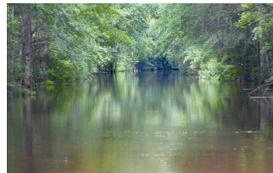




# LIMS Implementation Defect Tracking



**Jim Tussey**  
**Principal Engineer**  
**Westinghouse Savannah River Site**  
**August 17, 2005**

# LIMS Implementation Defect Tracking

## Background

- **Savannah River Site is a Department of Energy Facility located in Aiken, SC**
- **Primary work is environmental restoration**
- **Multiple laboratories across the Site**
  - Ranging from large to small labs doing a variety of work
- **Commercial-off-the-shelf (COTS) laboratory information management system used**
  - Configuration, enhancements, and modifications controlled via Site procedures

# LIMS Implementation Defect Tracking

What is this presentation about?

- **How to track software design implementation defects prior to production use**
  - A step by step engineering approach
  - Testing occurs after development of code but before acceptance testing
- **How to measure success**
  - Use of in-house database to track defects
  - Continual feedback between developers and test team
  - Ensure that developers are working on the right things by prioritizing defects
  - Statistics to determine rate of defect detection to defect correction
- **Methodology described used on high priority, short turn around LIMS migration**

## LIMS Implementation Defect Tracking

### Advantages of Early Defect Detection

- **Saves \$\$ and project deadlines**
  - Testing process is under control
- **Ensures high priority problems are fixed first**
  - Customer has input into priority of defects
- **Lessens the number of errors/defects that are placed into production**
  - Defects detected and corrected early in process
- **Customer verification and validation done early**
  - Customer assists in internal module testing
- **Overall product quality increase**

# LIMS Implementation Defect Tracking

## Step 1: Develop Test Cases to Test Requirements

- **Test Team is independent of developers**
  - Customer on Test Team
  - Developers draft rough test case
  - Testers and Customer edit draft, run test case to identify defects
- **Determine test cases to be generated per approved functional requirements**
  - Requirements are listed in a Requirements Traceability Matrix which relates requirements to test cases
- **A test case is written to test a specific function or part of the process**
- **Test cases are assigned to project personnel to generate**
- **Implementation testing is done by test case, so defects are listed by test case**
- **Not all defects are test case related, so system categories are used**
- **Determine with Customer rules for Priority Class**
  - Class A : Must be fixed prior to Acceptance Test
  - Class B : Must be fixed prior to Production
  - Class C : Enhancement for later implementation

# LIMS Implementation Defect Tracking

## Step 1: Develop Test Cases to Test Requirements (cont)

Rational RequisitePro - EMCAP Replacement - [R: RSS to DDS to TC RTM]

File Edit View Requirement Traceability Tools Window Help

EMCAP Replacement

- DOC-Requirements Specification for S...
- DOC - Design Document for Software (...)
- ICD - Interface Control Diagram
- Site Acceptance Test (SAT)
- RSS to DDS to TC RTM

Requirements:	Priority	Cost	Difficulty	COTS	Traced-to
R3.1.3.2: Sample type. Example: Freshwater sediment	Medium		Medium		D2(s), T2.17(s)
R3.1.3.3: Sample collection location. Example: SC-4 Steel Creek at Road C	Medium		Medium		D4(s), T1.1
R3.1.3.4: Collection method. Example: Freshwater sediment	Medium		Medium		D3(s), T2.5(s)
R3.1.3.5: Phase. Example: Solid	Medium		Medium		D2, T2.27(s)
R3.1.3.6: Kind. Example: Environmental	Medium		Medium		D3(s), T1.1
R3.1.3.8: Sample size range	Medium		Medium		D4, T2.6(s)

Attribute Matrix of RSS tracing to design (DDS) and test cases (TC)

R3: Functional Requirements

Ready 188 requirements

# LIMS Implementation Defect Tracking

## Step 1: Develop Test Cases to Test Requirements (cont)

Implementation Testing Defect Tracking

Test Case Development Status | Test Case Execution | Defect Entry | Quick Update | Reports | Search Defects

**Test Case Development Status**

Order	Test Case Name	% Comp	In VSS?	Req Pro ?	Reportable Test Case?
▶ 1	TC-001-Schedule Transfer	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	TC-005-Historical Limits Calculation	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	TC-002-Sample Login	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	TC-027-Composite Samples	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	TC-003-Prep Methods Labels Calculations	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6	TC-018-Preps Report	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7	TC-006-Gamma Instrument Interface (HPGE)	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
8	TC-007-Gamma Instrument Calculation	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
9	TC-008-Alpha Instrument Interface	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
10	TC-009-Alpha Instrument Calculation	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
11	TC-010-LSC Instrument Interface	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
12	TC-011-LSC Instrument Calculation	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
13	TC-012-Gas Proportional Counter Interface	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
14	TC-013-GFPC Instrument Calculation	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
15	TC-024-TAT Report	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
16	TC-020-Process Report	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
17	TC-019-Deliquent Report	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
18	TC-025-WorkList Report	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
19	TC-026-Worklist Exception Creation	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
20	TC-021-Rerun Report	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
21	TC-022-Special Report	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
22	TC-023-Waste Report	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
23	TC-015-RDB Verify Transfer of Approved Task	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
24	TC-016-RDB Verify Database Tables	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
26	TC-017-RDB Monthly Average Calculation	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
* 0		0	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Record: 1 of 25

Print Selected Test Case Defects

# LIMS Implementation Defect Tracking

## Step 2: Start Implementation Evolution

- **Test cases are executed in Evolutions**
  - An evolution is a implementation test cycle
  - Evolution consists of test, documentation of defects, rating of defects, correction of defects
- **An evolution begins when enough software and test cases have been developed to warrant execution**
  - Since the LIMS is automating the process, enough primary steps in the process have to be developed to warrant testing
- **Customer participates in each test evolution**
  - Test team consists of Customer and Process Control personnel
- **Execution generates defects and redlines to test cases**
  - Defects are errors, problems with requirements, application setup errors, etc
  - Redlines are changes to test case(s)

# LIMS Implementation Defect Tracking

## Step 2: Start Implementation Evolution (cont)

**Implementation Testing Defect Tracking**

Test Case Development Status | Test Case Execution | Defect Entry | Quick Update | Reports | Search Defects

**Testing Cycle**

- Evolution 1
- Evolution 2
- Evolution 3
- SAT Regression
- Site Acceptance Test

**Add New Test Cycle**

Cycle Name:

Start:  End:

**Test Cases**

Order	Test Case Name:	Date Ran	Executed	RedLines	Defects
▶ 1	TC-001-Schedule Transfer	1/17/2005	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	TC-005-Historical Limits Calculation	1/17/2005	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	TC-002-Sample Login	1/18/2005	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	TC-027-Composite Samples	1/20/2005	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	TC-003-Prep Methods Labels Calculations	1/22/2005	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6	TC-018-Preps Report	1/24/2005	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	TC-006-Gamma Instrument Interface (HPGE)	1/26/2005	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	TC-007-Gamma Instrument Calculation	1/26/2005	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	TC-008-Alpha Instrument Interface	1/28/2005	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	TC-009-Alpha Instrument Calculation	1/28/2005	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11	TC-010-LSC Instrument Interface	1/27/2005	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
12	TC-011-LSC Instrument Calculation	1/27/2005	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
13	TC-012-Gas Proportional Counter Interface		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	TC-013-GFPC Instrument Calculation		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	TC-024-TAT Report	1/30/2005	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
16	TC-020-Process Report	1/30/2005	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
17	TC-019-Deliquent Report		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Record:  1  of 24

Print Selected Test Case Defects

# LIMS Implementation Defect Tracking

## Step 3: Enter Defects in Tracking Database

- **After evolution is complete, defects from test log are entered into tracking database**
  - Defects given title and entered in database
  - Steps in test case and setup for reproducing defect are logged
  - Defect evaluated to determine if it effects multiple areas
  - Defect marked as in development
- **Defect reviewed by Customer**
  - Customer assigns a priority to the defect
  - Assigned to Software Development personnel

# LIMS Implementation Defect Tracking

## Step 3: Enter Defects in Tracking Database (cont)

**Implementation Testing Defect Tracking**

Test Case Development Status | Test Case Execution | Defect Entry | Quick Update | Reports | Search Defects

**TestCaseName:** TC-002-Sample Login

**AssignedTo:** S. McCrary

**WrittenBy:** S. McCrary

**Description:** The purpose of this test is to ensure that the Collectors can log Samples, enter collection data, and the system will automatically retrieve the corresponding Sample Description Number (SDN), collection efficiencies, High/Low Sample and Effluent Limits, and perform

**Execution Notes:**

**PercentComplete:** 100

*Record below the defects found during the execution of the test case!*

**Defect List**

**Defect: 1 Problem Title**

Sample was not logged into system by SQL\*LIMS

**Problem Description**

After logging in a sample with sample plan PROCESS SEWER WATER 1105-R SUMPS it was noticed that the sample was not showing up under View-->Sample by Location. On review of the Log History it was noted that ERROR 208 was logged for submission. Another sample was logged under the same sample plan the same

**Comments**

A review of the system was performed and it was noted that Oracle had logged that the number of open cursors for the system had been exceeded. The number of open cursors for Oracle is a database parameter and has a default value of SQL\*LIMS of 500. Change the open cursor parameter to be 600

Class A  Class B  Class C

Dev  Rdy for Tst  Closed

**Dev. Assigned**

D. Tucker

**Date Opened** 1/24/2005 **Date Closed**

Multiple Areas Effected  Workaround Available?

Defect  Setup  DA Review

Tst Case  System  Proj Man Review

Cust Reported  Fnd In SAT

Vendor

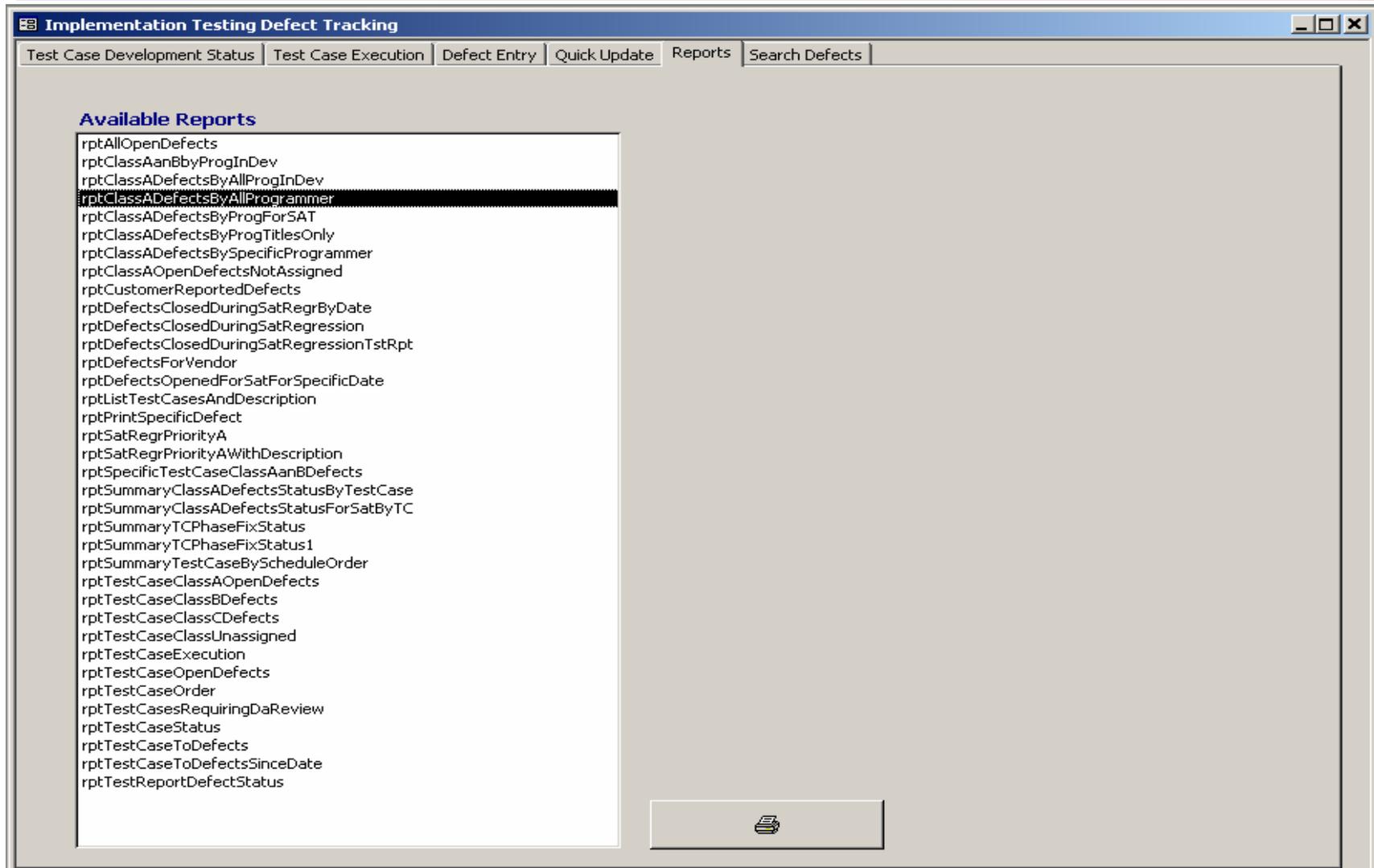
Record: 1 of 22

Record: 2 of 28

- **Assigned Developer evaluates problem**
  - Reviews defect in database and adds additional comments
  - Determines if multiple areas in the design are effected
  - Updates defect tracking database
- **Code is checked out of Configuration Management Database**
  - Changes made to code to correct problem
  - Developer checks code back into Configuration Management
  - Developer updates design documentation (if necessary)
- **Developer updates status of defect to Ready for Test**
  - Testers evaluate number of corrected defects to determine if ready for next evolution
- **Supplier is notified of defects to be corrected**

# LIMS Implementation Defect Tracking

## Step 4: Developer Evaluates Defect (cont)



# LIMS Implementation Defect Tracking

## Step 4: Developer Evaluates Defect (cont)

Test Case to Defects

---

### *Class A Internal Module Testing Defects by Programmer*

	Total:	In Dev:	Awaiting Testing:	Closed:	Remain Open:
Class A:	148	0	1	144	4
Class B:	45	19	2	24	21
Class C:	22	4	1	2	20
Class Unassigned:	3				
Total Defects:	217				

Sorted by Test Case And Date Opened

---

#### D. Tucker

---

#### TC-002-Sample Login

Num: 3 Title: Logging SANITARY WASTEWATER GRAB SOLID was slow in logging a sample location

Descr: After logging a sample using the Sanitary/Wastewater/Grab Solid sample plan, the operator attempted to access the sample by View --> Sample by location. The sample did not display an automatically assigned location as it had done in previous login locations. A second attempt was made to view the sample by the same means, and this time the sample was displayed along with its automatically assigned location.

Comment: System Problem. This problem seems to be associated the Oracle or system resources, since a general slowdown was observed during this time.

Class A:  Class B:  Class C:  Cycle: Design:  Test:  Closed:  Date Opened: 1/24/2005 Date Closed:

Workaround:  Multiple Areas:  Customer Reported:  CMT:

---

Num: 1 Title: Sample was not logged into system by SQL\* LIMS

Descr: After logging in a sample with sample plan PROCESS SEWER WATER 1105-R SUMPS it was noticed that the sample was not showing up under View--> Sample by Location. On review of the Log History it was noted that ERROR 208 was logged for submission. Another sample was logged under the same sample plan the same results of the sample not being logged in occurred. This time the error code displayed in the Log History was Error 0.

Comment: A review of the system was performed and it was noted that Oracle had logged that the number of open cursors for the system had been exceeded. The number of open cursors for Oracle is a database parameter and has a default value of SQL\*LIMS of 500. Change the open cursor parameter to be 600

Class A:  Class B:  Class C:  Cycle: Design:  Test:  Closed:  Date Opened: 1/24/2005 Date Closed:

Workaround:  Multiple Areas:  Customer Reported:  CMT:

---

#### TC-008-Alpha Instrument Interface

Num: 16 Title: Correct TPU Error and MDC with Same Factors as Weighted Concentration

Descr: Factors applied to Activity to arrive at Weighted Concentration should also be applied to MDC and TPU Error as all three of these must be reported on the BEIDMS report in the same units.

Comment: Until BEIDMS reports are required on soil samples, the weighted concentration and activity will be the same. PC&ES recommends adding components "Weighted MDC" and "Weighted TPU Error" but the fix should be delayed until the priority 2 item for moisture content is implemented, which means it should be classified as a B.

Class A:  Class B:  Class C:  Cycle: Design:  Test:  Closed:  Date Opened: 3/11/2005 Date Closed:

Workaround:  Multiple Areas:  Customer Reported:  CMT:

---

Legend: A - Fixed prior to SAT; B - Fixed prior to project closure; C - Fixed outside project

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Page: 1

# LIMS Implementation Defect Tracking

## Step 5: Start Next Evolution (cont)

**Test Case to Defects**

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### Testing Defects

Supplier Notified Defects  
Sorted by Test Case And Date Opened  
*This information is released to the addressee only under the terms and agreement of the WSRC Nondisclosure agreement.*

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#### Applied Biosystems

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**SYS-001-System, Oracle, SQL\*LINK & Labtronics**

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Num: 4 Title: Received PEN-10644 Error

Description: While selecting Result--- by Worklist from the SQL\*LINK main menu we got PEN-10644 Error when the data was committed.

Comment: This problem was reported to ABI earlier internal review on 2/17/05 to Aaron Mills. Assigned : AMMS-69P88C

-----  
Aaron Mills responded on 2/17/2005 at 1609 hrs with the following:  
Results by Worklist Error  
\*PEN-10644: Warning: Could not locate status request for the result(s) list entered.\*  
This is corrected by patch file tpatch SL40165\_021  
-----

This problem was reported from an unpatched workstation. P&CS personnel are in the process of updating consistent patching across all workstations in the customers facility at this time. J. Tessey 2/18/05

Class A:  Class B:  Class C:  Cycle: Design:  Test:  Closed:  Date Opened: 2/9/2005 Date Closed: 2/24/2005  
Workaround:  Multiple Areas:  CMT:

---

8/8/2005 9:15:30 AM Page 1 of 1

Page: 1

# LIMS Implementation Defect Tracking

## Step 4: Developer Evaluates Defect (cont)

Implementation Testing Defect Tracking

Test Case Development Status | Test Case Execution | Defect Entry | Quick Update | Reports | Search Defects

**TestCaseName:** TC-002-Sample Login  
**AssignedTo:** S. McCrary  
**WrittenBy:** S. McCrary  
**Description:** The purpose of this test is to ensure that the Collectors can log Samples, enter collection data, and the system will automatically retrieve the corresponding Sample Description Number (SDN), collection efficiencies, High/Low Sample and Effluent Limits, and perform

**Execution Notes:**  
**PercentComplete:** 100

*Record below the defects found during the execution of the test case!*

**Defect List**

**Defect: 1 Problem Title**  
Sample was not logged into system by SQL\*LIMS

**Problem Description**  
After logging in a sample with sample plan PROCESS SEWER WATER 1105-R SUMPS it was noticed that the sample was not showing up under View->Sample by Location. On review of the Log History it was noted that ERROR 208 was logged for submission. Another sample was logged under the same sample plan the same

**Comments**  
A review of the system was performed and it was noted that Oracle had logged that the number of open cursors for the system had been exceeded. The number of open cursors for Oracle is a database parameter and has a default value of SQL\*LIMS of 500. Change the open cursor parameter to be 600

Class A    Class B    Class C  
**Dev**  Rdy for Tst    Closed     
**Dev. Assigned**  
D. Tucker  
**Date Opened** 1/24/2005   **Date Closed**  
 Multiple Areas Effected    Workaround Available?   
 Defect    Setup    DA Review  
 Tst Case    System    Proj Man Review  
 Cust Reported    Fnd In SAT  
 Vendor

Record: 1 of 22

Record: 2 of 28

# LIMS Implementation Defect Tracking

## Step 5: Start Next Evolution

- **Testers determine which test cases are to be reran**
  - Customer has input
  - Decision based on process flow, number of defects, number of redlines, changes in design
- **Testers printout list of Test Cases**
  - Execution of test cases begins
  - Closure of defects, redlines, and new defects noted in test log
- **Testers update defect database**
  - Defects closed by testing are set to Closed Status

# LIMS Implementation Defect Tracking

## Step 5: Start Next Evolution

**Implementation Testing Defect Tracking**

Test Case Development Status | Test Case Execution | Defect Entry | Quick Update | Reports | Search Defects

**Testing Cycle**

- Evolution 1
- Evolution 2
- Evolution 3**
- SAT Regression
- Site Acceptance Test

**Add New Test Cycle**

Cycle Name:

Start:  End:

**Test Cases**

Order	Test Case Name:	Date Ran	Executed	RedLines	Defects
7	TC-006-Gamma Instrument Interface (HPGE)	2/18/2005	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
▶ 8	TC-007-Gamma Instrument Calculation	2/18/2005	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	TC-008-Alpha Instrument Interface	2/22/2005	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	TC-009-Alpha Instrument Calculation	2/24/2005	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	TC-010-LSC Instrument Interface	2/24/2005	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
12	TC-011-LSC Instrument Calculation	2/25/2005	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
13	TC-012-Gas Proportional Counter Interface	2/28/2005	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
14	TC-013-GFPC Instrument Calculation	3/1/2005	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
16	TC-020-Process Report	3/1/2005	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
19	TC-026-Worklist Exception Creation	3/1/2005	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	TC-022-Special Report	3/1/2005	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	TC-015-RDB Verify Transfer of Approved Task	3/1/2005	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
* 0			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Record:   2    of 12

Print Selected Test Case Defects

# LIMS Implementation Defect Tracking

## Step 5: Start Next Evolution (cont)

**Implementation Testing Defect Tracking**

Test Case Development Status | Test Case Execution | Defect Entry | Quick Update | Reports | Search Defects

Test Case: TC-002-Sample Login

**Class Defect Types**

Class A  Class B  Class C  All  All Unassigned  Class A and B  Class A and B SAT\_Regression

**Defects Status Sheet**

**Test Case TC-002-Sample Login**

<b>Defect #</b>	1				
<b>Problem Title</b>	Sample was not logged into system by SQL*LIMS				
<b>Class A:</b> <input checked="" type="checkbox"/>	<b>In Dev:</b> <input type="checkbox"/>	<b>Rdy to Test:</b> <input type="checkbox"/>	<b>Closed:</b> <input checked="" type="checkbox"/>	<b>Date Opened:</b> 1/24/2005	<b>Date Closed:</b>
<b>Assigned Prog:</b> D. Tucker					
<b>Defect #</b>	2				
<b>Problem Title</b>	Marine Fish sample plan did not provide a default type/subtype attribute				
<b>Class A:</b> <input checked="" type="checkbox"/>	<b>In Dev:</b> <input type="checkbox"/>	<b>Rdy to Test:</b> <input type="checkbox"/>	<b>Closed:</b> <input checked="" type="checkbox"/>	<b>Date Opened:</b> 1/24/2005	<b>Date Closed:</b>
<b>Assigned Prog:</b> M. Scott					
<b>Defect #</b>	3				
<b>Problem Title</b>	Logging SANITARY WASTEWATER/GRAB SOLID was slow in logging a sample location				
<b>Class A:</b> <input checked="" type="checkbox"/>	<b>In Dev:</b> <input type="checkbox"/>	<b>Rdy to Test:</b> <input type="checkbox"/>	<b>Closed:</b> <input checked="" type="checkbox"/>	<b>Date Opened:</b> 1/24/2005	<b>Date Closed:</b>
<b>Assigned Prog:</b> D. Tucker					

Record: 1 of 3

# LIMS Implementation Defect Tracking

## Step 6: Statistics

- **Statistics generated each evolution**
  - Log new defects
  - Update the status of known defects from testing
  - Determine what areas need more attention
- **Review from reports the status of defects**
  - Defects under development
  - Awaiting Test
  - Closed by Testing
- **Generate for each Evolution Open Defects graph**
  - Evolution 1: Defect Numbers are growing
  - Evolution 2 : Defect Numbers level off, slight downward trend
  - Evolution 3 : Defect Numbers dropping, definite downward trend

# LIMS Implementation Defect Tracking

## Step 6: Statistics (cont)

Evolution Testing Summary Report

### Test Phase: Evolution 3

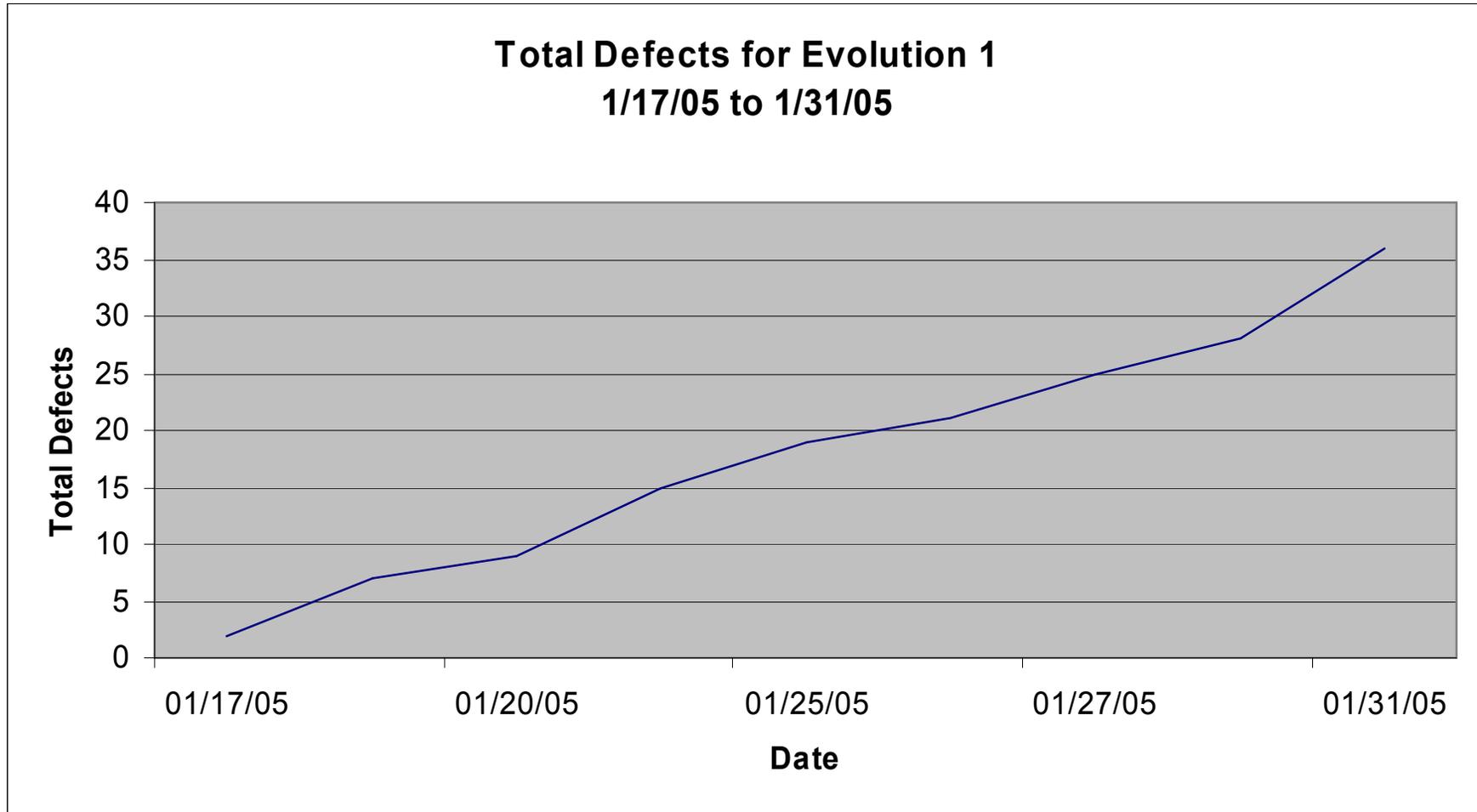
Start Date : 2/18/2005

Stop Date : 3/1/2005

Test Case Name		Tot	Dev	Tst	Cls		Tot	Dev	Tst	Cls
TC-006-Gamma Instrument Interface (HPGE)	Class A	6	0	1	5	Class B	2	1	1	0
TC-007-Gamma Instrument Calculation	Class A	1	0	0	1	Class B	0	0	0	0
TC-008-Alpha Instrument Interface	Class A	5	0	0	5	Class B	1	0	0	1
TC-009-Alpha Instrument Calculation	Class A	0	0	0	0	Class B	0	0	0	0
TC-010-LSC Instrument Interface	Class A	8	0	0	8	Class B	0	0	0	0
TC-011-LSC Instrument Calculation	Class A	0	0	0	0	Class B	0	0	0	0
TC-012-Gas Proportional Counter Interface	Class A	8	0	0	8	Class B	3	2	0	1
TC-013-GFPC Instrument Calculation	Class A	0	0	0	0	Class B	0	0	0	0
TC-020-Process Report	Class A	0	0	0	0	Class B	1	0	0	1
TC-026-Worklist Exception Creation	Class A	0	0	0	0	Class B	0	0	0	0
TC-022-Special Report	Class A	0	0	0	0	Class B	0	0	0	0
TC-015-RDB Verify Transfer of Approved Task	Class A	6	0	0	6	Class B	1	1	0	0

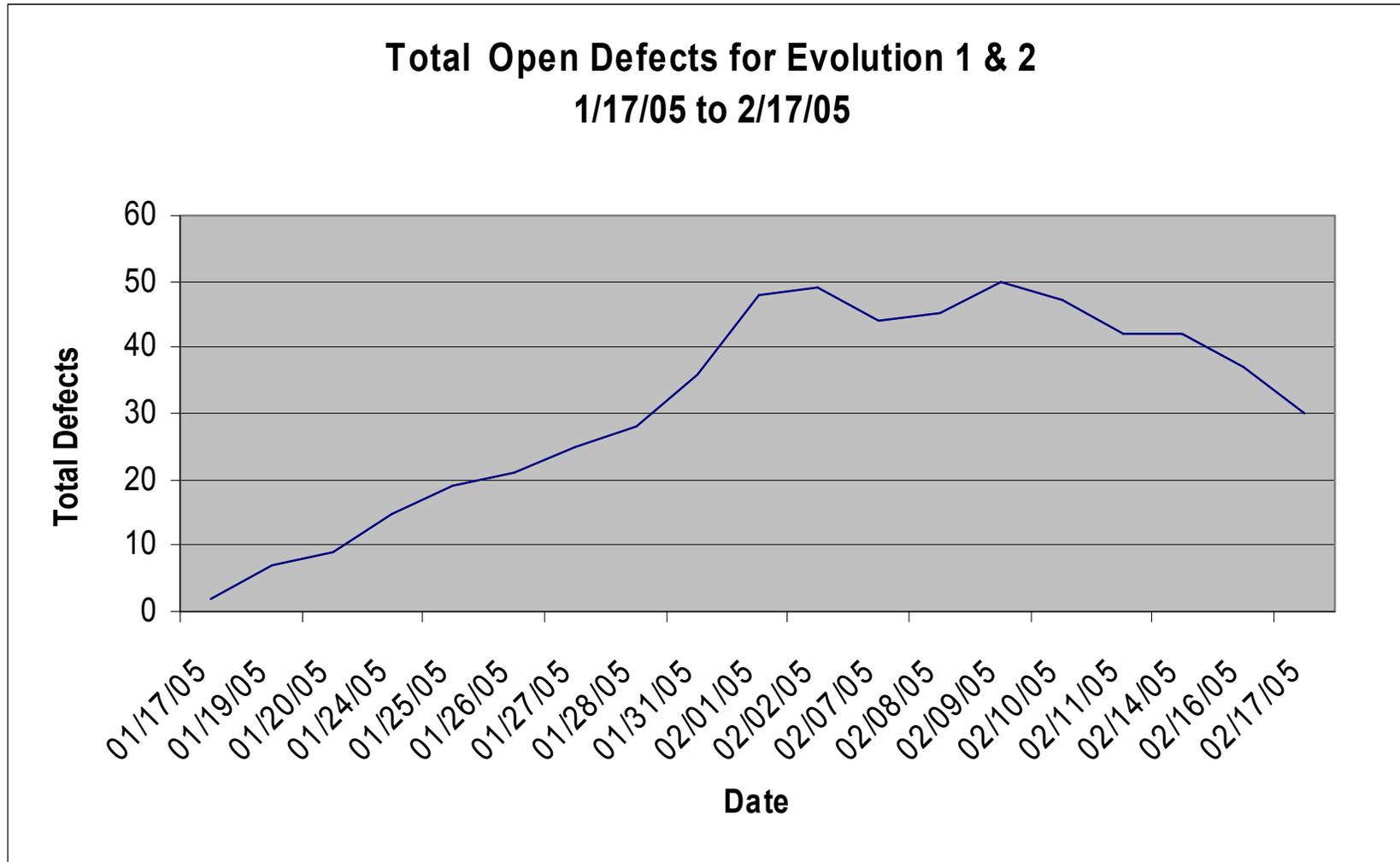
# LIMS Implementation Defect Tracking

## Step 6: Statistics (cont)



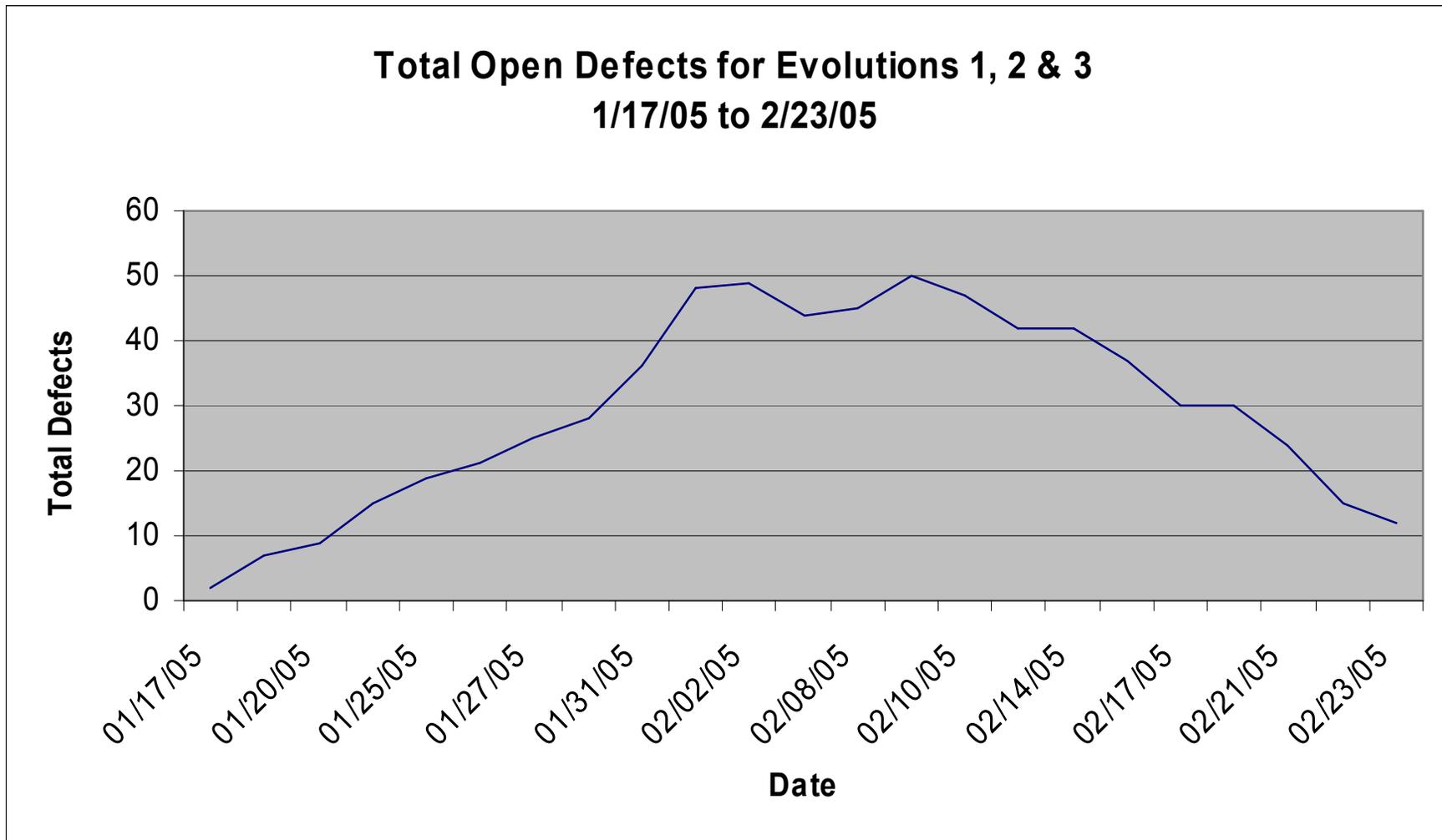
# LIMS Implementation Defect Tracking

## Step 6: Statistics (cont)



# LIMS Implementation Defect Tracking

## Step 6: Statistics (cont)



# LIMS Implementation Defect Tracking

## Step 7: Acceptance Testing

- **After all category A defects are closed, begin acceptance testing**
  - Defects detected during implementation have been corrected
  - Changes to design per Customer have been incorporated
  - Test Cases used in Acceptance Testing are the same as those during Implementation
- **Record any defects found during Acceptance Testing**
  - Log defects into defect database
  - Customer rates the defects
  - Assign developers to work on
- **Retest defects recorded in Acceptance Testing in Regression Testing**
  - Final acceptance of application occurs after testing is complete
  - Generate report showing all defects closed

# LIMS Implementation Defect Tracking

## Step 7: Acceptance Testing (cont)

SAT Regression Priority As

### Site Acceptance Test Defect Status

<i>GenOps-001-General Operational Defects</i>		<i>In Dev</i>	<i>In Test</i>	<i>Closed</i>	<i>SAT Vendor</i>	<i>Closed in Regr</i>
GenOps-001 -002	Worklist Does Not Show Location	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
GenOps-001 -003	Inconsistent Aliquot Units	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
GenOps-001 -004	GW specials do not automatically calculate laboratory receipt date or default dates	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
GenOps-001 -005	GroundWater (GW) Special Sample Plan Modifications	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
GenOps-001 -006	Analysis missing from Worklist report	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
GenOps-001 -008	Reserver labels did not print	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
GenOps-001 -009	LSC Batch Report event does not run	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
GenOps-001 -010	QC order incorrect for strontium worklist	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
GenOps-001 -011	LSC IDM3 transfer significantly different from others	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
GenOps-001 -013	EMA special's SDNs need to be transferred to Reporting Database	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
GenOps-001 -014	Collection Method LOVs	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<i>SYS-001-System, Oracle, SQL*LIMS &amp; Labtronics</i>		<i>In Dev</i>	<i>In Test</i>	<i>Closed</i>	<i>SAT Vendor</i>	<i>Closed in Regr</i>
SYS-001 -011	Two Versions show up on Enter Task Results	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
SYS-001 -012	Attachment for change reason on effluent volume disappears	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<i>TC-002-Sample Login</i>		<i>In Dev</i>	<i>In Test</i>	<i>Closed</i>	<i>SAT Vendor</i>	<i>Closed in Regr</i>
TC-002 -022	Lab location for silica gel sample plan should be 403.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<i>TC-003-Prep Methods Labels Calculations</i>		<i>In Dev</i>	<i>In Test</i>	<i>Closed</i>	<i>SAT Vendor</i>	<i>Closed in Regr</i>
TC-003 -007	Text Printing in BarCodes	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
TC-003 -012	LSC H3 Prep Method Label not printed	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

# LIMS Implementation Defect Tracking

## Conclusion

- **Defect tracking during Implementation reduces development cost**
  - Resources dedicated where needed
  - Customer dictates priority of defects so development staff concentrates on what is important
  - Saves \$\$ because high priority items concentrated on
- **Use a tracking tool to organize resources**
  - Tool records defects and resolutions
  - Defects and corrections do not fall through the cracks
  - Track the trends between open defects and closed defects