

Data Management for Large Scale and Multiple Monitoring Programs

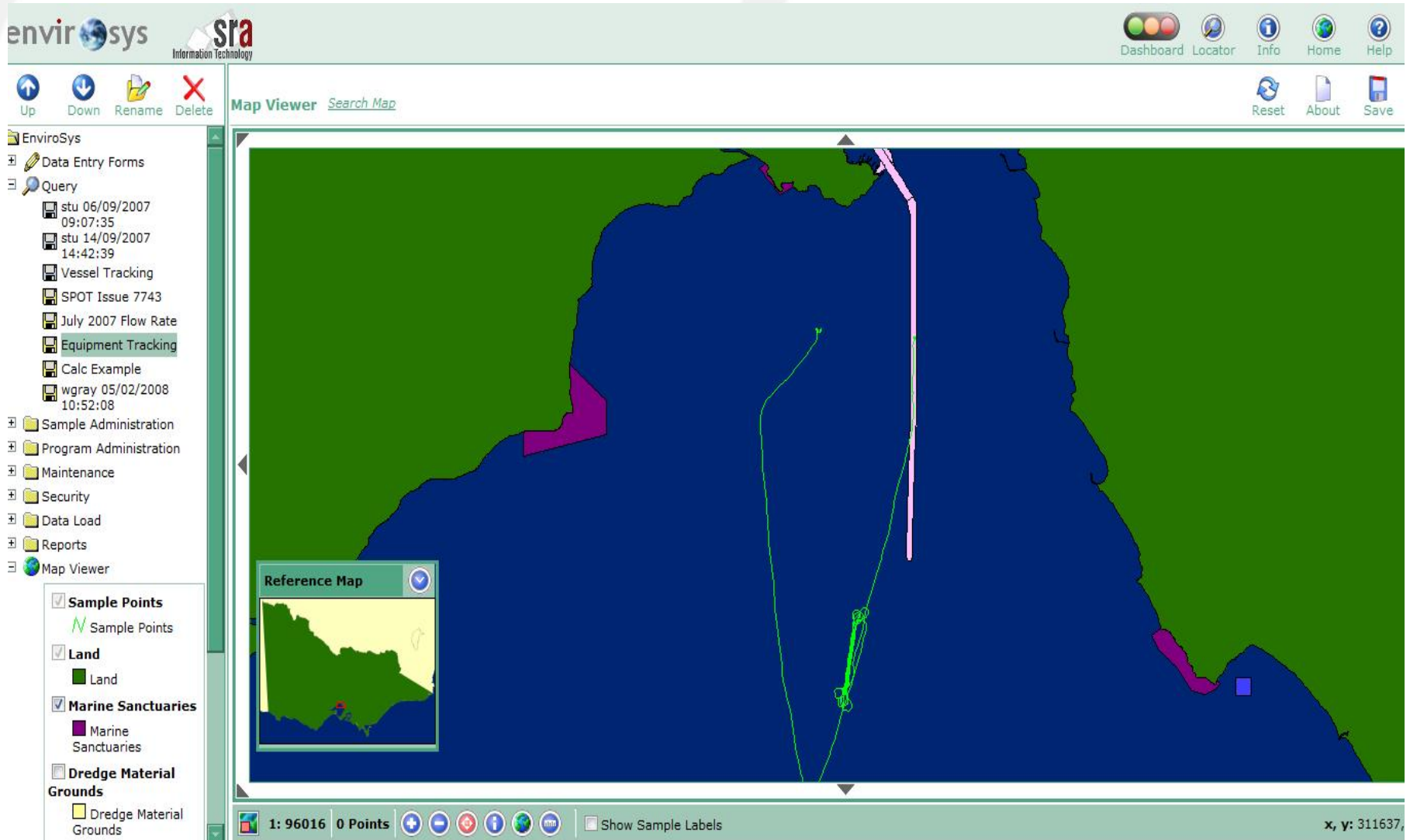
Jim Rowe

- SRA is an Adelaide-based software developer
- Building environmental information management systems since 1997
- It's flagship product is EnviroSys™, an award winning monitoring data management system



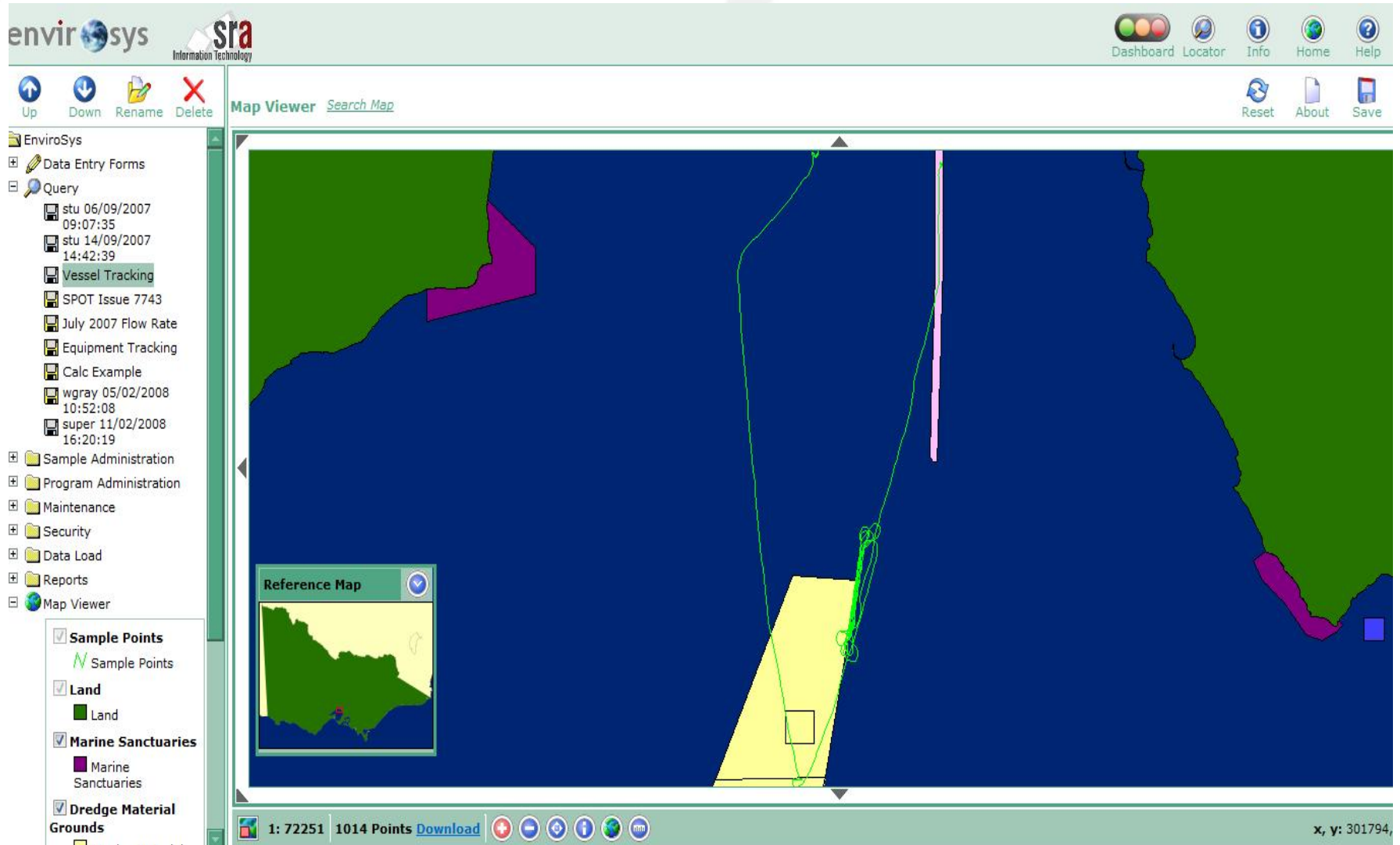
What is happening at the Port of Melbourne?

PoMC – continuous monitoring



The screenshot displays the EnviroSys web application interface. At the top left, the 'enviro sys' logo is visible. The top right corner features navigation icons for Dashboard, Locator, Info, Home, and Help. Below these are icons for Reset, About, and Save. The main interface is titled 'Map Viewer' and includes a search bar. On the left side, there is a tree view of the application's data structure, including folders for 'EnviroSys', 'Data Entry Forms', 'Query', 'Sample Administration', 'Program Administration', 'Maintenance', 'Security', 'Data Load', and 'Reports'. The 'Query' folder is expanded, showing a list of data points with timestamps and names like 'stu 06/09/2007 09:07:35', 'stu 14/09/2007 14:42:39', 'Vessel Tracking', 'SPOT Issue 7743', 'July 2007 Flow Rate', 'Equipment Tracking', 'Calc Example', and 'wgray 05/02/2008 10:52:08'. Below the tree view is a legend with checkboxes for 'Sample Points', 'Land', 'Marine Sanctuaries', and 'Dredge Material Grounds'. The main map area shows a coastal region with a blue sea and green land. A pink line represents a vessel's path, and a blue square indicates a specific location. A 'Reference Map' inset is visible in the bottom left of the map area. At the bottom of the interface, there are map navigation controls (zoom in, zoom out, home, etc.), a scale of 1:96016, 0 Points, and a 'Show Sample Labels' checkbox. The coordinates 'x, y: 311637,' are displayed in the bottom right corner.

PoMC – continuous monitoring



The screenshot displays the EnviroSys Map Viewer interface. At the top, the 'enviro sys' and 'sra Information Technology' logos are visible. A navigation bar includes icons for Dashboard, Locator, Info, Home, and Help. Below this, a secondary bar contains 'Up', 'Down', 'Rename', and 'Delete' icons, along with 'Map Viewer' and a 'Search Map' link. On the right side of this bar are 'Reset', 'About', and 'Save' icons.

The main map area shows a coastal region with green landmasses and blue water. A yellow polygon highlights a specific area in the water. A green line with circular markers indicates a vessel's path. A pink vertical line is also present. A 'Reference Map' inset in the bottom-left corner shows a larger view of the region. The bottom status bar displays '1: 72251 1014 Points Download' and a coordinate 'x, y: 301794'.

enviro sys **sra**
Information Technology

Dashboard Locator Info Home Help

Up Down Rename Delete **Map Viewer** Search Map

Reset About Save

EnviroSys

- Data Entry Forms
- Query
 - stu 06/09/2007 09:07:35
 - stu 14/09/2007 14:42:39
 - Vessel Tracking
 - SPOT Issue 7743
 - July 2007 Flow Rate
 - Equipment Tracking
 - Calc Example
 - wgray 05/02/2008 10:52:08
 - super 11/02/2008 16:20:19
- Sample Administration
- Program Administration
- Maintenance
- Security
- Data Load
- Reports
- Map Viewer

Sample Points
N Sample Points

Land
Land

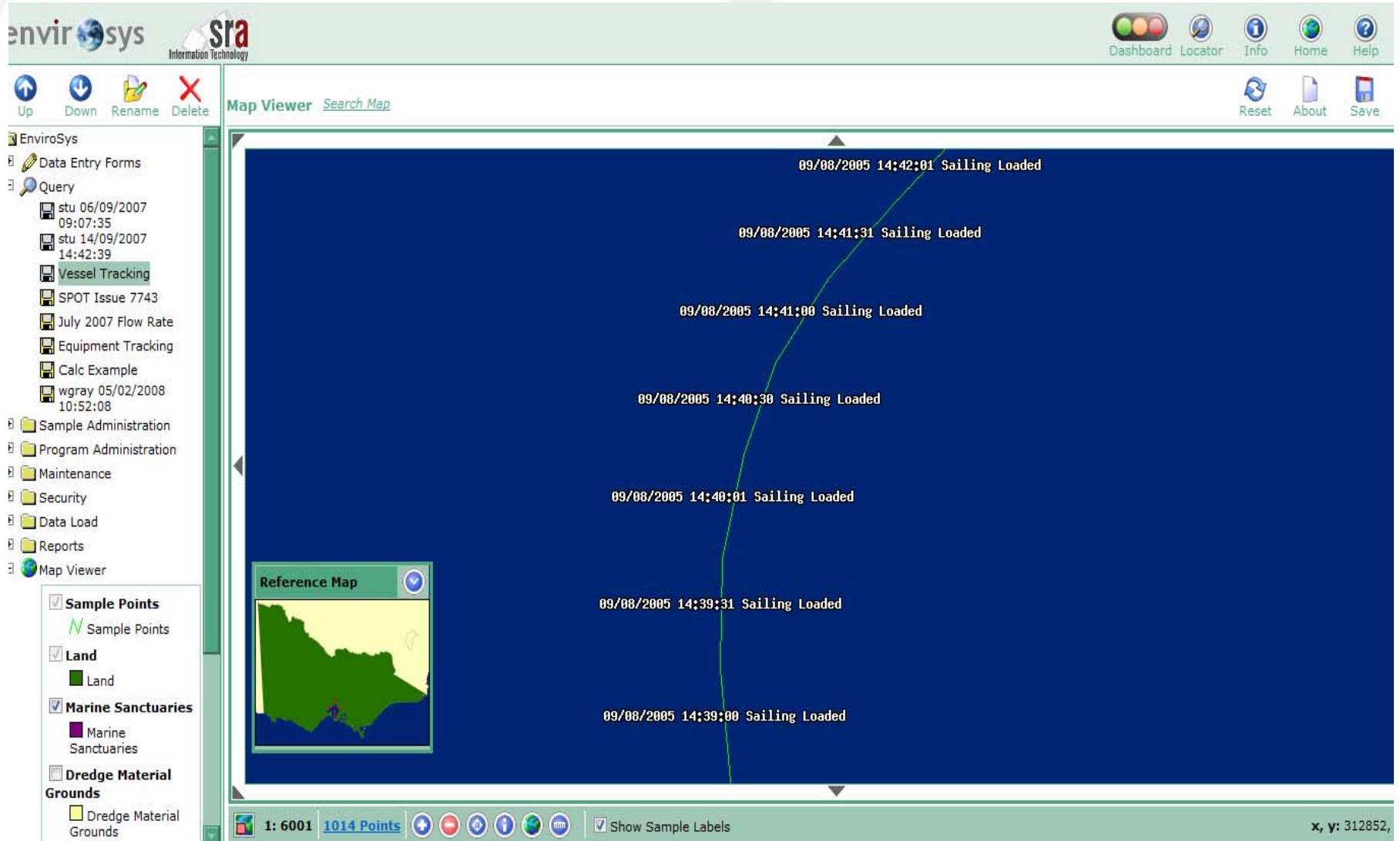
Marine Sanctuaries
Marine Sanctuaries

Dredge Material Grounds

Reference Map

1: 72251 1014 Points Download x, y: 301794

PoMC – temporal over spatial



The screenshot displays the EnviroSys Map Viewer interface. The main map area shows a vessel's path on a dark blue background, with several data points labeled with timestamps and the status "Sailing Loaded". The path starts at the bottom and moves upwards, curving slightly to the right. The data points are:



- 09/08/2005 14:42:01 Sailing Loaded
- 09/08/2005 14:41:31 Sailing Loaded
- 09/08/2005 14:41:00 Sailing Loaded
- 09/08/2005 14:40:30 Sailing Loaded
- 09/08/2005 14:40:01 Sailing Loaded
- 09/08/2005 14:39:31 Sailing Loaded
- 09/08/2005 14:39:00 Sailing Loaded

The interface includes a left-hand navigation pane with a tree view containing folders like "Data Entry Forms", "Query", "Sample Administration", and "Program Administration". Under "Query", "Vessel Tracking" is selected. Below the tree is a legend with checked items for "Sample Points", "Land", and "Marine Sanctuaries". The bottom status bar shows a scale of 1:6001, 1014 points, and a "Show Sample Labels" checkbox. The coordinates x, y: 312852 are displayed in the bottom right corner.

A Variety of Information Types

- Vessel tracking
- Turbidity
- Rainfall, river flow and height
- Noise
- Ocean swell
- Water sampling
- Plant and aquatic life

The Environmental Dashboard

Dashboard
Locator
Info
Home
Help
Logout

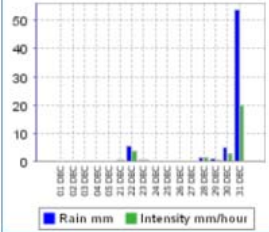
Up
Down
Rename
Delete

My Dashboard

- EnviroSys
 - Data Entry Forms
 - Tabular Query
 - Query
 - Sample Administration
 - Program Administration
 - Maintenance
 - Maintain Business Rules
 - Maintain Display of Metadata Categories
 - System Parameters
 - Lookup Types
 - Lookup Values
 - Report Parameters
- Help
 - Full Auditing
 - Postcodes
 - Code Associations
 - Disabled Buttons
- Toolbar Buttons
- Menu Items
- System Messages
- Dashboard
- Security
- Data Load
- Reports
- Map Viewer
- System
- Reference Guides
- Release Information

My Dashboard
Site Dashboards

Daily Rainfall Summary



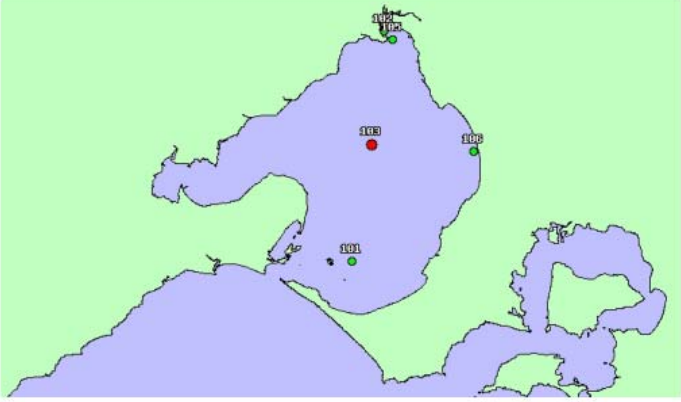
Schedule Calendar

May

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

2007


Daily Humidity Summary



Program: Turbidity Buoys
Site: Port of Melbourne
Guideline: Turbidity Max: 70
Date Range: Last 7 Days

Last Update: 25th March 2007 12:35:00


Image Viewer



93DG3468_RJ.JPG

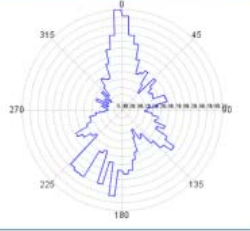
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Traffic Light

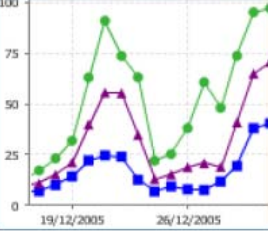


Target: Reduce water use by 10%
Period: 01/07/2006 to 25/05/2007
Status: On Track

Test Point 01 Wind Rose



Daily Humidity Summary



Monthly Rainfall Summary

Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Weather Point 1	1.0	0.0	0.0	3.0	0.0	1.2	0.0	0.2	6.2	0.0	0.1	0.0
Weather Point 2	0.1	0.0	0.0	4.2	0.2	0.0	0.0	0.0	0.0	2.2	0.0	1.0
Weather Point 3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Weather Point 4	0.0	0.0	1.6	6.0	0.4	0.5	9.2	0.0	0.0	0.0	0.0	0.2
Total	1.3	0.2	1.8	13.4	0.8	1.9	9.4	0.4	6.4	2.4	0.3	1.4

Key Features of the PoMC System

- Heavy use of continuous monitoring devices and telemetry.
- Temporal data overlaying spatial.
- Near real-time view(s) of the situation.

The 'old' way

- Each monitoring program has a separate database
- The 'database' is often a spreadsheet
- The data is hard to access and insecure

New requirements for data management

- Corporate ownership of data
- Organisation-wide reporting
- Auditable and secure
- Visibility - access anywhere, anytime
- Pockets of data no longer acceptable

What does this mean for management systems?

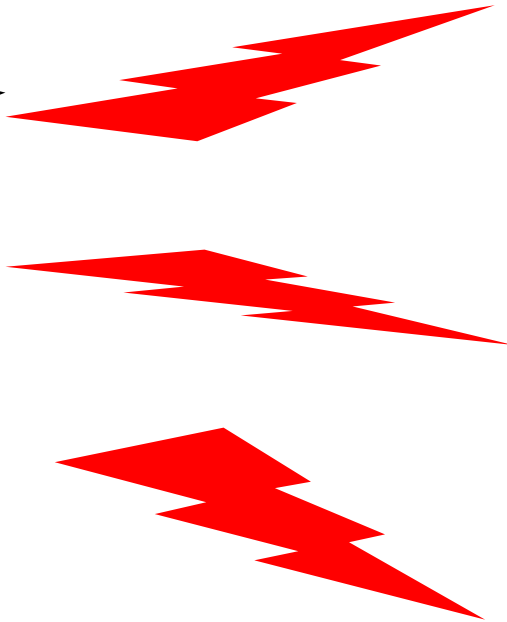
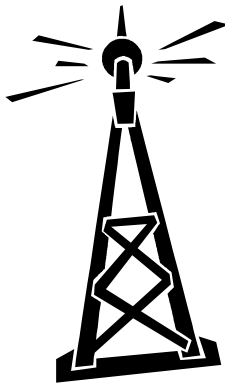
- 'Roll-up' data for corporate level reporting
- Keep large volumes of data
- Restrict access
- Interfaces to core systems
- Dashboards

What does this mean for the software technology?

- Secure, high performance databases
- Ubiquitous data access interfaces
- Standardised data presentation and transfer formats
- Built-in user authentication and authorisation

End to end automation

Monitoring data



Automated:

Data Retrieval and Storage

*Data checking and
exceedance notifications*

*Report generation and
distribution*

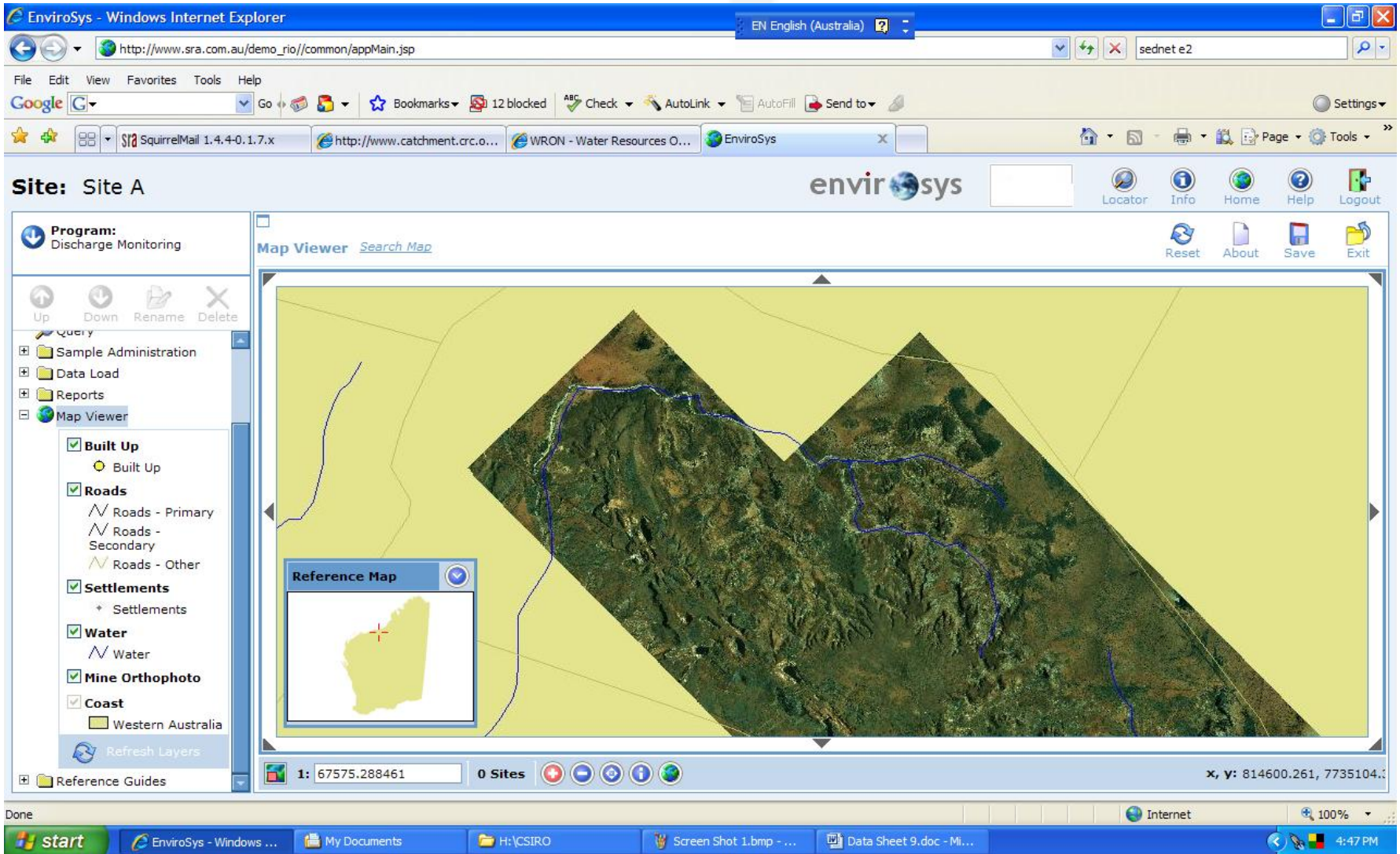
Program monitoring

Complex calculations

Environmental management systems and GIS

- Temporal data over spatial data – a natural fit for environmental monitoring
- A system should interface to an the existing corporate GIS

GIS Interfacing



The screenshot displays the EnviroSys web application interface within a Windows Internet Explorer browser window. The browser's address bar shows the URL `http://www.sra.com.au/demo_rio//common/appMain.jsp`. The application header includes the text "Site: Site A" and the "enviro sys" logo. A navigation bar on the right contains icons for "Locator", "Info", "Home", "Help", "Logout", "Reset", "About", "Save", and "Exit".

The main interface is divided into a left-hand navigation pane and a central "Map Viewer" area. The navigation pane, titled "Program: Discharge Monitoring", contains a tree view with the following categories and sub-items:

- Sample Administration
- Data Load
- Reports
- Map Viewer
 - Built Up
 - Built Up
 - Roads
 - Roads - Primary
 - Roads - Secondary
 - Roads - Other
 - Settlements
 - Settlements
 - Water
 - Water
 - Mine Orthophoto
 - Coast
 - Western Australia

Below the tree view is a "Refresh Layers" button. At the bottom of the navigation pane, there is a "Reference Guides" section.

The "Map Viewer" area displays a satellite-style map of a region with a yellow overlay. A "Reference Map" inset window is visible in the bottom-left corner of the map area, showing a smaller map with a red crosshair. The map viewer includes a search bar and a "Search Map" link. At the bottom of the map viewer, there is a coordinate display showing "1: 67575.288461" and "0 Sites".

The Windows taskbar at the bottom shows the "start" button, several open applications including "EnviroSys - Windows ...", "My Documents", "H:\CSIRO", "Screen Shot 1.bmp - ...", and "Data Sheet 9.doc - Mi...", and the system tray with the time "4:47 PM".

Trends

- Telemetry enables continuous visibility
- Taking a more holistic view of the data
- Approaching a real-time understanding of the environmental position
- Operational interventions may become more frequent and targeted
- ‘Environmental Intelligence’ becomes part of core ‘Business Intelligence’