

出國報告（出國類別：洽公）

「中央調度控制系統」資料庫工作，
出廠驗收「中央調度控制系統」EMS
電力應用軟體

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派赴國家：美國

出國期間：95年12月19日至96年8月23日

行政院及所屬各機關出國報告提要

出國報告名稱：

「中央調度控制系統」資料庫工作，出廠驗收「中央調度控制系統」
EMS 電力應用軟體

頁數 57 含附件：是 否

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出國類別：1 考察 2 進修 3 研究 4 實習 5 其他

出國期間：95.12.19 – 96.8.23

出國地區：美國

報告日期：96.10.23

分類號/目

關鍵詞：

TPC Taiwan Power Company 台灣電力公司

Siemens 西門子輸配電公司

DCC Dispatching Control Center 電力調度中心

EMS Energy Management System 電能管理系統

SINAUT Spectrum 西門子電能管理系統

FAT Factory Acceptance Test 駐廠驗收測試

SCADA Supervisory Control and Data Acquisition 監視控制及資料蒐集

DTS Dispatcher Training Simulator 調度員訓練模擬器

GUI Graphic User Interface 圖形化使用者界面
HIS Historical Information System 歷史資訊系統
SA Scheduling Application 排程應用
UC Unit Commitment 機組排程
HS Hydro Scheduling 水力機組排程
HTC Hydro Thermal Coordination 水火力機組協調
STLF Short Term Load Forecast 短期負載預測
IPP Monitoring Independent Power Producer Monitoring 獨立發電業者監視程式
TCI TeleControl Interface 資料收集與控制介面裝置
TCS TeleControl Server 資料收集與控制伺服器
TCB TeleControl Board 資料收集與控制模板
COM Communicator Server 傳播伺服器
DNP Distributed Network Protocol 分散式網路通信協定
RTU Remote Terminal Unit 資訊末端設備
CNM Computer Network Management 電腦網路管理

內容摘要：(二百至三百字)

本計畫為執行本公司中央調度中心電能管理系統(EMS)汰換計畫契約規定之駐廠驗收測試(Factory Acceptance Test)。職等奉派赴得標廠商西門子輸配電公司(Siemens)位於美國明尼阿波里斯(Minneapolis)的工廠，進行資料庫更新及協助相關整合測試工作，最後代表本公司辦理該系統之出廠驗收工作。本報告敘述駐廠驗收項目中軟體功能之架構與組成、驗收期間所參與之驗收過程、所觀察到系統問題描述、所開出的相關功能差異項目及整理駐廠訓練期間之工作心得，期為系統接收及移轉後自行運轉與維護之參考。

本文電子檔已傳至出國報告資訊網 (<http://report.gsn.gov.tw>)

出國報告審核表

出國報告名稱：「中央調度控制系統」資料庫工作，出廠驗收「中央調度控制系統」EMS 電力應用軟體		
出國人姓名(2人以上,以1人為代表)	職稱	服務單位
陳政宏	電機工程師	台灣電力公司電力調度處
出國期間：95年12月19日至96年8月23日		報告繳交日期：96年10月23日
出國計畫主辦機關審核意見	<input checked="" type="checkbox"/> 1.依限繳交出國報告 <input checked="" type="checkbox"/> 2.格式完整(本文必須具備「目地」、「過程」、「心得」、「建議事項」) <input checked="" type="checkbox"/> 3.內容充實完備. <input checked="" type="checkbox"/> 4.建議具參考價值 <input checked="" type="checkbox"/> 5.送本機關參考或研辦 <input type="checkbox"/> 6.送上級機關參考 <input type="checkbox"/> 7.退回補正,原因: <input type="checkbox"/> <input type="checkbox"/> 不符原核定出國計畫 <input type="checkbox"/> <input type="checkbox"/> 以外文撰寫或僅以所蒐集外文資料為內容以 <input type="checkbox"/> <input type="checkbox"/> 內容空洞簡略 <input type="checkbox"/> <input type="checkbox"/> 電子檔案未依格式辦理 <input type="checkbox"/> <input type="checkbox"/> 未於資訊網登錄提要資料及傳送出國報告電子檔 <input type="checkbox"/> 8.本報告除上傳至出國報告資訊網外,將採行之公開發表: <input type="checkbox"/> 辦理本機關出國報告座談會(說明會),與同人進行知識分享。 <input type="checkbox"/> 於本機關業務會報提出報告 <input type="checkbox"/> 9.其他處理意見及方式:	
層轉機關審核意見	<input type="checkbox"/> 1. 同意主辦機關審核意見 <input type="checkbox"/> 全部 <input type="checkbox"/> 部分_____ (填寫審核意見編號) <input type="checkbox"/> 2.退回補正,原因: _____ <input type="checkbox"/> 3.其他處理意見:	

說明：

- 一、出國計畫主辦機關即層轉機關時，不需填寫「層轉機關審核意見」。
- 二、各機關可依需要自行增列審核項目內容，出國報告審核完畢本表請自行保存。
- 三、審核作業應於報告提出後二個月內完成。

報告人：      

主管處 主管 

總經理
副總經理：

QP-08-00 F06 

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1 出國任務

1.1 緣起

本計畫為執行本公司中央調度中心電能管理系統(EMS)汰換計畫契約規定之駐廠驗收測試(Factory Acceptance Test)。職等奉派赴得標廠商西門子輸配電公司(Siemens)位於美國明尼阿波里斯(Minneapolis)的工廠，參與駐廠驗收測試。

中央調度控制系統汰換工程包含台北中央調度中心汰換及增設高雄中央調度中心和調度員模擬訓練中心，由西門子公司承包，在美國進行設計、裝配及整合，目前進行至出廠驗收測試及除錯工作。

除了驗收工作外，本工程由本公司負責資料庫建檔，為使資料庫更正確完整，並可進行系統功能之測試，須於出廠驗收開始前進行資料庫更新，故職等亦於正式驗收工作開始前進行資料庫的更新工作，並在更新完成後交西門子公司的確認檢驗之後才展開驗收。

1.2 出國行程

日期	地點	工作概要
12月19日~ 12月19日	台北⇨洛杉磯⇨明尼阿波里斯	往程
12月19日~ 2月11日	明尼阿波里斯 - 西門子公司	功能討論 資料庫更新
2月12日~ 4月13日	明尼阿波里斯 - 西門子公司	資料庫更新完成後 進行回歸測試
4月14日~ 8月20日	明尼阿波里斯 - 西門子公司	硬體及應用軟體出 廠驗收
8月21日~ 8月23日	明尼阿波里斯⇨洛杉磯⇨台北	返程

1.3 工作任務包含下列項目：

- 應用程式、TCI資料庫內容檢查與更新。
- 功能要求澄清與會議討論。
- 檢查程式功能，協助西門子公司調整程式至收斂狀態。
- 與西門子公司每日進行進度會議。
- 資料庫更新完成後進行回歸測試。
- 電力系統應用軟體、硬體及TCI功能出廠驗收

1.4 EMS汰換工程作業流程

- 一、 顧問聘請作業
- 二、 採購作業
- 三、 Kickoff 會議及安排得標廠商軟硬體功能介紹
- 四、 功能規範審核

- 五、 廠商標準設計規範審閱及台電特殊要求審核
- 六、 發展系統驗收
- 七、 建置即時資料庫及歷史資料庫批次輸入樣本
- 八、 建置單線圖
- 九、 建置報表
- 十、 測試計劃書審核
- 十一、 工廠驗收 ← 本次出差任務
- 十二、 現場安裝
- 十三、 現場驗收
- 十四、 現場可靠度測試
- 十五、 其他

2 EMS 功能介紹

2.1 新 EMS 架構簡介

出廠驗收的EMS系統系採用西門子公司之SINAUT (Siemens Network Automation) Spectrum 3.x 為核心之電能管理系統(此後簡稱Spectrum)，架構於IBM AIX作業系統平台上(一種類似UNIX的作業系統)，是一種開放且分散式架構的系統，Spectrum 是一套歷經30年考驗且持續改進的系統，西門子共提供超過650套給全球客戶，其中有超過280個計劃案已採用Spectrum這種開放且分散式架構的系統，其優點包括如下：

- Spectrum是模組化系統，軟體/硬體擴充及升級容易，硬體為分散式工作站及伺服器連接而成，軟體亦採用高階語言及結構化設計。
- 軟體具有可攜性，並採用許多工業標準如TCP/IP、DNP等，及商業軟體發展而成，如UNIX、X Window、ORACLE等，具有開放性之特性。
- 不會被特定硬體平台廠商限制住。

Spectrum系統做為電力調度的功能主要分成兩大部分，即基本電力應用軟體功能SCADA (Supervisory Control and Data Acquisition，監視遙控及資料收集) 功能及進階之EMS電力應用軟體功能。SCADA為電能管理系統的基礎，負責監視遙控及資料收集功能，子功能計有遠端遙控、資料收

集、資料處理、資料交換、警報與事件訊息、人機界面等。EMS 電力應用軟體功能，又由四大應用軟體功能組成，分別是電力應用（PA， Power Application）、電網應用（NA， Network Application）、發電排程應用（SA， Scheduling Application）及調度員訓練模擬系統（OTS， Operator Training Simulator），並分佈在各應用伺服器上。

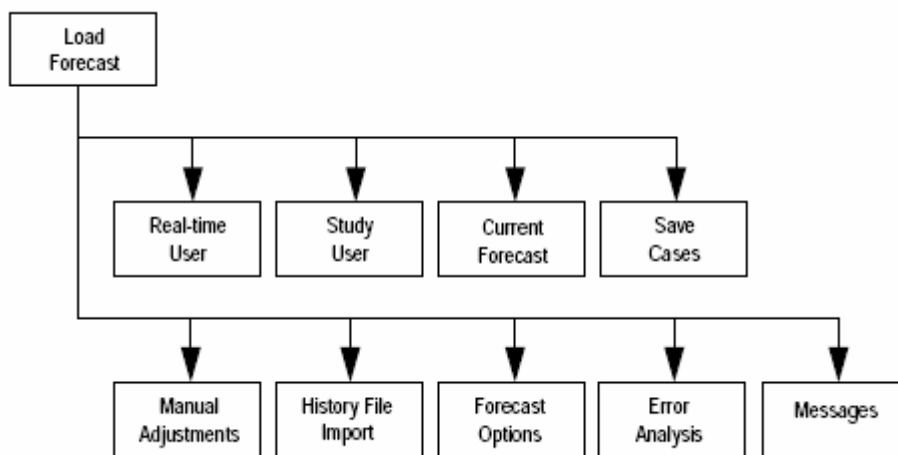
Spectrum系統是由下列數個單元模組、不同功能之應用伺服器和工作站等組成，以分散形態架構成，主要計有Tele-control Interface (TCI)、Communicator Server、Utility Communication Server(UCS)、Man Machine Interface Workstations、Administration Server、Historical Information System (HIS) Server、Generation Scheduling / Network Analysis (GS/NA) Server、Operator Training Simulator (OTS) Server 及Web UI Server，說明如下：

- Tele-control Interface (TCI) 資料收集與控制介面
- Communication Sever(COM) 傳播伺服器
- Utility Communication Sever 公司間通訊伺服器
- Administration Server (ADM) 管理伺服器
- Historical Information System (HIS) Server 歷史資訊系統伺服器
- Man-Machine Interface Workstations (MMI) 人機界面工作站
- Operator Training Simulation(OTS) Server 調度員模擬訓練系統伺服器

2.2 主要驗收項目及功能介紹：

2.2.1 短期負載預測 Short Term Load Forecast

短期負載預測是用來預測未來一段期間的各區域負載，以計算全系統的負載。在許多的Study Case中，會有一個符合需求的預測結果會被送到COP中，以供其他的應用程式使用。在負載資料中，目前的負載預測是提供未來一段時間負載的最好的根據。而且要同時有歷史負載資料、歷史氣候資料及氣候預測資料以供負載預測功能使用。負載預測功能存有負載預測自己的資料庫，裡頭的時間級距可以選擇15,30,45,60分鐘。



負載預測程式資料流程關係圖

相關功能簡述如下：

即時使用者(Real-time User)

即時使用者是在執行即時短期負載預測時所使用的使用者。

學習使用者(Study User)

系統中可以有很多的學習使用者，學習使用者是用來維護負載預測的歷史資料數據。

目前的預測/存於 COP(Current Forecast/COP)

目前的最新預測包括了各區域的負載預測，並存在於 COP 中，以是供給各應用程式使用。

儲存的 Case(Save Cases)

用以儲存必需的負載預測值。此部分的資料可供各使用者重新叫出使用。

手工調整(Manual Adjustments)

可提供使用者去維護調整歷史負載資料。

歷史資料的匯入(History File Import)

可以將文字檔存在型式的歷史負載及氣候資料，匯入系統中。但此功能僅能提供給學習使用者使用。

預測選項(Forecast Options)

近似天的預測(Similar Day Forecast)

輪廓比對預測(Pattern Matching Forecast)

氣候適式預測(Weather Adaptive Forecast)

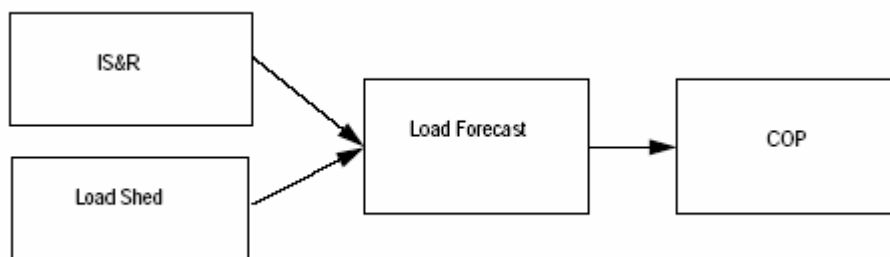
追蹤預測(Tracking Forecast)

誤差分析(Error Analysis)

提供在實際負載及預測負載間的誤差統計分析功能。

訊息(Messages)

可在畫面中顯示負載預測的訊息。



負載預測資料流程圖

負載預測資料流程圖簡述如下：

Information Storage and Retrieval (IS&R)

IS&R 儲存著實際量測的負載資料及預測的負載資料。

Load Shed

指著由於頻率關係而被採取的卸載動作的卸載量。

COP

所會被採用的負載預測資料會經由即時使用者送到 COP 中存放，以供其他應用程式使用。此功能可採取週期性的自動存取，但均須由即時使

用者設定。

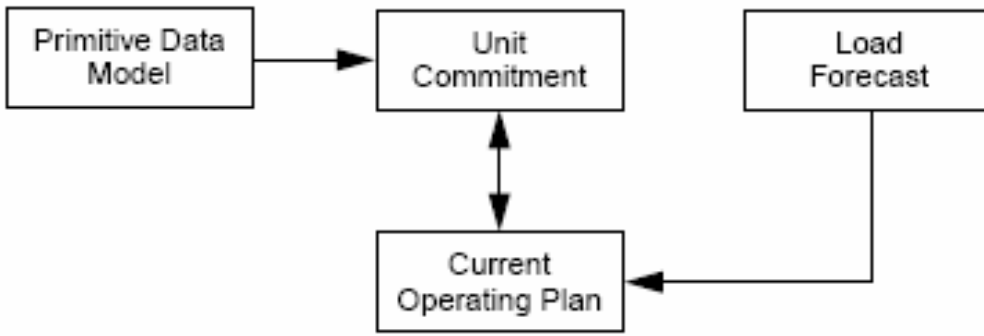
2.2.2 機組排程 Unit Commitment

UC 排程是用以提供計畫人員製作提供火力機組發電成本最小化的排程組合的工具。

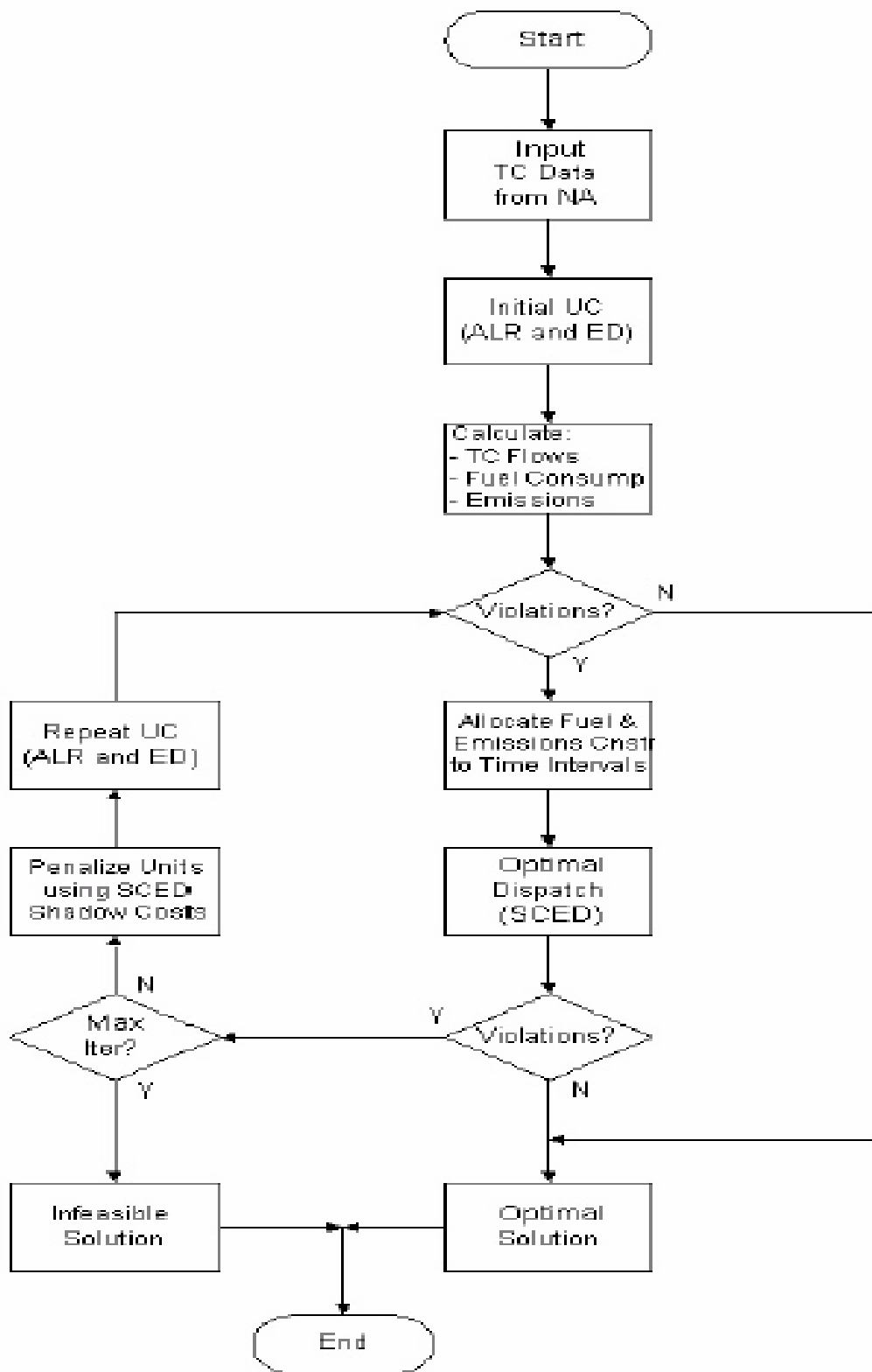
UC 排程工具所供的功能概述

- 產生機組排程 Working Case
- 評估電業自由化下的交易(Transaction)
- 調度交易(Transaction)
- 線上修正燃料成本及其他輸入資訊
- 計算機機組排程解(Solution)
- 手動製作機組排程計畫
- 分析機組排程的結果
- 比較機組排程在不同 working case 的解
- 儲存機組排程的解

下圖顯示 UC 資料庫與其他資料庫間資料流程的關係:



資料流程



UC 資料流程圖

Augmented Lagrangian Relaxation (ALR)；(增長拉格朗之鬆弛法)

Augmented Lagrangian Relaxation 解是用以提供機組及交易制度排程一個可行的經濟解。The Augmented Lagrangian Relaxation dual problem 是由機組排程一組最原始的限制條件物件方程式及 Lagrange multipliers 所構成。在 Augmented Lagrangian Relaxation solution 中，當計算系統的淨需求時會一起考量排程的交易制度。

Security Constrained Economic Dispatch (SCED)；安全限制經濟調度

Security Constrained Economic Dispatch (SCED) 採用了非線性的 Dantzig-Wolfe decomposition 演算法，以強制輸電線安全空間(Transmission corridor)、燃料、排放量限制都能符合能量平衡以及備轉容量要求。

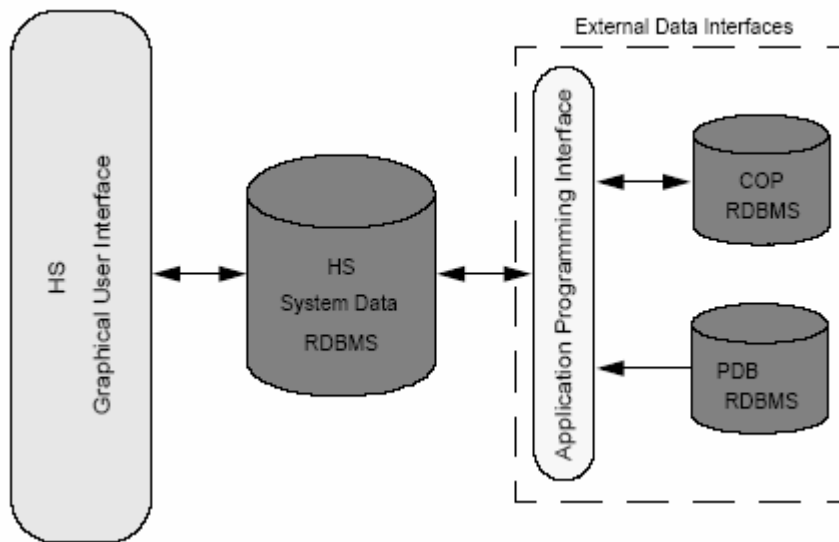
2.2.3 水力排程 Hydro Scheduling

水力機組排程是一套提供水力機組排程的工具，可為計畫人員及調度人員提供自動的水力機組排程以及初步的水力系統發電成本計算。

HS 水力機組排程工具功能概述

- 產生水力機組排程 Working Case
- 修正輸入資料
- 計算水力機組排程解

- 分析水力機組排程結果
- 儲存水力機組排程結果
- 比較水力機組排程解



HS 資料流程圖

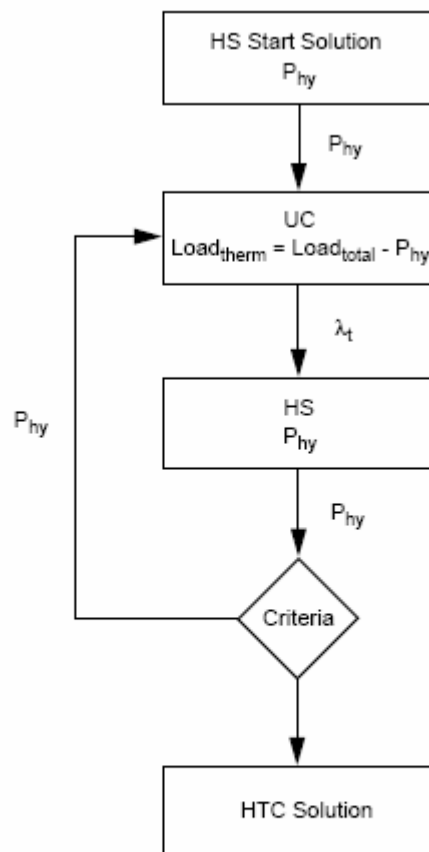
2.2.4 水火力機組協調(Hydro Thermal Coordinator, HTC)

水火力協調程式是用以整合火力機組排程以及水力機組排程結果的整合工具。以提供計畫人員製作水火力機組排程計畫以及初步的系統成本計算。

HTC 水火力機組協調排程工具功能概述:

- 產生水火力機組排程 Working Case
- 修正輸入資料
- 計算水火力協調解

- 分析水火力協調解
- 儲存水火力協調解
- 比較水火力協調解



Legend:

Load _{total}	Total system load [MW]
P _{hy}	Hydro generation [MW]
Load _{therm}	Total system load minus actual hydro generation [MW]
λ _t	Marginal costs of thermal system [\$/MWh]

HTC 資料流程圖

2.2.5 最新運轉計劃(Current Operation Plan,COP)

COP 為排程應用程式中共同的資料傳輸介面, 內含電力交易排程 (ITS)、網路的大修排程、網路敏感度、負載預測、機組排程、水力機組協調、水火力機組協調等正式結果, 並供各應用程式取用資料及

資訊交換。採用網路介面(WebUI)，操作無區域限制，只要登上電能管理系統網域的使用者均可以登錄。

2.2.6 調度員訓練模擬器 Dispatcher Training Simulator

用以訓練調度員運轉電力系統及提升操作品質。舉凡日常操作、意外事件的模擬、歷史事件…等，均能利用此調度員訓練模擬器實現訓練的目的地。本訓練模擬器包含了以下功能與特性：

- 與 EMS 相同的網路模型初始化本訓練模擬器。
- 與 EMS 使用相同的資料庫。
- 與 EMS 使用相同的單線圖，維護容易。
- 與 EMS 的 AGC、SCADA 有相同的特性。
- 針對發電機的原動機提供不同複雜層級的原動機模型。
- 允許使用者使用多組操作台及一台教官操作台以實現群體訓練。
- 可模擬多孤島系統。
- 可模擬包含頻率效應、負載管理、以電容電抗器及變壓器有載接頭操作的電壓調節的負載模型。
- 提供全黑啟動模擬。
- 提供直流輸電的模擬。

- 可模擬低頻卸載的模型。
- 訓練模擬器可由 EMS 的即時資訊初始化。
- 可模擬各種電力系統事件。
- 可模擬外公司(external companies)的 AGC 行為。
- 包含各種電驛模型。

過/欠頻電驛

過流電驛

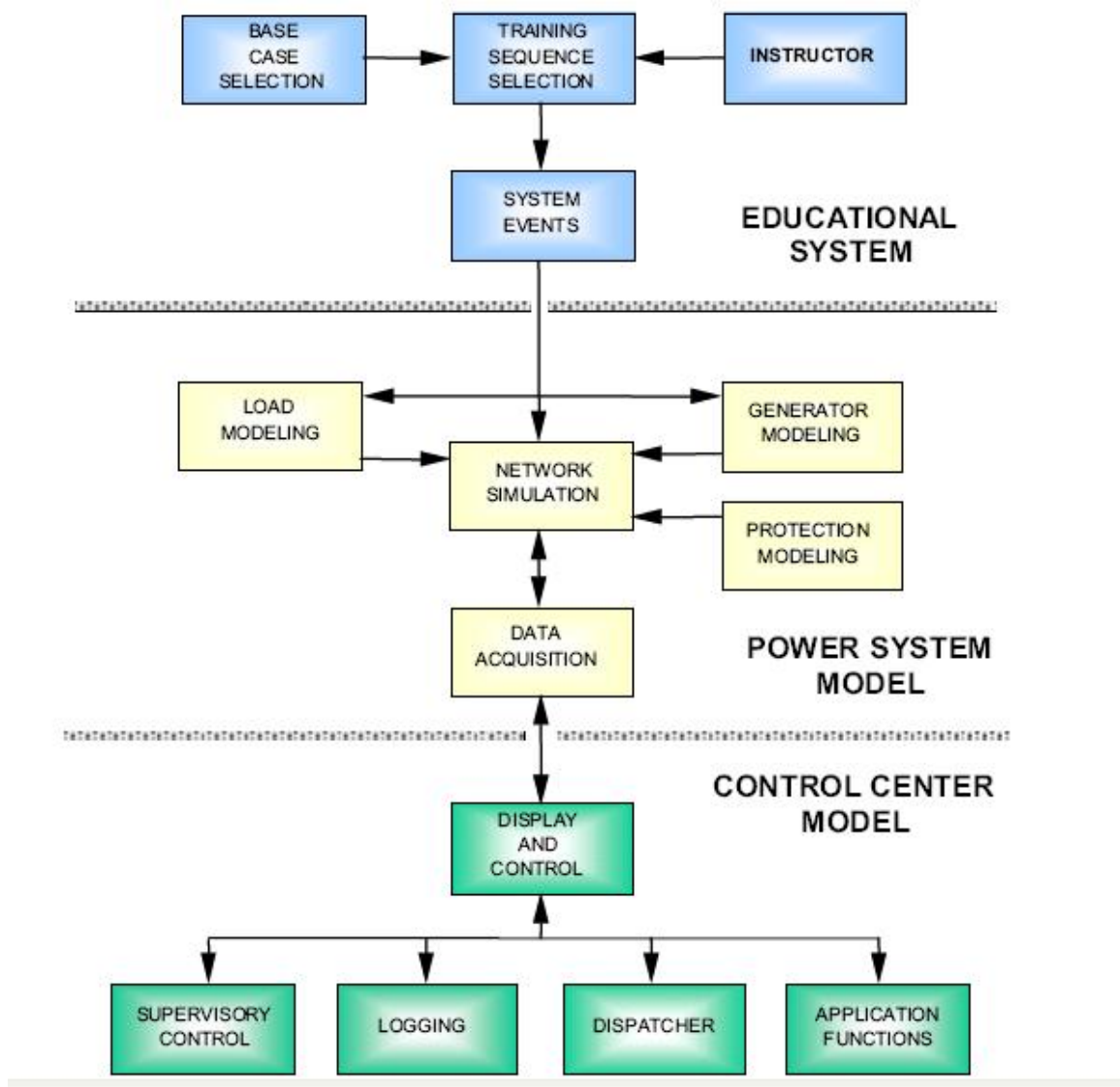
過/欠壓電驛

同步並聯電驛

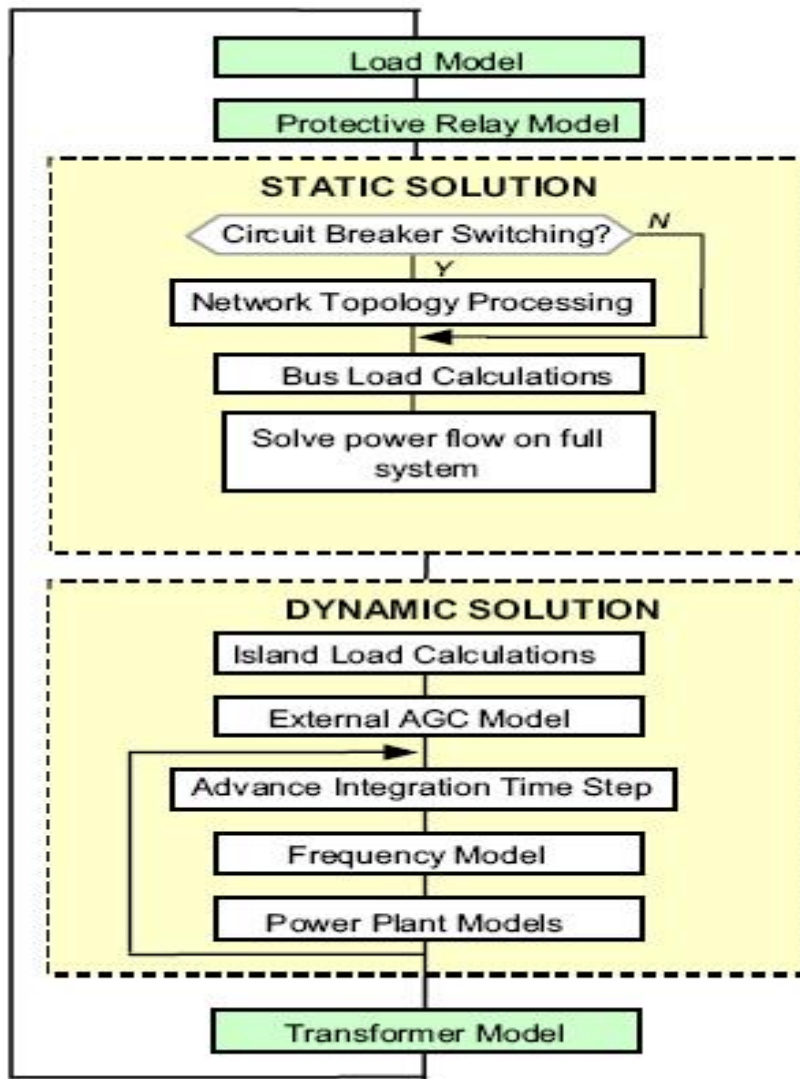
時間開關電驛

過/欠壓激磁

- 教官可模擬電廠操作員的操作行為。



圖表 OTS 操作層級



圖表 OTS 迴圈結構圖

2.2.7 獨立發電業發電排程監視功能 IPP Monitoring Function

利用預先編排好的發電機排程，監視並記錄獨立發電業者(IPP)的發電行為。在發電行為中有違規行為發生時予以記錄並產生報表及以警示(Alarm)提醒調度員。

2.2.8 資料收集與控制介面 Tele-control Interface (TCI)

資料收集與控制介面(TCI)包括資料收集與控制介面(TCS)和資料收集與控制介面模板(TCB)等主要元件。各遠端變電所及電廠的資訊末端設備

(RTU)，透過數據機(使用DNP協定)，將現場(遠端變電所及電廠)之即時資料，傳送至TCI，再經Communicator Server，傳送至Spectrum之EMS系統，完成監視遙控及資料收集功能。

- 資料收集：負責定時收集發電廠、變電所內的類比量與數位狀態值等資料，經由通訊網路傳回主站(調度中心)。
- 資料處理：將RTU設備傳回的原始資料轉換成可用的資訊。
- 遠端遙控：對發電廠機組出力，變電所開關、變壓器分接點等予以控制。

通訊方式可分下列三種：

1. 網路連線(DNPi)

TCI利用TCP/IP網路與RTU連線收集資料。

2. 直接連線(DNP3 PtP)

TCI利用modem 用專線直接與RTU連線收集資料。

3. 撥接連線(DNP3 Dial up)

TCI利用撥接線路使用撥接modem連接RTU收集資料。

2.2.9 即時資料收集

Spectrum支援5種資料收集設定方式

1. 週期性資料擷取 (Periodic Scan or Continuous Scan)

主站週期性的向RTU設備發出收集資料的指令，RTU設備回送全部遠端資料(類比點或數位點)，可設定連續不間斷的發出收集資料的指令。

2. 變化偵測資料擷取(Report by Exception)

主站週期性的向RTU設備發出收集資料的指令，只有異動(更新)的遠端資料被回送至主站。

3. 主動回報資料擷取(Unsolicited Data Acquisition)

當遠端資料有變化時，RTU設備主動送回遠端資料。

4. 累積值(發電量)之資料擷取 (Accumulator Data Acquisition)

在預先設好的週期下(通常為一小時)，向單個或多個RTU設備發出凍結指令(Freeze Command)，再發出收集資料的指令，使RTU設備送回累積值。

5. 強制資料擷取(Forced Scan / General Interrogation)

要求RTU設備將所有遠端資料送回主站，通常在系統起動時、資料庫異動、RTU重置或調度人員要求下，將會執行此命令，強制擷取遠端資料。

2.2.10 RTU 設定

為達成上述遠端現場電力即時資料收集，需要應用一軟體 Config Pro 在 RTU 設備設定相配合的協定和傳輸方式，才能讓 RTU 正常動作。

3 工廠測試期間的功能差異

主要問題分類

3.1 排程運用程式 (Scheduling Application):

3.1.1 依照功能差異順序排序:

1. TPCF10054 (opn/3) -Number for "OS-UC/HS/HTC – Areas for interface flow monitoring" unclear
2. TPCF10056 (dup/4) -Missing functionality for Area for Interface Flow Monitoring.
3. TPCF10152 (opn/3) -The inconsistent data on TCDC site and KCDC site
4. TPCF10192 (opn/3) -Oracle forms sometimes hang during data entry
5. TPCF10222 (opn/3) -Mismatch between IS&R (HIS) and STLF load history data
6. TPCF10241 (opn/3) -The system response during STLF FAT is quite slow
7. TPCF10270 (opn/3) -Emission Dispatch - Shadow Cost could not be fetched from UC
8. TPCF10295 (sub/0) -UC Ignores Curve '1' for CC Units from AGC Initial Conditions Interface
9. TPCF10301 (opn/3) -Two RealTime user can login at the same time
10. TPCF10342 (opn/3) -Corridor Flow Constraints function is missing
11. TPCF10346 (opn/3) -Entering large value for Heat Content on fuel display causes UC to Abort
12. TPCF10351 (fix/4) -In Unit Cost Results Daily, Generator 'MW' should be MWh' and should be * 15/60
13. TPCF10375 (opn/3) -2 operators can login into UC webui using same user number
14. TPCF10376 (opn/0) -Startup Cost Calculation Incorrect
15. TPCF10415 (opn/3) -Constraint Relaxation should be done when infeasible reserve requirement
16. TPCF10416 (opn/3) -Reserve Violation Message when all Reserve set to Inactive
17. TPCF10423 (opn/3) -The execution time exceeds the required time a lot
18. TPCF10427 (sub/3) -The calculation results of Fuel cost is not correct
19. TPCF10430 (opn/3) -UC Abort with no message for Priority Order constraint active
20. TPCF10462 (opn/3) -The result of down time constraint is not correct
21. TPCF10469 (opn/4) -The units don't obey the startup/shutdown constraint properly.
22. TPCF10521 (sub/4) -All the input data shall be modify via display

23. TPCF10537 (opn/3) -UC abort when run more than 8 days study case
24. TPCF10601 (opn/3) -HS can't find the maximize energy production feasible solution
25. TPCF10638 (sub/3) -Hydro units statuses changed in HS solution mode B
26. TPCF10645 (opn/3) -Reservoir Target level constraints are not observed
27. TPCF10655 (opn/3) -The unknow reason message information in all results
28. TPCF10667 (opn/3) -The spinning reserve are strange in the result
29. TPCF10671 (sub/3) -8 very important Units parmeters missing in HS program
30. TPCF10730 (sub/3) -HTC can't retrieve a saved case TPCF10780 (opn/3) -HTC takes too long time to execute a case
31. TPCF10788 (opn/3) -The meaning of MISC. Generation in HTC, and UC program is not unique
32. TPCF10804 (opn/3) -Must run for thermal unit (CCP) failed
33. TPCF10805 (opn/3) -Low operating limits of hydro units are not observed
34. TPCF10809 (opn/3) -Reservoir level and volumn limits are violated
35. TPCF10813 (opn/3) -HTC can't initialize Initial conditons when KCDC doesn't have GSIM running
36. TPCF10816 (opn/3) -HTC can't get the initial condition for reservoir and hydro units
37. TPCF10817 (opn/3) -HTC can't execute 15 days case
38. TPCF10835 (opn/3) -The result of hydro units is sharply oscillated

3. 1. 2 依照功能差異分類:

安全性問題:

1. More than two users can login the same user.

系統效能及空間規劃:

1. The response of the system is slow. In average, need 5 seconds to open a display on wb1k, more than 30 seconds on wb2k.
2. UC and HTC take too long time to execute a solution.
UC take average 20 minutes to execute 1 day solution.
HTC take average 35 minutes to execute 1 day solution.
2. UC, HS, and HTC can't execute study case more than 7 days.

功能遺漏:

1. Important constraints still can't work on UC, HS, and HTC.(UC and HTC: Spinning reserve, Operating reserve, Regulating reserve, Constraints relax priority order, Solution priority order; HS: Ramp rate, initial condition from AGC, min up/down time constraint, Units capacity limit,)
2. No Shadow Price on UC and No water value on HTC.
3. UC doesn't have corridor flow constraint.
4. Not all the input data can be modified on display.

5. UC doesn't provide Shadow Cost to AGC.

程式功能錯誤:

1. The way HS calculate the spinning reserve is wrong. That will cause HTC has problem on calculating spinning reserve.
2. The results of HS and HTC are oscillated.
3. The interface between SA and HIS still has problem.
4. Oracle form sometimes hang when enter data into STLF.
5. UC can't identify the real configuration on C.C units from AGC when AGC is using Curve 1 on that C.C. unit.
6. The results of calculation on start up costs and fuel cost still have problem.
7. Minimum start up/down time constraint still have problem in UC.
8. In HS, reservoir target level can't work.
9. HTC can't obey the initial condition on hydro units.
10. HS can't obey the level and volume constraints
11. In UC, C.C units doesn't obey the must run constraint.
12. HS still have strange messages in solution message.
13. HS's mode B will can't obey the recommitted rule.
14. HS can't proof the solution is maximize energy production and feasible.
15. UC Abort with no message for Priority Order constraint active
16. The multisite function problem.
17. UC and HTC doesn't relax the constraints by list when there is no feasible solution.
18. Enter large fuel heat content will cause UC abort.

程式參數定義不一致:

1. The spinning reserve in UC, HS and HTC.
2. The definition of MISC (miscellaneous) amount of generation in UC and HTC.

3.2 調度員訓練模擬系統 (Dispatcher Training Simulator)

3.2.1 依照功能差異順序排序:

1. TPCF10884 (mon/3) -The OtsEsi goes core dump occasionally
2. TPCF10885 (fix/3) -The OtsTsmsg disappear occasionally
3. TPCF10907 (opn/3) -The OTS display will logout occasionally
4. TPCF10908 (opn/3) -The Display flicker too much
5. TPCF10910 (opn/3) -The OTS->SCADA mapping is missing (For Combined Cycle Units)
6. TPCF10925 (opn/3) -Three winding voltage regulation(auto) is incorrect.
7. TPCF11015 (int/3) -OtsTsmsg disappears after synchro check relay operation.
8. TPCF11041 (cld/3) -The OTS's HIS function is missing in HIS
9. TPCF11065 (opn/3) -OtsTsmsg core dump during Base Case Retention.

10. TPCF11066 (opn/3) -OtsTsmsq core dumps when simulation is started after base case retention.
11. TPCF11067 (opn/4) -Reservoir elevation is incorrect after a specific simulation time.
12. TPCF11086 (sub/3) -An Isolated SA function is missing in OTS
13. TPCF11087 (sub/3) -An isolated IPP monitoring function is missing in OTS
14. TPCF11088 (sub/3) -An isolated ITS function is missing in OTS
15. TPCF11089 (sub/3) -An isolated HIS function is missing in OTS
16. TPCF11090 (int/3) -An isolated TCI function is missing in OTS
17. TPCF11091 (sub/3) -An isolated RDD function is missing in OTS
18. TPCF11092 (sub/3) -An isolate SOPM function is missing in OTS
19. TPCF11093 (sub/3) -An isolate CONSTAT function is missing in OTS
20. TPCF11095 (sub/3) -An isolate "SYS CONF" function is missing in OTS
21. TPCF11096 (sub/3) -An isolate CDL function is missing in OTS
22. TPCF11215 (sub/3) -The cycle time is too long to cause the updating rate slower than T.S.

3.2.2 依照功能差異分類:

系統效能及空間規劃:

1. 每運算週期均為 5 秒,影響動態條件無法一至兩秒更新一次。
2. Snapshot 的空間規劃量不足合約規定的 30 個。

功能遺漏:

1. 短缺 SA、IPP、ITS、HIS、TCI、RDD、SOPM、CONSTAT、SYS CONF、CDL 等功能。

程式功能錯誤:

1. 部份編輯事件無法正常動作。
2. 內部兩隻主程式會不定時消失或當掉。
3. 部份電驛跳脫不正常。
4. 水文模擬無法符合計算結果。

3.3 獨立發電業者發電監視功能(IPP monitoring Function)

3.3.1 依照功能差異順序排序:

1. TPCF10103 (opn/3) -IPP Report failed to retrieve archived data from HIS. Data display on Reporting
2. TPCF10119 (fix/3) -Problems encounter when applying multiple day schedule for monitoring
3. TPCF10120 (opn/3) -The "Transmitted" flag should be defined as an ICCP data.

4. TPCF10123 (fix/3) -Some of the IPP infos not archived in HIS
5. TPCF10125 (fix/4) -IPP Setpoint Emergency reference code need to corrected
6. TPCF10127 (opn/4) -The backdrop of schedule is missing on trend
7. TPCF10130 (int/3) -The data is inconsistent between ORACLE DB and Display shown
8. TPCF10138 (opn/3) -The scheduled daily data from tomorrow to the UC scheduled date can't shown
9. TPCF10146 (opn/4) -Do not have print function in monitoring function
10. TPCF10150 (opn/3) -The monitoring function under AGC mode is missing
11. TPCF10157 (fix/3) -The timing to generate this alarm is not correct
12. TPCF10160 (int/3) -Data can't get in this program
13. TPCF10161 (int/3) -The data can't get in this program
14. TPCF10162 (int/3) -Data can't get in this function
15. TPCF10163 (int/3) -data can't get in this function
16. TPCF10165 (fix/3) -no calculation result
17. TPCF10167 (int/3) -no alarm be generated when reaching the limit
18. TPCF10168 (opn/3) -The data can't get in to verify this function
19. TPCF10171 (int/3) -The data can't get in
20. TPCF10172 (int/3) -The data can't get in
21. TPCF10173 (int/3) -The last column is empty

3.3.2 依照功能差異分類:

安全性問題:

1. 程式無對輸入的資料校對正確性。

系統效能及空間規劃:

1. 系統反應慢。

功能遺漏:

1. 於 AGC 下的 Important constraints still can't work on UC, HS, and HTC.(UC and HTC: Spinning
2. 沒有'print'功能。
3. 在 trend 的功能中沒有以時程表(schedule)為背景的圖。
4. 在 HIS 中沒有訂點去儲存資料。

程式功能錯誤:

1. 在傳送多天排程時會產生問題。

3.4 潛在的問題(合約未明定)

短期負載預測功能沒有支援MultiSite功能!

依照西門子公司的架構，STLF的程式分別在台北及高雄站單獨執行，彼此相互不聯繫。其一站執行完預測結果後，僅會將資訊儲存在自站而不會傳送到另一站；另一站所需要用的預測結果需要自行去產生。並且，各站自行蒐集氣候及負載資訊。雖然在正常情形下並不會有問題產生(通訊正常，並且都不進行主站切換)，但在非正常情形下(兩站有任一站氣象訊息有誤、採用預測方法不同…等等)，或切換站時，便會因負載資料不一致而造成潛在的運轉問題。

另一方面，在另一站的人員亦無管道可以得知在主站的負載預測值，在儲存進入歷史資料庫時，亦會造成資料的混亂。

4 心得與建議:

目前台電在使用中的電能管理系統(EMS)，已有十六年的使用時間，即將汰換至第三代的系統，能夠有這機會參與(依照目前分散式電腦的架構，未來系統只須要升級，很難會再須要全面汰換新系統)汰換計劃的駐廠驗收工作，真的是非常的榮幸，也讓人格外的珍惜。

針對參與本計劃至今所進行的一些觀察，有以下的建議事項:

4.1 資料庫建置

資料庫的建置在類似的工程中必然是一項重要且繁雜的工作，參與其中所獲取的能力及相關知識的效用是有目共睹的；然而，一方面本計劃客製化的功能較多，西門子公司的系統也因邊開發邊整合而需要較多的時間，以致於在驗收的過程中，會遭遇到部份的功能異常，很難釐清是起因於資料庫或是程式；對於責任歸屬問題，便常有爭議。在協調的過程中便會耽誤部份的工進時程。

建議：

為工程進度的順利，建議往後的工程可以交由廠商建立初期的資料庫樣本，待確認系統均能符合期望結果時，再由本公司人員進行剩餘資料庫的建製及訓練。如此在建立系統時，便可較為清楚的釐清本公司或是廠商的責任歸屬；在接受廠商的訓練時，也有功能更明確的系統可以使用，訓

練也能更加踏實。

4.2 駐廠協調人員

本次駐廠驗收工作由於不單純只有進行驗收工作，相對的有許多溝通協調工作必須透過雙方的代表進行，因此本次駐廠訓練安排有駐廠協調者(領隊)一職負責與西門子進行相關的工作協調與工作的分配。本梯次在領隊雷旭民股長的帶領下，可以說成功的達成公司交付的任務，雷股長多次的出面協調為公司同仁與工作增取到非常圓滿的成績，在此感謝他的成功帶領；但在另一方面，也看到了雷股長所額外付出的大量辛勞，由於這一工作是由雷股長兼任，除了本身所負責的驗收項目重要而且煩雜，本案因目前進度已落後，衍生出許多的協調工作，不論是工作上的責任歸屬、假日加班、晚上與台北公務聯繫、問題討論…，都需要額外花費大量的精神與時間協調，睡眠時間因此減少許多。兩位股長，深夜還和台北討論公務，而雷股長更是每天早上8:30~下午6:30在西門子公司工作，回到家匆匆用過晚餐後，晚上的8:00~11:00又繼續和台北同仁討論公務至深夜。所投入的精力，讓人欽佩。另外，Minneapolis現在是全美國高科技品的生產地之一，生活水準頗高，近幾年來物價調高不少，公寓每月房租調至二千美元左右，大眾運輸系統不發達，租車每月需一千美元左右，幸賴同仁們一起生活和長官照顧，才可負擔高生活費用。

建議：

1. 接下來的重測工作所遭遇到的問題將更多，相對的領隊所肩負的責任更重；建議上級長官在派遣人選時，能另外考慮加派將負責協調的人力，尤其建議有更高層級的長官帶領，如此讓本公司與西門子在溝通協調上較不會處於劣勢，並增加西門子對本公司工作團隊的重視。因為依西門子一直以來的處事原則，關於管理協調事項，只願與領隊溝通，不直接面對參與技術的同仁進行任何協調工作，因此領隊的重要性相對的提高。
2. 懇請政府主管機關重新檢討明尼蘇達州，明尼亞波里市的生活費支付標準。

4.3 冬季氣候

Minneapolis冬天非常峻寒，氣溫約華氏零下二十度，加上有風切效應，有時會達華氏零下三~四十度。但因室內有空調設備，室內外溫度的差異約華氏九十度左右。若長時間待在室外，請加強保暖。此次才體會到人是會凍死的。

建議：

請未來冬天出國人員，加強保暖事項。

4.4 負載預測同步化

負載預測程式沒有被' Multi-Site' 功能支援

負載預測程式在美國進行FAT時，職發現了沒有被' Multi-Site' 功

能支援的問題(北、南兩個中心資料完全不同步，開出了功差異後還被西門子公司退回)；此表示北、南控制中心的資料將各自蒐集、計算、整理及預測，完全沒有同步或比較；當向西門子公司反應時，反而得到‘相關的功能規範已經台電核准通過’的解釋。

本公司在審核 Multi-Site 功能時，未考量對負載預測程式的需求，以致於造成這個可能會造成兩調度中心資訊不同步的問題。

建議：

在屬於全系統的功能上，若能由主辦者邀集相關人員進行討論推演後再回覆西門子公司，便可減少此類問題發生的機會；若小組成員能時常討論，便可去除可能的盲點及可能會造成的系統問題。

4.5 工廠驗收重新測試

本案第一梯次、第二梯次駐廠訓練及預定的工廠驗收已結束，但因功能差異數量太多，依據實際需求，仍需再派員出國進行工廠驗收重新測試 (retest)。下次重測的人力預期將較本次不足，且較本次具有更大的進度壓力及需要有很多的協商。

建議：

建請及早規劃赴美重測的人力及權責，除可讓即將赴美人員有充足時間蒐集所需資訊，安頓生活，未雨綢繆外，也可以避免掉未來可能遇到的

衝擊影響到整個時程。另一方面，也建請在協調機制上有所調整，因出國預算問題，赴美人力已是經精簡過後的人力，屆時出國每個人所須負擔的驗收功能勢必會比本次駐廠驗收繁重，若能充分授權駐廠人員，讓每個人都在自己的領域中，當成西門子公司和台電公司間的協調者，在工進及公共的議題或是不能解決的問題上再經由雙方的協調者來協商溝通，如此本公司協調者的工作壓力才不會太過繁重，而可能影響到自身該驗收的項目所該有的品質，相對的也能提高協調的品質。

4.6 組織劃分

計劃中在進行訓練及相關的事項討論時，未來可能會面臨要維護及運轉系統(軟體、硬體)的部份人員反應沒有直接參與到這項工程的進行，亦沒有受到充份的訓練。

建議：

若能在未來組織上，及早規劃相關的組織及配置人員和權責，日後有需要討論相關功能及訓練人員時，便可直接安排恰當人員接受訓練與參與工作及討論，以落實未來系統接收時的流暢及責任歸屬，並能更有效率的學習相關技術及經驗傳承。

4.7 未來之挑戰

此次驗收的EMS並不是制式的SCADA系統，又增加許多新功能、更包含調度中心整體設計及雙調度中心運行的架構，使得計畫執行相當艱鉅，

目前因系統複雜超過西門子預期，以致進度落後。

建議：

惠 請長官加派員額支援，以利加速工程進行。

5 結語

在本次駐廠同仁的努力下，本電能管理系統（EMS）汰換案目前已完成規劃中的FAT任務，但因西門子公司被開出的‘功能差異(Variance)’項目過多，導致於有第二次駐廠驗收的需要。惟新電能管理系統所具有之功能較現有系統多且因具有異地備源及調度員訓練功能，在人力與工作整合方面亟需即早做更周詳的規劃與調整，以期在完成交貨後發揮新電能管理系統的功能，進而讓調度員在配備完整的工具，進行安全且經濟的調度運轉，並且提供用戶可靠的電源。而年底的另一次重新測工作是另一個關鍵性任務，亦需相關部門長官鼎力支持及指導，以及同仁間的相互支援與合作，以確保未來驗收、交貨、運轉能順利進行。

職等承蒙長官憐選為出國人員，但此次出國時間長達八個月，期間即無法協助分擔家務、照料父母，身心備感煎熬與愧疚，職等懇請主管機關制訂出國期間暫時返國探親事宜，以振奮員工士氣，提高職場效率。

6 附錄(相關功能差異列表)

Scheduling Application

1. TPCF10295 (opn/0) -UC Ignores Curve '1' for CC Units from AGC Initial Conditions Interface
2. TPCF10316 (fix/0) -Some CC Penalty Factors not obtained from NA because names do not match
3. TPCF10376 (fix/0) -Startup Cost Calculation Incorrect
4. TPCF10408 (opn/0) -Regulating Reserve Violation not Understood
5. TPCF10412 (fix/0) -Error Msg if Reg Reserve Req > 0 and Spin Reserve Inactive
6. TPCF10413 (int/0) -Undergen at 00:00 with Spin = 'I' is not understood
7. TPCF10607 (sub/0) -The graphic displays in case comparison is missing
8. TPCF10017 (opn/3) -HTC has under and over-generation with ramping enabled
9. TPCF10054 (int/3) -Number for "OS-UC/HS/HTC - Areasfor interface flow monitoring" unclear
10. TPCF10088 (fix/3) -COP did not return System Fuel Usage Schedule Data
11. TPCF10152 (fix/3) -The inconsistent data on TCDC site and KCDC site
12. TPCF10192 (opn/3) -Oracle forms sometimes hang during data entry
13. TPCF10222 (fix/3) -Mismatch between IS&R (HIS) and STLF load history data
14. TPCF10230 (fix/3) -unable to call up load forecast trending display.
15. TPCF10241 (opn/3) -The system response during STLF FAT is quite slow
16. TPCF10243 (opn/3) -Missing feature to graphically modify a daily load curve
17. TPCF10270 (fix/3) -Emission Dispatch - Shadow Cost could not be fetched from UC
18. TPCF10301 (opn/3) -Two RealTime user can login at the same time
19. TPCF10306 (fix/3) -The entry of date requires a chinese character
20. TPCF10324 (fix/3) -COP interface is fail now
21. TPCF10342 (opn/3) -Corridor Flow Constraints function is missing
22. TPCF10343 (fix/3) -Quick start reserve results is not correct(a common problem in C.C. units)
23. TPCF10346 (fix/3) -Entering large value for Heat Content on fuel display causes UC to Abort
24. TPCF10348 (fix/3) -Unusually low fuel limit caused UC to Abort with no solution and no message
25. TPCF10375 (int/3) -2 operators can login into UC webui using same user number

26. TPCF10415 (opn/3) -Constraint Relaxation should be done when infeasible reserve requirement
27. TPCF10416 (opn/3) -Reserve Violation Message when all Reserve set to Inactive
28. TPCF10423 (fix/3) -The execution time exceeds the required time a lot
29. TPCF10425 (fix/3) -UC Aborted with no error message when testing overgeneration
30. TPCF10427 (fix/3) -The calculation results of Fuel cost is not correct
31. TPCF10430 (opn/3) -UC Abort with no message for Priority Order constraint active
32. TPCF10437 (opn/3) -Program shows wrong message which is not consistent with the actual situation
33. TPCF10462 (dup/3) -The result of down time constraint is not correct
34. TPCF10488 (fix/3) -Some Transaction data is missing in COP
35. TPCF10489 (fix/3) -The full graphic display for all hourly data in UC is missing
36. TPCF10504 (opn/3) -ED Violation after commitment with no violations during Emergency Limit test
37. TPCF10530 (fix/3) -The feature in Case Comparison is missing
38. TPCF10531 (opn/3) -The feature for providing some information is missing
39. TPCF10537 (fix/3) -UC abort when run more than 8 days study case
40. TPCF10601 (opn/3) -HS can't find the maximize energy production feasible solution
41. TPCF10638 (opn/3) -Hydro units statuses changed in HS solution mode B!
42. TPCF10643 (opn/3) -Low Channel Discharge limits are not observed
43. TPCF10645 (opn/3) -Reservoir Target level constraints are not observed
44. TPCF10655 (opn/3) -The unknown reason message information in all results
45. TPCF10666 (opn/3) -(Gen Value Jumps)some units gen high MW then 0 MW then high MW again, to explain
46. TPCF10667 (opn/3) -The spinning reserve are strange in the result
47. TPCF10671 (opn/3) -8 very important Units parameters missing in HS program
48. TPCF10676 (sub/3) -HS can't provide enough model to describe TPC hydro system
49. TPCF10730 (fix/3) -HTC can't retrieve a saved case
50. TPCF10759 (fix/3) -Errors in Validation of values
51. TPCF10774 (fix/3) -The execution of case comparison failed
52. TPCF10780 (opn/3) -HTC takes too long time to execute a case
53. TPCF10788 (fix/3) -The meaning of MISC. Generation in HTC, and UC program is not unique
54. TPCF10792 (opn/3) -Hydro units still generating in over generation condition
55. TPCF10804 (int/3) -Must run for thermal unit (CCP) failed
56. TPCF10805 (opn/3) -Low operating limits of hydro units are not observed
57. TPCF10807 (opn/3) -discharge limits of channels are not observed.
58. TPCF10809 (opn/3) -Reservoir level and volume limits are violated
59. TPCF10813 (int/3) -HTC can't initialize Initial conditions when KCDC doesn't have GSIM running

60. TPCF10816 (opn/3) -HTC can't get the initial condition for reservoir and hydro units
61. TPCF10817 (fix/3) -HTC can't execute 15 days case
62. TPCF10821 (opn/3) -HTC doesn't support the water cost capability
63. TPCF10835 (opn/3) -The result of hydro units is sharply oscillated
64. TPCF10940 (fix/3) -HTC fail the GCNA server fail over test
65. TPCF11143 (sub/3) -COP can't show steam turbine outage schedule unit data
66. TPCF10006 (opn/4) -Small violations for HS generation and discharge
67. TPCF10015 (mon/4) -Working forecast value was 0.0
68. TPCF10021 (opn/4) -Hydro Reserve Values need further investigation
69. TPCF10056 (dup/4) -Missing functionality for Area for Interface Flow Monitoring.
70. TPCF10072 (fix/4) -Mismatched status text between COP and NA
71. TPCF10076 (fix/4) -Increase value resolution on UC fuel usage values
72. TPCF10077 (fix/4) -COP is displaying wrong values (data type)
73. TPCF10087 (fix/4) -Problem with multi_name & multi_time views when no data exists at beginning of
74. TPCF10090 (fix/4) -Problem with Interval/Unit design & usage
75. TPCF10091 (fix/4) -Print function (icon) on chart display does not work
76. TPCF10191 (fix/4) -Can't identified characters
77. TPCF10202 (fix/4) -Error messages problems
78. TPCF10213 (fix/4) -Data entry problems caused by another Oracle form
79. TPCF10221 (fix/4) -Missing weather data item (cloud cover)
80. TPCF10223 (fix/4) -Mismatch between IS&R (HIS) and STLF weather history data
81. TPCF10234 (opn/4) -Problem with exception processing for weather data
82. TPCF10237 (opn/4) -Effect of load shed on load history values
83. TPCF10239 (fix/4) -Invalid day types may be entered
84. TPCF10242 (fix/4) -The Oracle form has abnormal button appear
85. TPCF10244 (opn/4) -Issue with bar graph
86. TPCF10245 (fix/4) -unknown toolbar with list of gray buttons appears
87. TPCF10273 (fix/4) -UC should get AreAReqR1, AreAReqR3 as spinning and operating reserve
88. TPCF10277 (fix/4) -Display column headings should match data names in test plan and U0332
89. TPCF10297 (fix/4) -Curve ID should be enterable on Unit Input Data - Schedule Thermal Data
90. TPCF10303 (fix/4) -The graph lost it vertical coordinate axis when move the scroll bar
91. TPCF10305 (fix/4) -Words are not shown properly
92. TPCF10317 (fix/4) -Transactions obtained by UC from ITS can be viewed in ITS rather than COP

93. TPCF10318 (fix/4) -The base net interchange retrieved in COP from ITS is not correct.
94. TPCF10323 (fix/4) -Date shown in error message are wrong (offset by 5 or 6 hours)
95. TPCF10325 (fix/4) -Case comparison threshold table can't identify invalid negative value
96. TPCF10326 (fix/4) -error message shown not logical ($0 \leq x \leq -20000$)
97. TPCF10327 (fix/4) -Error msg displayed on another page(error page) instead of "on the display"
98. TPCF10330 (fix/4) -Display column headings should match data names in test plan
99. TPCF10347 (fix/4) -Case Comparison displays should allow selection of 'ALL' for Gen Units
100. TPCF10349 (fix/4) -unit for emission difference should be Kg (not lbs)
101. TPCF10351 (fix/4) -In Unit Cost Results Daily, Generator 'MW' should be MWh' and should be * 15/60
102. TPCF10353 (fix/4) -Fuel Consumption Hourly Results display should include Allocation and Shadow Pr
103. TPCF10354 (fix/4) -Emissions Constraints not enforced when ramping constraints exist
104. TPCF10374 (fix/4) -COP WEB UI should show individual transactions
105. TPCF10407 (fix/4) -Display Headers should not be cut off
106. TPCF10424 (opn/4) -Constraint Relaxation not done for Overgeneration
107. TPCF10426 (fix/4) -Maint/Derate change for Fuel Sched starts/ends 15 minutes too late
108. TPCF10428 (fix/4) -Oracle Error (pop-up box) for duplicate constraint priority entries
109. TPCF10435 (fix/4) -minimum up/down time issue
110. TPCF10463 (fix/4) -The characters are cut and need more space
111. TPCF10469 (fix/4) -The units don't obey the startup/shutdown constraint properly.
112. TPCF10478 (fix/4) -Charts should be available for all Case Comparison displays
113. TPCF10505 (cld/4) -Incremental cost assigned to MW between normal and emerg limit may be too high
114. TPCF10521 (fix/4) -All the input data shall be modify via display
115. TPCF10544 (opn/4) -Missing one hour reserve capacity
116. TPCF10545 (fix/4) -Column headers or Button labels are not consistent with TestBook T0702-2
117. TPCF10546 (fix/4) -Filter function does not work properly in HS-Unit Production Profile Display
118. TPCF10548 (fix/4) -Errors related to data display in HS
119. TPCF10635 (fix/4) -Max value validation problem
120. TPCF10636 (fix/4) -Drop down list changed to text field

121. TPCF10641 (fix/4) -Can not set current Generation to 0MW if Min Generate limit larger than 0MW
122. TPCF10668 (dup/4) -Spinning reserves and generation values are not consistent
123. TPCF10727 (fix/4) -HTC can't retrieve data from COP
124. TPCF10733 (fix/4) -The data enter process will run into a infinite loop
125. TPCF10738 (fix/4) -Following items in WebUI need to change
126. TPCF10739 (fix/4) -Hydro Unit Maintenance Schedule Not Displayed in COP
127. TPCF10754 (fix/4) -The Reservoir schedule accepts a negative "Max volume"
128. TPCF10755 (fix/4) -HTC doesn't check the Discharge amount
129. TPCF10757 (opn/4) -The unknown parameters should have explanation in documentation
130. TPCF10761 (opn/4) -There is no documentation describe the Global Parameters in HTC
131. TPCF10790 (fix/4) -Load requirements changed in result solution message
132. TPCF10803 (fix/4) -Error in Schedule data validation of HTC
133. TPCF10806 (fix/4) -WebUi needs to be modified in HTC Generation Profile
134. TPCF10812 (fix/4) -Can not initialize transaction data from cop
135. TPCF10815 (fix/4) -result not matching probably due to round off errors
136. TPCF10820 (fix/4) -Some interface is missing
137. TPCF10822 (opn/4) -An option to allow user to select solution interval in the first day is missing
138. TPCF10823 (fix/4) -The Regulation Reserve Requirement display in HTC is not available
139. TPCF10838 (fix/4) -Couple results of calculation result in HTC are not correct
140. TPCF10953 (opn/4) -User mrrou_1 is unavailable although no one is connected to it.
141. TPCF10981 (opn/4) -STLF program hang during GCNA failover
142. TPCF11142 (sub/4) -The outage scheduling data won't be shown if the time interval in COP doesn't
143. TPCF10075 (fix/5) -Request for on-demand transfer of data to COP
144. TPCF10086 (rej/5) -Hydro units/plants should only be used where appropriate
145. TPCF10071 (cld/6) -Documentation error
146. TPCF10073 (cld/6) -Documentation error
147. TPCF10078 (cld/6) -Documentation error
148. TPCF10079 (cld/6) -Documentation error
149. TPCF10080 (cld/6) -Documentation error
150. TPCF10081 (cld/6) -Documentation error
151. TPCF10082 (cld/6) -Documentation error
152. TPCF10083 (cld/6) -Documentation error
153. TPCF10084 (cld/6) -Documentation error
154. TPCF10085 (cld/6) -Documentation error

155. TPCF10089 (cld/6) -Documentation error
156. TPCF10092 (cld/6) -Documentation error
157. TPCF10093 (cld/6) -Documentation error
158. TPCF10094 (cld/6) -Documentation error
159. TPCF10275 (fix/6) -Test Step to Set Study Period out of order
160. TPCF10276 (fix/6) -Data names should match names on displays
161. TPCF10296 (fix/6) -Test step must use same data names as in U0332 and UI displays
162. TPCF10329 (fix/6) -Documentation Errors in steps of segment 4.2
163. TPCF10352 (fix/6) -Test Step for Fuel Constraint Hourly Results should use correct display name
164. TPCF10429 (fix/6) -Test Step 4.3-39 needs to be more clearly written and clarified
165. TPCF10477 (opn/6) -F0702-1 should show penalty factors in economic formulas
166. TPCF10479 (fix/6) -Clarification on presenting results below thresholds for multi-result displays
167. TPCF10480 (fix/6) -Comparison of Incr Cost vs System Lambda should account for state space limits
168. TPCF10520 (fix/6) -Relax to Emergency Limit coordinated with Global Parameters
169. TPCF10547 (fix/6) -Documentation Errors for segment 4.1 and 4.2
170. TPCF10634 (fix/6) -Documentation Error in segment 4.3
171. TPCF10760 (fix/6) -Documentation Errors
172. TPCF10814 (fix/6) -Test step is confusing and can not be tested

Dispatcher Training Simulator

1. TPCF11044 (opn/0) -over/under excitation Ry. doesn't trip a device.
2. TPCF10884 (opn/3) -The OtsEsi goes core dump occasionally
3. TPCF10885 (opn/3) -The OtsTsmsq disappear occasionally
4. TPCF10018 (cld/4) -RTL & RTR events does not work.
5. TPCF10047 (int/4) -sizing script did not report all numbers for DTS
6. TPCF10048 (opn/4) -No numbers for "DTS - Power flow periodicity" or "DTS - Dynamics calculation"
7. TPCF10853 (opn/4) -Creation of basecase zero fails
8. TPCF10854 (fix/3) -medi periodically stops running
9. TPCF10855 (cld/6) -Documentation errors

10. TPCF10857 (opn/4) -Date label beside "Init to HIS via MSE" does not match simulation date/time.
11. TPCF10859 (fix/4) -Unable to activate FLT event.
12. TPCF10869 (opn/4) -No station available for selection when LDC and LDCS is selected during event
13. TPCF10872 (cld/4) -No external company available for selection when NISC is selected in Event
14. TPCF10873 (fix/4) -Activate/Deactivate Event Groups does not work for some event groups.
15. TPCF10875 (opn/4) -Error in PSM messages for BKTC and BKCO events.
16. TPCF10876 (opn/4) -BKT event was not executed when GUMW condition is satisfied.
17. TPCF10884 (mon/3) -The OtsEsi goes core dump occasionally
18. TPCF10885 (fix/3) -The OtsTsmsg disappear occasionally
19. TPCF10895 (opn/4) -VRMX/VRMN events does not work.
20. TPCF10896 (opn/4) -PRD/PCRD appeared as invalid events upon event activation.
21. TPCF10897 (opn/4) -PRXA event does not work.
22. TPCF10900 (cld/6) -Documentation errors.
23. TPCF10901 (cld/6) -Missing details in documentation.
24. TPCF10903 (cld/6) -Documentation error.
25. TPCF10907 (opn/3) -The OTS display will logout occasionally
26. TPCF10908 (opn/3) -The Display flicker too much
27. TPCF10909 (opn/4) -The Character is been cut
28. TPCF10910 (opn/3) -The OTS->SCADA mapping is missing (For Combined Cycle Units)
29. TPCF10911 (fix/4) -OTS can't receive RTU2 value
30. TPCF10915 (opn/4) -Dropped load is not approx. equal to Generation - (Load + Losses).
31. TPCF10917 (cld/6) -Move test steps related to External AGC to Test Segment 4.29.3.

32. TPCF10918 (opn/4) -The random noise can accept value over 4%
33. TPCF10921 (opn/4) -In OTS, the Time on BSW and simulation is not the same
34. TPCF10923 (cld/6) -Documentation errors.
35. TPCF10925 (opn/3) -Three winding voltage regulation (auto) is incorrect.
36. TPCF10938 (cld/4) -O.F/U.F Ry fail to operate
37. TPCF10944 (cld/6) -Documentation errors.
38. TPCF10946 (opn/4) -XTAR events were not executed during Playback session.
39. TPCF10948 (opn/4) -The pause action will terminate session record function
40. TPCF10952 (cld/6) -Documentation corrections.
41. TPCF11000 (int/4) -Missing column in Performance Measurement/Branch Log display.
42. TPCF11001 (opn/4) -Branch flow violations in Performance Measurement does not work properly.
43. TPCF11002 (cld/6) -Documentation corrections.
44. TPCF11012 (opn/4) -Error in OTS Output/Network Summary Generation column.
45. TPCF11013 (opn/4) -The filter function in OTS be reset occasionally
46. TPCF11015 (int/3) -OtsTsmsg disappears after synchro check relay operation.
47. TPCF11020 (opn/4) -Some function in OTS can't work properly
48. TPCF11021 (opn/4) -The first edit action will be reset in the Load Curve display
49. TPCF11023 (opn/4) -The one-line diagram will show "SPECTRUM LOCKED" in OTS
50. TPCF11024 (opn/4) -The "get load curve from real-time" won't load historical load when the data is
51. TPCF11025 (opn/4) -Time of EMS PF solution should match with OTS simulation time.
52. TPCF11026 (opn/4) -Skip re-loading of load group schedules during re-initialization.
53. TPCF11030 (cld/6) -Documentation correction.
54. TPCF11031 (opn/4) -Synchro Check relay fail to operate where voltage difference exceeds defined

55. TPCF11032 (opn/4) -The "Combined Cycle Plant Control" display flicker too much
56. TPCF11037 (opn/4) -under voltage Ry. display KV output is not equal to actual voltage in OTS
57. TPCF11038 (int/4) -No data validation for Desired KV on Unit Voltage Control display.
58. TPCF11039 (cld/6) -Documentation corrections.
59. TPCF11040 (int/4) -Correction in Adv Options menu list.
60. TPCF11041 (cld/3) -The OTS's HIS function is missing in HIS
61. TPCF11044 (fix/0) -over/under excitation Ry. doesn't trip a device.
62. TPCF11045 (cld/4) -The "enable" flag can't be changed on the Inverse Time Ry. Display
63. TPCF11046 (opn/4) -Some of the reservoir elevations are wrong in OTS
64. TPCF11048 (opn/4) -The valve position keep unreasonable increasing in Hydro Unit in OTS
65. TPCF11049 (opn/4) -The OTS event "GUNR" fail
66. TPCF11059 (opn/4) -Data validation on pump unit desired generation disallows update of Unit Plant
67. TPCF11064 (cld/6) -Documentation corrections.
68. TPCF11065 (opn/3) -OtsTsmsg core dump during Base Case Retention.
69. TPCF11066 (opn/3) -OtsTsmsg core dumps when simulation is started after base case retention.
70. TPCF11067 (opn/4) -Reservoir elevation is incorrect after a specific simulation time.
71. TPCF11068 (opn/4) -The response of frequency in OTS seems very difference with TPC power system
72. TPCF11069 (opn/4) -The information in table headers of "Added Removed Equipment" are cut.
73. TPCF11070 (opn/4) -BKTC, BKCO, BKTO events should be sent as single BKT and BKC events to SCADA.
74. TPCF11071 (opn/4) -The O/U Ry is fail to set 3 different trip conditions in OTS
75. TPCF11075 (cld/6) -Documentation corrections - Relays' final statuses should be "I"

instead of "S".

76. TPCF11079 (sub/4) -The number of snapshots is not enough
77. TPCF11081 (cld/4) -Some update timing feature in OTS are not meet T.S. requirement
78. TPCF11085 (opn/4) -The NA time in OTS is different with simulation time.
79. TPCF11086 (sub/3) -An Isolated SA function is missing in OTS
80. TPCF11087 (sub/3) -An isolated IPP monitoring function is missing in OTS
81. TPCF11088 (sub/3) -An isolated ITS function is missing in OTS
82. TPCF11089 (sub/3) -An isolated HIS function is missing in OTS
83. TPCF11090 (int/3) -An isolated TCI function is missing in OTS
84. TPCF11091 (sub/3) -An isolated RDD function is missing in OTS
85. TPCF11092 (sub/3) -An isolate SOPM function is missing in OTS
86. TPCF11093 (sub/3) -An isolate CONSTAT function is missing in OTS
87. TPCF11095 (sub/3) -An isolate "SYS CONF" function is missing in OTS
88. TPCF11096 (sub/3) -An isolate CDL function is missing in OTS
89. TPCF11097 (opn/4) -The TCI information is incorrect in TCI (in OTS) display
90. TPCF11182 (opn/3) -The OTS has problem to login to instructor display occasionally
91. TPCF11215 (sub/3) -The cycle time is too long to cause the updating rate slower than T.S

IPP Monitoring Function

1. TPCF10061 (fix/4) -IPPOn Flag cannot be found on the display, Pdeviation and Energy should not be
2. TPCF10063 (fix/3) -Shortage of one ICCPSch profile point
3. TPCF10069 (fix/6) -Test step correction is required
4. TPCF10074 (fix/3) -ITS started with missing menus
5. TPCF10096 (fix/4) -Variable can only display whole number
6. TPCF10097 (fix/4) -Test step is unclear

7. TPCF10098 (fix/4) -ITS Profiles cannot be printed within a page and ITS schedules should not be
8. TPCF10100 (fix/5) -The ADU utility does not have direct validation of some entries.
9. TPCF10103 (opn/3) -IPP Report failed to retrieve archived data from HIS. Data display on Reporting
10. TPCF10107 (fix/4) -Test step should be modified to reflect current IPP Monitoring implementation
11. TPCF10119 (fix/3) -Problems encounter when applying multiple day schedule for monitoring
12. TPCF10120 (opn/3) -The "Transmitted" flag should be defined as an ICCP data.
13. TPCF10121 (fix/4) -Acknowledged flag should be manually update in ITS profiles form
14. TPCF10122 (fix/4) -Only HePing Unit#1 can be monitored
15. TPCF10123 (fix/3) -Some of the IPP infos not archived in HIS
16. TPCF10124 (int/3) -IPP Comment cannot be manually entered
17. TPCF10125 (fix/4) -IPP Setpoint Emergency reference code need to corrected
18. TPCF10126 (int/3) -Lastest LNG binaries not on KCDS system
19. TPCF10127 (opn/4) -The backdrop of schedule is missing on trend
20. TPCF10128 (fix/3) -The ITS schedule can't cover at least one day
21. TPCF10130 (int/3) -The data is inconsistent between ORACLE DB and Display shown
22. TPCF10135 (fix/6) -the name obtained from executing sql statements doesn't match the LNG Units in
23. TPCF10138 (opn/3) -The scheduled daily data from tomorrow to the UC scheduled date can't shown
24. TPCF10146 (rej/4) -Do not have print function in monitoring function
25. TPCF10150 (opn/3) -The monitoring function under AGC mode is missing
26. TPCF10157 (opn/3) -The timing to generate this alarm is not correct
27. TPCF10160 (int/3) -Data can't get in this program

28. TPCF10161 (int/3) -The data can't get in this program
29. TPCF10162 (int/3) -Data can't get in this function
30. TPCF10163 (int/3) -data can't get in this function
31. TPCF10165 (mon/3) -no calculation result
32. TPCF10167 (opn/3) -no alarm be generated when reaching the limit
33. TPCF10168 (opn/3) -The data can't get in to verify this function
34. TPCF10171 (int/3) -The data can't get in
35. TPCF10172 (int/3) -The data can't get in
36. TPCF10173 (int/3) -The last column is empty
37. TPCF10176 (int/3) -No forecast MW data shown on UNIT LNG HOURLY display
38. TPCF10177 (int/3) -No MW forecast data from PLANT LNG HOURLY display
39. TPCF10178 (fix/6) -The query result does not tally with the value shown on the form display
40. TPCF10179 (int/3) -The result could not be verified

Hardware

1. TPCF10029 (opn/4) -Need to verify 3PP Software
2. TPCF10030 (cld/4) -System hanged during diagnostic to check all resources
3. TPCF10031 (cld/6) -Required more information in Test Segment Procedure for 7.1.3, 7.2.3 and 7.3.3
4. TPCF10057 (int/4) -IBM X336 tw1t
5. TPCF10058 (cld/4) -SSA Adapter on gn1t and gn2t
6. TPCF10164 (mon/4) -Amendment to HD0100
7. TPCF10166 (opn/4) -Communication Channel
8. TPCF10169 (cld/6) -Amendment to test procedure for IBM RAID
9. TPCF10170 (int/4) -Enclosure Service 2 on cm1k
10. TPCF10196 (opn/4) -Equipment Configuration Test
11. TPCF10197 (opn/4) -Port usage on Firewall Equipment

12. TPCF10198 (opn/4) -Diagnostics for Dell 850 Server, SMS and Xserve RAID
13. TPCF10199 (fix/4) -Enclosure grounding
14. TPCF10201 (opn/4) -Assembly and Component identification of TEMS
15. TPCF10214 (fix/4) -Label assignments scheme
16. TPCF10215 (int/4) -IBM Cabinet Enclosure Requirement
17. TPCF10240 (int/6) -LOD Amendment
18. TPCF10941 (int/3) -Non-Redundant Lock LAN between Oracle Servers
19. TPCF10942 (rej/3) -Several Processors have single points of LAN failure that would cause the
20. TPCF10976 (int/4) -AIX servers cant auto power up upon power plug-in
21. TPCF11006 (rej/3) -Single power failure affect availability of equipment

TCI

1. TPCF10014 (mon/3) -Too early unsolicited message at runup (of TCB) is nor acknowledged by the TCB.
2. TPCF10039 (int/4) -number for "RTU (TCDS)" and "RTU (TCDS)" not sufficient
3. TPCF10307 (fix/3) -invert setting in TCI for double pole status not working
4. TPCF10490 (cld/6) -Requirements/preconditions need to note FAT only items.
5. TPCF10558 (int/3) -no control success event show on General Summary
6. TPCF10559 (cld/6) -update of Test Step
7. TPCF10561 (int/4) -Occasionally, Station display not renew after mark down, mark up RTU.
8. TPCF10562 (mon/3) -Occasionally, RTU is down when forcing the RTU to switch from one TCI to
9. TPCF10563 (cld/6) -update of Test Step
10. TPCF10564 (mon/4) -when RTU is MARK UP, Digital values is actualized but analog values is sill
11. TPCF10565 (int/3) -Time waiting for TCP/IP RTU to reflect status change too long.
12. TPCF10566 (int/4) -unknown characters found on the cancel button of the TCI Scan

Group Control

13. TPCF10568 (int/3) -loss of data during disconnecting/connecting link of RTU
14. TPCF10569 (int/3) -no SOE buffer full clear event when the SOE buffer full is cleared on RTU
15. TPCF10571 (cld/6) -need to update test step
16. TPCF10572 (int/3) -got duplicate messages on SOE Summary during failover of TCI
17. TPCF10573 (opn/3) -time stamp between two points connected to same switch exceed 500msec
18. TPCF10574 (int/3) -buffer full event didn't appear at General Summary
19. TPCF10600 (fix/3) -RTU time is 1 min difference from system time when startup of RTU.
20. TPCF10609 (int/4) -The Analog element is not displaying as an Invalid Value
21. TPCF10610 (opn/4) -RTU communication error is not displaying in communication error list display
22. TPCF10611 (int/3) -sometimes, CB status message duplicated 3 to 4 times in General summary display
23. TPCF10612 (rej/4) -345kV CB status shouldn't show in alarm list 2
24. TPCF10613 (mon/4) -TCI database has to be clean
25. TPCF10614 (cld/6) -Documentation has to correct from "RTU" to "LRU"
26. TPCF10615 (fix/4) -some of the communication error counter is not renew in HIS database
27. TPCF10616 (int/4) -There is no tabular display for communication error counter
28. TPCF10617 (cld/6) -The Scan group periodicity should be set longer(i.e. 3600s) not "0s"
29. TPCF10618 (int/3) -changing enable unsolicited in PDM, but ther is no change in parameter of TCB board
30. TPCF10619 (int/4) -ESD display cann't accept chinese character in the comment dialog box in TEST
31. TPCF10624 (cld/6) -change the TCB board number tcb0105 to tcbxxyy where xx indicates board number

32. TPCF10625 (cld/6) -Change TCB0105 text to TCBxxyy for dialup communication log
33. TPCF10626 (int/3) -No Dialup message found in Dialup summary display.
34. TPCF10627 (int/3) -Sometimes ESD display of TCDS & KCDS are different
35. TPCF10628 (int/3) -TCTRAM core dump during file transfer
36. TPCF10629 (int/4) -Long Value qualifier messages doesn't show in general summary
37. TPCF10630 (int/4) -Scan periodicity should be range between 1 second to 2880 minute in TCI PDM scan
38. TPCF10749 (opn/6) -Documentation for TCI regarding static and dynamic Relations is not provided
39. TPCF10769 (opn/0) -File Download/upload
40. TPCF10770 (int/3) -Digital element didn't show normal color in RTU Test mode
41. TPCF10771 (int/3) -In Test Mode, Alarms & events from RTU shouldn't enter into general summary & IS&R
42. TPCF10772 (int/4) -The detail message is not displaying in General summary while station is
43. TPCF10773 (int/4) -standby channel fail timeout happens after 10 mins
44. TPCF10851 (int/3) -tcsd missing on cm1t caused failover to SB COM
45. TPCF10934 (opn/3) -Failover of TCI channels to partner TCS servers after STOPSOS needs 60s
46. TPCF10935 (cld/3) -During TCS server failover, the RTUs are INOP but the graphics show RENEW status
47. TPCF10945 (opn/4) -RTU is not controllable via TCI Equipment Status Display in OTS(training mode).
48. TPCF10965 (dup/3) -RTU line failover to partner TCS server in 1min
49. TPCF10974 (mon/3) -TCB board 0105 hang
50. TPCF11171 (fix/3) -TCI GESD discrepancy at TCDS and KCDS
51. TPCF11224 (fix/3) -DongShan data not send to the TCDS
52. TPCF11239 (fix/4) -Simulation was for 400 analogs and 480 digitals.

CNM

1. TPCF10916 (opn/2) -During COM power off-on testing, RTU status went to unknown on the DR CC
2. TPCF10920 (rej/3) -wb2t is unable to host OTS webui
3. TPCF10927 (cld/6) -Words on test steps incorrect
4. TPCF10929 (opn/0) -Failover time for ADM block function is 180s waiting and 60s runup
5. TPCF10930 (cld/6) -Test procedures need to be amended
6. TPCF10931 (fix/4) -Failover time for GCNA server is 240s waiting and 60s runup
7. TPCF10932 (cld/6) -Additional test steps needed
8. TPCF10937 (opn/6) -WebUI cant re-direct request to another partner WebUI during failover
9. TPCF10955 (opn/4) -An ordered list of EMS time sources is not available
10. TPCF10956 (cld/6) -Document need to amended
11. TPCF10957 (int/4) -Disconnect SB COM, but no report in G.S. Display
12. TPCF10958 (fix/4) -LAN IF status of com1t is inconsistent with the satus of other servers in CNSTAT
13. TPCF10959 (fix/3) -Message Description of occurrence of LAN Fault Detection and Recovery showing in
14. TPCF10960 (int/2) -udp_recvspace settings not retained on reboot of gn1k, gn2k
15. TPCF10961 (fix/4) -Program cnstat which display the redundant LAN status on LNB-IF2
16. TPCF10962 (int/3) -General Summary display status of COM down in 20s
17. TPCF10963 (int/4) -General Summary displays UCS computer status in 30s
18. TPCF10964 (int/4) -Unknown General Disk Alarm from GCNA
19. TPCF10966 (opn/3) -WebUIs LAN status not shown on General Summary and CNSTAT
20. TPCF10967 (opn/4) -Network devices status not shown on General Summary and CNSTAT

21. TPCF10968 (opn/4) -Multi-site messages are inconsistent
22. TPCF10969 (int/4) -LAN A network not stable on KCDS
23. TPCF10971 (fix/4) -Tags placed on TCDS not shown on KCDS
24. TPCF10972 (opn/3) -Messages lost and display not updated during dual COM down
25. TPCF10973 (cld/6) -Document Amendment
26. TPCF10975 (cld/6) -Document Admendment
27. TPCF10977 (opn/0) -Servers boot up time plus Spectrum inits too long
28. TPCF10978 (int/3) -HIS oracle db not access when one node of HIS is down
29. TPCF10979 (opn/4) -Oracle cant start automatically when GCNA server reboots
30. TPCF10980 (int/4) -Some servers cant autorunup Spectrum
31. TPCF10982 (mon/3) -During GCNA PC failover, some programs failed
32. TPCF10983 (opn/0) -The time difference between Spectrum servers is too long
33. TPCF10984 (int/3) -Spectrum servers not synchronized with GPS when ON
34. TPCF10985 (mon/4) -Printer lw1 occassionally unavailable
35. TPCF10986 (opn/4) -WebUI session had to be connected when HIS SB disconnected
36. TPCF10987 (dup/3) -Disconnect the Lock LAN from HIS cause oracle to be inaccessible
37. TPCF10988 (opn/3) -HIS node runs down after Lock Lan plug in
38. TPCF10989 (opn/4) -Network Configuration shows different status
39. TPCF10990 (opn/4) -Some of KCDS switches not shown on CISCO works
40. TPCF10991 (int/3) -MMI unable to display CISCO works topology
41. TPCF10992 (cld/6) -Document Admendment
42. TPCF10993 (cld/6) -Document Admendment
43. TPCF10994 (int/3) -MMI cant display CISCO ASDM Firewall Software
44. TPCF10995 (cld/6) -Document Amendment
45. TPCF10996 (cld/6) -Document Amendment
46. TPCF10997 (opn/3) -SMS01T is unavailable

47. TPCF11005 (opn/3) -Network security not meet requirement of TS
48. TPCF11007 (opn/3) -Some servers appear disturbance status after X09T power off.
49. TPCF11008 (opn/3) -Spectrum can't raise alarms when network communication has problems.
50. TPCF11010 (fix/4) -The comment dialog box can't display character "cancel" correctly