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ID	Work Item	Description	Staging Plan #3 Item No. and prior target release date	Sub System	Target Release Date	Comments
2	**COMPLETE** HIM Server	An archival database is to be created for permanent historical storage of bidding, price and schedule data. HIM is defined in section 3.2.5 of the SI DSOW: Archival Database The purpose of the archival database is to provide long term historical storage for the ISO Scheduling data. Data are stored to support: • Statistic analysis of market data; and • Audit function. The Archival Database will be distinct and separate from the main system database. SC's will not be able to access data in the archival database directly. On-line storage must be provided for 5 years of data.	Item 9 1/29/99	SI	Completed 2/15/99	Completed 2/15/99
8	Beep Modifications	The ISO SI/SA System will be modified to accommodate the following Balancing Energy and Ex-Post Pricing (BEEP) functions: 1. Change the balancing energy computation and ensure that this computation is based on actual generation output. Ensure that BEEP is looking forward in calculating the requirement. Modify the computation of instructions of generation to ensure that only the unit(s) that were instructed via phone call or AGC are paid. Nomination list modification associated with beep shall result in this. 2. Publish incremental and decremental zonal prices every interval. The publication must contain all 24 hrs – 10 min incremental and decremental prices and average hourly price. The ISO needs to know the 10 minute decrement and incremental prices along with the ex-post price calculated by BEEP. Additionally, publish the 10 minute interval prices calculated by BEEP. Finally, retain the 10 minute ex-post zonal prices in the SI ODB for 90 days and then move to long term storage. 3. Ensure that BEEP instructions do not contradict ACE movement. 4. Ensure that BEEP is taking into account RMR dispatch. 5. Ensure that BEEP is not depleting the Operating Reserve requirement. 6. Integrate BEEP and SDLF, so BEEP is using 10 min load forecast data for the calculation of the 10 min requirement, use actual and forecast load from SDLF. 7. Integrate EMS generation and interchange data into BEEP.	Item 1 1/1/99	SA	Q4/99	Items 1, 3, 6,7 Completed on 10/13/98 Items 2 and 4 are covered with nomination list modifications of BEEP associated with WI 88 Analope Item 5 deferred to based on RMR negotiations. Expected completion end of 3rd quarter 1999

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13	**COMPLETE** Enhancement of Settlement model to support individual intertie schedules	The Settlement model was designed to handle only net intertie schedules. Individual schedule information is needed in wheeling and GMC calculations. The SCs also request to have settlement data broken down by schedule. The settlement model as well as the SI/Settlement interface will be enhanced to support the transfer and storage of individual intertie schedules.	Item 11	BBS	10/15/98	Completed 10/19/98.
14	**COMPLETE** Wheeling/GMC Settlement Enhancements and Statement File Expansion	The Settlement System was designed to use the hour ahead net exports in the calculation of wheeling charges and GMC. Since these charges should be assessed using real time gross exports, the charge calculation is currently performed outside the Settlement System using a semi-manual process. The Settlement System needs to be enhanced to include automate such calculations. Exports scheduled under existing transmission contracts are exempted from wheeling charges. They may also receive a 50% or 100% waiver in the GMC assessment. These exemptions are currently handled outside the Settlement System since it was not designed to handle such exemptions. The system needs to be enhanced to include this requirement. Wheeling charge is assessed for energy leaving the ISO grid at locations within the ISO control area. This charge calculation is also handled outside the Settlement System. The system needs to be enhanced to include this requirement. To provide more detail and transparent settlement information to the SCs, the settlement statements will be enhanced as follows: • GMC information will be provided in the daily statements with details for each hour and each resource location; • Wheeling charges will be listed for each hourly export schedule; • For charges related to imbalance energy at the interties, details will be provided for each individual schedule (instead of an aggregated schedule) and any associated real time adjustments.	Item 11	BBS	3/16/99	Completed 4/18/99

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16	**COMPLETE** Settlement file expansion	The settlement statement files should be expanded to show the detail breakdown of various charges. The following requirements should be met: • For charges related to the imbalance energy group, the files should provide information for the individual intertie schedules including any real-time adjustments and contract exemptions. • Wheeling charges should be posted daily with appropriate breakdowns. • Grid Management Charges should be posted with daily breakdown of the charge components.	Item 11	BBS	1/18/99	Combined with 13 and 14
16.1	**COMPLETE** Allocation of A/S to SC's	Allocating Ancillary Service responsibility will be based on obligations derived from the SC's metered demand.	AS Redesign	BBS	In production 8/18/99	
27	Inter SC trades for A/S	ISO SI/SA System will be modified to provide market participants means to trade ancillary services. This will allow one scheduler coordinator to self-provide ancillary services that are actually provided by a second scheduler coordinator under a bilateral contract between the two. This is required, for example, for scheduler coordinators that have load in the control area but have no internal generation resources with unused capacity and do not wish to buy ancillary services from the auction since they have long term arrangements on the side.	AS Redesign 8/30/99	SI	Week of 9/13/99	
29 29.a	**COMPLETE** Add'l. Public Market Information (PMI) for Load Forecast (LF), A/S requirements, Generic message mechanism	This work item will modify SI PMI displays to provide Market Participants additional data to make market decisions. Additional data includes congestion path usage, updated TTC or ATC and actual ISO load. Furthermore, SI will be modified to provide an ISO Messaging System via the WENET. The messaging system will enable the ISO operator to send out either pre-structured or free form messages to the Scheduling Coordinators.	Item 19 3/16/99	SI	Completed 4/15/99	Completed 4/15/99
31	**COMPLETE** On-demand obligations	ISO SI/SA System will be modified to provide functionality to allow SCs to self-provide or purchase from ISO the operating reserves required for their interruptible imports and on-demand obligations.	Item 13 3/16/99	SA	Completed 3/17/99	Completed 3/17/99

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34	**COMPLETE** A/S import	The ISO SI/SA System will be modified to accept import bids and self-provided interchange schedules for spinning, non-spinning and replacement reserve for the day ahead and hour ahead markets. These bids and/or schedules may or may not be associated with existing transmission contracts.	Item 12 9/27/98	SA	Completed 8/5/98	Completed 8/5/98
36	Bidding and self provision from same unit	ISO SI/SA System will be modified so SCs can self-provide and bid the same A/S commodity from the same resource. This capability provides the flexibility to self-provide and bid into the market with a single unit resulting in more A/S capacity for the control area.	Item 14 1/1/99	SA/ BBS	2001	Deferred to 2001
39	**DELETED** - RTU protocols, additional SCADA features	RTU capabilities will be augmented to incorporate data exchange with new and expanding market entities. This will allow ISO systems to interface with other entities for data interchange and future direct generation control.	Item 6 6/1/99	EMS	N/A	Functionality no longer required. Item has been deleted.
40	**COMPLETE** Centralized Generation Monitoring and Control (GMAC)	A centralized, single level control scheme will be provided on the ISO EMS System. Individual units will be controlled directly via Area Control Center via setpoint (phase 1a) and by Remote Terminal Unit (RTU) (Phase 1b). This application will also provide for multi-area control ability.	Item 6 6/30/99	EMS	Completed 10/5/98	Completed on 10/5/98
41	Firm Transmission Rights	Firm Transmission Rights (FTR) are rights across an interface, in one specific direction, between two congestion zones. ISO SI/SA and BBS System will be modified to implement a mechanism to track FTR holders so as to properly allocate Usage Charge revenues.	FTR	SI/SA/ BBS	2/1/00	
41.1	FTR Auction	Perform the FTR Auction	FTR 4/12/99	Trading Dynamics	11/16/99	
41.2	Firm Transmission Rights (FTR) SRS (Secondary Registration System)	The SRS is for facilitating FTR transactions between owners of FTRs and entities wishing to purchase them. Therefore, providing the ownership chain of FTRs.	FTR	SRS	11/21/99	
43	**COMPLETE** Allocation of replacement reserve cost. (See WI 43.1)		Item 3	SI/SA/ BBS		Combined with 43.1
43.1	**COMPLETE** Deviation Replacement Reserve Procurement & Cost Allocation	This work item changes the procurement and cost allocation methods for Replacement Reserve. Replacement Reserve costs will first be recovered from SCs who have over scheduled generation and under scheduled load. The remaining costs will be allocated to the SCs according to their metered load.	Item 3 AS Redesign 8/16/99	SI/SA/ BBS	In production 8/18/99	Combined with 43

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46	**COMPLETE** Effective Price (Work item changed from Imbalance energy settlement period, to Incentives to follow command (Min/Max) to Effective Price)	A new settlement procedure will be implemented by which deviations from ISO dispatch instructions will be settled at the unit's "Effective Price". This will remove the incentives for intentional deviations that take advantage of the difference between instructed price and ex-post price.	AS Redesign 8/16/99	BBS	In production 8/18/99	
49	Web browser interface with multi party access	At present, SCs have to issue a request to get data from MDAS. A capability that will allow SCs to extract data from MDAS via a WEB Browser will be developed.	Item 4 9/1/99	MDAS	11/30/99	Integration Testing to begin 8/23/99
50	**DELETED** Profiled meter data	Verification of profiled Meter Data	Item 5 10/1/98	MDAS		Verification of all SC submitted Load Profile data was determined to be impractical. Audits of SC meter data will be done on an individual basis.
51	**COMBINED** Authentication of data requests (See WI 49)		Item 4 9/1/99	MDAS		Combined with 49
55	Standing schedules	ISO SI/SA System will be modified to provide SCs the ability to create standing schedules. The SCs will be able to click on the standing schedule and add it to their set of Preferred or Revised Preferred schedules. NOTE: This item has already been approved.	Item 10 On Hold	SI	2001	Deferred to 2001
57	Acquisition of voltage support services	Currently, the ISO meets its voltage support requirements using the mandatory power factor range requirements of all Generators and will call on the Reliability Must-Run Units if additional voltage support is required. This new functionality will allow the ISO to procure additional voltage support capability through auction. Voltage service will be procured through auction.	Item 16 TBD	SI	2001	Deferred to 2001
58	Non-spinning replacement sync time	SI/SA System will be modified to adjust the relationship between capacity bid and ramp rates and provide the ability to acquire A/S in the real time market to replenish reserve.	Item 17 TBD	SI	2001	Deferred to 2001
59	Acquisition of black start services	SI/SA BBS System will be modified so ISO can procure and settle Black Start competitively (auction based). This is needed to meet ISO's requirement to procure Black Start competitively. Currently ISO maintains Black Start capability via long term contracts.	Item 15 TBD	SI/SA BBS	2001	Deferred to 2001

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ID	Work Item	Description	Staging Plan #3 Item No. and prior target release date	Sub System	Target Release Date	Comments
60	Intra-zonal CONG	SI/SA System will be augmented so that in the event of intra-zonal congestion, generation resources within the zone will be adjusted to alleviate the constraint. The ISO will use an optimization algorithm which will calculate the amount of balancing energy bought from or sold to each zonal resource to remove all constraint violations within the zone based on the increment and decremental prices available within the zone.	Item 8 1/1/99	SA	Q4/00	
61	Avail Transfer Capability (ATC)	The SA System will be augmented to provide ISO the ability to calculate in real time, available transfer capability on all paths (FERC 888/889 requirement) and monitor the quantity in use.	Item 7 TBD	SA	2001	Deferred to 2001
62	Voltage Stability & Collapse	A SA Subsystem will be provided to monitor voltage levels and stability across the grid. This Subsystem is defined in section 10.6 of the SA DSOW: "A voltage collapse monitoring program will be used by the ISO to assess voltage collapse margins and identify potential reactive power deficiency. Voltage Collapse Monitoring and Evaluation may be used to assess whether Preferred Schedules submitted by SC's are feasible with regard to voltage and reactive limits both in normal and contingency conditions. It may also be used to update local operating instructions and nomograms."	Item 7 TBD	SA	2001	Deferred to 2001
63	Refine market activity rules	The SA System will be modified such that ISO selects either the Preferred or Revised Schedules based on which schedule provides the lower total Usage charge revenues to the ISO. Presently the ISO will use the Revised Schedules even if the resulting solution is more expensive. This enhancement will increase efficiency in the market and avoid high cost solutions. Additionally, SI/SA will be modified to publish results of comparative congestion costs. (Comparative congestion costs are the CONG prices calculated when relieving the constraint that ensures congestion adjustments are made such that SCs' schedules are balanced.)	Item 18 TBD	SA	2001	Deferred to 2001
64	Bid evaluation and pricing algorithm	ISO SA System will be modified so the A/S bid evaluation and pricing takes into account applicable usage charges. CONG and ASM will interface to allocate transmission for a variety of A/S.	Item 11 5/1/00	SA	2001	Deferred to 2001

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65	Transient stability	A Transient Stability Analysis (TSA) Subsystem will be provided in SA. TSA is defined in section 10.7 of the SA DSOW: "The Transient Stability Analysis (TSA) function will be provided to study the impact of symmetrical and asymmetrical disturbances. Analysis will be in the time domain, extending to about 25 seconds (user-adjustable). TSA will be initialized from Power Flow or OPF (phase I) using and off-line network model and PMS SE (phase II) save cases and will be executed periodically or on user demand. The TSA function will be able to execute a 25-second study within 20 minutes."	Item 7 TBD	SA	2001	Deferred to 2001
66	Calculation of GMM	1. ISO SA will be augmented to calculate ex-post GMM's derived from actual metered quantities. Currently, ISO Settlements subsystem is using only forecasted values. Using actual (ex-post) GMM's instead of forecasted will allow the ISO to calculate settlement charges more accurately after the fact. Modifications to allow all for the UDC losses to be allocated based on the transmission branch losses associated with the UDC's transmission system will now be done under Work Item 166	Item 2 11/1/99	SA	Q4/00	The branch loss modification will now be done under Work item 166
70	Network Application State Estimator	A Network Application State Estimator will be provided with ISO EMS. The State Estimator (SE) will provide an estimation of non-observed points for a complete and reliable base case containing information for use by other Transmission Security Assessment functions and for display. The SE will take advantage of available ISO area measurements and WSCC data external to the ISO area. This data will be augmented with pseudo measurements to allow the SE to get a solution for the unobservable areas of the network model. Additionally, when SE is available, a second set of MWh estimates will be obtained by integrating the appropriate line flow values from the State Estimator solution.	Item 7 1/1/99	EMS	Q1/00	In progress, estimated complete Q1/00

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72	Network app. OPF, PF, CA, TLF, SSV	The following network applications will be provided with ISO EMS: <u>Optimal Power Flow</u> In addition to the standard power flow which solves the power flow equation without regard to load bus voltage magnitude limits and branch power flow limits, a power flow will be provided that optimizes a user selected function. <u>Power Flow</u> An interactive Power Flow will compute active and reactive power flows and bus voltage magnitudes and angles for the ISO Network Model. The user will be able to execute a power flow analysis only, or as an option, continue with an optimization analysis where users could specify the applicable objective functions. The PF will provide display-based input/output and will include a load and generation scheduler. <u>Contingency Analysis</u> The CA function will use the State Estimator or PF/OPF results as a base case and check specified contingency cases to determine if potential overloads or voltage problems exist. After screening all of the contingency cases, full ac studies will be performed on a user-chosen number of the most severe cases (up to100). For each element in violation, the output will identify its name, the value of the parameter and it's associated limit, and the value of the parameter in the base case. <u>Transmission Loss Factors</u> The Transmission Loss Factors (TLF) function will be provided to calculate transmission loss factors for use by other Power Management System functions. The loss factors for each user-designated bus and user-designated group of buses (e.g., load zone) in the ISO network will represent the sensitivity of ISO losses to changes in power injection at the buses or load zones <u>Security/Stability Validation</u> The Security/Stability Validation (SSV) function will be provided to monitor ISO network conditions with respect to ISO Operating Procedures (IOPs) and to provide easy access to applicable IOPs. ISO will prepare the IOPs in a rule-based format and store these procedures in the Power Management System where they can be accessed by the SSV function	Item 7 8/12/99	EMS	Q2/00	In progress, estimated complete Q2/00
88	Analope – Phase I (Automate communication of BEEP instructions)	A new system will be implemented to automate and provide electronic communication of BEEP instructions to generators.	AS Redesign TBD	SI/SA	Week of 10/18/99	Technical issues were identified during Integration Testing

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100	No Pay scheme for the use of A/S in uninstructed deviations	Under this work item, the "No Pay" scheme will be implemented in Settlement System. This scheme is designed to discourage uninstructed deviations using committed capacity. With this scheme, ISO will only pay for Ancillary Service capacity that is unloaded and available.	AS Redesign TBD	BBS	Week of 10/18/99	Work complete but must be installed concurrently with Analope (WI 88)
140	**COMPLETE** Separate markets for Regulation Up and Regulation Down	SI/SA will be modified so that Regulation Up and Regulation Down are distinct Ancillary Services with separate markets and clearing prices.	AS Redesign 8/16/99	SA/SI	In production 8/18/99	
153	**COMPLETE** Rational Buyer	ISO will develop a new Rational Buyer program which will calculate an alternative set of Ancillary Service capacity requirements which when run through the SA ASM procurement function will give the lowest total A/S capacity cost while still meeting ISO's reliability requirements. This new module will integrate with SA's existing ASM function. Settlement will be based on requirements from initial auction and MCPs from the Rational Buyer auction.	AS Redesign 8/16/99	SI/SA/BBS	In production 8/18/99	
166	Calculation of GMM	Modifications to the loss allocation methodology are proposed. This modification will allow for the UDC losses to be allocated based on the transmission branch losses associated with the UDC's transmission system. This item will be performed separately form Work Item 66.	Item 2 11/1/99	SA	Q4/99	This was originally part of Work Item 66