WATER SUPPLY

Testimony: Robert Harrington, Ph.D, RG, Director, Inyo County Water Department

I. INTRODUCTION

A. **Qualifications**: Dr. Harrington's qualifications are as noted in the general statement of his qualifications and his resume contained in Appendix A to the County's General Project Comments.

B. **Prior Filings**: In addition to the statements provided herein, this testimony includes by reference the following documents submitted in this proceeding:

1. Inyo County Response to Notice of Intent to Prepare Environmental Impact Statement. Dated: December 6, 2011; Posted: December 13, 2011.

2. Inyo County PSA Comments. Received: July 25, 2012.

3. Letter from the BLM to Mike Monosmith transmitting the BLM's water-related concerns and proposed mitigation measures for HHSEGS. Received: March 12, 2012.

4. Mitigation for the Hydrological Impacts of the Proposed Hidden Hills Solar Project as Proposed by the County Of Inyo. Received: January 30, 2012.

C. Attachments:

1. Memorandum from Bob Harrington, Water Director, to Dana Crom, Deputy County Counsel dated January 16, 2013 presenting comments on the Hidden Hills Solar Electric Generating System –Water Supply Section of the California Energy Commission Final Staff Assessment.

2. Memorandum from Robert Harrington, Ph.D, R.G, to Mike Monosmith presenting "Comments on Preliminary Staff Assessment for the Hidden Hills Solar Energy Generating System"

II. TESTIMONY

The Final Staff Assessment (FSA) for the Hidden Hills Solar Electric Generating System (HHSEGS) contains an assessment of the water supply for HHSEGS in section 4.14. The FSA arrived at five conclusions with seven associated conditions of certification aimed at addressing

issues related to water supply. Four of these conclusions (FSA pages 4.14-1 – 4.14-2) are used below as a framework for commenting on water supply aspects of HHSEGS.

Conclusion #1. Concerning overdraft in the Pahrump Valley groundwater basin, the FSA concludes that:

> The proposed project would exacerbate overdraft conditions in the Pahrump Valley groundwater basin. WATER SUPPLY-1 would require the proposed project to mitigate for its groundwater use by offsetting it with groundwater pumping reductions that would constitute a real water savings for the basin. Such mitigation could only be effective if pumping reductions are associated with a real pumping history and could not be replaced by other unused water rights.

There is no disagreement that the basin is in overdraft. Condition of Certification WATER SUPPLY-1 adequately mitigates HHSEGS's contribution to overdraft.

Conclusion #2. Concerning the amount of water supplied to the HHSEGS, the FSA concludes that:

> Potential project impacts must be consistent with those analyzed. Staff thus proposes Condition of Certification WATER SUPPLY-2 which limits the applicant's water use and WATER SUPPLY-3, which requires the applicant to construct and report well-related information in accordance with appropriate LORS and install metering devices to ensure accurate reporting of water use.

The duration of the construction period should be specified in WATER SUPPLY-2. Rather than leaving the length of the construction period undefined, WATER SUPPLY-2 should be modified to require that the project's groundwater use shall not exceed 288 acre-feet per year for the first three years following the start of construction, and shall not exceed 140 acre-feet per year for the period commencing either for the fourth year following start of construction, or on the completion of construction, whichever occurs sooner. This would avoid potential inconsistencies between the amount of pumping analyzed in the FSA and the actual amount of pumping, should the construction period extend beyond three years.

Conclusion #3. Concerning water level declines near HHSEGS, the FSA concludes that:

> The proposed project pumping could exacerbate water level declines in the project vicinity. To prevent such declines from becoming significant impacts, staff proposes a monitoring plan: WATER SUPPLY-4 monitors groundwater conditions for potential impacts on existing neighboring wells, groundwater dependent vegetation, the Stump Spring Area of Critical Environmental Concern (ACEC), and groundwater quality. The monitoring is designed to prevent

> potential impacts to groundwater dependent vegetation, among the other concerns noted above, and therefore also compliments conditions recommended in the Biological Resources section. WATER SUPPLY-5 mitigates for pumping induced drawdown impacts in existing wells. WATER SUPPLY-6 recommends a plan to monitor land subsidence as a result of declining water levels and aquifer dewatering that potentially may occur as a result of pumping.

To address concerns that have been raised over the effect of HHSEGS on off-site groundwater wells and groundwater-dependent habitat, a thorough groundwater elevation and groundwater quality monitoring program is needed, and, in general, WATER SUPPLY-4 fulfills this need.

There are two points that require clarification.

WATER SUPPLY-4 section D.2.e and f are aimed at compensating adversely affected neighboring well owners. It should be clarified that the level at which it may be necessary to lower pumps or deepen wells is the water level in the well while the well in question is operating, not under static conditions.

Inyo County must comply with the California Groundwater Elevation Monitoring Program with regard to reporting groundwater elevations in the basin where the project is located. In the FSA, responding to comments 1.11 and 1.12, CEC staff asserts that "The revised conditions would ensure that the project owner shares their groundwater elevation data with the county." In order to ensure that these data are shared with the County, the verification section of WATER SUPPLY-5 Section D (page 4.14-88) should be modified to include Inyo County as a recipient of the data that the project owner shall submit to the CPM. This modification pertains to items #3 and #5 on page 4.14-18.

Conclusion #4. Concerning effects of the HHSEGS on groundwater flow to the Amargosa River, the FSA concludes:

> Given the lack of evidence for a hydraulic connection, the relatively large intervening distance (about 20 miles), and uncertainty in potential flow barriers and permeability contrasts within the subsurface it would be speculative to conclude that project pumping would adversely affect the Amargosa River. There is no available data that identifies groundwater flow paths or confirms a hydraulic connection between PVGB and the Amargosa River, so the water consumed by project pumping may or may not be a source of inflow to the Amargosa River. Although staff concludes that a significant impact due to project pumping is unlikely, WATER SUPPLY-1 which requires an offset of project water use in the

PVGB would ensure there is likely no net overall change in subsurface outflow from the PVGB that might affect the Amargosa River.

Inyo County is concerned about potential effects of the project on down-gradient groundwater users and groundwater-dependent habitat in the China Ranch/Amargosa River/Tecopa area. While there may be a lack of evidence for a hydraulic connection and uncertainty about flow barriers and permeability contrasts, this absence of data cannot be construed as indicating that the connection does not exist, it simply means there is a lack of data. Absence of data does not justify a conclusion that adverse effects will not occur. That conclusion can only come from evidence that a hydraulic connection does not exist and that an adverse impact will not occur.

That said, in light of the large intervening distance and the proposed pumping rate, conditions of certification BIO-23, WATER SUPPLY-1, WATER SUPPLY-2, and WATER SUPPLY-5 are sufficient mitigation for potential down-gradient effects outside the Pahrump Valley groundwater basin.

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COUNTY OF INYO
WATER DEPARTMENT

July 13, 2012

TO: Mike Monasmith, Project Manager
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California Energy Commission
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Sacramento, California 95814

FROM: Robert Harrington, Ph.D, R.G.
Director, Inyo County Water Department

SUBJECT: Comments on Preliminary Staff Assessment for the Hidden Hills Solar Energy Generating System

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Thank you for the opportunity to comment on the Hidden Hills Solar Energy Generating System (HHSEGS) Preliminary Staff Assessment (PSA). Also, the CEC is to be commended for the thorough, transparent, and accessible public process conducted for this project. The following comments pertain to Section 4.15 (Water Supply) and parts of Section 4.2 (Biological Resources) that pertain to groundwater-dependent vegetation.

Comment #1: Hydrologic analysis. The emphasis of the conditions of certification associated with groundwater extraction should be on monitoring to detect off-site reductions in groundwater elevation. In response to data request #141, the applicant conducted an aquifer performance test (APT) to observe the groundwater system's response to pumping. The PSA, as well as discussions at status conferences and public workshops, have placed considerable emphasis on the results of APT. The applicant has used the APT results to argue that the project will have no off-site impacts to the groundwater system; CEC staff argues in the PSA that the applicant has misinterpreted the ATP results; and other parties have criticized the conduct of the APT. The applicant and CEC staff presented a number of interpretations of the APT results, all of which necessarily simplify the hydrogeologic system; however, there is insufficient data to settle on one single interpretation as the correct rendition of the hydrologic system. In general, the simple analytical models such as used by the applicant and CEC staff to interpret the APT results do not provide a single, uniquely correct interpretation of the aquifer system; multiple interpretations may fit the test results equally well. We agree with CEC staff's analysis that stabilization of the Orchard Well's cone of depression was probably due to leakage from an unidentified source. There is insufficient information to determine whether the leakage is from an underlying, overlying, or adjacent aquifer. The applicant argues that the regional gradient stabilized the cone of depression. In general, a developing

cone of depression is additively superimposed on a regional gradient, and the transient effects resulting from a pumping well are unaffected by the presence of a regional gradient. There is insufficient evidence in the record to show that this general feature of groundwater systems is, for some reason, not applicable to the project site, so we disagree with the applicant's contention. Further, we agree with CEC staff's contention that partial penetration of the APT monitoring wells may have affected the test results, and was not accounted for in any APT analysis.

The APT provided useful information related to conditions near the pumped wells, but extrapolating results from a test that spanned a few days into an assessment of impacts over the life of the project is inherently uncertain. Additional testing for a week or a month will not eliminate this uncertainty, so the CEC is faced with developing its final staff assessment based on inconclusive data. A high level of hydrogeologic uncertainty is not unique to this project; rather, it is typical when making hydrogeologic predictions involving new stresses on an aquifer system. For example, not far to the north of the project area, billions of dollars have been spent evaluating the Yucca Mountain Nuclear Waste Repository, yet great uncertainty still remains as to the likelihood of radionuclides escaping the repository via the groundwater system. For HHSEGS, because the assessment of impacts is inconclusive, the most viable way for the project to proceed is to require monitoring that will allow tracking of impacts to the groundwater system as they develop during the life of the project, so that mitigation can be implemented if it becomes apparent that groundwater dependent resources will be impacted. This approach is reasonable and feasible for HHSEGS. The applicant predicts that the modest amount of pumping proposed for this project will have negligible off-site effects; therefore, from a hydrogeologic perspective, all that is required is monitoring sufficient to verify the applicant's contention, and mitigation measures that become active if monitoring shows that the applicant's contention was wrong.

We support the provisions of WATER SUPPLY – 6A and 8A and for a monitoring well network, and recommend that conditions of certification WATER SUPPLY – 6A and 8A be modified to include the following:

> In cooperation with USBLM, the applicant shall fund and construct a monitoring well approximately ½ mile west of the Stump Springs ACEC for inclusions in the monitoring well network.

Comment #2: Triggers for mitigation actions. We do not see in the PSA a mechanism to avoid impacts by tracking groundwater level changes and taking action to reduce or stop pumping before negative impacts occur. Mitigation measures Bio – 23 and Water Supply – 8C do not require that action be taken until vegetation vigor has declined by 20%, which may be well past the point where moderating pumping would avoid impacts. Groundwater level declines necessarily precede pumping-induced declines in soil moisture and vegetation condition; therefore, observations of water level change can be used to anticipate negative impacts and manage pumping to avoid them.

Vegetation conditions are affected by numerous factors. Our experience in Owens Valley has been that using vegetation condition as a trigger to control pumping is less reliable than using groundwater levels. We recommend that mitigation actions be triggered by changes in groundwater levels, and vegetation monitoring be used as a check to evaluate the effectiveness of the triggering mechanism, so that the water-level based triggering mechanism can be modified if the vegetation monitoring shows that vegetation conditions are declining due to water table withdrawal.

We recommend using the monitoring well network as an early warning system, and that action be taken based on observed declines in groundwater levels to avoid significant impacts. Action levels can be

determined using predictive hydrologic modeling tools to associate observed water level changes in monitoring wells with quantitative measures of significant impact at groundwater dependent resources. In groundwater systems where pumping continues for long periods of time and large areas are affected, groundwater levels at sensitive resources may continue to decline even after pumping has stopped; therefore, special care should be given to account for delayed water table recovery at sensitive resources. To this end, we recommend that BIO-23.3 be replaced with the following:

> Based on the results of inventory of groundwater-dependent and groundwater-influenced habitat and resources produced under BIO-23, subparagraph 13, an amount of water table drawdown that would cause a significant impact to GDEs shall be identified. Using drawdown curves calculated using representative aquifer parameters applied to the Theis method, determine the maximum pumping rate that will not exceed the threshold of significant drawdown at GDEs over the life of the project. Using this pumping rate and these aquifer parameters, determine the maximum drawdown that could occur within each monitoring well located between the project and the GDEs without exceeding the threshold of significant drawdown for any GDE. If drawdown in any monitoring well exceeds the drawdown that corresponds to a threshold of significant drawdown for any GDE, the project owner shall have 90 days to provide evidence to the CPM that the drawdown is not a result of groundwater pumping by the project. If after reviewing the evidence provided by the project owner and other relevant evidence, the CPM, in consultation with BLM Nevada and California state leads for Soil, Water, Air and Riparian Programs, the BLM Southern Nevada District Hydrologist and Botanist and the Inyo County Water Department concludes that the drawdown is due to groundwater pumping by the project, the CPM shall notify the project owner that its groundwater pumping is to cease.
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> Subsequently, the project owner may resume pumping if the CPM, in consultation with BLM Nevada and California state leads for Soil, Water, Air and Riparian Programs, the BLM Southern Nevada District Hydrologist and Botanist and the Inyo County Water Department concludes that the exceedence of the drawdown trigger(s) was due to factors other than the project's pumping, and that the project's groundwater pumping did not contribute to the trigger exceedence, or the water table recovers to baseline levels.

Condition of certification BIO-23 is unclear as to what measure of vegetation condition will be used to determine if action is necessary. On page 4.2-234, a significant impact is described as "decline in health of any groundwater-dependent species of 20 percent or more." Elsewhere, a less than significant impact is defined as "less than 20 percent change from the baseline condition" (p. 4.2-233), "20 percent above baseline" (p. 4.2-235), and on pages 4.15-43 – 44, one of the criteria given for reducing pumping is given as "the significance threshold for decline in plant vigor is reached." This mitigation measure and related water supply mitigation measures should clearly define what methods and variables will be used to assess vegetation health or vegetation vigor, and use consistent terminology throughout.

BIO-23 discusses whether changes are correlated solely to regional drought conditions. It is unclear whether the correlation with drought conditions is applied to vegetation conditions, hydrologic conditions, or both. We recommend that this concept be broadened to allow the applicant to resume pumping if the applicant can show that the trigger exceedence was caused by some other factor than the applicant's pumping.

BIO-23.9 requires that offsite reference plots have similar species assemblages, depth to groundwater, and lithology to sites of concern. Other considerations in identifying valid reference sites are similarity

in climate, geomorphic position, soils, elevation, potential evapotranspiration, runoff/runon status, depth to water variability, site disturbance, and water quality. We recommend that numerous control sites be monitored in order to reduce the effect of monitoring site idiosyncrasies on management decisions. We have found that locating truly valid control plots is challenging because of the many factors that may invalidate a plot, and that the validity of plots needs to be reassessed as time goes on and plots are subject to later disturbances.

Comment #3: Water-related compliance with Inyo County Code Title 21. The CEC should use Inyo County Code Title 21 as a framework for analyzing groundwater-related impacts. PSA page 4.15-3 lists local laws, ordinances, regulations, and standards related to groundwater use by the project. Inyo County Code Title 21, Renewable Energy Development, was omitted from this list. Were it not for the CEC's sole permitting authority over the HHSEGS, this project would be subject to Title 21. Title 21 provides that:

> As a condition to the issuance of a renewable energy impact determination or a renewable energy permit, the county planning commission may, in the case of a renewable energy impact determination, incorporate, and in the case of a renewable energy permit, impose such reasonable and feasible mitigation measures as it finds to be necessary to protect the health, safety and welfare of the county's citizens, the county's environment, including its public trust resources, and to ensure that the county and its citizens do not bear an undue financial burden from the project. (Ord. 1158 § 3, 2010.)

To implement Title 21, County staff would develop and recommend mitigation measures for consideration by the Planning Commission. To protect the County's citizens and environment from impacts related to groundwater pumping, staff would develop and recommend a mitigation plan according to this outline:

1) The Project Owner shall cooperate with the County to complete an inventory of non-project wells potentially affected by the Project that identifies the owner of each well and includes the location, depth, screened interval, pump depth, static water level, pumping water level, and capacity of each well. For each such well, the Project Owner shall assess any projected impact of the Project on the well and shall develop and submit a plan for monitoring and mitigating any adverse effects on the well, including thresholds where mitigation activities would be undertaken. The plan should include, as feasible, agreements from the owner of each well approving monitoring activities. Monitoring should include both groundwater elevation and water quality. Mitigations should include deepening or replacing wells that become inoperable due to Project pumping, monetary compensation for additional pump lift incurred by Project pumping, and mitigation for impacts to water quality.

2) The Project Owner shall complete and provide to the County an inventory of groundwater-dependent or groundwater-influenced habitat and resources that may be potentially affected by the Project. The inventory should identify and describe habitat and resources dependent on or influenced by groundwater, including spring flow, baseflow to streams and rivers, phreatophytic meadows, phreatophytic scrub, and riparian areas. For each habitat or resource identified, quantitative measures of what constitutes a significant impact to such habitats and resources should be identified and associated with corresponding amounts of water table drawdown, a monitoring program should be developed that is sufficient to assess potential impacts to the habitats and resources, and mitigation measures should be identified that will be implemented if significant impacts to such habitats and resources should occur. The preferred form of

mitigation is avoidance of adverse effects on habitat and resources by modifying, reducing, or ceasing groundwater pumping by the Project if adverse impacts are projected as a result of prior evaluations and monitoring results.

3) The Project Owner shall develop a model for predicting changes in the groundwater flow system resulting from the Project which has the capability to assess changes in hydraulic head, flow rate, flow direction, and water budget. The Project Owner shall also provide to the County model runs which predict effects of the planned groundwater pumping by the Project on the habitats and resources described above and predictions of the level of groundwater pumping that will cause significant impacts on such habitats and resources. The Project Owner shall also use the model to provide an evaluation of the sustainability of the water supply for the life of the project, including the cumulative sustainability when considered with other pumping occurring or projected to occur in the groundwater basin.

4) The Project Owner shall develop and provide to the County the following:

    a. A plan for a network of monitoring wells (either existing or to be constructed) to be regularly monitored together with a schedule for reporting water levels in the wells to the County by the Project Owner. Construction of production and monitoring wells (water level monitoring should be initiated as soon as wells are available and results will be publicly available);

    b. A plan for logging and aquifer testing of all new production wells;

    c. A plan for monitoring and reporting on the impacts of the Project on private wells and on habitats and resources described above.

    d. A plan for verifying the predictive tools described above and for revising or recalibrating the tools during project operation.

    e. A plan for revising thresholds as dictated by new data concerning system response to Project operation.

    f. An enforceable commitment based on monitoring data and significance thresholds, to implement mitigation measures as necessary.

Comment # 4: Water Use Offset Plan (page 4.15-32). Condition of Certification Water Supply – 1 requires that the Project Owner shall submit a plan "showing that it will replace 4,900 acre-feet or 163 AFY and the [Project Owner] shall undertake one or more of the activities identified below to mitigate project overdraft impacts…" In this section, it is unclear what types of activities are contemplated. Activities such as retirement of water rights, development of artificial recharge, or salvage of phreatophyte transpiration could each be thought of as activities that replace water in an overdrafted aquifer, but these activities each have differing environmental and economic considerations. This condition of certification should be more specific regarding what activities it encompasses.

If acquisition and retirement of water rights in Pahrump Valley is approved under this condition of certification, the CEC should require that the retired rights are currently being exercised. Since the amount of permitted groundwater rights in Pahrump Valley is far greater than actual pumpage, it is clear that there are permitted rights to pump groundwater that are currently unexercised. If rights are acquired and retired that are currently not being used, there would not be an actual reduction in

groundwater extraction. Retirement of water rights is effective as mitigation only if the retirement results in an actual reduction in pumping, and even then, it is only mitigation for basin-wide overdraft. Water rights retirement does not in any way mitigate for any impacts that might occur to groundwater dependent resources affected by project pumping unless the retirement results in the water table rising in the affected area. This is unlikely to happen unless the retired water rights are located approximately equidistant to the affected area as the project is to the affected area.

This condition should require that the applicant provide records showing that any water rights retired for the purpose of satisfying this condition of certification were actually being exercised. When determining how much water use offset should be credited to a water right, the offset should be based on consumptive use of groundwater, not the total water right or the total amount of water pumped. For example, if a water right that was being used for irrigation is acquired for water offset, the offset should be for the amount of water lost to evapotranspiration, not the amount permitted or the amount pumped.

Comment #5: Compliance with California mandates for groundwater elevation monitoring. This project hampers Inyo County's ability to comply with state-mandated groundwater monitoring requirements. The State of California enacted legislation in 2009 (SBX7-6, Statutes of 2009, Seventh Extraordinary Session, chaptered as Water Code 10920 et seq.) that requires all groundwater basins and subbasins delineated in *California's Groundwater*, the Department of Water Resources' (DWR) Bulletin 118-2003, to be monitored for seasonal and long-term trends in groundwater elevation. The data collected is required to be reported to DWR who will in turn compile the data in an online system that is accessible to the public. The law identifies numerous entities such as counties, cities, water districts, and groundwater monitoring cooperatives that may assume responsibility for the monitoring. Notably, state, tribal, and federal agencies are not among the eligible monitoring entities.

To fulfill the requirements of the legislation, DWR initiated the California Statewide Groundwater Elevation Monitoring Program (CASGEM). Participation in CASGEM by local entities is voluntary; however, if no eligible local party volunteers to become the designated monitoring entity, DWR may undertake the groundwater elevation monitoring. If DWR assumes responsibility for the groundwater monitoring, nonparticipating eligible monitoring entities may lose eligibility for water grants and loans awarded or administered by the state. Naturally, Inyo County is concerned about the potential for losing eligibility for these grant funds, and wishes to comply with the requirements of CASGEM. No funding was provided in the legislation for local entities to implement this new state program.

SBX7-6 does not allow for exceptions to its requirement that groundwater elevations be monitored in all groundwater basins. In many remote desert basins in Inyo County, designation as federal wilderness or military uses render it impossible to construct monitoring wells, and additionally, many other basins have no significant groundwater pumping. To address these flaws in the SBX7-6 legislation, in August 2011, legislation passed (AB 1152) amending Water Code Sections 10927, 10932, and 10933, and authorizing that a monitoring entity may report groundwater elevations using specified alternate monitoring techniques for certain groundwater basins and subbasins meeting prescribed conditions. AB 1152 allows that, at DWR's discretion, a monitoring entity may use alternative monitoring techniques to assess whether groundwater conditions in a basin are changing. Alternative monitoring techniques may be approved by DWR if groundwater elevations are unaffected by land use activities or planned land use activities.

Approval of HHSEGS will invalidate any argument by Inyo County that the California portion of Pahrump Valley, California Valley, and Middle Amargosa Valley are unaffected by land use activities; therefore,

the County will be required to either develop a program for reporting groundwater elevations to DWR, or be ineligible for state water grants and loans. In order to comply with CASGEM requirements, the County could use the groundwater elevation monitoring data proposed in condition of certification Water Supply – 6.C.4 and Water Supply – 8.C.5 if those data are made available to the County. To that end, we request that the conditions of certification be modified to require that:

> Groundwater elevations shall be measured throughout the life of the project at least twice per year, and reported to the CPM and to the Inyo County Water Department. The County will report these data to the California Department of Water Resources as part of the California Groundwater Elevation Monitoring Program.

Comment # 6: Water Level Monitoring for Neighboring Wells, Mitigation, and Reporting (Pages 4.15-36 – 4.15-40). Concerning section A.2, we understand from discussion with CEC staff that the well network will include at a minimum one well at the ***southern*** end of the site. Development of water level maps within the Pahrump Valley, as required by A.4, will require a network of more than the one well indicated in A.2. Section C.3 requires that an owner provide documentation of the well location, construction, and pump intake depth. Some well owners may not have all of this information available, particularly pump intake depth. The Project Owner should be required to assist well owners with developing this information if the information is not readily available to the well owner. Concerning section C.5, monetary compensation should be on an annual basis only so that this payment transfers to any new owner of the land.

Comment # 7: Corrections. On page 4.15-11, Table 2, there appears to be an error in determining the median value. The Stateline well has a trend of -0.237, but the overall median is given as -0.273 at the bottom of the table and in the text at the bottom of page 4.15-10.

The language in WATER SUPPLY 8.C.6 appears to be more applicable to domestic wells. Likewise for the language at the top of page 4.15-45.

On page 4.15-13, in the definition of the variables for Equation 2, time should be lowercase t.