



Department of Energy  
Washington, DC 20585

DEC 10 1993

Mr. Joseph J. Holonich, Director  
Repository Licensing and Quality  
Assurance Project Directorate  
Division of High-Level Waste Management  
Office of Nuclear Material Safety  
and Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Dear Mr. Holonich:

Pursuant to a telephonic request on August 27, 1993, by Mr. Kenneth Hooks of your office to Ms. Sharon Skuchko of my office, enclosed for your information and reference is a list of approved quality-affecting software programs currently in use as of November 5, 1993.

In addition to the above request, Mr. Hooks requested that the U.S. Nuclear Regulatory Commission (NRC) be placed on periodic distribution to receive subsequent revisions to this document. Accordingly, the Yucca Mountain Site Characterization Project Office has been notified of the request and has arranged for the NRC to be placed on the distribution list to receive all future revisions to this document.

Some errors may be noted in the initial publication of this document. Assurances will be made that any corrections to the list are incorporated through future revisions.

Should you have any questions in this regard, please contact Sharon Skuchko at (202) 586-4590.

Sincerely,

Dwight E. Shelor  
Associate Director for  
Systems and Compliance  
Office of Civilian Radioactive  
Waste Management

030045

Enclosure:

Document entitled, "List of Approved  
Quality Affecting (QA) Software  
Programs Currently in Use"

9401070317 931210  
PDR WASTE PDR  
WM-11

NHOB 11  
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102.8

cc w/Enclosure:

R. Nelson, YMPO

T. J. Hickey, Nevada Legislative Committee

R. Loux, State of Nevada

S. Zimmerman, State of Nevada

D. Bechtel, Las Vegas, NV

Eureka County, NV

Lander County, Battle Mountain, NV

P. Niedzielski-Eichner, Nye County, NV

W. Offutt, Nye County, NV

L. Bradshaw, Nye County, NV

C. Schank, Churchill County, NV

F. Mariani, White Pine County, NV

V. Poe, Mineral County, NV

J. Pitts, Lincoln County, NV

J. Hayes, Esmeralda County, NV

B. Mettam, Inyo County, CA

K. Hooks, NRC

**List of Approved Quality Affecting (QA)  
Software Programs Currently In Use**

**Prepared for:**

**U.S. Department of Energy  
Yucca Mountain Site Characterization Project Office  
101 Convention Center Drive  
Las Vegas, Nevada 89109**

**Prepared by:**

**TRW Environmental Safety Systems Inc.  
Information Resources Management  
101 Convention Center Drive  
Las Vegas, Nevada 89109**

**Under Contract Number:  
DE-AC01-91RW00134**

## **Summary**

**As a result of a specific concern identified by Asta Engineering during a Quality Assurance Management Assessment performed in 1992, a recommendation was made that "a complete list of approved software programs related to quality affecting activities be developed, maintained and promulgated."**

**In response to specific tasking from Mr. John Gandhi, Information Resources Manager for the Yucca Mountain Site Characterization Project (YMP), the Information Resources Management Department of the Management and Operating Contractor in Las Vegas was assigned the responsibility for the development and maintenance of a comprehensive list of approved software related to quality-affecting activities.**

**A letter from Mr. Gandhi was distributed to members of the YMP Software Advisory Group (SAG), a body constituted to address issues related to the acquisition, development and management of software related to quality-affecting activities. All Project Participants acquiring, developing, or using software in support of quality-affecting activities are represented on the SAG. The letter, dated August 30, 1993, requested specific information on any and all approved software programs in use in support of quality-affecting activities. The attached table comprises a summary of the responses received up to and including October 12, 1993. The table reflects any changes and additions that were reported for the period between April of 1993 to October of 1993.**

Quality Affecting (QA) Software Programs  
Currently In Use  
November 5, 1993

There are no changes to the T&MSS list of QA Software:

<b>Technical &amp; Management Support Services (SAIC)</b>				
Name of Software	Release / Version #	Description Of Software	QA Program/ Approval Date	Operating System
PC208 DATALOGGER	1.0.A, 1.0.B	Datalogger is a suite of data processing software applications that performs the following functions: Editing of instruction sets Downloading of data Reformatting of data files	T&MSS QA 4/3/92 , 6/2/92	Windows and DOS
BEEMET	3.01.A	Software application for deriving a stability parameter for concurrent measurements of wind speed, wind direction, and variation of the horizontal wind direction.	T&MSS QA 2/19/93	Windows and DOS
CONVERSION	1.0.A	Software application for converting data in one format into another format.	T&MSS QA 4/19/92	Windows and DOS
ENVAID	3.21.A, 5.0.A	Data processing software that performs the following functions: Display of data files for editing Export of data files for reformatting by spreadsheets	T&MSS QA 4/3/92	Windows and DOS
ENVICOM	4.21.A, 5.0.A	Data acquisition software application that extracts data files from data cartridges.	T&MSS QA 4/3/92	Windows and DOS
WROSE	2.01.A	Software application for creating graphical displays of wind frequency distribution. Generates plotable code for graphical displays of wind frequency distribution.	T&MSS QA 10/30/92	Windows and DOS

Quality Affecting (QA) Software Programs  
Currently In Use  
November 5, 1993

One addition made to RSN list of QA Software:

<b>Raytheon Services Nevada (RSN)</b>				
Name of Software	Release / Version #	Description Of Software	QA Program/ Approval Date	Operating System
Fast Lagrangian Analysis of Continua (FLAC)	2.27 TC, 3.0, 3.03	An explicit finite difference code which simulates the behavior of structures built of soils, rock or other materials which may undergo plastic flow when their yield limit is reached. It is possible, therefore to examine the stabilizing effects of supported excavations or to examine the effects of soil or rock instability on surface structures.	SQAP 12/20/89 10/24/91 6/25/92	MS DOS 3.0 or higher
Ventilation Network and Gas Distribution Analysis (VNETPC)	3.0	Design, Planning and control of Underground Ventilation Systems.	SQAP 12/20/89	MS DOS 3.0 or higher
Electrical Distribution System Analysis (EDSA)	100 Super NK	Calculates Load and Flow, Power requirements, etc. for complete electrical distribution system.	SQAP 12/20/89	MS DOS 3.0 or higher
ANSYS	4.4A +	Engineering Analysis System: a general purpose finite element program for solving engineering problems using mesh generations, geometry definitions, materials definitions, constraint definitions, load definitions and model displays.	SQAP 4/28/91	MS DOS 3.0 or higher
Fire Protection Systems Hydraulic Calculations (Hypercalc)	4.0	Hydraulic analysis of fire sprinkler systems and general water distribution networks.	SQAP 6/23/92	MS DOS 3.0 or higher

**Raytheon Services Nevada (RSN)**

Name of Software	Release / Version #	Description Of Software	QA Program/ Approval Date	Operating System
SOKKIA Net2 Mapp 5.0 Surveying System Software	5.0	SOKKIA Map 5.0 is a computer software program which accepts the Net2 instrument recording module data and converts the data to digital form or accepts manual entry data and processes the survey sightings into a data file. The data file is then processed and plotted. The software package includes the capability to join lines, break lines, change plotting symbols, draw curves, close objects, and coordinate buildings by manual taping.	RSN PP-19-07, Rev. 0 9/1/93	MS DOS 3.0 or higher

Quality Affecting (QA) Software Programs  
Currently In Use  
November 5, 1993

Changes made and 4 additions to the Sandia list of QA Software:

Sandia National Laboratories				
Name of Software	Release / Version #	Description Of Software	QA Program/ Approval Date	Operating System
COYOTE II	3.00	A general purpose program package designed for the solution of heat conduction and/or coupled diffusion problems based on the Galerkin Finite Element Method.	QAIP 3-2 6/25/91	UNICOS
HEFF	4.1	Boundary-element code for predicting stresses, displacements, and temperatures in the vicinity of an opening in a linear, elastic, homogeneous medium. HEFF is based on the fictitious stress method. The thermal model is a closed-form solution for a line heat source in an infinite medium. Input includes initial conditions, material properties, heat sources parameters, and problem geometry.	QAIP 3-2 7/26/91	DOS
JAC2D	5.10 with Mod 106 * 1.00 with Mod 107	Nonlinear finite element code for solid mechanics analysis. The code treats both material and geometric nonlinearities. It uses a nonlinear conjugate gradient method to solve the governing equations.	QAIP 3-2 12/11/92 * 1/28/93 *	UNICOS/ SUN OS
JAC3D	6.1 -01	JAC3D is a three-dimensional finite element program designed to solve quasi-static nonlinear mechanics problems.	4/2/93	SUN OS

**Sandia National Laboratories**

Name of Software	Release / Version #	Description Of Software	QA Program/ Approval Date	Operating System
MM4BAT	1.0	ICS's adaptation of the Penn State/NCAR Meso-scale Model including the Biosphere-Atmosphere Transfer Scheme (BATS). This model will be used for regional climate simulation.	QAIP 3-2 6/12/91	UNICOS Ver 5
NORIA-SP	0.00 0.1 Incorporates mods 101, 102, 103	NORIA-SP is a finite element computer program that solves a nonlinear partial differential equation describing the transport of liquid water through partially saturated porous media. Spatial discretization is by the Galerkin method and time integration is by a second-order predictor-corrector scheme. Most material properties can be defined as either constants or functions of other variables.	QAIP 3-2 12/17/90 8/5/92 *	CTSS/UNICOS SUN OS 4.1
PPICKNTS	1.0 1.1	This code reads an input data file, picks the arrival time, plots the "pick" on a time history; predicts max 3-D vect amplitude given Mb and distance from source; compares prediction to measured value in data file and prints a summary file; also produces a file that can be plotted using BAR (110-125). Input fuel for PPicknts is created by READFILE (110-123). This code is used as a tool to evaluate UNE-generated ground motion.	QAIP 3-2 12/18/90 3/5/91 *	SEVMS 5.1-1 SEVMS 5.3-1
STRES3D	4.0 4.10	Thermomechanical analysis code for predicting transient temperatures, stresses, and displacements in infinite and semi-infinite conduction, homogeneous, elastic media. The code is based on thermoelastic analytic solutions for point heat sources in an infinite body. Semi-infinite bodies are treated by superposition of source and sink terms, coupled with relief of surface shear stresses by numerical integration.	QAIP 3-2 12/17/90 8/18/92	DOS 3.1 Ulrix

**Sandia National Laboratories**

Name of Software	Release / Version #	Description Of Software	QA Program/ Approval Date	Operating System
TOSPAC	1.00 1.10	TOSPAC models on-dimensional, vertical groundwater flow with transport of decaying contaminants through unsaturated, fractured, porous media.	QAIP 3-2 12/18/90 11/12/92	VAX VMS SUN OS
TOUGH2	1.00	TOUGH2 is a numerical simulation program for nonisothermal flows of multicomponent, multiphase fluids in porous and fractured media.	QAIP 3-2 3/4/93	SUN OS
UDEEC	1.82	UDEEC is a discrete block motion code. The block can be rigid or deformable. Arbitrary contact between the blocks is possible.	QAIP 3-2 5/18/93	UNIX
VEC/DYNA3D	3.20	An explicit finite element code for the non-linear dynamic analysis of structures in three dimensions.	QAIP 3-2 6/16/93	ULTRIX 4.3







Quality Affecting (QA) Software Programs  
Currently In Use  
November 5, 1993

8 additions made to the LANL list of QA Software:

<b>Los Alamos National Laboratories (LANL)</b>				
Name of Software	Release / Version #	Description Of Software	QA Program/ Approval Date	Operating System
<b>Crystal Ball</b>	01-00-00	Virtually identical to @Risk program and provides the same capabilities. Easier to learn but provides more extended capabilities for adaptation to scientific calculations.	SQAP 3/11/93	PC DOS Apple/MAC
<b>GEO-CALC</b>	01-00-00	Thermo-dynamic code for calculating phase equilibria.	SQAP 8/22/91	PC DOS
<b>LCLSQ</b>	01-00-00	Lattice parameter refinement program for x-ray powder diffraction.	SQAP 4/10/93	PC DOS
<b>LSODPK</b>	01-00-00	Converts partial differential equations into ordinary differential equations.	SQAP 3/11/92	Apple/MAC
<b>Non-Linear Forecasting</b>	01-00-00	Implements non-linear forecasting methods. Primary goal is to allow study of the predictability of non-linear systems. Code is best used for time-series problems demonstrating complex behavior. Can be applied to experimental data as a means of testing alternative forecasting methods. Program works best with large data sets and is difficult to apply to sparse geological data.	SQAP 4/17/92	PC DOS

## Los Alamos National Laboratories (LANL)

<b>@Risk</b>	01-00-00	Risk analysis and simulation add-in for Excel spreadsheet. Program uses Monte Carlo and Latin Hypercube sampling methods to run simulations that calculate cumulative probability distributions of uncertain variables. Instead of using midpoint estimate values for spreadsheets, allows you to define data as distributions to specify uncertainty. Resulting calculations are displayed as output distributions using the Excel plotting capabilities. The program also allows you to set up sensitivity simulations to identify key output variables.	SQAP 3/11/93	PC DOS Apple MAC
<b>SORBEQ</b>	01-00-00#	Finite difference model of one-dimensional advective, dispersive transport of a solute that undergoes equilibrium adsorption.	SQAP 2/12/93	Sun/UNIX
<b>TRACRN</b>	01-00-00 Probationary Release	Perform retardation sensitivity analysis calculations. Finite difference code that models single or two-phase flow and transport in porous, deformable heterogeneous media.	SQAP 3/24/93	Sun/UNIX

Quality Affecting (QA) Software Programs  
Currently In Use  
November 5, 1993

There were 3 additions to the CRWMS M&O list of QA Software:

<b>Civilian Radioactive Waste Management System (CRWMS M&amp;O)</b>				
Name of Software	Release / Version #	Description Of Software	QA Program/ Approval Date	Operating System
Characteristics Data Base		Software defines and maintains a data base of the characteristics of spent nuclear fuel characteristics.	CRWMS M&O Software Plan, QAP-19-1 and QAP- 19-2 2/93	MS DOS 5.0
<b>STAAD III/ISDS</b>	V4-8MB	Used for structural analysis, design and drafting.	M&O QA 6/14/93	MS DOS 5.0
<b>FLAC</b>	V3.22	Used to simulate behavior of structures built of soil, rock or other materials which may undergo plastic flow.	M&O QA 6.10.93	MS DOS 5.0
<b>ANSYS</b>	V6.0	Used for thermal and structural analysis	M&O QA 8/9/93	UNIX 8.07



Quality Affecting (QA) Software Programs  
Currently In Use  
November 5, 1993

1 addition and 1 deletion from USGS's list of QA Software:

United States Geological Survey (USGS)				
Name of Software	Release / Version #	Description Of Software	QA Program/ Approval Date	Operating System
ADAPS- FORTRAN C	88.1	To process and store surface-water data (A subset of NWIS, a national data base.)	5/1//90	
ANALYST	11/13	The data taking algorithm chooses mathematically optimized values for parameters such as integration and delay times for peak-jumping, location, and the order of peak switching.	1/18/91	
ANNIE	02/90	Data-management, input-output files for all surface water models used by the survey (including PRMS)pre-imposed processing.	04/19/91	
BANK	1.00	Data reduction of previously acquired spectrometer system.	1/18/91	
BARHATCH.FOR	1.000	Generates bar-histograms of data, where the data are (x,y) with y optionally a Gaussian deviate.	8/23/91	
C20CIN	2.00	Transfers data from cassette tapes through the C20 interface into files on the Prime	8/5/91	
CALIBRATE.FOR	1.001	Calculates ground displacement from a monochromatic signal amplitude, as scaled in the Golden, CO data collection center. This displacement is compared with a theoretical displacement to determine if system is functioning properly.	6/22/90	
CELLCAL	1.001	Reads temperatures from the SPRT on a thermistor. Graphs are then used to check SPRT against standard temperature cells.	4/12/91	

**United States Geological Survey (USGS)**

Name of Software	Release / Version #	Description Of Software	QA Program/ Approval Date	Operating System
CNOS	1.3	To automate the acquisition and reduction of mass spectrometric analysis of the stable isotopic composition of CO2 gas.	1/18/91	
COMPARELOC .FOR	1.001	Compares the UNIX-derived (FASTPONG) epicenter with the HYPO71 location to insure that the data set of earthquake locations generated by HYPO71 are complete and correct.	5/3/91	
CONTROL	1.3	Data acquisition and reduction for mass spectrometer.	1/18/91	
CONVEYANCE/ SLOP	1.0	To calculate the Manning equation, $C = (1.486/n)AR^{2/3}SO^{1/2}$ , to estimate peak streamflow events. To assist in the reduction of regional streamflow monitoring data.	5/11/90	
EXTRACT. PAS	1.004	Extract selected information from data files generated by calibration programs and write it to data files suitable for use by regression programs.	7/30/91	
FASTPONG. FOR	1.001	To determine local and regional earthquake hypocenter estimations and magnitude estimations, for preliminary catalogs and analysis. P and S waves are used in locating Southern Great Basin earthquakes.	8/25/89	
FIRMOT.FOR	1.000	Converts phase data from HYPO71 bulletin forms to input data either FOCNEC.F, which use only one event (or composite) per execution. Alternately, reads and converts hypoellipse file if required.	10/24/90	
FLUME.F77	0002	Calculates the discharge from the observed water levels in 9 and 6 inch flumes. This program is used to convert flumes and their gage heights to discharges. The project will use this program to aid in the evaluation of the flumes operation.	4/19/91	

**United States Geological Survey (USGS)**

Name of Software	Release / Version #	Description Of Software	QA Program/ Approval Date	Operating System
FOCMEC.FOR	1.000	To automatically calculate acceptable focal mechanism solutions from earthquake data composed of P-wave polarities and (S/P) amplitude ratios from Southern Great Basin seismic stations.	10/24/90	
FORUV.FOR	1.001	To change bulletin formats from FASTPONG output to HYPO71 phase input, where P-arrival and S-arrival weights are saved, but locations are not. These earthquakes are detected by the Southern Great Basin Seismic Network (SGBSN).	10/24/90	
FSUB	1.000	Reads data from two time-series files and calculates the difference between...? Subtract two time-series files and create a third file with the differences.	12/2/90	
GEOCOMPS	1.0	To compute quadrilateral solutions by reducing, processing and adjusting horizontal angle, vertical angle, and distance measurement data. To analyze and interpret horizontal and vertical movement of the earth's surface.	4/19/91	
GEOPROGRAM	V01.0	Aids geologists in evaluating three-dimensional data acquired from photogrammetric measurements. It uses measured data to compute geologic structured parameters and surfaces that can be compared to the terrain in the stereoscopic model.	5/25/90	
GVDAYRED	1.001	One of series of steps to convert field data to values contoured on interpretative maps for Activity.	1/22/93	
GVHANDTC	1.001	One of series of steps to convert field data to values contoured on interpretative anomaly maps for Activity.	12/09/93	
HYPO71. FOR	1.001	To determine local and regional earthquake hypocenter estimations and magnitude estimates, for preliminary catalogs and analyses.	10/24/90	

**United States Geological Survey (USGS)**

Name of Software	Release / Version #	Description Of Software	QA Program/ Approval Date	Operating System
HYTEQ	1.0	To model multi-component chemical transport in variably saturated porous media, where the chemicals are subject to equilibrium speciation reactions. To model one-dimensional variably saturated flow and transport of conservative tracers at Yucca Mountain.	11/21/90	
<i>INPUT.F (To be removed)</i>	1.000	<i>To input seismic P and S phase arrival data, read from developeorder films, into a HYPO71 or HYPOELLIPSE formatted file.</i>	8/23/91	
IOWDM	2/90	To enter data in selected file formats into a WDM file and to output data from WDM file to selected file formats.	4/19/91	
ISOPLLOT	1.10	Plot figures and calculate statistical parameters.	1/18/91	
LDMUX.C	1.000	To demultiplex 96 channel data tapes from the PDP 11/34 "seismic" system.	5/11/90	
LPTPLOT.C	1.001	To plot one or more pages of trace data per event from stations in a triggered mode into a VERSETEK plotter.	5/25/90	
MAINDATA	2.00	Process data from 21x data loggers into water levels.	8/23/91	
MARVEY.F	1.001	Looks for the HYPO71 "bulletin format" hypocenter, identifying it by a letter code and by the year of the event.	7/8/91	
MILLIB	1	To calculate dissolved solids, percent reaction ability, change units of elements and compounds between mg/L, millimoles/L millequiv./L. Converts between the water quality units of milligrams per liter, milli-equivalents/L, or millimoles/..	6/26/90	

**United States Geological Survey (USGS)**

Name of Software	Release / Version #	Description Of Software	QA Program/ Approval Date	Operating System
MING.PAS	1.000	To extract engineering data from D files generated by I CONVERT to make ING files.	2/4/93	
MINITAB	7.2	To estimate missing weather data by regression to surrounding weather stations.	5/4/92	
NWIS	90.1	To provide storage and retrieval capabilities for water resources information.	6/25/90	
ORIPROGRAM	V01.0	To support the orientation of photographic images in the Kern DSR11 analytical plotter. Also capable of camera calibration.	1/28/91	
PBDAT	6248B	Laboratory data reduction for calculating isotope concentration and composition.	1/18/91	
PHREEQE	19904	Modeling mineral-water interaction at Yucca Mountain.	12/9/92	
PING.C	1.003	To scale data from digitally-recorded seismograms.	11/21/90	
PRMS.F77	1.00	To evaluate the impacts of various combinations of precipitation, climate, and land use on surface-water runoff, sediment yields, and general basin hydrology. To calculate evapotranspiration and recharge.	10/22/90	
PT510.PAS	1.000	For use in calibration of the air permeability testing pressure transducers.	3/10/93	
PTCAL.PAS	1.008	Calibrate pressure transducers.	12/9/92	
PTMREG	1.001, 1.002	Fits pressure transducer calibration data to a regression equation.	6/30/92 9/2/92	
RADSQL.F77	1.0	Estimates solar radiation for specific days and times to be used as input to a model that calculates recharge.	4/3/91	

**United States Geological Survey (USGS)**

Name of Software	Release / Version #	Description Of Software	QA Program/ Approval Date	Operating System
RAIN-CAL.BAS	1.0	Software acts as an interface between PC, a tipping bucket rain gage, and an electronic scale.	12/9/91	
RTM	1.0	Generates images of reflecting and diffracting interfaces using recorded seismic wavefield as input.	5/31/90	
RTRC	1.0	Calculates seismic arrival times at every point in a seismic medium, using an arbitrary distribution of velocities given the location of the seismic source.	5/31/90	
SEISMIC.CMD	1.000	Detects seismic events on a real-time basis by comparing short-term and long-term averages of seismic data.	1/26/90	
SIGMAMEC.FOR	1.000	Using preset directions and relative amplitudes of a fixed regional stress tensor's a1 and a3, computes resulting resolved shear and normal stress on each nodal plane of a set of focal mechanisms, in order to characterize regional stress.	11/20/91	
SLOPE-AREA-USGS	5.83	Computes peak streamflow discharge measurements. Assists in the reduction of regional streamflow monitoring data.	5/11/90	
SPHERESTAT. FOR	1.000	Computes summary "pressure" and "tension" axes from distributions of each. Copies from Schunemeyer, Koch, and Link, Journal of Mathematical Geology, v 4, no. 3	8/23/91	
SQUASH.C	1.001	Removes undesired traces from a trace datafile for data from SGBSN.	5/25/90	
TARVAX.FOR	1.000	To extract files from Tar tapes onto a VAX running with a VMS operating system. It is specifically set up to read SGBSN archive data tapes.	10/24/90	
TCPCAL	1.008, 1.009	Calibrates thermocouple psychrometers.	7/8/91 12/9/92	

**United States Geological Survey (USGS)**

Name of Software	Release / Version #	Description Of Software	QA Program/ Approval Date	Operating System
TCPREG	1.002	Fits TPC data to: Bars = a + 3pv + CpVpV + ETT + FpTT where pv= delta intercept and t= temperature.	9/2/92	
TCPREG.PAS	1.001	Fits TCP calibration data to a regression equation.	7/14/91	
THMCAL	1.006, 1.007	Provides unattended calibration of thermistors.	6/27/91 12/31/92	
THMREG	1.008	Fits thermistor data to the Steinhart-Hart equation.	9/2/92	
THMREG.PAS	1.007	Fits thermistor calibration data to a regression equation.	6/30/92	
UTH.FOR	2.00	To control alpha-spectrometer system to acquire and reduce alpha decay radiation data for U series and U trend analysis.	4/29/92	
WAVSEP	1.0	Using the recorded seismic wavefield as input, this program will process the data to identify shear end compressional wave modes.	5/31/90	
WTLISO.FOR	1.002	Computes coefficients of regression equations using least squares. Adapted for arrival times of P- and S-waves to get Vp/Vs from the stone. Plots data for graphic display on a "Wadati diagram".	10/18/91	
X-ACO	1.0	Acquires and stores seismic data.	3/18/92	