5 Flow Rate Monitoring and Water Accounting

As summarized in the Final EIR (September 2005), MID will monitor the volumes of water entering the ranch for recharge and the volumes of recovered water leaving the ranch. This section specifies the frequencies, locations and procedures by which water flow rates and volumes will be measured.

5.1 Objectives

The objectives of the flow monitoring program will be to document the following:

- The volumes of surface water delivered to Madera Ranch;
- The volumes of water recharged by in-lieu means at Madera Ranch;
- The estimated volumes of evapotranspirative loss of applied water at Madera Ranch;
- The volumes of water directly recharged at Madera Ranch;
- The volumes of water left behind to aid in reduction of aquifer overdraft (10% leave behind); and
- The volumes of water recovered from storage and delivered to MID customers.

5.2 Responsibilities

MID is responsible for implementation of the flow monitoring program with the following specific responsibilities:

- Installing, operating and maintaining flow measuring devices;
- Entry of water quality measurements into an electronic database; and
- Performing required calculations and reporting.

MID's daily, ongoing operations currently include surveillance of conveyance facilities to ensure that accidental water spills and/or theft does not occur or are halted when found. This surveillance will continue and extend to the facilities constructed as part of the Project.

5.3 Monitoring Locations and Frequencies

Flows will be monitored at the locations and frequencies specified on Table 9. Water conveyed through the MID system to Madera Ranch is part of normal MID operations. Monitoring of these off-ranch flows are part of the normal MID operation and are not covered by this MOCP.

Table 9: Flow Monitoring Locations, Frequencies and Accuracies

Location	Frequency	Accuracy	Precision
Incoming Surface Water Flow Monitoring			
All locations where surface water enters Madera Ranch	Continuous recordation of totalizing and instantaneous readings (when operating)	Totalizing: 1 AF Instantaneous: 0.1 cfs	Totalizing: 2%+/- Instantaneous: 2%+/-
All turnouts from canals, pipelines or ditches to Madera Ranch farmland	Daily recordation of totalizing and instantaneous readings (when operating)	Totalizing: 1 AF Instantaneous: 0.1 cfs	Totalizing: 2%+/- Instantaneous: 2%+/-
All turnouts from canals, pipelines or ditches into swales or recharge basins	Daily recordation of totalizing and instantaneous readings (when operating)	Totalizing: 1 AF Instantaneous: 0.1 cfs	Totalizing: 2%+/- Instantaneous: 2%+/-
Recovered Water Flow Monitoring			
All Madera Ranch irrigation wells	Weekly recordation of totalizing and instantaneous readings (when operating)	Totalizing: 1 AF Instantaneous: 0.1 cfs	Totalizing: 2%+/- Instantaneous: 2%+/-
All Project Recovery wells	Weekly recordation of totalizing and instantaneous readings (when operating)	Totalizing: 1 AF Instantaneous: 0.1 cfs	Totalizing: 2%+/- Instantaneous: 2%+/-
All turnouts from canals, pipelines or ditches to Madera Ranch farmland	Daily recordation of totalizing and instantaneous readings (when operating)	Totalizing: 1 AF Instantaneous: 0.1 cfs	Totalizing: 2%+/- Instantaneous: 2%+/-
All locations where recovered water leaves Madera Ranch	Continuous recordation of totalizing and instantaneous readings (when operating)	Totalizing: 1 AF Instantaneous: 0.1 cfs	Totalizing: 2%+/- Instantaneous: 2%+/-

Notes:

1. *After recovered water leaves Madera Ranch for delivery to customers, flows and volumes delivered will be monitored in accordance with MID's normal procedures.*
2. *Evapotranspirative loss monitoring is covered under the Meteorological Monitoring portion of this MOCP*
3. *AF: acre-feet, cfs: cubic feet per second*
4. *Other units such as gallons or gallons per minute are acceptable as long as the same accuracies and precisions are provided*

5.4 Monitoring Procedures

Volumetric and instantaneous flow measurement devices will be installed, maintained and used in accordance with applicable procedures specified by the manufacturers and following applicable guidelines in the following document:

"The Water Measurement Manual," A Water Resources Technical Publication, US Department of Inferior, Bureau of Reclamation, Water Resources Research Laboratory, available on the Internet at: http://www.usbr.gov/pmts/hydraulicslab/pubs/wmm/

Flows may be measured manually or automatically using data loggers and can be recorded on forms (in pen) or in log books (in pen), but in all cases, the following information will be recorded:

- Location (turnout number or station name);
- Date and time (military);
- General description of weather;
- Instantaneous flow and cumulative volume;
- Technician name;; and
- Note any significant changes to meter location since last measurement.

The technicians should record any circumstances which may cause flow measurements to be questionable or could cause measured flows to deviate significantly from those previously measured at a location. The technicians should record any circumstances which prevent them from measuring flows.

5.5 Water Accounting Procedures

Table 10 lists the monthly water accounting calculations that will be performed by MID.

Table 10: Monthly Water Accounting Requirements

#	Item	Computation Method
1	Volume of surface water delivered to Madera Ranch	Summation of flows entering Madera Ranch
2	Volume of surface water delivered to Madera Ranch farmland	Summation of flows through turnouts to farmlands
3	Volume of surface water delivered to recharge swales and basins	(Item 1) – (Item 2)
4	Estimated volume of water delivered to recharge swales and basins, but lost to evapotranspiration	See Meteorological Monitoring Procedures
5	Volume of water recharged through direct means	(Item 3) – (Item 4)
6	Volume of water recovered using recovery wells and Madera Ranch irrigation wells	Summation of flows from recovery and irrigation wells
7	Volume of recovered water delivered to Madera ranch farmlands	Summation of flows from irrigation wells discharging to Madera Ranch farmland
8	Volume of recovered water delivered to Madera ranch farmlands and lost to evapotranspiration	See Meteorological Monitoring Procedures
9	Volume of recovered water delivered to Madera ranch farmlands and returned to storage through deep percolation	(Item 8) – (Item 9)
10	Volume of recovered water leaving Madera ranch for delivery to customers	Summation of flows leaving Madera Ranch
11	Volume placed into storage	(Item 5) + (Item 6)
12	Volume removed from storage	(Item 9) + (Item 11)
13	Volume of water in storage	(Σ of Item 12) – (Σ of Item 11)
14	Volume of water contributed to overdraft recovery	0.1 x (Item 14)
15	Volume of recoverable water in storage	(Item 14) – (Item 15)

Notes:

1. *All indicated computations will be tabulated for the following time intervals: the previous month, the year to-date, prior years (calendar or water year basis as desired by MID) and Project cumulative to-date.*

5.6 Data Management

MID will develop a standard flow measurement form or log book format which meets the information requirements specified in the previous section. The District will maintain a file where these forms and log books are stored when not in use. If data loggers are used, information will be downloaded at least once a month.

MID will create a separate file for each monitoring location in which the records regarding meter types, maintenance and calibration will be stored for easy reference by MID and the MROC.

MID will enter flow measurements into an electronic database within 1 month of measurement collection.

5.7 Required Accuracy, Quality Control and Quality Assurance

Instantaneous and totalizing flow meters will be calibrated at least annually using procedures and tolerances specified by manufacturers. Required flow measurement accuracies are specified in Table 9.

The Project flow monitoring system will include 2 types of redundancy that will be used to perform QA/QC checks as follows:

Incoming volume check: the summation of volumes delivered into recharge basins, recharge swales and fields should be slightly less than the summation of volumes entering the ranch (due to evaporative and seepage losses). During recharge periods these 2 volumetric summations will be compared on a monthly basis. If the resultant sums are more than 15% different, MID will perform an audit of flow meters and measurements to determine if any devices are malfunctioning or if records have been incorrectly entered.

Recovered volume check: the summation of volumes recovered from wells should be slightly higher than the summation of recovered water delivered to fields and leaving the ranch (due to evaporative and seepage losses). During recharge periods these 2 volumetric summations will be compared on a monthly basis. If the resultant sums are more than 15% different, MID will perform an audit of flow meters and measurements to determine if any devices are malfunctioning or if records have been incorrectly entered.

6 Surrounding Land Use and Well Status Monitoring

This MOCP is intended to ensure that surrounding landowners are protected from unacceptable impacts caused by the Project. In order to ensure that impact evaluations remain objective and well informed, the status of surrounding land uses and wells will be periodically documented by MID so that changes unrelated to Project operations can be considered during impact evaluations.

6.1 Objective

The objective of the land use and well status monitoring program will be to document changes that might impact water levels and quality in wells within 1 mile of Madera Ranch.

6.2 Responsibilities

MID is responsible for implementation of the land and well status monitoring program with the following specific responsibilities:

- Obtaining 3rd party permission to access their lands/wells and report data;
- Performance of periodic inspections; and
- Maintenance of Project files.

6.3 Monitoring Locations, Frequencies and Procedures

As detailed in previous sections, the water level and quality monitoring programs will entail MID technicians entering 3rd party lands, inspecting wells and collecting water levels at various times. As specified in previous sections, MID technicians are required to document changes to conditions of wells and surrounding land uses. These records will be augmented by the following supplemental work. On an annual basis, MID will:

- Send a questionnaire to each property owner within 1-mile of Madera Ranch asking the following questions (at a minimum):
  - Have you installed any new wells in the last year? If so, what are their uses?
  - Have you taken any wells out of service in the last year? If so, what were their uses?
  - If you have new wells, would you be willing to allow MID to measure water levels and/or collect water quality samples?
- Request from the Madera County Department of Environmental Health a listing of all well permits issued by Madera County for the area within 1-mile of Madera Ranch;
- If the questionnaires or well permit logs specified above indicate that a new domestic well has been installed within 1 mile of the ranch, MID will be required to request permission to include that well in the monitoring program. If approval is granted and an access agreement obtained (if one is not already in place), this well will be added to the water quality monitoring program.
- MID will review aerial photographs and/or perform drive-through surveys of the area within a 1-mile radius of the ranch to document changes in land use that might significantly impact groundwater levels or quality in the vicinity. The land use change survey will be documented by marking observations on a map or aerial photograph. Examples of land-use changes that should be documented include (but are not limited to):
  - Conversion of farmland from permanent crops to row crops or the reverse;
  - Construction of new houses or development of other non-agricultural land uses;

- New well locations;
- Fallowing of land; and
- Installation, extension, re-activation or abandonment of canals or ditches.

6.4 Data Management

The District will maintain a file where questionnaire records, County well permit records and land use change maps are stored for easy reference by MID and the MROC.

7 Meteorological Monitoring

As detailed in previous sections, MID is required to estimate evapotranspirative losses of water delivered to Madera Ranch for direct recharge purposes. This meteorological monitoring program specifies how data will be collected and used to estimate evapotranspirative losses.

7.1 Objective

The objective of the meteorological monitoring program is to collect adequate information to enable estimation of evapotranspirative losses of water on Madera Ranch at an accuracy that is adequate for the purpose of the water balance calculations specified in previous sections.

7.2 Responsibilities

MID is responsible implementation of the meteorological monitoring program, including collection of data from 3rd party operated monitoring stations.

7.3 Monitoring Locations and Frequencies

Table 11 specifies the parameters and measurements that will be made by MID and obtained by MID as part of the meteorological monitoring program.

Table 11: Meteorological Monitoring Program Locations, Parameters and Frequencies

Monitoring Location	Parameters	Frequency
Near the center of Madera Ranch (to be installed) Measurements by MID	Maximum air temperature Minimum air temperature	Daily
	Dry-bulb temperature Wet-bulb temperature	Daily
	Dew point	Daily
	Precipitation	Daily (indicate snow or rain)
	24 hour wind movement	Daily
	Pan A evaporation	Daily
MID Headquarters (existing station) Measurements by MID	Maximum air temperature Minimum air temperature	Daily
	Dry-bulb temperature Wet-bulb temperature	Daily
	Dew point	Daily
	Precipitation	Daily (indicate snow or rain)
	24 hour wind movement	Daily
	Pan A evaporation	Daily
CIMIS Station 145 6.7 miles north of Madera Ranch at Ave 18 ½ and Rd 19 ½ Measurements by DWR	Irrigated pasture reference crop evapotranspiration	Hourly and daily
	Precipitation	
	Solar radiation	
	Net radiation	
	Maximum, minimum, average soil temperature	
	Maximum, minimum, average air temperature	
	Maximum, minimum, average vapor pressure	
	Wind cubed, wind speed, wind direction, wind run	
	Pan A evaporation	
	Maximum, average, minimum relative humidity	
	Penman-Monteith ETo and ETr	
	Dew point	

Notes:

1) MID is not responsible for the continued operation of or the accuracy of data from CIMIS Station 145. If this station goes off-line, an alternate source of the listed data will be determined at that time.

7.4 Monitoring Procedures

MID meteorological instrumentation will be installed, maintained and operated in compliance with applicable procedures specified by the manufacturers.

7.5 Data Management

Data collected by MID will be recorded either manually on DWR forms already used by MID for recordation of data from the existing MID headquarters weather station or in an electronic format which incorporates the same information that is included on the DWR forms. The District will maintain a file where forms are stored when not in use.

7.6 Estimation of Evapotranspiration

Some of the water applied to swales or ponds for recharge will be lost to open water evaporation and evapotranspiration by plants along the fringe of water. These losses will be computed at least once a month as follows:

1) The average lateral extent of inundation will be mapped, with 2 categories of wetting noted as follows:
   - Areas of complete inundation with no vegetation emerging from the water; and
   - Areas of partial inundation with vegetation.
2) The gross water application rate (feet/day) will be computed as:

   Gross application rate = (Average flow rate + precipitation) / Area of inundation

3) Open water evaporation rate (feet/day) will be estimated by multiplying the average ranch Pan A data by a free water pan coefficient of 0.72 (National Weather Service/NOAA Evaporation Atlas for the Contiguous United States, June 1982). Open water evaporation loss (acre-feet) will be estimated by multiplying the open water evaporation rate by the acreage of open water and the number of days considered.
4) Evapotranspirative (ET) losses will be broken into 2 components as follows:
   - ET by grasses within areas of partial inundation; and
   - ET by grasses thriving along the edge of ponded water.
5) It will be conservatively assumed that 100% of the ET requirement of fringe and partial inundation grasses is provided by the applied water (ie, rainfall and soil moisture storage are not assumed to reduce ET of applied water, ETAW). Daily deference ET (ET_o) will obtained from CIMIS Station 145 – which uses irrigated pasture as the reference crop – an almost identical condition to that in the Madera Ranch recharge swales, therefore a crop coefficient of 1.0 will be used (approach validated through CUP-E software, DWR 2004).
6) ET (feet/day) will be multiplied by the number of days considered, the acreages of partial inundation and vegetation fringe surrounding the application areas to provide the amount of water that was lost to grass ET (acre-feet).
7) Recharges volumes (acre-feet) will computed as follows:

   Recharged volume = (Gross application rate – Evaporation – ET_{fringe} – $ET_{partial\ inundation}$) x Days

8 Subsidence Monitoring

Land subsidence is the lowering or sinking of the ground surface due to any of several processes. Historically, subsidence has occurred to the west of the Madera Ranch as a result of groundwater pumpage which caused compaction of aquifer materials. However, ground elevation monitoring conducted by the U.S. Geological Survey (USGS) has indicted that no more than one foot of subsidence has occurred on Madera Ranch even though the area of Madera Ranch has been subjected to over 100 years of intense groundwater pumpage. Therefore, it is unlikely that subsidence will be a factor in Project operations. Nonetheless, MID has committed to performing elevation monitoring of multiple locations on Madera Ranch before and during Project operation (EIR, pp. 2-25). This section specifies how the elevations of on-site markers will be measured on an annual basis and compared to distant benchmarks to allow detection of change in ground elevations.

8.1 Objective

The objective of subsidence monitoring is to measure ground surface elevations at sufficient locations, frequencies and precision to provide early indications of elevation changes that might be due to Project pumpage.

8.2 Responsibilities

MID will implement the subsidence monitoring program with the following specific responsibilities:

- Preparation of a detailed subsidence monitoring plan under the supervision of a professional engineer or land surveyor licensed to practice in California;
- Installation and maintenance of subsidence bench marks;
- Performance of annual subsidence surveys under the supervision of a professional engineer or land surveyor licensed to practice in California; and
- Compilation, QA/QC and reporting of subsidence survey data.

8.3 Monitoring Locations and Frequencies

Land subsidence is measured by comparing sequential measurements of land surface elevation at a location. This comparison is predicated on the assumption that the reference bench mark for computation of elevation is outside of the area within which subsidence (or other elevation changes) will potentially occur. Therefore, each subsidence monitoring event must be tied to at least one of the following: a vertically stable geodetic station in the regional network; a geodetic station in the regional network for which current coordinates are available; or a Continuously Operating Reference Station (CORS) in the NGS network. CORS are permanent, continuously tracking GPS sites whose coordinates are computed nearly daily and are available via the Internet. MID subsidence monitoring will include the following elements:

<u>Base Station:</u> Reference of all elevation measurements to a base station at least 1 mile away from the Madera Ranch property line;

<u>Perimeter Benchmarks:</u> Placement of permanent bench-marks at least every 2 miles along the Madera Ranch property line (approximately 12 benchmarks);

Recovery Well Benchmarks: Placement of permanent measurement points on each Project recovery well;

Baseline Measurements: Measurement of the elevations and x,y-coordinates of each perimeter benchmark at least 1-year prior to commencement of banked water recovery operations and of each recovery well benchmark following development but prior to commencing operation of the well;

Annual Measurements: Measurement of the elevations of each perimeter benchmark and recovery well bench mark at least annually.

8.4 Monitoring Procedures

Benchmarks will be constructed and installed using procedures approved by the California Board for Professional Engineers and Land Surveyors and using appropriate guidelines promulgated by the National Geodetic Survey and the California Spatial Reference Center. Subsidence monitoring can be performed using traditional leveling surveys, high precision GPS surveys and remote sensing radar techniques. Any of these methods may be used by MID as long as precision and accuracy requirements specified below are achieved. Survey work and calculations will be performed by a surveyor licensed to perform this work and in good standing with the California Board for Professional Engineers and Land Surveyors.

8.5 Data Management

Field measurements will be documented log books and electronically in accordance with procedures specified by the previously cited organizations. The District will maintain a file where log books are stored when not in use. A back-up photocopy of each new log book entry and all electronic records will be made within 1 month of data collection and the backup copies will be stored at a separate location at MID.

MID will enter elevation measurements into an electronic database within 1 month of measurement collection.

8.6 Required Accuracy, Quality Control and Quality Assurance

Subsidence monitoring will be performed within the following precision and accuracy specifications:

Elevation: measurements will be referenced to the geodetic vertical datum used by Reclamation in Madera County and accurate to at least 0.066 ft (2 cm). Measurements will be reported to a precision of at least 0.01 ft (0.3 cm).

X,Y coordinates: each benchmark used within the subsidence survey will be referenced to the geodetic datum used by Reclamation in Madera County, accurate to at least 3.28 feet (1 meter).

Elevation and location measurements will be made under the supervision of and certified by a professional engineer or land surveyor licensed to practice in California.

9 Reporting

This section specifies reporting requirements. As detailed in Table 1, the MROC requires the following reports:

- Report all groundwater levels a minimum of 4 times per year or as the Committee Chair requests (Item 1 .A of Draft Operational Guidelines, approved by MROC on 8/22/05);

- Water quality report 2 times per year (Item 1 .D.3 of Draft Operational Guidelines, approved by MROC on 8/22/05);

- Report amount stored annually or as Committee requests, but no more than 3 times per year (Item 1 .E.1 of Draft Operational Guidelines, approved by MROC on 8/22/05); and

- Triennial Monitoring Report (every 3 years) providing executive summary of ranch status (Item 2.H of June-July-August 2005 Principles, Monitoring, Reporting, Responsibilities, edited and approved by MROC on 8/22/05).

9.1 Responsibilities

MID is responsible for preparing and submitting all required reports to the MROC. To the degree that MID relies on information from 3rd parties to prepare a report and the 3rd party does not make the required information available, MID will make note of this in the impacted report and will not be held responsible for the missing information.

9.2 Quarterly Water Level Reports

MID will prepare and submit quarterly water level reports to the MROC according to the following schedule:

- 1st Quarter Report (January through March): by May 15th
- 2nd Quarter Report (April through June): by August 15th
- 3rd Quarter Report (July through September): by November 15th
- 4th Quarter Report (October through December): by February 15th

At a minimum, each report will include the following:

- A map depicting the locations at which water level measurements have been made;
- A tabulation of all water level measurements from all MOCP program wells since 1985;
- A hydrograph for each MOCP program well (both elevation and depth to water) since 1985;
- A listing of all wells (if any) in which water levels were within 30 feet of the ground surface;
- A listing of all operable irrigation wells in which water levels fell to the level of the pump intake (i.e. the well began to draw air);
- A listing of all wells (if any) for which the owner complained of failure, reduced productivity or other perceived water level impact;
- A listing of all wells in which water levels might rise to within 30 feet of the ground surface within 3 years based on extrapolation of water level measurements. The appropriate

extrapolation method is to be determined by MID although a published, peer reviewed 3rd party reference must be used as the basis for the chosen extrapolation method;

- A listing of all operable irrigation wells in which water levels might fall to the level of the pump intake within 3 years based on extrapolation of water level measurements. The appropriate extrapolation method is to be determined by MID although a published, peer reviewed 3rd party reference must be used as the basis for the chosen extrapolation method;
- A graph for each well depicting the 3 year moving average rate of water level rise/decline (feet/year). The appropriate averaging method is to be determined by MID although a published, peer reviewed 3rd party reference must be used as the basis for the chosen averaging method;
- A listing of all wells in which the 3 year moving average rate of water level decline during the most recent reporting period was more than that at any point in the baseline period from 1985-2005 (as reported in the document, "*Baseline Groundwater Level Report*," January 2006). For wells with insufficient baseline data, the baseline average for all wells within a 1-mile radius of the subject well may be used in this determination;
- A listing of all wells within which the 3 year moving average rate of water level decline is greater than 5 feet per year;
- A water level contour map (referenced to the geodetic vertical datum used by Reclamation) with the following identified features:
    - The Madera Ranch boundary;
    - Major roads;
    - MOCP program wells;
    - The average water level elevation in each MOCP program well during the quarter being reported;
    - Contour lines based on the average water level elevations;
    - Locations at which recharge was performed on Madera Ranch during the quarter being reported; and
    - Recovery wells that were used during the quarter being reported.
- A depth to water contour map with the following identified features:
    - The Madera Ranch boundary;
    - Major roads;
    - All MOCP program wells;
    - The average depth to water from ground surface in each MOCP program well during the quarter being reported;
    - Contour lines based on the average depth to water;
    - Locations at which recharge was performed on Madera Ranch during the quarter being reported;
    - Recovery wells that were used during the quarter being reported;
- A listing of MOCP program wells at which required measurements were not made during the last quarter (if any), the reasons for these omissions and plans to rectify the problem(s) or remove the well(s) from the program; and
- Summary of results of statistical analyses regarding potential impacts to 3rd party wells.

9.3 Semi-Annual Water Quality Reports

MID will prepare and submit semi-annual water quality reports to the MROC according to the following schedule:

- 1st Semi-Annual Report (January through June): by August 15th

- 2nd Semi-Annual Report (July through December): by February 15th

At a minimum, each report will include the following:

- A map depicting the locations at which samples were collected;
- A tabulation of all water quality measurements from all MOCP program locations since monitoring began at each location;
- A listing of all wells (if any) for which owners complained of quality, odor or taste problems;
- A graph of TDS concentrations versus time at each monitoring location, including a plot of the 3 year moving average TDS concentration;
- A listing of all wells in which TDS concentrations might rise above 500 mg/l within 3 years based on extrapolation of measurements (if any);
- A listing of all wells in which the following parameters were detected at concentrations above the indicated thresholds:
    - TDS (California Department of Health Services Secondary Maximum Contaminant Level, currently 500 mg/l)
    - Fecal coliform (any detection)
    - Chloride (California Department of Health Services Secondary Maximum Contaminant Level, currently 250 mg/l)
    - Nitrate (California Department of Health Services Maximum Contaminant Level, currently 45 mg/l)
    - Sulfate (California Department of Health Services Secondary Maximum Contaminant Level, currently 250 mg/l)
    - 1 ,2,3-Trichloropropane (all detections)

- A listing of MOCP program wells at which required samples were not collected during the last quarter (if any), the reasons for these omissions and plans to rectify the problem(s) or remove the location(s) from the program; and
- Results of statistical analyses regarding potential impacts to 3rd party wells.

Water quality reports are not required to include field data sheets or laboratory reports. However, copies of these back-up documents must be maintained at MID and made available for MROC members and well owners to review upon request.

In addition to the report specified above, each 3rd party well owner will be provided with a letter report presenting results from the most recent sampling event according to the same schedule as the semi-annual water quality reports.

9.4 Annual Water Accounting Reports

MID will prepare and submit water accounting reports to the MROC annually by March 1st of each year for the preceding year. At a minimum, each water accounting report will include tabulations of the following (both for the preceding year and cumulative since January 1, 2005):

- The volumes of surface water delivered to Madera Ranch;
- The volumes of evapotranspirative loss of water applied to direct recharge areas at Madera Ranch;
- The volumes of water directly recharged at Madera Ranch;
- The volumes of water left behind to aid in reduction of aquifer overdraft (10% leave

behind); and

- The volumes of water recovered from storage and delivered to MID customers.

9.5 Triennial Status Reports

MID will prepare and submit Project status reports to the MROC every three years with the first report due on March 1, 2009 and with subsequent reports by the same date every 3rd year thereafter. At a minimum, the reports will include the following:

- A summary of regulatory compliance;
- A summary of Project build-out and operational status;
- A summary of Project impacts to groundwater levels;
- A summary of Project impacts to groundwater quality;
- A summary of water accounting;
- A summary of subsidence monitoring results;
- A listing of complaints against the Project by adjacent landowners (if any) and the status of complaint resolution; and
- A summary of trends or issues of concern regarding water levels, water quality and/or subsidence and MID's approach to resolving these issues or concerns.

9.6 Reporting Formats and Availability

MID will deliver 1 copy of each required report to each MROC member by the dates specified above. The required reports will be large and in hard copy would require significant storage space. Therefore, MID can choose to deliver all reports to MROC members in an electronic format (e.g. Adobe PDF format) as long as at least one hard copy of each report is maintained for review at MID. As requested, MID will make available up to three additional electronic copies of each report available to MROC members.

As specified above, each 3rd party well owner will be provided with letter reports presenting results from water quality sampling events.

9.7 3rd Party Information Requests

From time-to-time 3rd parties may request copies of reports and/or monitoring data. MID will make the documents available for review at MID, with the exception of water quality reports sent to individual well owners. These later reports will be considered confidential unless a written release is received from the well owner by MID.

Data Evaluation, Operational Constraints and Mitigation

This section specifies evaluation procedures and operational protocols that will be used by MID to minimize and/or mitigate unacceptable impacts to 3rd parties as a result of Project operations.

9.8 Responsibilities

MID is responsible for compiling/evaluating data and corresponding with 3rd parties to:

- Make reasonable efforts to estimate if unacceptable impacts to 3rd parties may occur in the future as a result of Project operations relative to conditions that would have occurred absent the Project;
- Adjust Project operations to minimize unacceptable impacts to 3rd parties relative to conditions that would have occurred absent the Project;
- Respond to reasonable complaints of unacceptable impacts as a result of Project operations relative to conditions that would have occurred absent the Project;
- Determine if unacceptable impacts to 3rd parties have occurred as a result of Project operations relative to conditions that would have occurred absent the Project; and
- Adjust Project operations to prevent further unacceptable impacts to 3rd parties and/or mitigate unacceptable impacts to 3rd parties relative to conditions that would have occurred absent the Project.

The following figure depicts the process by which MID will evaluate data, respond to complaints, perform operational adjustments or mitigation. The MROC is responsible for resolution of disputes in which MID and a 3rd party are unable to reach agreement on appropriate mitigation measures.

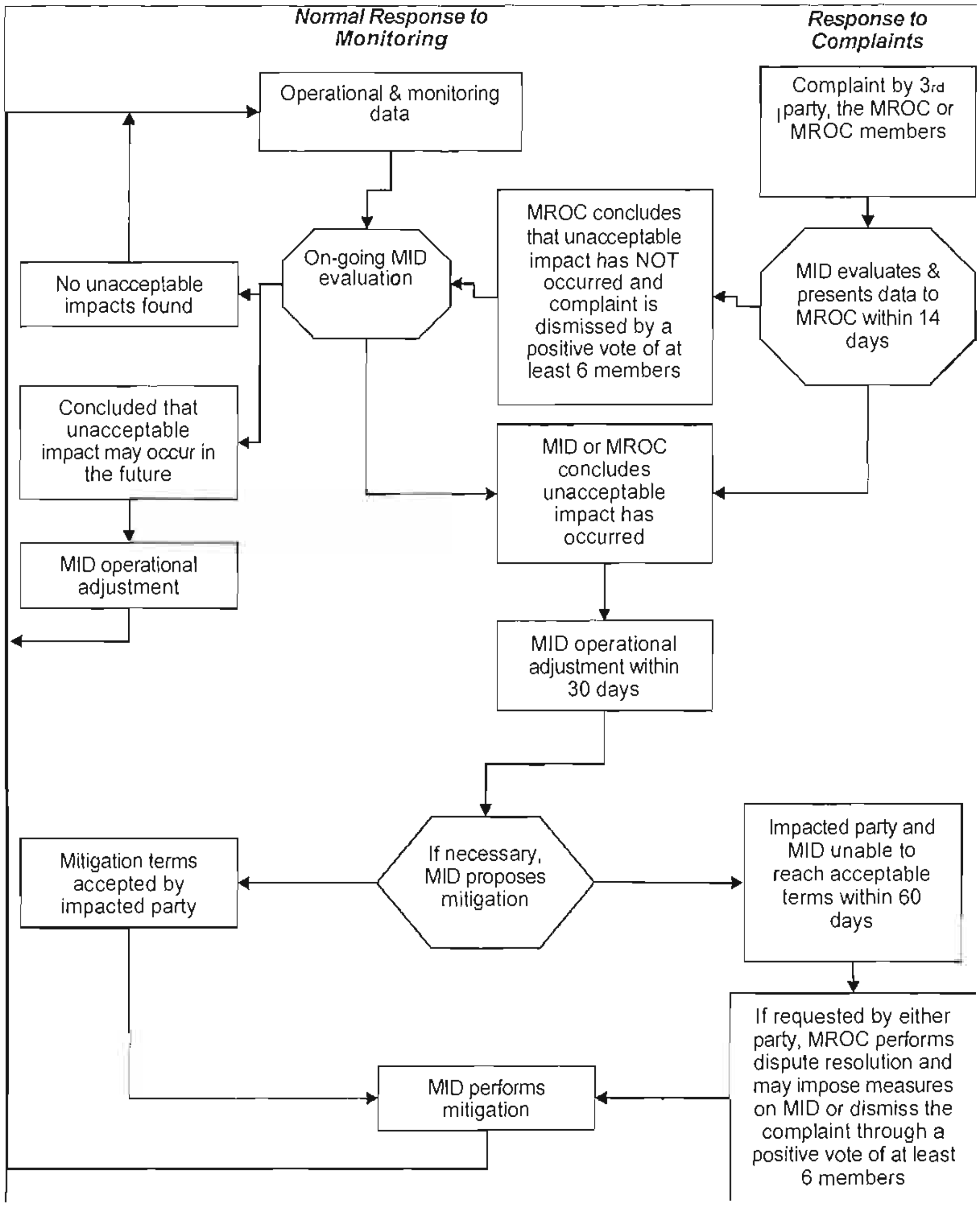

Figure 4: Operational Adjustment and Mitigation Decision Matrix

9.9 MID Evaluations

This section specifies evaluations that will be performed by MID to determine if unacceptable impacts have occurred or may occur as a result of Project operations relative to conditions that would have occurred absent the Project. Examples of problems that can occur from time to time in 3rd party wells include, but are not limited to the following:

- Groundwater levels rising within 30 feet of the ground surface outside of Madera Ranch;
- Well water levels dropping significantly, causing significant increases in pumping costs;
- Well water levels dropping below the point where 3rd party wells can operate adequately; and
- Water quality in 3rd party wells degrading to the degree that they cannot be used for their intended purposes.

The aquifer underlying the Project area has been in chronic overdraft for more than 50 years, characterized by dropping groundwater levels, groundwater quality degradation and periodic failure of wells as water levels drop below pump intakes. In addition, the area is also periodically subject to flooding which can cause temporary shallow groundwater conditions. Finally, old wells/pumps periodically fail or are impacted by installation of nearby wells by other farmers. Taken together, each of the potential Project impacts might also be caused by conditions that are not related to Project operations. Therefore, evaluation of monitoring data must include three levels of analysis as follows:

- Has an undesired condition occurred?
- Will an undesired condition occur if current trends continue?
- Are the undesired conditions impacts caused by Project operations?

The MOCP monitoring network includes a variety of wells anticipated to be outside of the area to be impacted by the Project. Data from these "background" wells will help to distinguish between Project impacts and unrelated trends. In addition, the document, "*Baseline Groundwater Level Report*," (January 2006) presents 20 years of pre-Project groundwater level variations in over 100 wells. Likewise, the land use and well status monitoring elements of this MOCP are designed to identify land/groundwater use changes that might impact wells independent of Project operations. Taken together, these data should enable MID to adequately answer the three questions posed above. A variety of statistical procedures are available to perform these evaluations. Some examples of commonly used guidance documents include the following:

USEPA, "Statistical analysis of groundwater monitoring data at RCRA facilities. Addendum to Interim Final Guidance", Office of Solid Waste, July 1992;

USEPA, "Statistical analysis of groundwater monitoring data at RCRA facilities - Interim Final Guidance", (April 1989); and

Ohio EPA's Division of Hazardous Waste Management, "Technical guidance Manual for Hydrogeologic Investigations and Groundwater Monitoring," February 1995

9.9.1 Water Level Evaluations

Baseline groundwater levels are defined as those groundwater levels that would occur in the absence of the Project. The determination of baseline levels can be complicated because they vary seasonally in response to irrigation pumpage (which changes from year to year as a function of well/pump age, weather and amount of irrigation) and are generally dropping over the long term in response to aquifer overdraft. As a consequence, even without this Project, future groundwater levels are anticipated to rise and fall – with a long term trend downward. These baseline variations must be taken into account when evaluating potential Project impacts. The statistical procedures that are appropriate will vary by parameter, location and time as more monitoring data are collected. Therefore, this MOCP cannot specify the procedures to be used. However, this MOCP does specify the decision framework as follows.

1) Within 14 days of receiving a complaint of unacceptable impact, MID will evaluate the complaint as outlined below.
2) Otherwise, on a quarterly basis, MID will review the graphs and tabulations specified for Quarterly Water Level Reports (Section 8.2).
3) The Quarterly Water Level Reports will include lists of wells which might be currently experiencing undesired conditions and a sub-set of wells which may in the future experience undesired conditions (see Section 8.2). MID will perform statistical analyses to filter out water level declines, water level increases and well/pump failures that are unrelated to Project operations. Factors that may be included in this filtering process include, but are not limited to:
   - Review and confirmatory collection of water levels to ensure that measurement or data entry error has not occurred;
   - Review of 3rd party complaints that are not validated by field measurements;
   - Review of recharge operations to filter out water level rises that had no correspondence to periods in which the Project recharged (even after taking into account time-lags);
   - Review of recovery operations to filter out water level declines that had no correspondence to periods in which the Project recovered (even after taking into account time-lags);
   - Review of baseline and background water level trends to determine which changes would have occurred absent Project Operations. This filtering will entail evaluation of baseline trends (1985-2005) and background trends in wells outside of the Project influence;
   - Review of changes in surrounding land uses (new wells, higher irrigation pumpage etc.) to filter out changes that were due to 3rd party operations unrelated to the Project.
4) Step 3 may provide MID with a sub-set of wells for which a 3rd party complained of undesired conditions, but for which MID has concluded that there was no unacceptable impact caused by Project operations. In these circumstances MID will notify the MROC and 3rd party of this finding within 14 days of the complaint. If the MROC agrees with MID's finding, the MROC can vote to dismiss the complaint by a positive vote of at least 6 members. If the MROC disagrees with MID's finding and MID has not reached acceptable terms with the 3rd party within 60 days of the complaint, the MROC can choose to impose an operational constraint or mitigation on MID by a positive vote of at least 6 members.

5) Step 3 will provide MID with a sub-set of wells which are apparently currently experiencing unacceptable impacts due to Project operations and a sub-set of wells that may experience unacceptable impacts in the future.
6) The list of wells that may experience unacceptable impacts in the future will be used by MID at its discretion to guide future operations. MID will not be obligated to perform operational adjustments in response to this list, but it will be in MID's interests to prevent unacceptable impacts before they occur.
7) The list of wells that are apparently currently experiencing unacceptable impacts due to Project operations will be used by MID as follows:
   - MID will contact the owner of the impacted well within 14 days of having made a determination of unacceptable impact to discuss potential mitigations and/or operational adjustments; and
   - At MID's discretion, the district can choose to propose any combination of operational adjustments or mitigations to resolve the problem. However, if after 60 days of the original finding, MID and the 3rd party have not reached mutually acceptable terms, either party may seek dispute resolution from the MROC and the MRPOC can choose to dismiss the complaint or impose an operational constraint or mitigation on MID by a positive vote of at least 6 members.

Potential operational adjustments that might be used by MID may include, but are not limited to shifting the locations, schedules and rates at which recharge and recovery are performed. Potential mitigations that might be proposed by MID may include, but are not limited to:

- Reimbursement for higher pumping costs;
- Well rehabilitation;
- Lowering a pump further down a well;
- Providing an alternate water supply; and
- Installation of a new well.

9.9.2 Water Quality Evaluations

Baseline groundwater quality is defined as that which would occur in the absence of the Project. The determination of baseline quality can be complicated because it can vary seasonally and in some areas is degrading over time in response to migration of contaminants, overdraft and overlying land use. As a consequence, even without this Project, future groundwater quality is expected to change with a long term trend of degradation in some areas. These baseline variations must be taken into account when evaluating potential Project impacts. The statistical procedures that are appropriate will vary by parameter, location and time as more monitoring data are collected. Therefore, this MOCP cannot specify the procedures to be used. However, this MOCP does specify the decision framework as follows.

1) Within 14 days of receiving a complaint of unacceptable impact, MID will evaluate the complaint as outlined below.
2) Otherwise, on a semi-annual basis, MID will review the graphs and tabulations specified for Semi-Annual Water Quality Reports (Section 8.3).
3) The Semi-Annual Water Quality Reports will include lists of wells which might be currently experiencing undesired conditions and a sub-set of wells which may in the future experience undesired conditions (see Section 8.3). MID will perform statistical analyses to filter out water quality changes that are unrelated to Project operations. Factors that may be included in this filtering process include, but are not limited to:

- Review and confirmatory collection of water samples to ensure that measurement or data entry error has not occurred;
- Review of 3rd party complaints that are not validated by field measurements;
- Review of recharge operations to filter out water quality changes that had no correspondence to periods in which the Project recharged (even after taking into account time-lags);
- Review of recovery operations to filter out water level changes that had no correspondence to periods in which the Project recovered (even after taking into account time-lags);
- Review of baseline and background water quality trends to determine which changes would have occurred absent Project Operations. This filtering will entail evaluation of baseline trends and background trends in wells outside of the Project influence;
- Review of changes in surrounding land uses (changed irrigation practices, new wells, higher irrigation pumpage etc.) to filter out changes that were due to 3rd party operations unrelated to the Project.

4) Step 3 may provide MID with a sub-set of wells for which a 3rd party complained of undesired conditions, but for which MID has concluded that there was no unacceptable impact caused by Project operations. In these circumstances MID will notify the MROC and 3rd party of this finding within 14 days of the complaint. If the MROC agrees with MID's finding, the MROC can vote to dismiss the complaint by a positive vote of at least 6 members. If the MROC disagrees with MID's finding and MID has not reached acceptable terms with the 3rd party within 60 days of the complaint, the MROC can choose to impose an operational constraint or mitigation on MID by a positive vote of at least 6 members.
5) Step 3 will provide MID with a sub-set of wells which are apparently currently experiencing unacceptable impacts due to Project operations and a sub-set of wells that may experience unacceptable impacts in the future.
6) The list of wells that may experience unacceptable impacts in the future will be used by MID at its discretion to guide future operations. MID will not be obligated to perform operational adjustments in response to this list, but it will be in MID's interests to prevent unacceptable impacts before they occur.
7) The list of wells that are apparently currently experiencing unacceptable impacts due to Project operations will be used by MID as follows:
   - MID will contact the owner of the impacted well within 14 days of having made a determination of unacceptable impact to discuss potential mitigations and/or operational adjustments; and
   - At MID's discretion, the district can choose to propose any combination of operational adjustments or mitigations to resolve the problem. However, if after 60 days of the original finding, MID and the 3rd party have not reached mutually acceptable terms, either party may seek dispute resolution from the MROC and the MRPOC can choose to dismiss the complaint or impose an operational constraint or mitigation on MID by a positive vote of at least 6 members.

Potential operational adjustments that might be used by MID may include, but are not limited to shifting the recharge water types, locations, schedules and rates at which recharge and recovery are performed. Potential mitigations that might be proposed by MID may include, but are not limited to:

- Reimbursement for treatment costs;
- Installation of treatment systems;
- Providing an alternate water supply; and
- Installation of a new well.

9.9.3 Subsidence Evaluations

Annual subsidence surveys will be used to determine if Project recovery operations are causing ground surface elevations to decline. The data from each annual survey will be compared to previous surveys within 30 days of each annual survey to determine if:

- The elevation at any single location has decreased repeatedly for 3 consecutive surveys;
- The elevation at any single location has decreased more than 0.25 feet (7.6 cm) from the previous survey; or
- The elevations at more than 50% of the survey locations have decreased more than 0.1 feet (3 cm) from the previous survey.

If any of the conditions cited above occur, MID will report the finding to the MROC along with recommendations regarding appropriate next steps to determine if an unacceptable impact is occurring as a result of Project operations. The MROC may choose to impose an operational constraint or mitigation on MID by a positive vote of at least 6 members.

9.10 MID Response to 3rd Party Complaints and MROC Dispute Resolution

As detailed in the previous sections, MID will be obligated to respond to 3rd party complaints of undesired conditions according to the following schedule:

- Within 14 days of MID receipt of the complaint MID will perform evaluations and report back to the MROC and complainant;
- The MROC can choose to conclude that an unacceptable impact has not occurred and can dismiss a complaint through a positive vote of at least 6 members;
- If MID or the MROC concludes that the complaint is valid, within 30 days of MID receipt of the complaint, MID will perform operational adjustments and if necessary propose mitigation measures to the complainant; and
- If mutually acceptable terms for resolution of the complaint have not been reached within 60 days of the complaint, MID or the 3rd party can seek dispute resolution from the MROC and the MROC can dismiss the complaint or impose an operational constraints or mitigation measures on MID through a positive vote of at least 6 members.

MID will keep a separate file for each complaint with dated records regarding date received, results of evaluations, correspondence with the 3rd party and ultimate resolution. MID will make these files available for MROC review upon request. If a complaint is first received by the MROC, it will be promptly forwarded to MID and the schedule specified above will track from the date that the complaint is received by MID.

MID may incur significant costs and time in responding to, verifying and evaluating various complaints. In the event that it is found that the Project did not cause an unacceptable impact, MID may seek reimbursement from the 3rd party for incurred costs. However, MID is obligated to advise the 3rd party of this potential outcome in advance of incurring the costs.

In the event that MID or the 3rd party seeks dispute resolution from the MROC, the process will be performed in accordance with the following procedures.

- The MROC will review all relevant data and facts regarding the dispute and, if possible, recommend fair and equitable resolution of the dispute. The MROC and its members shall not act in an arbitrary, capricious or unreasonable manner;
- MROC dispute resolution decisions will be approved by a positive vote of at least 6 members;
- MROC imposed mitigation measures will follow the philosophy of restoring a 3rd party's water supply conditions to those that would have been present absent the Project;
- MROC imposed mitigation measures will be limited to reparation of the unacceptable impact. MROC will not have the authority to impose consequential damage measures or punitive measures. At no time will the MROC impose measures beyond those necessary to restore water supply conditions to those that would have existed absent the project; and;
- From time to time, the MROC may need to retain attorneys, technical experts or consultants to aid in a dispute resolution process. In these circumstances, the party which loses (the non-prevailing party) in the dispute resolution ruling will be responsible for payment of these costs.

In the event (1) the MROC fails to act herein provided, (2) any party disputes the MROC recommended resolution or (3) any party fails to implement the MROC recommended resolution; the MROC, MID or the complainant may seek any legal or equitable remedy available as provided below.

Arbitration: If all of the parties agree that a factual dispute exists regarding any recommendation of the MROC made pursuant hereto, or implementation thereof, such disputes shall be submitted to binding arbitration before a single neutral arbitrator appointed by unanimous consent, of all of the parties, and in the absence of such consent, appointed by the presiding judge of the Madera County Superior Court. The neutral arbitrator shall be a registered civil engineer, preferably with a background in groundwater hydrology. The arbitration shall be called and conducted in accordance with such rules as the contestants shall agree upon and, in the absence of such agreement, in accordance with the procedures set forth in California Code of Civil Procedure, Section 1282 et seq. Any other dispute may be pursued through a court of competent jurisdiction as otherwise provided by the law.

3rd Party Remedies: Nothing in this MOCP shall prevent any 3rd party from pursing any remedy at law or in equity from judicial relief in the event such 3rd party is damaged as a result of the Project.

10 Funding of Monitoring, Committee Activities and Mitigation

MID is the owner and operator of the Project and will therefore fund the following activities:

- Implementation of all monitoring, data management, evaluation and reporting activities specified in this MOCP;
- MID will make MID's board room reasonably available for MROC meetings;
- All operational adjustments and mitigation measures agreed upon with 3rd parties or imposed on MID by the MROC; and
- Payment of attorney, technical expert or consultant costs incurred by the MROC while arbitrating a complaint that is ultimately ruled by the MROC in favor of a 3rd party.

Each of the parties participating in the MROC will be responsible for the personnel and travel costs of its representative on the MROC.

MID may seek reimbursement from 3rd parties for time and costs incurred by MID in responding to 3rd party complaints that were found to not be caused by Project operations. However, MID is obligated to advise the 3rd party of this potential outcome in advance of incurring the costs. Likewise, the MROC may seek reimbursement from 3rd parties for costs for complaints that are ultimately ruled in favor of MID.