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LOS ALAMOS NATIONAL LABORATORY
APRIL 21, 1998

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**Year 2000 Assessment
Los Alamos National Laboratory**

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April 21, 1998

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Executive Summary

The purpose of this report is to advise managers on the status of Year 2000 readiness at the Laboratory and provide a summary of critical issues to be addressed in order to ensure that the Year 2000 date rollover will not disrupt Laboratory operations. The Laboratory's Year 2000 Council members are in the first phase of Year 2000 plans: gathering data and assessing the status of their divisions or programs. This first snapshot of the Laboratory Year 2000 readiness assessment is expected to grow and change over time as more refined assessments, plans, and schedules are developed and as more information becomes available. Here are findings to date:

- Embedded systems' status not known. Embedded systems use computer chips as an integral part of operation. Laboratory embedded systems control facility heating and cooling, telephones, numerical controllers (NC) machines on machine tools, elevators, experimental controls, data capture equipment, bar code readers, and telecommunications systems, and a multitude of other devices that we don't commonly think of as "computers." More than 50% of computer chips manufactured are used for embedded systems. Although two facility managers are actively assessing their areas, as is Johnson Controls of Northern New Mexico (JCNNM), the Laboratory's overall status for embedded systems in facilities and experimental equipment is unknown, as are the costs to discover problems and implement fixes.
- Preliminary cost estimates for Year 2000 repairs, testing, and implementation are estimated to be at least \$5.9 million, not including embedded systems. Although existing funds will cover a portion of the work, additional funding requirements and sources are still undetermined in many cases. Year 2000 costs are defined as the additional costs that will need to be incurred as a result of the Year 2000 and do not include other planned upgrades and retirement of systems. An example of a known Year 2000 cost is the \$1 million to upgrade the CIC-13 IBM mainframe.
- The Laboratory is required to make unavoidable purchases of Year 2000-compliant products. Because vendors are also facing liability issues, they are forcing the Laboratory to purchase, install, and integrate the latest versions of software and hardware. Vendors only guarantee the latest versions of their products to be Year 2000 compliant because of costly certification testing and liability issues. An example of a known required Year 2000 upgrade is the \$500,000 CIC-4 will spend on a new telephone switch.
- The Year 2000 short-term issue forces some long-term transition plans to be set aside. Systems that are planned for migration or replacement are being repaired because the changes cannot occur by 2000. Costs will increase in the long-term because of Year 2000. An example is the maintenance of CIC-13 VAX systems when they were planned to be retired.
- The Laboratory is at risk for the following consequences if we can't demonstrate an active Year 2000 program:
 - Risk of system failures
 - Potential funding freezes by the OMB and DOE.
 - Legal liabilities
 - Risk to the UC contract
- The deadline for this project is immutable. The steps in achieving successful Year 2000 solutions are (1) awareness, (2) inventory, (3) assessment, (4) remediation (repair), (5)

testing, and (6) implementation. Testing is estimated to be at least 50% of the effort. OMB calls for mission-essential system implementation by March 31, 1999. Industry's goal is December 1998. Some systems will experience problems at the beginning of the government's fiscal Year 2000 (10/1/99). Some disruptions may occur on or after 9/9/99 (some programs interpret 9999 as "end of job"). The Laboratory as a whole is still taking the early steps, and many people do not recognize that the problem affects them.

- DOE is continually increasing reporting requirements, expanding from only DOE mission-essential to all operations. Because DOE continues to be on the "worst" list in Office of Management and Budget quarterly progress reports on Year 2000 progress, the Laboratory is getting extensive requests for additional reporting requirements from DOE HQ. These requests taxing the very people who are already heavily loaded with repairs and testing for their systems.
- DOE audit criticizes the Laboratory's mission-essential systems planning. In March, DOE audited the four DOE mission-essential systems at the Laboratory (CARLA, BRASS, MASS, and the Secure ICN), and the preliminary findings criticize the lack of detailed planning for required actions and testing for their systems.

In conclusion, the Year 2000 Council has been working diligently to prepare this first preliminary assessment. However, we have not yet gathered all the data necessary to provide a full assessment.

The cost of the date rollover is currently being assessed at least \$5.9 million. However, we believe these known costs could increase dramatically because this is a first assessment and we have not been able to get information on the facilities at the Laboratory. We still need to determine the difference in the cost to repair and the costs we can cover from our existing budgets.

In addition, there are many embedded systems that use computer chips as an integral part of operations, for which we may need additional technical assistance to evaluate the problems.

Reporting requirements continue to increase; and for this effort, both because of DOE pressure and the clock itself, deadlines cannot be changed.

Table 1. First-Cut Laboratory Year 2000 Cost Estimate Summary by Division or Program
(4/17/98)

Division/Program	Year 2000 Council Member	No. of Year 2000 Affected Systems	Critical Systems	Important Systems	Non-Critical Systems	Prelim. Cost Estimate (\$K)
Total		622	152	272	198	\$5,895
Accelerator Production of Tritium Project (APT)	Art Nichols	0				
Applied Theoretical and Computational Physics Division (X)	Michelle Murillo	4	4			
Audits and Assessments (AA)	Diana Armijo	9		3	6	
Business Operations Division (BUS)	Scott Larkin & Jeff Bryant	7			7	408
Chemical Science and Technology Division (CST)	Greg Woodfin & Nick Degidio	23	1	2	20	59
Civilian and Industrial Technology Program Office (CIT-PO)	John Troxell					
Community Involvement and Outreach Office (CIO)	Jeff Vigil	2		2		1
Computing Information and Communications Division (CIC)	Diane Weir	170	114	41	15	3,155
Dynamic Experimentation Division (DX)	Lyle Kerstiens	2		2		
Earth & Environmental Science Division (EES)	Lynn McDonald	41			41	26
Environmental Management Program (EM)	Gary Garrett	10		7	3	73
Engineering Sciences & Applications Division (ESA)	Jeff Stoddard	17		17		86
Environment Safety & Health Division (ES&H)	Susan Kreiner & Carol Cox-DeVore	24	3	8	13	50
Facilities Division	Kevin Leifheit	1		1		50
Government Relations Office (GRO)	Catherine Agresto	0				
Human Resources Division (HR)	Doug Coombs	9		8	1	1
Laboratory Counsel (LC)	Catherine Agresto	33	1	29	3	106
Los Alamos Neutron Science Center (LANSCE)	John Booth	26	9	13	4	595
Life Sciences Division (LS)	Mark Wilder	14	1	10	2	10
Materials Science and Technology Division (MST)	Tracy Hendricks	37			37	
Nonproliferation and International Security (NIS)	Loretta Garcia	94	13	55	26	791

Nuclear Materials and Stockpile Management (NMSM)	vacant					
Nuclear Materials Technology Division (NMT)	Dave McNeese	8		6	2	20
Nuclear Weapons Technologies Programs (NWT)	vacant					
Ombuds Program Office	vacant					
Physics Division (P)	Diann Mills & Layle Zongker	5		5		2
Public Affairs Office (PAO)	Ed Vigil	1		1		1
Quality & Planning Program (QP)	N/A					
Safeguards & Security Division (S)	Bob Pearson	11	3	1	7	190
Science & Technology Base Program (STB)	Betty Gunther & Ed Rodriguez	1		1		20
Theoretical Division (T)	Peter Lomdahl	1		1		1
Technology & Safety Assessment Division (TSA)	Chester Painter	1			1	
JCNNM	Dale Coy & Dolores Montano	71	3	60	8	251

Year 2000 Assessment Report

1.0 Los Alamos National Laboratory Year 2000 Project Objectives

The objective of the Year 2000 project at the Laboratory is to ensure a seamless rollover of operations into the Year 2000. The Computing, Information, and Communications (CIC) Division Director formed the Year 2000 Council to address the Laboratory-critical systems. The Council has a representative from most major divisions and program offices; its charter is to assess and prepare all organizations for the Year 2000. The Information Architecture (IA) Project Leader in CIC-DO chairs the Council. The Council charter, current roster, and a memo of support from the Laboratory Director are in Appendix A. The Council members have been using the 6-step risk-based approach outlined in Table 2 to meet its objective.

Table 2. Six-Step Risk-Based Approach to the Year 2000

Step	Who is Responsible	Progress Status
1. Awareness	Year 2000 Council leader	On schedule. Presentations to managers and staff. Web site for Year 2000 information. Posters, primers, and table tents planned for the next 20 months.
2. Assessment	Year 2000 Council members	28 active divisions/program offices
3. Planning and cost analysis	Division and Group management	In process
4. Repair	Group management	Just starting Waiting for some vendor software to become available
5. Testing (50% of effort)	Group management	Unknown
6. Implementation	Group management	A few cases reported

2.0 Reporting Requirements for Los Alamos

The Office of Management and Budget (OMB) is in charge of the government Year 2000 readiness effort and mandates deadlines and documentation for all federal agencies. OMB and Congress are concerned that the government agencies won't be ready. No one in Congress wants a Year 2000 failure to occur in their districts especially since 2000 is also an election year. The predictions from the latest OMB reports are that some government agencies won't be ready for the Year 2000 until 2020! The deadline for this effort will not be extended. The calendar will roll over, whether the government is prepared or not. The computer industry itself has a notorious reputation for delivering products late. This lack of trust has Washington concerned, and in turn we are getting extensive, almost weekly, requests for additional reporting requirements from DOE HQ.

2.1 Office of Management and Budget

OMB's original schedule called for implementation of all systems by November 1999. This left a 1-month margin of error. The schedule was questioned and revised. The current OMB milestones for Year 2000 readiness by all government agencies are as follows:

Table 3. OMB Year 2000 Readiness Milestones

Category	Milestone
Planning	January 15, 1997
Risk Assessment	January 15, 1997
Data vulnerability (data exchange) assessment	May 1, 1997
Test Planning	June 15, 1998
Renovation (Repair)	September 15, 1998
Validation	February 15, 1999
Implementation	March 31, 1999
Contingency Planning	March 31, 1999 (for any system that does not meet validation and implementation milestones).

OMB is concerned because most of the DOE mission-essential systems are scheduled to be completed late in the cycle, between January and March 1999. The implementation schedules do not follow a straight line and leave little margin for slippage.

2.2 Department of Energy (DOE)

A team from the DOE HQ CIO Office manages the DOE Year 2000 project. The Year 2000 HQ team initially focused on mission-essential systems.

2.2.1 Four DOE Mission-Essential Systems at Los Alamos

DOE required that all sites identify their mission-essential systems; Los Alamos identified four: Classified Records (CARLA), Nuclear Material Accountability (MASS), Secure Alarm System (BRASS), and the Secure Integrated Computing Network (Secure ICN). All mission-essential systems must be completed following the OMB schedule listed above or Los Alamos risks additional reporting requirements, funding restrictions, additional audits, and poor publicity. To illustrate, Sandia National Laboratories has two systems currently scheduled for implementation

in September 1999. This resulted in Sandia appearing "at risk" in the February OMB report. EM program funds for all IT expenditures were frozen for over 3 months until the EM program offices were assured that all sites had adequate plans. As of March, Savannah River and Richland were still under an IT spending freeze.

The DOE Year 2000 HQ team conducted a site visit during the week of March 16, 1998 in Albuquerque to review progress for mission-essential systems at Los Alamos, Sandia, Pantex, and DOE AL. The purpose of the site visit was a documentation review. DOE's objective was to verify that documentation existed that could be used to prove "due diligence" in the case of a system failure that resulted in litigation. The Laboratory also needed to prove that we had met the milestones as we reported in the DOE HQ Year 2000 database. The report is still pending and will go to the DOE CIO. The Laboratory was found weak in the areas of planning and testing. We are awaiting the assessment report before implementing corrective actions. The DOE team left a summary of the audit at the end of the visit (see Appendix B of this report).

CARLA The Classified Records System (CARLA) is scheduled for implementation in June 1998, but that date will move out some. The current plan calls for implementing the classified system based on a new technology using Documentum currently being implemented for the unclassified records system.

A new document management project, in partnership with Xerox, is developing for the nuclear weapons archive project. The Weapons program is very enthusiastic about the Xerox project and is funding the effort. The better long-term solution may be to use the Xerox technology for classified records so that we are completely compatible with the nuclear weapons archive program. This would result in a consistent architecture for centralized classified records functions. We are closely examining the Xerox project to determine if we should adopt that technology in lieu of the current plan. We will make a determination by balancing the Year 2000 milestone requirements with Xerox plans.

Secure ICN The Secure ICN is the Los Alamos classified computing environment focuses on satisfying the needs of the weapons program. It includes the hardware and software for our networks, supercomputers, file systems, and output systems. One computer will discontinue operation because it cannot be upgraded for Year 2000 compliance. The hardware is too old to handle the new system software. We plan to use this supercomputer until November or December of 1999 and work with our customers to move their applications to other computers. The rest of the computers will continue to be used past 2000, but the Cray computers require an operating system upgrade to UNICOS 10. This operating system upgrade may affect our extensive collection of locally developed software. CIC will need to closely coordinate with X division customers to the impact of UNICOS 10 on the existing software tools.

The CIC High Performance Computing Focus Team has chartered its own Year 2000 working team to examine and coordinate the Year 2000 ICN migration, both Secure and Open. This team will coordinate the plans, paying special attention to the interdependencies of the ICN components.

MASS The Nuclear Material and Accountability System (MASS) is mostly compliant now. The application developers implemented 4-digit years more than 5 years ago in anticipation of the century change. Only the calibration subsystem needs modifications. We now estimate that it will take 2 months, use existing staff, and will be completed by May 1, 1998. Documenting the tests that prove that the system is Year 2000 ready will take additional time and resources. We are waiting to get the DOE site visit report to see the specific requirements before we retest and document the results.

BRASS The Secure Alarm System is well on its way to Year 2000 readiness. We originally estimated that this system would be implemented in February 1999. Based on the request for escalation from DOE HQ, we were able to reallocate resources and modify plans so that we now expect the system implementation in December 1998. DOE issued a request to escalate our Year 2000 schedules in February 1998. We realized that we could escalate the BRASS schedule and reflected that schedule change on February 24, 1998 in the DOE HQ Year 2000 database. DOE would like us to balance slippage in one mission-essential system milestones with advancement in another.

2.2.2 DOE Requirements for Laboratory-Critical Systems

DOE is increasing its scope of concern and becoming more involved in the readiness of all Laboratory systems. DOE focused on only the mission-essential until February 1998 when we were requested to report to DOE AL about all other Laboratory systems. The Year 2000 Council database facilitated responding to this call.

In March 1998, DOE HQ issued a call for information about data exchanges (electronic files with dates that we send to, or receive from, outside organizations on a routine basis) for all Laboratory systems. Data exchange examples include tapes we receive from the phone company to process the phone bill or tapes we send to the bank for payroll deposits. We have a month to respond with the number of exchanges by organization type, count of how many contacts we have made regarding these exchanges, and the number of compliant exchanges.

On March 24, 1998, DOE HQ requested cost information by fiscal year from FY 1996 through FY 2000, again for all systems. We observe that we are getting more requests for information to calm the apparent panic in Washington about the Year 2000.

Each of these requests for information add to the administrative reporting required of the same key people working to fix the problem. This reporting burden detracts from getting the work done.

2.3 University of California

The University of California Senior Vice President sent a memo to all Chancellors on February 12, 1998 to request their support for broad oversight of campuses of the Year 2000 computer software and hardware problem. Los Alamos National Laboratory was sent a copy of this memo. The Senior Vice President stated that some campuses have chosen to organize a campus-wide steering committee to provide coordination, education, and general oversight. He indicated that others might want to consider this approach if they have not already done so. He also stated that involving broader campus representation is particularly important since the Year 2000 problem typically extends beyond the organizational grasp of most officers, who report that they are most often unable to get the attention of departments. He encouraged management to raise this topic to a level of campus-wide concern. He stated that it is prudent to assess the risks and to ensure there are courses of action set for the most serious situations.

3.0 Laboratory Internal Assessment

We realized that we needed to do more to assure that the Laboratory as a whole was prepared for the Year 2000, both to satisfy DOE and OMB requirements and simply as good business practice. While the four mission-essential systems are critical to our mission and operations, numerous other systems must also operate. We are calling these systems "Laboratory-critical."

Failure of systems supporting the payroll, accounts payable, facilities, safety, security and environmental functions would cause severe disruptions. The Year 2000 forces us to inventory and assess every computer and application we use so that we can do our best to assure that the Year 2000 will not cause any serious problems.

3.1 Year 2000 Council

Year 2000 Council members meet every two weeks to discuss their progress and new findings. The Council decides which type of Year 2000 evaluation tools may be useful for Laboratory-wide use and requests that CIC division and the IA project select the best tool to meet the identified needs. The Council members communicate the Year 2000 assessment and milestones for their organizations. They work with their division managers and computer professionals to provide assessment, cost, and schedule information to the Year 2000 project office. A Year 2000 Council database supports the collection of information. The database is constantly being revised in response to DOE requests for information.

Information about facilities is still a void. Council members are predominately computer professionals and lack knowledge about facilities. Only two facility managers are actively working with their Year 2000 council representatives.

Appendix B contains the current assessment of Laboratory systems gathered by the Year 2000 Council members. This snapshot of the Laboratory Year 2000 readiness assessment is expected to grow and change over time as more refined assessments, plans, and schedules are developed. The Year 2000 process is like peeling the layers of an onion in reverse. As one layer of the Year 2000 onion is removed, another layer grows. This apparently simple problem becomes more complex as we learn about the systems and the vendor software.

3.2 Known Year 2000 Required Fixes at the Laboratory

Computing, Information and Communications (CIC) division is more heavily impacted by Year 2000 than some other divisions. Almost every server, product line, and service needs be upgraded to be Year 2000 compliant. Numerous applications supported by CIC need to be repaired or replaced due to Year 2000.

Integrated Computing Network (ICN) The CIC High Performance Computing Focus team chartered its own Year 2000 team to assure the readiness of the Open and Secure ICN. The ICN is a complex environment where changes made in one segment often affect other segments. The team is planning the transition carefully so that its services are uninterrupted. One unknown is the effect of migrating to UNICOS 10, which is certified as Year 2000 compliant on the Cray computers. The team does not know if its locally developed software, like LDB, will run on UNICOS 10.

CIC-2 The Desktop Group is working with IA to select one standard set of tools for testing PCs for the BIOS problem and the common applications like spreadsheets and databases. CIC-2 is actively engaging its customers in the Year 2000 issue.

CIC-4 The Laboratory will spend \$500,000 to upgrade its phone switch, required by Year 2000 issues. This cost seems high, but is one of the lower telecommunications Year 2000 costs in the DOE complex. For example, Livermore has not kept current with its software upgrade and expects to pay \$1.4 million. Other DOE sites are looking at a cost range from \$700 K to \$1.7 million.

CIC-13 has 49 problematic applications. CIC-13 would like to migrate applications from the VAX computer to the IBM. Those plans are delayed by the Year 2000 problem. There is not enough time to move all the applications by 2000, so CIC-13 will have to spend money upgrading the VAX system software and spend staff time upgrading the old VAX applications. This will cost the Laboratory money in the long run, but the Year 2000 offers no other options.

For the many CIC-13 applications that do run on the IBM mainframe, we recently discovered that the mainframe operating system, compilers, code generator, and client-server development tool

need to be upgraded. The costs for these upgrades approach \$1 million. Funding is undetermined at this time.

CIC-13 is concurrently implementing three commercial software products, PeopleSoft, Passport, and AMS procurement, as an answer to some of the Year 2000 problems. Phasing of these projects is critical because of the immutable 2000 deadline. Implementation is being carefully watched to ensure that we are not caught with delays in the rollout of these new products.

CIC-15, the Advanced Database and Information Technology group, has 24 systems and applications that need to be upgraded or replaced due to the Year 2000. This number is lower than the actual workload of the group, because some applications supported by CIC-15 are reported as belonging to its customers, like Legal Counsel, although CIC-15 will repair the systems.

Chemical Science and Technology Division (CST) has 5-10 problematic applications that will need to be addressed before Year 2000. The main efforts will be to fix known Year 2000 issues with the VAX's in support of an AFTEC project scheduled to run for the next 5 years. These are a suite of custom applications, with no off-the-shelf solution available. The remainder of the applications pertain to data acquisition/process control equipment. This equipment will be replaced/retired. DX is in control of its desktop environment. It is in the process of training the computer support team to spot potential problems with a combination of training and Year 2000 tools.

Dynamic Experimentation Division (DX) has 18 NT-based servers with no Year 2000 problems anticipated. Of these 18 servers, 8 will be retired from service or consolidated with other servers. There is one UNIX-based Unigraphics CAD/CAM server that has no Year 2000 problems anticipated. There are three Mac servers. One will be retired, one replaced with an NT 4.0 system, and one will be left in service with no Year 2000 problems anticipated. There are 5 VAX's. Of these two are in service with no anticipated Year 2000 problems. Of the other 3 VAX's, two will be retired prior to Year 2000, and the other will be modified or retired as necessary. The cost to DX Division is minimal because it is in already upgrading and consolidating servers.

Earth and Environmental Sciences (EES) has identified a few problem systems; however, in most cases the fixes are trivial and the costs are covered under existing maintenance contracts. No significant or critical problems have been found.

Engineering Sciences and Applications Division (ESA) relies entirely on commercial software, and these vendors are making their software Year 2000 compliant. ESA uses maintenance agreements to keep its operating systems and application software licensing current, which allows it the right to upgrade at no additional cost. These fixes are reasonable and a part of the normal system management functions.

Environment, Safety, and Health Division (ESH) has 5-10 major applications (e.g., external badge dosimetry, internal dosimetry, air and water monitoring, injury-illness, occupational medicine) that may need attention for Year 2000 issues. Some of these applications reside on older servers and will require migration. Regardless of Year 2000 issues, a major information management effort has been ongoing in the division for more than a year, and a new enterprise server (Sun 3000) that is Year 2000 compliant, has been requested, approved, and is on order. Most enterprise data in the division is in the Oracle database system (Version 7 or higher) and should not present major transitional to Oracle Version 8 on the new enterprise server. However, funding and staffing limitations may delay the division's ability to resolve its known Year 2000 problems.

Human Resources (HR) retired all its 486 computers and most Pentium 90 machines. All HR desktop systems are running Windows 95 or Windows NT with Microsoft Office 95 or 97. Novell 486 servers will be retired before 2000. A few noncompliant Access 2.0 applications will be retired by the Year 2000, migrate to PeopleSoft, or convert to Access 97 or above. Three R:BASE applications will be migrated to Access 97, PeopleSoft, or the HR imaging system by 2000 regardless of Year 2000 compatibility. The HR commercial system, Resumix, is not yet Year 2000 compliant. However, as part of its computer maintenance plan, HR will upgrade to the next release, which is compliant. The HR commercial system, PeopleSoft, is Year 2000 compliant and is currently being implemented by CIC-13 in cooperation with HR subject matter experts. The HR client-server database system is Microsoft SQL Server 6.5; by the Year 2000, HR will have upgraded to SQL Server 7.0.. When there is official approval of BIOS testing software for PCs, HR will test its machines as required. HR will set its machines to display a four-digit year by default.

Johnson Controls of Northern New Mexico (JCNNM) JCNNM is an active participant on the Year 2000 Council. and has assigned one full-time employee to research and work on the Year 2000 problem. JCNNM is responsible for the operation of the electric, steam, water, wastewater treatment, and natural gas plants/controls. JCNNM is upgrading its financial systems to be Year 2000 compliant. JCNNM has several older PCs, VAX's, and Westinghouse computers that will have to be replaced and/or upgraded. In researching the embedded date problem, JCNNM suspects that the following equipment is not Year 2000 compliant: some building control systems; radios; scales; fluke meters; cranes; HVAC systems; thermostats; time of day metering; controllers; and machines in machine shop. JCNNM has several one-of-a-kind pieces of equipment that will have to be researched further. JCNNM considers these systems to be mission critical.

Legal Counsel (LC) uses three systems to support its operations. Two systems will not accept '00' as a valid date. Another system uses the date as part of the document identifier so that the document sequence is correct on retrieval. The document identifier will need to be modified for all existing and new documents. LC is studying a way to bring these three systems into more parallel tracks in order to simplify the systems and end-user training. The Year 2000 impact will influence the study and the recommended actions.

Life Sciences (LS) has relatively few computers with Year 2000 issues, and of those, most are issues with commercial software. Those problems will be resolved by the normally occurring effort of the computer support staff to keep current software in use. Those computers with hardware issues are in the process of being replaced. The presence and state of embedded controller chips in the various other scientific instruments in the division are mostly unknown at this time. The vendors of these instruments are being contacted to collect this information. All of these instruments are in the lowest importance category. The LS Division Facility Manager has been in contact with FSS Division to begin to assess the presence and state of embedded controller chips in the facility systems.

Los Alamos Neutron Science Center (LANSCE) has been no problem getting people to provide information. Those with critical, noncompliant systems have been quick to realize the extent of the problem and have started working on fixes.

Nonproliferation and International Security (NIS) as a whole has a good grasp of the Year 2000 problem. Most applications and workstations are already Year 2000 compliant. Some machines used mostly for research affect only a small number of individuals are not being fully assessed. These will be repaired if and when they fail. This is consistent with the risk-based approach to the problem. In some cases, NIS is dependent on vendors for upcoming commercial software releases that solve the Year 2000 problem. These changes will be implemented as they are

available. There are some applications that are dealing with minor date formatting issues, but these will be addressed in the near future. Some NIS equipment is old simply due to the nature of the work being done. In most cases the equipment will still operate beyond Year 2000. Home-grown code is the biggest concern. In most cases the code can be fixed. Other cases are still being assessed in more detail.

Physics (P) Division has just appointed a Year 2000 Council representative who has started the assessment process and is entering the information into the Year 2000 database.

Public Affairs Division (PAO), which uses Macs almost exclusively, is in good shape for Year 2000. The only two issues are (1) upgrading any older versions of software that may still be in use throughout the division that may not be Year 2000 compliant, and (2) upgrading one PC-compatible database server running Windows NT in Conference and Visitors Management (PA-4). The costs to implement Year 2000 compliance should be negligible and will be part of routine systems maintenance.

Security Division (S) is not anticipating problems in making its systems Year 2000 compliant. The major application, BRASS, is a DOE mission-essential system and will be completed early. Other S division systems are local and do not rely heavily on dates.

Technology & Safety Assessment Division (TSA) systems are, or will be, Year 2000 compliant. The few remaining older systems are being retired, and normal software maintenance and patches should fix any known problems. TSA will continue to review new Year 2000 problems as they are found and see if they apply to any of its systems.

3.3 Laboratory Assessment Summary

Experts in the computing field say that with the Year 2000, an organization "must do good *and* look good." The potential legal liability is large. If we were to have a catastrophic incident where the Year 2000 is involved, the Laboratory must prove due diligence in assessment and intent to repair problems before the fact.

An incident could risk our UC contract, but many managers still do not have a sense of the extent of the problem or their potential liability. The Council members are educating their division manager and staff about the issue as it pertains to their organization.

Facilities and Embedded Systems. Repeated attempts to get the Facility managers or FE Division involved with the Year 2000 has fallen on deaf ears. Only a few individual facility managers are aware of the issues. The Year 2000 project leader contacted FSS facility management three times in the fall of 1997 and got no response. Attempts to get a facility expert on the Council have not been successful. Now, FSS is reorganizing and that is distracting managers; by comparison Year 2000 is a nonissue. Embedded systems run invisibly to most of us, and we rely on other organizations to assure embedded system performance. It is a bit frightening when this area is not receiving attention.

Although two facility managers are actively assessing their areas, the Laboratory's overall status for embedded systems is unknown.

4.0 Year 2000 Progress at other DOE sites

The Energy Facility Contractors Group (EFCOG) Information Management subteam, which has representatives from each DOE site, met in Amarillo March 11-12 to present and share Year 2000 assessments, project management approaches, and issues. Every site has known problems. For example, embedded systems problems are the critical issue for Savannah River. Los Alamos readiness falls about in the middle of DOE sites.

1. Allied Signal in Kansas City seems to be a leader. Its Year 2000 program started in 1996, and it is well on its way to fixing the problems. It has data exchange agreements in place with all suppliers and customers. Its primary areas of concern are 237 automated test systems. The Flexible Manufacturing Dept. upgrade will cost \$15 M. It identified 18 mission-essential systems and is relying heavily on retired associates returning as contractors to complete the work.
2. Argonne National Laboratory did not identify any mission-essential systems to DOE because it was not in its contract. It is approaching Year 2000 from a computer security perspective, because if some of the computers don't work, the security can be compromised. Most of its computers are UNIX-based and follow accepted date-handling techniques, so the Year 2000 issue is not as critical for that Laboratory.
3. Livermore reported five DOE mission-essential systems and has a site coordinator who oversees the Year 2000 task force. Livermore sees the next steps as assessment, planning, implementation, testing, and deployment. Livermore created an off-line Oracle test environment for testing business systems and any other system that uses the Oracle database.
4. Lockheed Martin Idaho Technologies Company operates the Idaho National Engineering and Environmental Laboratory (INEEL). Lockheed Martin identified 13 noncompliant mainframe applications with more than two million lines of code. It hired a consulting firm to perform the assessment on the 13 systems and the repair of one of those systems. Its target completion mainframe date is April 1, 1998. Its in-house developed, nonmainframe applications numbered 22, with about 320,000 lines of code. Expected completion is September 1998. Its Desktop Refresh Program is replacing the noncompliant hardware and software. This company has concerns about its process and utility systems, so a dedicated project manager has been appointed and facility management meetings are being held to gather detailed inventories of process and facility equipment.
5. Oak Ridge is in the midst of reorganization. The facility is being split into Lockheed Martin Energy System (LMES) and Lockheed Martin Energy Research (LMER). LMES is currently completing the assessment of its systems and working on repair and implementation phases of some systems. LMES internally developed a Year 2000 PC testing tool that tests the machine and logs the results. This helps track the PCs that were and were not tested. More than 20,000 PCs have been tested to date. LMES identified 13 DOE mission-essential systems. LMES, like Sandia, has extensive reporting requirements from its corporate offices as well as DOE. LMER has a Year 2000 project manager with division contacts, like our Year 2000 Council. LMER centrally managed systems, like Payroll and Accounting, are the responsibility of LMES. Of the remaining research codes, only one significant problem was found. LMER expects to be fully compliant by the end of 1998. This follows the common IT industry practice calling for an organization to be ready by the end of 1998.
6. Pacific Northwest National Laboratory (PNNL) also began this analysis early, in 1996. It has identified its high-risk systems and developed remediation plans and costs. The program is active and on track.
7. Pantex has an active Year 2000 program that started as a project in 1996 and became a program in 1997. It is on track with most of its computer systems and is studying the embedded processors. It is using walkarounds to identify and test all embedded processors in the plant. Pantex found that its Automated Energy Monitoring System that controls all facility heating and cooling is not Year 2000 compliant. A replacement was planned in the near future, so it is

evaluating if the date can be set back to 1972 as a temporary measure. (Dates in 1972 correspond to Year 2000 dates; both are leap years). A number of biomedical devices are not Year 2000 compliant and will require upgrades.

8. Richland is challenged by dealing with nine different organizations in its effort to coordinate a Year 2000 program. It has completed an inventory, drafted a Year 2000 handbook, and prepared cost estimates for its systems.

9. Sandia is a privately held corporation, and its Year 2000 project has been active since 1997. Sandia reports on 26 DOE mission-essential systems and two DoD mission-essential systems. Sandia performed an inventory and risk ranking of its systems. It has identified all data exchanges and their contacts to share information about file format changes or assumptions. Like the Laboratory, Sandia is also using a web-based database to track Year 2000 status.

10. Savannah River Site (SRS), like Oak Ridge, was still under an IT spending freeze for its poor Year 2000 planning at the time of this meeting. It has 495 mission-essential systems rolled up into 37 DOE HQ systems. This rollup has caused them problems because none of the systems are reported as complete until all the subsystems are complete. Five of the 37 systems are "at risk," meaning they are not meeting the OMB milestones. Its worst-case implementation date is October 31, 1999. Many of its problems lie in embedded processors on assembly lines. Its plan is to roll the clock back to 1972 so that the day of week and leap year are still correct. Operators will need training to ignore the processors' dates.

5.0 History of the Year 2000 Project at Los Alamos

In September 1997, the CIC Division Office at Los Alamos National Laboratory began a Laboratory-wide Year 2000 awareness campaign that evolved into a project. The Year 2000 effort includes the following initiatives:

- Raising awareness

The Year 2000 project leader began the awareness campaign with a series of presentations. The first presentations were an introduction to the two fundamental issues: (1) the potential for misinterpretation of the century if years are represented with two digits, and (2) the Year 2000 as a leap year.

More specific, focused presentations for software developers, computing division managers, and programmers were developed and presented later.

- Inauguration of a Laboratory Year 2000 web site

The site links to Year 2000 status of software and hardware products, government sites, and other computer industry information. Presentations and Year 2000 Council news and documents are located there, as well as testing strategies and a "tip of the week." The site can be found from the Laboratory home page under "information by subject/Year 2000."

- Attending conferences and other connections with what business and industry are doing
- Gathering information for reports on the Lab's DOE mission-essential systems.
- Working with CIC15 to develop a Year 2000 assessment database for all Laboratory systems.

6.0 Conclusion

The Year 2000 issue is expensive. Funding must be found within the institution or the programs. Although cost data are still being gathered, it is now known that the Laboratory will be required to spend at least \$5.9 million on Year 2000 issues, including \$500,000 to upgrade its phone switch and more than \$1 million just in software upgrades for CIC-13.

Year 2000 problems for facilities and other embedded systems are still unknown and are getting little attention. Although two facility managers are actively assessing their areas, the Laboratory's overall status and potential costs for ensuring the Year 2000 readiness of embedded systems is unknown.

The Laboratory cannot afford to put itself at risk of system failures. The potential legal liabilities are great, so we must be able to prove due diligence to protect the Laboratory in worst-case scenarios. The Year 2000 requires documentation that we have inventoried our systems, assessed the impact, fixed the problem, tested, and implemented upgrades or replacements for all mission-essential and Laboratory-critical computer systems.

In some cases, the Year 2000 forces us to upgrade and often purchase the latest version to be Year 2000 compliant. In other cases, application code must be analyzed and repaired. Data exchanges require analysis, agreement, and in some cases, implementation of new file formats.

OMB ranks DOE as one of the worst five government agencies for action on Year 2000 issues. DOE is responding by increasing its scope from only mission-essential systems to all systems and issuing frequent calls for additional information. DOE conducted a site visit of the AL sites and found the Laboratory weak in planning. DOE AL has announced that it will visit each site to follow up on the report findings. We should expect this oversight to increase over the next year.

The Year 2000 requires that we change some of our long-term plans. CIC-13 would like to expend its limited resources by migrating from VAX hardware. There is just not enough time to do that. Instead, it must upgrade those applications for the Year 2000, which delays the migration by almost 2 years. Likewise, CARLA may not be able to wait for the new Xerox technology for the Classified CARLA system, due to DOE immutable milestones. The Year 2000 offers no other options.

We will have some Year 2000 failures. We are using a risk-based approach to solving the problem by assuring ourselves that our critical systems will continue to operate. Critical systems support both programmatic and operational functions. Our risk-based approach will focus efforts where we need them. In the meantime, we need to assure DOE and ourselves that those failures will be minor and not affect the Laboratory's overall mission, or health, safety, or the environment.

Year 2000 Glossary

Mission essential	<p>Major systems at the Laboratory whose failure would come to the attention of the Secretary of Energy or Departmental senior programmatic official because a mission of the Department is not being accomplished. The four mission-essential systems have been identified at the Laboratory: BRASS, MASS, CARLA, and Secure ICN.</p> <p>DOE audited; and reporting to DOE required</p>
Laboratory critical	<p>A broad category of systems required to keep Laboratory research and internal business running as usual during the series of date transitions that mark the Year 2000. The designation of "critical" stems from the potential risk to the ability to perform the Lab mission, health and safety, security, environment, or programmatic loss of or damage to property.</p> <p>Reporting to DOE required</p>
Year 2000 Council	<p>A group of Laboratory computer professionals appointed from each of 30 divisions at the Laboratory and Johnson Controls of Northern New Mexico (JCNNM) who manage and report on Year 2000 issues in their divisions. The Council was formed by CIC Division Director and is led by the Information Architecture Project Leader. Many of the members are not managers.</p>
Data exchanges	<p>Electronic information routinely sent between the Laboratory and outside organizations. For the purpose of reporting, this does not include data exchanged within the DOE. DOE requires that data exchanges be reported and recommends that there be a written agreement between the sharing parties on the date format used, to avoid potential misinterpretations.</p>

Appendix A

Year 2000 Council charter

Year 2000 Council roster

Memo of support from Laboratory Director John Browne

Appendix B

Summary results of DOE HQ audit of March 16, 1998

Current assessment database, sorted by system name