BEFORE THE DEPARTMENT OF WATER RESOURCES

OF THE STATE OF IDAHO

IN THE MATTER OF THE MITIGATION COMPUTATIONS IN WATER DISTRICT 120 FOR THE SURFACE WATER COALITION	))))))	**IDWR'S RESPONSE TO SURFACE WATER COALITION'S COMMENTS AND FIRST QUESTIONS ON DIRECTOR'S 2009 PROTOCOL**

A. General Comments and Questions about the Protocol:

Question No. A1: What is the underlying authority for adopting a Protocol, and what is the appropriate procedure for adopting it? It is our understanding the Director has initiated a separate contested case entitled *In the Matter of the Mitigation Computations in Water District 120 for the Surface Water Coalition.* Consequently, Minidoka Irrigation District is filing, concurrent with these comments, a *Petition for Review of Director's Interlocutory Orders and Request for Hearing*. Therefore, we presume that IDWR's "Rules of Procedure" (IDAPA 37.01.01 *et seq.*) now apply to this matter. If the Director believes a different procedure is being employed please advise. In addition, because the Protocol seeks to establish IDWR policy for rather broad issues that affect or may affect a significant population of citizens, should the Protocol be adopted as a rule?

Answer No. A1: The underlying authorities for adopting a Protocol are: (1) the requirement for the Director to administer water rights in accordance with the provisions of Chapter 6, Title 42, Idaho Code; and (2) the Conjunctive Management Rules, which provide the framework for integrating delivery of groundwater and surface water in response to delivery calls.

Question No. A2: The Protocol continues the myth that conjunctive administration can be successfully implemented on a single year basis. The impacts of groundwater pumping are multi-year and need to be administered as such. Continuing single year water replacement plans will not lead to a stable environment for either the surface or groundwater users, particularly when these plans are not even submitted or approved until well into the irrigation season. The Director's Final Order (Conclusion of Law 14) found that water replacement plans can be used only for the short-term, but once a hearing record is available, a mitigation plan must be filed and processed in accordance with Rule 43 of the CMRs. The groundwater users are now under obligation to submit a mitigation plan that fully complies with CM Rule 43, including assuring that long-term injury is fully mitigated. The Protocol and the replacement plans offered since 2005 have attempted to only address year-to-year shortages, at best, and cannot fully satisfy CM Rule 43. Does IDWR anticipate that the Protocol will have continuing relevance beyond this year and as a tool to be used with the required mitigation plan?

Answer No. A2: Some water calls, such as those in the Thousand Springs area, are based on long-term hydrographic trends and thus lend themselves to long-term mitigation plans. Other calls, such as the call by the SWC, are highly impacted by annual hydrographs and thus do not lend themselves as well to long-term mitigation plans.

We must not fail to recognize that one good water year can fill or almost fill the reservoirs and provide a full supply for the SWC, even in a year following a low supply year. We have experienced this phenomenon recently, in 2006 following the low supply year of 2005, and in 2008, following the low supply year of 2007.

Question No. A3: The Protocol does not adequately set forth the complete process that must be made to determine the amount and timing of providing the required replacement water and carryover storage water. The Protocol should include a description of the overall process to aid in understanding how each step of the Protocol fits. Just reading the "powerpoint slides" describing the Protocol, it seems that the SWC entities are assured the reasonable in-season demand (RISD) and that replacement water will be provided to meet the demand shortfall (DS). Elsewhere (for example the answer to Question 29 in "IGWA's First Questions"), IDWR clarifies that the replacement water amount will also depend upon the estimated depletion in reach gains caused by groundwater withdrawals. Details are not offered concerning the determination of reach gain depletions and how these will be integrated into the computation of required demand and available water supply.

Answer No. A3: The protocol is fully detailed in the Director's June 2009 Order.

Question No. A4: One of the basic tenants of the law of prior appropriation is that junior priority water users will be held to their rights in times of shortage. This Protocol turns the priority system on its head and places an extraordinary burden on the senior users while the use by juniors is unchecked and authorized to their maximum rights. If IDWR is serious about managing the resource shouldn't RISD and actual irrigated acres first be applied to juniors? The Conjunctive Management Rules specifically require the Director to "consider whether the respondent junior-priority water right holder is using water efficiently and without waste". CM Rule 40.03. To date the Director has failed to take any action to implement this rule. Moreover, if senior surface water right holders are held to a "reasonable in season demand" that is an amount of water less than their decreed right, the same standard should apply to all junior groundwater users.

Answer No. A4: Experience has shown that diversions by the groundwater users are in most cases limited by an economic incentive to minimize pumping costs. Across the ESPA the average pumpage is about two acre-feet per acre per season for irrigation from groundwater. This is significantly less than the diversion rate from surface water sources.

Question No. A5: The Protocol sets forth a procedure that takes essential management decisions away from the SWC entities concerning use of their real property and wrongfully gives this decision making authority to IDWR and the groundwater users. Failure to quantify prior to the end of the irrigation season the amount of water that must be provided to

assure the SWC entities have adequate carryover storage for the following year and the failure to require the groundwater users to procure and assign the required carryover storage to the senior users misplaces the risk of replacement water not being available on the senior surface water users while allowing the groundwater users to operate unfettered for at least another year. If carryover storage is not required to be provided until after the next season storage allocation, how is carryover storage different than the replacement water required to meet the DS?

Answer No. A5: Carryover storage is not different from the replacement water required to meet the DS. It is a component of the need of the SWC user.

Question No. A6: IDWR currently employs procedures within Water District 01 that can be used to properly distribute available natural flow and monitor allocation and use of stored water to those having the right to its use (Ref. Tony Olenichak's procedure for accounting for mitigation water posted by IDWR last year seeking public input on transfer and mitigation procedures). Using the procedure documented by Mr. Olenichak will make adoption of the Protocol unnecessary and assure the SWC entities (and all others affected by depletions in reach gains) are properly distributed their lawful water supplies without worrying about issues addressed in the Protocol.

Answer No. A6: Use of the procedure described for transfers is not a tool to address the extent of in-season injury and provide direct replacement water to an injured party during the season. The current procedure is focused on solely the SWC's shortages and providing direct replacement water in the season of need.

B. Comments on Procedure to Determine SWC Irrigation Requirements:

Question No. B1: The IDWR mitigation protocol continues to incorrectly rely on single-year administration and replacement water plans.

The IDWR mitigation protocol ("Protocol") essentially implements single-year administration. An evaluation of long-term impacts, aquifer management and mitigation that address the long-term impacts is missing from the proposed protocol. The impacts from groundwater pumping on natural flow and storage can occur over multiple years. Single-year administration does not properly account for these impacts or prevent injury to senior surface water rights.

Answer No. B1: The protocol provides the vehicle for assuring material injury is not incurred during the current season through replacement water or curtailment. Long-term improvements to the aquifer water budget is occurring through the CAMP process.

Question No. B2: The information provided regarding the proposed Mitigation Protocol is incomplete.

Information regarding some of the components has not been provided or is incomplete (details noted in comments below). Other components and calculations have only been provided for TFCC and have not been provided for the other seven SWC members. It is not possible to

provide complete comments on the Protocol or finish a technical review without all of the information. The SWC requests that IDWR make this information available and allow for additional comments regarding IDWR's calculations for each SWC member.

Answer No. B2: The initial proposed protocol analysis was limited to TFCC as it is the most susceptible to injury. The protocol is intended to establish the procedure, and then an implementation of that procedure will commence in the 2009 irrigation season using the input of the parties generated from the workshop and technical meetings. Publishing of the results of that implementation will be done over the 2009 season, and further analysis results of the other SWC entities will be provided as they are completed.

It is anticipated some refinement to the protocol will be necessary as the process evolves with real-time information. Again, the protocol is intended to establish the framework for the computation of injury, and is seen to be a dynamic process that will incorporate the latest information and analysis techniques as they become available.

Question No. B3: The Protocol does not provide mitigation water in-season when the crop demand occurs.

The IDWR Protocol contemplates the following schedule to provide water if shortages are determined. *"Two weeks after the day of allocation, IGWA is required to provide evidence to the satisfaction of the Director, establishing their ability to secure a volume of storage water equal to the entire amount of the predicted demand shortfall. At that time, the portion of the demand shortfall equal to the reasonable carryover deficit shall be made available to the SWC. The remainder of the demand shortfall (demand shortage-reasonable carryover deficit) shall be provided to the SWC at the time of need- typically in September. If IGWA can not meet these requirements by the established due date, IDWR will issue a curtailment order to IGWA for the remainder of the season".*

This Protocol does not provide the water needed to mitigate shortages in-season when the water is needed to meet crop demand. In other words, the injured SWC members will not have the water to provide to their landowners and shareholders to prevent shortages. If a water shortage in excess of the carryover deficit occurs prior to September, then that shortage will not be mitigated until later in the season. We are concerned that the length of time it would take to review and analyze data, determine that shortages are occurring and issue an Order for the release of water would result in water being released late in the season and well after the shortage has occurred. The result would be that the crop water demand would not be met or that the canal company would be forced to secure additional water supply by independent negotiations as has been done in the past. A curtailment order issued late in the irrigation season would do nothing to remedy injury that occurred earlier in the irrigation season and would have little if any benefit to the SWC water supply for the remainder of that season. In essence, the Protocol ensures no administration by allowing juniors to pump until the end of the irrigation season before the possibility of a curtailment order would be issued.

IDWR's Protocol shows that some years will have a large demand shortfall (and a carryover deficit) greater than the storage water available for lease or purchase. In this case, if groundwater use is curtailed, there is no benefit to SWC members in the same year shortages are

occurring. Moreover, some groundwater users may have finished their irrigation for the year by the time a curtailment order would be issued in mid to late September. The protocol would result in untimely administration with respect to crop needs during the irrigation season.

Answer No. B3: Curtailment is most effective if it occurs at the start of the irrigation season. Therefore, the April computation of the RISD is based on an estimate of runoff that is a full standard deviation below the actually projected runoff. This provides a safety factor for the senior. Our experience has been that in-season adjustments have normally reduced the amount of mitigation required. While there are some situations that conceivably could provide reduced protection for the seniors, the Protocol has been designed to provide a reasonable amount of protection while not overly curtailing the juniors.

Question No. B4: The Protocol incorrectly uses annual supply and demand to estimate shortages. The supply remaining during the irrigation season should be used to estimate shortages.

The IDWR protocol uses an annual demand/supply calculation to estimate shortage. This is not appropriate for these reasons:

a. The IDWR protocol compares the estimated annual supply to the estimated demand to compute shortage. This is incorrect, because water used early in the season cannot be used to meet the demand that occurs later in the season. The shortage calculations should be computed every month and they should be based on the amount of remaining water supply and not the total annual supply.

b. Under the IDWR protocol, any water that is beneficially used by the SWC under their decreed water rights early or late in the season that is excess of the IDWR calculated demand reduces the amount of water that is available for mitigation of shortages occurring in the middle of the season when demands are high. Weather, crop requirements, irrigation practices, canal delivery operations and other factors may cause an irrigation entity to beneficially divert and use more water than the irrigation requirement computed by IDWR. If this occurs, it should not result in a reduction of the amount of mitigation water available to meet the mid-season demand. This should apply to both storage and natural flow.

c. There should be no argument that if natural flow is diverted in excess of the computed demand that this should not reduce the amount of water required for mitigation later in the season, when shortages occur. Natural flow diverted in excess of the IDWR protocol demand estimates cannot be "saved" or "banked" and diverted and used later in the season.

Answer No. B4:

a. The currently proposed dates for assessing the supplies and injury are mid-April, mid-July and mid-September. Monthly assessments of actual crop water need and RISD will be done as the season progresses, but only the cumulative amounts calculated in mid-April, mid-July and in September will be used as the basis for mitigation or replacement water.

b. The current protocol does take into account the change in supply as the season progresses, as shown in the PowerPoint presentation from the protocol workshop:

http://www.idwr.idaho.gov/News/WaterCalls/Surface%20Coalition%20Call/mit_present/PPT/Adjustment%20of%20Forecast%20Supply.ppt

c. The protocol does not explicitly address the over-diversion of water that undoubtedly will occur, such as when irrigation is shut down during cool wet spells after full canal system operations have begun. A proposed solution would be to deduct any amount of water diverted in excess of the calculated reasonable demand from the remaining forecasted supply. Using the equation form of protocol Step 5, the mid-July adjustment, this would look like:

$$\text{Demand Shortfall} = RISD_{july/sep} - FS_{july/sep} + \max\,(Q\ !\ \Sigma ACWN/E_p,\ 0)$$

Where:

Q = accumulated diversions to date,

$\Sigma ACWN/E_p$ = accumulated required diversions to meet crop water need, and

max operator denotes the limit of the adjustment to positive over-diversions.

Over-diversions for uses other than the stated beneficial use of the senior water right could be excluded, as determined by the Director.

<u>Question No. B5</u>: The IDWR mitigation protocol uses a single-year (2006) to estimate the baseline demand. The irrigation diversions in 2006 were low for some SWC members and should not be used to establish baseline demand.

Please explain how the use of the year with some of the lowest irrigation diversions for the individual SWC members could be representative of the "average-year" demands? We understand that Hearing Officer Schroeder identified that predictions of need should be based on an average year of need and recommended against the use of a single low-demand year (1995) to establish the irrigation requirements. This was adopted by the Director in the Final Order.

The plot of annual natural flow diversions versus Heise natural flow shows the year 2006 is more than one standard deviation below the fitted regression line. The baseline demand is used as the basis for baseline crop water need for each year and, likely could require a different subjective selection of a representative year for each year in the future. Irrigation diversions for 2006 were low for some SWC entities. For example, for TFCC the 2006 diversions were the second lowest since 1990 and are not reflective of average conditions. This data indicates that 2006 is not a representative year upon which to base the baseline demand. The early-season precipitation was also unusually high. We understand that IDWR is considering precipitation as part of the supply to establish baseline demand, but we do not believe this to be appropriate, since much of the precipitation early in the season does not meet actual crop demand and also cannot be used to offset demand during the middle, or peak of the irrigation season. For these reasons, 2006 should not be used to establish baseline demand. We request that IDWR evaluate the monthly and annual diversions for each SWC member and re-examine this issue.

Answer No. B5: With respect to using 2006 as baseline year, IDWR recognizes that water conservation measures were likely in place due to lack of late season flows forecasted after an early runoff, and that a perfect irrigation season from an operational standpoint occurred, i.e. no major rain events in June, and sustained high temperatures made it possible to run systems very efficiently. This led in large part to the low total season diversion volumes compared to the recent historic averages of AFRD2, NSCC, and TFCC. By incorporating the additional term described in B.4.c above, it will allow additional diversions for years with less optimal operation scenarios.

Based on the analysis of the draft ETIdaho 2006 data, IDWR concurs with SWC that incorporating precipitation as an adjustment to the baseline year adjustment is not appropriate. Adjustments will be made for the contribution of effective precipitation for year under evaluation (2002 for the protocol example) and is further detailed in B.11 response. The project efficiencies are still draft numbers. Final numbers will use METRIC ET in conjunction with the irrigated area data from the SWC being developed at the request of IDWR.

Use of the 2006 season as the baseline serves as a starting point to implement the protocol, and to take advantage of the current year's good water supply conditions to refine the protocol, with the goal of improving the overall process. The 2008 season may be more representative of an average runoff year with normal crop water demands that would be a better comparison to 2009. When additional 2008 METRIC ET data are available, this will be evaluated. It is the intent to generate a catalogue of years using the METRIC ET data as it becomes available. From this catalogue, IDWR will be able to choose the most suitable baseline, matching to the current year's unique growing season and climatic characteristics.

Question No. B6: The early and late season irrigation efficiency is too high. There may be other problems with the method for computed irrigation efficiency for the other SWC entities.

The computed "Baseline Project Efficiency" shown for TFCC is higher in the beginning and end of the irrigation season. This is likely to be incorrect, since surface water irrigation projects are typically less efficient during early and late in the season when water is being put to beneficial use for purposes other than meeting the crop ET requirement, such as charging delivery systems, early irrigations, or softening the soil for tilling. Irrigation efficiency calculations for all of the SWC entities should be provided for review to identify whether there are potential issues with the Protocol approach, including overestimating efficiency.

Answer No. B6: The baseline project efficiency is calculated using draft values of METRIC ET calculated as an average for all lands within the SWC entity boundaries. Final METRIC ET values will reflect actual irrigation areas for the entities, and will be evaluated at that time for the unrealistic early season efficiency. Annual efficiency calculations for the other entities have been completed for 2006 and posted on the web site at:

http://www.idwr.idaho.gov/News/WaterCalls/Surface%20Coalition%20Call/mit_present/mitigation_presentations.htm

Under data and calculation files Q.

Additional monthly efficiency calculations for all entities for 2006 will be posted during the implementation of the protocol in this irrigation season.

Question No. B7: Use of NVDI approach to estimate crop demand.

IDWR's approach specifies calculating in-season crop ET demand using the NDVI approach which is based on Landsat. Has the protocol for this analytical procedure been documented? Could you please provide the documentation so the SWC members can understand the proposed method? How does it compare to a standard demand calculation method (like Agrimet)? Will the results be available on a real-time basis (like Agrimet) so the irrigator can match water application to the IDWR computed demand?

NDVI is proposed to be used for actual crop ET instead of metric but is reported to have ±10% difference than metric. Assuming an irrigation entity has a 50% system efficiency the difference between NDVI and metric can result in a 20% error in determining actual crop water needs. Please explain how this will be addressed.

The water demand estimates have only been provided for 2006 and only for TFCC. Please provide the water demand estimates that are proposed to be used for the protocol for all of the SWC entities and for all of the years back to 1990 so we can complete a technical review of the applicability of the method and results as compared with standard irrigation demand calculations and historic diversions.

Answer No. B7: A separate protocol for the NDVI method is being developed by the University of Idaho at Kimberly and will be provided when complete later this summer. Comparison of the NDVI method with Agrimet, METRIC, and an evaluation of potential error sources is part of the ongoing development by University of Idaho at Kimberly.

IDWR has not completed analysis for other years or other entities besides what is shown in the protocol. Additional analysis will be done as the protocol is implemented and provided at that time.

Question No. B8: Use of County-wide crop data.

The protocol contemplates using County-wide crop data to forecast and evaluate the demand during the irrigation season. County-wide census data will not reflect the unique distribution of crops grown at each irrigation district or canal company. IDWR is requesting irrigated acreage data from the irrigation entities. If a crop ET calculation is to be prepared it should be based on the most-accurate data from the irrigation entities on the actual crops grown, not the County-wide crop data.

Answer No. B8: The region wide crop data the USDA National Agricultural Statistics Service is used in the calculation of potential crop ET for the reasonable carryover explanatory variable. These data represent a consistent and complete record for the 1964 through 2008 period of analysis. County wide and entity specific data are not available for that entire period for each year. Use of the USDA NASS regional data was thus the only option.

For the RISD effective precipitation calculations, crop data will be solicited from the irrigation entities. The calculations of effective precipitation will use data submitted by the SWC entities, included as hearing Exhibit 3026. Further explanation is included in B.11 response.

Question No. B9: Lands served by supplemental groundwater rights should not be removed from total SWC irrigated acreage.

Supplemental groundwater rights are held by private individuals and should not be considered to be a source of supply by the SWC entities. An irrigator that is a member of a surface water irrigation company or district that pays assessments to receive surface water should not also have to also pay to develop and pump groundwater when others are injuring his primary surface water supply. Also, to our knowledge, there is little data to determine whether the infrastructure needed to put these rights into use (wells, pumps, pipelines, electricity) has even been developed.

Answer No. B9: The protocol uses a ratio of 70/30 for mixed source acres, as described in Answer No. 10 to the City of Pocatello's questions.

Question No. B10: Issues with forecasting supply.

The NATURAL FLOW SUPPLY for the beginning of the season is based on the regression of historical natural flow diversions vs. Heise and the STORGE (predicted fill + carryover) is based on a 'similar year' selection (2006 in the example for the 2002 irrigation season for TFCC) and the DEMAND SHORTFALL calculated as the difference between the BASLINE DEMAND and the sum of the NATURAL FLOW SUPPLY and STORAGE. IGWA must assure the Director that this DEMAND SHORTFALL is or will be available during the irrigation season. However, the stated protocol is not clear on what form of assurances are required.

The regression of historical natural flow diversions for TFCC vs. Heise April through July flow used in the protocol is not a good estimate of TFCC water supply for average and dry years. **Attachment 1** shows this same regression for the period 1990 through 2007 with the 20% exceedence (high flow) years removed. The resulting R^2 value of 0.21 should not be used to estimate the TFCC natural flow water supply.

The proposed July and September updates to the REASONABLE IN-SEASON DEMAND are to be based on the water use to date for each irrigation entity, estimated CROP WATER NEED(adjusted for monthly effective precipitation and a monthly estimated project efficiency. Again, additional NATURAL FLOW diversions for the remainder of the season are estimated by selecting historical data from a year with similar reach gains for the season. Apparently a selection of the similar year is made for each irrigation entity based on the near Blackfoot to Milner historical plot of reach gains for select years. This procedure of selecting a 'representative year' is subjective and depends on the analysts judgment without knowledge of the effect of cultural practice changes, manager and board of directors risk evaluations and weather patterns for the 'similar year' compared to the year to be estimated.

Answer No. B10: IGWA is required to provide evidence, to the satisfaction of the Director, establishing their ability to secure a volume of storage water equal to the entire amount of the predicted demand shortfall.

In April of the current irrigation year, the regression analysis is used to estimate the natural flow diverted for the irrigation season. The graph as presented in the presentation shows that the regression equation would have underestimated the availability of natural flow in all but two of the years. Using the one standard error line to estimate the natural flow is a conservative approach to estimating the natural flow supply.

The selection of the representative year is by its nature fairly subjective. The analysts will consider the various factors environmental and human factors when selecting a similar year. In cases where there are multiple similar years to choose from the more conservative year will be selected.

Question No. B11: Inappropriate assumption that soil moisture is part of the total supply.

We understand that early-season soil moisture is computed and counted as part of the irrigation season supply under the IDWR protocol. As part of the protocol, the use of soil moisture to meet crop ET is not limited to the weeks or months when the soil moisture occurs, instead, it is used to compute the total irrigation supply and demand across the entire irrigation season. This is incorrect for two reasons.

a. The early season excess precipitation as calculated from NRCS estimates is used as a surrogate for antecedent moisture. The apparent assumption that any early season soil moisture can be utilized in its entirety by the crop over the full period of the growing season is incorrect. Irrigators typically depend on the soil moisture reservoir to hold water between irrigation sets and it is not used as a long-term water supply reservoir. Between June and September the soil moisture is often drawn down to the maximum allowable depletion between irrigation sets for many crops. There isn't sufficient soil moisture available within the effective rooting depth of many crops to provide a long-term water bank as contemplated by the IDWR procedure.

b. If soil moisture is going to be included it is critical to perform daily soil moisture accounting evaluating daily supply and demand and incorporating analysis of actual shallow-rooted crops (like potatoes, beans, sugar beets, and some grains) under actual ET demands occurring on a daily to weekly basis. Otherwise, IDWR will not really know how much soil moisture is actually available to meet crop demand.

c. The Protocol describes the use of antecedent soil moisture conditions but the discussion on June 1 indicated effective precipitation was considered and not soil moisture. If either or both are going to be considered the Protocol needs to be specific and clear on how the factors will be considered and where the data will be obtained for the Protocol.

Answer No. B11: **Note: Development of the procedure for calculating the contribution of precipitation for meeting crop water requirements was completed after the issuance of answers to the City of Pocatello's questions on June 11, 2009. Answer Nos. 2 and 5 in those questions are no longer correct, and are superseded by the response to this comment.**

The procedure for determining the soil moisture available to crops from rainfall will be done on a daily basis using the ETIdaho crop consumptive use model. Agrimet weather data from Twin Falls and Rupert will be the basis for the SWC canals. Data from Rupert will be used for A&B, BID, Milner, and MID. Data from Twin Falls will be used for AFRD2, NSCC, and TFCC.

The process for calculations used in the ETIdaho model are fully described in hearing Exhibit 3024, including the use of the NRCS runoff procedure and the soil water balance calculations. The proposed method will use the mix of crops submitted by the SWC shown in hearing Exhibit 3026 to determine the volume of effective precipitation available for crop use. This volume is calculated as the variable is P *rz* for the specific crop times the crop area in the irrigation entity, summed for all crops for each day. The calculations for P_*rz* for TFCC are shown in the spreadsheet titled RISD_Prz_adjustment.xls on the web site at:

http://www.idwr.idaho.gov/News/WaterCalls/Surface%20Coalition%20Call/mit_present/mitigation_presentations.htm

Under data and calculation files Q.

The basic algorithm for calculating the available soil moisture from precipitation is to use the downloaded daily Agrimet data during the irrigation season to keep the water balance model updated. At each protocol evaluation period during the irrigation season, the P_*rz* in acre-feet cumulated to date for season will subtracted from the cumulated NDVI-ET to get the actual crop water need. The actual crop water need (ACWN) is divided by the baseline project efficiency for cumulated period to arrive at the RISD to date.

This same model is used for the baseline year to deduct the P_*rz* from the ET prior to calculating the baseline project efficiencies. With the use of the ETIdaho model, corrections for rainfall for the 2006 diversions are already accounted for in the baseline project efficiencies. Previous versions of the protocol using early season adjustments are not correct and will be updated in the Director's June 2009 Order regarding the protocol.

The ETIdaho water balance model is run in continuous mode from the previous irrigation season, and includes the antecedent moisture from the previous time step in the P_*rz*. No separate accounting of antecedent moisture is needed for the beginning of the season. The previous examples of the protocol are no longer valid with respect to references to antecedent moisture adjustments.

The soil water characteristics for each SWC entity will be the default parameters listed for the appropriate Agrimet site as shown Table 52 of hearing Exhibit 3024. Crop parameters

such as rooting depths, runoff curve numbers, and growth stage data are also the default values from Table 7 of hearing Exhibit 3024. The protocol will dictate that changes to crop distributions shown in hearing Exhibit 3026 be revised through submittals from the SWC canals.

C. Comments on Procedure to Determine SWC Reasonable Carryover

NOTE: In order to avoid confusion, IDWR has kept the same numbering sequence as submitted by SWC. Section C's numbering continues consecutively from Section B.

Question No. C12: The IDWR procedure does not comply with Hearing Officer Schroeder's recommendations. The amount of reasonable carryover in a current year should be based on the risk of shortage occurring in the next year.

On page 62 of *Opinion Constituting Findings of Fact*, the Hearing Officer states "... *the amount (of carryover) should be sufficient to assure that if the following year is a year of water shortage there will be sufficient water in storage ... to fully meet crop needs.*" The IDWR protocol does not meet this objective.

The Protocol should include two components. The first should include a determination of what carryover had historically been provided to the SWC members (assuming current demand) and establish the reduction in carryover that is now occurring. This can be done using a reservoir operations analysis. The next component should provide an analysis of the impacts to storage caused by groundwater pumping. This can be done using the ESPAM model. The impacts to carryover storage from groundwater pumping should be mitigated and enough carryover storage should be provided as mitigation to, "fully meet crop needs" every year.

Answer No. C12: IDWR is administering water to meet the crop's needs, but only after making sure the reservoirs do not fill before requiring that that water be provided.

IDWR's approach using the regression equation is a different modeling technique to arrive at the same result as would be obtained by a reservoir operation analysis. The model result either way is quantification of what the carryover should be given current demands, absent groundwater depletions. All models have inherent error, and it is recognized by the hearing officer that the reasonable carryover number is not a precise number. *See* Recommended Order at 62, ¶ 12. The regression models provide an acceptable estimate of the number without the intensive parameter and model development necessary for a full reservoir operations analysis.

Question No. C13: The IDWR procedure does not provide reasonable carryover in-season or in a timely manner. The potential method of administration does not address the shortage if the injury is not mitigated.

The Protocol stipulates that carryover will only be provided in the following year- and only after the date of allocation, and only if the irrigation demands show shortage in the middle of the following season. Curtailment is the only form of administration contemplated in the Protocol if the water is not provided and it only occurs after September in the next irrigation season, which is not in-season administration. Moreover, it is obvious that curtailment the following September does nothing to remedy a carryover shortage from the prior year. Yet that

is the scenario created by the Protocol. Curtailment would still not provide water to remedy the shortage.

Answer No. C13: Under the protocol, if the juniors are shown to have reduced the carryover, and if the storage space of the senior does not fill during the storage season, and if the RISD shows an expected shortfall, then the juniors must assign to the senior the carryover shortfall within 14 days after the Day of Allocation. Hence the water would be provided to the seniors prior to the time that it would be needed for use by the seniors.

Question No. C14: The assumption that groundwater depletions to reach gains were insignificant prior to 1987 is incorrect.

Groundwater pumping started in earnest in the 1940s to 1950s and the rate of pumping in the 1980s was very significant. The ESPAM model can be used to show that the reach gain depletions occurring within the 1964 to 1987 period were significant.

Answer No. C14: It is assumed supplies were fully adequate during those early years such that carryover amounts were not impacted by the influence of depleted reach gains from groundwater. The amount of water put out for lease and returned to back to TFCC from 1980 through 1986 as indicated by Water District 01 annual reports show that shortages were not an issue in that period.

Question No. C15: It is statistically incorrect to correlate between the two periods (1964-1986 and 1987-2008) used in the analysis to determine similar carryover because the first period was relatively wet and the second period was relatively dry.

We understand that IDWR performed multiple linear regressions to compare the water supply between two periods (1964-1986 and 1987-2008) to evaluate current versus historic carryover. This type of analysis requires that the two periods have similar population distributions. Either the period of record must be long enough to be representative of the hydrologic record or the populations must include enough wet, dry and average years to be similar. Are these assumptions true for the years selected by IDWR? If not, there is a significant potential for error. A simple analogy may help to prove this point. If you have a group of 100 tall people and 100 short people, a statistical comparison between the two populations would result in incorrect assumptions. For example, the 90th percentile exceedence height for the two groups would likely be very different. The same is true for two groups of dissimilar water supply years.

Answer No. C15: The assumption of similar populations between the two periods was evaluated and determined to be true as stated in the last paragraph of page one in the statistics report

http://www.idwr.idaho.gov/News/WaterCalls/Surface%20Coalition%20Call/mit_present/PDFs/REVISED%20ANALYSIS.pdf

Based on this report, it is IDWR's judgment that the predictions do provide an appropriate measure of the actual reasonable carryover for the protocol.

Question No. C16: The IDWR method of comparing the 1964-1987 to 1988 to 2008 period does not account for recent conservative operations by the SWC members due to shortages.

The IDWR's correlation analyses for carryover (based on data from the 1970s and 1980s) do not incorporate the effects of the more uncertain water supply situation that currently exists. TFCC had full reservoir space in 21 out of 23 years (in what period?). Their carryover storage in this period was provided due to a greater and more reliable natural flow supply, as opposed to water intentionally being held to protect future supplies. When reservoir water users are operating in more uncertain hydrologic conditions, they will tend to operate more conservatively and as a result will operate to hold relatively more water in carryover storage. In the period after 1986, TFCC only had full reservoir space in 13 out of 22 years. Therefore, these more recent conditions and the decisions SWC entities have been forced to make regarding carryover storage (which likely will continue in the future) are hardly comparable to those from 20 or 30 years ago.

Answer No. C16: The regression models predict the amount of carryover in the year of evaluation that would have occurred under the same climate and supply conditions but absent the effects of groundwater depletions. For TFCC, this predicted amount during the validation period is consistently the same or higher than the observed carryover. This prediction subsumes the combined influences of climate and irrigation supply on the carryover, and any difference with the observed is attributed to groundwater depletion effects. No attempt is made to capture the management decisions beyond what is represented in the explanatory variables (*see* also Response 17).

Question No. C17: If SWC uses more water more than the reasonable in-season demand calculated by IDWR, it loses any carryover deficit it might be due.

If the SWC uses less water than the IDWR calculated demand, they will have likely have more water in carryover than the historically-based regression indicates that they would have had, and this will reduce the amount of potential mitigation next year.

The use of a historically based regression to calculate reasonable carryover forces SWC members to continue to operate for carryover as they did in that historical period. They are punished for operating more frugally (i.e., to protect more carryover).

Answer No. C17: SWC entities may carryover their full allocation if they chose, but it is only when the reasonable carryover is greater than actual carryover that there is a potential requirement for mitigation.

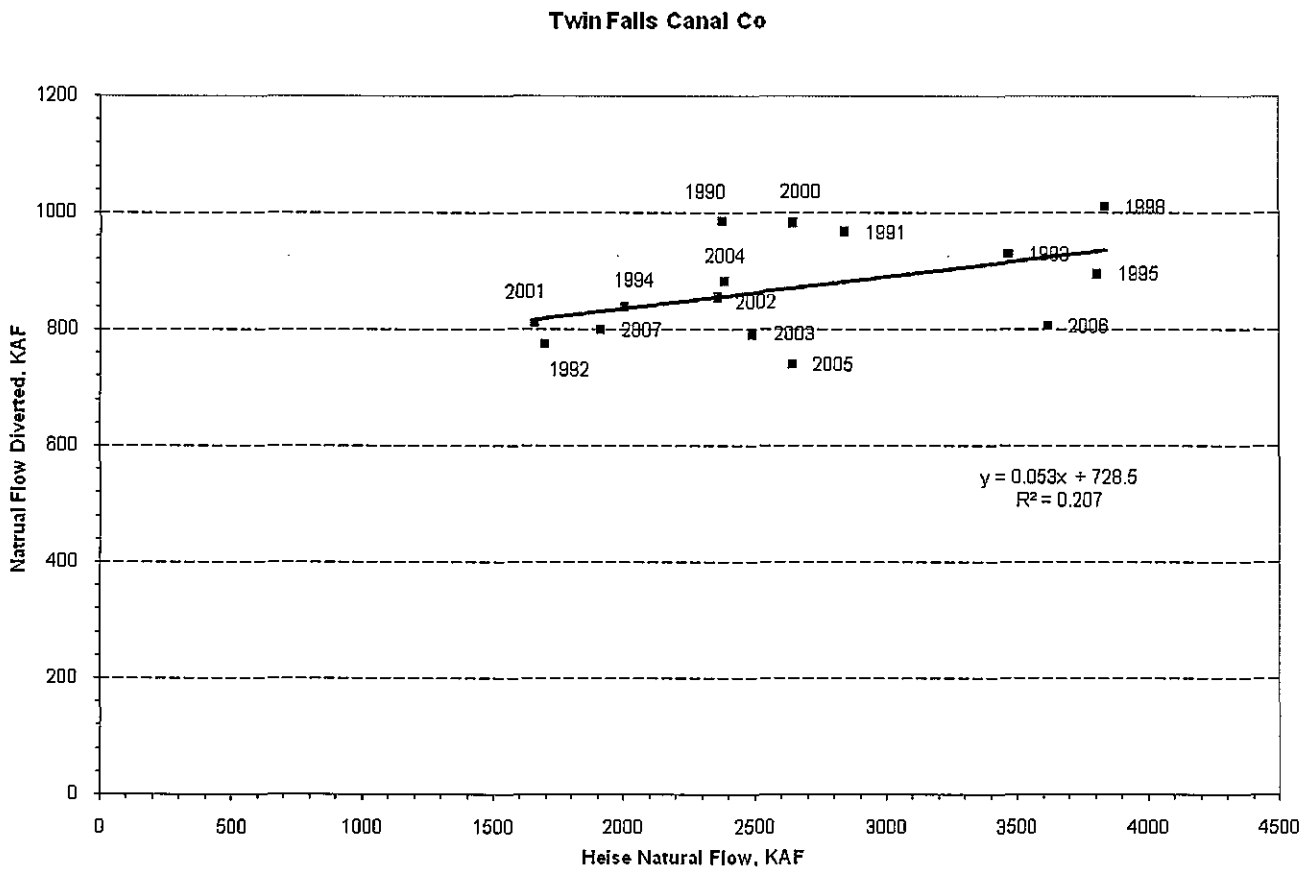
Question No. C18: The regression analysis performed by Dr. Van Kirk is deficient in several ways.

The assumption that the differences in hydrology, water use patterns, and effect of junior pumping during the regression prediction period are reasonably accounted for by the variables

utilized in the calibration period is not substantiated. Dr. Van Kirk admitted that no one unique equation was possible utilizing the same predictive variables which he believed would be more justifiable. The variability in the predictive variables during the calibration period is significantly lower than in the prediction period. Dr Kirk also admitted that social or cultural factors, including canal company managerial and board decisions, influencing the prediction variables and ultimately the predicted carryover was not considered in his analysis. Decisions on diversions and allocation within the districts based on perceived or documented risk to the water supply can account for large differences in diversions and carryover.

Several other drought or drought related indices are available that could have been evaluated and may have accounted for more variability in the carryover analysis other than the Palmer Drought Severity Index, PDSI. These indices were not evaluated. It was not clear which region the September PDSI index which was used in the regression represented.

Attachment 1



The chart above shows the relationship of Twin Falls Canal Company natural flow diversions compared to the April – July natural flow discharge of the Snake River at Heise. IDWR continues to rely upon the Heise gage to predict water supply for the members of the Surface Water Coalition but the relationship is not suitable in the case of TFCC. This chart is for the period 1990 – 2007 but excludes high flow (20% exceedence) years.

Answer No. C18: The regression equations address factors enumerated in the CM Rules and in the Recommended Order for evaluating reasonable carryover: average annual rate of fill of storage reservoirs, average annual carry-over for prior comparable water conditions, and projected water supply for the system. The CM Rules and interpretations have not directed any evaluation into management decisions by the districts as they are not easily measurable.

The use of the PDSI does serve as a surrogate for management decisions, as the degree of drought would have certainly impacted management decisions in a given year. Since the PDSI incorporates the cumulative effects of drought from previous months, use of the September value represents the type of season that the canal leadership had just experienced. No other published drought measurement indices were identified that had a 45-year continuous record. Region 7 is used, which encompasses the Magic Valley.

D. Comments and Questions about IDWR's Responses to "IGWA's First Questions":

Question No. D1: IDWR's answer to IGWA's Question 1 of "IGWA's First Questions", indicates that storage deliveries were adjusted for various reasons. Attached Table 1 indicates the adjustments were made for "spills past Milner." Is this appropriate? How could the SWC entity be responsible? Adjustments also appear to have been made for water provided by IGWA as replacement water. Is this appropriate? Does the process penalize SWC entities for stored water obtained to "self mitigate" shortages caused by IGWA depletions?

Answer No. D1: The purpose of the numerical values and adjustments described in Question 1 is solely for the reasonable carryover analysis regression model development and nothing is implied regarding mitigation requirements.

Question No. D2: The answer to Question 10 indicates that the "more conservative year will be selected." Conservative in what way and from whose viewpoint?

Answer No. D2: Conservative in this context means the year with the minimum available natural flow supply, if there are multiple similar years.

Question No. D3: The answer to Question 12 indicates that "*Any carryover replacement water delivered by groundwater users will be included in the total mitigation (sic) requirement...*" Not sure how carryover water can be carried over if it has been delivered. Also not sure the limits of "any." Does this include water supplied to the spring users or others requiring mitigation? (Note: Because the requirements and parameters of "mitigation" are specifically defined in the CMRs, the Protocol does not pretend to comply, and the Protocol is associated with plans for annually supplying replacement water, the Protocol and discussions of the Protocol should consistently avoid using the term mitigation.)

Answer No. D3: This answer to Question 12 is referring the amount of carryover shortfall for a SWC entity that resulted after the end of last season, which is only due if there is a demand shortfall in the current season. Any (meaning there may or may not be a shortfall in a given year) carryover shortfalls determined under the protocol are due two weeks after the day of allocation in Water District 01.

Question No. D4: The answer to Question 13 is confusing within itself and with other related information on the issue of irrigated acreage within the SWC entities. What will be required from SWC entities and how often? The explanation that IDWR's SRBA recommendations would be the basis for the water right is troublesome because the prior decrees and licenses held by the SWC entities continue to legally define the water right until partial decrees are entered or interim administration is ordered by the SRBA court. How can the acreage count exceed the "water right" unless the recommendation was simply less than the area the entity has been serving under its rights? Also, the open-ended threat that "an assessment must be made of the impact of this reduction in use of the water right on the mitigation (sic) requirement" is not comforting. Taken to the extreme, users in a SWC entity reducing irrigated area to be sure water demand is met on a very dry year, will be faced with a snowball effect: the more they consolidate short water supplies on fewer acres, the less their supply.

Answer No. D4: IDWR's proposal in this regard merely recognizes that the place of use of the senior must be considered when mitigation is to be provided by the juniors. IDWR is open to other approaches to recognize an increase or decrease of acres irrigated by the seniors.

Question No. D5: Additional clarification is needed for Answer 18 which concludes with the following sentence: *"As before, any volume of water less than the reasonable carryover deficit amount owed to the SWC must be provided immediately and any volume of water in excess of the reasonable carryover deficit may be provided to the SWC at the time of need."*

Answer No. D5: *See* IDWR Answer to IGWA Question No. 45.

Question No. D6: The answer to Question 25 indicates that project efficiency is "best achievable." The hearing officer has acknowledged that a water user is not required to meet that extreme standard for water use. Rather, the standard is based upon not wasting water.

Answer No. D6: Best achievable in this context refers to the current state of operations of the SWC entities, and the improved efficiency achieved through conversion to sprinkler systems and automated delivery relative to years past.

Question No. D7: The answer to Question 33 indicates that changes implemented under the CAMP process "will be reflected in the criteria that are used to select the baseline year." Additional explanation is requested of why CAMP and other factors that alter the surface water/groundwater relationships influence the "baseline year" rather than the detailed procedures for determining injury and for determining RISD, Demand Shortfall (DS) and reasonable carryover storage. Because CAMP is funded from sources other than IGWA, the benefits should not be automatically and arbitrarily assigned to junior priority groundwater users.

Answer No. D7: One objective of the ESPA CAMP is to more fully satisfy the needs for irrigation water in the ESPA. If the ESPA CAMP is successful to some extent in satisfying irrigation requirements, this should be recognized in computations of mitigation requirements.

Question No. D8: The answer to Question 34 indicates conditions under which the mitigation computation for the SWC "would be adjusted" but does not explain what that adjustment would be. Is this answer consistent with the answer to Question 35 from IGWA and Question 11 from the City of Pocatello? If the answer to either part of this question is "No" please explain.

Answer No. D8: The answer to Question 34 is consistent with answers to IGWA Question No. 35 and City of Pocatello Question No. 11. If it is determined by Water District 01, according to its Rental Pool Procedures, that a SWC entity has been impacted (i.e., a shortage to its storage allocation) due to supplying flow-augmentation rental during the previous irrigation season, the amount of impact from the rental will be added to the available storage supply similar to the process that would occur if the entity had supplied (leased) storage to another entity during the irrigation season.

Question No. D9: In the answer to Question 40 c) should the word "sufficient" in the second line be "insufficient"? If not, please explain the meaning of this answer.

Answer No. D9: Sufficient is correct, and refers to wet and dry cycles as evident by inspecting the graph of April – July unregulated flow at the Heise Gage. Heise data for the modeling period from 1964 through 1986 does encompass the lowest recorded annual runoff.

DATED this 30th day of June, 2009.

David R. Tuthill, Jr.
Director

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on this 30th day of June, 2009, a true and correct copy of the foregoing document was served upon the following by the indicated method:

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