SOFTWARE RELEASE NOTICE

1. SRN Number: 3172B321

2. Project Title: Repository Design and Thermal Mechanical Effects – Preclosure Activities   Project No. 06002-01-102

3. SRN Title: SAP 2000, Version 8.3.1 Integrated Software for Structural Analysis & Design

4. Originator/Requestor: Luis F. Ibarra   Date: May 26, 2004

5. Summary of Actions

☒ Release of new software   ☐ Change of access software

☐ Release of modified software: ☐ Software Retirement

    ☐ Enhancements made

    ☐ Corrections made

6. Validation Status

    ✓ AHC 6-2-04

☒ Validated

☐ Limited Validation

☒ Not Validated   Explain: _____

7. Persons Authorized Access

Name	Read Only/Read-Write	Addition/Change/Delete
Luis Ibarra Bis Dasgupta	Read only	N A

8. Element Manager Approval: _____   Date: 6-1-04

9. Remarks:

SOFTWARE SUMMARY FORM

01. Summary Date: 05/25/2004	02. Summary prepared by (Name and phone) Luis Ibarra , (210)522-5152	03. Summary Action: NEW
04. Software Date: 05/21/2004	05. Short Title: SAP 2000	

06. Software Title: SAP 2000, Version 8.1 Integrated Software for Structural Analysis and Design	07. Internal Software ID: None

08. Software Type: ☐ Automated Data System ☒ Computer Program ☐ Subroutine/Module	09. Processing Mode: ☐ Interactive ☐ Batch ☐ Combination	10. Application Area a. General: ☒ Scientific/Engineering ☐ Auxiliary Analyses ☐ Total System PA ☐ Subsystem PA ☐ Other b. Specific: Structural Analysis and Design.

11. Submitting Organization and Address: CNWRA/SwRI 6220 Culebra Road San Antonio, TX 78228	12. Technical Contact(s) and Phone: Computers & Structures, Inc. (510) 845-2177

13. Software Application: SAP 2000 allows model creation, analysis, design, and results review within a single interface. The program will be used for linear/nonlinear static & dynamic structural analysis

14. Computer Platform PC	15. Computer Operating System: Windows XP	16. Programming Language(s): NA	17. Number of Source Program Statements: NA
18. Computer Memory Requirements:	19. Tape Drives: N/A	20. Disk Units: N/A	21. Graphics:

22. Other Operational Requirements
None

23. Software Availability: ☒ Available ☐ Limited ☐ In-House ONLY	24. Documentation Availability: ☒ Available ☐ Preliminary ☐ In-House ONLY

25.

Software Developer: _____   Date: 07/28/2004

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QA VERIFICATION REPORT
FOR
→ACQUIRED SOFTWARE *NOT* TO BE MODIFIED ←

Software Title/Name:	SAP 2000
Version:	V. 8. 3. 1
Demonstration workstation:	PC
Operating System:	Win XP
User:	L. Ibarra

NOTE: Acquired software may or may not meet all requirements and will be evaluated on a case-by-case basis.

Installation Testing [TOP-018, Section 5.6]

Has *installation testing* been conducted for each intended computer platform and operating system?

Yes: ☐ No: ☐ N/A: ☐

Computer Platforms: __PC__ Operating Systems: __Win XP__

Location of Acceptance Test Results: _See enclosed "SAP 2000 Integrated_

Comments:. ⟩ Software for Structure Analysis & Design

July 8, 2004 ⟹ ⟨ Acceptance Tests for Configuration Control"

Software Output [TOP-018, Section 5.5.4]

Is software designed so that individual runs are uniquely identified by date, time, name of software and version?

Yes: ☐ No: ☐ N/A: ☒

Date and Time Displayed:___
Name/Version Displayed: ___
Comments:

NOTE: Output identification content and format is typically taken as is.

Medium Documentation [TOP-018, Section 5.5.6]

The physical labeling of software medium (tapes, disks, etc.) contains: Program Name, Module/Name/Title, Module Revision, File type (ASCII, OBJ, EXE), Recording Date, and Operating System(s)?

Yes: ☐ No: ☐ N/A: ☒

Comments:

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User Documentation [TOP-018, Section 5.5.7]

Is there a Users' Manual for the software and is it up-to-date?

Yes: ☒   No: ☐   N/A: ☐

User's Manual Version and Date: V. 8   July 2002
Comments:

Are there basic instructions for the _installation_ and _use_ of the software?

Yes: ☒   No: ☐   N/A: ☐

Location of Instructions: User manual
Comments:

Configuration Control [TOP-018, Section 5.7, 5.9.3]

Is the Software Summary Form (Form TOP-4-1) completed and signed?

Yes: ☒   No: ☐   N/A: ☐

Date of Approval: 7/28/04

Is the list of files attached to the Software Summary Form complete and accurate?

Yes: ☐   No: ☐   N/A: ☒

Comments:

Is the source code available or, is the executable code available in the case of (acquired/commercial codes)?

Yes: ☒   No: ☐   N/A: ☐

Location of Source Code: CD
Comments:

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Have all the script/make files and executable files been submitted to the Software Custodian?

Only the executable files are being submitted.

Yes: ☒   No: ☐   N/A: ☐

Location of executable files: C D - QA Record
Comments:

Software Release [TOP-018, Section 5.9]

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➔ *ACQUIRED SOFTWARE <u>NOT</u> TO BE MODIFIED* ◆

Upon acceptance of the software as verified above, has a Software Release Notice (SRN), Form TOP-6 been issued and does the version number of the software match the documentation?

Yes: ☒   No: ☐   N/A: ☐

SRN Number: _321_

Comments:

Software Validation [TOP-018, Section 5.10]

Has a Software Validation Test Plan (SVTP) been prepared for the *range of application* of the software?

Yes: ☐   No: ☒   N/A: ☐

Version and Date of SVTP: ___   TBD

Date Reviewed and Approved via QAP-002: ___

Comments:

Has a Software Validation Test Report (SVTR) been prepared that documents the results of the validation cases, interpretation of the results, and determination if the software has been validated?

Yes: ☐   No: ☒   N/A: ☐

Version and Date of SVTR: ___   TBD

Date Reviewed and Approved via QAP-002: ___

Comments.:

Additional Comments:

~~signature~~ 07/29/2004   _~~signature~~_ 1/29/2004

Software Evaluator/User/Date   Software Custodian/Date

SAP 2000 Technical Description

SAP 2000 is an structural analysis and design program that carries out linear/nonlinear static and dynamic analysis. The program includes step-by-step large deformation analysis, multiple P-Delta, eigen and ritz analyses, cable analysis, tension or compression only analysis, buckling analysis, blast analysis, fast nonlinear analysis for dampers, base isolators and support plasticity, energy methods for drift control and segmental construction analysis.

The program includes an interface that allows to create structural models rapidly. Complex models can be generated and meshed with templates built into the interface.

Technical information can be found in the following reports:

Wilson, E. "Dynamic Analysis Using Mode Superposition",
http://www.comp-engineering.com/technical_papers.htm

Wilson, E. "Fundamentals of Dynamic Analysis",
http://www.comp-engineering.com/technical_papers.htm

Wilson, E. "Dynamic Analysis by Numerical Integration",
http://www.comp-engineering.com/technical_papers.htm

Anwar, N. "Basic Modeling and Analysis Concepts",
http://www.comp-engineering.com/technical_papers.htm

Computers and Structures, Inc. "SAP 2000 Presentation with New Graphics",
http://www.comp-engineering.com/technical_papers.htm

Anwar, N. "Behavior, Modeling and Design of Shear Wall-Frame Systems",
http://www.comp-engineering.com/technical_papers.htm

SAP2000

Integrated Software for Structural Analysis and Design

Acceptance Testing for

CONFIGURATION CONTROL

July 08, 2004

Acceptance Testing for Configuration Control of SAP2000

The CNWRA has recently acquired the structural software SAP 2000, and needs to put it under configuration control. Then, several tests were performed to assure that the program has been correctly installed and it is able to reproduce the structural response of sample models that have the potential to be analyzed in the Center. For this purpose, the problems included in SAP2000 program for internal software verification were employed. SAP 2000 contains 60 verification examples, some of them subdivided in several cases. The examples include frames, shells and systems with link elements (elements exhibiting some type of nonlinearity). Each example includes a pdf file with a description of the problem, main results and a comparison with independent calculations. These calculations are carried out by hand or using an independent structural software. These files can be found in the subdirectory of SAP2000:

C:\Program Files\Computers and Structures\SAP2000\Manuals

The SAP2000 files for each one of these problems (extension *.SDB) are located at:

C:\Program Files\Computers and Structures\SAP2000\Verification\

There is also a excel file with the main results for the proposed examples, the file is located at:

C:\Program Files\Computers and Structures\SAP2000\Verification\SAP2000_Verification_812

Once the software was properly installed, several problems were retrieved from the "Verification" subdirectory and the analyses were ran to verify that the results corresponded with those included in the pdf and excel files.

Among the problems included in this testing phase are: 1-022, 1-024, 2-008, 2-011, and 6-009. These problems cover most of the applications that Center staff will utilize when modeling structural systems in SAP2000 such as: diaphragm constraints, modal analysis, response spectrum analysis, linear and nonlinear direct integration time history analysis for base excitation, analysis of end element forces, etc. The selected structures comprise two-dimensional and tri-dimensional moment frames, plates modeled with shell elements, and plastic kinematic components. All the obtained results coincide with those reported in the SAP 2000 documentation. Therefore, the Center staff is confident that the program has been properly installed. The description of the selected problems and corresponding results have been submitted to the quality assurance staff of the CNWRA.

Problems Encountered
It was detected that structural problems involving direct integration time histories were not running. The Center got in contact with SAP 2000 staff located at Houston, TX: Darrell Foster, tel: (713) 533-4420. After describing the problem to him, it was decided to update the SAP 2000 version of the Center from 8.2.7 to 8.3.1. This modification is documented in the ticket 1700 of CNWRA Helpdesk.

Version 8.3.1 is currently installed and the conflict with directory integration this has been solved.

07/28/04