementation of alternatives, relative to the groundwater conditions and assumptions made as part of the OBMP evaluation.
- Assessment of the impact on nitrate-nitrogen (nitrate) concentrations in groundwater and in the extracted water resulting from the alternatives, relative to the OBMP modeling.

To accomplish these objectives, CDM obtained and modified a previously developed model from the Chino Basin Watermaster that was used to support the development of the OBMP. The model used was a modified version of the OBMP model. The OBMP model was used to address water quantity issues as part of the programmatic EIR. The modifications made to the OBMP original model to fulfill the objectives of this study included:

- Reduction of the modeling area to represent the specific area of interest a segment of the westerly portion of the Chino Basin that includes the area in and around the MVWD service area and the Montclair and College Heights spreading grounds to the north (See Figure A-1).
- Modification of the model from a steady-state to a transient mode to allow evaluation of non-equilibrium conditions over time.
- Addition of new MVWD wells.
- Implementation of seasonal flow changes for MVWD facilities.
- Addition of solute transport capabilities to allow evaluation of nitrate-nitrogen (nitrate) concentrations in the aquifer.

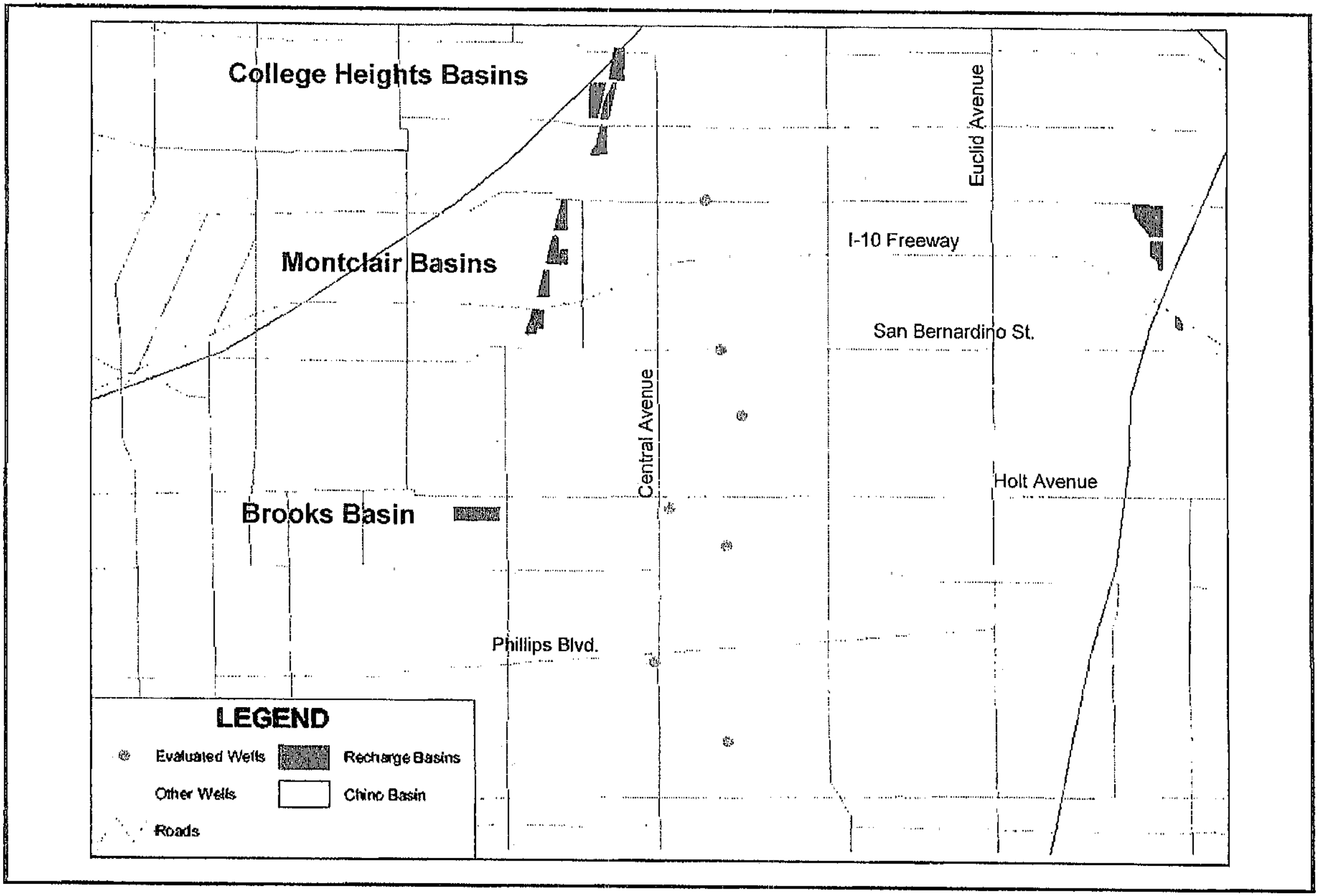

Figure A-1
Modeled Area

A.2 Development of Conceptual Model

The conceptual model for the OBMP Chino Basin groundwater flow model developed by Wildermuth Environmental Inc. (WEI) is summarized in the Draft Initial State of the Basin Report (WEI 2002). A full description of the conceptual model for the basin is provided in that report and is not included here. Geologically, the Chino Basin consists of a faulted valley filled with unconsolidated alluvial sediments. In the area of interest, the aquifer thickens from approximately 300 feet in the north to approximately 700 feet in the south. In the area of interest, groundwater flows in a generally south-southwesterly direction. Natural groundwater recharge in Management Zone 1 occurs along the mountain fronts and stream channels where water flows into this portion of the basin. A significant amount of recharge also occurs throughout this management zone due to precipitation and at spreading basins such as the Montclair and College Heights basins. Water discharges from the Chino Basin flow to streams, wells, and evapo-transpiration by vegetation along the Santa Ana River and other streams in the basin.

The Chino Basin's water supply systems are subject to significant seasonal variations in supply and demand. This seasonal variation has been conceptualized in the OBMP as a yearly cycle of supply and demand based on a seven-month winter season of October through April and a five-month summer season of May through September. The winter season is characterized by a lower demand and higher supply; the time of year when groundwater extraction will typically be lower and more abundant water supplies will make artificial recharge more practical. The summer season is characterized by higher demand and less abundant supplies resulting in limited availability of water for recharge and higher groundwater extraction rates.

Project alternatives evaluated the use of existing or new wells at the locations of MVWD wells No. 1, 4, 9, and 12 and increased spreading at the Montclair and College Heights basins. The impacts of the alternatives on MVWD ASR wells and the City of Chino wells CC-5, CC-10, and CC-14 were estimated for each of the alternatives. The City of Chino wells are located immediately downstream of the MVWD wells. Figure A-2 presents a summary of extractions by MVWD and surface water spreading in Management Zone 1 based on the different alternatives as well as the OBMP assumed conditions. In this section of the report, MVWD wells currently identified by the prefix "W" will be referred to as "MV" to distinguish among wells operated by other entities such as the City of Chino (CC). For example, MVWD well W-4 is referred as well MV-4.

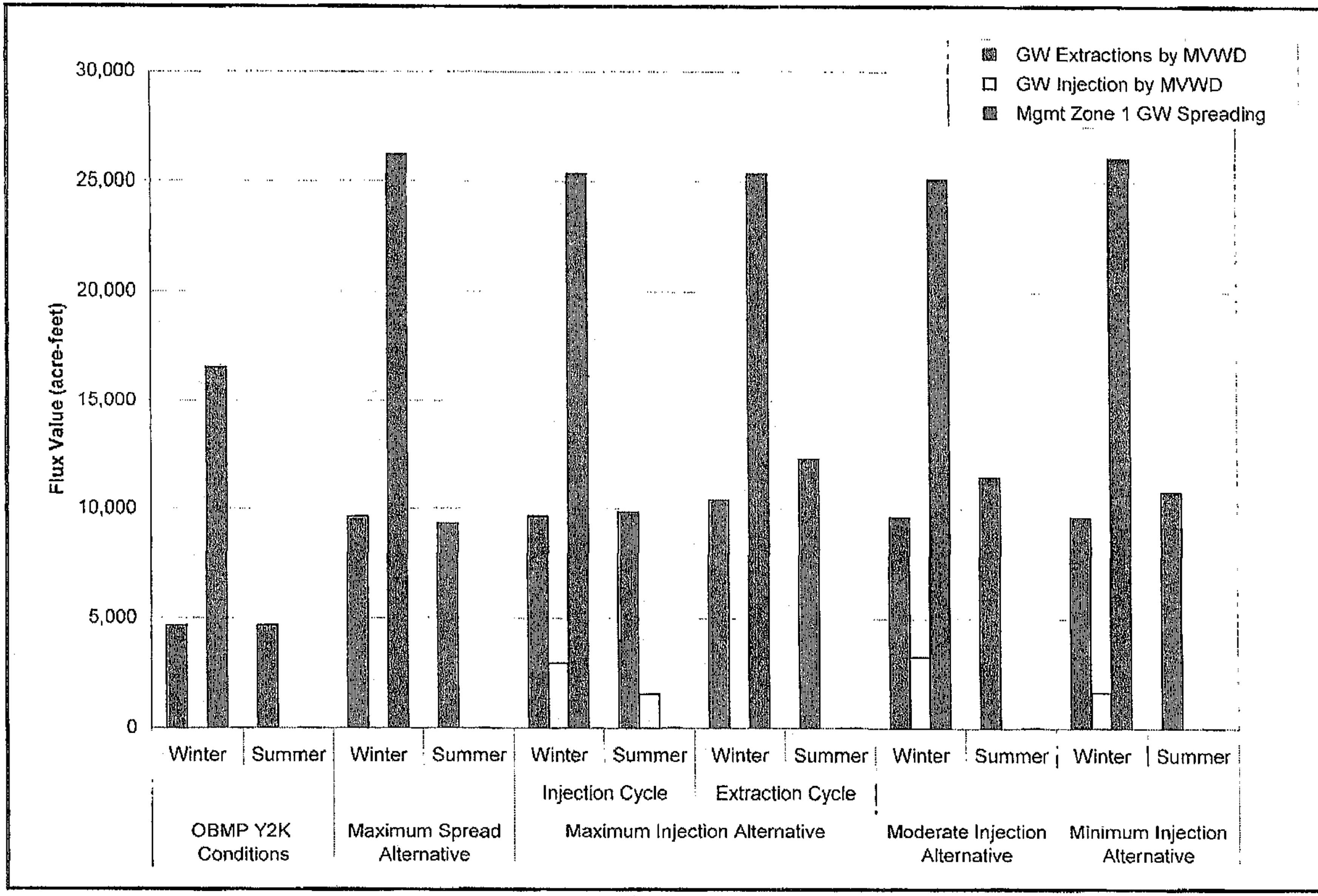

Figure A-2
Total Seasonal Extraction, Injection and Recharge Summary

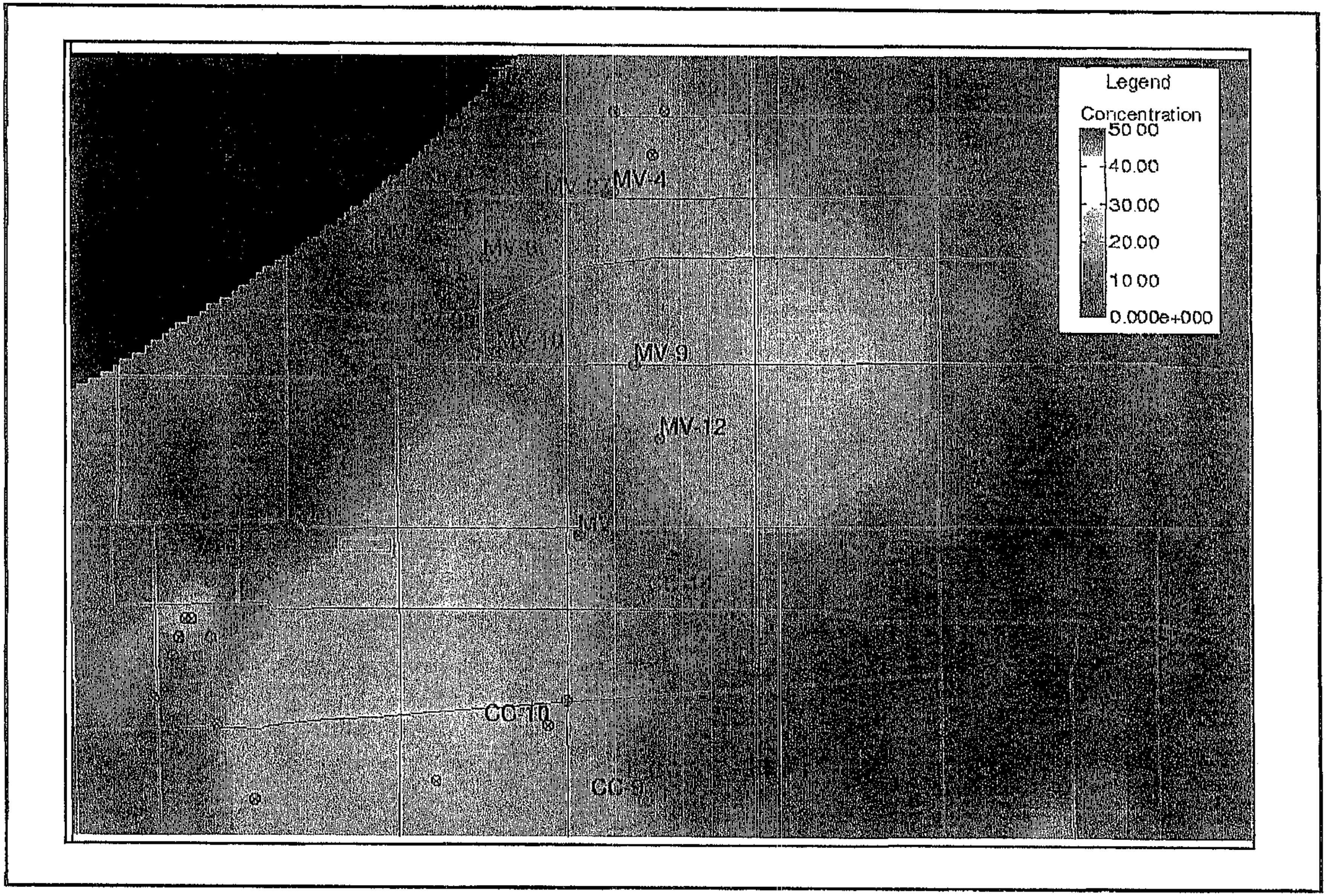

Figure A-3
Nitrate (as N) Initial Concentration Distribution Map

The groundwater nitrate concentrations in the Chino Basin present challenges to drinking water suppliers. According to the Draft Initial State of the Basin Report, in the post-1998 period, of 610 groundwater samples collected in the Chino Basin 509 contained concentrations of nitrate in excess of the US EPA drinking water standard of 45 mg/l as NO_3 or 10 mg/l as nitrate-N (WEI 2002). Figure A-3 presents the initial concentrations of nitrate-N distribution used for development of the solute transport model. Nitrate-N concentrations in groundwater in the vicinity of the MVWD artificial recharge program ranges from approximately 3 mg/l in the northern part of the study area, near Base Line Road to greater than 25 mg/l in the vicinity of Mission Boulevard and Central Avenue and in areas to the southeast. The data presented were received from the Chino Basin Watermaster and interpolated onto a grid for use in the modeling analysis. For modeling purposes, the nitrate distribution was static, with no additional nitrate loading added to the system such as potential loading from the overlying vadose zone, except for that contained in imported water used for spreading and injection. Based on analyses of MVWD deliveries from the WFA treatment plant, a 0.75 mg/L nitrate as N (3.3 mg/L as NO_3) concentration was used for all recharge water. This was considered an acceptable approach since it is constant for all alternatives and the modeling results are not absolute but relative to OBMP conditions.

A.3 Model Selection

A finite difference groundwater flow model of the Chino Basin was developed and calibrated by WEI for the Chino Basin Watermaster. The OBMP model was configured using the USGS MODFLOW software package (McDonald & Harbaugh, 1988) as implemented in the Groundwater Vistas (version 3) graphical user interface (ESI,2001). The OBMP model provides a steady-state solution from the calibrated groundwater flow model and uses the most current pumping and recharge fluxes available. The well pumping and recharge fluxes provided by Watermaster were specified as the "Year 2000 pumping Chino Desalter 1, 50 percent recharge" scenario; in this report, this scenario is known as the Y2K scenario.

The OBMP model was calibrated by WEI to the Y2K conditions using yearly average recharge and pumping rates. Recharge in the model is simulated using both the Recharge and Stream packages. No constant head boundaries are used in the model. All discharges from the OBMP model are simulated via wells or as stream discharges.

No reports describing the OBMP model or the Y2K scenario were available from the Watermaster. The model has been used for groundwater management in the Chino Basin and has been adopted for the evaluation of alternatives presented in this study. The two-dimensional OBMP model simulates the basin as a single unconfined aquifer using a single layer. The OBMP model addresses steady-state groundwater flow only and does not simulate chemical transport. This model is described in greater detail under Section A.4 of this report.

The OBMP model was supplemented to allow simulation of nitrate transport for evaluating relative impacts of alternatives on the distribution of nitrate in the aquifer.

The solute transport code MT3DMS (Zheng, 1999), as issued by the US Army Corps of Engineers, was used for chemical transport analysis. The basic flow model configuration was incorporated into MT3DMS, with retention of the same grid design and boundary conditions.

A.4 Numerical Implementation of Conceptual Model

The OBMP numerical groundwater flow model developed by WEI simulates the Chino Basin as a single-layer system with no-flow boundaries surrounding the model domain and at the bottom of the system. The model consists of a uniform finite difference grid with 537 rows and 663 columns. These square cells have a uniform dimension of about 197 feet (60 meters) on each side. In the model 157,834 of the cells are active, giving the model a relatively large number of grid elements. Hydraulic conductivity in the study area ranges from about 10^{-4} to 10^{-3} feet per second, as depicted in Figure A-4, and is considered constant through the aquifer thickness.

Inflow of water to the model is simulated with the Stream and Recharge packages. The Stream package is a module that simulates streams flowing through the Chino Basin with water either discharging from the aquifer to the stream or vice-versa, depending on the difference in water level between the stream and the aquifer. The Recharge package is a module that simulates the addition of areal recharge to the water table, either from precipitation, return flows from irrigation or from recharge basins. Outflows from the model were simulated by WEI using the Stream and Well packages. The model units for length and time are feet and seconds respectively.

No modifications were made to the aquifer properties, grid dimensions, or to the Stream package in the basin model.

Prior to assessment of alternatives, the following modifications to the OBMP groundwater flow model were implemented:

- Inclusion of aerial recharge at the simulated recharge basins
- Addition of simulated recharge wells operated by the MVWD
- Addition of MVWD wells constructed since the Y2K scenario fluxes were compiled
- Addition of the College Heights No. 1 recharge basin
- Implementation of transient flow conditions
- Assignment of a specific yield estimate for the aquifer materials
- Implementation of the solute transport model MT3DMS and simulated nitrate concentration field

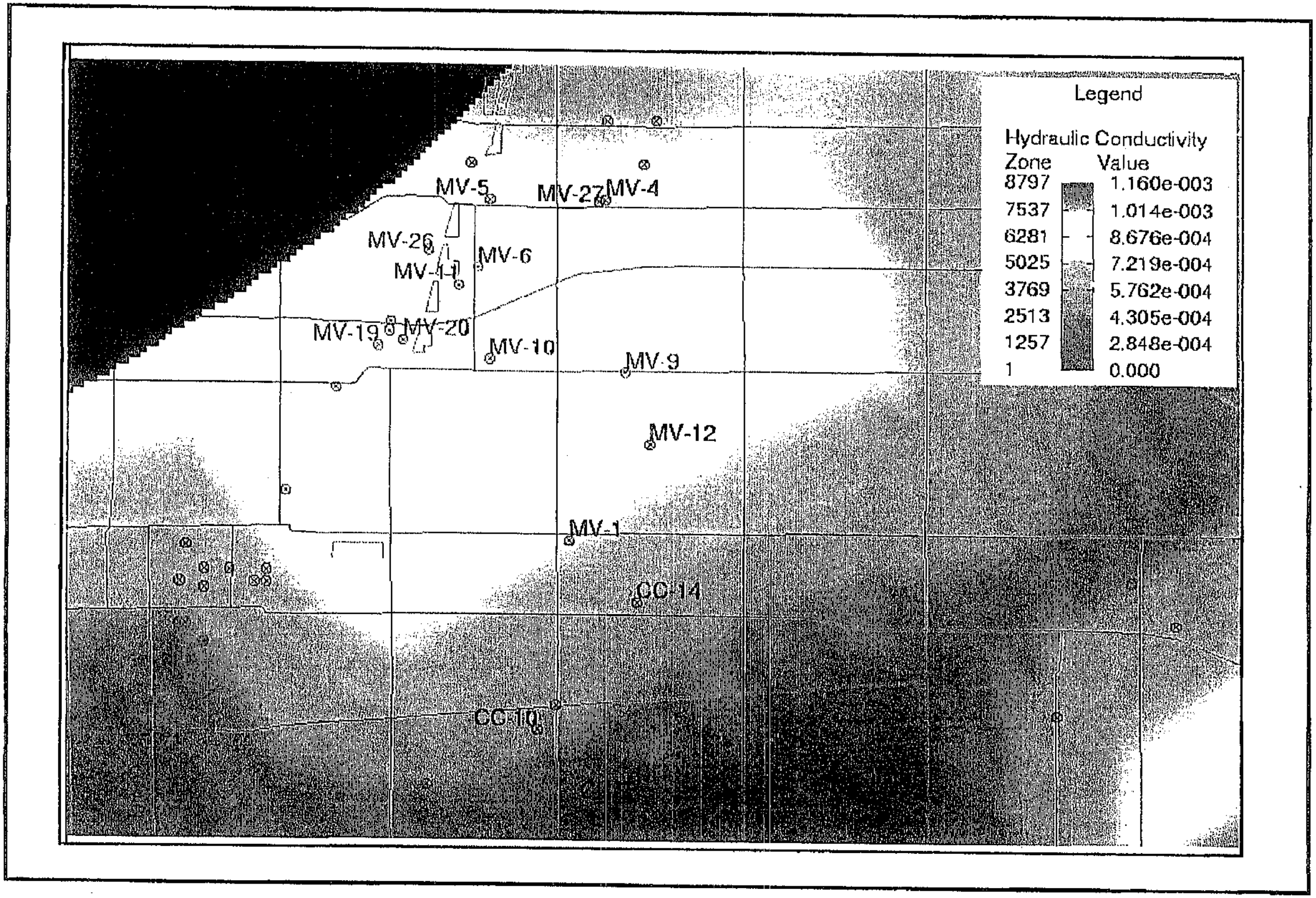

Figure A-4
Hydraulic Conductivity Distribution in Modeled Area

The transient simulation consists of a 20-year period with each year divided into winter and summer seasons based on a seven-month winter season of October through April and a five-month summer season of May through September. The winter and summer stress periods were further discretized into 10 and 7 time steps (approximately three weeks), respectively.

Implementation of the transient simulation scheme required the assignment of a value for specific yield, which is the amount of water produced from a unit volume of aquifer resulting from a unit change in head. A value of 0.13 was applied across the entire model. This value represents an average of the values present in the area of interest that were provided by WEI. It should be noted that the specific yield values were derived from the upper part of the aquifer's zone of saturation and may be significantly different throughout the aquifer's thickness. Limitations resulting from this assumption are discussed below.

After implementation of a transient simulation scheme, the model was run for a simulated period of twenty years using the same aquifer stresses as the OBMP Y2K model, after which the results were compared with the original steady-state OBMP Y2K model's solution. The results of the transient run and the original OBMP Y2K model were in agreement indicating that the transient version of the OBMP Y2K model represents the same set of aquifer stresses as the original OBMP Y2K model.

Following the comparison of the transient and original steady-state simulations, a seasonal component was applied to the simulated recharge basins in Management Zone 1 and extraction wells operated by the District to simulate seasonal variations in these aquifer stresses. High groundwater extraction rates and low recharge rates were simulated in the summer when stormwater runoff and imported water are scarce and demand is high. All other fluxes representing pumping by other agencies in the area were simulated as constant rates.

A monthly schedule of anticipated extraction and injection rates at all MVWD wells for the alternative was provided by the District. These values were divided into winter and summer seasonal totals. The pumping or injection rates were summed seasonally. For each alternative evaluated, a flux term was assigned for each of the 40 stress periods for each of the MVWD wells. Table A-1 presents a summary of groundwater extraction and injection rates.

Table A-1

Groundwater Injection and Extraction Summary (ac-ft per year)

Location	OBMP Conditions	Maximum Spreading Alternative		Maximum Injection Alternative				Moderate Injection Alternative		Minimum Injection Alternative	
				Injection		Extraction					
	Total	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
Seasonal Extraction	9,319	9,649	9,337	9,649	9,878	10,430	12,332	9,649	11,502	9,649	10,823
Annual Extraction	9,319	18,986		19,527		22,762		21,152		20,472	
Seasonal Injection	0	0	0	2,946	1,552	0	0	3,272	0	1,640	0
Annual Injection	0	0		4,498		0		3,272		1,640	

Recharge at spreading basins was simulated by increasing the recharge rate specified in the model for those cells overlying the location of the simulated basin. Recharge of imported water was simulated during the winter months (October through April). Table A-2 presents a summary of groundwater recharge rates at the various recharge basins.

Table A-2

Groundwater Recharge Summary (ac-ft per year)

Spreading Basin	OBMP Conditions	Maximum Spreading Alternative	Maximum Injection Alternative		Moderate Injection Alternative	Minimum Injection Alternative
			Injection Cycle	Extraction Cycle		
Montclair 1	3,121	4,076	3,991	3,991	3,967	4,061
Montclair 2	5,134	6,706	6,565	6,565	6,526	6,681
Montclair 3	2,745	3,585	3,510	3,510	3,489	3,571
Montclair 4	4,793	6,260	6,129	6,129	6,092	6,237
College Heights 1	6	2,422	2,202	2,202	2,146	2,384
College Heights 2	777	3,194	2,974	2,974	2,917	3,155
Annual Recharge	16,575	26,243	25,370	25,370	25,136	26,089

In the assignment of recharge fluxes, the geometry of the College Heights spreading basins in the Y2K OBMP model was observed to differ significantly from the mapped spreading basins. Corrections to the simulated location of the College Heights spreading basins were made in the OBMP model to more closely correspond to their actual location and size. The simulated area for the College Heights spreading basins (1 and 2) appeared to be a single elongate zone larger than any of the spreading basins. A second simulated spreading basin was configured in the revised model to represent the more northerly College Heights No. 1 basin. The flux of the larger recharge zone representing the College Heights spreading basins was originally 773 ac-ft per year in the OBMP Y2K model. For all alternatives, the increased quantities of water added to the College Heights spreading basins was divided evenly between and the No. 1 and 2 basins. No changes were made to the configuration of the Montclair spreading basins. MVWD wells that have been constructed in recent years

(MV-26, 27 and 28) were not present in the OBMP Y2K model were added to the revised model.

The solute transport model MT3DMS was used to simulate the effects of the various alternatives on relative nitrate concentrations and movement within the aquifer. This solute transport model uses the groundwater flow results from MODFLOW and simulates the transport of dissolved species in the aquifer. The initial conditions used to simulate nitrate were provided by Watermaster and an interpolated grid was developed. The grid of nitrate data values was then loaded to MT3DMS. This interpolation assumed that data were representative of average concentrations in the entire thickness of the aquifer. No continuing sources of nitrate were incorporated in the model. All nitrate impact analyses used this nitrate distribution as the initial condition. Limitations resulting from these assumptions are discussed below. Figure A-3 presents a contour map showing the initial distribution of nitrate used for evaluation of the alternatives.

Based on water quality data provided by the District for imported water, the nitrate (NO3) concentration of recharged water in the model was set to 3.3 mg/L or 0.75 mg/L as Nitrogen. This value was assigned to all simulated water recharged at the recharge basins and at the four injection wells. This value remained constant throughout the entire 20-year simulated period.

A.5 Groundwater Simulation of Alternatives

Four alternatives were evaluated using the revised basin model. Figure A-2 summarized the overall recharge and extraction flows used in each alternative. In addition to the four alternatives evaluated, the revised model was run to simulate OBMP conditions which were used as a basis for comparison. Comparison of results between the different alternatives with the OBMP conditions are presented in Appendix B. The OBMP conditions and the four alternatives evaluated are discussed below.

A.5.1 OBMP Conditions

The OBMP conditions simulation provides the baseline against which all four alternatives were evaluated. To be consistent with the OBMP Y2K model, this simulation uses the same well pumping rates for the MVWD wells and the same recharge basin fluxes (See tables 4-1 and 4-2) at the Montclair and College Heights spreading basins. In this simulation, groundwater pumping by the District wells represented an annual aggregate of 9,319 ac-ft per year. The alternative was implemented by leaving all simulated MVWD wells pumping at a yearly aggregate of 9,319 ac-ft per year and setting the Montclair and College Heights spreading basin fluxes to simulate recharge of 16,575 ac-ft during the winter season. This recharge is simulated as having 15,793 ac-ft recharged between the four Montclair spreading basins and 782 ac-ft recharged at the two College Heights spreading basins. In this simulation, there is no groundwater injection at any of the District wells. Of the four wells considered for ASR purposes, only MV-4 was modeled as an active well; this well has been used by the District since it was rehabilitated in the late 1990's.

A.5.2 The "Maximum Spreading" Alternative

This alternative represents the current plan under which imported water would be recharged in Management Zone 1 in the absence of a well injection and extraction program. Under this alternative, modeled groundwater extractions were increased, relative to OBMP conditions, by 9,667 ac-ft to a total of 18,986 ac-ft per year. The increased in production resulted in the same increase in surface water recharge, relative to OBMP conditions, to a total to 26,242 ac-ft per year. In this alternative, groundwater extractions and imported water recharge follow a seasonal schedule with recharge occurring in winter and the majority of extractions in summer. There is not deep well injection recharge considered in this alternative.

A.5.3 The "Maximum Injection" Alternative

This alternative considers the construction of two new ASR wells (MV-9 and MV-12), the rehabilitation of MV-1 by installing a liner casing, and the refurbishment of MV-4 to become an ASR well. This alternative simulates a five-year cycle composed of three consecutive years of injection followed by two years of extractions. During the injection cycle, it was assumed that treated imported water would be available for injection over the entire year. The two new ASR wells would operate continuously over the three initial years while the refurbished wells would inject during the winter only reverting to the extraction mode during the summer. During the two drought years, groundwater production would be increased to make up for reduced imported water deliveries by operating all four ASR wells in the extraction mode only. This second period is known as the extraction cycle.

In the three-year modeled injection cycle, 4,499 ac-ft per year would be injected into the aquifer through the four ASR wells representing a total of 13,497 ac-ft of imported water injected. Groundwater extractions during this period would be increased relative to the OBMP conditions by 10,208 ac-ft per year to a total of 19,527 ac-ft per year.

During the two-year extraction cycle the four ASR wells would operate as extraction wells only. Modeled groundwater extractions were increased to reflect the reduced availability of treated imported water to meet summer demands. Relative to the OBMP conditions, modeled groundwater extractions were increased by 13,443 ac-ft per year to a total of 22,762 ac-ft per year.

During the five-year cycle, spreading of imported water would be reduced from maximum spreading over the five-year period at 25,370 ac-ft per year to reflect the basin recharge that took place through direct injection. This level of modeled recharge represents an increase of 8,794 ac-ft per year over the OBMP conditions.

A.5.4 The "Moderate Injection" Alternative

Similar to the Maximum Injection alternative, this alternative considers the construction of two new ASR wells (MV-9 and MV-12), the rehabilitation of MV-1 by installing a liner casing, and the refurbishment of MV-4 to become an ASR well. Under this alternative, MV-4, MV-9 and MV-12 would operate in the injection mode during the winter months reverting to the extraction mode during the summer. Well MV-1 would operate on the injection mode during the winter but it would be shut down during the summer. This mode of injection/extraction operation was maintained constant over the 20-year evaluation. In the model, a total of 3,272 ac-ft of treated imported water were injected on an annual basis over the study period.

Groundwater extractions in the model were increased, relative to the OBMP conditions, by 11,833 ac-ft per year to a total of 21,152 ac-ft per year. Annual groundwater spreading was increased by 8,561 ac-ft per year to a total of 25,136 ac-ft. The relative increase in groundwater spreading represents the difference between increased extractions (11,833 ac-ft per year) and groundwater recharge via injection (3,272 ac-ft per year).

A.5.5 The "Minimum Injection" Alternative

This alternative considers the rehabilitation of three MVWD wells (MV-1, MV-9, and MV-12) by installing a liner casing, and the refurbishment of MV-4 to become an ASR well. Injection/extraction operations under this alternative were consistent with the moderate injection alternative. All four ASR wells operated in the injection mode during the winter months reverting to the extraction mode during the summer. This mode of injection/extraction operation was maintained constant in the model over the 20-year evaluation. Under this alternatives, a total of 1,640 ac-ft of treated imported water were modeled as injection on an annual basis over the study period.

Groundwater extractions in the model were increased, relative to the OBMP conditions, by 11,153 ac-ft per year to a total of 20,472 ac-ft per year. An increase in annual groundwater spreading of 9,514 ac-ft per year, over OBMP conditions, to a total of 26,089 ac-ft was simulated. The relative increase in groundwater spreading represents the difference between increased extractions (11,153 ac-ft per year) and groundwater recharge via injection (1,640 ac-ft per year).

A.6 Modeling Assumptions and Limitations

As with any mathematical simulation of a real-world system, certain assumptions and limitations exist due to the inability to practically account for all variables. This is true of the model application used to simulate the MVWD's artificial recharge alternatives.

All modeling was performed using the existing basin model, which represents the basin aquifers as a single hydro stratigraphic layer. This simplification results in the following limitations of the groundwater flow model:

- Confined or semi-confined conditions are not be simulated.
- The model does not allow evaluation of vertical flow within the aquifer.
- The use of surface spreading basins and wells for recharge or extraction assumes that recharge or withdrawl of water is evenly distributed throughout the entire thickness of the aquifer.
- The specific yield value assigned to the model is constant throughout the entire thickness of the aquifer.

The representation of the basin aquifers as a single hydro stratigraphic layer results in the following limitations of the solute fate and transport (MT3DMS) model:

- Within a given model cell the simulation of dissolved species is assumed to be homogenous throughout the entire thickness of the aquifer.
- Stratification of dissolved nitrate cannot be simulated; any nitrate mass loading or removal is distributed evenly throughout the entire aquifer thickness.
- Areal recharge does not provide for simulation of nitrate mass loading in areas other than the spreading basins.

The above model limitations affect both the evaluation of groundwater flow and solute transport for the alternatives evaluated. The exclusion of simulated nitrate loading from basin-wide areal recharge in the model may result in the underestimate of nitrate concentrations in the aquifer. Conceptually, the simulated existing nitrate mass in the aquifer is diluted by the effect of clean water being added to the aquifer. In reality, it is anticipated that nitrate concentrations in unsaturated zone will continue loading nitrate mass to the aquifer well into the future. However, this approach is considered acceptable since it is the same for all alternatives and the results are used for relative comparison between alternatives and the OBMP conditions.

Conversely, there is a significant likelihood that in reality, nitrate concentrations are highest in the uppermost portion of the aquifer and that due to the construction of wells used to collect samples, a bias exists in the representation of the nitrate concentration field. This bias could result in the overestimation of nitrate concentrations throughout the entire saturated thickness of the aquifer. In a practical sense the impact of such a bias may not be significant if vertical flow from the lower aquifer to supply wells is minimal, thus diminishing the relevance of the lower aquifer to the analyses.

The lack of the model's ability to represent aquifer stratification also impacts the evaluation of the movement of water recharged via both injection wells and spreading basins. As the simulated "bubble" of recharged water containing low concentrations of nitrate is distributed throughout the aquifer's entire thickness, the areal extent of the recharged water is understated by the model. In reality, the "clean" recharged water would be more likely to spread laterally in a distinct vertical interval. This is especially true if distinct layers of less permeable materials exist throughout the aquifer's thickness, as shown in aquifer cross section diagrams presented in the Draft Initial State of the Basin Report (WEI 2002).

Like most numerical groundwater flow models, the MODFLOW software does not provide for simulation of flow through the unsaturated zone. As a result, areal recharge is applied instantaneously to the aquifer. This limitation prevents simulation of lag time between the time water is applied to the recharge basins and the time it reaches the aquifer.

The uniform grid spacing of 197 feet does not allow for detailed assessment of drawdown at or very near the simulated wells. The result of this limitation is that simulated heads at wells are the average head over the model cell (an area of 197 ft by 197 ft square). This is not anticipated to affect evaluation of heads at pumping wells. If a well in a thick aquifer pumping at a given rate results in a given drawdown, a regional lowering of the head in the aquifer by a few feet would not result in the well's drawdown being significantly increased.

The OBMP model was developed as a basin-wide model and does not provide a detailed representation of the hydrogeology in the vicinity of the MVWD wells. The result of this limitation is that the model's representation of the localized stratigraphy, aquifer stresses, and boundary conditions are not defined in great detail.

Due to the uncertainties introduced by the model's limitations, the model should not be considered a predictive tool to quantify the actual concentration of nitrate at a well in the future or to determine exactly how many feet of drawdown will occur under a given pumping or recharge scenario. For this reason, all analysis and interpretation of results is conducted to provide a relative comparison between the alternatives and OBMP conditions.

Appendix B
Evaluation of Alternatives

This section presents the evaluation of the alternatives based on groundwater impacts, project economics, and other factors. In addition, it presents the selection of the preferred alternative.

B.1 Groundwater Impacts

The evaluation of groundwater impacts is based on comparison of water levels and nitrate concentrations differences between the alternatives relative to OBMP conditions. As discussed in Appendix A, the modeling results present relative changes over the 20-year study period and not absolute values at a given well, location, or time. To illustrate the groundwater impacts of the different alternatives, modeling results are presented for key individual wells within the study area being modeled. Modeling results are presented for the four ASR well locations and for four additional wells located downstream of the District wells. These additional wells include the City of Chino wells 10 and 14, the City of Ontario Well 15 (ONT-15) and the Sunkist No. 2 well (SKS-2). The location of these wells is depicted in Figure B-1.

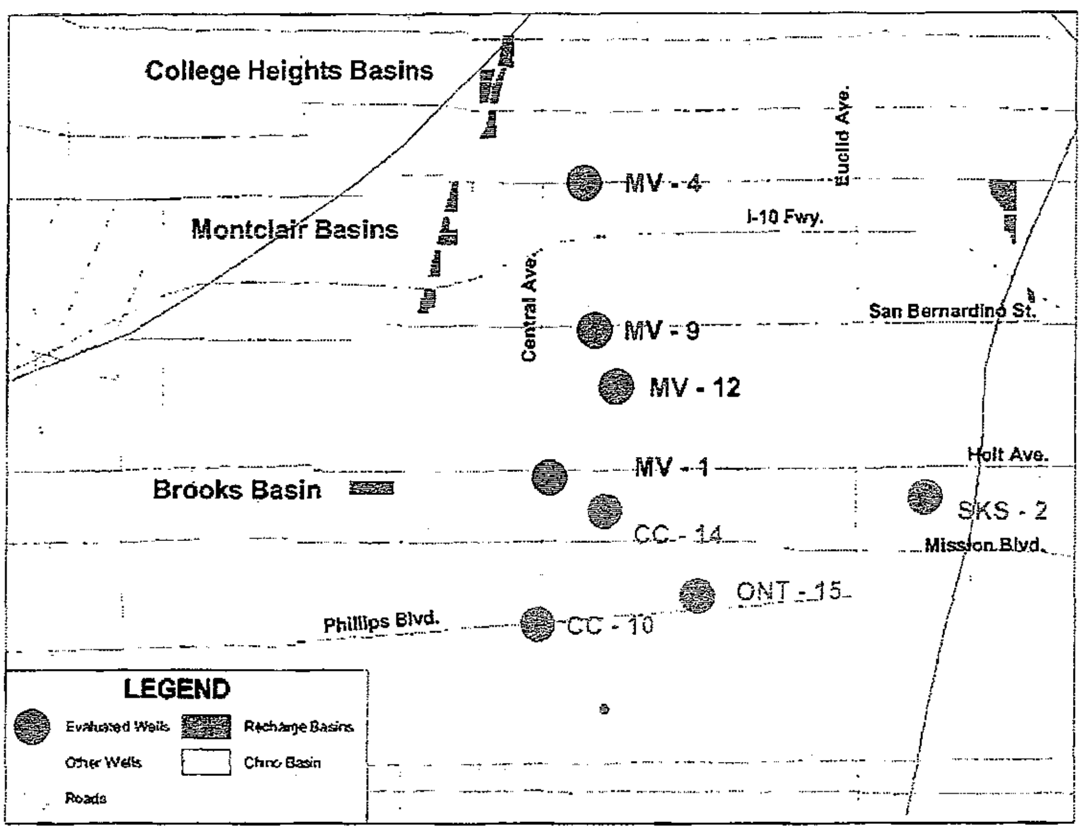

Figure B-1
Location of Wells used to Evaluate Modeling Results

B.1.1 Groundwater Level Impacts

In general, modeling results for all alternatives indicate that water levels in the study area would not significantly change or would slightly increase as a result of injecting treated imported water and bringing additional imported water for basin recharge. Figure B-2 shows the annual water level changes under each alternative, relative to OBMP conditions, for the four ASR wells over the 20-year study period. Annual water levels were used to reflect the weighted average between winters and summer cycles. Four individual graphs, representing the District wells MV-1, MV-4, MV-9, and MV-12, are presented in this figure. The zero line in the individual graphs represents OBMP conditions. Values above the zero line indicate water levels under a given alternative would be higher than those estimated under the OBMP conditions; conversely, values below the line indicate water levels would be lower. The following observations are made from this figure.

- The rapid modeled rise in water levels during the first year is in part related to the significant amount of additional recharge that was added to all alternatives relative to OBMP conditions. This can be observed by the modeled increase in water levels under the Maximum Spreading alternative during that year. In the OBMP model groundwater pumping by MVWD was 9,667 ac-ft lower than actual for the year 2000 (See Figure A-2). To maintain the basin whole, the increase in pumping was matched by an increased in surface water recharge.

- The additional modeled increase in water levels during the first year is related to the mounding created around injection sites as a result of modeled cells being filled with imported water.

- Long-term simulated trends in water level shows that after the initial rise, water levels at the four wells would fall back asymptotically towards equilibrium conditions over the 20-year simulation.

- Long-term water levels under the three injection alternatives are projected to be slightly higher than those projected under OBMP conditions over the 20-year study period.

- Simulated water levels under the Maximum Injection alternative show the projected response to the annual three-year injection cycle followed by the two-year extraction cycle. Simulated changes in annual water levels are much more accentuated at wells MV-9 and MV-12 because of their higher injection and extraction rates.

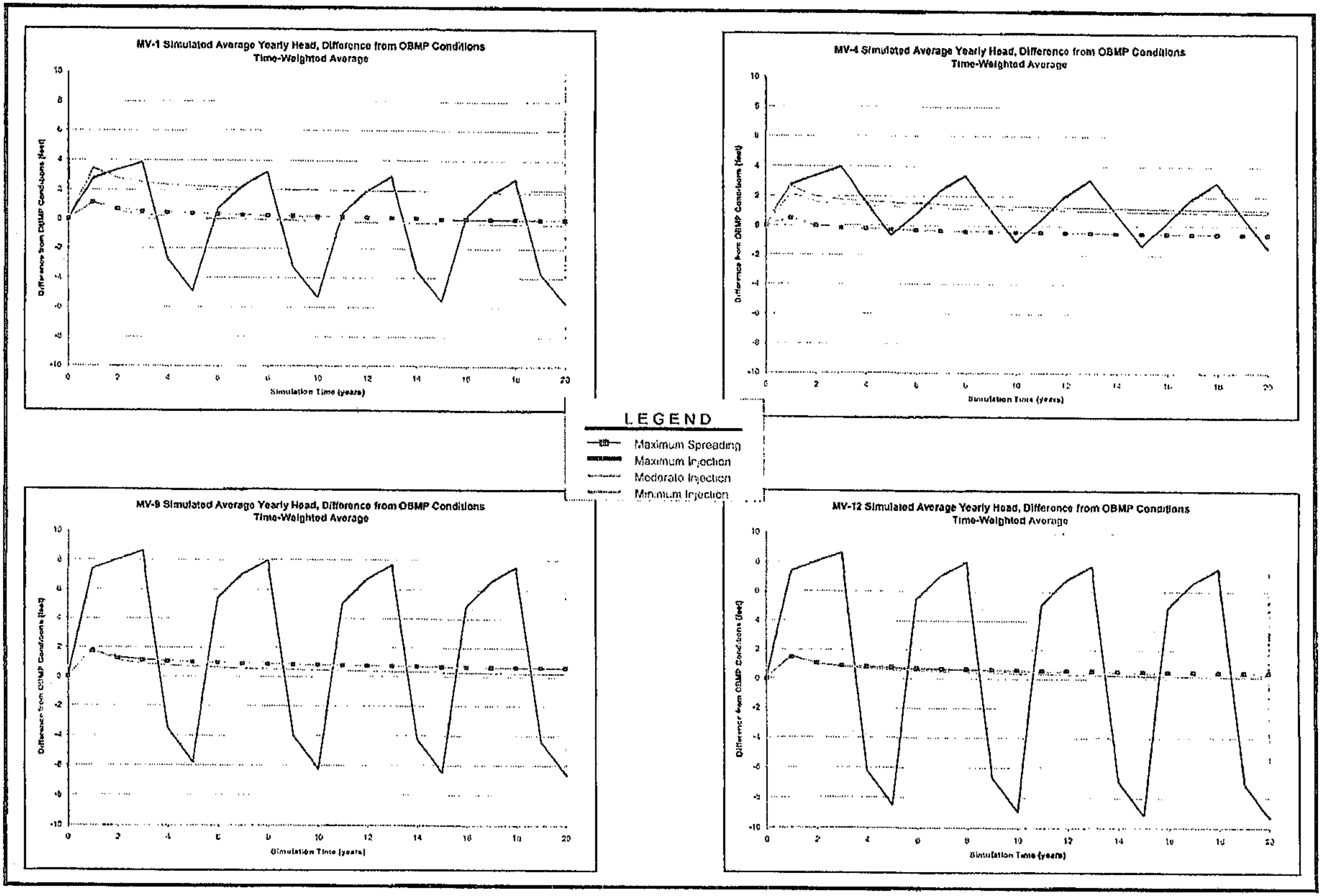

Figure B-2
Water Level Changes at ASR Wells Relative to OBMP Conditions for all Alternatives

Simulation results indicate that bringing additional imported water into Management Zone 1, either by surface spreading or direct injection, would not result in any significant change in water levels at the wells owned by the cities of Chino and Ontario and by Sunkist. Figure B-3 illustrates simulated water levels for all alternatives over the 20-year study period at CC-10, CC-14, ONT-15 and SKS-2. These wells are located downstream of the District wells with CC-14 being the closest to the south and SKS-2 the furthest to the east from the injection wells. Projected annual average water levels at these wells under the Maximum Spreading, Moderate Injection, and Minimum injection alternatives would vary less than a foot compared to those projected under the OBMP conditions. Simulated annual average water levels under the Maximum Injection alternative would have a higher variation in response to longer injection and extraction cycles. The change would be less than four feet higher during the injection cycle and less than four feet lower during the extraction mode with minimal long-term change. It should also be noted that the variations in water levels at the city wells would be higher at the closest well (CC-14) and would dampened at the furthest locations.

B.1.2 Groundwater Quality Impacts

Modeling results for all alternatives indicate that injecting treated imported water and bringing additional imported water for basin recharge would have a positive impact on groundwater quality in Management Zone 1 in general and at the District and City of Chino wells in particular. To illustrate the impacts, the modeling results are depicted as regional water quality nitrate contour maps at discrete times over the 20-year modeling period for each of the alternatives and as water quality histographs at individual wells.

Groundwater Quality Impacts in the Study Area

Modeling results indicate that the study area would be positively impacted by spreading imported water at the Montclair and College Heights basins and by the injection at the four ASR wells. Imported water would generally dilute and displace the high nitrate plumes towards the south and injection would additionally create localized zones of good quality water downstream of the ASR wells. Figures B-4 through B-7 depict the modeling results for each of the alternatives showing nitrate contour zones for initial conditions and after 5, 10 and 20 years. A contour showing the 45 mg/l nitrate (as NO_3) concentration during initial conditions has been added to these figures to illustrate the pattern of change in the area of poor quality water over time. The following observations can be made from these figures:

- Initial conditions show the existence of two main areas within the model area where nitrate concentrations exceed the 45 mg/l MCL. The upper area is generally bounded by Arrow Highway and Holt Avenue in a north-south direction and by Euclid Avenue and Central Avenue in an east-west direction. The lower high nitrate area is located south of Holt Avenue between Central Avenue and Ramona Avenue.

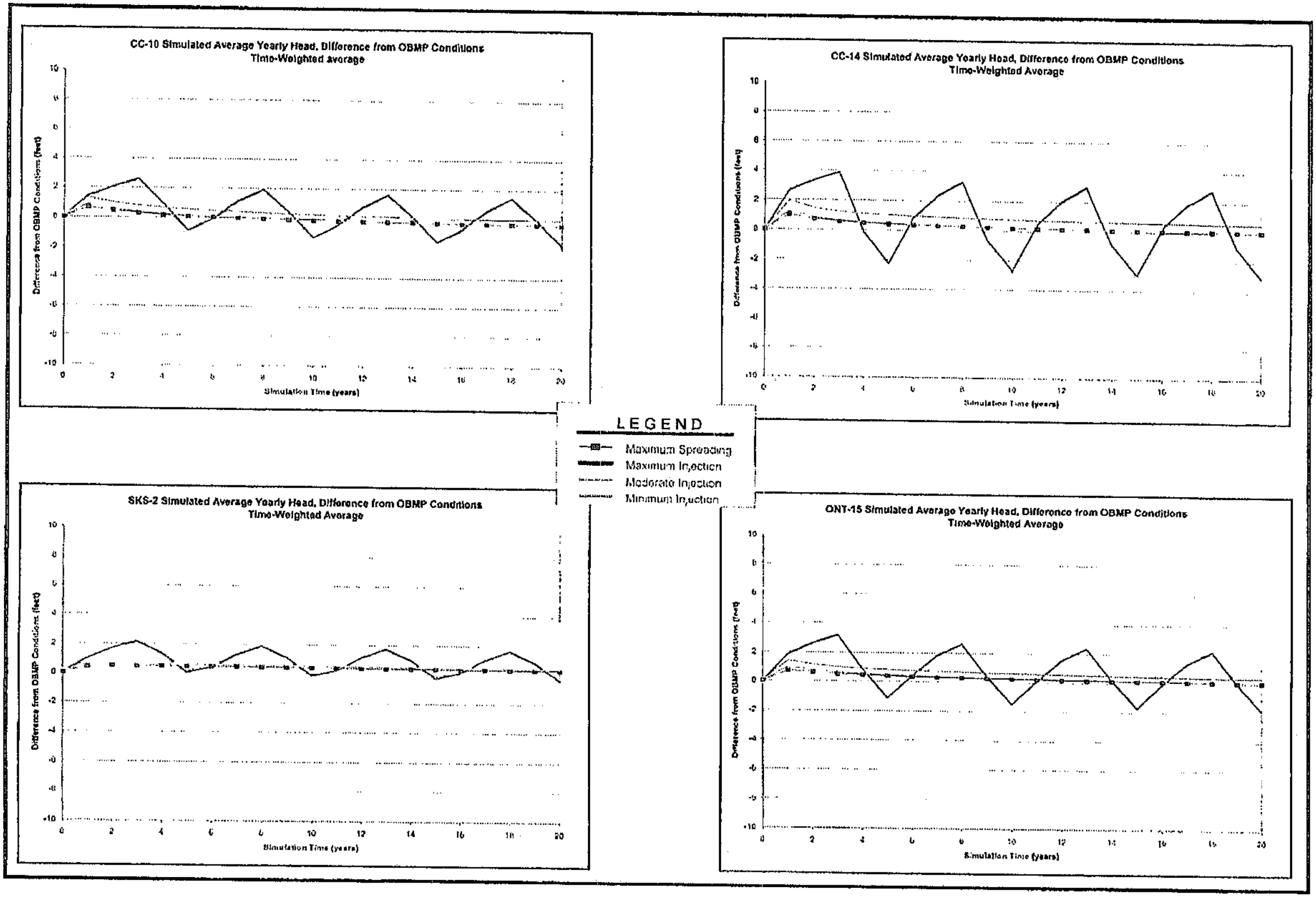

Figure B-3
Water Level Changes at Other Local Wells Relative to OBMP Conditions for all Alternatives

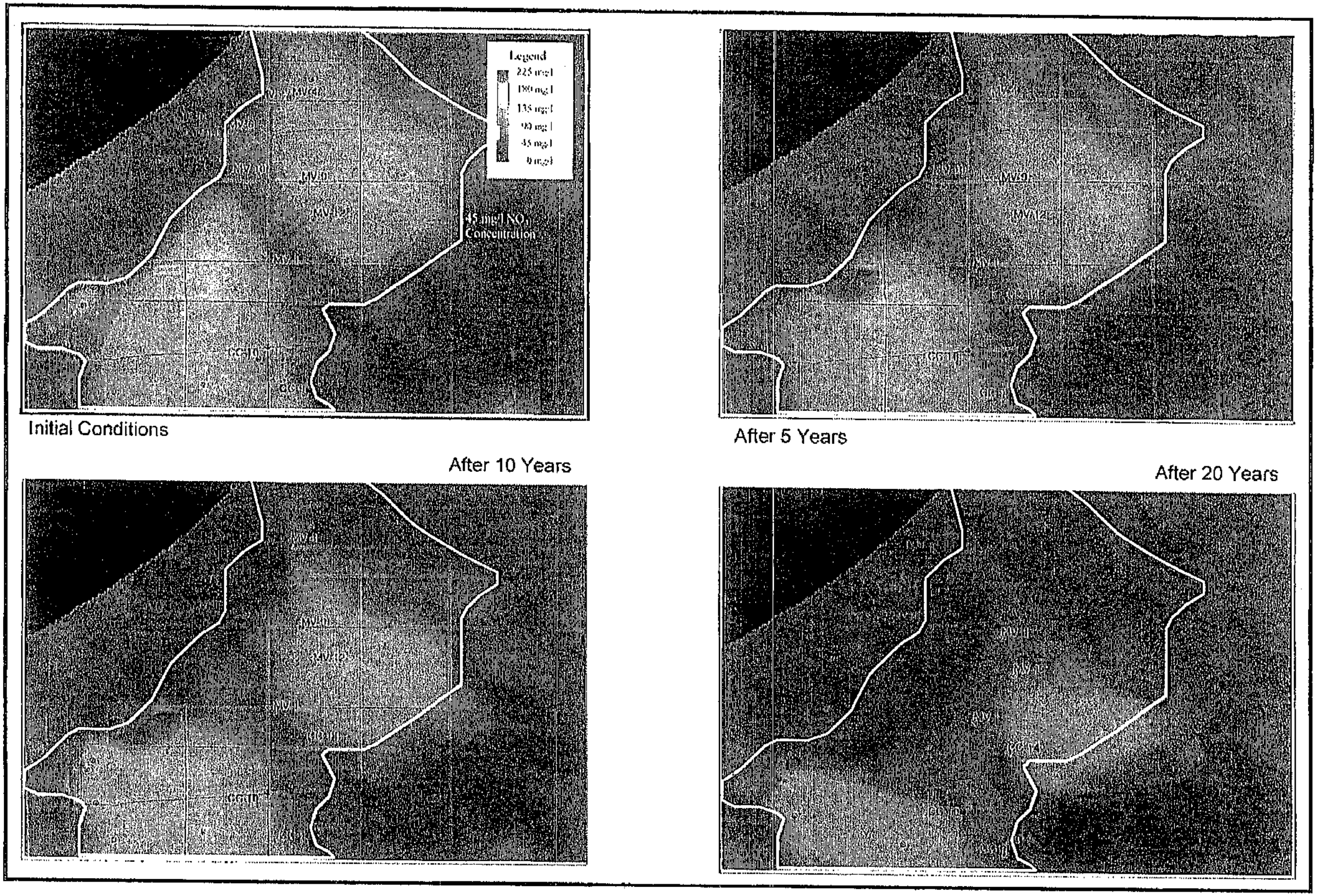

Figure B-4
Maximum Spreading Alternative - Time Series of Nitrate (as N) Concentrations

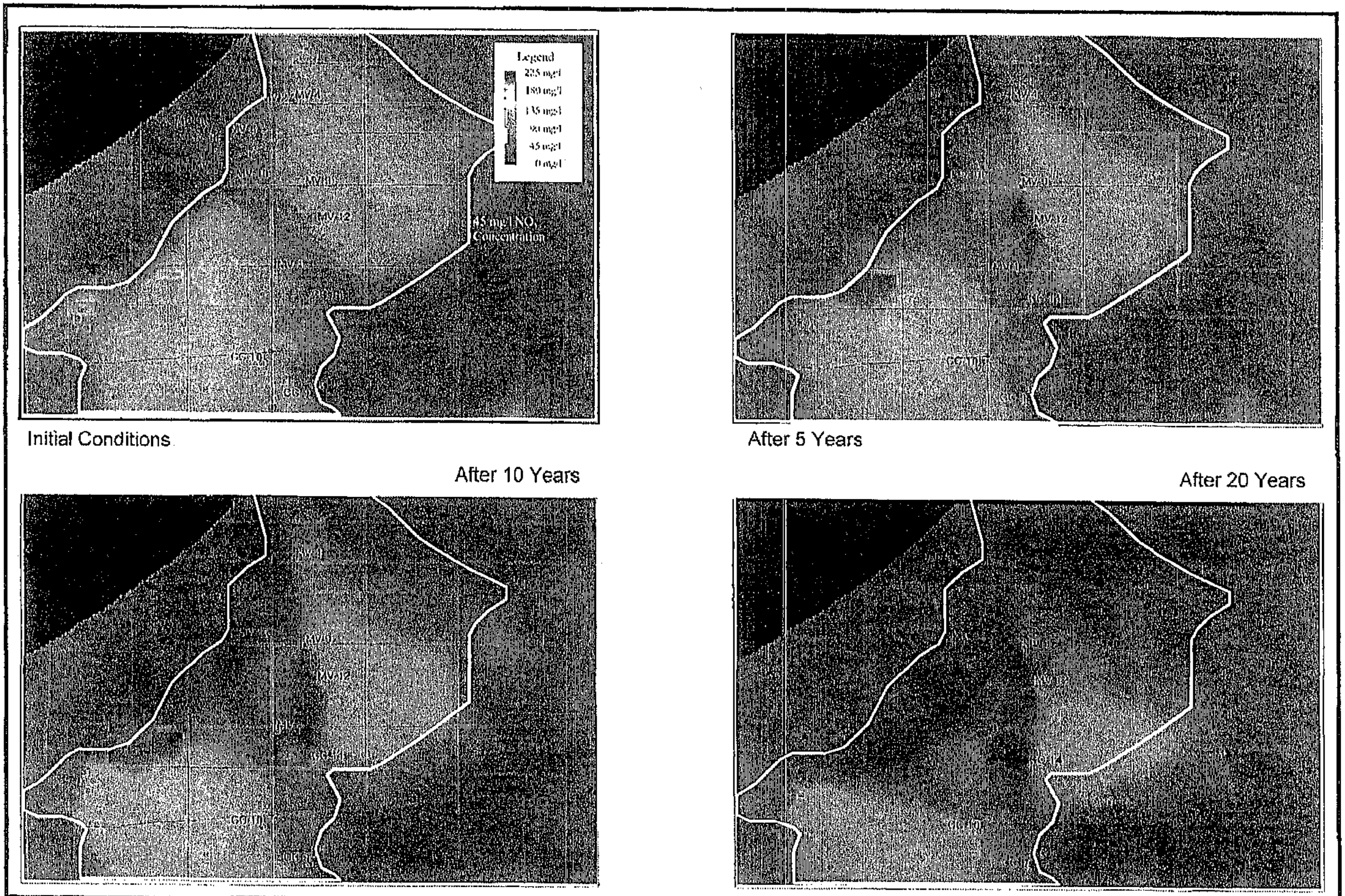

Figure B-5
Maximum Injection Alternative - Time Series of Nitrate (as N) Concentrations

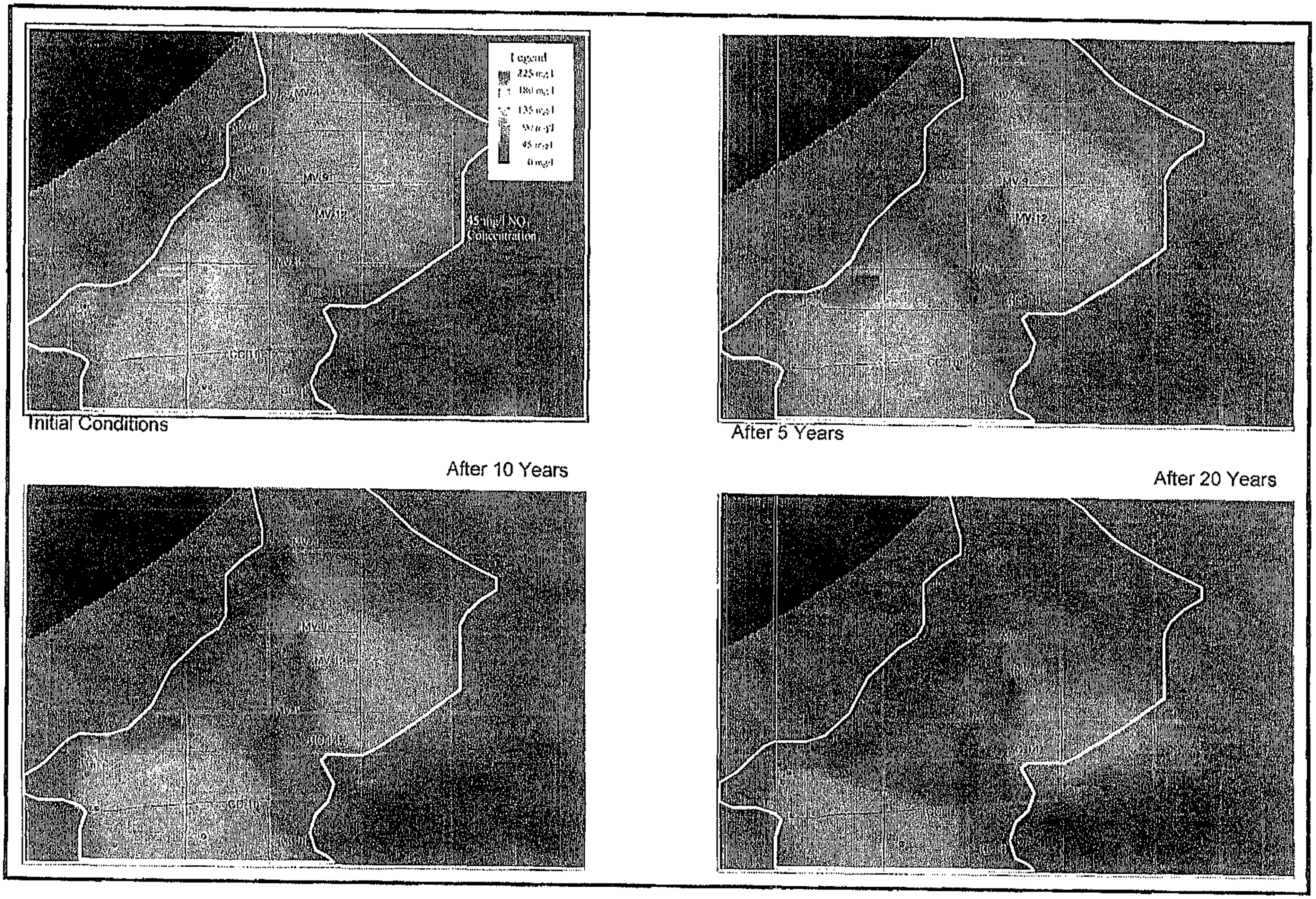

Figure B-6
Moderate Injection Alternative - Time Series of Nitrate (as N) Concentrations

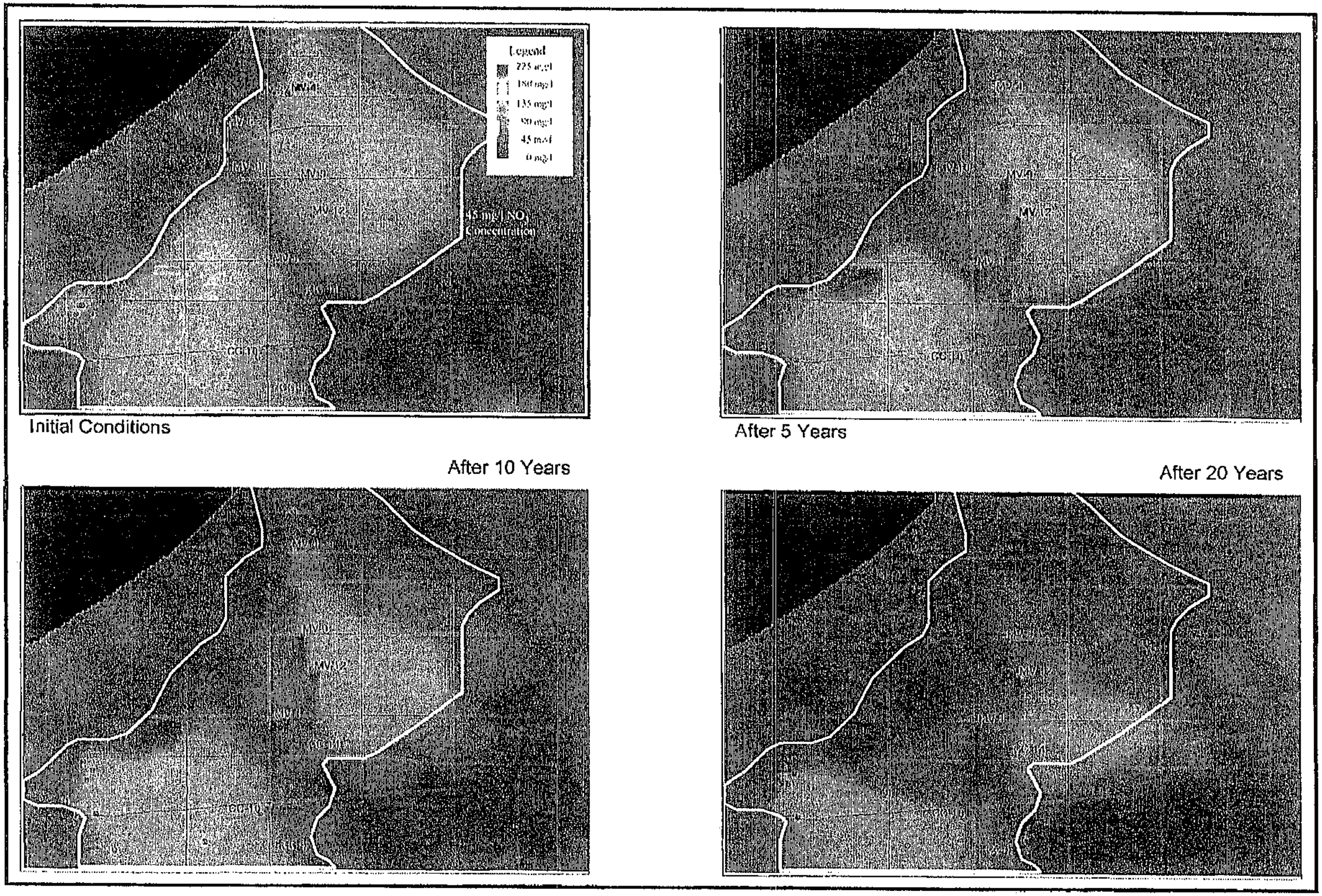

Figure B-7
Minimum Injection Alternative - Time Series of Nitrate (as N) Concentrations

- The District's MV-4, MV-9 and MV-12 wells are located along the westerly edge of the upper high nitrate area while the MV-1 well is located along the northeasterly edge of the lower area. Other District wells are mainly located around and south of the Montclair spreading basins where groundwater quality meets drinking water standards.

- The City of Chino wells CC-10, and CC-14 are all located along the easterly edge of the lower high nitrate area.

- The City of Ontario Well ONT-15 and the Sunkist well SKS-2 are located outside the 45 mg/l Nitrate concentration contour line in areas where groundwater quality under initial conditions is acceptable.

- Groundwater recharge through surface water spreading constitutes all of the imported water recharge for the Maximum Spreading alternative and most of the recharge in Management Zone 1 for all injection alternatives.

- Modeling results indicate that water spread at the Montclair and College-Heights basins would move south with the gradient into areas where poor quality groundwater exists today. The effect of surface water spreading at these spreading basins is relatively similar between all the alternatives because surface water recharge would continue to represent all or most of imported water recharge in Management Zone 1.

- Under the Maximum Recharge alternative, surface water recharge would displace the upper high-nitrate area towards the south and east resulting in water quality improvement at MV-4, MV-9 and MV-12. The water quality impacts at CC-10 and CC-5 would be generally positive as a result of direct spreading; however, CC-14 may observe higher nitrate concentrations as the upper high-nitrate area moves south. It should be noted that the deterioration of groundwater at CC-14 is also observed under the OBMP conditions; a relative water quality comparison at the City of Chino wells between all alternatives and the simulated OBMP conditions is provided later in this section.

- Improvements in water quality represent relative changes between all alternatives compared to OBMP conditions since the model does not consider any continued loading of nitrates in the unsaturated portion of the aquifer.

- Injection of imported water at the four ASR wells would create areas of high quality water in between the upper and lower high nitrate areas and would greatly improve the quality at the District Wells and at the CC-14 well over time.

- A portion of the injected water may not be recovered by the ASR wells because stored water move would south with the gradient and away from these facilities. At the same time, high-nitrate water upstream of the injection points would move towards the ASR wells during the extraction cycle. This could potentially greatly benefit downstream wells as areas of good quality water move in a southerly direction.

Groundwater Quality Impacts at Individual Wells

Similar to the water level impact results, separate graphs have been created to illustrate the relative impacts on the District wells and on the City of Chino wells downstream. Figure B-8 shows the annual nitrate (as NO_3) concentrations changes under each alternative, relative to OBMP conditions, for the four ASR wells over the 20-year study period. Annual values were used to reflect the weighted average between winter and summer cycles. Four individual graphs, representing the District wells MV-1, MV-4, MV-9, and MV-12, are presented in this figure. The zero line in the individual graphs represents OBMP conditions. Values below the zero line indicate a decrease in the nitrate concentration in the aquifer under a given alternative compared to OBMP conditions. The following observations are made:

- The rapid decline in nitrate concentration simulated during the first year at ASR wells is associated with the injection of imported water with a very low nitrate concentration into the aquifer. The model cell (60 mts x 60 mts square) around each well in this single layer model is quickly filled with imported water resulting in a rapid decrease in nitrate concentration relative to the OBMP conditions.

- The difference in simulated nitrate concentrations between the alternatives and the OBMP conditions tend to diminish over the 20-year study period. This is due to the relative improvements in water quality under the OBMP conditions associated with the spreading of imported water. Water quality at the District wells would improve over time as imported water spread moves in a southerly direction.

- Simulated nitrate concentrations under the Maximum Injection alternative show the response to the three-year injection cycled followed by the two-year extraction cycle. Simulated changes in water quality are more accentuated at wells MV-9 and MV-12 because of their higher injection and extraction rates. Under this alternative, nitrate concentrations at the ASR wells rise during the first year of extraction. This rise is associated with the depletion of good quality water in the cell where individual wells are located. As the water in these cells is depleted, groundwater from the surrounding areas moves towards the wells.

- The reduction in water quality at MV-1 and MV-4 under the Maximum Injection alternative during the first year of extraction in the five-year cycle is not as accentuated as in the other two ASR wells. This is due to the relatively lower amounts of imported water injected at these two wells

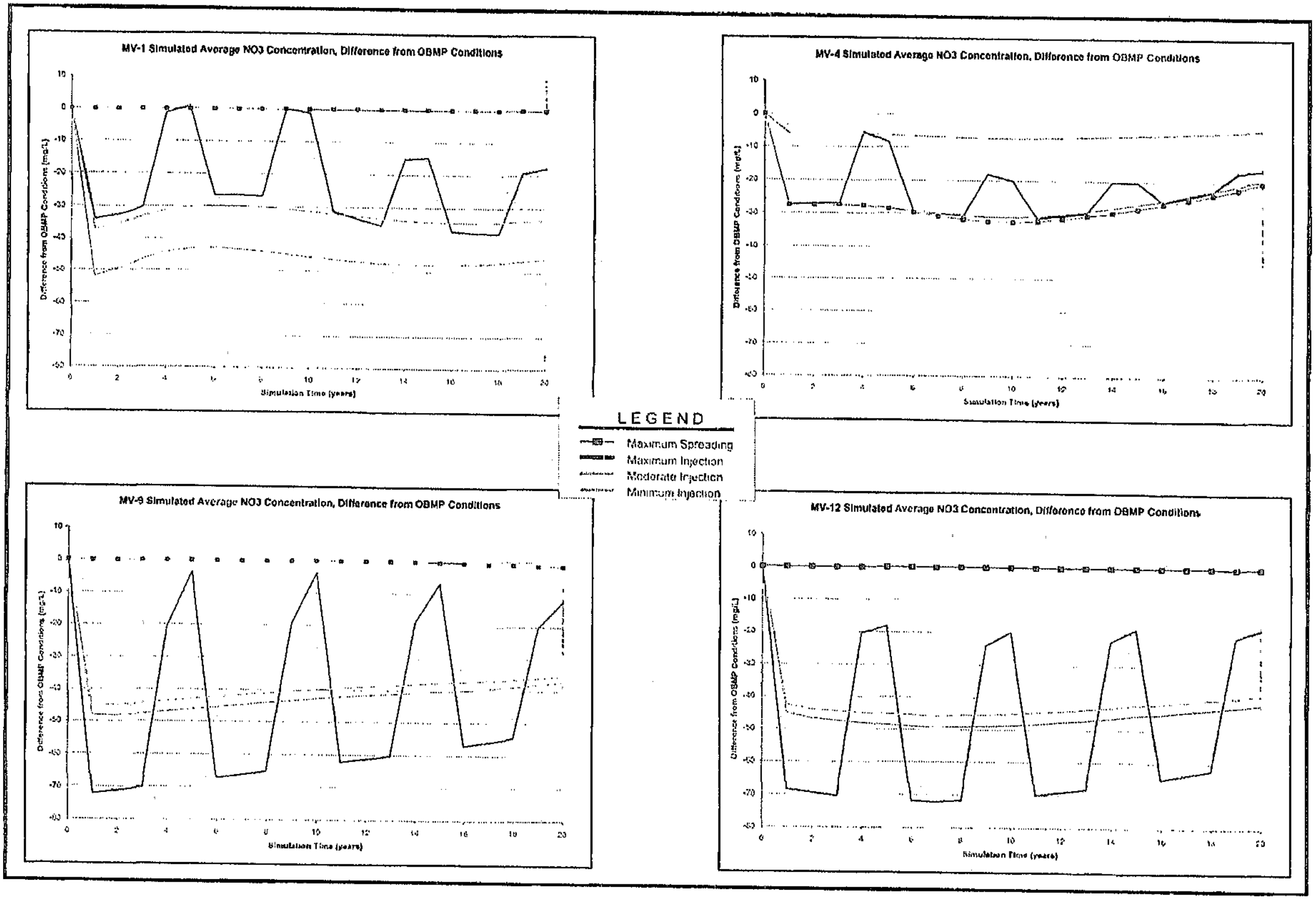

Figure B-8

Nitrate (as NO_3) Changes at ASR Wells Relative to OBMP Conditions for all Alternatives

- Modeling results under the Maximum Injection alternative for the study area, depicted in Figure B-5, indicate that extractions at MV-4 would be directly impacted by surface water recharge at the College-Heights spreading grounds. This can also be observed in Figure B-8 where nitrate concentrations at this well are closer between the alternatives. This later figure also indicates that surface spreading of imported water under the Maximum Spreading alternative would result in much lower nitrate concentrations when compared to OBMP conditions.

- Modeling results under the Maximum Injection alternative for the study area (Figure B-5) indicate that injection of imported water at MV-9 would result in water quality improvements at MV-12 downstream.

Simulation results indicate that the injection of imported water under all injection alternatives would have an impact in water quality at the City of Chino Wells. Figure B-9 illustrates water quality impacts at CC-10, CC-14, ONT-15, and SKS-2 wells under all simulated alternatives. Water quality impacts would be more noticeable at CC-14 because it is the closest one to the District wells. Water quality at this well would significantly benefit with increasing levels of injection. Impacts at CC-10 would be minimal for most alternatives, but positive under the Moderate Injection alternative. Negligible but positive impacts are anticipated at ONT-15 and SKS-2 because of their relative location.

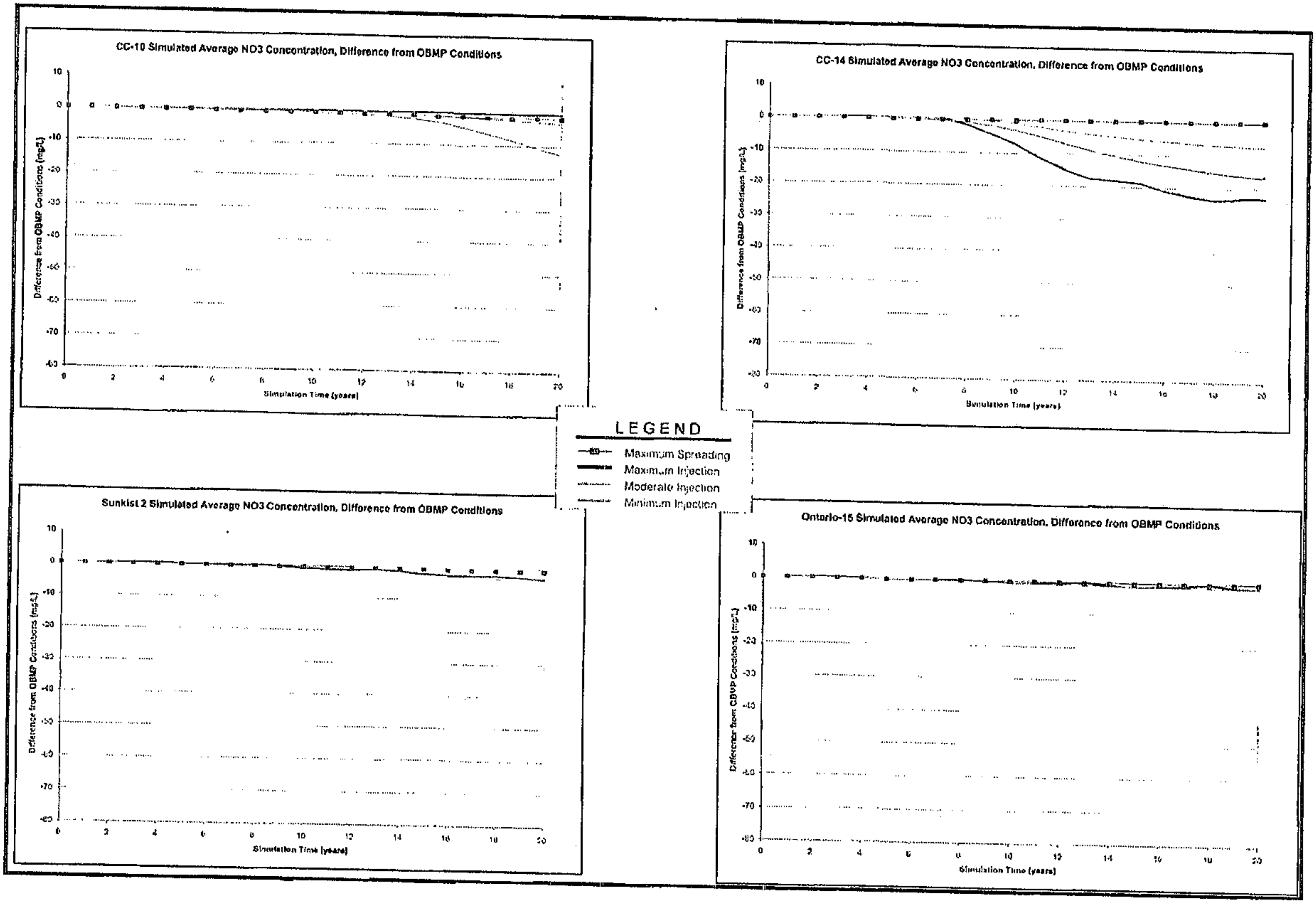

Figure B-9

Nitrate (as NO_3) Changes at Other Local Wells Relative to OBMP Conditions for all Alternatives

CHINO BASIN WATERMASTER

V. INFORMATION

1. Newspaper Articles

Article Last Updated: 1/01/2006 10:11 PM

Dam drains water quality

Solving tainted supply problem to cost millions

Andrew Silva, Staff Writer
San Bernardino County Sun

The water flowing from the rugged canyons northeast of San Bernardino was renowned for its purity, clarity and abundance.

Born of the snow and rain that fall on the San Bernardino Mountains, the water trickles, tumbles, and sometimes roars out of the mountains and into the headwaters of the Santa Ana River where it begins its 96-mile journey to the Pacific Ocean.

But now, that once-pure water resembles chocolate milk, meaning higher costs for water suppliers and possibly higher water rates for the region's consumers.

With problems caused by one great engineering project, the Seven Oaks Dam, it will take tens of millions of dollars in new engineering work to undo the damage.

Area water agencies treasured the water's pristine quality, quality far higher than the water imported from Northern California.

In the name of safety, the purity of the water was sacrificed.

"They were focused on building a flood-control dam. And they built a very good flood-control dam. This (water-quality problem) is an issue that wasn't a priority," said Bob Martin, general manager of East Valley Water District.

The district has budgeted $227,000 in 2006 to buy replacement water. The value of the lost water has been put at several million, and local agencies will likely spend millions for replacement water in the coming years.

A modest trickle during the summer months, the Santa Ana River could build into a murderous torrent during the storms that occasionally pummel Southern California.

Indeed, the Army Corps of Engineers for decades called the Santa Ana River the greatest flood threat west of the Mississippi River.

In 1999, with the completion of the Seven Oaks Dam just east of Highland and north of Mentone, that threat was largely gone.

Also gone was the ample supply of pure water.

The dam itself has trashed the purity of the Santa Ana's flows.

A report completed in December details the problems created by the dam and offers possible solutions - all of them expensive.

The study was commissioned by the local water agencies because the Army Corps of Engineers, which built the 550-foot-tall earthen structure, was only recently allocated $1 million by Congress to start its own study of the problem.

Any solution, even if everything moves ahead smoothly, is years away.

The report prepared by CDM in Carlsbad lists several possible solutions and recommends a two-part fix.

The centerpiece would be a treatment plant near the front of the dam that would scrub the water of the silt, algae and organic material that make it all but unusable.

That means water that is absolutely clean less than a mile upstream will have to run through a plant to restore it to the condition it was in before it hit the backside of the dam.

"It's very frustrating," Martin said.

The problem is the pool that's allowed to form behind the dam at the beginning of the rainy season. While perhaps not an engineering disaster, it's a design feature the water agencies were worried about from the beginning, Martin said.

About 100 feet deep, the so-called debris pool acts as a cushion to protect the inlet works and the back of the dam from the boulders, trees and debris that can come hurtling down the canyon during a big storm.

It also serves as a catch basin for all the fine sediment that flushes down with the early storms.

Sediment isn't the only problem. Once the pool is established, if it doesn't rain again for a while, imagine a swimming pool untended for a year.

It turns a putrid green.

Water that hits the pool later stirs up the sediment and becomes contaminated itself.

It literally mucks up the works for every supplier downstream.

When water like that is diverted to percolate into the ground, the silt plugs up the settlement basins, and the water has a much harder time seeping into soil. That means more expenses for the San Bernardino Valley Water Conservation District, which has to scrape out the basins to make them work properly.

The dirtiness or color of the water, called turbidity, has declined from a crystal clear rating of 1 or 2 up to a nearly opaque rating of 200 when at its worst.

And the organic materials means agencies have to add more disinfectant when they treat the water for distribution to homes and businesses. The problem is the disinfectants can react with the organic material to create other chemicals thought to be health threats.

The U.S. Environmental Protection Agency recently tightened rules for such byproducts, presenting another challenge to water agencies charged with delivering pure water to the area's taps.

The second part of the proposed fix is to move more water through the 100-year-old tunnels, flumes and pipes that Southern California Edison uses to run two of its small hydropower plants. That conduit system carries water around the dam without touching the polluted pool.

A few miles up the canyon on a rugged, dusty dirt road accessible only by four-wheel drive, Southern California Edison's Santa Ana River No. 1 hydroelectric plant, built in 1898, still cranks out power. Back then it sent electricity to Los Angeles on the highest-voltage, longest power lines in the country at the time.

Mule teams used to haul supplies, including the still-running original turbines, up the rocky, sandy track, said Marty Weinberg, operations supervisor for Edison's hydropower department.

Tim Rippy, who works on the remote station, cranked a wheel 3 feet in diameter to open a valve that allows the water into the turbine. With a loud whoosh as the water rushes in, the old generators quickly settle into a smooth, steady hum, as they turn at 300 revolutions per minute, putting out 1.25 megawatts of power.

"I get a four-wheel drive loaded with my tools and I drive back in the canyons," he said. "They so much knew what they were doing back then. When you try to modernize, it makes it harder to work on. This is just basic, simple. They run just like sewing machines. I love this job."

But when water backs up behind the dam, that access road is submerged. The station is maybe a quarter-mile up the canyon from the high point of the reservoir if the dam ever filled to its capacity of 145,600 acre-feet. If full, the reservoir would cover 780 acres and reach nearly 3 miles up the canyon.

Hardening the Edison plants to reduce damage during the storms and creating a way to run water through the pipes around the dam even if the stations aren't operating would provide additional uncontaminated water, the report says.

But Edison recently had the plants relicensed, a process that takes years, and any changes to operation could create a bureaucratic nightmare, the report says.

Officials at the Army Corps familiar with the dam were not available last week. So, it's not clear how long its study of the problem might take, or how long it will take to adopt a solution.

Until then, agencies are left watching millions of gallons of water go to waste, while being forced to spend hundreds of thousands of dollars to replace it.

"The Santa Ana River has been one of our highest-quality sources. We went from one of the best sources of water to one of the worst," Martin said. "If things go well, we're looking at years for a solution."

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Article Last Updated: 1/03/2006 10:42 PM

Board: Groundwater near ONT contaminated

By Mason Stockstill, Staff Writer
Inland Valley Daily Bulletin

ONTARIO -- A recently discovered plume of contaminants in the groundwater south of Ontario International Airport will be cleaned up by the industrial firms and military agencies responsible for the pollution, water quality officials say.

The Regional Water Quality Control Board has not yet issued a formal cleanup order for the contaminated groundwater, but the responsible parties are already working on a plan to remove the chemicals before they enter the drinking water supply.

"We are giving the companies the opportunity to voluntarily come together, hire a consultant, perform an investigation and reach an agreement to fully fund the cleanup," said Gerard Thibeault, executive director of the state Regional Water Quality Control Board, Santa Ana division.

People believe the contaminants seeped into the groundwater between the 1940s and 1980s, when the airport hosted numerous industrial operations, such as aircraft maintenance plants.

The pollution was not detected until recently because the area south of the airport is largely dedicated to agricultural uses, such as dairy farms. Agricultural wells are not tested for the same number of contaminants as is water used for human consumption, Thibeault said.

However, the contamination is a larger concern now, because local agencies are relying more on groundwater pulled from wells in that area for drinking water.

"The Chino Desalter Authority has a series of extraction wells and a desalting facility that is pumping up salt-contaminated groundwater, pumping salt out and supplying it to local water agencies," Thibeault said. "This plume from Ontario is migrating toward those wells."

The main component of the plume is trichloroethylene, a solvent used for cleaning metal. It can cause health problems if ingested by humans over a long period of time; the International Agency for Research on Cancer lists TCE as a probable carcinogen.

In the groundwater south of the airport, TCE has been detected at concentrations more than 16 times the maximum level in drinking water set by the Environmental Protection Agency.

Since cleanup plans are still in the works, additional data is being collected by the responsible parties that will be involved in the cleanup -- aerospace firms Boeing, Lockheed Martin and Northrop Grumman; industrial giant General Electric; the Department of Defense and the California Air National Guard.

As part of that effort, some dairy farmers in Ontario will be asked to share water-quality information with local officials so that the extent of the contamination can be better understood, said Ken Manning, executive director of the Chino Basin Watermaster, which oversees the groundwater basin.

The watermaster has collected data on water usage and purity on behalf of dairy farmers in the area for years, Manning said. Using that information to compare levels of TCE or other pollutants through the years could help track the plume's growth and movement.

"It's not complete data, but it's a lot," Manning said. "It goes back several years, depending on the well -- at least a decade on many of them."

Groundwater contaminated by aerospace and defense industries is nothing new for the Inland Valley. Cleanup efforts are at various stages in several other cities, including Rialto, Chino Hills and Norco.

There are also three other known groundwater plumes in the area south of the airport: two related to former General Electric facilities, and one from the now-closed Milliken landfill.

The parties held responsible for the pollution will likely seek to correct it either by cleaning up the groundwater before it reaches the desalter plants, or by paying the local agencies to remove the contaminants during the water treatment process.

"We've had very good cooperation from them," Thibeault said. "This is something that has come out of the blue, sometimes from operations that are 40 to 50 years in the past for them."

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CHINO BASIN WATERMASTER

V. INFORMATION

2. NWRA Election Results

Association of California Water Agencies

Leadership Advocacy Information *Since 1910*

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CHINO BASIN
WATERMASTER SERVICES

MEMORANDUM

December 20, 2005

TO: ACWA MEMBER AGENCY BOARD PRESIDENTS and GENERAL MANAGERS

FROM: JAN JENNINGS, DIRECTOR OF ADMINISTRATION

SUBJECT: NWRA ELECTION RESULTS

It gives me great pleasure to officially inform you that the following candidates have secured the position of NWRA Board Director for the California Caucus during the recent election.

David A Breninger, Placer County Water Agency, NWRA Board of Directors
Lawrence M. Libeu, San Bernardino Valley WCD, NWRA Board of Directors
John Fraser, El Dorado Irrigation District, NWRA Board of Directors
Wayne Clark, Municipal Water District of Orange County, Alternate NWRA Board of Directors
Adrienne (Ann) Mathews, Kern County WA, Alternate NWRA Board of Directors

Additionally, ACWA's newly appointed Federal Affairs Chair, Greg Zlotnick, serves on the NWRA Board by virture of the office. Elected representatives shall assume their respective positions at the next scheduled NWRA meeting.

In this time of increasing legislative and regulatory mandates, it is essential for California to take a proactive posture in NWRA and on its Board.

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CHINO BASIN WATERMASTER

V. INFORMATION

3. AGWA Conference

American Ground Water Trust

Independent Authority on Ground Water

16 Centre Street ★ Concord, New Hampshire 03301 ★ (603) 228-5444
Fax (603) 228-6557 ★ Email: TrustInfo@agwt.org ★ Web: www.agwt.org

"Hydrologic, Environmental and Legislative Challenges to Southern California's Present and Future Managed Aquifer Recharge Programs"

Association of Ground Water Agencies / American Ground Water Trust

A one-day program – Monday February 6th, 2006
Ontario, California

(Field trip: February 7th)

To all program presenters and panelists:

I have enclosed copies of the February 6th program flyer. PLEASE will you mail (or give) them to colleagues and contacts who are likely to be interested in this AGWA/ AGWT event. We appreciate your willingness to be involved in the program. In a few days I will send via e-mail, details about the conference presentation logistics.

Please ensure that this conference is listed on your organization's events calendar. If you have contact information on an organizational e-mail list serve, I hope that you will forward information about the event throughout California.

Full program details are listed at www.agwt.org.

Many thanks

Andrew Stone
American Ground Water Trust

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