

UTILITIES AND THE NATIONAL POWER GRID

HEARING BEFORE THE SPECIAL COMMITTEE ON THE YEAR 2000 TECHNOLOGY PROBLEM UNITED STATES SENATE ONE HUNDRED FIFTH CONGRESS

SECOND SESSION

ON

THE READINESS OF THE UTILITY INDUSTRY, INCLUDING ELECTRIC
AND GAS UTILITIES, TO DEAL WITH THE YEAR 2000 TECHNOLOGY
PROBLEM

JUNE 12, 1998

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SPECIAL COMMITTEE ON THE
YEAR 2000 TECHNOLOGY PROBLEM

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UTILITIES AND THE NATIONAL POWER GRID

FRIDAY, JUNE 12, 1998

U.S. SENATE,
SPECIAL COMMITTEE ON THE YEAR 2000
TECHNOLOGY PROBLEM,
Washington, DC.

The committee met, pursuant to notice, at 9:38 a.m., in room SD-192, Dirksen Senate Office Building, Hon. Robert F. Bennett (chairman of the committee), presiding.

Present: Senators Bennett, Kyl, Smith, and Dodd.

OPENING STATEMENT OF HON. ROBERT F. BENNETT, A U.S. SENATOR FROM UTAH, CHAIRMAN, SPECIAL COMMITTEE ON THE YEAR 2000 TECHNOLOGY PROBLEM

Chairman BENNETT. The committee will come to order.

Good morning. Welcome to the inaugural meeting of the Special Committee on the Year 2000 Technology Problem. This special committee was formed pursuant to S. Res. 208, introduced by both the majority and minority leaders of the Senate on April 2, 1998, and which unanimously passed the Senate. This bipartisan support is indicative of the fact that we in the Senate recognize the serious nature of the Year 2000 problem and the potentially dire consequences to every citizen, not only in this country but throughout the world.

We have become a highly automated society. Technology has made our lives easier on the one hand, but highly dependent on automation on the other. If we do not aggressively address the Year 2000 problem, the consequences could be devastating.

Undetected bugs in embedded systems could be in everything from microwaves to cars, to power generation facilities. The jurisdiction of this special committee extends beyond the public sector into the private sector.

As a result, this committee will hold hearings on important business sectors of our economy, beginning today with the utility industry, specifically gas and electric utilities this morning. At subsequent hearings we will look into the Year 2000 preparedness of health services, telecommunications, financial services, transportation, general government services, and general business. We will also look into the legal liability of firms that have become the subject of court suits due to Year 2000 technology problems.

I have some disturbing news to report this morning. In order to prepare for today's hearing, I directed the committee staff to conduct a formal survey. It was of modest proportions, including only

10 of the Nation's largest electric, oil, and gas utility firms. I wanted to know the status of their Y2K preparedness.

Now, the survey, admittedly, is not statistically representative of the entire industry, but it does include geographically dispersed firms engaged in all aspects of power generation and gas and electricity transmission and distribution.

Together, the companies surveyed serve a population of over 50 million people in more than 3,000 municipalities, including 20 major airports and 3,000 hospitals.

I had anticipated that I would be able to provide a positive report on the Y2K status of these public utilities, which is why we did it. One of the functions of this committee is going to be to allay false rumors and concerns as well as expose genuine concerns and raise significant issues. However, based on the results of the survey, I cannot be optimistic, and I am genuinely concerned about the prospects of power shortages as a consequence of the millennial date change.

I will share a few of the survey's findings.

Only 20 percent of the firms surveyed—since there were 10 firms, you can figure out how many that is—had completed an assessment of their automated systems. One firm did not even know how many lines of computer code it had to check. Experts have testified before the Banking Subcommittee on Technology—where Senator Dodd and I first became involved in this issue—that any major firm that has not already completed its assessment cannot hope to be Y2K compliant by January 1, 2000. If that holds true with the utilities, we have 8 out of the 10 that are in serious trouble.

None of the utilities surveyed was assured after making their inquiries that their suppliers, vendors, and servicers would be Y2K compliant. Utilities are highly dependent on services, suppliers, and other upstream activities to transmit and distribute gas and electricity. In fact, many power distribution companies are ultimately dependent on foreign oil imports.

None of the firms surveyed had completed contingency plans for Y2K-related eventualities. Even though all of these firms are required by their regulators to maintain emergency response plans, none had completed a Y2K contingency plan. My concern is that they probably don't know what contingencies to prepare for.

The last question on the survey asked for recommendations, and one respondent, after making several, made the following profound statement: "Whatever actions are taken by Congress, they must be done quickly, during this session, or they will have no impact on the Y2K problem."

I am personally concerned that the Y2K problem is not receiving sufficient attention at this point in time except for the absolute alarmists who are telling everybody it is too late and they must dig up their backyards, bury a propane tank, and prepare to become hunter-gatherers for the next 5 years. That kind of attention is not going to get us where we need to be to get the problem solved.

I am concerned that when it does become a matter of general public concern it will be too late to bring pressure to bear on the timely correction of the many Y2K problems that exist. My greatest fear is that when it does become a matter of general public con-

cern, it will bring with it a measure of panic that will be detrimental to effective and efficient remediation of the problems that present themselves. That is why we are holding this series of hearings, not only to raise the level of awareness but at the same time focus on solutions so that the panic can be alleviated.

Now, for the private sector, I define the Y2K problem in much broader terms than what I see generally discussed and reported in the trade press, where most of the Y2K stories are showing up. The problem is more than a computer's ability to function on January 1, 2000. It includes not only computers, it includes embedded systems, such as process control units.

I have here a circuit board taken out of a PC, but it could be taken out of any one of the process control systems that abound in our society. It is a fairly standard circuit board. It has in it one, two, three, four, five, six, seven, eight, nine obvious chips—chips that were once circuit boards themselves, but in the magic of modern technology were shrunk down into tiny chips that could then be placed in this circuit board.

Every one of those embedded chips is at risk of having a Y2K problem. The estimates that we have of the number of embedded chips that will fail because of Y2K go from a low of 2 percent to a high of 5 percent. We can relax, some people say; that is a very small number. When you think of the billions of chips that are in circuit boards like this one and say even if 2 percent of them fail, the impact could be significant. That is a problem that has not received the amount of attention that it should in the press so far.

I read a story recently about a major oil company that tested one of its oil refineries. They found that the refinery had 90 separate systems that used a microprocessor. Many of these were key systems. Now, of the 90 systems, they were able to come up with detailed documentation on 70. Of these 70, they determined that 12 had date-dependent embedded chips, and of the 12, 4 failed a Y2K test and will have to be replaced. And had any of the 4 been in place on January 1, 2000, they would either have completely shut down the plant or have caused a high-level safety hazard which would have caused the other safety systems to shut it down.

Now, what is really worrying the company's experts is the other 20 systems. They don't know what functions the chips in those systems have. They are leaning towards replacing them all. This happens to be a relatively modern plant.

On June 8, U.S. News & World Report ran a story concerning a Midwestern electric generation facility that was taken off-line to test for Y2K compliance. When the test clock was rolled forward to January 1, 2000, a safety system mistakenly detected dangerous operating conditions and shut the generator down. After 3 days, they reran the test, only to have a different sector fail, shutting down the generators again.

USA Today ran an excellent article yesterday describing the impact of the Year 2000 problem on other parts of the economy. I could go on through the whole morning with these kinds of examples, but I assure my colleagues I won't.

Now, another area of the Y2K problem is interfaces. Interfaces sometimes exist between systems within a company, and sometimes exist between a servicer, supplier, vendor, and customer. It

is important that Y2K remediation corrections among these parties be compatible. It was possible that every computer or chip in the chain be itself Y2K compliant and still have the system fail because they can't talk to each other properly.

Infrastructure plays an important supporting role for almost any business. Utilities, as I have indicated, are dependent on transportation, telecommunications, water and sewer facilities, all of which are critical to their continuing operations, all of which are open to Y2K problems.

Government services are frequently taken for granted, but they also have challenges, and Senator Dodd pointed out there is a story in this morning's paper that raises concerns about the Defense Department, where apparently some systems are being certified as Y2K compliant when, in fact, according to the inspector general, they are not.

[The prepared statement of Chairman Bennett and the article on the Defense Department can be found in the appendix.]

Chairman BENNETT. Well, as I say, I could go on all morning. I have probably reached the level of endurance on this issue as far as my opening statement is concerned, so I will now turn to our vice chairman, Senator Dodd, who has been a stalwart in addressing this problem right from the first time we uncovered it in the Banking Committee, and we are delighted, Senator Dodd, to have you as the vice chair and ranking member on this committee.

OPENING STATEMENT OF HON. CHRISTOPHER J. DODD, A U.S. SENATOR FROM CONNECTICUT, VICE CHAIRMAN, SPECIAL COMMITTEE ON THE YEAR 2000 TECHNOLOGY PROBLEM

Vice Chairman DODD. Well, thank you very, very much, Mr. Chairman, and I am delighted as well to be joining with you in this effort and others of our colleagues, Senator Smith, who is here this morning, and the other members of the committee. I want to thank the leadership of the Senate, Senator Lott and Senator Daschle, for their support for the establishment of—Senator Kyl, Jon, I didn't see you there. I apologize. Senator Jon Kyl as well is with us. I thank the leadership for their support in establishing this special committee. This to many people, I suppose, at the outset seems like an arcane subject matter. In fact, it has been the subject of some humor, I suppose, along the way. Just the title of it, the Y2K issue, and the assumption that Bill Gates or someone else in Silicon Valley would come up with a chip at some point here that would just solve this problem and it would go away immediately and we could all sit back and relax.

But I think as people now pay more and more attention to it, you see stories like the one in the Washington Post this morning identifying a very serious problem at the Defense Department, and more and more articles begin to emerge. With something a little more than 500 days remaining before January 1, 2000, more and more people are getting a larger sense of the magnitude of this problem not only here at home but globally, given the inter-reaction, the seamless web in a sense that ties our economies together, our telecommunications, our transportation systems. So this is a tremendously serious subject matter, and we are very fortunate indeed that Senator Bennett of Utah has taken this issue on and was cer-

tainly in a lonely position 1 or 2 years ago in getting the Banking Committee to establish a separate subcommittee and technology, but really to focus on this question. So I am deeply grateful to him, as I think all of our colleagues are, and the Nation will be ultimately when we plow through these issues over the coming months.

This is our inaugural hearing, and it is appropriately so we are looking at utilities, and this is a very important issue for the very simple reason that if we don't get this right, nothing else works. If you don't have the power to generate electricity, then every other issue we could talk about becomes sort of moot.

I was back in Connecticut last weekend and noticed a fair amount of advertising in my State, as I am sure is true around the country, by various tourism groups asking the question: Where do you want to be on New Year's Eve or New Year's Day the Year 2000? What are your plans?

While I don't know where anyone else plans to be, let me suggest three places you wouldn't want to be, in my view, based on where we are today: you wouldn't want to be in airplane, you wouldn't want to be in an elevator, and you wouldn't want to be in a hospital, in my view. Barring some tremendous changes and some accelerated dealing with these issues, those three places pose some difficulties.

The fact is that with less than 18 months to go, I am very concerned, as the chairman is and others are, that we are going to face serious economic dislocations from this problem.

I am very, very concerned that even as Government and business leaders are finally acknowledging the seriousness of this problem, they are not thinking about the contingency plans that they ought to be thinking about today—not waiting a year from now, but thinking about them now—that need to be put into place to minimize the harm from widespread failures.

Senator Bennett is fond of likening this committee to Paul Revere. It is a good analogy. He says that we have to sound the alarm that the millennium is coming. Well, today's hearing should answer the question about whether there is going to be any lights shining out of the Old North Church.

Some people have asked why we are starting our hearings with the power industry. As I said a moment ago, it is rather simple: Without electricity, nothing else works. And the power industry provides a good model for thinking about the Year 2000 in a lateral rather than a vertical manner. By that I mean that a corporate executive or Government official can't simply look at the four corners of their business or agency and ignore the outside world.

Say, for example, you took all the necessary steps to make your home Year 2000 compliant: You updated your PC and software, you replaced your answering machine, you determined that the VCR and the microwave would still work, and you put a brass knocker on your door as a contingency, just in case your new modern doorbell didn't work.

Even though you were vertically complete, you still have to worry about the electricity, your water, the mail, cable and phone service, and on and on. That analogy illustrates, I hope, the way business and Government must also think about the Year 2000 problem.

Since all the utilities are tied together in the power grid and are dependent upon a whole series of steps in order to function, it is an excellent illustration of how you cannot simply focus on one's own company or agency, no matter how big or little, and declare it to be Year 2000 compliant.

Senator Bennett mentioned that the special committee conducted a survey of major energy producers, and it revealed that we are not in very good shape.

Quite honestly, I think we are no longer at the point of asking whether or not there will be any power disruptions, but we are now forced to ask how severe the disruptions are going to be.

Given the brevity of time left before the millennium conversion, contingency planning has got to start today—not just for the worst-case disaster scenarios but for all the medium-sized disruptions that are more likely to occur.

One thing that I have noticed is that every company, Government agency, or trade association that I have met with over the past number of weeks has a very nice, neat chart showing the timeline for completion of their Year 2000 project. My deep concern is that those nice, neat little charts will be blown to smithereens the moment they start testing their repairs.

I have been constantly surprised by senior Year 2000 officials who say with one breath that testing will take just as long as fixing the code, and say with the next breath that they need only a few months for complete system testing after fixing the system took years.

Now, while it took me a while to figure out the difference, unlike the chairman of this committee, between an embedded chip and a wood chip, I certainly can do enough math to determine that there isn't a single company or Government agency that is leaving itself any margin of error in these neat little charts they are so fond of showing.

It has been said before, but I think it bears repeating: Failure is simply not an option. If the critical industries and Government agencies don't start to pick up the pace of dealing with this problem right now, Congress and the Clinton administration are to have to make some very, very tough decisions to deal with a true national emergency.

Mr. Chairman, I thank you.

[The prepared statement of Vice Chairman Dodd can be found in the appendix.]

Chairman BENNETT. Thank you very much, Senator Dodd.

Senator KYL, we appreciate your joining us. We realize for all the Senators this is an additional burden to their regular committee assignments, and we are glad to have the committee that we do have.

**OPENING STATEMENT OF HON. JON KYL, A U.S. SENATOR
FROM ARIZONA**

Senator KYL. Thank you, Mr. Chairman. A burden we happily assume, and I, too, want to commend you for your leadership in this vital issue. There has been a fair amount of activity in the Congress on the Y2K-related matters up to now, but really it hadn't received the prominence that it deserves until you brought

this committee into being. And I want to thank you for recognizing the need for the committee, for taking the time to chair it, and for your personal commitment to the welfare and security of our Nation.

In my Judiciary Subcommittee on Technology, Terrorism, and Government Information, we have been examining threats to the Nation's critical infrastructure, from terrorists and hackers and foreign states employing new techniques of information warfare. Clearly, at both the national and local level, we will need serious and well-founded contingency planning for Y2K-related disruptions to assure at a minimum the provision of essential Government emergency services.

When on March 6, I asked John Koskinen, Chairman of the Y2K Council, what the Government was doing in the area of contingency planning, he wrote back that "FEMA will take the lead in assuring that the Federal Government is doing all that is necessary to be ready should serious disruptions occur."

But I had also written to James Lee Witt, the Director of FEMA, the Federal Emergency Management Agency, to inquire about their assessments of possible disruptions in the electric power grid and their associated contingency plans. The FEMA Assistant Director wrote back in May, saying: "FEMA has performed no assessments of the Y2K computer problem on the telecommunications and electric power infrastructures. FEMA has no contingency plans specifically designed to address network interoperability or embedded chip failures in either the telecommunications or electric power industries."

Mr. Chairman, if the agency charged with the contingency planning still has no contingency plans, then I submit either the administration does not expect to have any emergency preparedness needs that are Y2K specific or the Federal Government has been delinquent in fulfilling its responsibility to our citizens and needs to correct that deficiency immediately. So the hearing you have called today is especially timely.

I would also mentioned that at my urging the Federal Communications Commission will be tasking the Network Reliability and Interoperability Council to perform an assessment of the Y2K readiness of telecommunications infrastructure. I hope that the results of their study will be available to this committee at our upcoming hearing on telecommunications.

One last point. As the work of this committee progresses, we should focus not only on problems but, as you have so often reminded us, on opportunities. For example, some computer-dependent industries and public utilities are getting the opportunity to make much needed upgrades, which, if done properly, may make them more resilient to other kinds of disruptions in the future. Y2K is also prompting both private and Government organizations to review their contingency plans and improve their readiness against information system failures, whether from internal glitches or deliberate attack. And as we enter the next century, we will continue to build on this vast technological landscape.

The Y2K problem is the first collective technological challenge to our Nation. Like it or not, Y2K provides a nationwide test bed for dealing with what the effects of a deliberate attack on the infra-

structure might look like. We can benefit from this opportunity to enhance Government/industry cooperation and endeavor to learn about its implications for the reliability of our critical infrastructures. With well-reasoned measures and working together, our Nation can come through this challenge stronger, wiser, and better prepared.

[The prepared statement of Senator Kyl can be found in the appendix.]

Chairman BENNETT. Thank you, Senator Kyl.

Senator Smith, we welcome you also and look forward to your opening statement.

**OPENING STATEMENT OF HON. GORDON SMITH, A U.S.
SENATOR FROM OREGON**

Senator SMITH. Thank you, Senator Bennett. In the interest of time, I would just ask that my statement be included in the record, and I will make a few brief comments, first to thank you and Senator Dodd for your leadership of this committee. I agree with the description of you as our Paul Revere on a very important issue, and I am honored to be on this committee because my State of Oregon, Senator Dodd, produces lots of computer chips and wood chips. [Laughter.]

So in the interest of both of those important industries, I am delighted to be here.

I am particularly interested in the comments our distinguished panel might have on issues of rural electrification as the computer grid might affect people in rural communities. I am anxious that they are not left out of this equation.

And I will end on one final metaphor. I think it is attributed to you, Senator Bennett: Even if we fix our problems as a country on the Y2K issue, we may find ourselves having constructed a modern Tower of Babel when our Nation may not be able to communicate very well with other nations who may not be addressing this issue. But let's hope they do, and let's get started for our country.

Thank you.

[The prepared statement of Senator Smith can be found in the appendix.]

Chairman BENNETT. We will include in the record the statement of Senator Moynihan.

[The prepared statement of Senator Moynihan can be found in the appendix.]

Chairman BENNETT. Thank you very much. I accept the Paul Revere tag, but I must hasten to add the second half. I tell people this committee must be Paul Revere, but we cannot be Chicken Little. We can't give too much aid and comfort to those who say the sky is falling and the problem cannot be solved. The reason for the committee is to raise the awareness to the point that we do get the problem solved.

Now, I would like to start today with a demonstration of how the electric power industry works. We have a computer model that can track power generation, transmission, distribution, and demand. And I think it is instructive for us to see the interdependency of the power supply system and what happens when certain facilities are taken off line.

I have asked representatives from Wisconsin's utility industry who are familiar with the PowerWorld model to provide us with this demonstration based on a real power system. I say in advance these people are not Y2K experts. We asked them in the preview last night, well, what happens when Y2K came along? And they said, no, no, no, we can just show you what happens when a particular generating plant goes down. But this will help us get an understanding of what would happen in the event a facility did go down on January 1, 2000.

Following the demonstration, we will be pleased to welcome our witnesses. I apologize for having all of the witnesses sitting at the table simultaneously instead of bringing them up one at a time. Frankly, we are doing this to save space in the room because if we sit you at the table, that means another seat for the people that are backed up who want to be here. We didn't expect this big a turnout, and next time we will have a bigger room.

But we will welcome the Honorable Betsy Moler, Deputy Secretary of the Department of Energy; the Honorable James Hoecker, Chairman of the Federal Energy Regulatory Commission; the Honorable Shirley Jackson, Chairwoman of the Nuclear Regulatory Commission; and pending his arrival, the Honorable John Koskinen, who is Chairman of the President's Council on Year 2000 Conversion. Mr. Koskinen has told us in advance he had another assignment earlier, and we will just slip him in when he arrives.

So, with that, we turn to our friends from Wisconsin, and Cole Price and Lynn Hobbie will lead us through this demonstration.

DEMONSTRATION BY LYNN K. HOBBIE, VICE PREIDENT-MARKETING, MADISON GAS AND ELECTRIC CO., MADISON, WI, AND COLE PRICE, WISCONSIN PUBLIC POWER, INC.

Ms. HOBBIE. Thank you, Mr. Chairman.

Vice Chairman DODD. You have to bring that microphone up close to you now here.

Chairman BENNETT. These microphones, we will tell you, are 1950's technology. My father and Senator Dodd's father both spoke through these same microphones, for whatever that—

Ms. HOBBIE. Well, let me know if you can hear me when I speak. Does that work?

Vice Chairman DODD. Senator Thurmond calls them "speaking machines." [Laughter.]

Gives you some idea how old they are. They are Y2K compliant, though.

Senator KYL. No chips in those.

Vice Chairman DODD. No chips in those, I will tell you.

Ms. HOBBIE. Thank you all for the opportunity, for letting us use these speaking machines before you today. We appreciate the opportunity to be here.

Again, I am Lynn Hobbie from Madison Gas and Electric Company, an investor-owned utility in Wisconsin. With me is Cole Price, from Wisconsin Public Power, Inc., a company which supplies power to municipal utilities in Wisconsin. Thank you also for heeding our claims that we are not experts in the problems of Year

2000 compliance. Our expertise is in the electric utility industry and how the interrelated electrical systems function.

We are here today to show you a tool to begin your hearings that we believe will help you visualize and better understand how electric systems work. The tool is called PowerWorld. It is a computer simulation model. It was developed by a consortium of universities in Illinois.

You can see before you on the monitor a map of the major transmission lines in the United States. And as you can see, it is a very complex system. What you cannot see but need to know is that this system is highly integrated, which means that things that happen in one part of the system can and do impact other parts of the system.

Mr. PRICE. If we zoom in on the map of the New England region, we can see an illustration of how the system works.

Chairman BENNETT. This is done for Senator Dodd's benefit? Connecticut is there.

Mr. PRICE. An important feature of the electric system as compared to the natural gas system is that electricity cannot be stored. Electricity is a real-time industry. It must be generated at the time it is consumed. A generator somewhere in this region is running right now to light the power in this room. The area we are most familiar with is Wisconsin. If you continue to watch the monitor, it will come right up, hopefully.

So we are going to show you a model of a situation that Wisconsin faced last summer. That situation was an extreme case and is not typical, but it is useful to demonstrate that the system has physical limitations and that different parts of the system can be vulnerable in different situations and under different conditions.

The day model is a very hot day. Multiple generating plants were out of service in our region for various reasons.

Vice Chairman DODD. Pull that microphone close to you now, Mr. Price. I am having a hard time hearing you.

Mr. PRICE. And we had a limited ability to import power into Wisconsin from other States. Because of the location of the power plants that were out of operation, combined with the physical limitations of the transmission system, we had some low voltage problems in the region. Those are shown by the red colors around the power lines.

If during that time we had lost a large power plant in the southern part of the State, as I will now demonstrate—now, I just turned of a power plant that is on the map as shown in Michigan, but it is actually located down here in the southern part of the state. I draw it over in Michigan to have easy access to the units.

Our situation would have worsened in this model. You can see the deeper red colors representing that worsened situation.

If instead we had lost a smaller power plant in the northern part of the State, we could have experienced blackouts. And now I am taking off a unit that is located closer to the problem.

If you can't read that, it says, "The system can no longer supply the load. Blackout." This shows why location rather than size or fuel of the power plant is a key factor.

Now, this is just a model and does not reflect the automated safety features that electric systems have in place. In real life, in-

stead of a complete system collapse, protective measures would automatically kick in, and instead we would deal with this situation by having rolling brownouts.

Ms. HOBBIE. Again, this is a single example. PowerWorld as a tool can demonstrate many different electric system situations, and we have shown you only one. But in closing, let us leave you with these key points about our industry.

The electric system is, in fact, very complex. It is highly integrated. Events that happen in one location can impact other locations. It is a real-time industry, and it has physical limitations. And all of these characteristics need to be considered in understanding the challenges of Year 2000 compliance within this industry.

If you have any questions, we would be happy to take them; otherwise, thank you very much for your time.

Chairman BENNETT. Thank you very much. The deepening and spreading read area is enough to get our attention.

Secretary Moler, we appreciate your being here and welcome you.

Vice Chairman DODD. Could I just ask one question before you go? I am curious. You show Wisconsin and you show the Connecticut-New England area. Basically, you—are you localized to some extent there so that to the extent there is a power system that shuts down or fails in the New England area, that would really just affect that geographical area? Or is there a danger of that spreading across the country in any way creating, you know, less serious problems but nonetheless—when you say integrated, is it integrated nationally or regionally?

Mr. PRICE. It depends on the severity of the outage. For the most part, outages are contained and localized to as small a region as possible. But if you were to lose control of an outage, it could cascade through and to other regions. But that is usually unlikely.

Vice Chairman DODD. OK.

Chairman BENNETT. Secretary Moler.

**STATEMENT OF HON. ELIZABETH A. MOLER, DEPUTY
SECRETARY, U.S. DEPARTMENT OF ENERGY**

Ms. MOLER. Thank you, Mr. Chairman and members of the committee. It is an honor for me to appear before you today at the committee's inaugural hearing. You have asked me to focus on the readiness of the utility industry, including electric and gas utilities, to deal with the Year 2000 technology problem.

Before I turn to the specifics of my testimony, let me commend you, Mr. Chairman, as well as Senator Dodd, the committee's vice chairman, and the other members of this special committee, for your willingness to invest your time and energy on this important subject matter. Computer technology has become a pervasive part of our society and our Nation's well-being. Both technologists and leaders in all sectors of our society must work together to ensure that we are investing adequate energy and resources in addressing this important potential problem.

President Clinton and Vice President Gore have paid particular attention to the need to address the Year 2000 issue. They personally recruited the former OMB Deputy Director for Management, John Koskinen to chair the President's Council on Year 2000 Con-

version, and you will hear from him today. The President and the Vice President have spoken repeatedly on the need for both Government and the private sector to address this issue. Back in February, when the President's Year 2000 Conversion Council was being formed, the Vice President met personally with the members of the President's Management Council, on which I serve, to discuss the Year 2000 problem and made it very clear that we, as managers, must pay particular attention to this issue.

We have used the Year 2000 Conversion Council as a vehicle for the administration to identify the administration's key participants who will focus on various sectors of our economy and to divide up the work. The Department of Energy has agreed to take the lead on the electricity sector, so my testimony today will focus on that sector. The Federal Energy Regulatory Commission has agreed to take the lead on the oil and gas subgroup, so you will hear from FERC Chairman Jim Hoecker on that sector.

Electricity is, of course, one of those ubiquitous things that Americans take for granted. It is also the lifeblood of our modern economy. Simply put, our Nation depends upon a reliable supply of electricity. We cannot afford to have the Year 2000 technology issue disrupt our Nation's supply of electricity.

Our domestic electricity industry has a long and proud history of bringing reliable, affordable supplies of electricity to American consumers. The industry has its own reliability organization, the North American Electric Reliability Council, which was formed in the aftermath of the 1965 Northeast power outage. When I think about reliability issues, having spent some time as a Government employee worrying about this sector, I automatically think of NERC. It is the industry organization that has been responsible for electric reliability for the past 30 years. NERC is a privately chartered, industry-run organization. While the administration's Comprehensive Electricity Competition Plan calls upon Congress to strengthen the Government's authority and oversight of NERC, at present there is little in the way of either Federal or State regulatory authority to address reliability issues.

Consequently, when the Department of Energy agreed to take the lead in assessing the electricity sector's Year 2000 readiness, Secretary Peña and I, naturally, turned to NERC. On May 1, we wrote to Erle Nye, the current chairman of NERC. We asked NERC to undertake a comprehensive assessment of the industry's Year 2000 readiness. NERC agreed to our request and has taken on the key task of assessing the industry's state of readiness and coordinating the industry efforts, including contingency planning.

As the NERC testimony acknowledges, our request prompted NERC to coordinate otherwise dispersed industry studies about the implications of this issue. Senator Dodd's observations are right on the mark. The companies have been thinking individually, and in the case of NERC, they had been thinking regionally already. But there was no overall coordinated nationwide assessment of this issue.

We expect to receive an interim report in September and a complete assessment next July. I want to assure the members of the committee that we will monitor NERC's progress along the way.

Our staff is having weekly meetings at the present time with NERC.

Let me emphasize, however, that the Federal Government cannot solve this problem. It is up to the industry itself to do so. Every leader, every officer, and every manager in this industry must feel a sense of responsibility for addressing and solving this problem. That is the only way we will get it done. The Government's primary role is to promote industry efforts, without getting in the way or creating needless bureaucratic hurdles that distract attention rather than add value.

The American people have the right to expect the electricity sector to be prepared for a smooth Year 2000 transition. People can dream up doomsday scenarios of what might happen if the industry is not ready. We need the facts, not doomsday scenarios. Once we know what the facts are, we can go from there to solve any problems that emerge. Ultimately, the electricity industry itself bears the primary responsibility for addressing the challenge of assuring a smooth transition through the critical dates surrounding the Year 2000 issue, as well as the skills and knowledge needed to meet that challenge.

Government's role is to facilitate their efforts by promoting the sharing of Year 2000 information within the industry, its companies, suppliers, consultants, and State and local regulators. We can help disseminate what is known in other industries about similar products and problems, and we can maintain an awareness about factors external to the industry upon which energy depends. We can also help to keep Government speaking with a consistent, hopefully calm, voice and cooperate with other levels of Government to minimize requirements that do not add value.

This completes my prepared remarks, Mr. Chairman. I would ask that my complete testimony be included in the committee's hearing record, and I look forward to hearing from my colleagues and would be pleased to answer any questions at the appropriate time.

Thank you.

[The prepared statement of Ms. Moler can be found in the appendix.]

Chairman BENNETT. Thank you. Your full statement will appear in the record, and we are grateful to you for your appearance here today and your preparation.

Mr. Hoecker, I apologize for mispronouncing your name, and we look forward to your presentation and appreciate your being here today.

**STATEMENT OF HON. JAMES J. HOECKER, CHAIRMAN,
FEDERAL ENERGY REGULATORY COMMISSION**

Mr. HOECKER. Thank you very much, Mr. Chairman, and thank you for the opportunity to appear before this special committee to discuss Year 2000 readiness and the energy industry, and the oil and natural gas business in particular. Mr. Chairman and Senators, it is my view that your leadership will be immeasurably helpful in marshaling private resources to address this issue. I therefore applaud your efforts to raise awareness of the Year 2000 challenge.

Today I will focus briefly on the state of our understanding of what is being done with respect to the Year 2000 challenge for energy businesses and what this Commission is doing in coordination with the President's Council on Year 2000 Conversion to encourage industry to take steps to ensure that our Nation's critical energy services will not be subject to unplanned interruption or that any such interruptions will not be unduly disruptive.

Whether the Year 2000 challenge represents a crisis, as GAO has characterized it, or a technical matter that can be swiftly diagnosed and addressed, a failure to fully understand now the potential seriousness of the issue for energy companies may be the greatest problem we currently face. Cooperation and communication are therefore necessary in order to assess the nature and dimensions of the problem, to formulate development and testing of solutions, and set in place timely operational contingency plans that will avert any loss or prolonged loss of service, including electric transmission and sales and interstate gas and oil transportation.

Unfortunately, the extent of completed Year 2000 work within the energy industry is largely unknown. To date, most available information is anecdotal, with very little empirical data being available on completion of conversion and testing. Compilation of this information has been inadequate. Larger energy companies and some industry associations have promoted awareness of Year 2000 issues and in some cases have shared information about the readiness efforts. The state of awareness and planning of smaller companies, regulated or unregulated, is less certain, however.

The FERC is working cooperatively with other Federal agencies as a member of the President's Council on Year 2000 Conversion. Through participation in the Council's energy working group, the Commission has been designated leader for the oil and natural gas sector.

On June 5, 1998, the oil and gas sector of the energy working group held a meeting with representatives of trade associations and various research and standards boards who represent the oil and natural gas industries. The meeting participants agreed that Year 2000 Conversion readiness should focus on: First, safety; second, reliable delivery of energy products; and, third, accurate accounting and billing.

Separately, FERC is also developing an outreach program for the Commission's regulated entities and industry associations, in coordination with the energy working group.

Information about Year 2000 readiness may be difficult to obtain. Fear that the information may be commercially sensitive, that certain liability issues may arise, or even that collaboration on this problem may expose companies to antitrust actions is clearly inhibiting disclosure. Moreover, it appears that even when companies share operation of common delivery networks, information about Year 2000 work is not often being disseminated between or among these companies.

It nevertheless appears to me that gas and oil companies are willing to act in good faith to address this issue promptly. We hope to encourage companies to make more information available to the general public, including their assessment of how serious they think the problem is, what is being done to address it, and what

is expected to happen on January 1, 2000. If companies can be persuaded to submit information in protected form to third-party organizations like the Natural Gas Council, the Gas Industry Standards Board, or the American Petroleum Institute, industry participants will be able to develop a greater sense of confidence that they are not at risk for the inactions of others. The Commission can then make information on Year 2000 remediation available through the FERC Web site and the energy working group web site.

In the end, I clearly subscribe to the administration's views, as described by Deputy Secretary Moler, that energy industry participants have the responsibility for addressing this problem. There should be no competitors when it comes to this critical issue, critical to the public welfare.

We believe the Commission has an important role to play, however, and I view it as the Commission's responsibility to the American people to help alleviate this potential threat to the reliability of our energy systems.

I look forward to your questions, and thank you for asking me to be here today.

[The prepared statement of Mr. Hoecker can be found in the appendix.]

Chairman BENNETT. Thank you very much.

Ms. Jackson, we welcome you. We appreciate your being with us.

STATEMENT OF HON. SHIRLEY ANN JACKSON, CHAIRMAN, U.S. NUCLEAR REGULATORY COMMISSION

Ms. JACKSON. Thank you. Mr. Chairman, members of the special committee, I am pleased to be here to discuss with you the status of the U.S. Nuclear Regulatory Commission (NRC) response to the Year 2000 computer problem for nuclear power plants. I would like to begin by thanking you, Mr. Chairman, Mr. Vice Chairman, and members of this special committee, for taking on this critical task and for heightening Government, business, and public awareness of Year 2000 computer issues.

In general, NRC efforts on the Year 2000 problem can be divided into three basic areas: our efforts internal to the NRC; our interactions with our reactor licensees and the nuclear power industry; and our broader actions to address the issue of a reliable electrical grid.

The NRC is working to ensure that all of our agency mission-critical systems that relate to power reactor licensees, seven systems in total, will be Year 2000 compliant so that our communications and data interfaces will continue to function properly. The one NRC system linked directly to operating nuclear power plants is our Emergency Response Data System, or ERDS, which transmits near real-time data to NRC incident response personnel during declared emergencies. The NRC currently is upgrading ERDS to be Year 2000 compliant. The upgrade is on schedule for full implementation by March 4, 1999. Each of our other mission-critical systems also are on schedule to be Year 2000 compliant in accordance with OMB guidelines, with three systems currently being repaired and three being replaced.

The potential impact of the Year 2000 problem on nuclear power plants varies with the types of computer systems in use. Our li-

censees rely upon: First, software to schedule maintenance and surveillances; second, programmable logic controllers and other commercial off-the-shelf software and hardware; third, digital process control systems, such as pump or valve controllers; fourth, digital systems for collecting operating data; and, fifth, digital systems to monitor post-accident plant conditions.

Examples of systems and equipment most likely to be affected by Year 2000 problems include plant security computers, plant process systems, and radiation monitoring systems.

Since 1996, the NRC has been interacting with industry organizations to address the Year 2000 problem. This interaction has included issuing an NRC Information Notice in 1996, holding workshops and numerous meetings on the issue, and developing a standard review plan for NRC staff use in reviewing licensee Year 2000 readiness.

In addition, the Nuclear Energy Institute, NEI, has taken the lead in developing industry-wide guidance which the NRC subsequently reviewed and approved. This guidance presents nuclear power plant licensees with an acceptable approach for addressing the Year 2000 problem.

To obtain confirmation of licensee action on the Year 2000 problem, the NRC has issued a generic letter, which has regulatory force, requiring a written response from each licensee. A copy of that generic letter is being provided for the record. The initial response from each licensee is due in August. This response must provide written confirmation that the licensee is implementing a Year 2000 program, which includes scoping, prioritization, assessment, remediation, testing, and contingency planning. Licensees who elect to use a different Y2K program than that described in the NEI guidance are required to present a description of their programs to ensure that their computer systems will be ready for the Year 2000. In addition, each licensee must submit confirmation in writing by July 1, 1999, that its facility is or will be Year 2000 ready by the Year 2000.

In addition to these written responses, the NRC will conduct special sample inspections at 12 nuclear power plant sites to verify that effective actions are being taken. These inspections will begin in September of this year and continue into early 1999. They will be conducted by instrumentation and control system specialists from our Office of Nuclear Reactor Regulation, who will receive specific training on the Y2K problem. The inspections will be conducted in accordance with guidance in a temporary instruction which currently is in draft form and will be issued in August. The inspection guidance is based on the program described in the NEI guidance document.

Inspectors will, in fact, verify scoping, prioritization, assessment, including testing for Y2K problem susceptibility, remediation and modification testing. The inspectors will also review licensee-identified contingency plans. The site selected for inspection will be determined based upon licensees' initial responses to the generic letter, the safety significance of known issues, the type of reactor, plant location in order to cover all NRC regions, as well as input from observation by our site resident inspectors.

The NRC recognizes, however, that despite every reasonable effort by licensees to identify and correct Year 2000 computer system problems at their facilities, some software applications, embedded systems, equipment, may remain susceptible to the problem. Therefore, as I noted earlier, to ensure continued safe operation of a facility into the Year 2000 and beyond, we expect licensees to formulate contingency plans for affected systems and equipment.

Our concept of Year 2000 readiness includes the planning, development, and implementation of site-specific contingency plans or compensatory actions for items that are not expected to be Year 2000 compliant.

Although our primary interactions with licensees in this area have focused on reactor safety, we recognize that the Y2K problem also may have the potential to affect the reliability of electrical grids. Nuclear power reactors are designed with at least two independent sources of off-site power. Even if all off-site power is lost due to a transient on the electrical grid, on-site power systems are designed to circumvent challenges to plant safety systems by providing adequate electrical power to safely shut down and cool the reactor.

I should also add that nuclear power plants, particularly the larger ones, are also very robust in terms of being able to withstand transience on the grid.

As you know, NRC regulatory oversight and authority does not extend to the off-site electrical grid system. On the other hand, we recognize the need to ensure that grid reliability concerns are identified and resolved. We support the efforts of the President's Council on Year 2000 Conversion and our members of the Energy Working Group. We will continue to work closely with the Federal Energy Regulatory Commission and the Department of Energy on any potential problems associated with the Year 2000.

This concludes my oral testimony. We have submitted a complete written statement, and we ask that it be included in the hearing record together with the generic letter, and we look forward to working with the special committee and to addressing any questions this morning.

Thank you.

[The prepared statement of Ms. Jackson can be found in the appendix.]

Chairman BENNETT. Thank you very much, and your full testimony will indeed appear in the record.

Mr. Koskinen, we are delighted that you have joined us, and we look forward to your testimony.

STATEMENT OF HON. JOHN A. KOSKINEN, ASSISTANT TO THE PRESIDENT, AND CHAIR, PRESIDENT'S COUNCIL ON YEAR 2000 CONVERSION

Mr. KOSKINEN. Thank you, and good morning, Mr. Chairman and members of the panel. I am pleased to appear with this distinguished panel before the committee this morning to discuss the activities of the President's Council on Year 2000 Conversion and the Year 2000 problem's implications for the energy industry. Let me begin, however, as the other panel members have, by expressing my support for the work of this committee. I am confident the com-

mittee will play a key role in helping to address the Year 2000 problem, and I appreciate your commitment to focus not only on Year 2000 activities within the Federal Government, but in the private sector as well, where it is clear we face a real challenge in raising awareness among small- and medium-size organizations.

I would also like to express my appreciation to you, Mr. Chairman, and to Senator Dodd for the work you both have done through the Senate Banking Committee to increase awareness of the problem in the financial services industry.

As you know, like the financial sector, energy is a key part of our Nation's infrastructure. While people in other sectors are focused on ensuring that their systems and date-sensitive embedded chips are ready for the new millennium, that work will be irrelevant if we have power failures on January 1, 2000. To prevent such an outcome, we need to work together in an ongoing dialog with the industry to raise awareness of the problem and to facilitate information exchanges. Today's hearing is a valuable contribution to that dialog.

As you suggested in your invitation, Mr. Chairman, I would like to give you a brief overview of the Council's activities. As you know, I returned to the Federal Government in March to chair the President's Council. The Council's mission is twofold: To assist Federal agencies as they work to prepare their systems for the new millennium, and to coordinate agency efforts to increase awareness of the problem among private sector entities, State and local governments, and international organizations.

While several of the agencies confront significant management challenges, I am confident that the vast majority of Federal mission-critical systems will be ready for the Year 2000. Many agencies are already making excellent progress. According to the most recent OMB quarterly report, 71 percent of mission-critical systems in the nine agencies assigned OMB's highest ranking are already Year 2000 compliant—9 months ahead of the Government-wide goal.

An important fact in our favor is that senior managers in the Federal Government are very much aware of the Year 2000 problem. I have met individually with the heads of more than 40 Federal agencies, and their agencies are working hard to ensure that Federal systems are compliant.

One of the things I emphasized in my meetings with the agency heads was that, while it is very important for agencies to focus on fixing their own systems, they also have an obligation to reach out to organizations within their policy areas to increase awareness of the problem and to offer support. We decided that, to be most effective, we needed to build on existing organizational relationships between agencies and outside groups, which in many cases are their normal constituencies.

The Council has organized itself to take advantage of these relationships. We have identified roughly 30 economic sectors and enlisted agencies that have policy interests in, or connections to, those areas to chair working groups for those sectors, to increase awareness of the problem, and to offer support. In particular, agencies are working with industry trade associations, which have unique capabilities for communicating with their members about

the problem, as well as with individual companies, State and local governments, and international institutions.

For example, the Transportation Department will soon be holding an Intelligent Transportation Systems summit in Washington that will bring together industry leaders, State and local transportation officials, and transportation technology suppliers to discuss solutions for possible Year 2000-related disruptions in the operation of traffic control systems. And just last week, the Federal Communications Commission held a roundtable of industry leaders to discuss the Year 2000 problem's implications for public safety systems.

We are also using other leverage points in our outreach efforts. There are organizations that, by virtue of their actions or opinions, can be a powerful influence to encourage others to ensure that their systems are ready for the new millennium. Therefore, I have met with several rating agencies and the Year 2000 Task Force of the American Institute of Certified Public Accountants to encourage them to reiterate to their clients the importance of addressing the Year 2000 problem.

The Council has formed working groups to coordinate agency outreach activities in several key areas of the Nation's infrastructure that require an intensified focus. We have working groups that cover telecommunications, financial institutions, workforce issues, emergency services, and energy. I will address the energy working group's activities in greater detail momentarily, but let me begin by noting that the telecommunications group, chaired by the FCC and GSA, is working with industry groups and the Nation's largest telecommunications service providers to minimize any disruptions to the communications networks we have all come to rely upon.

For financial institutions, chaired by the Federal Reserve, the working group is focusing on addressing the problem not only with U.S. banks but with the securities industry, mortgage companies, and Government-sponsored entities.

The Labor Department chairs the workforce issues group, which is focused not only on monitoring the Federal Government's supply of workers for its Year 2000 remediation activities, but on ways to help mitigate some of the potential Year 2000 workforce shortages in the economy as a whole.

The emergency services working group, chaired by the Federal Emergency Management Agency, is concentrating on ensuring that State and local emergency response officials are addressing the Year 2000 problem.

Because it is such a critical part of the Nation's infrastructure, we are very concerned about Year 2000 progress in the energy industry. The wide range of companies active in the production and transportation of power, which include investor-owned utilities, publicly owned utilities, Federal power marketing associations, and oil and gas producers, makes the challenge of outreach all the more difficult.

As a result, as you have heard, the Council has taken the step of appointing two chairs in the energy area: the Department of Energy, as Secretary Moler noted, is chairing that portion of the energy working group's activities for electric power, and the Federal Energy Regulatory Commission is chairing the operations for oil

and gas. The entire group is working to engage industry in an ongoing dialog about the level of awareness, assessment, and remediation that is underway, and is offering to coordinate the activities of all Federal agencies in this area. Again, as Secretary Moler noted, while the Government does not have direct control over most of these organizations, we can play an important role in facilitating an information exchange on Year 2000 best practices and shared experiences among those in the industry.

We are also very concerned about the implications of date-sensitive embedded chips for the energy industry. Some of these chips help to carry out critical functions in power plants and oil production facilities, and we are encouraged that the industry recognizes the importance of this issue.

Thus far, we have been delighted with the response we have received from various energy trade associations. As noted, the working group has met with the North American Electric Reliability Council, which has agreed to be our contact with the electric power industry. In a meeting last week, the American Petroleum Institute and the Natural Gas Council agreed to use their capabilities as umbrella organizations to raise awareness of the problem within their industries and to survey the progress of their members. While it is difficult to make estimates at this stage in the process, the consensus is that the largest companies in the energy industry are actively working to ensure their ability to function as we move into the new millennium.

There is no doubt that the Year 2000 problem poses a significant challenge to the global economy. I am confident that Federal agencies will live up to their end of the bargain, both in fixing their critical systems and in increasing awareness beyond the Federal Government. As I have often said, there is no guarantee that every critical system will be fixed. But if we work hard and if we work together, I think we will be well positioned to achieve our ultimate goal of ensuring that any inconveniences caused by the Year 2000 problem will be relatively minor.

I thank the committee again for its interest in this issue. You are making a valuable contribution to the public dialog about the matter, and I look forward to working with you. I would be happy to answer any questions that you may have. And as the other witnesses noted, I would appreciate it if my full statement could be entered into the record.

[The prepared statement of Mr. Koskinen can be found in the appendix.]

Chairman BENNETT. It will be so ordered.

Mr. Koskinen and I speak weekly either face to face or by telephone and sometimes both, as we are making every effort to see to it that the excellent work he is doing within the administration is well-coordinated with the work that we are trying to do on the Hill.

I have a number of questions. Let me first ask all of you if you would respond to questions that would be submitted to you from the committee.

You all heard except for you, Mr. Koskinen, my opening statement, and the summary of the survey that we took on behalf of the committee. I apologize that the survey was not finished in time for

me to give it to you prior to your attendance at the hearing but, nonetheless, I would appreciate it if you would respond to what you heard as I opened the hearing.

To remind you this is not a got'cha-kind of test, were you listening. I will repeat the three major findings that we got from the survey: A lack of completed assessments, a lack of assurances that Y2K compliance would be there from servicers, suppliers, and vendors, and a lack of contingency plans.

First, does this result surprise you? And, second, do you have any reactions, contradictions, comments, what have you?

Secretary Moler, perhaps we begin with you.

Ms. MOLER. The lack of completed assessments surprises me. The lack of assurances that particular software and replacement chips, if you will, does not surprise me because of the time that I have spent on this issue.

We do not have the knowledge, certainly in the Federal Government, whether the software suppliers, in particular, will meet the promises they have made for replacement systems. That is actually one of the reasons why in Federal circles we have a March 1999 deadline for completing things rather than a say, November or December 1999 deadline. So, that we have our own surveys and we have plans to complete our own work well ahead of a time that the issue becomes critical for Federal systems.

On contingency planning, I think that the recognition is just dawning for lots and lots and lots of groups that contingency planning is a critical part of preparedness in this area.

Chairman BENNETT. If I may, from the visits that I have made and I have been into two plants now, a nuclear plant in California and then a nuclear plant connected with New York Power Authority who are involved with fossil fuel generation as well as hydro-generation. There are suppliers other than software suppliers that are in the chain that are vital. And I would hope, as we talk about their need to check with suppliers, we do not just focus on software suppliers.

The plant in San Onofre that I visited gave me a fairly detailed list of all of the suppliers that they had checked, including municipal water systems. They said we cannot run this plant if we cannot get any water. Checking the people who provided their security system, what happens if the Y2K problem locks everybody out on New Year's Day and no workers can get into the plant? We have had examples of that kind of failure occurring from people who have tested for it.

So, I hope when we use the term, servicers, suppliers, and vendors, we realize that it is all across-the-board and not just in the computer world.

Mr. Hoecker, did you have a response or a reaction?

Mr. HOECKER. Yes, Mr. Chairman.

Speaking for the Commission, where we believe all our systems will be 2000 compliant by this time next year, what we have learned in our discussions with the industry is, I think, somewhat surprising. It is the lack of information about all these areas that is perhaps most troubling to me.

We have found that even though many natural gas and oil companies are moving ahead, particularly larger companies, with as-

assessments of the problem and testing, frequently that information is not being communicated. And, since we are dealing with the integrated networks of companies that provide transportation in gas and oil over long distances, it is the lack of communication between those companies as to what the status of their activity is that is particularly troubling.

I sense that it may require everyone to reach the same degree of readiness or compliance in order for the system to work as a whole. And that is why I wanted to emphasize this morning that awareness and communication is key and I think the energy working group is going to make a major difference in that sort of communication.

Chairman BENNETT. Ms. Jackson.

Ms. JACKSON. Thank you.

My response would be that I would say we are not entirely surprised that all the assessments may not have been done. A number of the panelists have spoken to the question of lack of information but it is because of that, and to address that with respect to the limited part of the electricity sector with which we deal but an important part, that we issued the generic letter that I spoke about and had earlier sent out an information notice.

Because we were not entirely satisfied that there was enough attention based on the earlier information notice, which was sent out in 1996, we issued the generic letter which requires a written response. We will know more specifically in August when those responses are due. And because we are a regulatory, health and safety, regulatory agency we are able to require certain responses from our licensees, and that is the way we are getting at it.

In addition, we do know that the Nuclear Energy Institute is developing supplemental guidance specifically on contingency planning for the power reactor licensees that would focus on issues such as additional staffing, increased on-site oil supplies for emergency diesel generators, enhanced communication and the communication protocols with reactor operators in other countries, particularly in the Pacific Rim, which would experience Y2K about 12 hours earlier than our licensees, and also enhanced communications with the low-dispatch centers to have more specific knowledge of the general conditions on the network and how they would affect the nuclear plants.

And, so, that, coupled with the specific remediation relative to software and embedded chips in the plant, is the way that we feel is the appropriate way to get at these issues.

Chairman BENNETT. Thank you.

Mr. Koskinen, again, we recognize you were not here to hear the—

Mr. KOSKINEN. Well, as you know, this morning I had a previously scheduled meeting with a set of chief financial officers from many of the largest companies in the United States, and we discussed the point you have hit upon here today, which is the endemic problem of the supply chain. Everyone has moved to just-in-time inventory controls as an efficient way of running their operations. And that means that everyone is now interconnected, not just in telecommunications matters, but in actual business operations.

From industry to industry, large companies in many cases are confident that they will be ready, but they have concerns about whether those upon whom they depend in the supply chain will be ready and will be able to operate. As you note, suppliers to energy firms are important. Suppliers to manufacturers are important as well. As you can see by the ongoing General Motors strike, supplier in the chain can, in effect, shut down the entire process.

So, I think that is a common problem. Like Deputy Secretary Moler, I too am surprised that the level of assessment is at 20 percent because that is a much lower level than indicated by the feedback we have received. But we should recall, as you know, that the embedded chip problem is what I call the growth industry of the Year 2000 problem. Most people have only recently become aware of the importance of embedded chips. Everyone started out 3 or 4 years ago by focusing on this as a problem of software applications which are significant in financial processing and other areas.

But it is only in the last 12-to-18 months that industries across-the-board have focused on the fact that, while the percentage of chips that may fail is very small, the number is very large. If you are talking about a 1 or 2 percent failure rate in the roughly 5 billion chips we ship in a given year, that means you have 100 million chips that have some potential to create difficulty. It is that assessment, I assume, that these companies in particular are struggling with.

I don't know about the particulars of this survey, but my experience is that it is more likely to be an assessment problem of their chips, not their software systems.

Chairman BENNETT. Thank you. The only other comment I will make with respect to this, sounding a broken record again and Senator Dodd mentioned it in his opening statement, the most time-consuming portion of this whole process is the testing portion and I always get very nervous when someone says, we will have the problem solved by October of 1999. You have to have the problem solved on paper by this year because 1999 is going to be consumed in testing and then validating the testing results.

And I have other responsibilities that I use with respect to the Year 2000 problem. I am chairman of the Legislative Branch Subcommittee on Appropriations which means that every portion of the legislative branch has to come before my committee for their money and I am disturbed by some agencies in the legislative branch who said, oh, yes, we are going to have this all solved and the new equipment and software program that will solve the problem is now on schedule to be delivered in the Fall of 1999, which does not give you any testing time at all and makes me very nervous.

Vice Chairman Dodd.

Vice Chairman DODD. Thank you very much, Mr. Chairman.

And I will underscore that point. I mentioned earlier to you that I had a conversation. The Gardner Group, as many of you may know, is located in my State of Connecticut and the CEO of that firm who I met with the other day, they do about 98 percent of the Y2K compliance issues on Fortune 500 companies and their concern is that we are not developing at this point contingency plans.

The fear is that we will start waiting until next year to decide that contingency plans may be necessary and their point is that

they ought to be doing it now because of their fear of noncompliance.

Let me, if I can, Mr. Koskinen—and I thank all of you. We are all very thrilled, by the way, that the President has asked you to take on this responsibility and you, obviously, know this issue well and it is reassuring, quite candidly, that we have someone of your talents and ability who will be working with us over the coming months on this issue.

One of the things we find over the years here is that there is a tendency and I guess it is the nature of how business gets done is we constantly try to put a good face on things. We want to talk about things that are happening right and, obviously, that is very important. The chairman has made that point. We do not want to get into dooms-day scenarios and so forth. That does not help in this situation.

But also we need to get good, candid assessments, particularly at this stage because we can do something about this now. While it is 18 months, that is a short amount of time, but a lot can happen in 18 months to get this on the right track.

And, so, it is very, very important that this committee and others know about things that are not working as well as things that are working so that we spend our time and attention focusing on the questions where some real effort is needed. And I say that to you because in looking over this report from the Office of Management and Budget, you cite in your statement here that 71 percent of our agencies or 71 percent of the systems at the Government's most successful agencies are Year 2000 compliant. What you fail to mention is that these are mostly smaller agencies by and large.

Now, there are some exceptions here. But the National Science Foundation, the Small Business Administration, FEMA, GSA, are really some of our smaller agencies. Now, there are some large ones here: SSA, NASA, and so forth, but if you look at this, and you go down further here and you get to the big agencies, the large agencies: Defense, Education, HHS, it is only 31 percent.

And, you know, it just seems to me we got to focus on these kinds of things here. I mean I appreciate what you are getting at here, but we need to know about the big ones. Now, this morning the Post has an article on the Defense Department which Senator Kyl and Senator Bennett may want to get into a bit more with you here. But I think it is critically important that we need to know about what is going on.

The Department of Energy is one of the OMB's categories. And they list them, by the way, here as insufficient progress is being made in these areas. And at this pace, the OMB says that here, "The Department of Defense will not meet its goals and complete its work on time." And, candidly, the Department of Defense, this is an OMB study now saying this, is pretty alarming, quite candidly.

And it seems to me that we need to get your, when you come up here to talk to us here, you need to put us on notice up here so that we can be doing smart things from a legislative branch to help out with this.

And, so, I would urge you in your work here, let us know where the bad news is here, at this point, not just some of the good news.

Now, let me ask if I can, Ms. Moler, about the Department of Energy here, since we have got you. They have got insufficient progress. And I wonder whether you can explain what is being done to improve that situation and what the consequences are for the Nation if the Department of Energy fails to meet its millennium requirements?

Ms. MOLER. The Department of Energy has the fourth highest number of "mission critical"—in the jargon—systems. We have done a complete survey and there are currently 411 of them. The Department of Defense has five times as many.

But we still have a significant number of systems. We are at this point 42 percent compliant. We believe we will have all systems except a couple that will be compliant by March of next year. We are using a slightly different planning scenario than OMB prefers. I am trying to move it up.

And there are a couple of systems that we know will not be fixed by March. They are isolated. I can go into the specifics of those if you want. Our progress is picking up. I have just instituted an independent audit of—*independent*, but still DOE employees—of our CIO's assessment. A lot of these things are in the field and they are at the National Laboratories and we are going system-by-system and looking at each and every one of them. And we believe that we will be ready—

Vice Chairman DODD. OK.

Ms. MOLER [continuing]. Based on the information I have now. Now, if I find something else out, I will certainly—

Vice Chairman DODD. Please, let us, we want to know about it.

Ms. MOLER [continuing]. Let the world now. I mean you cannot hide these things, that will not help.

Vice Chairman DODD. Let me ask you, Mr. Koskinen, just in the seconds or so remaining here on the time clock. Let me read you some of the questions that were in the committee's survey of the 10 largest energy producers, and one company's responses to it, if I can.

The committee asked the companies, and I am quoting here, "How many systems were identified with Y2K implications and how many of those were mission-critical?"

This company which is one of the largest energy companies in the United States with more than \$20 billion a year in revenues and is 1 of the 100 largest U.S. companies, responded in the following manner and I quote them in their response: "We have numerous systems. It would not be cost-beneficial to count them." They also gave the exact same answer to the question about how many embedded systems were identified.

The committee also asked how many lines of code were reviewed as part of the assessment, and the company responded and I quote them here: "It is unknown how many lines of code have been reviewed."

Last, the company also stated that, "No Federal or state regulatory body has requested Y2K information of it." It is a \$20 billion company.

Now, I wonder if you might tell us if a Federal agency were to give you that kind of report, would you find it satisfactory?

Mr. KOSKINEN. Obviously not and, in fact, if you would not mind, I will respond to your earlier comment as well.

Vice Chairman DODD. Please.

Mr. KOSKINEN. I could not agree with you more that all of us, as the chairman and I have discussed, need to focus our energies as much as we can on where the problems are.

Vice Chairman DODD. Let me ask you and then I want you to answer that. One, would you be satisfied and, two, is that company in your mind, based on what it has answered here, going to be compliant by the Year 2000?

Mr. KOSKINEN. Clearly, in the OMB rating system that company would be a Tier 1 agency, one that is not demonstrating sufficient progress. If that is the actual state of play, as opposed to their having gotten legal advice to reply very generally for fear that it will become public information, then I think that organization has a potentially insurmountable challenge to complete their work in the next 18 months.

We need to focus on where the problems are and to be candid with one another. It does not totally surprise me that no agency has asked them for information as we do not have authority in many of these areas to actually require companies to give us information. One of the reasons the Council is working with umbrella groups is to engage in a candid discussion with industry leaders and get them to assess the industry with us and give us more information. We need that information.

My point about citing the nine agencies that are doing well was not to say that we do not have problems. The OMB report, which focuses on the problem agencies in some detail, is a public document. I do, however, want to take issue with the notion that the Government should get an "F" for its work. I think we clearly have several agencies that face major challenges, but it strikes me that we cannot create a stereotype that there are no Federal systems that work.

The other thing to bear in mind, and the chairman's hearing on Wednesday noted this, is that you can find out exactly what progress Federal agencies are making. It is all there. They will tell you exactly how many mission-critical systems they have, and where those systems are in each phase. So, you do not have to guess, and creating the stereotype that nothing works does not necessarily help in solving the problem.

We are focused on those areas in which there has been insufficient progress. I have announced that I will now attend the monthly management meetings with senior managers of the six Tier 1 Cabinet agencies, again to work jointly with them to see what are the issues that we can try to resolve to make sure that they can meet their plans, all of which show that they will be compliant.

But there are major challenges. Some of the Tier 2 agencies in the OMB report, such as the IRS, have major challenges as well. I am not only troubled by, but surprised at, as everyone is, the lack of assessment in the results from your report. Clearly, we would consider any agency in the Federal Government that has not completed its assessment, or virtually completed it by now, to be at high-risk.

Vice Chairman DODD. Last on this point and let me ask this quickly of the FERC and Department of Energy, and you heard Mr. Koskinen's response here. You know, if somebody like this company of this size, \$20 billion in revenues, 1 of the top 100 companies in the country, is looking like they are not going to make it here, what powers do you have in order to try and put some pressure here, if you will, or some authority here to get them to move on this or, do you have any at all?

Ms. MOLER. We have limited regulatory authority, limited powers. However, we do have the bully pulpit and the power of public scrutiny and, frankly, embarrassment.

But as far as directing them to comply with a particular order, it is limited.

Mr. HOECKER. I agree. Certainly for the FERC, for whom reliability of electric and gas service is always a concern, our ability to direct companies to assess, to be in compliance and so forth is virtually nonexistent.

I mean we regulate rates and we can deal with discrimination issues but beyond that there are some serious gaps in the law.

Vice Chairman DODD. Mr. Chairman, I have gone way over the time, and I apologize.

Chairman BENNETT. No. Thank you.

I think that was an important point to pursue and let me make again the point that when we did the survey we promised these companies absolute anonymity. And I would hope that any staffers who know the names of these companies will recognize that promise because we are grateful to this company for being that candid. And we do not want to chill the opportunity to get more information by violating that confidentiality.

Senator KYL.

Senator KYL. Thank you, Mr. Chairman.

Since the energy system is the primary focus of our work today, I would like to ask whether any of you are prepared at this time to characterize the degree of Y2K problems in the U.S. energy system or the status of remedial actions?

And I am not suggesting that you came here to do that; I just wonder if we can obtain any of that information from you?

Ms. MOLER. We do not have a comprehensive picture of the electricity sector which has been our focus. So, we hope to have one, at least a better picture, in September.

Senator KYL. Thank you.

Mr. HOECKER. Certainly one of the goals of the energy working group and the people who are working on gas and oil issues is to flesh out that picture as soon as we possibly can. We have trade associations that are serving their members, we are engaging in meetings and discussions about this but, currently as I said in my testimony, the evidence we have of assessment compliance is completely anecdotal.

Senator KYL. Ms. Jackson.

Ms. JACKSON. We will be able to provide very specific information in August because of the fact that we are requiring the written response to our generic letter. Theoretically, we could gather some information today but since, in fact, the responses have to be very

specific to the letter, I think we will be able to provide you with a wealth of information at that time.

Senator KYL. Thank you.

Mr. KOSKINEN. This reveals part of the thinking behind our strategy at the council. In a number of important industry areas the Government has basically no oversight or regulatory authority at all, and I am not suggesting we should have that authority. Therefore, I think Senator Dodd is right, and your question is very appropriate, we and the public need to know over time where the problems are going to occur.

So part of our strategy in creating these sector leaders and working groups, and engaging in a constructive dialog with industry leaders and umbrella groups, is to try, as the chairman noted, to cultivate candid exchanges at the level we need to know, which is how industries generally are doing.

We do not need to know whether a particular company is going to make it or not. But we need to know how is the industry doing, both as an industry and also geographically and regionally. And in the time remaining, 567 days or so, I do not think that we are going to be able to yell at people or beat the information out of them.

What we can do is to have them understand that we are anxious to work with them constructively. We are anxious to have a dialog to see if there is anything we can do to help them solve their problem. But, ultimately, it is their problem. What we can do, and what you are doing here, is raise the visibility of the issue, raise awareness of its importance, and encourage people to address the problem in time. Because time is the vanishing resource.

Senator KYL. But all of the Federal agencies or departments that rely upon the energy system—they all do, of course—but all of them that rely upon it in significant ways are going to have to make that assessment themselves, both in order to understand what they will have to do remedially and also to provide for contingency planning.

Mr. KOSKINEN. That is right. And one of the things we hope to do through the council as we move through what I call the proselytizing/organizing phase into the monitoring and assessment phase, is to begin to coordinate Government contingency planning as we move into next year and try to share among the agencies our concerns about this area.

The two major areas that we are obviously concerned about are energy and telecommunications because every agency depends upon those parts of the infrastructure. And we need to be able to collect the information so that we can respond. Senator Dodd's point is exactly right in response to the surveys, and the chairman noted that contingency planning is not something you do at the last minute. Contingency planning has to be done in terms of going forward, in terms of how you protect your core basic business processes.

The Council and OMB are working, and GAO has done good work in this area as well, to stress to the Federal agencies that they must have contingency plans. The point is well taken, and Senator Dodd again made it correctly, we need the information as early as we can so that we can respond accordingly. The response

is not necessarily to yell at people, the response is to figure out what we are going to do in response to the reality. But we need to know what the reality is.

Senator KYL. I mentioned in my opening statement that with respect to contingency planning, I had written you back in March. You indicated that FEMA would be the agency. When I heard from FEMA in May and they still had not done any Y2K-related contingency planning. So, it seems to me that recognizing the nature of the challenge is one thing but getting on with it is something else.

I am also concerned that the report that was mentioned before in the Washington Post today, an article by Stephen Barr, raises a similar kind of concern. I gather that had the Inspector General's report not been forthcoming, we would not know that the Pentagon's reports were faulty in terms of compliance rates.

What that IG report found was that many systems who reported themselves as compliant, apparently, were not, in fact, compliant. And the article goes on to note that the Agriculture Department also has reported systems compliant that were apparently only in developmental stages. That, according to the GAO.

I guess the question here is, do we have to rely upon independent studies by GAO or a department's Inspector General to find out whether Government agencies, themselves, are in compliance or is there an overall plan? Since you are heading up the effort—what is the plan we have for verifying whether agencies are, in fact, at the stage of compliance that they say they are?

Mr. KOSKINEN. Testing is an important issue. OMB has required the agencies to have an independent verification and validation program not only to test the assumptions but to test the reality as well.

As the chairman noted, the reason everybody should be pushing to complete work on their systems by the end of this year into the first quarter of next year is that while you may think you are done at that point, you will then have to go out and solve all the unforeseen problems.

Nobody in the private or the public sector has ever had to deal with this issue before, and that is why testing is so important. And testing is a continuous process; the Inspectors General in many of the organizations are right now working very closely with the management, continually going out and checking whether the information is valid. And it is not that people are trying to mislead anyone. If they were, we would have much better numbers. The numbers in some areas are very troubling, but we are talking about hundreds, in some cases, thousands of systems you continually have to monitor and check.

The bottom line will not be the reports, but whether the systems actually operate. But your point is well taken. In every agency, we have an ongoing evaluation and verification program that will continue to show that things people thought were going to work turned out not to work.

And, as the chairman said, even when everybody signs-off and they think they are 100-percent compliant, and Social Security is almost there, they are still retesting all of those systems to make sure in different configurations they, indeed, are compliant. They

are actually running and rerunning those systems. That takes time, and that is what we have to do.

Senator KYL. One final question, if I could?

On April 1, you testified that you would be joining the Vice President and the staff of the National Partnership for Reinventing Government as they continue to work to improve customer service at the 32 Federal agencies identified as having a high impact on our citizens.

What is the role of the Vice President in meeting the Y2K challenge?

Mr. KOSKINEN. As you noted, the Vice President has been very focused on those agencies that most directly relate to the public. He and his staff have been working with them for some time and are stressing the importance of solving the Year 2000 problem in the meetings they are having with each of those 32 agencies.

At a late January cabinet meeting, he and the President very vigorously stressed to agency heads that this was their problem. It was not their division's problem, or their IT-area problem, it was their personal responsibility. As I met with the Cabinet agencies, all of the Secretaries told me of the impact that the President and the Vice President's remarks had on them.

As Deputy Secretary Moler noted, the Vice President has met with the President's Management Council where he again reaffirmed the importance of this process. But I think the ongoing review that he and his staff are having with the high-impact agencies is sending the right signal that this is a matter of the highest importance.

Senator KYL. Thank you.

Thank you, Mr. Chairman.

Chairman BENNETT. Thank you very much. We express our gratitude to the panelists for their participation and also for the support and assistance that their staffs have provided in preparation for this hearing.

Vice Chairman DODD. Mr. Chairman, can I ask one more question—

Chairman BENNETT. Surely.

Vice Chairman DODD [continuing]. And I apologize—is it—

Mr. HOECKER. Hoecker.

Vice Chairman DODD. Hoecker. Thank you. I apologize for not picking that up earlier. I want to thank you, Chairman Hoecker. You gave a very candid statement this morning here about where things are from your standpoint and I appreciate it.

You say that the state of the Year 2000 readiness of the utility industry is not yet fully known. And you go on to expand on the point by stating that the extent of completed work, Year 2000 work, within the energy industry is unknown. The compilation of this information has been inadequate. The state of awareness in planning of small utilities and cooperatives is less certain. You also stated and I quote you here: "At the present time any failures to fully understand the seriousness of the issues must be regarded as a serious problem."

I just was impressed by that. And, you know, from a Federal Government standpoint, we are sort of the clearinghouse in a sense here. I guess I agree with Mr. Koskinen, we are not going to solve

this problem except our own agency issues that we have to look at but the broader issue is to sort of be a clearinghouse. But I must tell you with less than 18 months to go, you know, if we do not have any idea where the utility industry is to the point where we do not even know if the utilities are even aware of the problem, then have we not fallen into that failure to understand the seriousness category?

Mr. HOECKER. Indeed. I am hopeful, more than hopeful that the President's Council and the work that we will be able to do in the months to come, in the immediate months to come, will cure much of that problem. And we are getting very good cooperation from individual companies and from trade associations. I hope we can bridge this information gap quickly. But it is a disturbing phenomenon.

My CIO has been talking with many people and meeting with Mr. Koskinen and the group and reports to me that she cannot really get a good handle on where these companies are in terms of their activity.

Vice Chairman DODD. Well, I would hope—you know, this is June and while 18 months is pretty quick, we probably ought to hear back from you fairly quickly about how much cooperation you are getting on this. I mean I do not know what is available to us in this session but it seems to me if we are not getting that information then we might want to think about some other measures that we might have to take to get it to you.

In that light, I am curious as well, Chairperson Jackson, on the NRC issues, you are surveying 12 out of about over 100 power plants in the country. You are going to get that generic information in August. What are you going to do with the information if you find deficiencies in August? What is the response of the agency at that point?

Ms. JACKSON. Well, first let me say that the responses to the generic letter are 100 percent. It is not 12 percent.

Vice Chairman DODD. Oh, all right.

Ms. JACKSON. Using those generic responses, we are going to be doing two things. We are going to be doing sampling—

Vice Chairman DODD. You cited 12, right.

Ms. JACKSON. That is right. Then that is how we picked the 12 but then we are having a workshop, participating in a workshop with all of the licensees, in the Fall to discuss the results of those inspections and the problems that have arisen. And that is our way of working with the industry to get the word out and then it will also determine what specific follow-up we have to take.

We have a drop-dead date of September 30, 1999, in terms of making a—

Vice Chairman DODD. We have to come up with a better description of that date. [Laughter.]

The language in this debate is not exactly—

Chairman BENNETT. The lights out date.

Vice Chairman DODD. Yeah, lights out.

Ms. JACKSON. Well, let me finish my sentence, please.

Vice Chairman DODD. Yes.

Ms. JACKSON. We have a final determination date of September 30, 1999, to make a decision because that would allow time for al-

ternative energy sources to be brought onto line if we have to make a determination from a public health and safety point of view relative to a nuclear plant shutdown.

Vice Chairman DODD. Can I also ask you very quickly, to what extent are you coordinating or working at all with foreign nations to determine what is being done there? We have seen, there is a history now of some very serious health and safety problems at certain nuclear power facilities around the world. To what extent are you in touch with or is the agency in touch with foreign countries that have power plants to determine what they are doing?

Ms. JACKSON. OK. Let me answer that briefly in about three or four ways. First, we have had very specific interactions with the French, the British, and the Canadians, particularly the Canadians because of some inter-connectivity of the grids on the steps that they are taking.

Second, we are in the process of working out communication protocols because of the 12-hour advance with certain countries in the Pacific Rim.

Third, we have been working with the International Atomic Energy Agency to get them to act as a clearinghouse on information, particularly relative to testing and problem identification and corrective actions.

And we also will be working with them to try to get them to develop a communication protocol for how the different countries can communicate as we go up to the actual year turn-over.

And, finally, we also work with the OECD Nuclear Energy Agency in a comparable effort.

Vice Chairman DODD. I notice you did not—I mean specifically, what about the plants in Eastern Europe? Let me—

Ms. JACKSON. Well, that is why we, in fact, are working with the IAEA, the International Atomic Energy Agency because they, in fact, work closely with those countries and we feel that they are the appropriate clearinghouse and change agent relative to those countries.

Vice Chairman DODD. Do you want to follow-up on that?

You mentioned the Canadian—Ms. Moler, what sort of interplay is there with the Canadians on this question? We have a tremendous interplay, obviously, with the hydro-Quebec power production. What coordination is happening?

Ms. MOLER. The Canadian companies are a part of the North American Electric Reliability Council and they are included—let me just add one thing. When the Secretary and I asked NERC to play the coordinating role they responded very quickly and very positively. They and, indeed, they are going beyond their normal realm. They usually look just at what is called bulk power issues. They do not usually go to actual distribution utilities.

And I have spoken with their chairman and they have been very responsive. I hope that they will also be very candid with us as the work unfolds and you are going to hear from them on the next panel.

Vice Chairman DODD. OK.

Thank you, Mr. Chairman.

Thank you all very much.

Chairman BENNETT. Thank you very much.

Mr. Koskinen, we would be delighted to have you remain to listen to the next panel if you have the time. We will understand if you have commitments you have to leave. But I think we are going to get—

Mr. KOSKINEN. I will stay for a few minutes, but I have a noon meeting with everybody you ever heard of at the Defense Department to talk about this issue.

Chairman BENNETT. I think that may come up overnight. I can understand that. [Laughter.]

Well, we thank you all and appreciate your support and that of your staffs as well.

Thank you.

All right. We welcome the members of the second panel. I apologize to you for making you wait so long, but given the nature of the issue I think we had to go in as great a depth as we did with the first set of witnesses.

We will now hear from witnesses outside of Government. You can correct all of the errors that were given us in the first panel if you found that there were. You can comment on the survey and our interpretation of it if you find that it is incorrect. We are very grateful that you have been willing to come here.

I will introduce the members of the panel by name, reading from right to left, and then let each of you give additional biographical information if you feel so moved. We would hope that you would make an effort to stay within the time limit so that we have time for questions afterwards.

Mr. Lou Marcoccia, consultant with Duke Energy, Washington Gas, and Baltimore Gas and Electric; Mr. Michael Gent, who is president of NERC, about whom we have heard so much in the first panel; Dr. Charles Siebenthal, who is manager of the Year 2000 Programs for the Electric Power Research Institute; James Rubright, executive vice president of Sonat, Inc.; and Gary Gardner, chief information officer of the American Gas Association.

Gentlemen, we are very grateful to you for your willingness to participate and look forward to your testimony.

Mr. Marcoccia, we will start with you.

STATEMENT OF LOUIS J. MARCOCCIA, PRESIDENT MTS/PEOPLESOURCE AND CONSULTANT FOR DUKE ENERGY, WASHINGTON GAS, AND BALTIMORE GAS AND ELECTRIC

Mr. MARCOCCIA. Good morning. I am really glad to be here this morning sharing this day.

First of all, Senator Dodd, you had difficulty calling Mr. Hoecker. I have much more of a difficult name, so you can certainly call me Lou. That certainly will be fine. [Laughter.]

Vice Chairman DODD. We are going to call you Lou. I already made that decision. [Laughter.]

Mr. MARCOCCIA. Fine. What I would like to do, if I may, is provide a brief biography, and then I would like to hit a few points that was made by the first panel and get into my written testimony if I can.

I became a project director of the Year 2000 for the New York City Transit Authority in 1991, and I have been dealing with the Year 2000 for the last 7 years as a practitioner.

Two years ago I started a consulting firm, and I have personally worked at over 38 client sites throughout the United States, which includes energy utility organizations, banks, school systems from a petitioner putting code back into production, both computer systems as well as embedded systems.

What is very interesting, Senator Dodd, you mentioned the Gardner Group comes from Connecticut. According to the first panel, if you do an assessment, you are in pretty good shape. According to the Gardner Group, which I certainly concur with, that the assessment constitutes 4 percent of the total project, which means that if we agreed that a major milestone is the assessment, and we are basically just getting through the assessment now, that means we only have 96 percent left to the project. That is one, certainly, point.

What is really interesting to note is that—and I certainly do this with respect and deference—it was noted by the representative from the NRC that they initially had their first contact in 1996 and, yet, their second response, which is a generic letter, comes 2 years later. What happened between 1996 and 1998? I think, at that point, we should have been in the middle of testing and not just sending out a generic letter to find out what the status for are for our utilities organizations.

I also noted that we seem to be pleased if we are actually in the assessment and inventory phase. As of today, for organizations to be confident that they will be complying, should have completed 60 percent of their system tested and back in production as of today.

The target date for compliance, which is really misunderstood, is not December 31, 1999, and I will walk through the details of that, it is December 31, 1998, and I will articulate the detailed reasons for that.

The utility industry has not met the criteria for successful implementation of the Year 2000 for the mission-critical systems. Therefore, they have failed in their responsibility to their stockholders, partners, and customers.

I believe their failure will cause major disruptions here in the United States and overseas. I say this based on the following analysis: As it relates to criteria for analysis, all mission-critical systems and embedded systems must be completed by December 31, 1998, and there are five major reasons for that.

No. 1, we must allow for complete year-end process of the code and take advantage of the factor shutdown because that is when you have the opportunity to test those embedded systems.

No. 2, to allow for a contingency for unexpected problems not resolved in 1998 or if the project is generally running late. As we all know in this business, we never have projects that run late. Therefore, maybe step 2 is not required. [Laughter.]

No. 3, to allow for integration testing within an organization and between external partners, 1999 should be used for the integration between external partners and within one organization.

No. 4, to allow for replacement or upgrades of computer software, computer hardware, and embedded systems, there might be delays, and that may not be complete in 1998.

No. 5, and this is a technical fact, a 1-year calculation which are present in many systems will fail January 1, 1999, not January 1,

2000. So if you have an application that does a 1-year calculation, that will fail in January 1, 1999, and that is part of many applications that we have in our industry.

I have used the following criteria to establish what a successful Year 2000 implementation is:

No. 1, all mission-critical systems that require corrections are fixed, tested, implemented in a Year 2000 production environment.

No. 2, formally document which systems are going to be retired. We seem to talk about retirement, but we never seem to retire major applications.

No. 3, the current software, hardware embedded systems that were candidates for replacement have, in fact, been replaced. It will take, for major manufacturing type of equipment, utility and other manufacturing equipments, 12 to 18 months to replace a piece of equipment that will fail. You simply do not have enough time if you find that out June or September of next year. There is not enough time to replace that piece of equipment.

The strategy for the Year 2000 correction implementation has been agreed to and documented. What is the readiness of computer systems, as it relates to the utility companies? Currently, many large utilities have not defined what needs to be corrected. The industry has not yet determined how they will fix or test what they have found, both on the application side and on the embedded systems side.

The industry has not yet determined the resource requirements for the entire life cycle of finding the problem, fixing the problem, and testing the problem. You can have all the committees you want, if you are not fixing and testing and placing back in production, you are late.

The industry has not developed contingency plans for its mission-critical systems if failure occurs, and failure will occur. The industry is not in the triage mode in determining what systems must be compliant by December 31, 1999. Most organizations or many organizations will not implement the entire portfolio and they must decide which will make it and which will not. We should have that list today.

Replacement strategy for noncompliant computer systems with compliant software purchases or converting these systems to other platforms had to already have been started. To try to have a replacement strategy today or even last month on a wholesale basis is simply not feasible, in that we have never done it before in the past and we will not do it for this project.

Chairman BENNETT. Can you summarize? We are running out of time.

Mr. MARCOCCIA. Oh, really. OK. Wow. It went by fast, huh? I apologize for that.

Chairman BENNETT. Not at all. You have been very, very responsive, but we will get back to you in the question period.

Mr. MARCOCCIA. I really want—embedded systems. Because of the slow start in dealing with the computer system, the embedded system is the area the industry has fallen far behind in their understanding of how to find, fix, and test the embedded systems.

We currently know of systems that will definitely fail. Computer systems that are associated with the tankers we know will fail

sometime in 1999. We have known that—I did a seminar in Europe in 1996/1997, and I made those same statements. We have known that certain monitoring systems at a utility company will fail. We have known that.

A failure, even though they may be contained within 2, 3, or 4 percent, and I do not know how true that number is, the problem is not identifying units. What makes an organization run is the connection of each of those pieces in a process. So if a particular unit or component in that process fails, the whole process fails, and we have a problem.

Since I have taken up more time than I should have, I will conclude at this point.

Thank you for your time.

[The prepared statement of Mr. Marcoccia can be found in the appendix.]

Chairman BENNETT. Thank you very much, and I now apologize. Your name is pronounced Marcoccia.

Mr. MARCOCCIA. It is going to be tough, Senator. [Laughter.]

Chairman BENNETT. But I appreciate it. In the spirit of Senator Dodd, thank you, Lou. We appreciate it. [Laughter.]

Mr. Gent.

**STATEMENT OF MICHEHL R. GENT, PRESIDENT, NORTH
AMERICAN ELECTRIC RELIABILITY COUNCIL**

Mr. GENT. Thank you, Senator Bennett and Senator Dodd.

I would like to try to summarize my prepared text and have the rest of it entered into the record.

I find myself agreeing with a little bit of what everybody has said.

As you know, the North American Electric Reliability Council, of which we have a map up here—

Chairman BENNETT. Could you pull the speaking machine a little closer. Thank you.

Mr. GENT. You just really have to get into this, do you not.

Chairman BENNETT. Yes. [Laughter.]

Mr. GENT. In 1968, we formed NERC, and under NERC's leadership we have made the North American electric supply system the most reliable in the world. In fact, it is the best by any measure that you want to use around the world.

About a month ago, you have heard Deputy Secretary Moler indicate, that the Department of Energy asked NERC to assume a leadership role in preparing the electric supply and delivery systems in North America for this transition to the millennium. Our response to that challenge is actually attached in my prepared statement. It is our Phase 1 plan. I want to assure you that this is a living plan, and it will be adjusted and changed to fit the conditions as we move along.

I know that you are also aware, as you have inspected several facilities, that individual utilities and companies have collaborative efforts underway, as well as their individual efforts. They are to be commended for attacking this problem aggressively head-on. However, I have a concern—and I know it is your concern. I have heard it today—that this activity may not be coordinated.

Because of the high degree of interdependence in the electric systems, as you saw earlier in the demonstration, it is imperative that we have a cooperative plan.

The plan that NERC has come up with, as I have said earlier, is attached to my testimony. There is a map in it that is very similar to the one you have on your stand. I would like to point out that there are four major Interconnections in the United States and Canada.

The eastern two-thirds of the United States and Canada is included in what is called, appropriately, the Eastern Interconnection.

The Western Interconnection is the one-third that is on the left of that map. Note also that a huge amount of Canada and a little bit of Mexico are included in that portion.

The two smaller Interconnections are most of the State of Texas and the Province of Quebec.

Within each of these Interconnections, the utilities operate synchronously. That is a very big word, but let me say it is like breathing together. They all have the same heartbeat. A major disturbance caused by one utility in one part of the Interconnection affects all.

For instance, in answer to Senator Dodd's question earlier, if we had a disturbance in Miami, it would be felt equally in Manitoba, as it is in Tampa. Just remember that an electrical disturbance travels at the speed of light. So distance does not mean very much on the electrical grid.

NERC intends to provide a coordinated team effort to deal with the Y2K issue. We have divided our Y2K transition effort into five critical areas. The first, as you can see in the plan, is generating facilities. The second encompasses energy management systems, which you may wish to think of as control computers. The third is telecommunications. The fourth is those protection devices we hear so little about, but which are the electronic guardians that protect billions of dollars of electrical equipment from damage. And the fifth area is distribution.

NERC is focusing on operational security through what we call a defense-in-depth concept. It assumes that, although one has taken all the reasonable and necessary preventative steps, there can never be 100 percent assurance that major system failures cannot cause a catastrophic outcome.

Although most utilities, and vendors, and manufacturers eventually will be expected to exercise due diligence, I am certain that not all Y2K problems will be identified, fixed, and tested. In fact, it may not even be prudent to spend unlimited resources on some potential problems.

The ultimate goal of our plan is to establish a coordination process that allows the electric systems in North America to maintain operational stability during the Y2K transition periods.

Our program for implementing this defense-in-depth strategy focuses on three principal areas. I won't go into them in-depth, but they are sharing of Y2K solutions, identifying additional potential weaknesses in the interconnected systems in the way they operate together, and operational preparedness, much of which you have been calling contingency planning.

So behind these simply-stated three lines of solution, there are 13 tasks, 3 phases and a plan that spans nearly 2 years.

This program, of course, depends on the cooperation of electric utilities in North America. Our role at NERC is to facilitate this North Americanwide coordination so that the collective efforts of the industry will minimize risks posed by Y2K.

The NERC program provides operating entities with the opportunity to share Y2K solutions and to prepare coordination plans with neighboring systems and regions. To staff for this coordination, and it has been said earlier that this requires a huge staff, we intend to use the best there is, the utilities themselves. We have this knack of being able to get the world's leading experts to do things when their actions are important. This approach will give us the unparalleled expertise we will need to pull this program off.

Public exchange of information is a cornerstone of this program and must not be viewed by utility participants as feeding information to potential litigants. We will be requesting the support of regulators and public officials to support the electric industry's need to exchange information. Any restraint that we face in sharing this information will be a direct challenge to the reliability of electric supply.

In conclusion, NERC has taken this leadership role very seriously in coordinating the Y2K preparations of the electric supply and delivery systems in North America. The industry is committed to maintaining a reliable supply of electricity through this transition to the new millennium.

I look forward to answering your questions at the end.

[The prepared statement of Mr. Gent can be found in the appendix.]

Chairman BENNETT. Thank you.

Dr. Siebenthal?

STATEMENT OF CHARLES D. SIEBENTHAL, MANAGER OF YEAR 2000 PROGRAMS, ELECTRIC POWER RESEARCH INSTITUTE, PALO ALTO, CA

Mr. SIEBENTHAL. I would like to congratulate you, Senator, on getting my name straight. Most people do it backwards.

I am going to focus my remarks today on the EPRI Y2K Embedded Systems Program and the role it plays in the electric power industry's Y2K effort.

Before I do that, I would like to give you a little background information about EPRI so you can understand how this came about. EPRI was founded in 1973, as the Electric Power Research Institute. We are a nonprofit, collaborative research organization with headquarters in Palo Alto, CA.

EPRI membership currently represents about 87 percent of the U.S. regulated utility industry, and we have a very large number of international members as well now. We have a 25-year record of providing very objective and, hopefully, good science and technology to address important energy and environmental questions. Thus, we were kind of a natural choice for the industry's collaborative effort on the Y2K embedded systems problem.

We began our Y2K program on October 1, 1997 to act as a forum and a shared source of practical technical information. From the

beginning, this program has been open to any organization, not just electric utilities, which has embedded systems problems and is willing to share their information with other participants in the program.

I am pleased to be able to say that even in an electric power industry restructuring for competition the overriding importance of sharing technical information about Y2K embedded systems has been well recognized. Today, we have 74 companies, including three major oil companies, participating in this program and additional participants join weekly. I believe this week's crop raises it to 76.

And I need to explain what I mean by company. Many of the companies who have joined our program are joining as holding companies and not regulated utilities. That means that all of their power concerns in both the regulated and the nonregulated area and internationally as well are sharing the benefits of our program.

U.S. utility participants in the EPRI Y2K program represent now more than 70 percent of the electric power generation capacity in the United States. Our program has four major features.

First, an Internet-based clearinghouse for participants to share their knowledge, real time, on component and system testing, which was activated in March of this year. A few weeks after that, utilities and vendor organizations began uploading their data bases to our electronic knowledge base. Today, we have over 300 data uploads from these organizations on-line. Our target by mid-August is to raise that to over 1,000.

Second, we conduct workshops quarterly to provide an opportunity for in-depth, face-to-face discussion of problems, processes, testing methods, and results. The first and second workshops were held in January and May of this year. We are currently planning our third workshop for August of this year, and we expect between 500 and 600 people at that workshop.

We plan these workshops to go through 1999 dealing with many of the issues that were discussed here already as being important for continuing the program.

Third, and I think this is very important. We are organizing industry technical teams to work collaboratively with key equipment vendors and to better understand those vendors' product, Y2K compliance programs, methods, and results.

Our program participants have identified over 45 major vendors in power generation equipment and over 20 major vendors in transmission and distribution equipment.

We are really quite pleased that the vendor organizations have recognized the need to work in partnership with us to resolve the many questions which have to be addressed.

Last, we have attempted to identify Y2K embedded systems programs in other industries and to develop interindustry information sharing, where appropriate. In April of this year, EPRI and the American Petroleum Institute co-hosted a meeting of industry trade associations to see if other industries were having similar collaborative data sharing efforts.

Unfortunately, at that time, we did not find any other similar data bases on an industry basis, other than the one that API is

putting together, but EPRI has offered to host future data bases of other industries on our electronic platform.

I would like to summarize the progress to date. This has to be generic, obviously. Many utilities are ahead of this. All of our program participants are deeply into the inventory and assessment phases of their program as you have heard. Many of them have begun component testing, many of them are very foreign to component testing.

Testing results to date have been largely limited, however, to off-line tests of individual components. So far these tests have identified primarily nuisance-type problems, such as erroneous dates on computer screens and computer systems that have to be rebooted with new year inputs.

So far, fortunately, instrument and controller functionality appears to be largely unaffected. Now, these tests have to be confirmed by on-line testing. They are very preliminary, but they are encouraging.

Some off-line testing of larger integrated systems, such as distributed control systems in power plants has been started. These tests have produced some conflicting results, and we are resolving those through the collaborative efforts in our program.

Initial efforts at contingency planning, a subject which is obviously very hot here today, have made us very, very aware of the critical dependence of the electronic power industry response plans upon electronic communications. We are currently designing a pilot program for utilities and their major telecom service providers to sit down face-to-face and discuss their mutual dependencies, identify areas of common concern and, hopefully, joint action.

Finally, I would like to offer some experience from this program for consideration by the committee.

First, the list of services which are vital to our Y2K performance, but which are outside of our direct control, continues to grow as we go through the contingency planning process.

At this point in time, we, like you, have very little information regarding the degree to which many of these other vital services will be able to operate effectively during Y2K transition dates.

Second, utilities trying to develop contingency plans also need to understand what their customers are going to do in these times in order to prepare both the level of service that we have to provide and to prepare for any disruptions that the customers may induce by their own Y2K failures.

The success of these efforts rests on the ability of businesses to share information free of litigation concerns. EPRI corporate counsel and counsel for our participating companies have worked long and hard to overcome their shared concerns over the liability issues associated with information sharing.

Those who have weighed these risks and recognize that the overriding public interest and the magnitude of the business problem is so pressing that it takes precedence over these concerns are to be congratulated.

We believe that the Government could significantly advance the Y2K remediation process by stating a public policy, which encourages the noncompetitive resolution of Y2K problems and acting to

address legal liability concerns associated with sharing technical information.

In conclusion, our industry is working very hard to ensure that electrical service remains reliable, while the companies, themselves, are responsible for actual solutions and implementations. Sharing of technical information and development of collaborative solutions, where appropriate, should be officially recognized and encouraged.

We are pleased to be part of this program and pleased to have been able to testify today. I would appreciate it if our written testimony could be incorporated in the record.

[The prepared statement of Mr. Siebenthal can be found in the appendix.]

Chairman BENNETT. It will. Thank you very much.

Mr. Rubright.

STATEMENT OF JAMES A. RUBRIGHT, EXECUTIVE VICE PRESIDENT, SONAT, INC., AND REPRESENTATIVE OF THE INTERSTATE NATURAL GAS ASSOCIATION OF AMERICA

Mr. RUBRIGHT. Thank you, Mr. Chairman. I am Jim Rubright, executive vice president of Sonat, with responsibility for our pipeline and energy services businesses.

Sonat owns interests in over 14,000 miles of interstate natural gas pipelines serving the southeast and the Gulf of Mexico. But I represent here today the Interstate Natural Gas Association of America, the trade industry association that represents substantially all of the interstate natural gas pipelines in the United States, Canada, and Mexico.

I will report today that the interstate natural gas industry has taken the Year 2000 problem very seriously, and we are, and have been for some time, working on fixing systems well prior to the millennium change.

Also, as a result of an INGAA membership survey, we are pursuing a number of initiatives to foster cooperation among industry participants.

I would also like to address some areas where we think this committee and the Congress can be helpful in this effort.

Clean burning, environmentally friendly natural gas is a major energy source for our economy, second only to petroleum in energy use. Natural gas currently provides 24 percent of this Nation's energy for use in homes, industries, businesses, and in electric power generation. In fact, natural gas currently fuels about 11 percent of all electric power production in America, but that percentage is expected to grow substantially.

The Federal Energy Regulatory Commission, the FERC, which regulates interstate natural gas pipelines, has made our industry competitive through a number of initiatives over the last 15 years, and the changes in our businesses associated with competition accelerated the application of computer and telecommunications technologies for our operations and our customer service.

Our industry's current high degree of reliance on computer and telecommunications technology is one reason why we have taken the Year 2000 so seriously. We need to ensure that our extremely

safe and reliable gas delivery systems remain that way on January 1, 2000.

In March 1998, INGAA conducted a voluntary high-level survey of its INGAA membership. All respondents had a Year 2000 plan in place and were in the process of implementing their plans. The survey respondents believe that Year 2000 compliance for the pipelines themselves will be completed by October 1999.

As Chairman Hoecker mentioned, the INGAA members have consistent priorities for addressing the Year 2000 issue. In order of importance, these are: Protecting people and ensuring safety; second, maintaining the flow of natural gas to markets; third, accounting for gas flows; and, fourth, maintaining the integrity of our internal business systems.

The first priority for our industry is safety. To operate and monitor our pipelines, we make extensive use of automated equipment that is replete with embedded chips placed in service over long periods of time.

The diversity and the large quantity of equipment with date-sensitive embedded chips makes identifying, testing, and fixing these devices very time consuming. Fortunately, from a safety perspective, natural gas transmission systems are designed with multiple safeguards. In addition to sophisticated digital control systems, operating and safety systems use automatic analog, pneumatic, and mechanical control devices.

Also, in the event of an emergency, operating and safety systems are equipped with manual override capabilities. Therefore, despite extensive work which lies ahead, INGAA is confident that the pipeline systems will remain safe on January 1, 2000, even in the face of digital device failures.

However, we intend for all of our mission-critical devices to function on January 1, 2000. Thus, for Sonat, an example I am very familiar with, our Year 2000 Team has already worked to identify all of the hardware/software applications and service providers that are potentially susceptible to a Year 2000 problem.

If the existing electronic device was supplied by a vendor, we requested certification of compliance with the Year 2000. We quickly realized that relying on certification would be an inadequate basis to ensure our own compliance. As a result, we implemented a second assessment phase, where we assessed, essentially, every device with a mission-critical or mission-important criteria and have developed testing protocols, with which we have begun to test those devices.

Based on the work that we have done, in addition to operating safely, we believe that as a pipeline supported by the upstream and downstream segments of our industry and by the electronic and telecommunication providers that we rely on, the pipelines can operate reliably.

The other INGAA priorities are maintaining an accurate flow of gas accounting and protecting our internal business systems. These applications, in most cases, are the easiest to analyze, since they tend to involve main frame and PC-based systems. However, they can be very expensive for our industry to deal with because of the massive amounts of codes that may have to be rewritten and the cost and timeframe to introduce new systems.

While the pipelines believe that they themselves can achieve Year 2000 compliance as regards their own systems, we are very concerned with our interfaces, with our upstream and downstream suppliers, and with our customers, as well as the utilities and telecommunication providers that we rely on.

For this reason, we are reaching out to our customers, to service providers and to others to ensure that this is a coordinated effort and to maximize interface testing.

INGAA is recommending a natural gas industry conference, sponsored by the Natural Gas Council, in September to discuss preparedness issues. We will encourage all segments of the industry to participate, including service providers.

We believe sharing information and raising the visibility of the Year 2000 problem is the best way to ensure compliance. We are also working closely with the FERC to assist it in its role.

Now, what can this committee and the Congress do? Certainly raising visibility of the Year 2000 problem will help. It would also help if Congress would minimize significant electronic commerce initiatives in the next 18 months.

We all know that solving the Year 2000 problem requires a massive effort. We need to be spending our time working on this problem, not responding to new Government data requests, which require reprogramming and new reporting requirements.

Our industry is also concerned with the litigation risk that we and you foresee. We do not see how our economy can possibly benefit from the estimated \$1 trillion that may be allocated to seeking blame among the blameless for the consequences of an eventuality that was simply unforeseeable in the early decades of the computer industry.

In the time left to deal with this problem, we need to concentrate our efforts on engineering and systems. We do not need to worry about anticipated litigation, and the economy will not benefit from defending lawsuits with the plaintiff's bar in the aftermath.

INGAA, thus, suggests that the committee seriously consider limiting liability for 2000 events. Moreover, creating new sources of statutory liability will simply exacerbate the problem.

Finally, the proposed antitrust exemption for sharing information among competitors to address this problem is a very important initiative that you can undertake with almost no adverse consequences for our economy.

We congratulate you and thank you for your leadership on this critical issue and, together, we can solve this problem.

[The prepared statement of Mr. Rubright can be found in the appendix.]

Chairman BENNETT. Thank you very much.
Mr. Gardner.

STATEMENT OF GARY W. GARDNER, CHIEF INFORMATION OFFICER, AMERICAN GAS ASSOCIATION

Mr. GARDNER. Mr. Chairman and members of the special committee, good morning. I am Gary Gardner, chief information officer of the American Gas Association. I have over 16 years of information technology experience—with roots as a programmer, I wish we had used four dates instead of two, now that I think about it.

In the interest of time, I plan to summarize my testimony and ask that my full statement be included as part of the hearing record.

Thank you for inviting me to speak to you regarding the Year 2000 readiness of the natural gas distribution companies. AGA represents 181 natural gas utilities that deliver gas to 54 million homes and businesses in all 50 States.

Our members distribute 85 to 90 percent of the natural gas delivered in the United States. AGA and natural gas utilities are fully aware of the issues surrounding the Year 2000 and the possible impact on consumers and the economy.

Our industry views the Year 2000 issue as a serious one and has been working hard for the past 3 years to ensure the safe and reliable delivery of natural gas in the Year 2000 and beyond.

As with many industries, the issue was first viewed as an information technology issue and most activities were focused on traditional IT solutions. Over the last 2 years, the main focus has shifted to embedded systems and contingency planning.

With respect to contingency planning, our industry is very proud of its record in maintaining reliable service to our customers in the face of natural disasters and emergency situations.

Regarding the readiness of the natural gas utilities, we have gathered data from two sources within our industry for presentation to the committee today.

First, this spring, the Gas Research Institute conducted a survey which focused on natural gas distribution companies. The 49 companies that responded have customer base ranges from 35,000 customers to 4.8 million customers and are located in all parts of the United States.

Based on the responses, it was found that 90 percent were very confident in their ability to resolve software problems by December 1999, with most companies indicating they have been working on Year 2000 software issues for the past 2 to 6 years.

All respondents indicated that a formal enterprisewide assessment was being followed. Overall, 93 percent of the companies in the survey indicated they had completed the initial inventory and assessment phase and were in the remediation and testing phase of software code resolution.

In terms of embedded systems, 71 percent were confident in resolving embedded processor issues, with 84 percent indicating they are at the remediation testing phase of their embedded program.

And, finally, 80 percent expected their embedded systems will be Year 2000 compliant by June of 1999.

I would like to comment on the use of the term Year 2000 complaint. Year 2000 ready is probably the better term to referring to a company's readiness. For purposes of the survey, Year 2000 complaint means that the component is unaffected by Year 2000 dates.

Noncompliance, however, does not indicate a dysfunctional system. In the triage and prioritization process, component that are not mission critical may be intentionally bypassed prior to December 1999. Also important to note is most distributions have manual controls as back-ups, so getting around an embedded component issue should not be difficult.

For the distribution companies, the focus for embedded systems is to ensure that, on January 1, 2000 mission-critical gas delivery systems are working properly.

Another checkpoint of industry readiness were the observations of Stone and Webster, a management consulting firm active in the natural gas industry. To date, they have conducted 14 assessments for gas, electric, and combination companies. These companies have customer bases that range from 500,000 to 1.5 million customers.

Areas they have reviewed included utility operations, upstream critical service providers, which includes electric, water, telecommunications, downstream customers and vendor supply chains.

From the entry point into the distribution system to the end-use meter, you will typically find 50 to 100 systems with embedded processing. Those are located in such areas as storage fields, gas control and management operations, metering and facilities, and find embedded processing in systems such as compressor controls, flow calculations, supervisor control and data acquisition systems, or SCADA systems, control computers, correcting devices, mobile devices, instrument calibration systems, HVAC, and security systems.

The process to address and identify embedded systems typically involves system identification, determining manufacturer compliance, and performing upgrades and replacements. Based on complexity, this process could take 12 to 18 months to complete.

In terms of specific findings from Stone and Webster, systems with embedded processing within large and small gas utilities are essentially similar, plus utilities are fairly consistent in devices they use. As mentioned before, many possess manual override options.

A number of critical operation systems, those that directly affect the delivery of gas that have exhibited weakness in Year 2000 compliance, have been running between 5 and 10 systems. The systems which usually have compliance issues are the SCADA systems within an organization.

In summary, our Nation's natural gas utilities are actively and aggressively addressing Year 2000 issues. Segments within the natural gas industry, production, transmission, and distribution are collaborating and working closely in the assessment and resolution of issues.

While our members are at varying levels of degree of compliance, a very high level of confidence is present regarding the safe and reliable delivery of natural gas. As mentioned, because the success of our industry relies on the delivery of services and because we have established proven contingency plans to handle crisis and emergency situations, we are prepared to handle the issues related to the Year 2000.

Our industry is totally focused on ensuring the delivery of energy to the U.S. consumer, our customer.

Thank you for the opportunity to testify, and I look forward to any questions you may have.

[The prepared statement of Mr. Gardner can be found in the appendix.]

Chairman BENNETT. Thank you very much. We appreciate all of you and appreciate your testimony.

I would like to ask all of the other panelists if they would like to comment on Lou's deadline of December 31, 1998, and the assessment of the importance and timing required for testing and implementation.

Does anyone wish to respond?

Mr. SIEBENTHAL. I think it is well-known, Mr. Chairman, that certain software systems do have a problem with the rollover to 1999. We are not aware at this point in time of any embedded systems that suffer from that same problem, but our test programs do use that as a critical date.

Chairman BENNETT. Any other reaction to that?

Mr. GARDNER. I would just say, as far as the software side of it, again, in the evaluation of what has taken place in the environment, that certainly the software issues are ahead of the game. As far as where the embedded are, and certainly from discussions with our members, as far as where they are with software remediation and testing, that I understand of plans and testing that they are doing this summer, software testing could be completed by that date. On the embedded side, I believe it will go past that date.

Chairman BENNETT. Lou, what is your reaction?

Mr. MARCOCCIA. I think there is a system—and correct me if I am wrong—the GPS system that is associated with the tankers that actually has a deadline that will not work in 1999. That is certainly my understanding. I am certainly not an engineer, but every time I brought that issue up since 1995 or 1996 I have not had one engineer or organization tell me I am incorrect.

I visited several organizations on the embedded system side that deals with tankers that have agreed with me that, in fact, there is a 1999 date that is involved with the tracking of all tankers.

Mr. SIEBENTHAL. Mr. Chairman, it is my understanding that that critical date is August 20, 1999. I do not know why that date is a problem, but that is supposedly a problem. It is also my understanding that the Air Force is supposed to be fixing the problem in satellites, but that the people on the ground have to fix their own receivers if there is a problem with the receiver.

Mr. MARCOCCIA. That is correct. The August 20, 1999 date is a hard date that is in that system that is real and will stop. We have known about that problem for several years, and that problem is still not resolved by enough organizations that I am concerned about it.

If they cannot handle, and the way I look at this, if they cannot handle a known problem from several years ago, how difficult will it be to handle a problem that they are not aware of that will creep up sometime in 1999?

Chairman BENNETT. My own sense of things, as I have immersed myself in this issue, is that January 1, 1999 will be a bigger event than we currently think it will be.

Mr. MARCOCCIA. That is right.

Chairman BENNETT. And, in a way, that is good because that will trigger the awareness of the fact that this really is coming. People who think that nothing will happen until New Years Eve are going to get a wake-up call.

Now, Lou, you are nodding and saying that is correct. Do any of the rest of you agree that January 1, 1999 has the potential of pro-

viding us with a serious jolt along the way? I am not suggesting that the power grid is going to go down on January 1, 1999, but I think we will have some rude wake-up calls on that date in areas that we are not aware of.

Are you prepared to reassure me or reaffirm me in that assumption?

Mr. GENT. Mr. Chairman, I wish it were black and white like that. There are a number of power pools and——

Chairman BENNETT. You have never dealt with the media. It is always black and white. [Laughter.]

Mr. GENT. Well, I read in the media this morning that we have a 40 percent chance of making it through the Year 2000, so I am comforted by that.

Chairman BENNETT. Do not be. That is my assessment. [Laughter.]

Mr. MARCOCCIA. And I certainly concur.

Mr. GENT. There are a number of software programs in play right now that deal with planning ahead and trying to commit resources for the next hour, the next day, the next month, and the next year, and I suspect that we will run into glitches in that software all along the way.

I can tell you that a lot of that software is being tested. What we do not know is has every piece of software been tested? For instance, I am personally aware of one major power pool that has tested, found a problem, and fixed it. I cannot assure that the other 50 organizations that operate with their own similar software have made that test. But that is what part of what the NERC program is intended to do—to coordinate these activities so that we are all aware of the problems. We take a look, develop checklists, and proceed in an orderly way to correct the problem.

Chairman BENNETT. Before I turn to Senator Dodd, let me, for those who may not have understood this quick exchange about the 40 percent, make it very clear what I have said there.

If the Y2K problem were this weekend, as opposed to 18 weekends [sic] away, there is 100 percent probability that the grid would fail. I do not think there is really much debate there. Fortunately, it is not this weekend. It is 18 months away, and we have 18 months to work on it, and when pressed by members of the press to come up with a number as to what percentage there is that the grid would fail 18 months from now, I have said it is less than 50/50, and I have put it at 40.

But I make it very clear I am willing to move that peg as we get more information. When we get the study from NERC we may say, no, the 40 is far too doomsday, and it is really 30 or 25 or 20 percent the grid will fail or we may say, holy cow, let us go back up to 50/50 shot that the grid will fail.

But I use that to illustrate the challenge we are facing here. We have a system right now which, if we had no time, is in failure. I think it is important that people understand that. There is not a chance that it will fail. There is not a percentage that it will fail. It is a certainty that if the Year 2000 were to hit us today at the state of readiness we are in today, the power grid would fail.

Now, we have 18 months to work on that, and what can we accomplish in that 18 months to get us to the point that we have to

be? And as Senator Dodd said in his opening statement, failure is not an option. So we have to use the 18 months as wisely and as in focused a fashion as we possibly can.

Vice Chairman Dodd.

Vice Chairman DODD. Thanks very much, Mr. Chairman.

Let me, if I can, I want to ask—I think all of you were sitting in the room when I raised the issue with Mr. Koskinen on the issue of the larger company that very honestly and courageously responded to the questions the committee had asked about Y2K readiness. I think it is a good suggestion to talk about readiness rather than compliance. It is probably a better word to use. The public may understand it better as well.

Let me ask all of you, basically, the same question I asked him. You are all knowledgeable people. Some of you work a great deal in this area.

The answer to the question obviously was that it would not be cost beneficial to count their systems with a possible Y2K problem was the response of the company at the time.

So I have four questions for you. Is that an acceptable answer? Based on these answers, does this company have a chance to meet the millennium deadline? What should be done, if we know in advance that a major energy producer is not going to be Y2K ready? And what contingency plans need to be in place to deal, in your view, with such an eventuality?

Lou, why do we not begin with you.

Mr. MARCOCCIA. Sure. The first question is no.

The second question is no, and what should probably happen, the project manager for that organization should probably commit suicide, and that is what I certainly would recommend. I certainly want to echo the comment about that one firm. I, personally, know of several utility organizations that have not placed one line of code back in production being Year 2000 compliant, and they have over 30 million lines of code. So it is not one, Senator, it is many utility organizations.

And for software and embedded systems, and more so software, the deadline is 12/31/98 because of the timeframe that it takes to test these systems. And if you want to do some integration, what happens, if you do not get it done at that point, even though it looks good on paper, the risk actually goes up tremendously because of that.

So it is not just one company. I would not be concerned if it was one. It is many companies that fall into that category.

What should happen, one, if that organization has an incentive plan that pays bonuses, the bonus plan should be based on implementing Year 2000. It is amazing, when I work with companies and when I get the CEO to change a bonus plan, which I did for a major organization, it is amazing how the management of that organization actually are very aware of the Year 2000, and it is simply not good enough to be aware and concerned.

Let me give you an analogy, if I can. I am absolutely aware and concerned about my weight problem. I have the best gym equipment in the basement. It is not good enough to be aware. I have to turn that awareness and that concern into action, and that is what is missing.

Awareness and concern is simply not good enough June of 1998. Action has to occur. What I certainly heard today, based on what I heard—I have not read the reports—very little action and a lot of awareness, and concern, and reports, and meetings, and no real action that people—this is a dirty job. This is digging a hole in the back yard, and I have not heard any of that. What I have heard was analysis, reports, assessments, review, generic letters, and nothing about the how and where we are.

So I would change the management, so that actually changes. I would develop a war room, and I would develop a triage that says, “We are not going to get 100 million lines done. What can we get done in that operation?” and then take that hit because that organization will not be completely Year 2000 ready.

Many firms, also, and it has not been brought up, one of the additional problems in the Year 2000 is that firms have what is called a legacy clean-up dirty shop problem. So a firm that has 40/50 million lines of code probably only has 20 million lines that is really production, and they can eliminate 20 million lines of code. The problem is it takes 2/3/4/5 months to decide and figure out which of those modules and jobs are really production, so they can actually work on them. That is a big problem that many organizations have.

Vice Chairman DODD. Gentlemen, I suspect you might have some alternative suggestion for the gentlemen responsible for this. [Laughter.]

But I appreciate your colorfulness, Lou, here.

Mr. GENT. Under no circumstance, do I want to make this sound like it is not a problem, but in direct counter to some of my colleague's suggestions, I am aware of a number of instances that—it is not up to me to disclose—but a number of instances where utilities have tested both code and equipment, found them to be incorrect or at fault, corrected the problems, and put them back in service. You notice he carefully chose his words, placed back in service.

Starting at the bottom of your list dealing with contingency plans, others have discussed how they handle contingencies, and I do not want to paint this as just another contingency, but I want to remind you that in the operation of these Interconnections, we deal with contingencies every day. The whole system is planned on the possibility of contingencies, credible contingencies. The way that we will approach this problem is that it will become a huge contingency.

I almost take issue with the 100 percent probability of failure that you are using, Senator, because we have a time zone lag rolling across the country. I think we are quick enough to be able to take advantage of time zone lag and learn within an hour, if you can believe that.

NERC recently installed an incredible telecommunication system for communications among the 23 security coordinators across North America. It has been proven to be Y2 compliant. So I am not sure this doomsday scenario is absolutely correct. I would not want to go public countering your 100 percent, but I just have.

Senator Dodd, I suggest if you ask that question of that company again you would get an entirely different answer after this public

disclosure of your opinion of the answer and the other answers that have been expressed here today. I find it inconceivable that a \$20 billion revenue company has not vigorously attacked this problem.

Mr. SIEBENTHAL. I cannot add anything to improve Mike's discussion of the reliability issue and the 100 percent issue.

I think, Senator, you have to be careful with surveys. We do them all the time to find out how people like our programs, et cetera, and the only people who respond are the ones who do not like us.

But, seriously, a \$20 billion company probably has many, many business units, many, many companies and probably each one of those companies is doing that because they are managing the budget that way. But the holding company probably does not really have any idea over maybe 10 different corporations in 20 different countries what the sum total are.

Now, we can argue—

Vice Chairman DODD. I hope you are right. But we asked the question. They gave us the answer.

Mr. SIEBENTHAL. Yes.

Vice Chairman DODD. If you got that answer, how would you react?

Mr. SIEBENTHAL. I am very surprised. I find it hard to believe that that is the correct answer. With Mike, I just cannot believe that a company that size—

Vice Chairman DODD. I think you are answering my question by suggesting you do not believe the answer because if you did believe the answer you would be more than surprised, you would be shocked, correct?

Mr. SIEBENTHAL. Yes. Correct.

Vice Chairman DODD. Any difference in that? Listen, I am just repeating what we have been told. I am not—

Mr. RUBRIGHT. I agree that it strains credibility. I take the statement on its face.

I think that the recommendations that INGAA made are all directed toward sponsoring cooperation. What contingency plans can you make? We all must realize that there are people who will be in various stages of readiness and, apart from assessment, as you get into the execution of your plans, no matter where you are, there will be people who are surprised by their inability to execute as they had intended.

So as this problem becomes closer to the date, the ability of existing industry participants to benefit from the knowledge and experience of other industry participants and to focus on what is absolutely necessary will become increasingly critical if it is not critical today.

That is why we are suggesting that any impediment that you can remove to cooperation between industry competitors, between upstream and downstream suppliers, is essential and would be extremely helpful.

Vice Chairman DODD. I guess I know maybe your answer to this. To the extent that the Federal Government, FERC, Department of Energy is a clearinghouse for this information, we listened to these two representatives of the DOE, the chairman of the FERC, say they really did not have any authority, any power to do anything

about getting information. I was a little surprised at that. I probably thought they had more. I was sort of stunned that they did not.

In addition to what other recommendations you are making, should they have more authority to be able to get this information?

Mr. RUBRIGHT. I think they can request the information, and the power of their request, particularly in light of the visibility that has developed, will increase the access.

I do not personally believe that the Government has the time to fix this problem itself.

Vice Chairman DODD. No, it cannot fix it. I agree.

Mr. RUBRIGHT. It has to motivate private industry to do so and remove impediments for it to do so. I think that is the approach that our regulatory bodies have taken, and so when they have seen us take initiatives, such as the Natural Gas Council initiative, they are very quick to support them and say, "What can we do to support your initiatives?" because the solution will only come from the people with the resources, and that is private industry.

Vice Chairman DODD. Thanks very much.

Mr. MARCOCCIA. But, Senator, it is true that maybe they have restrictions, but the problem is, if they do not have any control, then how can they state that everything appears to be fine, and they are OK. You cannot be on both sides of the coin. If you do not have control, at least use the bully pulpit and articulate what you think the realities are.

I just find that to be inconsistent. You do not have control, but things are great. Well, how do you know things are great if you do not have control? I do not understand how you can link those two together.

Vice Chairman DODD. That is what we are wrestling with here, Lou. I appreciate that. I do not disagree. As we heard from the Nuclear Regulatory Commission and others, I like the fact that they are asking the questions, but it is getting a high degree of concern that we come down to a point here where we do not know more about it, and what we do know about it is alarming in terms of whether or they are going to be ready by the Year 2000 to respond to those issues, and then have the problem emerge, not only, and I have been sympathetic on litigation reform issues, but I do not need to tell you here what is going to happen in these areas.

Mr. MARCOCCIA. It is going to be the same old story. When I started on my crusade in 1991, most people thought I was nuts. When I had the plan to implement Year 2000, people thought I was nuts. And the last 2 years, as a matter of fact 18 months, I have been able to sign up 38 major companies in the United States, and the last 18 months I have gone from being in debt to being a multi-millionaire. If this flies, there is reason why this flies around.

And what I am here to say, Senator, that it is an issue, and I think one of the reasons that it is not being addressed because we have not had a national spokesperson take up the bully pulpit. What we hear all the time is the Internet and everything else, but we have not had a national spokesperson that has really grabbed onto it and made the headlines in the papers.

I have, basically, in the last several years, been talking to almost every project manager of the major Federal Government agencies.

I remember being in the DOD's office at a very high level, I don't know, about a year ago/year-and-a-half ago, and they were very proud. They did an assessment of 3,500 applications. And then when I asked the question, "At this rate, you would have to implement in production seven applications a day, seven applications a day," and that was over a year ago, and the shift has not occurred. The Federal Government has not made the shift, and that only has happened in the last few months.

There has to be a national spokesperson, and I——

Vice Chairman DODD. I hear you. That is why we are here today.

Let me, if I can, just quickly, to EPRI, I am impressed with the work that you are doing providing a clearinghouse of that information. One of the concerns I have is some of the manufacturers of these embedded systems are no longer in business, as I am told. What can you do about that particular problem in terms of getting information from the manufacturers?

Mr. SIEBENTHAL. Virtually nothing, although the manufacturers will work with us on those issues. But one has to understand the manufacturers have two problems. They have to fix their own manufacturing line, so they can stay in business, and they have to help us fix the products which they have sold us in the past.

Legacy products of the kind that you have talked about have to be tested by the current owner. There is virtually no alternative to that, and that is what we are recommending to all of the participants in our program.

Vice Chairman DODD. Do you have any sense of numbers on this, what we are talking about in terms of the numbers or percentages of manufacturers of embedded chips that are out of business?

Mr. SIEBENTHAL. I really do not, sir. In many cases, you will find that something you bought 10 years ago has passed through the hands of five or six subsequent purchasers, and through mergers, and it is almost not worth, if I can use the word that your Fortune 500 company said, it is not cost-effective to try to figure that out. It is better to go test it and make your own decision.

Vice Chairman DODD. I apologize, again, Mr. Chairman.

Chairman BENNETT. Not at all.

Vice Chairman DODD. Thank you all very, very much. I appreciate your willingness to be here with us today.

Chairman BENNETT. Yes. Thank you. I will not debate with you whether or not a current failure is absolute or whether there are contingency plans because we are not going to get a failure this weekend. So it would be a worthless kind of intellectual exercise.

But my point, regardless of what number you put on it, is I think one that you have helped us make, which is that the present system is clearly in jeopardy, the jeopardy is serious, the impact on the Nation would be incalculable if it were not fixed, and we need to do the very best we can to get it fixed and to raise both the awareness and, as Lou points out, the level of action that comes as a result of the awareness.

This hearing was scheduled for that purpose and, if I may, I think we have accomplished that purpose, at least to the degree that it is possible for any Senate hearing to produce that result.

Thank you all. The committee stands adjourned.

[Whereupon, at 12:30 p.m., the committee was adjourned.]

APPENDIX

ALPHABETICAL LISTING AND MATERIAL SUBMITTED

PREPARED STATEMENT OF CHAIRMAN ROBERT F. BENNETT

Good Morning, and welcome to the inaugural hearing of the Special Committee on the Year 2000 Technology Problem. This special committee was formed pursuant to Senate Resolution 208, introduced by the Majority and Minority Leaders of the Senate on April 2, 1998 and which was passed unanimously by the Senate. The jurisdiction of the special committee extends beyond the public sector into the private sector.

As result, this Committee will be hearing from the utility industry, specifically gas and electric utilities, today. Subsequent hearings will look into the year 2000 preparedness of health services, telecommunications, financial services, transportation, general government services, and general business. We will also look into the legal liability of firms who become the subject of court suits due to year 2000 technology problems.

I have some disturbing news to report this morning. In order to prepare for today's hearing, I directed Committee staff to conduct a formal survey. The survey was of modest proportions including only ten of the largest electric, oil, and gas utility firms in the U.S. I wanted to know the status of their Y2K preparedness. While the survey is not statistically representative of the entire industry, it does include geographically dispersed firms engaged in all aspects of power generation, and gas and electricity transmission and distribution.

I had anticipated that I would be able to provide a positive report on the Y2K status of these public utilities. Instead, based on the results of this survey, I am genuinely concerned about the prospects of power shortages as a consequence of the millennial date change.

Let me share a few of the survey findings: Only 20 percent of the firms surveyed had completed an assessment of their automated systems. One firm did not even know how many lines of computer code it had. Experts have testified before my banking subcommittee that any major firm that has not already completed its assessment, can not hope to become Y2K compliant by January 1, 2000.

None of the utilities surveyed were assured after making inquiries that their suppliers, vendors, and servicers would be Y2K compliant. Utilities are highly dependent on servicers, suppliers, and other upstream activities to transmit, and distribute gas and electricity. In fact, many power distribution companies are ultimately dependent on foreign oil imports.

None of the firms surveyed had completed contingency plans for Y2K related eventualities. Even though all of these firms are required by their regulators to maintain emergency response plans, none had completed a Y2K contingency plan. My concern is that they probably don't know what contingencies to prepare for.

The last question on our survey asked for recommendations. One respondent, after making several recommendations made the following profound statement: "Whatever actions are taken by Congress, they must be done quickly, during this session, or they will have no impact on the Y2K problem."

I am personally concerned that the Y2K problem is receiving so little public attention. I am concerned that when it does become a matter of general public concern that it will be too late to bring pressure to bear on the timely correction of the many Y2K problems that exist. My greatest fear is that when it does become a matter of general public concern, it will bring with it a measure of panic that will be detrimental to effective and efficient remediation of the problems that will present themselves.

For the private sector, I define the Y2K problem in much broader terms than what I see generally discussed and reported in the trade press which is where many

of the Y2K problems are reported. The problem is more than a computer's ability to function on January 1, 2000. It includes not only computers, it includes embedded systems, such as process control units.

I read a story recently about a major oil company that tested one of its oil refineries. They found that the refinery had 90 separate systems that somehow used a microprocessor. Many of these were key systems. Of the 90 systems, they were able to come up with detailed documentation on 70. Of these 70, they determined that twelve had date dependent embedded chips. Of the twelve, four failed a Y2K test and will have to be replaced. Had any of the four failed on January 1, 2000, they would either have completely shut down the plant or would have caused a high level safety hazard which would have caused other systems to shut it down.

What is really worrying the company's experts now is the other 20 systems. They don't know what functions the chips in these systems have and are leaning towards replacing them all. This happens to be a relatively modern plant.

On June 8th, U.S. News & World Report ran a story concerning a Midwestern electric generation facility that was taken off-line to test for Y2K compliance. When the test clock was rolled forward to January 1, 2000, a safety system mistakenly detected dangerous operating conditions and shut the generator down. After three days, they reran the test, only to have a different sector fail, shutting down the generators again.

Another area of the Y2K problem is interfaces. Interfaces sometimes exist between systems within a company, and sometimes exist between a servicer, supplier, vender, or customer. It is important that Y2K remediation corrections among these parties be compatible.

Infrastructure plays an important supporting role for almost any business. Utilities, for example, are dependent on transportation, telecommunications, water and sewer facilities; all of which are critical to continuous business operations.

Ripple effects are an important concern. If foreign oil production is not Y2K compliant, or if oil tankers' navigation and propulsion systems are not Y2K compliant, what effect will that have on our electric generation facilities that are dependent on petroleum products to generate power?

Government services are frequently taken for granted, but are an area of significant concern. I know of no Federal data bases or information systems that are not computerized. We rely heavily on government services for mail delivery, transportation, financial services, water and waste treatment facilities, just to name a few. If, for example, the Coast Guard ships operating in the vicinity of the Alaska Pipeline are not Y2K compliant, we could find timely shipments of Alaskan oil jeopardized.

I find these categories useful in evaluating the breadth of the Year 2000 problem. I would encourage our witnesses to consider them as they make their presentations today.

Y2K COMMITTEE ANNOUNCES SURVEY RESULTS MEASURING Y2K PREPAREDNESS OF NATION'S LARGEST UTILITIES

[Survey conducted by the staff of the Senate Special Committee on the Year 2000 Technology Problem]

EXECUTIVE SUMMARY

The Special Committee on the Year 2000 Technology Problem recently completed a survey of ten of the largest oil, gas, and electric utilities in the United States. The purpose of this survey was to determine the status of the utility industry in terms of its year 2000 (Y2K) preparedness.

- Based on the survey results, we conclude that while these utilities are proceeding in the right direction, the pace of remedial efforts is too slow and the associated milestone dates are so distant that there is significant cause for concern.
- It is also clear from the survey responses that despite substantial completion of initial assessments, firms are not confident that they have a complete and accurate picture of their present Y2K compliance, making assurances of timely Y2K compliance little more than a hope.
- Experts contend that the most difficult aspects of remediation are in the renovation and testing phases; most of the firms surveyed have not begun these critical phases of remediation.
- Utilities' ignorance of the Y2K compliance of critical suppliers, vendors, and servicers and their lack of assurances from same create additional uncertainty for utility consumers.

—Since the firms tested are among the largest utilities in their fields with the most available resources, we are pessimistic about the implications for the rest of the utility sector.

PURPOSE AND METHODOLOGY

We asked survey respondents for information on their automated systems used to manage and operate their respective utilities; these include both their computers systems and embedded systems such as process control units used in their production and distribution systems. While the survey is not statistically representative of the utility industry at large, the inclusion of 10 of the largest oil, gas, and electric utilities, including generation, transmission, and distribution facilities, ensures broad representation of the industry. Pledges of confidentiality were made to survey respondents in order to facilitate honest and candid answers to survey questions.

Other studies have concluded that smaller utility companies are not as advanced in their Y2K preparedness as their larger counterparts. Hence, the results presented here probably represent the best prepared portion of the industry.

FINDINGS

The utilities surveyed generally did not become aware of their Y2K problems until 1995 or later. Each of them has since created a formal Y2K project within their firm. Unfortunately, only 2 of the utilities surveyed reported that they have completed the initial assessments of their automated systems, especially on the embedded systems side where 4 firms were unable to identify how many embedded systems they have in service.

All of the survey respondents reported using outside consultants or contractors in combination with in-house personnel in their Y2K assessment. All of the companies reported significant numbers of automated systems, with one firm reporting over 300,000. The typical firm reported about a third to a half of its systems were mission critical.

Of those who had identified their embedded systems, there was a wide variation in the number reported. Some firms reported numbers of embedded systems by type of application while others reported on a detailed inventory basis. In general, embedded systems assessments have lagged computer systems assessments. We were told that this is because the problem in embedded systems was not apparent until recently.

Costs for remediation also varied significantly, due perhaps to the fact that the companies involved were not homogeneous in terms of service provided and the types of assets in place, as well as the fact that final assessments are not complete. Two firms were unable to report their projected remediation costs. Notwithstanding the variation in estimated remediation costs, the total projected cost of remediation for the survey firms was over \$400 million.

The typical utility surveyed expects to renovate about 75 percent of its noncompliant systems and to replace or retire the remainder.

All of the firms surveyed were optimistic that they would have their mission critical systems renovated or replaced by January 1, 2000; however, most implied that remediation efforts for non-mission critical systems would still be on-going after January 1, 2000. All the firms surveyed reported checking with suppliers and servicers, but few of them received assurances of uninterrupted service and many are having difficulty obtaining responses to their inquiries. This creates some additional uncertainty for continuous utility service after the millennial date change depending on the criticality of goods and services provided by vendors, suppliers, and servicers.

While most surveyed firms recognized a potential for legal problems and/or liability in conjunction with the millennial date change, several indicated that they did not anticipate legal or liability problems even if suppliers and servicers failed to make timely deliveries. Nonetheless, each firm surveyed indicated that it had received inquiries regarding its Y2K preparedness from regulators, creditors, and/or stockholders/investors.

None of the utilities surveyed had completed contingency plans, for potential eventualities associated with the millennial date change. Most of this effort will be done in conjunction with standing disaster recovery or emergency response plans.

One of the more interesting parts of the survey asked about the need for congressional action. Fifty percent responded that they needed the ability to share Y2K information and best management practices more freely among other companies without fear of legal reprisal. Since the Justice Department (DOJ) addressed this issue last week, we assume the DOJ information has not been widely distributed. Twenty percent suggested the need for a liability limit, and 10 percent suggested a need to

defer Gas Industry Standards Board implementations so that all available resources can be focused on Y2K remediation efforts.

SENATE COMMITTEE ON THE YEAR 2000 TECHNOLOGY PROBLEM RESULTS OF UTILITIES SURVEY

Company	Date aware	Establish formal project	Assessment complete	Percent systems mission critical	Status of service providers/vendors	Legal or liability concerns	Contingency plans complete	Contacts by creditors	Contacts by investors	Will you finish in time
1	1995	Yes	No	54	?	Yes	No	Yes	.....	Yes
2	1995	Yes	Yes	5	?	Yes	No	Yes	Yes	Yes
3	1996	Yes	No	?	?	Yes	No	No	Yes	Yes
4	1992	Yes	No	30	?	Yes	No	Yes	Yes	Yes
5	1995	Yes	Yes	50	?	No	No	Yes	Yes	Yes
6 .....	.....	Yes	No	?	?	Yes	No	Yes	Yes	Yes
7	1996	Yes	No	?	?	Yes	No	Yes	Yes	Yes
8	1996	Yes	No	25	?	No	No	Yes	Yes	Yes
9	1996	Yes	No	35	?	Yes	No	Yes	Yes	Yes
10	1996	Yes	No	18	?	No	No	Yes	Yes	Yes

Notes:

1. The eight companies that reported cost expect to spend over \$400 million collectively on Year 2000 problems.
2. While no company had completed contingency plans, all but one had begun planning.

Source: Committee staff.

PREPARED STATEMENT OF VICE CHAIRMAN CHRISTOPHER J. DODD

Thank you Mr. Chairman. This is the special committee's inaugural hearing and I want to extend my congratulations to you for getting us to this point.

If it weren't for your tireless—and sometimes lonely—efforts to raise the Senate's awareness about the Year 2000 problem, I doubt very much if we would be here today.

When I was back in Connecticut last weekend, I noticed a fair amount of advertising for New Year's eve 1999 in which the question was asked: "Where do you want to go for New Year's? Make your plans today!"

While I don't know where anyone else wants to be, let me suggest three places you don't want to be: In an elevator, in an airplane or in a hospital.

The fact is that with less than 18 months to go, I am very concerned that we are going to face serious economic dislocations from this problem.

And I am very, very concerned that even as government and business leaders are finally acknowledging the seriousness of this problem, they are not thinking about the contingency plans that need to be put into place to minimize the harm from widespread failures.

Senator Bennett is fond of likening this committee to Paul Revere, saying that we have to sound the alarm that the millennium is coming; well today's hearing should answer the question about whether there's going to be any lights shining out of the old north church.

Some people have asked why we are starting our hearings with the power industry. The answer is brutally simple: Without electricity nothing else works.

And the power industry provides a good model for thinking about the Year 2000 in a lateral, rather than vertical, manner.

By that I mean that a corporate executive or government official can't simply look at the four corners of their business or agency and ignore the outside world.

Say, for example, you took all necessary steps to make your home Year 2000 compliant—you updated your pc and software, you replaced your answering machine, you determined that the vcr and microwave would still work and you put a brass knocker on your door as a contingency, just in case your new, modern doorbell didn't work.

Even though you were vertically complete, you still have to worry about the electricity, your water, the mail, cable and phone service and so on.

That analogy illustrates the way business and government must also think about the Year 2000 problem.

Since all the utilities are tied together in the power grid and are dependent upon a whole series of steps in order to function, it is an excellent illustration of how you cannot simply focus on one's own company or agency, no matter how big or little, and declare it Year 2000 compliant.

Senator Bennett mentioned that the special committee conducted a survey of major energy producer and it revealed that we are not in very good shape.

Quite honestly, I think we're no longer at the point of asking whether or not there will be any power disruptions but we are now forced to ask how severe the disruptions are going to be.

Given the brevity of time left before the millennium conversion, contingency planning has to start today—not just for the worst-case disaster scenarios but for all the medium-sized disruptions that are more likely to occur.

One thing that I've noticed is that every company, government agency or trade association that I've met with has a nice neat chart showing the timeline for completion of their Year 2000 project.

My deep concern is that those nice, neat little charts will be blown to smithereens the moment they start testing their repairs.

I have been constantly surprised by senior Year 2000 officials who say with one breath that testing will take just as long as fixing the code, and say with the next breath that they need only a few months for complete system testing after fixing the system took years.

Now while it took me a while to figure out the difference between an embedded chip and a wood chip, I certainly can do enough math to determine that there isn't a single company or government agency that is leaving itself any margin of error in these neat little charts they're so fond of showing.

It's been said before, but it bears repeating: Failure is simply not an option. If the critical industries and government agencies don't start to pick up the pace of dealing with this problem right now, Congress and the Clinton administration are to have to make some very tough decisions to deal with a true national emergency.

[From the Washington Post, June 12, 1998]

PENTAGON FAULTED ON YEAR 2000 REPORTS INVESTIGATORS FIND UNRELIABLE
ACCOUNTING OF COMPUTER SYSTEM COMPLIANCE

(By Stephen Barr)

When it comes to computers and the Year 2000 glitch, the Pentagon's compliance checklist doesn't always produce compliance. An investigation by the Defense Department's inspector general found that computer system managers turned in reports listing critical technology systems as ready to accurately process and calculate dates in the next century even though the systems had not received such certification.

The prospect of incorrect information in the Year 2000, or Y2K, progress reports has raised concerns about the integrity of the process used by top Pentagon and White House officials to track computer repairs and to make contingency plans for any possible technology crisis on Jan. 1, 2000.

"Senior DOD management cannot afford to make Y2K program decisions based on highly inaccurate information," the office of the inspector general concluded in its report on the matter. "If DOD does not take the action that it needs to obtain accurate information as to the status of its Y2K efforts, we believe that serious Y2K failures may occur in DOD mission-critical information technology systems."

Rep. Stephen Horn (R-Calif.) raised the report at a House subcommittee hearing Wednesday on Year 2000 computer repairs. "I thought we were past the days of the Vietnam body count," Horn said as he inquired about Pentagon plans for "improved honesty of compliance."

William A. Curtis, a retired Army combat officer recruited by the Pentagon 60 days ago to shape up its Year 2000 computer repair program, did not dispute the findings.

"We have got to have the most accurate data * * * and not be shooting the messenger," Curtis told Horn.

Curtis and Sally Brown, a Defense official involved in Y2K compliance efforts, said they did not believe system managers were trying to intentionally mislead superiors on Y2K progress.

The Year 2000 problem stems from the use in many computers of a two-digit dating system that assumes that "1" and "9" are the first two digits of the year. Without specialized reprogramming, the systems will recognize "00" not as 2000 but 1900, which could cause computers to shut down or malfunction.

Overall, the Pentagon is running at least four months behind schedule on its timetable for Year 2000 computer fixes and estimates that it will spend about \$1.9 billion on the problem. The department has about 25,000 computer systems, with about 2,800 designated as "mission critical."

They include command and control, satellite, inventory management, transportation management, medical and equipment, and pay and personnel systems.

At the Defense Department, Year 2000 policies say that computer users cannot assume a system will successfully operate in the next century until it has been certified by a system manager. A computer system is not certified until the system manager signs a Y2K compliance checklist, the inspector general's report said.

But when the office of the inspector general sampled 430 computer systems that the Pentagon had reported as Year 2000 compliant in November 1997, it found that defense officials could not provide documents to show they had followed proper procedures. Using a statistical model, the office concluded "that between 265 and 338 systems were not certified," although the systems had been reported to senior management as certified.

In addition, investigators found that "the existence of a completed and signed Y2K compliance checklist did not always mean that the system was Y2K compliant."

They did not identify the systems by name or function, but the computers were reportedly being used by large Defense agencies, such as the Army, the Air Force, the Finance and Accounting Service, the Special Weapons Agency and the Defense Logistics Agency.

The report, issued last month, underscores the problems federal agencies face as they try to define such terms as "Y2K compliant" and "Y2K ready."

The Agriculture Department, for example, recently reported 15 systems as compliant, even though they were only in developmental stages, said Joel C. Willemssen of the General Accounting Office.

In the Pentagon's case, the report from the office of the inspector general said the department's Year 2000 management plan did not clearly describe the certification process or the specific requirements for systems managers.

"The word certified had so many different kinds of meanings that it had lost all its meaning," Brown said yesterday.

A new management plan will be published within the next few days to clarify procedures and expectations, Curtis said. Some Defense agencies also have decided that it is no longer appropriate for only one person to sign off on a certification and now require senior managers to participate in the decision, he added.

To help accelerate its repair effort, Curtis said, the Pentagon plans to set up a High Risk Systems Board to oversee each computer system in Y2K jeopardy and will form a 250-person evaluation force to independently validate the fixes and testing for the Pentagon's most important systems.

PREPARED STATEMENT OF GARY W. GARDNER

OPENING REMARKS

Mr. Chairman and members of the select committee, Good Morning, I am Gary Gardner, Chief Information Officer of the American Gas Association. Thank you for inviting me to speak to you regarding the status and readiness of natural gas distribution companies as it relates to Year 2000 (Y2K) issues. Our industry views the Y2K technology issue as a serious one and has been working hard to ensure safety and reliability in the natural gas distribution chain.

The American Gas Association (A.G.A.) represents 181 local gas utilities that deliver gas to 54 million homes and businesses in all 50 states. Our members distribute 85-90 percent of the natural gas delivered in the United States. Additionally, A.G.A. provides services to member natural gas pipelines, marketers, gatherers, international gas companies and a variety of industry associates.

BACKGROUND

A.G.A. and gas utilities have been fully aware of the issues surrounding the Year 2000 and the possible impact on U.S. citizens (our customers) and the economy. Natural gas utilities have always been committed to ensuring the safe and reliable operation of our delivery systems. As a result, our industry has been heavily working on Y2K issues for the past three years. As with many industries, the issue was first viewed as an information technology (IT) problem and most of the activities were focused in the internal IT departments of our companies. Over the last two years, the major emphasis has shifted to the issues surrounding embedded systems and contingency planning.

With respect to risk management and contingency planning, our industry is very proud of its record of maintaining reliable service to our customers in the face of natural disasters, extraordinary weather conditions and emergency situations. Our contingency planning efforts are based on years of experience in operating safe delivery systems for consumers.

INDUSTRY SURVEY

In an effort to provide specific information regarding the preparedness of the U.S. natural gas utilities, A.G.A. has gathered data for this hearing from active players in Y2K issues within our industry. First, the Gas Research Institute, the research, development, and commercialization organization of the natural gas industry, conducted a survey in May, predominately of local natural gas distribution companies. The companies which responded to the survey have customer bases that range from 35,000 to 4.8 million. The objective was to assess the Y2K status and need for collaborative efforts supporting Year 2000 resolution.

Preliminary results, based on responses of 49 companies of mixed size and geographic location are summarized as follows:

- The confidence level of avoiding significant operating disruptions is high—90 percent responded that they were very confident in their ability to resolve software problems by the end of 1999.
- The companies are undertaking a structured approach to resolving Y2K issues—all respondents indicated a formal, enterprise-wide assessment has been conducted. The priority areas and issues include operations, finance, IS vendor reliability, supply chain reliability, building systems, and customer service. Nearly half of the companies that responded indicated that Y2K amendments were made to their already existing contingency/emergency plans.
- The vast majority of the companies have been working on the software issue for 2–6 years. At this point, 20 percent of the companies indicated they have completed their software remediation program.
- Overall, 93 percent of the companies in the survey indicated that they are beyond the initial inventory and assessment phase, and in the remediation/testing/completed phases of software code resolution.
- In terms of embedded systems, 71 percent were very confident in their ability to resolve the embedded processor issues. This confidence level is expected to increase as they complete the remaining phases of their Year 2000 plan.
- 84 percent of the companies are in the remediation/testing/completed phase of their embedded processor program—with 80 percent of the companies expecting that their embedded systems will be Y2K compliant by June 1999.

I'd like to comment on the use of the term "Y2K compliant". "Y2K ready" may be the preferred term when referring to a company's readiness. For purposes of the survey, Y2K compliant means the component is unaffected by the Y2K dates. Non-compliance, however, is not interchangeable with the term "dysfunctional system." In the "triage" or prioritization process, components that are not mission-critical may be intentionally bypassed prior to Dec. 1999. They may be tested and the dysfunction found not to have significant implications to operations, or not tested at all, depending on their rank in the prioritization.

For distribution companies, the focus for embedded systems is to ensure that on January 1 mission-critical gas delivery systems are working properly. Also, it must be noted that most local distribution companies have manual controls as backups, so getting around an embedded component should not be difficult. Our bottom line emphasis and focus is on the remediation of issues that directly affect the delivery and proper accounting of natural gas.

REMEDICATION EXPERIENCES

The results of remediation testing by the management consulting firm of Stone and Webster should also provide the committee with a sense of the general preparedness and the nature of the challenges facing the industry. Stone and Webster has conducted fourteen Y2K assessments for gas, electric and combination companies. These companies have customer bases that range from 500,000 to 1.5 million. Their efforts have focused on all aspects of utility Y2K vulnerabilities including:

- Embedded systems within core utility operations
- Upstream critical service providers (electric, water, telecommunications)
- Downstream use of gas at customer location
- Vendor supply chains

With respect to the issue of embedded systems, the embedded systems are defined as systems within a gas utility's operation that contain microprocessors and have time/date stamps associated with their normal function. From the point of entry to the distribution/transmission pipeline of the local distribution company to the meter, you may find 50–100 systems with embedded processing, such as:

Locations	Embedded systems
Storage Fields	Compressor Control, Flow calculations.

Locations	Embedded systems
Gas Control	SCADA (supervisory-controls-data acquisition) systems Flow and control computers.
Metering	Transmit and Correcting Devices, Mobile and Handheld devices.
Gas Management	Electronic Bulletin Boards.
Operations	Instrument calibration systems, regulatory compliance tracking.
Facilities	Energy management control systems, HVAC, Security.

The process to assess and identify embedded systems typically follows an auditable methodology such as system identification, determining compliance from manufacturers, and performing remediation (replacement, upgrades, contingency plans) and associated testing. This process, based on complexity of operation, could take 12–18 months to complete.

Some general findings from the Stone & Webster engagements of natural gas utilities include the following:

- Embedded systems within a gas utility, whether a large or small LDC, are essentially similar.
- Most utilities are consistent in the type of devices they utilize (i.e. meters) and many have manual override options.
- The number of critical operational systems—those that directly affect the delivery of gas—are typically less than 10. The systems that predominately have Y2K compliance issues are the gas operation supervisory/control, (SCADA) systems.
- The critical embedded systems that have Y2K compliance problems are typically fixable through repair, upgrade, or replacement and can be corrected in less than a year.

SUMMARY

In summary, the local distribution companies, our nation's natural gas utilities, are actively and aggressively addressing Y2K issues. Segments within the natural gas industry (production, transmission, and distribution) are collaborating and working closely together in the assessment and remediation of Y2K issues. Operational and core business systems are being identified and remediated. While our members are at varying levels of compliance, a very high level of confidence is present regarding the safe and reliable delivery of natural gas. Because our industry is based on the successful delivery of services, and has established, proven contingency plans in place to handle crisis and emergency situations, we are prepared to handle the issues related to the Year 2000. As we are today, our industry is committed to ensuring the safe and reliable delivery of energy to U.S. citizens, our customers.

Thank you for the opportunity to testify this morning. I look forward to responding to any questions you may have.

GRI Y2K BLIND SURVEY SUMMARY—PRELIMINARY 6/9/98

FROM GRI SURVEY ON NEED FOR Y2K COLLABORATIVE ACTIVITY—SPRING 1998

Participants: Predominately distribution companies.

Respondents: 49 as of 6/9/98.

Questions:

1. Have you conducted a formal, enterprise-wide assessment of the potential financial risks presented by the Y2K problem?

Responses by percent:

Yes: 90

No: 8

Declined¹: 2

2. What are some of the priority areas and issues?

Response:

Operations, finances, IS vendor reliability, supply chain reliability, bids systems, customer service.

3. Do you feel you have enough information at hand to fully evaluate the financial risks associated with your company presented by Y2K?

Responses by percent:

¹“Declined”: Some respondents indicated they were not the right person for the specific question. Several respondents were short on time and went directly to specific questions, declining to discuss others.

- Yes: 80
 No: 14
 Declined: 6
4. As a senior executive, how confident are you in your company's ability to:
- a. assess and fix Y2K *software* problems by 12/31/99?
 Responses by percent:
 Very: 90
 Somewhat: 6
 Declined: 4
- b. assess and fix Y2K *embedded* processor problems by 12/31/99?
 Responses by percent:
 Very: 71
 Somewhat: 22
 Not: 2
 Declined: 4
5. Has your company developed a contingency plan for Y2K non-compliance/readiness—e.g. telecomm, public transportation failure?
 Responses by percent:
 Yes: 47
 No: 49
 Declined: 4
6. How confident do you feel in your contingency plan?
 Responses by percent:
 Very: 31
 Somewhat: 8
 Uncertain: 12
 Declined: 6
 N/A²: 43
7. Have you discussed having an outside firm conduct an audit of your contingency plan?
 Responses by percent:
 Yes: 49
 No: 29
 Declined: 4
 N/A: 18
8. What department has overall responsibility for your Y2K problem?
 Responses by percent:
 Y2K Team: 27
 IT/IS: 53
 Finance: 10
 Other: 6
 Declined: 4
9. How long has your company been addressing the embedded processor problem—corporately with direct Y2K responsibility?
 Responses by percent:
 2-4 years: 37
 1 year: 33
 Less than 1 year: 29
 Declined: 2
10. What type of assistance are you currently using or plan to use for your Y2K embedded processor problems?
- a. Local Contract Program
 Responses by percent:
 Currently use: 10
 Plan to use: 8
 Will not use: 73
 Declined: 6
 N/A: 2
- b. Consulting Firms
 Responses by percent:
 Currently use: 53
 Plan to use: 12
 Will not use: 27
 Declined: 6
 N/A: 2

²“N/A”: Indicates the question is not applicable. This is usually evidenced by other, related responses.

c. Equipment Supplies

Responses by percent:
 Currently use: 55
 Plan to use: 14
 Will not use: 22
 Declined: 6
 N/A: 2

d. Manufacturers

Responses by percent:
 Currently use: 51
 Plan to use: 14
 Will not use: 27
 Declined: 6
 N/A: 2

e. Other

Responses by percent:
 Trade Assoc.: 2
 Declined: 2
 N/A: 96

11. Has your company evaluated its major embedded processors for Y2K compliance?

Responses by percent:
 Yes: 86
 No: 12
 Declined: 2

12. At what stage of Y2K program completion is your company's embedded processor program?

Responses by percent:
 Launch: 0
 Inventory: 2
 Assessment: 12
 Remediation: 31
 Testing: 35
 Completed: 10
 Declined: 2

13. How probable is it that your company's embedded processors will be Y2K compliant by January 2000?³

Responses by percent:
 Very: 88
 Somewhat: 8
 Not at all: 0
 Declined: 4

14. When do you expect your company's *firmware/embedded* systems to be Y2K compliant? Prior to 12/31/99?

Responses by percent:
 Are now compliant: 8
 By 12/31/99: 16
 By 6/30/99: 55
 No: 16
 Declined: 4

15. What specific Y2K-related problems have you experienced with your embedded processors?

Responses by percent:
 No problems: 35
 Problems identified: 41
 Declined: 24

³“Y2K Compliant” vs. “Y2K Ready”

Y2K Ready is the preferred term when referring to an organization's preparedness to function through and beyond 2000.

Y2K Compliant, as used in this survey, means the component is unaffected by Year 2000+ dates.

Y2K Ready means the critical business functions associated with safety and deliverability are expected to continue operating. There may be some inconveniences or delays of a non-critical nature, for example billing.

Acceptable non-compliance: Note that in the “triage” or prioritization process, components that are not mission critical may be intentionally ignored during testing prior to 12/31/99.

Alternatively, testing may reveal a non-compliance that does not have significant implications to operations—these could be examples of a Y2K ready system with non-compliant components.

16. Have you found solutions to these problems?
 Responses by percent:
 Yes: 27
 No: 14
 Declined: 22
 N/A: 37
17. During testing, how often were faulty solutions uncovered in your embedded processor remediation?
 Responses by percent:
 Never: 18
 Rarely: 24
 Sometimes: 16
 Often: 0
 Haven't tested: 24
 Declined: 16
18. How long has your company been addressing the *software* Y2K problem?
 Responses by percent:
 5 years+: 6
 2-4 years: 67
 1 year: 18
 Less than 1 year: 6
 Declined: 2
19. What type of assistance are you currently using or plan to use for your Y2K software problems?
- a. Local contract program
 Responses by percent:
 Currently use: 16
 Plan to use: 6
 Will not use: 73
 Declined: 4
- b. Consulting firms
 Responses by percent:
 Currently use: 73
 Plan to use: 6
 Will not use: 16
 Declined: 4
- c. Equipment suppliers
 Responses by percent:
 Currently use: 51
 Plan to use: 8
 Will not use: 37
 Declined: 4
- d. Manufacturers
 Responses by percent:
 Currently use: 41
 Plan to use: 8
 Will not use: 47
 Declined: 4
- e. Other
 Responses by percent:
 In-house vendors: 2
 Contract programmers: 2
 Declined: 4
 N/A: 92
20. Has your company tested its major software for Y2K compliance?
 Responses by percent:
 Yes: 78
 No: 20
 Declined: 2
21. At what state of Y2K program completion is your company's software?
 Responses by percent:
 Launch: 0
 Inventory: 0
 Assessment: 6
 Remediation: 22
 Testing: 51
 Completed: 20

RESPONSES OF GARY W. GARDNER TO QUESTIONS SUBMITTED BY CHAIRMAN BENNETT

Statement: "Nearly half of the companies that responded indicated that Y2K amendments were made to their already existing contingency/emergency plans."

Question. What types of amendments were made and have they been tested?

Answer. The May 1998 Gas Research Institute (GRI) survey, that was presented during A.G.A.'s testimony on June 12, did not address the specific types of amendments or whether they have been tested.

Based on follow up discussions with our member companies, as remediation efforts progress, additions are being made to existing emergency response plans. Examination of existing contingency plans are being conducted in parallel with the execution of Y2K remediation plans. The objective is to determine what specific actions would be appropriate to minimize risk against unforeseen events. As an example, given a systems analysis, what manual override procedures and staffing should be in place to manage safety and deliverability issues. The process of determining the need for amendments includes analysis of assets and processes key to mission critical functions.

As stated during our testimony, natural gas utilities have very detailed emergency response plans (as required by the Department of Transportation, Office of Pipeline Safety) in place to address unusual operating situations. Most of their current efforts are focused on remediation and testing. Results from those activities are needed to complete a well-focused and efficient contingency plan.

Statement: "84 percent of the companies are in the remediation/testing/completed phase of their embedded processor program—with 80 percent of the companies expecting that their embedded systems will be Y2K compliant by June 1999."

Question. What type of testing is being done? Is it the short single type of testing (a short virtual test) e.g. start up the machine/system/component, see what happens when the Y2K tests or procedures are run and then shut it down? Or, is a longer time frame of testing being done such that the item being tested is in the "constant on condition" (a real virtual test) for a week or month or longer, as appropriate? We further understand the longer testing period can show if NON-critical errors such as filling up the error buffer will cause the system/item to crash. Does it seem prudent for the AGA to encourage real virtual testing?

Answer. The May 1998 GRI survey did not address the specific types of testing that was being conducted by the industry. However, based on follow up discussions, natural gas utilities are performing testing on many different levels including component, system and off-line testing. Such procedures include off-line bench-type testing of individual components as well as off-line systems testing when possible. Testing is being conducted on Supervisory Control and Data Acquisition (SCADA) systems, Remote Terminal Units (RTU), modems and various field devices. These tests are primarily off-line on spare components or on actual plant equipment. Testing is also being conducted on protective devices such as line relays, digital fault recorders, and meters. These tests have been bench tested on spare equipment under simulated conditions. Testing is performed on a component basis first and then end-to-end testing with all systems working together is completed. The utilities are indicating that they will be conducting on-line testing this fall as system conditions permit. Most "live" testing will take place later this year and early 1999.

Statement: Regarding a question you asked of your industry members, 49 percent indicated they have not " * * * developed a contingency plan for Y2K noncompliance/readiness—e.g. telecomm, public transportation failure." (Question 5 from the GRI survey).

Question. When will these 49 percent develop such contingency plans?

Answer. As stated earlier, detailed contingency plans already exist that cover the core operation areas. As remediation efforts are completed, it is anticipated that an increasing portion of an operating staff's time will be devoted to contingency planning. This is particularly true because collaborative testing efforts between utilities, vendors, and suppliers have not been completed. Over the coming months, numerous industry discussion forums, conferences, and Y2K Task Force meetings (working with the Natural Gas Council's Y2K Task Force and the President's Council on Y2k—Energy Working Group) will address contingency issues. These meetings will provide the opportunity to assess where our members stand in regards to readiness and contingency planning.

PREPARED STATEMENT OF MICHEHL R. GENT

Mr. Chairman and Members of the Special Committee, we appreciate the opportunity to express our views on this important topic.

My name is Michehl Gent. I am here today representing the North American Electric Reliability Council. NERC is a voluntary, non-profit organization formed in 1968 to coordinate the reliability and adequacy of bulk electric systems in North America. NERC consists of ten Regional Reliability Councils spanning the United States, Canada, and a portion of Mexico. For 30 years, NERC has played a leadership role in making the North American electric system the most dependable electric supply system in the world.

The U.S. Department of Energy has asked NERC to assume a leadership role in preparing the electric supply and delivery systems of North America for transition to the Year 2000, also known as Y2K. The Secretary of Energy has requested a status report and Y2K coordination plan by September 1998 and a full report of the preparedness of electric systems by July 1999. Today I intend to outline NERC's activities to coordinate the preparations of the electricity systems for Y2K. A copy of NERC's Y2K Coordination Plan is attached to my comments.

Let me begin by noting that Y2K is not a new issue to the electric industry. NERC, its ten Regional Reliability Councils, and their members recognized the threat posed by Y2K several years ago and have been working toward solutions at several levels. Although the effort to date may not have been entirely consistent across the industry, most electric utilities have established Y2K programs and invested substantial personnel and technical resources on identifying and resolving Y2K problems. The industry has been testing critical software and embedded digital controllers and working with vendors to find solutions.

Nearly all of the detailed Y2K problem identification and resolution has been and will continue to be performed by individual electric utilities. As an example of work under way, one major utility is investing 16 person-years in 1998 alone and expects to have 80 percent of the conversions done by the end of this year. One utility has assigned a Vice President full time to directing Y2K activities. That utility is more than 50 percent through known problems and is progressing on schedule. There are examples of utility Y2K teams which report directly to the CEO. At one utility, 1,400 people across various departments are assigned full-or part-time responsibility for Y2K activities. There are numerous examples of utilities investing tens of millions of dollars in resolving Y2K problems.

Those electric utilities that are attacking the problem aggressively are to be commended. However, NERC's concern is that all electric utilities that have a direct reliability impact on North American electrical Interconnections must address the Y2K problem in a coordinated manner. This concern is due to the high degree of interdependence of electric systems within an Interconnection.

The electric systems of North America are connected within four large Interconnections. The largest, the Eastern Interconnection, covers the eastern two thirds of North America, including the United States and Canada. The second largest, the Western Interconnection, covers the western one third of the United States and Canada, as well as a portion of the Baja California Norte region of Mexico. The other two Interconnections include most of the state of Texas, also known as the ERCOT Region, and the Québec Interconnection, which covers the province of Québec, Canada. I would like to emphasize the international nature of the Interconnections.

Each of these four Interconnections is a highly connected network. A major disturbance within one part of an Interconnection has the potential to cascade through the entire Interconnection. On the other hand, there is very little interaction between the Interconnections, with the notable exception being the major high voltage direct current tie lines from Hydro-Québec into the Northeastern United States. Loss of these facilities and the power supply from Québec can have a substantial impact on power delivery systems in the Northeastern portion of the United States.

Electrical systems are operated such that the loss of one facility, or in some cases two or three facilities, will not cause cascading outages. Y2K poses the threat that common mode failures, such as all generator protection relays of a particular model failing simultaneously, or the coincident loss of multiple facilities could result in stressing the electric system to the point of a cascading outage over a large area. I must stress this possibility is extremely low, but conceivable.

This high level of interdependence within an Interconnection means that the robustness of the overall system needs to be tested against this new "contingency." An individualistic approach to the problem may, and I stress "may," not cover all potential problem areas, e.g., coordination with neighboring utilities, and, thus, could adversely affect operations within an Interconnection. An individual electric utility that invests tens of millions of dollars in solving Y2K problems could be affected in a major way by neighboring systems that have not been as diligent. The preparation of the electricity systems in North America must be a coordinated team

effort by those entities responsible for system reliability. All prevention programs do not have to be the same, but they do have to be coordinated.

Let me take a few minutes to explain the specific nature of the Y2K problem associated with maintaining a reliable supply of electricity during the Y2K transition. There are four critical areas which pose the greatest direct threat.

First, power generating facilities must be able to operate through critical Y2K periods without tripping off-line. The threat is most severe in power plants with digital control systems, which contain time sensitive control and protection schemes. Most older plants operating with analog controls will be less problematic. Digital controllers built into station equipment may also pose a threat.

Energy management systems are computers within the electric control centers across North America. These computers are used to operate transmission facilities and control generating units. Many of the control center's software applications contain built-in time clocks used to run various power system monitoring, dispatch, and control functions. Many energy management systems are dependent on time signal emissions from Global Positioning Satellites as a time reference. In addition to resolving Y2K problems within utility energy management systems, these supporting satellite systems must be Y2K compliant.

Telecommunications is another critical area. Electric supply and delivery systems are highly dependent on microwave, telephone, frame relay, and radio communications systems. The dependency of the electric supply on facilities leased from telephone companies and commercial communications network service providers is a crucial factor. Telecommunications systems are the nerve center of the electric networks and it is important to address the dependencies of electric utility systems on the telecommunications industry.

The final technical area of concern is in relay protection devices, which are used to rapidly isolate a portion of the transmission system that may be in trouble. Many protective relays are electromagnetic and will not be affected. However, newer relays are digital and may have a risk of a common mode failure in which all the relays of a certain model fail simultaneously, resulting in a large number of coincident transmission facility outages.

Let me turn now to NERC's program to coordinate preparations for Y2K. The ultimate goal of the NERC Y2K program is to establish a coordination process that allows the electric systems in North America to remain operational during critical Y2K transition periods. The NERC Y2K program is focused on three principle areas: (a) sharing of Y2K solutions, (b) identifying potential weaknesses in interconnected system security, and (c) operational preparedness.

NERC will initially focus on the bulk electric systems because distribution systems are generally radial from the bulk supply network and cannot function without a robust bulk supply network or Interconnection. The Interconnection can function without reliable radial distribution systems. Maintaining the operability of this electric supply backbone may be the single most important step toward supporting our North American infrastructure during the Y2K transition. The Y2K needs of distribution systems will become understandable as bulk power supply issues are resolved.

NERC will work closely with other organizations to address the coordination of electricity distribution aspects of the Y2K problem. Likely participants in this joint effort include DOE, the Electric Power Research Institute, Edison Electric Institute, the National Rural Electric Cooperative Association, the American Public Power Association, and others.

NERC is focused on operational security through a "defense-in-depth" concept, which has been well developed in the design and operation of nuclear facilities. The defense-in-depth concept assumes that although one has taken all reasonable and necessary preventive steps, there can never be one hundred percent assurance that major system failures cannot cause a catastrophic outcome. Instead, multiple defense barriers are established to reduce the risk of catastrophic results to extremely small probability levels and to mitigate the severity of any such events.

I am certain that not all Y2K problems have been identified, fixed, and tested, nor will they be in the time remaining. It would not be prudent to expend unlimited resources on potential problems in search of one hundred percent avoidance of component failures. The cornerstone of the NERC Y2K plan, therefore, is to coordinate industry actions in implementing the following defense-in-depth strategy.

First, the industry is identifying and fixing known Y2K problems. NERC is providing a vehicle for sharing of information on known and suspected Y2K problem areas and solutions associated with the operation, control, and protection of power production and transmission facilities. From this information exchange, a master list of critical Y2K problem areas and solutions is being developed and made widely available. NERC is initiating a reporting process for key entities to report progress

against specific criteria designed to address the known list of Y2K problem areas. Through its Regional Reliability Councils, NERC will review the progress of these entities to verify that appropriate measures are being taken by all responsible parties.

Secondly, NERC intends to coordinate Regional and individual system simulations to identify moderate and worst-case scenarios in response to various classes of Y2K failures. Specific classes of failures that result in the worst conditions will be examined further to determine possible fixes and preventive or mitigation measures.

Thirdly, NERC will coordinate efforts to develop operational preparedness and contingency plans. This includes development of special operating procedures and the conduct of personnel training and system-wide drills.

Finally, NERC and the Regional Councils will coordinate efforts to operate transmission and generation facilities in precautionary configurations and loadings during critical Y2K periods. Examples of precautionary measures may include reducing planned electricity transfers, placing all available transmission facilities into service, bringing additional generating units on-line, and rearranging the generation mix to include older units with analog controls. Another example is increased staffing at control centers, substations, and generating stations during critical periods. Fortunately, from an electric reliability perspective, New Year's Eve falls on Friday, December 31, 1999, and January 1 is a Saturday. Therefore, electric system conditions are likely to be favorable with the level of electricity transfers at light levels and extra generating capacity available during the most critical period.

Let me move now to the issue of roles and responsibilities. The success of the NERC Y2K program depends on unbridled cooperation, full sharing of Y2K information, and diligence of effort commensurate with the potential consequences of failing to adequately prepare for Y2K.

NERC's Y2K program depends on cooperation by the electric utilities of North America. NERC does not currently have the authority in its Bylaws to order electric utilities to take Y2K corrective actions. Nor does NERC currently have the authority to conduct inspections or enforce compliance. The binding obligations of electric utilities are embodied in state and federal laws, filed transmission tariffs, and contractual agreements. Electric utility legal responsibilities are to shareholders, customers, the public, and state and federal regulators.

NERC's role is to facilitate North American-wide coordination so that the collective efforts of the industry will minimize risks imposed by Y2K to a reliable supply of electricity. The NERC Y2K program provides operating entities an opportunity to share in Y2K solutions and prepare coordination plans with neighboring systems and Regions. To facilitate this coordination, NERC is forming a Y2K Coordination Task Force with participation by all ten Regional Reliability Councils.

Let me now turn to an important issue of liability. The NERC Y2K program does not address legal liabilities and NERC defers to others in resolving these matters. However, NERC is particularly concerned that efforts to obtain voluntary disclosure by electric utilities of potential Y2K problems and solutions may be met with resistance due to the liabilities of exposing this information publicly.

As an example, one utility communications officer recently noted a customer identifying him/herself as "a concerned citizen" e-mailed the utility to ask what was being done on Y2K. The communications officer checked with the utility's Information Services (IS) Department and learned that it had been inundated with surveys from customers and lawyers about how the utility is preparing for Y2K. The IS staff had received a legal opinion from corporate attorneys not to respond, so the surveys were piling up unanswered. The communications officer prepared a generic, one paragraph statement saying that the utility had identified a number of issues and is working on them—that the utility's goal is to provide safe, reliable service.

Public exchange of information is a cornerstone of NERC's Y2K program and must not be viewed by utility participants as feeding information to potential litigants. NERC requests full support of regulators in supporting industry needs in this area. Any restraint in sharing known Y2K problems and solutions will be a direct challenge to the reliability of the electricity supply.

In conclusion, the North American Electric Reliability Council has taken a leadership role in coordinating Y2K preparations of the electricity supply and delivery systems of North America. The industry is committed to maintaining a reliable supply of electricity through the Y2K transition.

Y2K COORDINATION PLAN FOR THE ELECTRICITY PRODUCTION AND DELIVERY SYSTEMS OF NORTH AMERICA

PHASE 1: JUNE–SEPTEMBER 1998 INITIAL ASSESSMENT AND COORDINATION
NORTH AMERICAN ELECTRIC RELIABILITY COUNCIL

SECTION 1—BACKGROUND

The United States Department of Energy has asked the North American Electric Reliability Council to coordinate Y2K efforts so that the electricity power production and delivery systems in the United States maintain a reliable supply of electricity during the Year 2000 transition.

Department of Energy request

The U.S. Department of Energy has asked the North American Electric Reliability Council (NERC) to assume a leadership role in preparing the electricity production and delivery systems of the United States for the transition to the Year 2000 (Y2K). This transition effort is necessary because certain software and hardware in use in the electric and other industries use a two-digit code to represent the last two digits of the year. As a result, these software and hardware may misinterpret the change from 1999 to the Year 2000 as they process data. DOE's request is part of a broad initiative by the President of the United States to ensure that infrastructure essential to the nation's security and well being remains operational during critical Y2K transition periods.

The letter to NERC from the Secretary and Deputy Secretary of Energy is provided in Appendix A. DOE requests a status report and coordination plan by September 1998 and a full status report by July 1999. The status reports will review the measures that are being taken to prepare the electric power production and delivery systems for the transition to Y2K. Because NERC is an international organization and the electricity systems of the United States are interconnected with those of Canada and a part of Mexico, NERC's plan, of necessity, must include all of these interconnected systems. Thus, this document defines NERC's initial plan for coordinating the Y2K preparedness plans of the electric utilities that operate the electricity systems of North America.

Consolidating the prior work of the industry

Y2K is not a new issue to the electric industry. NERC, its ten Regional Reliability Councils, and their members recognized the threat posed by Y2K several years ago and have been working toward solutions at several levels. Although the effort to date has not been entirely consistent across the industry, most electric utilities have established Y2K programs and invested substantial personnel and technical resources in identifying and resolving Y2K problems. The industry has been testing critical software, and embedded digital controllers, and working with vendors to find solutions. NERC and the ten Regional Reliability Councils have been providing high-level coordination of Y2K efforts, principally through technical committee activities and information sharing through the NERC web site at <http://www.nerc.com>.

Nearly all of the detailed problem identification and resolution to date has been performed by the individual electric utilities. Those electric utilities that have attacked the problem aggressively are to be commended. However, NERC's concern is that all electric utilities with a direct reliability impact on North American electrical Interconnections must address the Y2K problem in a coordinated manner. This concern is due to the high degree of interdependence of electric systems within an electrical Interconnection. One unprepared system has the potential to adversely impact the operation of the rest of the Interconnection.

In response to the DOE letter, the NERC Y2K program will focus activities in three principal areas: (a) sharing of Y2K solutions, (b) identifying potential weaknesses in interconnected system security, and (c) operational preparedness. DOE's request provides NERC with an opportunity and a challenge to coordinate the efforts of individual Regions and electricity providers across North America toward a collective goal of maintaining secure operation of the electric systems through critical Y2K transition periods.

Importance of meeting the challenge

More than any other element of the North American economic and social infrastructure, the electricity production and delivery systems must be dependable during the transition to Y2K. Every other critical element of infrastructure depends on the availability of an interconnected, reliable supply of electrical power. There is no doubt that cascading or even localized outages of generators and transmission facilities could have serious short-and long-term consequences.

The weakest link concept

The electric systems of North America are connected within four large Interconnections (Figure 1). The largest, the Eastern Interconnection, covers the eastern two-thirds of North America, including the United States and Canada. The second largest, the Western Interconnection, covers the western one-third of the U.S. and Canada, as well as a portion of the Baja California Norte region of Mexico. The other two Interconnections include (1) most of the state of Texas—also known as the ERCOT Region—and (2) the Québec Interconnection, which covers the province of Québec, Canada.



Figure 1. Four Major Electrical Interconnections of North America

Each of these four Interconnections is a highly connected network. A major disturbance within one part of an Interconnection will rapidly have an impact throughout the Interconnection and has the potential to cascade the effect to the entire Interconnection. The four Interconnections are for the most part independent from each other, because they are connected by comparatively small high voltage direct current (HVDC) electrical ties and do not interconnect synchronously. The one notable exception is the major HVDC tie lines from Hydro-Québec into the Northeastern United States. Loss of these facilities and the power supply from Québec can have a substantial impact on power delivery systems in the Northeastern portion of the United States.

Within each Interconnection, power production and delivery systems are highly interdependent. In general, systems are operated such that the loss of one facility, or in some cases two or three facilities, will not cause cascading outages. Y2K poses the threat that common mode failures (such as all generator protection relays of a particular model failing simultaneously) or the coincident loss of multiple failures may result in stressing the electric system to the point of a cascading outage over a large area.

This high level of interdependence within an Interconnection means that the robustness of the overall system needs to be tested against this new "contingency." An individualistic approach to the problem may not cover all potential problem areas, e.g., coordination with neighboring utilities, and, thus, could adversely affect operations within an Interconnection. An individual electric utility that invests tens of millions of dollars in solving Y2K problems could be affected in a major way by an outage initiated in neighboring systems that have not been as diligent.

Therefore, preparation of the electricity power production and delivery systems in North America must be a coordinated team effort by those entities responsible for system reliability. All preventive programs do not have to be the same, but they do have to be coordinated. The industry will succeed or fail together in its readiness for Y2K.

Although the written request that sparked initiation of the NERC coordination program was received from the U.S. Department of Energy, NERC recognizes that maintaining grid security during the Y2K transition is an international issue requiring coordination with the United States, Canadian, and Mexican governments.

Nature of the Y2K problem in electricity production and delivery

Maintaining a reliable supply of electricity during the Y2K transition is not an insurmountable task. There are four critical areas that pose the greatest direct threat to power production and delivery:

- Power production.*—Generating units must be able to operate through critical Y2K periods without inadvertently tripping off-line. The threat is most severe in power plants with digital control systems (DCSs). Numerous control and protection systems within these DCS use time-dependent algorithms that may result in unit trips. Most older plants operating with analog controls will be less problematic. Digital controllers built into station equipment, protection relays, and communications also may pose a threat.
- Energy management systems.*—Control computer systems within the electric control centers across North America use complex algorithms to operate transmission facilities and control generating units. Many of these control center software applications contain built-in time clocks used to run various power system monitoring, dispatch, and control functions. Many energy management systems are dependent on time signal emissions from Global Positioning Satellites, which reference the number of weeks and seconds since 00:00:00 UTC January 6, 1980. In addition to resolving Y2K problems within utility energy management systems, these supporting satellite systems, which are operated by the U.S. government, must be Y2K compliant.
- Telecommunications.*—Electric supply and delivery systems are highly dependent on microwave, telephone, and VHF radio communications. The dependency of the electric supply on facilities leased from telephone companies and commercial communications network service providers is a crucial factor. With telecommunications systems being the nerve center of the electric networks, it is important to address the dependencies of electric utility systems on the telecommunications industry during critical Y2K transition periods.
- Protection systems.*—Although many relay protection devices in use today are electromagnetic, newer systems are digital. The greatest threat here is a common mode failure in which all the relays of a certain model fail simultaneously, resulting in a large number of coincident transmission facility outages.

SECTION 2—OBJECTIVES AND SCOPE

The ultimate goal of the NERC Y2K program is to establish a coordination process that, when implemented, allows the electric power production and delivery systems in North America to remain operational during critical Y2K transition periods.

Scope is electric power production and delivery systems

Several key elements are identified in this goal statement. First, the initial focus is on power production and transmission facilities. The goal is to maintain the “backbone” of the electricity supply infrastructure. As such, NERC will work closely with entities responsible for the operation and security of electric systems. These entities include:

- NERC Regional Reliability Councils
- Control Areas within the four major electrical Interconnections in North America
- NERC Security Coordinators
- Independent System Operators
- Owners/operators of high voltage transmission facilities
- Owners/operators of bulk power generating facilities
- Owners/operators of distribution supply system not included in the other categories

NERC will initially focus on the bulk electric systems because distribution systems are generally radial from the bulk supply network and cannot function without a robust bulk supply network or Interconnection. The Interconnection can function without reliable radial distribution systems. Maintaining the operability of this electric supply backbone may be the single most important step toward supporting our North American infrastructure during the Y2K transition. The Y2K needs of distribution systems will become understandable as bulk power supply issues are resolved.

As discussed in the next section, NERC is likely to work closely with other organizations to address the coordination of electricity distribution aspects of the Y2K problem. Likely participants in this joint effort include DOE, the Electric Power Research Institute, Edison Electric Institute, the National Rural Electric Cooperative Association, the American Public Power Association, and others.

Defense in depth

The second key element of the goal statement is that NERC is focused on operational security through a "defense-in-depth" concept, which has been well developed in the design and operation of nuclear facilities. The defense-in-depth concept assumes that although one has taken all reasonable and necessary preventive steps, there can never be one hundred percent assurance that major system failures cannot cause a catastrophic outcome. Instead, multiple defense barriers are established to reduce the risk of catastrophic results to extremely small probability levels and to mitigate the severity of any such events.

It is certain that not all Y2K problems have been or will be identified, fixed, and tested in the time remaining. Also, it would not be prudent to expend unlimited resources on potential problems in search of one hundred percent avoidance of component failures. The cornerstone of the NERC Y2K plan, therefore, is to coordinate industry actions in implementing the following defense-in-depth strategy:

1. *Identify and fix known Y2K problems.*—NERC is providing a vehicle for sharing of information on known and suspected Y2K problem areas and solutions associated with the operation, control, and protection of bulk power generation and transmission facilities. From this information exchange, a master list of critical Y2K problem areas and solutions will be developed and made widely available. NERC will initiate a reporting process for key entities to report progress against specific criteria designed to address a known list of Y2K problem areas. Through its Regional Reliability Councils, NERC will review the progress of these entities to verify that appropriate measures are being taken by all responsible parties. This identification of problem areas, solutions, and testing of the solution is a process that will continue into the millenium.

2. *Identify worst case conditions.*—NERC will coordinate the conduct of Regional and individual system simulations to identify moderate and worst-case scenarios in response to various classes of Y2K failures. Specific classes of failures that result in the worst conditions will be examined further to determine possible fixes and preventive or mitigation measures.

3. *Prepare for the worst.*—NERC will coordinate efforts to prepare for safe operation of the electric systems under potential worst-case conditions. Preparations will include development of special operating procedures and conducting training and system-wide drills.

4. *Operate systems in a precautionary posture during critical Y2K transition periods.*—NERC will coordinate efforts to operate transmission and generation facilities in precautionary configurations and loadings during critical Y2K periods. Examples of precautionary measures may include reducing the level of planned electricity transfers between utilities, placing all available transmission facilities into service, bringing additional generating units on-line, and rearranging the generation mix to include older units with analog controls. Another example is increased staffing at control centers, substations, and generating stations during critical periods. Fortunately, from an electric reliability perspective, New Year's Eve falls on Friday, December 31, 1999, and January 1 is a Saturday. Therefore, electric system conditions are likely to be favorable with the level of electricity transfers at light levels and extra generating capacity available during the most critical period.

SECTION 3—ROLES AND RESPONSIBILITIES

The success of the NERC Y2K program depends on unbridled cooperation, full sharing of Y2K information, and diligence of effort commensurate with the potential consequences of failing to adequately prepare for Y2K.

NERC's Y2K program depends on cooperation by the electric utilities of North America. NERC does not currently have the authority in its Bylaws to order electric utilities to take Y2K corrective actions. Nor does NERC currently have the authority to conduct inspections or enforce compliance. The binding obligations of electric utilities are embodied in state and federal laws, filed transmission tariffs, and contractual agreements. Electric utility legal responsibilities are to shareholders, customers, the public, and state and federal regulators. NERC's role is to facilitate North American-wide coordination so that the collective efforts of the industry will minimize risks imposed by Y2K to a reliable supply of electricity.

The roles and responsibilities of participants in the NERC Y2K program are defined below:

NERC.—NERC staff and support contractors will coordinate the NERC Y2K efforts defined within this plan. This activity includes collecting, consolidating, and distributing information on Y2K problems and solutions, and it includes coordination of system studies and preparedness plans. The information collected will be compiled into a report that will periodically be presented to the NERC Board of Trustees and DOE.

NERC Regional Reliability Councils.—Regional staff will coordinate NERC Y2K activities within their Regions. Responsibilities are similar to those listed above for NERC, but at the Regional level.

NERC Operating and Security Entities.—Operating entities, such as Control Area Operators, Security Coordinators, Independent System Operators, high voltage transmission system operators, and power producers, are on the front line of Y2K preparations. The NERC Y2K program provides these operating entities with an opportunity to share in Y2K solutions and prepare coordination plans with neighboring systems and Regions. The responsibilities of these operating entities within the NERC Y2K program are to share information on known Y2K problems and solutions and to report their progress according to the schedule established by the NERC Y2K program. These entities are expected to participate in system studies, coordinated system preparations, and precautionary system operating measures.

NERC Y2K Coordination Task Force.—NERC is forming a Y2K Coordination Task Force to focus on implementing this plan. The focus of the task force is on maintaining the reliable operation of bulk electricity production and delivery systems during Y2K transitions. The task force will facilitate coordination among the ten NERC Regional Reliability Councils. The task force will be organized around the four key technical areas identified in the previous section: Power Production, Energy Management Systems, Telecommunications, and Protection Systems.

Coordination with external agencies

NERC Y2K efforts are closely aligned with those of many other government and private agencies. Key partners with the NERC Y2K program are identified below.

Department of Energy.—DOE is the principal federal agency with oversight responsibility for Y2K issues in electricity supply systems. As such, NERC will report the results of the NERC Y2K program to DOE and work in close coordination with broader DOE efforts.

Edison Electric Institute.—EEI has established a program to address Y2K technical, regulatory, and liability issues. NERC is committed to full cooperation with EEI in identification of Y2K technical problem areas and solutions. The NERC Y2K program does not, however, address regulatory requirements or legal liabilities. As such, NERC defers to EEI's leadership in resolving these issues. NERC is particularly concerned that efforts to obtain full disclosure by electric utilities of potential Y2K problems and solutions may be met with resistance due to the liabilities of exposing this information publicly. Public exchange of information is a cornerstone of NERC's Y2K program and must not be viewed by participants as feeding information to potential litigants. NERC expects full support of EEI in defining and promulgating industry needs for protection in this area.

Electric Power Research Institute.—EPRI has a well established Y2K program to identify Y2K problems and solutions in embedded systems. EPRI's program spans a full spectrum of electricity production, delivery, and end use. NERC is committed to full cooperation with EPRI in the exchange of information related to electric power production and delivery. NERC encourages all elements of the electric power industry to participate in EPRI's Y2K embedded systems program.

Nuclear Regulatory Commission and Nuclear Energy Institute.—There is an obvious need to prepare nuclear facilities for Y2K and the remote, but real possibility of interruptions of off-site power. NERC will be coordinating efforts to maintain a reliable transmission network capable of providing continuous off-site power for nuclear facilities. However, NERC expects that the NRC, NEI, DOE, and others will take the leadership role in coordinating the Y2K activities of nuclear facilities.

Electric Power Supply Association.—NERC expects to work closely with EPSA in coordinating the resolution of Y2K problems in power production facilities.

American Public Power Association.—NERC will coordinate directly with APPA's larger members who operate control areas and high-voltage transmission systems. APPA is expected to be the primary way of coordinating with electric distribution systems that are not members of a Regional Council to resolve Y2K problems in state/municipal electric distribution systems.

National Rural Electric Cooperative Association.—NERC will coordinate directly with NRECA's larger members who operate control areas and high-voltage transmission systems. NRECA is expected to be the primary way of coordinating with electric distribution systems that are not members of a Regional Council to resolve Y2K problems in cooperative electric distribution systems.

Canadian Electricity Association.—NERC will work closely with CEA to assure coordination of Y2K efforts among electric power producers and delivery systems in Canada as well as electrical ties that connect Canada and the United States.

Additional Coordination.—NERC will cooperate fully with other federal and state government agencies and trade associations working toward Y2K solutions.

SECTION 4—WORK PLAN

The NERC Y2K program work plan is organized into three phases: (1) information sharing and status review, (2) coordination of preparedness plans and scenario analysis, and (3) coordination of precautionary operations during the Y2K transition.

Phase 1 (May–September 1998).—NERC will mobilize coordination and information sharing efforts and perform a preliminary review of Y2K readiness of electricity power production and delivery systems. Detailed plans for Phases 2 and 3 will be developed. Phase 1 will culminate with an initial report to the NERC Board of Trustees (BOT) and to DOE covering the preliminary situation report and a detailed work plan for Phases 2 and 3.

Phase 2 (September 1998–July 1999).—NERC will facilitate efforts by the Regional Reliability Councils and responsible operating entities to resolve the known Y2K technical problems. A process will be established for periodic progress reports using an established list of reporting criteria. System simulations and engineering studies will be conducted during this phase to understand likely and worst-case scenarios. This Phase will culminate in July 1999 with a report to the NERC BOT and to DOE on measures being taken to prepare electric power production and delivery systems for operation during the Y2K transition.

Phase 3 (July 1999–January 2000).—During this period, NERC will review the preparation of contingency plans and operating procedures. NERC will assist Regions in the conduct of drills and final arrangements to prepare for critical Y2K periods. Although the most critical period is expected to be on the dates of December 31, 1999 and January 1, 2000, configuring systems in a precautionary posture and then restoring normal conditions afterward are expected to require several weeks.

Phase 1 Tasks and schedule

Task 1. Establish an Internet Web Site for sharing of information on known Y2K problem areas and solutions related to electric power production and delivery systems.—NERC has established a Web Site and will continue to add resources and links to other sites. The Web Site will include a catalog of resources and an information exchange forum. Manufacturers and vendors of software, computer equipment, electronic devices, and communications systems who have information on Y2K solutions will be identified on the NERC Y2K Web Site, with links to those sites. [Established in May 1998 with continued support through Phase 3.]

Task 2. Prepare a list of bulk electric system Y2K key entities and contacts.—This list will identify key personnel in each Region and note areas of expertise, such as generation, protection, communications, energy management systems, etc. As stated previously, the key entities include Regional Reliability Councils, Control Area Operators, Security Coordinators, Independent System Operators, selected Transmission Operators, and selected power producers. The lists of entities and contacts will be posted on the Web Site. The key entities identified will be responsible for participating in the reporting requirements below. [List posted by June 30, 1998 with continued updates through Phase 3.]

Task 3. Establish a NERC Y2K Coordination Task Force.—This task force will have at least one representative from each Region who is knowledgeable about Y2K technical issues and the activities within his or her Region. The task force will establish four technical subgroups to focus on identifying known Y2K technical problems and solutions in the areas of power production (generation), energy management systems, telecommunications, and system protection. System vendors and manufacturers will be asked to participate with the technical subgroups. The task force and subgroups will coordinate through frequent telephonic meetings to ensure high levels of information exchange and coordination of efforts. [Task force will be established and populated by July 1 and will function until the end of Phase 3.]

Task 4. Consolidate known Y2K problems and solutions into a master checklist.—The NERC Y2K Coordination Task Force will develop and post publicly a master

list of Y2K problem areas and solutions related to electric power production and delivery. The master checklist will be categorized for efficient reference. The list will identify down to the component or software module level any known or suspected Y2K problems. Fixes, available resources, and contacts will be identified for each problem area as the information becomes known. The solutions posted will draw from "best practices" of organizations that have had the greatest success in resolving a Y2K bug. Known problems will be rated by a simple numbering scheme denoting the criticality of the component to Interconnection reliability. This effort is focused on consolidating known information into a common reference file for all impacted parties to use. [The initial outline of the master checklist will be posted by June 30, 1998. The goal is to have a completed list by September 15, 1998, but the list will continue to be updated as additional knowledge is gained.]

Task 5. Coordinate a preliminary review of Y2K activities by key entities.—NERC, along with the Regional Reliability Councils, will facilitate reporting of a preliminary status of Y2K activities by key operating entities. This report will be consolidated into an industry report to DOE in September 1998. [Reporting criteria will be established by July 31, 1998, entity reports completed by August 31, 1998, and the consolidated report completed by September 15, 1998. The report will be presented to the NERC BOT and then to DOE.]

Task 6. Prepare a detailed plan for Phase 2.—NERC will prepare a detailed plan for implementing Phase 2 activities. [Presented to NERC BOT in September 1998 followed by DOE.]

Phase 2 Tasks and schedule

Task 7. Conduct system studies and scenario analysis.—NERC, in coordination with Regional Reliability Councils, will facilitate the conduct of system simulations and engineering studies to understand expected and worst-case scenarios. These scenarios will be analyzed to determine corrective and mitigation strategies. [Simulations and studies will be completed by May 1999, with final scenario analysis presented in July 1999.]

Task 8. Perform Y2K readiness review.—NERC, in coordination with Regional Reliability Councils, will facilitate a review of the Y2K readiness of operating entities. [Readiness reporting will be conducted periodically through Phase 2, with a final report presented to the NERC BOT and DOE in July 1999.]

Task 9. Prepare detailed plan for Phase 3.—A detailed plan for Phase 3 will be presented in July 1999.

Phase 3 Tasks and schedule

Task 10. Facilitate development and implementation of Y2K preparedness plans.—NERC, in cooperation with the Regional Reliability Councils, will facilitate the development and implementation of special procedures and plans for operation during Y2K transition periods. NERC will develop the generic elements of a preparedness plan for use by operating entities in developing specific plans.

Task 11. Facilitate conduct of training and drills.—Training and system drills will be coordinated by Regional Reliability Councils to ensure personnel and systems are ready for operations during the Y2K transition.

Task 12. Coordination of plans to configure electric systems in precautionary posture.—NERC and the Regions will coordinate the preparation of operating plans to mitigate the consequences of any adverse Y2K problems. Examples may include placing all available transmission facilities in service, bringing additional generators on line, increased use of older analog controlled units, providing additional staff at control centers, power stations, and critical substations, and operating with reduced electricity transfers. The critical Y2K operating period is likely to extend several weeks before and after midnight December 31, 1999.

Task 13. Coordination of system monitoring and rapid response during Y2K period.—NERC, the Regional Councils, and Security Coordinators will monitor conditions during Y2K critical periods and be prepared to implement pre-established contingency plans.

SECTION 5—SCHEDULE

The NERC Y2K Program will coordinate activities according to the following schedule. Y2K preparation is a rare activity for which the "due date" really cannot change.

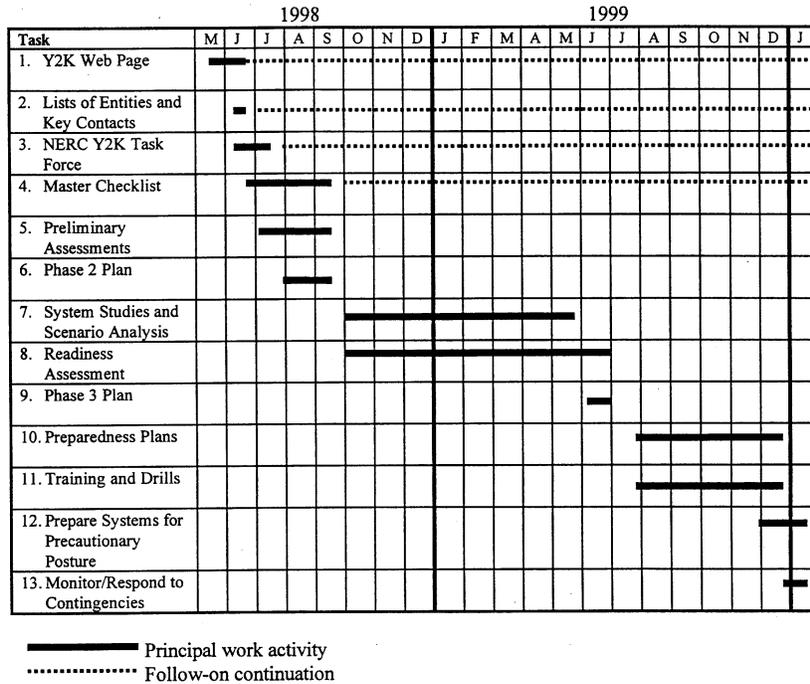


Figure 2. Time lines for the Y2K coordinated activities NERC Y2K

APPENDIX A—LETTER TO NERC FROM SECRETARY AND DEPUTY SECRETARY OF ENERGY

THE SECRETARY OF ENERGY,
 Washington, DC, May 1, 1998.

Mr. Erle Nye,
 Chairman of the Board,
 North American Electric Reliability Council,
 1601 Bryan Street, Dallas, TX

DEAR MR. NYE: We are writing to seek the North American Electric Reliability Council's (NERC's) assistance in assessing whether the Nation's electricity sector is adequately prepared to address the upcoming year 2000 computer problem.

The Administration is undertaking a coordinated effort to assess various sectors' readiness to address the issue. The Department of Energy (DOE) is taking the lead in working with the electricity industry to facilitate actions necessary for a smooth transition through this critical period. To this end, we are requesting that NERC undertake the coordination of an industry process to assure a smooth transition.

The electric system is such a highly interdependent network, and so vital to the security and well-being of the Nation, that there is very little margin for error or miscalculation. The Department realizes that activities designed to address this issue are already underway in many electric utilities, the Electric Power Research Institute (EPRI), and in other Federal agencies. We are concerned, however, that these activities may not be fully coordinated, or worse, may be incomplete. The Nation needs to know that a systematic process is in place to ensure that the electric supply system will not experience serious disruption.

This is truly a reliability issue, and NERC has demonstrated over the last 30 years that it is capable of coordinating the activities of electric market participants to resolve such issues. NERC is the most appropriate body to organize this process and report periodically on its status. We are confident that NERC will be able to mobilize the necessary cooperation from the Regional Reliability Councils, their members' utilities, and other industry organizations, to develop and implement a

process that is both efficient and effective. We are asking that you provide us with written assurances by July 1, 1999, that critical systems within the Nation's electric infrastructure have been tested, and that such systems will be ready to operate into the year 2000. The DOE is prepared to work with NERC to help overcome any obstacles that you might encounter in carrying out this effort. Finally, we wish to work with you to provide a suitable public forum in the late summer or early fall of this year at which NERC and others could report on the industry's assessment of this issue and outline its plans to address this challenge.

Public events on this subject are important and valuable for two reasons. First, they will convey to the public and public officials that the industry is indeed preparing systematically for the transition. Second, they will confirm to the industry that Government agencies and the public are depending on them to ensure that the transition goes smoothly.

We are looking forward to further discussions with you on this important issue.

Sincerely,

FEDERICO PEÑA,
Secretary.

ELIZABETH A. MOLER,
Deputy Secretary.

RESPONSES OF MICHEHL R. GENT TO QUESTIONS SUBMITTED BY CHAIRMAN BENNETT

Question 1. The Department of Energy seems to be relying almost exclusively on NERC to coordinate Year 2000 efforts in the electric industry. What do you see as the most difficult challenges facing your organization in that quest?

Answer. The most difficult challenge NERC faces in coordinating the efforts of the electric industry for Y2K readiness is the hesitance of many organizations to disclose information about the progress of their internal Y2K programs. Their fear is that information disclosed can be used in litigation against them. We have prepared a self-assessment instrument, which, if applied systematically across the industry, will provide credible measures of progress toward resolution of Y2K problems and contingency preparedness. One element of NERC's Y2K Program is to periodically report to the Department of Energy the collective readiness of various segments and regions of the industry. We are not developing "report cards" on individual organizations. We are seeking ways to protect the confidentiality of information collected from individual organizations. We would welcome any support in obtaining legal protections of the confidentiality of this data.

A second challenge NERC faces is the addition of electric distribution systems to the scope of its activities. NERC's coordination of reliability has historically focused on the bulk electric supply and delivery systems of North America. The addition of distribution systems to the program adds an estimated 2,000 entities to the coordination effort. These cooperatives, municipalities, and other local distribution entities are only partially covered by existing trade associations such as the National Rural Electric Cooperative Association (NRECA) and the American Public Power Association (APPA). In short, the sheer number and diversity of these organizations makes Y2K coordination difficult. NERC has enlisted the aid of NRECA, APPA, and the Edison Electric Institute to reach these organizations and include them in the NERC Y2K Program.

Question 2. With NERC's broad responsibilities and visibility over the electrical power industry, you are probably in the best position to know the seriousness of the Year 2000 problem and the overall status of remediation efforts. What is your assessment of the readiness of the industry for the millenium change? What is the status of remediation efforts? What are the biggest problem areas?

Answer. NERC was very recently asked by the Department of Energy to coordinate the Y2K issue for the electric industry. We have developed in our Y2K Program a process for systematically measuring progress in the areas of inventory, assessment, remediation, testing, and contingency preparations. We do not have specific results to report now. We do expect to be able to report in greater detail at the completion of Phase 1 in September after we have experienced a couple of cycles of our monthly Y2K readiness assessments. All indications we have received to date are that the industry is taking the Y2K challenge seriously. Electric utilities have made significant progress in identifying Y2K problems (inventory and assessment) and most have plans to complete remediation and testing by mid-1999. Although Y2K problems are not trivial in electric systems, most reports indicate that no major surprises have been found to date.

Question 3. Your testimony describes the fragile nature of the four North American Interconnection areas or grids as they are popularly called; the largest being the Eastern Interconnection covering the eastern two-thirds of the country. You describe how a failure in one part of the grid can have a cascading effect on other parts of the grid. What is NERC's role in helping to quickly isolate failing electrical systems within an Interconnection to prevent a major blackout?

Answer. NERC is engaging the Security Coordinators and Regional Councils in preparing special contingency plans. System studies and simulations will be conducted beyond those that are now performed. Operating procedures on critical Y2K dates will assure a heightened readiness. Examples may include appeals to reduce non-critical loads, reduction of inter-regional transfers, additional generation and transmission facilities in service, and others. NERC, the Regional Councils, and their members have a long and successful history of managing system reliability under challenging conditions.

Question 4. NERC publishes reliability assessments of bulk electric systems periodically, the last of which was issued in October 1997 covering projections for the years 1997 through 2006. However, there is no mention of the Year 2000 problem. Isn't the Year 2000 problem a major factor in your reliability assessment? Why was there no mention of the Year 2000 in these publications? When did NERC begin working on the Year 2000 problem?

Answer. Until the Department of Energy charged NERC with coordinating the Y2K issue for the electrical industry, each individual utility had responsibility for addressing Y2K for its facilities. NERC began looking at the Y2K problem late in 1996 and early 1997 in association with the President's Commission on Critical Infrastructure Protection. As a result of those discussions, NERC sought assurances from its telecommunications provider that the communications system it was installing to connect 23 Security Coordinators across North America was Y2K compliant. Y2K coordination has been an issue at NERC, the Regional Councils, and their members for more than a year. Certainly the Department of Energy's request has helped us formalize our Y2K Program. Reliability Assessments historically focus on adequacy of supply and transmission facilities. Y2K is a special condition that requires a different approach. NERC, through the Security Coordinators and Regional Councils, will be performing studies unique to Y2K challenges.

Question 5. Since Hydro-Québec is a major supplier of electrical energy for the U.S. Interconnections, is it involved in NERC's Year 2000 plans?

Answer. Hydro-Québec, as a member of the Northeast Power Coordinating Council (NPCC), is directly involved in coordination of Y2K efforts at NERC and the Regional Council levels. In fact, NPCC (including Hydro-Québec) has one of the more active Y2K programs.

Question 6. Does NERC require any legislative assistance in (1) sharing information about Y2K problems and solutions? (2) ordering electrical utilities to take Y2K corrective action?

Answer. The answer to this question is in part tied to the response to question number one. Legislation that would protect the confidentiality of Y2K readiness assessment data at the individual organization level would be very helpful. NERC does not believe that legislation is necessary to order electric utilities to take Y2K corrective actions. NERC, the Regional Councils, and their members are committed to addressing the Y2K issues.

Question 7. Your testimony describes the three phases of NERC's Year 2000 work plan. Phase 1 (May-September 1998) will culminate with delivery to DOE a situation report and detailed work plans for phases 2 and 3. Isn't September 1998 pretty late to complete your initial situation report? Will there be sufficient time for Phases 2 and 3?

Answer. If the industry was beginning its Y2K efforts from scratch, September might be late. However, substantial progress has and continues to be made. NERC is affording an opportunity to report this progress at a collective level. The time remaining is tight, but we have no indication at this time that preparations will not be completed. A more detailed assessment by September will provide information as to where to focus efforts in the remaining time for remediation, testing, and contingency preparedness.

Question 8. Similarly, Phase 2 of your work plan is not planned to be complete until July 1999 with the issuance of a report on steps to be taken to prepare electric power production and delivery systems during the Year 2000 transition. This leaves just six months to implement the steps called for in this phase and to complete contingency planning called for under Phase 3. Is there sufficient time to complete Phases 2 and 3 of NERC's work plan? Is there any way these phases can be accelerated?

Answer. We feel the schedule places the appropriate emphasis at the right times. The focus of the next 12 months needs to be on inventory, assessment, remediation, and testing at the component and system level. At that point, we will have a more complete picture of possible disturbance triggers and sequences. After July 1999, the major focus will shift from fixing the problem to preparing for possible contingencies. We believe the time is adequate though certainly tight.

Question 9. Common mode failure (e.g. specific model of a generator protection relay) is a relatively new threat due to the use of digital control systems. To your knowledge, has anyone tested the overall power system against this threat? What were the results?

Answer. NERC is encouraged by the electric industry's pursuit of testing at the integrated systems level. Although Y2K problems may reside at the individual software program or circuit-board level, the impacts result from the shared interactions of components and systems. We will be looking during our assessments at the level of testing at the systems level. We will also be coordinating system studies that consider the simultaneous failure of certain types of components. The goal will be to have electric systems in a position to withstand a higher than typical threat of simultaneous outages.

PREPARED STATEMENT OF JAMES J. HOECKER

Mr. Chairman and Members of the Committee: I appreciate the opportunity to appear before you to discuss the Year 2000 readiness of the utility industry, including electric, oil, and gas utilities. I commend you, Mr. Chairman, and the Special Committee for holding a hearing on this critical issue. My name is James Hoecker, and I am Chairman of the Federal Energy Regulatory Commission (Commission or FERC). Some months ago I appointed a Chief Information Officer (CIO) to be responsible for information technology issues at the Commission. FERC's CIO, Katie Hirning, represents the Commission on the President's Council on Year 2000 Conversion.

The state of Year 2000 readiness of the utility industry is not yet fully known. However, FERC acknowledges the importance of the Year 2000 problem and recognizes that its involvement in solutions may be necessary. Because the energy sector is critical to the operations of all other sectors of the economy, I believe that it is essential for the federal government, along with industry, to promote awareness of this problem through cooperation and communication.

Today I would like to: (1) describe what I understand the industry is doing about the problem; and (2) inform you of what the Commission is doing to encourage industry to take steps to ensure that our Nation's energy infrastructure still functions properly on January 1, 2000, including its coordination with the President's Council on Year 2000 Conversion.

The Year 2000 issue presents an unusual problem for FERC because the Commission does not exercise direct authority over internal operations of the regulated companies' businesses as a general matter. The Commission would have authority over the ability of regulated utilities to recover in cost-based rates the costs expended in correcting the Year 2000 problem, but not over how utilities implement specific measures to correct the problem. Furthermore, FERC's regulation does not encompass the entire energy sector or even all aspects of the natural gas, electric, or oil pipeline industries. Large portions of these industries are subject to the authority of other federal agencies or state and local governments, or are self-regulated or unregulated.

YEAR 2000 COMPLIANCE WITHIN THE COMMISSION

The Commission is diligently addressing its own computer systems to make sure that they work on and after January 1, 2000. A Year 2000 task force was established in March 1997 to examine FERC's computer systems and identify systems and applications with the potential for non-compliance, and to suggest a strategy for formulating corrective action for each. Of the 12 automated systems that are considered to mission-critical, one has already been made compliant, one will be upgraded, three have already been retired, four more will be retired, and three will be replaced. The Commission has developed renovation codes as a contingency measure that will enable it to operate even if replacement systems are delayed in implementation. However, FERC has a well developed implementation schedule for total readiness by January 1, 2000. Automated equipment associated with the agency's physical plant, such as elevators and the security system, were also evaluated. All equipment is compliant except for the security system, which will be upgraded before March 1999.

YEAR 2000 ISSUES FOR ENERGY BUSINESSES

At the present time, any failure to fully understand the seriousness of the issues must be regarded as a significant problem. Cooperation and communication is necessary in order to understand the severity of the problem. There is a need to identify what effect a failed computer, computer software program, or embedded microprocessor would have on the production or delivery of electricity, gas, and oil. Thus far, available information is anecdotal, with very little empirical data on completion of conversion tasks and structured testing.

Year 2000 readiness also includes the operation of not only conventional computer systems, but thousands of embedded microprocessors as well. Embedded systems are present at plants, wellheads, pipelines, control and dispatch centers, headquarters, and other energy facilities. Identifying Year 2000 errors in embedded systems generally requires significant manual effort. The process cannot be automated and is likely to require physical inspection of hardware distributed widely throughout an organization. Taking inventory, assessing, and fixing embedded systems is especially difficult and expensive.

THE INDUSTRY RESPONSE

The extent of completed Year 2000 work within the energy industry is unknown. Compilation of this information has been inadequate. Larger utilities and some industry associations have promoted awareness of Year 2000 issues and, in some cases, have shared information about industry readiness. The state of awareness and planning of smaller utilities and cooperatives is less certain.

One of the largest Year 2000 programs, offered for a fee by the Electric Power Research Institute (EPRI) to member companies of electric, oil, and gas associations, includes: an electronic system for real-time data and information collected from a number of industries, government agencies, vendors, and other service providers; and workshops for interactive discussion of methods and results among those involved in Year 2000 embedded systems efforts and the sharing of information among participants. The Edison Electric Institute is working closely with the EPRI program, on behalf of investor-owned electric utilities.

The National Association of Regulatory Utility Commissioners' (NARUC) has established an educational program and has a session scheduled in July to discuss Year 2000 issues.

Year 2000 managers within the national oil, gas, and electric associations are in frequent contact and are working together to address these issues. Several Year 2000 programs were initiated in the past year by industry associations. Last year the American Petroleum Institute (API) formed a Year 2000 task force of representatives from industry. They agreed to construct databases from various segments of the industry. API has scheduled a meeting for July 1998 to discuss Year 2000 compliance, information exchanges, and other issues. API also sponsored and disseminated a Year 2000 awareness research paper.

The Interstate Natural Gas Association of America (INGAA) has conducted a survey of their member companies' Year 2000 compliance status, and the results are currently being analyzed. The Gas Research Institute (GRI) is surveying its member companies to help formulate Year 2000 strategies. The Natural Gas Council (NGC), which encompasses leadership of a number of industry trade associations, is meeting in June to address industry coordination for Year 2000 readiness. It will focus on segment-by-segment coordination and creation of a coordination structure.

THE FEDERAL ENERGY REGULATORY COMMISSION'S ROLE

On its own, FERC is developing an awareness program for the Commission's regulated entities and industry associations, in coordination with the Energy Working Group activities. The purpose of FERC's outreach is to promote awareness of the potential seriousness of the Year 2000 problem and the need to devote adequate resources to fix it. I am working with the other FERC Commissioners, Office Directors, and the Commission's CIO to promote awareness of the Year 2000 issue and to encourage the cooperation that already exists among energy organizations and their customers. Further, we hope to encourage companies to make more information available to the general public. The public needs specific information on how serious the problem is, what is being done to address it, and what they can expect on January 1, 2000. The Commission will also make information on Year 2000 issues available to our regulated companies and to the general public through the FERC Website, and we will provide a link to the Energy Working Group Website once it is developed.

We have begun to establish regular channels of communication with appropriate Year 2000 experts in industry and to maintain an awareness of upcoming events and planned initiatives. We plan to:

- promote awareness among companies under our jurisdiction;
- monitor progress within the industry;
- develop a link on the FERC Website to Year 2000 information;
- encourage the inclusion of Year 2000 subject matter in future industry seminars, trade events, television programs, and publications;
- utilize Year 2000 public speaking opportunities; and
- work with members of the Energy Working Group of the President's Year 2000 Conversion Council.

THE OIL AND GAS SECTOR OF THE ENERGY WORKING GROUP

The Commission is also working cooperatively with other federal agencies as a member of the President's Council on Year 2000 Conversion. Through our participation in the Energy Working Group of the President's Council on Year 2000 Conversion, FERC is working with DOE, Department of Transportation (DOT), Department of Agriculture, Nuclear Regulatory Commission (NRC), General Services Administration (GSA) and Department of State to develop effective programs for facilitating Year 2000 solutions throughout the energy industry. The Council's Energy Working Group has been subdivided into two sectors: electric, and oil and gas. DOE is the sector leader for electric and FERC is the sector leader for oil and gas.

On June 5, 1998, the oil and gas sector of the Energy Working Group held a meeting with representatives of trade associations and research institutes representing the oil and gas industries. The meeting was facilitated by John Koskenin, Chairman of the President's Council on Year 2000 Conversion. Federal agencies present included FERC, as sector leader, and DOE, DOT, NRC, and GSA. Participants also included the Gas Industry Standards Board (GISB), Independent Petroleum Association of America, National Propane Gas Association, INGAA, API, National Petrochemical and Refiners Association, American Gas Association, GRI, Association of Oil Pipelines, American Public Gas Association, National Regulatory Research Institute, and NARUC.

The meeting participants were asked to join the oil and gas sector of the Energy Working Group in developing a focused, coordinated effort between the federal agencies and industry associations that would prevent redundant efforts and ensure that all companies in the oil and gas sectors are reached. The oil and gas sector of the Energy Working Group will serve as a point of coordination for all participants and a forum for collaborative efforts. The meeting participants agreed that it would be valuable to designate umbrella organizations for both the oil and gas industries that would be responsible for coordinating the collection and sharing of information among all trade associations and industry groups within each industry.

Meeting participants were asked to designate umbrella organizations for the natural gas industry and for the oil industry. GISB will focus on accounting standards for both oil and gas. Meeting participants agreed to compile existing surveys and information that has already been collected through the umbrella organizations, assess whether it is desirable to update existing surveys, and consider developing a comprehensive survey with core questions that could be used industry-wide in both the oil and gas sectors. An industry-wide survey may be distributed through the umbrella organizations, which can present summaries of the information that they gather to the Energy Working Group. The Energy Working Group is focusing on assessing industry-wide and regional readiness rather than examining the readiness of individual companies. GISB will ascertain if end users associations would be interested in participating in the Energy Working Group. Finally, FERC will serve as the oil and gas sector leader, and will be the point of contact for the umbrella organizations and facilitate the flow of information to a composite Website.

The meeting participants agreed that the focus of monitoring Year 2000 Conversion readiness should be: (1) safety, (2) reliable delivery of energy products, and (3) accurate accounting and billing.

CONCLUSION

In the end, energy industry participants have the responsibility to address this problem. I nevertheless believe the Commission has an important role in raising awareness of the issue. I view it as the Commission's responsibility to the American public to help alleviate this potential threat to the reliability of our energy systems. The Commission has special responsibility to focus on the natural gas and oil pipeline industry as part of the Energy Working Group of the President's Council. I have therefore asked our CIO to promote the sharing of Year 2000 information within

the industry. She will also facilitate dissemination of information about what is known in other industries about similar products and problems, as appropriate. Having ensured our own systems are Year 2000 compliant, we will continue to convey to the industry and its customers the importance of achieving solutions to Year 2000 issues promptly.

I look forward to working with the Senate Special Committee in the months ahead, and I welcome your questions.

RESPONSES OF JAMES J. HOECKER TO QUESTIONS SUBMITTED BY CHAIRMAN BENNETT

Question 1. How does FERC plan to assemble its assessment of the oil and gas industry for the President's Year 2000 Conversion Council? When will the results be available?

Answer. FERC plans to assemble its assessment of the oil and gas industry for the President's Council on Year 2000 Conversion through constructing a database. This database will include responses to a survey which will be conducted by the umbrella organizations that have been designated by the oil and natural gas sector of the Council's Energy Working Group. The umbrella groups are the American Petroleum Institute, Natural Gas Council, and Gas Industry Standards Board. This database will be made available through the Council's Website (www.y2k.gov). The focus of the survey will not be on how individual companies are doing, but rather on how the industry as a whole is doing, both in the aggregate and also geographically and regionally. The survey is expected to be finalized by the end of July, and preliminary results are expected to become available in September of this year.

Question 2. What portions of the oil and gas production and distribution industry are most susceptible to the Year 2000 problem? Does FERC have any specific plans to address these areas of susceptibility?

Answer. It is currently impossible to identify groups of companies that may be most susceptible. Virtually all oil and natural gas companies have a large number of embedded systems and software applications. Oil and gas management software includes contract administration, measurement systems, nomination systems, and bulletin board systems. Operations include field communications systems, Supervisory Control Data Acquisition Systems (SCADA), automated compressor systems, automated auxiliary plants, maintenance managements systems, and land and easement management systems. However, automated systems are not limited to pipelines. Embedded systems and software applications occur throughout the sector, including production, transportation, distribution, telecommunications links, and back office operations. FERC will work with the umbrella organizations of the oil and gas sector of the Council's Energy Working Group to ensure that the entire sector is reached by industry surveys. The activities of small companies and operators at the production and distribution ends of the interstate systems may prove the most difficult to assess.

Question 3. Your testimony describes the difficulty in identifying and rectifying automated systems embedded in the production and distribution of gas and oil. Could you elaborate on this difficulty? Is there sufficient time remaining to find and fix all of the embedded processors?

Answer. Part of the difficulty in identifying and rectifying embedded systems is the large number of types of embedded chips used within the industry. Systems that are physically difficult to test, such as underwater systems in offshore platforms, pose a special problem.

Further, many of these embedded systems were installed over a long period of time, and in some cases, without a lot of documentation. A major difficulty in identifying embedded systems is the sheer number of them. Production facilities such as an off-shore drilling platform may have ten thousand or more embedded chips. Further, while newer systems may not be at risk in isolation, they could be affected because of their links to older, "legacy" systems which have never been replaced.

Although only 5 percent of these embedded components are expected to malfunction by some estimates, a structured program to find and test all systems is unlikely. Nonetheless, a component may be non-compliant and yet not cause a system to malfunction. In fact, components that are not mission-critical, or are found not to have significant implications to operations, may be intentionally bypassed as a low priority for testing due to time constraints. Further, contingency planning is expected to be an integral part of industry Year 2000 strategies. Consequently, the main oil and gas delivery system may be considered Year 2000 ready without being fully Year 2000 compliant.

Question 4. You mention that FERC will be monitoring the progress of the oil and gas industry. Could you please tell us how you will attempt to monitor this progress? For example, will you be using surveys or personal interviews?

Answer. The survey being developed by the oil and gas sector of the Energy Working Group is expected to be repeated over time as a means to monitor progress and help identify problem areas. A database will be used to capture and compare survey results. A Website will be used as a vehicle to share information among Working Group members.

Question 5. The plan to compile survey results from existing efforts seems like a wise use of resources. Will this information help the energy working group to assess what types of contingency planning may be necessary?

Answer. The survey which is currently being developed by the oil and gas sector of the Energy Working Group will include questions regarding contingency planning. This survey is expected to be finalized by the end of July so it can be sent out to industry members. Hopefully, industry members will then be better able to find out what kind of contingency planning will work for them.

Question 6. Do you think that the consumer should begin saving their gas and oil bills to be able to demonstrate there would be problems with the billing and accounting systems? Or is it too soon to tell?

Answer. It is too soon to tell. From anecdotal information, it appears to me that industry has put a lot of effort so far on back office operations such as accounting, purchasing, and administration. The initial results of the survey being developed by the oil and gas sector of the Energy Working Group are expected to be available in September of this year, at which time we will have a clearer picture.

PREPARED STATEMENT OF SHIRLEY ANN JACKSON

INTRODUCTION

Mr. Chairman, members of the Committee, I am pleased to be here today on behalf of the Commission to discuss with you the status of the U.S. Nuclear Regulatory Commission (NRC) response to the Year 2000 computer problem for nuclear power plants. Our efforts can be divided into three basic areas: our actions internal to the NRC, our interactions with our reactor licensees and the nuclear power industry, and our broader actions to address the issue of a electrical grid.

THE NRC STRATEGY FOR ADDRESSING THE YEAR 2000 PROBLEM

Actions internal to the NRC

With respect to power reactor licensees, the NRC is working to ensure that all of our mission-critical systems (seven in total) will be Year 2000 compliant so that our communications and data interfaces will continue to function properly. The one mission-critical system that is directly linked to operating nuclear power plants is our Emergency Response Data System (ERDS). This application performs the communication and data transmission functions that provide near real-time data to NRC incident response personnel during declared emergencies. The NRC currently is upgrading ERDS to be Year 2000 compliant in order to maintain the same communication protocol as the current system. Once upgraded, either a 2-digit or a 4-digit date field will be accepted. The upgrade is on schedule to be completed, tested, and implemented by March 4, 1999. This effort is being conducted under the NRC Year 2000 effort and is overseen by Mr. Tony Galante, the NRC Chief Information Officer. All of our other mission-critical systems also are on schedule to be Year 2000 compliant in accordance with OMB guidelines, with three currently being repaired, and three being replaced.

NRC Interaction with reactor licensees

Since 1996, the NRC has been working with industry organizations to address the Year 2000 problem. After discussions with the Nuclear Energy Institute (NEI) in 1997, NEI agreed to take the lead in developing industry-wide guidance for addressing the Year 2000 problem at nuclear power reactors. Last November NEI sent a framework document, which NRC had reviewed, to all power reactor licensees. We believe that the guidance in that framework document, "Nuclear Utility Year 2000 Readiness" (NEI/NUSMG 97-07), when properly augmented and implemented, presents nuclear power plant licensees with an acceptable approach for addressing the Year 2000 problem. We will continue to work closely with other Federal agencies and industry groups, and to participate in interagency working groups, to ensure that we stay abreast of emerging Year 2000 concerns and that we take appropriate action to protect public health and safety and the environment. We strongly encour-

age licensees to share information regarding identified remediation and implementation activities, so that Year 2000 problems are identified early and addressed in a cost-effective manner.

In order to obtain confirmation that licensees are addressing the Year 2000 problem effectively with regard to compliance with the terms and conditions of their licenses and NRC regulations, the NRC is requiring that all operating nuclear power plant licensees submit a written response stating how they plan to address the Year 2000 problem. The written response is required by a Generic Letter issued on May 11, 1998, which has been developed and refined over the past six months.

A copy of that Generic Letter is being provided for the record (available at <http://www.nrc.gov/NRC/NEWS/year2000.html>). This Generic Letter refers to the NEI guidance document (NEI/NUSMG 97-07) as an example of an acceptable approach for addressing the Year 2000 issue at nuclear power plants.

By the middle of August 1998, the initial written response to the Generic Letter is due. In that response, nuclear power plant licensees will indicate whether they are pursuing a Year 2000 program based on the NEI program or a different program. Licensees who elect to use a different program are required to present a brief description of that program, to ensure that the computer systems at their facilities will be ready for the Year 2000. In addition, all operating nuclear power plants are required to submit a written response no later than July 1, 1999, confirming that the facility is, or will be, Year 2000 ready by the Year 2000. If their program is incomplete as of July 1, 1999, their response must contain a status report, including completion schedules, for work remaining to ensure Year 2000 readiness.

In addition to the written responses, we plan to conduct inspections, on a sampling basis, to assess licensee preparedness for the Year 2000. Any Year 2000 program used at a nuclear facility must be tailored to meet the specific needs and requirements of that facility and should, in general, comprise the following phases: awareness, assessment, remediation, validation, and implementation. Completion of the Year 2000 program means that the licensee has attained their program objectives. These program objectives could range from having all computer systems and applications, including embedded systems, being Year 2000 compliant, to having some systems Year 2000 compliant and the remaining systems retired or having permanent and/or temporary compensatory measures in place.

Bounding the year 2000 concern for nuclear power plants

The potential impact of the Year 2000 problem on nuclear power plants varies with the types of computer systems in use. Licensees rely upon: (1) software to schedule maintenance and technical specification surveillance, (2) programmable logic controllers and other commercial off-the-shelf software and hardware, (3) digital process control systems, such as a feedwater control or valve control, (4) digital systems for collecting operating data, and (5) digital systems to monitor post-accident plant conditions.

In addition to the reporting requirements in the Generic Letter, NRC regulations (10 CFR Part 21, 10 CFR 50.72, and 10 CFR 50.73) also require licensees to notify the NRC of significant deficiencies, significant non-conformances, and failures, such as some of those which could result from the Year 2000 problem in safety-related systems. To date, the NRC staff has not identified or received notification from licensees or vendors that a Year 2000 problem exists with safety-related initiation and actuation systems. However, some problems have been identified in computer-based systems that, while non-safety-related, are nonetheless important. Such systems, primarily databases and data collection processes necessary to satisfy license conditions, technical specifications, and NRC regulations that are date driven, may need to be modified for Year 2000 compliance.

Some examples of systems and computer equipment that are most likely to be affected by Year 2000 problems include:

- Plant security computers;
- Plant process systems (data scan, log, and alarm and safety parameter display system computers); and
- Radiation monitoring systems.

Because of the limited time remaining in which to address the problem, the majority of the program remediation, validation, and implementation activities should be completed at a facility by mid-1999, leaving only a few such activities scheduled for the third and fourth quarters of 1999. In addition, we recognize that despite every reasonable effort by licensees to identify and correct Year 2000 computer system problems at their facilities, some software, applications, equipment, and systems may remain susceptible to the problem. Additionally, software, data, and systems external to the facility could potentially affect the facility adversely. Therefore, to ensure continued safe operation of the facility into the Year 2000 and beyond,

licensees should formulate contingency plans for affected systems and equipment. The concept of Year 2000 readiness includes the planning, development, and implementation of appropriate contingency plans or compensatory actions for items that are not expected to be Year 2000 compliant, to address the possible impact that unrecognized problems may have on safe plant operation.

Interactions with the nuclear power industry

The NRC has been involved actively with the nuclear industry in addressing the Year 2000 problem, and we are reasonably encouraged by industry efforts. We expect continuation of this effort in the response to the NRC Generic Letter that I mentioned earlier.

To ensure that senior level management at nuclear power plant licensees were aware of the Year 2000 problem, the first industry-wide NRC action was to issue Information Notice (IN) 96-70, "Year 2000 Effect on Computer System Software," on December 24, 1996. In that Information Notice, the NRC staff described the potential problems that nuclear power plant computer systems and software may encounter during the transition to the new century. The NRC staff also encouraged licensees to examine their uses of computer systems and software well before the turn of the century, and suggested that licensees consider appropriate actions for examining and evaluating their computer systems for Year 2000 vulnerabilities.

At the Nuclear Utilities Software Management Group (NUSMG) Year 2000 Workshop, an industry workshop held in July 1997, selected nuclear power plant licensees described their Year 2000 programs and gave examples of areas in which they had addressed Year 2000 issues in order to ensure the safety and operability of their plants on and after January 1, 2000. Some of the issues discussed included: (1) the evaluation of the impact of the Year 2000 problem on plant equipment; (2) the assessment process involved in the identification of components, vendors, and interfaces; (3) the development of Year 2000 testing strategies; and (4) the identification of budget needs to address the Year 2000 problem.

In August 1997, the NRC staff incorporated recognition of the Year 2000 concern in the updated Standard Review Plan, NUREG-0800, Chapter 7, "Instrumentation and Control." This document provides guidance to NRC staff reviewers of computer-based instrumentation and control systems, to ensure that the Year 2000 issue was addressed in any new systems or modifications proposed by licensees.

Also in August 1997, the Nuclear Energy Institute (NEI) met with NUSMG and nuclear plant utility representatives to formulate an industry-wide plan to address the Year 2000 issue. On October 7, 1997, representatives of NEI and NUSMG met with the NRC staff to discuss the actions that NEI was taking to help utilities make their plants "Year 2000 ready." NEI presented the framework document discussed earlier. That document makes a distinction in terminology between the expressions, "Year 2000 ready," and "Year 2000 compliant." "Year 2000 compliant" is defined as those computer systems or applications that accurately process date/time data (including but not limited to calculating, comparing, and sequencing) from, into, and between the 20th and 21st centuries, the years 1999 and 2000, and leap-year calculations. "Year 2000 ready" is defined as a computer system or application that has been determined to be suitable for continued use into the year 2000 even though the computer system or application is not fully "Year 2000 compliant."

NEI/NUSMG issued the framework document to all licensees in November 1997. The document recommends methods for nuclear utilities to attain Year 2000 readiness and thereby ensure that their facilities remain safe and continue to operate within the requirements of their licenses. The scope of the document includes software, or software-based systems or interfaces, whose failure (due to the Year 2000 problem) would (1) prevent the performance of the safety function of a structure, system, or component, or (2) degrade, impair, or prevent compliance with the nuclear facility license and/or NRC regulations. After reviewing the document, the NRC has endorsed this document as an acceptable approach for dealing with the Year 2000 problem at nuclear power plants.

NEI/NUSMG 97-07 also suggests a strategy for developing and implementing a Year 2000 program for nuclear utilities. The strategy recognizes management, implementation, quality assurance (QA) measures, regulatory considerations, and documentation as the fundamental elements of a successful Year 2000 project. The document contains examples of strategies that licensees currently are using, and also recommends that the Year 2000 program be administered through standard project management techniques.

The recommended components for management planning are as follows: (1) management awareness, (2) sponsorship, (3) project leadership, (4) project objectives, (5) the project management team, (6) the management plan, (7) project reports, (8) interfaces, (9) resources, (10) oversight, and (11) quality assurance. The suggested

phases of implementation are awareness, initial assessment (which includes inventory, categorization, classification, prioritization, and analysis of initial assessment), detailed assessment (including vendor evaluation, utility-owned or utility-supported software evaluation, interface evaluation, and remedial planning), remediation, Year 2000 testing and validation, and notification.

The QA measures specified in NEI/NUSMG 97-07 apply to project management QA and implementation QA. Regulatory considerations include the performance of appropriate reviews, reporting requirements, and documentation. Documentation of Year 2000 program activities and results includes documentation requirements, project management documentation, vendor documentation, inventory lists, checklists for initial and detailed assessments, and record retention. NEI/NUSMG 97-07 also contains examples of various plans and checklists as appendices, which may be used or modified to meet the licensee-specific needs and/or requirements.

It should be recognized that NEI/NUSMG 97-07 is programmatic, and does not address fully all the elements of a comprehensive Year 2000 program. In particular, augmented guidance in the area of risk management, business continuity and contingency planning, and remediation of embedded systems is needed to fully address some Year 2000 issues that may arise in licensee program implementation. The NRC staff believes that the guidance in NEI/NUSMG 97-07, when properly augmented and implemented, presents an example of one acceptable approach for licensees when addressing the Year 2000 problem at nuclear power plant facilities.

The NRC role in ensuring electrical grid reliability

Although the primary focus with our licensees has been on public health and safety related to reactor operations, we recognize the concern that the Year 2000 problem may potentially affect the reliability of electrical grids. Our regulatory focus in electrical grid reliability primarily relates to the challenges to plant safety systems that might result from a transient on the electrical grid, such as a loss of offsite power. Nuclear power reactors have two independent sources of offsite power, and are designed to safely shut down if a loss of all offsite power were to occur. In the event of a loss of offsite power, onsite electric power systems provide adequate electrical power to safely shutdown and cool down the reactors. As you know, NRC regulatory oversight and authority does not extend to the offsite electrical grid system.

Notwithstanding our regulatory limits, we recognize the national importance of a broader focus that helps to ensure that potential concerns with electrical grid reliability are identified and resolved. We support the efforts of the President's Council on Year 2000 Conversion and are members of the Energy Working Group. We are working closely with representatives from the Federal Energy Regulatory Commission and the Department of Energy to give assistance with, and share information on, potential problems associated with the Year 2000.

Conclusions

The NRC and the nuclear power industry are addressing the Year 2000 computer problem in a thorough and deliberate manner. To date, we have not identified or received notification from licensees or vendors that a Year 2000 problem exists with safety-related initiation and actuation systems. Further, we believe that we have, through Generic Letter 98-01 and the planned follow-up inspections, established a framework that appropriately assures us that the Year 2000 problem will not have an adverse impact on the ability of a nuclear power plant to safely operate or safely shut down. We recognize the importance of maintaining a reliable electrical grid, and we will continue to work with the President's Council on Year 2000 Conversion Energy Working Group, the Federal Energy Regulatory Commission, and the Department of Energy to give assistance and share information regarding potential problems associated with the coming of the Year 2000.

We look forward to working with the Special Committee and welcome your questions.

ATTACHMENT—NRC GENERIC LETTER NO. 98-01: YEAR 2000 READINESS OF
COMPUTER SYSTEMS AT NUCLEAR POWER PLANTS, MAY 11, 1998

ADDRESSEES

All holders of operating licenses for nuclear power plants, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

PURPOSE

The U.S. Nuclear Regulatory Commission (NRC) is issuing this generic letter to require that all addressees provide the following information regarding their pro-

grams, planned or implemented, to address the year 2000 (Y2K) problem in computer systems at their facilities: (1) written confirmation of implementation of the programs and (2) written certification that the facilities are Y2K ready with regard to compliance with the terms and conditions of their licenses and NRC regulations.

DESCRIPTION OF CIRCUMSTANCES

Simply stated, the Y2K computer problem pertains to the potential for date-related problems that may be experienced by a system or an application. These problems include not representing the year properly, not recognizing leap years, and improper date calculations. An example of a date-related problem is the potential misreading of "00" as the year 1900 rather than 2000. These problems can result in the inability of computer systems to function properly by providing erroneous data or failing to operate at all. The Y2K problem has the potential of interfering with the proper operation of computer systems, hardware that is microprocessor-based (embedded software), and software or databases relied upon at nuclear power plants. Consequently, the Y2K problem could result in a plant trip and subsequent complications on tracking post-shutdown plant status and recovery due to a loss of emergency data collection.

The Y2K problem is urgent because it has a fixed deadline. It requires priority attention because of the limited time remaining, the uncertain risk that the problem presents, the technical challenges presented, and the scarcity of resources available to correct the problem.

Existing reporting requirements under 10 CFR Part 21, 10 CFR 50.72, and 10 CFR 50.73 provide for notification to the NRC staff of deficiencies and non-conformances, and failures, such as some of those which could result from the Y2K problem in safety-related systems. To date, the NRC staff has not identified or received notification from licensees or vendors that a Y2K problem exists with safety-related initiation and actuation systems. However, problems have been identified in non-safety, but important, computer-based systems. Such systems, primarily databases and data collection processes necessary to satisfy license conditions, technical specifications, and NRC regulations that are date driven, may need to be modified for Y2K compliance.

Some examples of systems and computer equipment that may be affected by Y2K problems follow:

- Security computers
- Plant process (data scan, log, and alarm and safety parameter display system) computers
- Radiation monitoring systems
- Dosimeters and readers
- Plant simulators
- Engineering programs
- Communication systems
- Inventory control systems
- Surveillance and maintenance tracking systems
- Control systems

To alert nuclear power plant licensees to the Y2K problem, the NRC issued Information Notice (IN) 96-70, "Year 2000 Effect on Computer System Software," on December 24, 1996. In IN 96-70, the NRC staff described the potential problems that nuclear power plant computer systems and software may encounter as a result of the change to the new century and how the Y2K issue may affect NRC licensees. In IN 96-70, the NRC staff encouraged licensees to examine their uses of computer systems and software well before the turn of the century and suggested that licensees consider appropriate actions for examining and evaluating their computer systems for Y2K vulnerabilities. The NRC staff also incorporated recognition of the Y2K concern in the updated Standard Review Plan, NUREG-0800, Chapter 7, "Instrumentation and Control," dated August 1997, which contains guidance for the NRC staff's review of computer-based instrumentation and control systems.

At the Nuclear Utilities Software Management Group (NUSMG) Year 2000 Workshop, an industry workshop held in July 1997, some nuclear power plant licensees described their Y2K programs and gave examples of areas in which they had addressed Y2K issues in order to ensure the safety and operability of their plants on and after January 1, 2000. Some of the issues discussed were (1) the evaluation of the impact of the Y2K problem on plant equipment, (2) the assessment process involved in the identification of Y2K-affected components, vendors, and interfaces, (3) the development of Y2K testing strategies, and (4) the identification of budget needs to address the Y2K problem.

The Nuclear Energy Institute (NEI) met with NUSMG and nuclear plant utility representatives in August 1997 to formulate an industry-wide plan to address the Y2K issue. On October 7, 1997, representatives of NEI and NUSMG met with the NRC staff to discuss the actions NEI was taking to help utilities make their plants "Year 2000 ready." NEI presented a framework document that provides guidance for utilities to use in readying for the Year 2000. The framework document makes a distinction in terminology between "Y2K ready" and "Y2K compliant." "Y2K compliant" is defined as computer systems or applications that accurately process date/time data (including but not limited to calculating, comparing, and sequencing) from, into, and between the 20th and 21st centuries, the years 1999 and 2000, and leap-year calculations. "Y2K ready" is defined as a computer system or application that has been determined to be suitable for continued use into the year 2000 even though the computer system or application is not fully Y2K compliant. (These definitions have been adopted by the NRC for purposes of this generic letter.)

NEI/NUSMG issued the framework document NEI/NUSMG 97-07, "Nuclear Utility Year 2000, Readiness," to all licensees in November 1997. The document recommends methods for nuclear utilities to attain Y2K readiness and thereby ensure that their facilities remain safe and continue to operate within the requirements of their license. The scope of NEI/NUSMG 97-07 includes software, or software-based systems or interfaces, whose failure (due to the Y2K problem) would (1) prevent the performance of the safety function of a structure, system, or component or (2) degrade, impair, or prevent compliance with the nuclear facility license and NRC regulations.

DISCUSSION

Diverse concerns are associated with the potential impact of the Y2K problem on nuclear power plants because of the variety and types of computer systems in use. The concerns result from Licensees' reliance upon (1) software to schedule maintenance and technical specification surveillance, (2) programmable logic controllers and other commercial off-the-shelf software and hardware, (3) digital process control systems, (4) software to support facility operation, (5) digital systems for collection of operating data, and (6) digital systems to monitor post-accident plant conditions. The scope of NEI/NUSMG 97-07 includes the broad range of computers and software-based systems in a nuclear power plant. However, NRC Y2K concerns are limited to safety-related systems and other systems required by the nuclear power plant license or NRC regulations.

One application that is common to all power reactor licensees is the link between plant computers and the NRC's Emergency Response Data System (ERDS). This application performs the communication and data transmission functions that provide near real-time data availability to NRC and State incident response personnel during declared emergencies. The NRC is currently performing Y2K-related upgrades to ERDS, which will maintain the same communication protocol as the current system, with the exception that either 2-digit- or 4-digit-year fields will be accepted. Those licensees that anticipate changes to their ERDS link should allow time in their schedules for retesting their systems. NRC contractors will support requests for testing on a "first-come, first-served" basis.

NEI/NUSMG 97-07 suggests a strategy for developing and implementing a nuclear utility Y2K program. The strategy recognizes management, implementation, quality assurance (QA) measures, regulatory considerations, and documentation as the fundamental elements of a successful Y2K project. The document contains examples currently in use by licensees and also recommends that the Y2K program be administered using standard project management techniques.

The recommended components for management planning are management awareness, sponsorship, project leadership, project objectives, the project management team, the management plan, project reports, interfaces, resources, oversight, and QA. The suggested phases of implementation are awareness, initial assessment (which includes inventory, categorization, classification, prioritization, and analysis of initial assessment), detailed assessment (including vendor evaluation, utility-owned or utility-supported software evaluation interface evaluation, and remedial planning), remediation, Y2K testing and validation, and notification.

The QA measures specified in NEI/NUSMG 97-07 apply to project management QA and implementation QA. Regulatory considerations include the performance of appropriate reviews, reporting requirements, and documentation. Documentation of Y2K program activities and results includes documentation requirements, project management documentation, vendor documentation, inventory lists, checklists for initial and detailed assessments, and record retention. NEI/NUSMG 97-07 also con-

tains examples of various plans and checklists as appendices, which may be used or modified to meet the licensee's specific needs and/or requirements.

It should be recognized that NEI/NUSMG 97-07 is programmatic and does not fully address all the elements of a comprehensive Y2K program. In particular, augmented guidance in the area of risk management, business continuity and contingency planning, and remediation of embedded systems is needed to fully address some Y2K issues that may arise in licensee program implementation. The NRC staff believes that the guidance in NEI/NUSMG 97-07, when properly augmented and implemented, presents an example of one possible approach for licensees when addressing the Y2K problem at nuclear power plant facilities.

Another document that provides a useful overview of the elements of an effective Y2K program is a guide issued by the Accounting and Information Management Division (AIMD), U.S. General Accounting Office (GAO), GAO/AIMD-10.1.14, "Year 2000 Computing Crisis: An Assessment Guide," September 1997. This guide is a distillation of the best practices of the Government and the private sector for dealing with the Y2K problem.

It should be noted that the guidance in NEI/NUSMG 97-07 and GAO/AIMD-10.1.14 provides a framework only. Any Y2K program employed at a nuclear facility must be tailored to meet the specific needs and requirements of that facility and should, in general, be composed of the following phases: Awareness, assessment, remediation, validation, and implementation. Completion of the Y2K program means the attainment of the program objectives, which could range from all computer systems and applications, including embedded systems, being Y2K compliant, to some being Y2K compliant and the remaining retired or with permanent and/or temporary compensatory measures or work-arounds in place. Also to be considered are the future maintenance requirements for keeping the systems and applications Y2K ready, for example, when the "fixed date window" approach is used.

It is recognized that in spite of every reasonable effort by licensees to identify and correct Y2K computer system problems at their facilities, some software, applications, equipment, and systems may remain susceptible to the problem. Additionally, software, data, and systems external to the facility could potentially affect the facility adversely. Therefore, to ensure continued safe operation of the facility into the Year 2000 and beyond, contingency plans should be formulated for affected systems and equipment. The concept of Y2K readiness includes the planning, development, and implementation of appropriate contingency plans or compensatory actions for items that are not expected to be Y2K compliant or ready and to address the possible impact of unidentified items and their effect on safe plant operation.

Because of the limited time remaining in which to address the Y2K problem, at some facilities it may be necessary that some remediation and implementation activities be performed during normally scheduled plant outages in order to avoid additional outages to effect these activities. Hence, licensees should plan for this work accordingly. The NRC staff notes that unless the majority of the Y2K program remediation, validation, and implementation activities are completed at a facility by mid-1999, leaving only a few such activities scheduled for the third and fourth quarters of 1999, the facility may not be Y2K ready by the year 2000.

In the course of implementing the Y2K program, problems could be identified that potentially affect the licensing basis of the plants. In certain cases, license amendments may be needed to address the problem resolution. Licensees should plan to submit such license amendments to the NRC on a timely basis. The utility Y2K programs and schedules should have the flexibility to accommodate such an eventuality. In addition, licensees are reminded that any changes to their facilities that affect their current licensing basis must be reviewed in accordance with existing NRC requirements and the change properly documented. Finally, we strongly encourage licensees to share information regarding identified remediation and implementation activities in order to maintain the likelihood that all Y2K problems are identified. We understand that Owners' Groups are implementing this and we encourage this effort.

REQUIRED RESPONSE

In order to gain the necessary assurance that addressees are effectively addressing the Y2K problem with regard to compliance with the terms and conditions of their licenses and NRC regulations, the NRC staff requires that all addressees submit a written response to this generic letter as follows:

- (1) Within 90 days of the date of this generic letter, submit a written response indicating whether or not you have pursued and are continuing to pursue a Y2K program such as, or similar to, that outlined in NEI/NUSMG 97-07, augmented appropriately in the areas of risk management, contingency planning, and re-

mediation of embedded systems. If your program significantly differs from the NEI/NUSMG guidance, present a brief description of the programs that have already been completed, are being conducted, or are planned to ensure Y2K readiness of the computer systems at your facility(ies). This response must address the program's scope, assessment process, plans for corrective actions (including testing and schedules), QA measures, contingency plans, and regulatory compliance.

(2) Upon completing your Y2K program or, in any event, no later than July 1, 1999, submit a written response confirming that your facility is Y2K ready, or will be Y2K ready, by the year 2000 with regard to compliance with the terms and conditions of your license(s) and NRC regulations. If your program is incomplete as of that date, your response must contain a status report, including completion schedules, of work remaining to be done to confirm your facility is/will be Y2K ready by the year 2000.

Address the written reports to the U.S. Nuclear Regulatory Commission, Attention: Document Control Desk, Washington, D.C. 20555-0001, under oath or Summation under the provisions of Section 182a, Atomic Energy Act 1954, as amended, and 10 CFR 50.54(f). In addition, submit a copy to the appropriate regional administrator.

BACKFIT DISCUSSION

This generic letter requires information from addressees under the provisions of Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f). The required information will enable the staff to verify that each nuclear power plant licensee is implementing an effective plan to address the Y2K problem and provide for safe operation of the facility before January 1, 2000, and is in compliance with the terms and conditions of their license(s) and NRC regulations. The following NRC regulations form a basis for this requirement:

- 10 CFR 50.36, "Technical Specifications," paragraph (c)(3), "Surveillance Requirements," and paragraph (c)(5), "Administrative controls." These sections relate, respectively, to requirements pertaining to testing, calibration, or inspection to ensure that the necessary quality of systems and components is maintained and to provisions relating to management, procedures, recordkeeping, and review and audit necessary to ensure operation of the facility in a safe manner.
- 10 CFR 50.47, "Emergency Plans," paragraph (b)(8), which relates to the provision and maintenance of adequate emergency facilities and equipment to support the emergency responses.
- Appendix B to 10 CFR Part 50, Criterion III, "Design Control," requires that design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program.
- Appendix B to 10 CFR Part 50, Criterion XVII, "Quality Assurance Records," requires that sufficient records shall be maintained to furnish evidence of activities affecting quality. The records are to include operating logs and the results of reviews.
- Appendix A to 10 CFR Part 50, General Design Criterion (GDC) 13, "Instrumentation and Control," which addresses the provision of appropriate instrumentation and controls to monitor and control systems and variables during normal operation, anticipated operational occurrences, and accident conditions, as appropriate, to ensure adequate safety.
- Appendix A to 10 CFR Part 50, GDC 19, "Control Room," which requires the provision of a control room from which actions can be taken to operate the nuclear plant safely.
- Appendix A to 10 CFR Part 50, GDC 23, "Protection System Failure Modes," which requires that the protection system shall be designed to fail into a safe state or into a state demonstrated to be acceptable on some other defined basis.

PAPERWORK REDUCTION ACT STATEMENT

This generic letter contains information collections that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). These information collections were approved by the Office of Management and Budget (OMB), approval number 3150-0011, which expires on September 30, 2000.

The public reporting burden for this collection of information is estimated to average 100 hours per response, including the time for reviewing the instructions, searching data sources, gathering and maintaining the needed data, and completing

and reviewing the information collected. This estimate assumes a licensee's response simply confirms the existence of a Y2K program, similar to that outlined in NEI/NUSMG 97-07, and that the program will be completed by July 1, 1999. Licensees whose Y2K program significantly differs from the NEI/NUSMG guidance or whose Y2K program will not be completed by July 1, 1999, must submit additional information to the NRC.

The NRC is seeking public comment on the potential impact of the collection of information contained in this generic letter and on the following issues:

1. Is the proposed collection of information necessary for the proper performance of the functions of the NRC, including whether the information will have practical utility?
2. Is the estimate of burden accurate?
3. Is there a way to enhance the quality, utility, and clarity of the information to be collected?
4. How can the burden of the collection of information be minimized, including the use of automated collection techniques?

Send comments on the burden estimate and any aspect of this collection of information, including suggestions for reducing this burden, to the Information and Records Management Branch, T-6 F33, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0011), Office of Management and Budget, Washington, D.C. 20503.

The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

If you have any questions about this matter, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

*JACK W. ROE, Acting Director,
Division of Reactor Program Management,
Office of Nuclear Reactor Regulation.*

Technical Contact: M. Chiramal, NRR 301-415-2845, E-mail: mxc@nrc.gov

Lead Project Manager: Allen G. Hansen, NRR, 301-415-1390 E-Mail: agh@nrc.gov

ATTACHMENT—LIST OF RECENTLY ISSUED NRC GENERIC LETTERS

Generic letter	Subject	Date of issuance	Issued to
97-06	Degradation of Steam Generator Internals	12/30/97	All holders of OLS for pressurized-water reactors, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.
97-05	Steam Generator Tube Inspection Techniques.	12/17/97	All holders of OLS for pressurized-water reactors, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.
96-06, Sup. 1	Assurance of Equipment Operability and Containment Integrity During Design-Basis Accident Conditions.	11/13/97	All holders of OLS for nuclear power reactors except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.
91-18, Rev. 1	Information to Licensees Regarding NRC Inspection Manual Section on Resolution of Degraded and Nonconforming Conditions.	10/08/97	All holders of OLS for nuclear power and NPRs, including those power reactor licensees who have permanently ceased operations, and all holders of NPR licenses whose license no longer authorizes operation.

OL=Operating License
CP=Construction Permit
NPR=Nuclear Power Reactors

RESPONSES OF SHIRLEY ANN JACKSON TO QUESTIONS
SUBMITTED BY CHAIRMAN BENNETT

Statement: "All of our other mission-critical systems are on schedule to be Year 2000 compliant in accordance with OMB guidelines, with three currently being repaired, and three being replaced" (page 2, para.1).

Question 1. What is the target completion date for the NRC mission-critical systems?

Answer. Two of NRC's seven mission-critical systems have been completed. Four of NRC's five remaining mission-critical systems are on schedule to be completed on or before January 1, 1999. The final mission-critical system is on schedule to be completed by March 1999.

MISSION-CRITICAL SYSTEM STATUS

System name	Renovation		Validation		Implementation	
	Milestone date	Percent complete	Milestone date	Percent complete	Milestone date	Percent complete
Repair						
Emergency Response Data System	08/1998	66	01/1999	35	03/1999	0
Emergency Telecommunications System ...	08/1998	65	09/1998	0	10/1998	0
Operations Center Information Management System	09/1998	42	12/1998	0	01/1998	0
Replace						
Agency Upgrade of Technology for Office Systems .....	.....	.....	.....	.....	12/1998	76
Licensing Tracking System .....	.....	.....	.....	.....	10/1998	40

Statement: "The concept of Year 2000 readiness includes the planning, development, and implementation of appropriate contingency plans or compensatory actions for items that are not expected to be Year 2000 compliant, to address the possible impact that unrecognized problems may have on safe plant operation" (page 5, para. 1).

Question 2. What contingency plans exist and what types of compensatory actions might be taken in the event such problems occur?

Answer. As part of the programs being pursued by nuclear power plant licensees to address the Year 2000 problem, all licensees are developing contingency plans in the event unanticipated problems arise. The Nuclear Energy Institute (NEI) in conjunction with the Nuclear Utilities Software Management Group (NUSMG) is developing additional guidance for nuclear power plant licensees on contingency planning. This guidance will be available later in the Summer of 1998. We currently do not have detailed information on power reactor licensees' contingency plans. However, contingency planning is one of the areas that licensees are to address in their Year 2000 programs in response to NRC's Generic Letter 98-01 Year 2000 Readiness of Computer Systems at Nuclear Power Plants. Further, the NRC will review licensees' contingency planning as part of the Year 2000 readiness sample inspections.

While contingency plans will be specific to the individual plant based on the specific impact of the Year 2000 problem on the facility, some general types of compensatory actions will likely be established. Examples of these include:

- (1) Provision for access control by augmenting the number of guards on site in the event of a failure in the security computer which prevents the ability to lock doors.
- (2) Provision for additional technical staff to perform engineering calculations in the event computer programs fail to work properly.
- (3) Provision for additional supplies of required materials such as fuel oil for backup diesel generators in the event of longer than anticipated loss of offsite power.

Statement: "In addition to written responses, we plan to conduct inspections, on a sample basis, to assess licensee preparedness for the Year 2000" (page 3, para. 3).

Question 3a. Describe the Year 2000 readiness inspection process. How many inspectors are there?

Answer. The NRC staff has developed a draft Temporary Instruction containing guidance for conducting the Year 2000 readiness sample inspections. The draft is currently out for comment and will be finalized in August. The NRC staff currently plans to use approximately 4 inspectors to conduct the Year 2000 readiness inspections.

Question 3b. What are the inspectors' backgrounds?

Answer. The NRC staff Year 2000 readiness inspectors are electrical/electronics engineers with backgrounds and knowledge in the review of the design of digital (software) based systems. These inspectors will have specific knowledge in the area of potential Year 2000 problems.

Question 3c. What time frame is in place regarding the inspections?

Answer. The NRC staff plans to begin the Year 2000 readiness inspections in September 1998 and complete them by March 1999.

Question 4. To what extent are NRC's nuclear power plant Year 2000 readiness assessments "self-verifying." Would a greater extent of independent verification be more useful?

Answer. In response to our Generic Letter, power reactor licensees will confirm and provide information regarding Year 2000 readiness of their facilities. The NRC will review licensee response to the GL 98-01. The NRC staff assessments and inspection-related activities of licensee Year 2000 programs are fully independent of any activities performed by the licensee. Therefore, the NRC staff review effort on licensee Year 2000 readiness is sufficiently independent to permit decisions to be made on the need for any subsequent actions. If the results of the sample inspections described in response to Question 3 identify generic concerns, either additional inspections will be conducted or additional guidance will be issued.

Statement: "It should be noted that NEI/NUSMG 97-07 (*Nuclear Utility Year 2000 Readiness* framework document prepared by the Nuclear Energy Institute) is programmatic and does not address fully all the elements of a comprehensive Year 2000 program. In particular, augmented guidance in the area of risk management, business continuity and contingency planning and remediation of embedded systems is needed to fully address some Year 2000 issues that may arise in licensee program implementation" (page 8, para. 2).

Question 5. Who will be the source of this guidance, and how can it be best coordinated across the nuclear power industry?

Answer. As mentioned above in the response to Question 2., NEI/NUSMG is developing additional guidance for the nuclear power industry on contingency planning. Guidance on risk management, business continuity and remediation of embedded systems is provided in the General Accounting Office (GAO) document, GAO/AIMD-10.1.14, "Year 2000 Computing Crisis: An Assessment Guide", September 1997 which is referred to in the NRC Generic Letter 98-01, "Year 2000 Readiness of Computer Systems at Nuclear Power Plants" dated May 11, 1998. Additionally, the NRC plans to participate in an industry-sponsored workshop to be offered later this year on industry Year 2000 progress. The NRC will use this opportunity to discuss its initial findings from the Year 2000 inspections it will begin in September.

Statement: "Notwithstanding our regulatory limits, we recognize the national importance of a broader focus that helps to ensure that potential concerns with electrical grid reliability are identified and resolved" (page 9, para. 1).

Question 6. What can be done to assure this broader focus?

Response: A broader focus for nuclear power plant Year 2000 readiness beyond nuclear safety is provided in NEI/NUSMG 97-07. This document addresses Year 2000 readiness of all nuclear power plant systems including not only safety-related systems, but those necessary for continued plant operation in order to maintain supply to the electrical grid. Moreover, NRC is fully supporting the broader focus as a member of the Energy Sector Working Group of the President's Council on Year 2000 conversion.

Statement: "To date, we have not identified or received notification from licensees or vendors that a Year 2000 problem exists with safety-related initiation and actuation systems" (page 9, para. 2).

Question 7. What are the exact reporting requirements of 10 CFR Part 21, 10 CFR 50.72, and 10 CFR 50.73, which mandate that the NRC be notified of such instances? How do these regulations relate to the vendors?

Answer. 10 CFR Part 21, Reporting of Defects and Noncompliances, specifically requires nuclear power plant licensees and vendors providing safety-related equipment or equipment providing safety functions to report defects and noncompliances identified in that equipment to the NRC. A Year 2000 problem in a safety-related initiation and actuation system is an example of such a reportable defect. 10 CFR 50.72, immediate notification requirements for operating nuclear reactors, requires nuclear power plant licensees to immediately notify the NRC of emergency situa-

tions and promptly notify the NRC of other non-emergency events such as deviations from plant technical specifications including unanalyzed conditions that significantly compromise plant safety or could prevent the fulfillment of a safety function.

10 CFR 50.73, Licensee Event Report System, requires licensees to submit a Licensee Event Report (LER) within 30 days after discovery of an event which is prohibited by plant technical specifications or results in the plant being in an unanalyzed condition that significantly compromises plant safety or was outside the design basis of the plant. Events covered by 10 CFR 50.72 and 10 CFR 50.73 include equipment failures and design errors such as may result from a Year 2000 problem in a safety-related initiation and actuation system. 10 CFR 50.72 and 50.73 do not apply to vendors.

PREPARED STATEMENT OF JOHN A. KOSKINEN

Good morning, Mr. Chairman. I am pleased to appear before the committee to discuss the activities of the President's Council on Year 2000 Conversion and the year 2000 problem's implications for the energy industry.

Let me begin, however, by expressing my support for the work of this committee. I am confident the committee will play a key role in helping to address the year 2000 problem, and I appreciate your commitment to focus not only on year 2000 activities within the Federal Government, but in the private sector as well, where it is clear we face a real challenge in raising awareness among small and medium-sized organizations. I would also like to express my appreciation to you, Mr. Chairman, and to Senator Dodd, for the work that you both have done to increase awareness of the problem in the financial services industry. The Council has formed a financial institutions group to work with industry leaders in this important area, and we look forward to working with you as well.

As you know, like the financial sector, energy is a key part of our Nation's infrastructure. While people in other sectors are focused on ensuring that their systems and date-sensitive embedded chips are ready for the new millennium, that work will be irrelevant if we have power failures on January 1, 2000. To prevent such an outcome, we need to work together in an ongoing dialogue with the industry to raise awareness of the problem and to facilitate information exchanges. Today's hearing is a valuable contribution to that dialogue.

COUNCIL STRUCTURE—ECONOMIC SECTORS

As you know, I returned to Federal Government in March to chair the President's Council on Year 2000 Conversion. The Council's mission is two-fold: To assist Federal agencies as they work to prepare their systems for the new millennium and to coordinate agency efforts to increase awareness of the problem among private sector entities, State and local governments, and international organizations.

The Council is made up of senior executives from more than 30 major Federal executive branch, regulatory, and independent agencies who were personally chosen by their agency heads and have the authority to commit their agencies to action on the spot. The full Council meets at least monthly to discuss not only agency efforts to increase awareness of the problem outside of the Federal Government, but agency progress in ensuring that Federal mission-critical systems will be year 2000 compliant.

While several of the agencies confront significant management challenges, I am confident that the vast majority of Federal mission-critical systems will be ready for the year 2000. In the ongoing discussion about the Federal response to this problem, we often overlook the fact that many agencies are making excellent progress. According to the most recent OMB quarterly report, 71 percent of mission-critical systems in the nine agencies assigned OMB's highest ranking are year 2000 compliant—nine months ahead of the government-wide goal.

An important fact in our favor is that senior managers in the Federal Government are very much aware of the year 2000 problem. I've met individually with the heads of more than 40 agencies, and their agencies are working hard to ensure that critical Federal systems are compliant. I wish I could be as certain that is the case in every organization outside of the Federal Government. Unfortunately, many organizations are not paying appropriate attention to the problem. That is why our outreach efforts are so important.

One of the things I emphasized in my meetings with the agency heads was that, while it is very important for agencies to focus on fixing their own systems, they also have a responsibility to reach out to organizations within their policy areas to increase awareness of the problem and to offer support. The agencies have accepted

that challenge, but that does not mean the Federal Government has the authority or the responsibility to fix others' systems. The Government has no such authority in many areas of our economy, and getting people to take personal responsibility for ensuring that their systems work is key to the success of the Nation's year 2000 preparations.

So how can we most effectively reach out to organizations outside the Federal realm? This was one of the first questions the Council addressed. We decided that, to be most effective, we needed to build on existing organizational relationships between agencies and outside groups, which are in many cases their normal constituencies. We asked the agencies to also consider reaching out to important sectors we don't regularly contact and to coordinate outreach efforts to ensure there are no gaps in coverage. Fortunately, our normal working relationships reach into many important areas of the economy. The Federal Reserve, for example, has an ongoing relationship with the Nation's banks. The Federal Aviation Administration has an ongoing dialogue with the airline industry. And there were obvious industries we could initiate contact with, such as having the Environmental Protection Agency discuss the year 2000 problem with the operators of local wastewater treatment plants.

The Council has organized itself to take advantage of these relationships. We have identified roughly 30 economic sectors and enlisted agencies who have policy interests in, or connections to, these areas to serve as "coordinators," to increase awareness of the problem and to offer support. In this role, agencies are also getting feedback on organizations' progress in addressing the problem, which will help us identify areas of concern. In particular, agencies are working with industry trade associations, who have unique capabilities for communicating with their members about the problem, individual companies, State and local governments, and international institutions.

For example, the Transportation Department will soon be holding an Intelligent Transportation Systems summit in Washington that will bring together industry leaders, State and local transportation officials, and transportation technology suppliers to discuss solutions for possible year 2000-related disruptions in the operation of traffic control systems. The Federal Communications Commission last week held a roundtable of industry leaders to discuss the year 2000 problem's implications for public safety systems. The Small Business Administration will run a series of public service announcements on the problem aimed at small business owners. The Department of Health and Human Services and the Veterans Administration are working with hospital trade associations and the American Medical Association to increase awareness of the problem among the Nation's hospitals. And the Food and Drug Administration is again surveying medical device manufacturers about the year 2000 compliance of their equipment.

We are also using other "leverage points" in our outreach efforts. These are organizations who, by virtue of their actions or opinions, can be a powerful influence to encourage others to ensure that their systems are ready for the new millennium. This is particularly important for small and medium-sized organizations that seem to be the least aware of the problem's significance to their operations. Therefore, I have met with several rating agencies and the year 2000 task force of the American Institute of Certified Public Accountants to encourage them to reiterate to their clients the importance of addressing the year 2000 problem.

COUNCIL STRUCTURE—WORKING GROUPS

The Council has formed agency working groups to coordinate agency outreach activities in several key parts of the Nation's infrastructure that require an intensified focus. We have working groups that cover telecommunications, financial institutions, workforce issues, emergency preparedness, and energy. I will address the energy working group's activities in greater detail momentarily.

The telecommunications group, which the FCC chairs, is working with industry groups and the Nation's largest telecommunications service providers to minimize potential disruptions to the communications network we have all come to rely upon. One of the real challenges in this area is international telecommunications. In countries that have thus far done very little to address the problem, there is a significant chance for telecommunications failures on January 1, 2000.

For financial institutions, I did not initially plan to form a working group because of the good progress being made, thanks to hard work of agencies like the Fed, the Office of Thrift Supervision and other members of the Federal Financial Institutions Examination Council, and the Securities and Exchange Commission. Recognizing this is an area of unparalleled importance to the Nation's economy, however, the Council decided we should form a working group. This Fed-chaired group is now

working to address the problem not only with U.S. banks, but with the securities industry, mortgage companies, and government sponsored entities.

The Labor Department chairs the workforce issues group, which is focused not only monitoring the Federal Government's supply of workers for its year 2000 remediation activities, but on ways to help mitigate some of the potential year 2000 workforce shortages in the economy as a whole. Labor has electronic job and talent banks that will be modified to contain a special section devoted to the year 2000 problem. This will enable job-seekers to connect with organizations that are in need of assistance. The group is also working to form relationships with outside parties such as the American Association of Retired Persons that have unique capabilities for reaching those retirees with special skills for addressing the problem.

The emergency services working group, chaired by the Federal Emergency Management Agency, is concentrating on ensuring that State and local emergency response officials are addressing the year 2000 problem. Emergency response agencies need to assess their own systems to make sure they are year 2000 compliant. But they also need to prepare for potential problems caused by failing computer systems and embedded chips in their communities just as they would a major storm or earthquake, since the year 2000 problem has the potential for causing disruptions in key infrastructure segments.

ENERGY

Because it is such a critical part of the Nation's infrastructure, we are very concerned about year 2000 progress in the energy industry. The wide range of companies active in the production and transportation of power, which include investor-owned utilities, publicly owned utilities, Federal power marketing associations, and oil and gas producers, makes the challenge of outreach all the more difficult.

As a result, the Council has taken the step of appointing two chairs—the Energy Department for electric power, and the Federal Energy Regulatory Commission for oil and gas. The entire group is working to engage industry in an ongoing dialogue about the level of awareness, assessment, and remediation that is underway, and is offering Energy and FERC to coordinate the activities of Federal agencies in this area. Again, while the Government does not have direct control over most of these organizations, we can play an important role in facilitating an information exchange on year 2000 best practices and shared experiences among those in the industry.

We are also very concerned about the implications of date-sensitive embedded chips for the energy industry. Some of these chips help to carry out critical functions in power plants and oil production facilities, and we are encouraged that the industry recognizes the importance of this issue.

Thus far, we have been delighted with the response we have received from various energy trade associations. The working group has met with the North American Electric Reliability Council, which has agreed to be our contact with the electric power industry. In a meeting last week, the American Petroleum Institute and the Natural Gas Council agreed to use their capabilities as umbrella organizations to raise awareness of the problem within their industries and to survey the progress of their members. While it is difficult to make estimates at this stage in the process, the consensus is that the largest companies in the energy industry are actively working to ensure their ability to function as we move into the new millennium.

MOVING FORWARD

There is no doubt the year 2000 problem poses a significant challenge to the global economy. I am confident that Federal agencies will live up to their end of the bargain, both in fixing their critical systems and in increasing awareness beyond the Federal Government. We will continue to reach out to public and private organizations—particularly in key infrastructure areas such as energy—to encourage people to take personal responsibility for solving their year 2000 problems. As I have often said, there is no guarantee that every critical system will be fixed. But if we work hard, and if we work together, I think we will be well-positioned to achieve our ultimate goal of ensuring that any inconveniences caused by the year 2000 problem will be relatively minor.

I thank the committee for its interest in the year 2000 problem. You are making a valuable contribution to the public dialogue about this matter. I look forward to working with you, and I would be happy to answer any questions that you may have.

RESPONSES OF JOHN A. KOSKINEN TO QUESTIONS SUBMITTED BY CHAIRMAN BENNETT

Question 1. You stated several times that sector groups will be both raising awareness and trying to develop assessments. What deadlines are being placed on the working groups to finish these assessments and at what point do they begin contingency planning?

Answer. The Council's sector groups are working closely with industry trade associations, companies, State and local governments, and international entities to raise awareness and gain an understanding of the state of year 2000 preparedness in various sector areas. While there is no deadline for this work, we expect to be able to make assessments in many areas by the end of this year. In Federally regulated areas, such as banking, many oversight agencies already have information available from preliminary and ongoing assessments.

With regard to contingency planning, the Council's sector groups will not be drawing up plans for each sector. Instead, as part of their efforts to increase awareness of the year 2000 problem, agencies are encouraging organizations outside the Federal Government to focus on contingency planning as part of preparing for the year 2000. (Federal agencies have already been required to begin contingency planning for their activities.) The Council itself will begin to consider appropriate contingency plans for a Federal response to possible third-party failures as we move toward the end of this year, when those organizations have a better sense for which of their systems are unlikely to meet the January 1, 2000 deadline.

Question 2. Could you please elaborate on the role the Vice President is playing in the Y2K challenge? What exactly is his level of involvement?

Answer. The Vice President is actively involved in the Administration's year 2000 efforts. He and the President have spoken to the Cabinet and emphasized to the agency heads that they must take personal responsibility for ensuring that their agency's mission-critical systems are ready for the year 2000. The Vice President has also worked to focus the President's Management Council, a group composed of agency deputy secretaries, on the issue, meeting with them to stress the importance of agencies preparing their systems for the new millennium. In addition, the Vice President receives briefings and reports from me, and he and his staff are working closely with the 32 "high impact" agencies that most directly relate to the public, to emphasize that solving the year 2000 problem is critical to their ability to deliver services to the American people.

Question 3. What do you see as the greatest national and economic security risks associated with the Year 2000 computer problem?

Answer. The greatest risks both to national and economic security come from outside the United States. We truly live in a global economy that is increasingly inter-related and dependent upon the electronic exchange of information for financial and other transactions. Unfortunately, a large number of countries have thus far paid little or no attention to the year 2000 problem. Part of our concern is based on the fact that we have little control over other countries' year 2000 preparations. Thus, while we are actively reaching out, through international organizations as well as our embassies, to encourage other countries to address the problem in areas such as finance and national security, there is little we can do ensure that their critical systems will be ready.

We are also concerned that countries take appropriate actions to ensure the safety of weapons systems that could be affected by the problem, and we have been working through the Defense Department, State Department, and other channels to encourage foreign governments to address this critical area. Council members from the State Department recently met in London with the international year 2000 experts from other G-8 countries to discuss trans-boundary aspects of the problem in areas such as defense and finance. Finally, we have discussed with the National Security Council and other security agencies our concern about possible problems raised by work done abroad on U.S. systems.

Question 4. You stated that FEMA will be chairing the emergency services working group. How will this group facilitate contingency planning when there are no accurate assessments of the potential Y2K problems? How will the emergency services group interface with the other working groups?

Answer. As chair of the emergency services sector group, FEMA is working to increase awareness of the year 2000 problem among State and local disaster officials and to stress the importance of contingency planning for failures that are likely to occur in systems that support key segments of the infrastructure. The FEMA-led group includes a wide range of Federal agencies, such as the SBA, the Defense Department, and GSA, with experience in responding to State requests for assistance. The group is reviewing what, if any, additional work is needed to prepare for possible infrastructure failures, since the effect of year 2000-related infrastructure fail-

ures will be similar to that created by natural disasters such as hurricanes and earthquakes. As noted above, we expect to begin to have better assessments of where the country may have difficulties by the end of this year, and FEMA and its working group will have full access to such information.

Question 5. In your testimony you mentioned that you asked agencies to consider reaching out to sectors they would not normally contact to ensure that there are no gaps. Could you give an example of such a sector?

Answer. As noted in my testimony, I have asked agencies "to reach out to organizations within their policy areas to increase awareness of the problem and to offer support." Some of these organizations will be outside of the agency's normal contacts. The food supply sector provides an excellent example of an agency reaching out to organizations with whom it would not normally have contact. The Agriculture Department, the sector group's lead agency, has a longstanding relationship with farmers and other producers in implementing food safety regulations. But since this sector group is looking at the concept of food distribution from farm to table, the Department is now reaching out to shippers, grocers, and others with whom they would normally have very little contact to increase awareness of the problem and offer support.

Question 6. Has the Council considered a public awareness campaign to educate and inform the general public about how to prepare for Y2K? For example, would you recommend people keep copies of their previous utility bills and bank statements in case there are problems with billing and accounting systems?

Answer. At this time, our major focus in terms of public campaigns is on raising awareness of the problem among small and medium-size businesses. The SBA has a major national campaign underway, supported by a series of private sector partners from several industries, that includes public service announcements, a web page, and distribution of printed materials. As we move forward, an important part of our communications efforts will be to ensure that the general public has available information about what works and what doesn't. On the Federal level, we have an obligation to advise the public directly about Government services that are year 2000 compliant, as well as those that are not. We will also be working with the private sector and State and local government to encourage them to share similar information about their services and products on an organization-by-organization basis. With regard to retaining bills and statements, information is not available at this time that would indicate the public should be advised that such actions are necessary, although many individuals already preserve such records for future reference.

Question 7. You briefly touched on the global implications of Y2K. Have you seen any indications that we could suffer disruptions in our oil imports?

Answer. Thus far, we do not have indications that Y2K will disrupt our oil imports. But energy generally, and oil and gas in particular, is an area of great concern to the Council. The Transportation Department is working to reach out to worldwide insurers and shippers, because there may be substantial risks in the embedded chips area to ports and ships' ability to operate effectively. Also, the oil and gas portion of our energy sector group is working closely with the industry on the problem, and part of their efforts will be to reach out to foreign counterparts as well.

Question 8. Some Year 2000 experts have pointed to other dates which could be problematic such as September 9, 1999. What attention is being paid to the possibility that this date could trigger disruptions in the different infrastructures?

Answer. While use of the date, September 9, 1999 (9/9/99), in programming could be a problem in specific instances, it is not likely to be a widespread problem. Unlike using a two-digit year, which was accepted programming practice, programmers' use of 9s to do things such as signal an end of a file or table have been viewed as bad programming practice. Furthermore, where a programmer used such a marker, it is much more likely they would use 99/99/99, instead of 9/9/99, since it is both logically higher than any possible date field and does not represent an actual date. Nevertheless, the problem could occur, and agency technicians are looking for it as part of their year 2000 fixes.

The fact that 2000 is a leap year also may be a problem in a few cases. But again, this should not be a widespread problem. The same logic (i.e., this system will not be in place when the year 2000 arrives) that caused programmers not to use a four-digit year, also works to mitigate the leap year problem. If the program was not expected to be running in 2000, there was little likelihood that there would be a focus on a complex way to calculate a leap year. The easiest way to calculate a leap year is: if the year is divisible by four, it is a leap year. Therefore, most programmers would have coded that logic. That logic will work in the year 2000 because, unlike 1900 or 2100, 2000 actually is a leap year. Programmers that were meticulous, and coded their programs to address the leap year in 2000, would have inves-

tigated the rules for 2000 and accommodated it. Here again, however, notwithstanding all of the above, the problem may occur and agency technicians are checking for it and testing to be sure that systems will work through the leap year.

Question 9. I understand that you have two assistants and a secretary. Is that the extent of your staff? If so, do you really think this is sufficient staff for this daunting management task?

Answer. My direct administrative staff, at this time, consists of two professionals, an administrative assistant, a senior-level detailee, and an intern. I believe that is an appropriate level of administrative staff in light of the structure we have created. We also receive direct support from several professionals at OMB and GSA, which provides logistical support for the Council. More significantly, each of the Council's 34 sector groups is chaired and supported by senior executives and support staff from the agencies heading up the groups. Thus, hundreds of individuals are working under my direction on the year 2000 problem as part of the Council's operations.

Question 10. What are the long-term effects of the Year 2000 computer problem? Will we suffer from the increased vulnerabilities of patched systems? Or will we benefit from strengthened and updated infrastructures?

Answer. I think the most important positive long-term effect of the problem is that it has forced organizations to conduct extensive inventories of their systems. This is leading to greater efficiency because, in the process, they are discovering new and better ways for carrying out business processes, in addition to retiring systems they no longer need. Unfortunately, one of the problem's negative effects is that, in some areas, organizations are delaying much-needed modernizations and upgrades just to ensure that they can keep their core business processes operating. These organizations are making investments, but they are investments to stay in business, not to improve productivity. On the latter point, we could suffer from increased vulnerabilities of patched systems, but we are just as likely to benefit from strengthened and updated infrastructures.

Question 11. What is the greatest challenge you face in reaching out to the public sector?

Answer. Our greatest challenge in reaching out to the public sector is increasing awareness among local governments. While I am reasonably confident that most States have a good handle on the problem, I am not as confident about county and town governments. However, we are working with groups such as the National Governors' Association, the National Association of Counties, and the National League of Cities to increase awareness of the problem among local officials.

PREPARED STATEMENT OF SENATOR JON KYL

Mr. Chairman, let me begin by commending you on your leadership on this vital issue. While there has been some activity in the Congress on Year 2000 related matters, up until now it has not received the prominence or the sustained focus it deserves. I want to thank you for recognizing the need for this Committee, for taking on the time consuming and difficult task of chairing this Committee, and for your personal commitment to the welfare and security of our nation.

As we begin today's hearing, I am reminded of a statement Henry Kissinger made in 1975 "Competing pressures tempt one to believe that an issue deferred is a problem avoided: more often it is a crisis invented."¹ Kissinger's statement is particularly true of the Year 2000 Technology Problem (Y2K). Y2K is an issue which has been deferred, and a problem that has been largely avoided. Now it may well escalate into a national crisis.

In fact, we do not know the scope or the severity of the problem. Right now speculation about the consequences of Y2K runs the gamut from a low of doomsday thinking to a high of reckless optimism. The empirical data needed for accurate infrastructure assessments and development of broad-based contingency planning does not exist.

I can only say two things for certain about the Y2K problem. The deadline is fixed and the litigation could be fierce. The Y2K environment is already a highly charged legal atmosphere. As we will hear, fears of liability and litigation are impeding some efforts to share information about Y2K readiness.

The Y2K problem is simple to state. Some software and computer chips interpret "00" of 2000 as the year 1900 which may result in miscalculations and even system failures. Fixing the problem is straightforward, but also time consuming and expensive, because it requires the careful correction, testing and replacement of affected software and chips. So for companies and government agencies alike, coordinating

¹ Henry Kissinger, TIME Magazine 1975.

the Y2K readiness of computerized and embedded systems is principally a management problem.

But on a national level, Y2K is not simply a management problem. We need clear leadership from the White House, and effective public policy initiatives to prepare the country for the far reaching ramifications of Y2K requirements and effects.

With the establishment of the President's Council on Year 2000 Conversion, we are seeing some of that much needed leadership emerge. But the Clinton Administration has come surprisingly late to this task.

One of the hallmarks of the Clinton Administration has been its focus on the "information superhighway." In 1993, the President established an Advisory Council on the National Information Infrastructure (NII) to examine a wide-range of NII relevant issues. Despite the Council's three committees, seven interagency working groups, and countless meetings and reports, no attention was paid to the coming Y2K challenge. Early assessments of the potential effect of Y2K on the NII may have helped prevent the growing frenzy we are witnessing today.

The President's Commission on Critical Infrastructure Protection (PCCIP) was formed in July, 1996 to address new threats and vulnerabilities emerging in the information age. While tasked to formulate a national strategy for protecting the infrastructures critical to our national life, the Commission was not asked to examine the implications of Y2K on those systems. And yet, the Commission warned that Y2K corrections could provide an opportunity for would be hackers and cyber terrorists to "design a subtle or comprehensive attack" against critical systems.²

In my Judiciary Subcommittee on Technology, Terrorism and Government Information, we have been examining threats to the nation's critical infrastructures from hackers, terrorists, and foreign states employing the new techniques of information warfare. At our March 17 hearing, Senator Sam Nunn testified in his role as Co-Chair of the Advisory Committee to the PCCIP:

The Year 2000 problem is a specific threat deserving immediate attention. Clearly, there is nothing hypothetical about this problem—we know that it is coming and we know when—and its effects will be far-and wide-ranging in both the private sector and the government.³

Clearly, at both the national and local level, we will need serious and well founded contingency planning for Y2K related disruptions, to ensure, at a minimum, the provision of essential government emergency services. When I asked John Koskinen, Chairman of the Y2K Council what the government was doing in the area of contingency planning, he wrote back that "FEMA will take the lead in assuring that the Federal government is doing all that is necessary to be ready should serious disruptions occur."⁴

But I had also written to James Lee Witt, the director of the Federal Emergency Management Agency (FEMA), to inquire about their assessments of possible disruptions in the electric power grid and their associated contingency plans. The FEMA Assistant Director wrote:

FEMA has performed no assessments of the Y2K computer problem on the telecommunications and electric power infrastructures. FEMA has no contingency plans specifically designed to address network interoperability or embedded chip failures in either the telecommunications or electric power industries.⁵

If the agency charged with contingency planning has no contingency plans, then either the Administration does not expect to have any emergency preparedness needs that are Y2K specific, or the federal government is failing in its responsibility to our citizens and needs to correct that deficiency immediately.

Mr. Chairman, the hearing you have called today is especially timely. The purpose of today's hearing is to allow us to gain insight into the electric power infrastructure and the special challenges Y2K poses to generation, transmission, and distribution systems. The electric power industry is very complex because there are no standard control center system configurations. They range from isolated, mainframe-based systems developed in-house more than 20 years ago to off-the-shelf, commercially developed, networked, client/server systems. These system are also tied to auto-

² *Critical Foundations: Protecting America's Critical Infrastructures*. The President's Commission on Critical Infrastructure Protection, October 1997.

³ Senator Sam Nunn, Testimony Before the Senate Committee on Judiciary Subcommittee on Technology, Terrorism and Government Information, March 17, 1998.

⁴ Letter from John Koskinen, Chairman of the Year 2000 Conversion Council, April 23, 1998.

⁵ Letter from Kay C. Goss C.E.M., Associate Director for preparedness, Training and Exercises.

mated substations and a variety of intelligent electronic devices which are all susceptible to Y2K problems with software and embedded chips.⁶

It would also be extremely helpful to hear an accurate assessment of the effects of Y2K on the electric power infrastructure, and to examine how disruptions could impact national and economic security. Unfortunately, what we will learn today is that no such reliable assessment exists. Throughout our proceedings we will hear an all too familiar refrain in the world of Y2K: "Nobody really knows."

Earlier this year, the Electric Power Research Institute (EPRI) took the lead in beginning to examine the possible effects of embedded chip failures in the electric power industry. We are very fortunate to have Dr. Charles Siebenthal, Director of EPRI's Y2K Embedded Systems Program testifying before us today. According to EPRI:

Embedded systems perform mission-critical functions in all parts of utility operations, communications, and business. Therefore it is important, particularly for infrastructure industries, to recognize the linkages upstream and downstream of their own operations. Failure to address the problem in one part of the larger system can have repercussions elsewhere. Because of the characteristic interconnectivity of the Information Age, Year 2000 problems experienced by major suppliers, vendors, and customers could also affect crucial business and infrastructure functions.⁷

There is clear reason for concern, as we will discuss today. But I also want to point out that despite difficulties, fears, and rising costs, the Y2K problem may also provide some unexpected benefits. For example, some computer dependent industries and public utilities are getting the opportunity to make much needed upgrades, which, if done properly, may make them more resilient to other kinds of disruptions in the future. Y2K is also prompting both private and government organizations to review their contingency plans and improve their readiness against information system failures, whether from internal glitches or deliberate attack.

As we enter the next century, we will continue to build on this vast technological landscape. The Y2K problem is the first collective technological challenge to the nation. Like it or not, Y2K provides a nation-wide test bed for dealing with what the effects of a deliberate attack on the infrastructures might look like. We can benefit from this opportunity to enhance government/industry cooperation and endeavor to learn about its implications for the reliability of our critical infrastructures. With well reasoned measures, and working together, our nation can come through this challenge stronger, wiser, and better prepared.

PREPARED STATEMENT OF LOUIS J. MARCOCCIA

PART 1

INTRODUCTION

The year 2000 is an event that will impact a large percentage of existing software. Most of the existing software has the year represented as a two character field (i.e. 1996=96). This will cause a problem for all dates that start in the year 2000. For example, the year 1999 is stored as 99 and the year 2000 will be stored as 00. Any comparisons between the two dates will cause inaccuracies within the existing systems. The year 2000 date change is one of the most significant changes ever faced by the Information Technology Industry, and will have an enormous impact on business applications, package solutions, and systems software, even putting some companies out of business. Also be aware that this problem also effects elevators, test equipment, personal computers, and pre-packaged software. All Information Technology and Business Units should be reviewing all applications in its enterprise. All applications that will not be replaced or retired by the year 2000 will have to be reviewed in detail. The applications that will exist past the year 2000 will have to be modified to correctly handle dates in the Year 2000 and beyond. Most of the required changes should be completed by the end of 1998. This will allow for a complete year-end processing of all applications that have become Year 2000 compliant and to allow for additional work on applications not completed by December 1998, and most one year calculations will fail in January 1999 and not December 1999.

⁶ *Electric Power Risk Assessment*. The President's National Security Telecommunications Advisory Committee, March 1997.

⁷ Electric Power Research Institute <http://www.eprweb.com/year2000/power.html>

There are two primary ways of correcting the year 2000 problem. The first is to expand all date fields to a four character representation and leave the existing software logic intact. The second is to leave the date fields as two characters but modify the software logic to handle the two character representation correctly. Organizations should look at each application separately and determine which approach is suitable and most cost effective. Within most organizations, there are "client developed" systems that the Technology Division does not support. These systems were developed or purchased over a period of years by the business units. It is important that Department Heads have their representatives produce a list of all software they are responsible for supporting.

A decision must be made to either retire, replace, or modify each system to handle the Year 2000. In addition, plans for each application must be made, detailing the time frame and resources necessary for analysis, program changes, testing, conversion, and implementation. This includes all in-house developed and purchased software. The planning has to be done now or there may not be enough time to correct the year 2000 problem. In addition, since this problem is so widespread the resources necessary to make the appropriate changes will become more expensive and less available as the year 2000 approaches. The Technology Divisions should coordinate and assist client organizations in developing the appropriate cost matrix for estimating the resources needed for this project.

THE PROBLEM

All application code modules that deal with date oriented calculations must be identified for legacy system applications. Most of these modules deal with the six digit date field, of which the last two digits represents the year. This will cause the Year 2000 to be less than the Year 1999. These modules must be changed to accommodate the processing of the four digit year. All current and historical data files and databases must be converted and reformatted to reflect the expanded four digit year. There are alternatives that can be implemented:

- Year field expansion from '00' to '2000'
- Add century field—add one digit
- Introduce logic algorithm—change program logic, not data
- Retire existing system with a Year 2000 compliant software package
- Rewrite system
- Retire system
- Do nothing and let systems fail—NOT A VIABLE ALTERNATIVE

In order to easily see and convince people how the Year 2000 effect everyone will perform a simple test using your home computer. This is just a test. It'll only take five minutes. It won't be painless, but the results may save a lot of anguish in the not too distant future. Set the date on your Personal Computer to December 31, 1999.

Set the time to 11:59 pm and then turn your computer off (power-down). Wait several minutes to allow the PC clock to go beyond the Year 2000. Power-up your computer and check to see what is the date and time is now displayed. If your computer does not reflect the Year 2000 than all calculation used within your computer applications will be inaccurate.

This will apply to spreadsheets, software packages, utilities, etc. The current date formats stored in computer environments exist in several different two digit year formats: MM/DD/YY, YYDDD, MMY, YYMM, YYMMDD, etc.

In the past, in order to save computer storage and save on data entry keystrokes the computer industry standard for storing the year field was to use a two digit field. All computer systems must be changed to process the two digit Year. Either the year digit must be expanded to four digits or a logical translation that is coded to recognize the differences between centuries.

WHY SYSTEMS WILL FAIL

When computer systems clocks reaches the Year 2000 computer programs will recognize the date as 1900 because of the current two digit format: Incorrect calculations. If we do not change the computer logic to recognize the new the Year 2000 software will assume the year field to be 00 to be the 19 hundreds, an erroneous answer will result:

Problem A

Current	Should happen	Will happen
99	2000	00
55	1955	55
—	—	—
44	45	55

Problem B

Should happen	Will happen
2000	00
1996	-96

Erroneous comparisons

Computer comparisons will produce an incorrect results.

Should happen	Will happen
2000 > 1996	00 < 1996

What has to be changed:

- Computer programs with date routines for (in-house programs and all third party software packages)
- Data Storage (files), Current and Historical?
- Data Display (screens, reports)?
- Interfaces (system to system)
- External Interfaces
- Data Center Operations
 - tape management systems
 - scheduling systems
 - operating environment (CICS, MVS, etc.)
- Computer Hardware (mainframe, mid-range, personal computers)
- Embedded Systems
- It is a multi-platform/multi-language problem
- IT IS A BUSINESS PROBLEM

WHY ISN'T ADDRESSES ALREADY

Impacted systems are old and not state of the art technology therefore, IS industry does not see glory in doing this project. Dates are distributed throughout the enterprise and locating and correcting these dates are an enormous task. This project for most organizations will be costly with no Return of Investment, except that the billions of dollars invested in our legacy systems will not operate properly. As with all legacy systems, this problem is messy, expensive, and unromantic. No one wants to go in and tell management "they have a multi-million dollar requirement just to keep the business running and that they really have no options." For the last thirty years, programmers have been writing programs which calculate dates for most business applications such as; pension checks, social security checks, mortgage calculations, credit card processing, etc. As the year 2000 creeps upon us, organizations across the world have been ignoring the Year 2000 problem. The IT community as well as senior management are still in denial and apparently expects a magic pill to be developed to solve this problem. It is not that the programmers do not know how to fix the date problem, or that current programming languages are incapable of handling dates in the next century. The problem is that millions of lines of old, legacy code, primarily on the mainframe, is still in use in business around the world processing mission critical systems. These systems have been around for the last ten to thirty years, were coded in a non-structured spaghetti code, and changes to these systems over the years have made them very difficult to modify these programs and maintain in good shape. The programmers that coded these programs are no longer around, or third-party software is no longer maintained by the vendor or organizations have taken over the responsibility of the third-party software. The world has a business disaster, that is well known, be predicted, and we know how to fix it. The time and date on which the meteor will hit earth is known. Like a "Legal Virus" (receiving data from another system that was calculated incorrectly from another system that was not processing the Year 2000 correctly). It will descend upon us like a plaque. When I testified in front of the first United States Congressional Hearing, as an expert witness on the Year 2000 on April 16, 1996, I said that the only way we can delay the implementation of this

problem was to “Legislate the Year 2000 away.” This is only dead line that cannot be pushed back and still the Business and IT community continues to ignore it.

I also stated that the Year 2000 is a management problem, not a technical problem. There is plenty of technology issues that IT needs to help senior management solve this business problem. And if we haven’t address this problem now—we are now late to avoid some degree of severe business problems by the year 2000 and even earlier. Many business systems will fail much earlier than January 1, 2000.

YEAR 2000 REALITIES

As the Year 2000 approaches and organizations starts to address this problem IT organizations will experience high turn-over rates. As the worlds gears up for the battle, the old Mainframe Cobol Programmer will be the most desired creature in IT. Forget about Visual Basic, Oracle, Client-Server—Learn Cobol. Consultant firms and the company across the street will offers huge salary increases to your staff to change jobs. Expect all computer programmer salaries to EXPLODE as the deadline approaches. Many firms may have large numbers of computer tapes and files unexpectedly erased due to automated systems that haven’t been told that time has reversed! Fallout from this is difficult to predict. Probably these same firms will try to hire more of those overpriced programmers. Look for possible quick fixes for some systems The cleanest way of applying the four-digit fix is to expand all date fields in every program, data-file, and database. The difficulty in making these changes is the size of how many fields and files that needs to be changed, assuming you can easily identify where these date are located (this is no easy task). Getting there. Think about researching the following organization:

number of modules = 25,000
 number of jobs = 7,000
 number of lines of code = 15,000,000
 number of dates = 200,000
 number of interface files = 250
 platformms = IBM mainframe, AS/400, System/38, PC, Client-Server
 languages = Cobol II, SAS, Culprit, Assembler, etc.
 file structures = IMS, CICS, VSAM, Flat Files, Third-party Software
 embedded processes = 175 embedded processes

Data is passed among hundreds of files dealing with thousands of programs both batch and on-line. Data is also sent to and from outside applications and organizations via magnetic tape, cartridges, diskettes, Internet, Intranet, EDI, Local Area Networks, etc. If a company applications, that you do business with, does not work properly after the Year 2000 then your company may suffer financially, fails to sell or ship any product; fails to bill for your product; or may place your employees life or health at risk. The U.S. has thousands of lawyers and they will be in a position to put your organization liable for failed applications. Auditors, and Outsourcers, financial backers, and software suppliers, and their consultants would potentially become liable. Data files (current, historical), computer programs, interface files, and all other programs and files affected, from the same or other systems, would have to be synchronizd, tested and implemented at the same time into production or bridges must be developed and implemented for the transitional period.

There are two Basic approaches for fixing code: *Expansion* and *Windowing Expansion*: The Expansion of two digit year field to four digit year field (MM/DD/YY/CC). It is the most cleanest and straight forward solution. For the long term and for maintaining those applications in the future. It will be very difficult to control downstream impact on sorts, DASD, file sizes, etc.

Advantages of the Expansion Approach:

1. Will be a long term viable solution.
2. Application will not be dependent on different algorithm.
3. Single technique for all modules.
4. Conversion of many modules might simply require a recompile.

Disadvantages of the Expansion Approach:

1. Requires conversion of ALL program modules.
2. Conversion of programs and data may have to occur simultaneously.
3. Many business application’s can not afford to be down the required time for such massive, simultaneous conversions, especially database systems.
4. Because interfaces between systems are significant, (foreign keys, referential integrity issues), there would have to be one mass conversion of segment of work would have to be partitioned.

5. Change Control, Version Control, would have to be tightly controlled and managed since programs need to be implemented simultaneously. Changes to the source code, keeping the converted Year 2000 code in sync with updates to the current code will be difficult to control and manage. The alternative is to freeze all maintenance and enhancements until conversion is completed. This option is very difficult for organizations with market pressures.

The Windowing Approach becomes a viable alternative for some systems. The Windowing approach ignores the expansion of all date fields and will code standard copy routines, per application requirement, several standard date routine using date window to represent the century in performing calculations on 2-digit years. No expansion of current or historical files, except for some system interfaces, dates used in key files, and fields that span over 100 years.

Advantages of the Windowing Approach:

1. No physical conversion of data (current or historical). No required synchronization of data and program conversion.
2. Program conversion can be phased in—one program at a time.
3. Some modules will require no conversion while other modules will require only minor changes
4. Only dates used in calculations will have to be dealt with. Dates used in display or definition are not required to be corrected.

Disadvantages of the Windowing Approach:

1. Many program modules will require extensive code changes for date fields used in calculations.
2. Will not handle cases where 100 year span is involved. Those applications will have to be expanded to a eight digit date. This is typical with birth date, land acquisition date, etc.
3. All programming staff will have to be made aware of the subroutines for determining century by each application.
4. Each application in your organization can have different number for it's logic comparison.

MAJOR STEPS TO IMPLEMENTATION

- I. Legacy System Clean-Up
- II. Change Control Environment
- III. Successful Year 2000 Implementation
- IV. Testing

I. LEGACY SYSTEM CLEAN-UP PROCESS

OVERVIEW

This process, or any piece of it, will be required for many organizations dealing with the Year 2000 in which these deficiencies exist in their organizations. If any part of these conditions exist in your shop, they will have to be resolved before the Year 2000 project is implemented.

Description

This process requires a number of tasks to be performed housekeeping/repair function involving all systems. The purpose of the project is to establish a stable production environment by installing a Corporate Change Control process at the application level, cleaning-up production jobs while maintaining functionality, developing standards on-line, and monitoring the changes on an ongoing basis. These activities are to prepare systems for correction of deficiencies in Applications.

Background, statement of problem

Examination of the current environment should determined what percent of the production jobs had adequate operating instructions also determine duplication of software modules in multiple development libraries was extensive, and the manpower needed to support production in the applications.

An analysis of the production log should be examined to determine what production jobs are being run from development libraries, by non-operations personnel. A protracted, round-robin implementation cycle which forces the applications to circumvent industry accepted production migration routes. The primary users of several major applications insist that the time has come for either an extensive improvement of their application, or, a complete re-write, because of the lead time necessary to change a function within these systems. This is a symptom of old program code.

Deficiencies identified

Listed below are problems that may exist in production systems which require analysis and re-certification during the execution of the Legacy System Clean-Up:

Application Environment Deficiencies:

1. Normal migration routes are being circumvented.
2. There exists a duplication of software modules within multiple development libraries.
3. There is a low level of program update activity resulting in extensive lead time for maintenance changes.
4. Insufficient system documentation.
5. Latent error conditions exist in Production Jobs.
6. Inadequate and non-existing job operation documentation.
7. Production Jobs being run from non-production libraries.
8. 'Dirty coding' exists in Production programs.
9. There is an absence of documentation which identifies Interface files.
10. A lack of a data dictionary which is a repository for all applications components and elements.

Legacy system clean-up deliverables

Task 1: Installation of a single production module

Task 1 General approach

All Production programs in a System must be researched for compliance to the above Task 1 General Approach. It is not intended that is render an opinion on the quality, effectiveness, or suitability of a given module with regard to its intended business function.

Must check for multiple modules of a Program, determine which is the current version running in production or quasi-production status conduct testing to confirm that said determination is correct, and install that current version into the Production Library. To the maximum extent possible, freeze windows for each Application will be established and agreed to by IT and the client. Once a single Production module has been identified, it will be necessary to match it to its source code and to place the source code into protected archive. This ensures that future modifications will be applied to the correct source code.

Task 1 Deliverable

A Production library containing a single version of Production Programs for each application. Programs for each application must be installed into a Production Library.

Task 2: Document all interfaces

Task 2 General approach

Identify each data file that enters and/or leaves and application from/to another application. Define all external interface files.

Task 2 Deliverable

Deliverable: A report produced for each system, in control document format, that identifies and describes all interface files existing in all Production systems, containing:

- The System and Job names that created the file.
- The Systems(s) and Job Name(s) and/or foreign designation of the file.
- The data set name of the file.
- The data field content of the file.
- The media on which the file resides.
- Timing of file creation.

Task 3: Analyze and prioritize production systems

Determine whether an Application should undergo major rewrite, partial rewrite, revision, or acceptance.

Task 3 General approach

The reports must address all production applications and highlight those programs or current business functions supported by an application, that are candidates for revision, and their type. The Company Strategic Plan should provide the starting point for assessing each application's "candidacy" for replacement, re-write or revision.

Task 3 Deliverable

Deliverable: Systems/Programs Evaluation Reports that states which Production Application should undergo major re-writing, minor revision, or require no revision. Also, recommendations will be made about whether certain applications can be re-engineered or right-sized.

II. CHANGE CONTROL ENVIRONMENT

PREFACE

The Corporate Change Control Management System (CCM) process as controls the migration of source modules, load modules, execute JCL, production PROCS, file definitions, and screen maps, executables, etc. for each application from test environments to production for all platforms. This process is also intended to provide line-item level change tracking in test or production environments, and is designed to track items in non-source-editable form (e.g., RACE changes, CICS RDO table changes). Vendor supplied updates to package software is facilitated by using a distinct "language type" value to identify package source.

The previous version would be archived during this process. Maintenance of customized software package modules should follow the standard change control procedures defined in this process.

OVERVIEW

Continual change is a characteristic of nearly all application software systems. Management and effective control of the change process is key to ensuring that systems are developed and maintained to provide their users with the service they require at an acceptable cost. The procedures defined in any CCM procedure is to promote effective control of the changes made to applications during the course of new development, routine maintenance, and emergency modifications. The CCM procedures are derived from a number of specific objectives for the CCM process, and embody a number of design principles.

The OBJECTIVES of the change control management process are:

1. *Consistency.*—There should be a standard set of environments through which applications are migrated during development and maintenance. Although every application will not necessarily make use of every defined environment, the set of environments should be the same for all systems.
2. *Flexibility.*—Some applications may use a subset of the full set of environments. However the migration rules should be consistent for all applications.
3. *Audibility.*—It should be possible to trace the history of and the reasons for any changes made, including emergency fixes.
4. *Ease and Speed of Operation.*—The procedures for effecting migrations should be such as to enable applications to be moved through the required stages of development or maintenance quickly. The activities needed to perform a particular migration should be carried out automatically by the system following receipt of such input.
5. *Uniqueness.*—A given source module should exist in only one of the Development environments at any one time, in addition to Production.
6. *Concurrency.*—The system must permit the emergency repair of a given module without jeopardizing ongoing maintenance of that module.
7. *Access Control.*—Access to entities and activities should be emulated according to the appropriate authority levels (i.e., only staff assigned to a given Applications group may access module types for that group, and only Project Leaders may initiate forward migrations).
8. *Recoverability.*—Back out procedures must exist to cover cases where an attempted activity is not completed successfully. Information relating to the system must be clear and statement of rules published should be kept up to date and preferably on-line. To enable these objectives to be achieved, the following PRINCIPLES have been incorporated into the design of the CCM system:

Library Control.—A software product should be used to provide the basic facilities used to implement the Change Control Management system. The facilities provided will be supplemented by other automated/manual procedures.

Security Software.—Will be used to control access to an activity or entity not under control of Library Control software product.

Environment.—Specific environments will be recognized by Change Control Management, and will apply to all applications. These are comprised

of Development/Test, System Test (optional), User Acceptance Test, Quality Assurance, Production and Post Production Support.

Migration Rules.—For the transfer of applications between environments will be incorporated within the Change Control Management system.

Module Versions.—The software system source archival facility will be used to store prior versions of a given module release level while it exists in a given environment. Although this facility is available in all environments, its use outside of Production is not necessary.

Other Environments.—(e.g., Training) which may be created for specific applications, will be controlled by the Change Control Management system.

Existing Operating Environment.—Existing operating environment like, should be used wherever possible, to enter and initiate Change Control Management (CCM) activities.

III. SUCCESSFUL YEAR 2000 IMPLEMENTATION

PHASE 1—ANALYSIS

Purpose

To estimate the cost and resources needed to implement all application software on diverse software/hardware platforms, including in-house developed and third-party vendor software and hardware.

Steps

1. Establish a Year 2000 project manager and team.
2. Develop a communications network with the organization.
3. Establish a date standard for all in-house and package software.
4. Develop a portfolio of all third-party software and hardware. Formally notify and coordinate with software providers for their plans to become Year 2000 compliant.
5. Have all business units within an organization agree on one overall strategy, recognizing that the tactical implementations might be different.
6. Secure consulting services, if required, by class for all platforms or perform analysis with internal staff.
 - class 1—turn-key solution
 - class 2—project management firm
 - class 3—body shop firm
7. Produce the Phase I analysis for all systems by category.
 - category 1—applications retained and to be converted
 - category 2—current ACTIVE plan to replace application's
 - category 3—applications already year 2000 compliant

PHASE I—TECHNICAL REPORTS (ANALYSIS)

1. Impact estimates

- resources required for the Year 2000
- identification of each computer module impacted
- total number of impacted lines per program
- total work hours/cpu time required for conversion

2. Where dates are located

- locate and print out every impacted line in each impacted program module

PHASE I—MANAGEMENT REPORTS (ANALYSIS)

3. Business impact statements

- describes what the business impact will be for each application if not Year 2000 compliant

4. Project schedule

- enterprise detail schedule for all category 1 applications

5. Cost matrix report

- cost estimate for all resources needed for all category 1 applications—hardware, software, testing, staffing, data center upgrades, etc.
- preliminary cost estimate for category 2 applications
- listing and confirmation of category 3 applications

II. PHASE 2—IMPLEMENTATION

Purpose

To implement the tactical plan developed in Phase 1 analysis.

Steps

1. Secure and mobilize the necessary resources defined in Phase 1 (Analysis).
 - in-house team fixing and testing
 - consulting services
 - software purchases
2. Select a pilot application to verify the cost model developed in Phase 1—Make the necessary cost adjustments based on the pilot results.
3. Resolve the necessary legal /procurement issues.
 - third-party providers questionnaire
 - third-party software and hardware
 - Year 2000 compliant statement in contracts

IV. TESTING

DEFINITIONS

Year 2000 Compliant Application.—The application has been successfully tested (included century tests) on compliant operating system software in all test regions. It has also been moved to production and is running on the same compliant platform that was tested upon.

Year 2000 Capable Application.—The application has been successfully tested (including century tests) and moved to production. At least one test platform and/or the production platform is non-compliant. It is assumed that the test and production platforms will be made compliant at some point. Century testing will take place again for critical applications to ensure the application is compliant. If testing is successful, the application becomes Year 2000 compliant when the application is replaced in production.

Year 2000 Non-Compliant Application.—The application has not been tested, or the application has failed to test successfully.

INTRODUCTION

The Testing approach should describes the Year 2000 overall testing approach. It should be noted that this is a planned approach, not an absolute approach, and may need to be adjusted per application based on such factors as application criticality, who converts the application, and other project impacts upon an application. Several early conversions will help “prove out” the direction specified in this document. Corrections or adjustments to the plan should be made as appropriate.

Conversions to supported applications may be made either in-house, by the vendor owning the code (which potentially means upgrades to compliant releases for packages), or by a third-party vendor. Regardless of who actually converts and tests the applications, the Year 2000 team will need verification that all applications are year 2000 compliant. An overall test plan, test specifications, test scripts, and test report will be required for each application to be certified as compliant. The amount of detail within these deliverables will vary according to the application. Test scripts will be automated as much as possible to provide a repeatable test process.

CENTURY TEST

The Test team will generate the test material needed for Century Test. This will be a set of test cases to test specific date related functions extending into the next century or back into the previous century. The Test team will also create separate processing “Jobs” to “age” test data as the system date is rolled forward. At this time, century testing will be accomplished using a date simulation tool or advancing the system date manually. The ‘basic’ Century Test is to take the test data produced for system testing and repeat the test in the next century with a range of system clock settings. Applications may have additional dates, beyond the core set of dates to check, which must be tested. These additional dates will depend on what is critical to each application. The depth of century testing must be decided on an application by application basis. Testing is resource and man-hour intensive and the effort required to achieve close to 100 percent level of confidence may not be commensurate with business risk.

STEPS TO IMPLEMENTATION

These steps will be used for all platforms and embedded systems for the Year 2000 project. Included are assumptions, and the strategy to be used for testing applications after the code is modified for year 2000 compliance. While some applications may choose not to follow this approach, this is the preferred approach.

1. At the time that an application (or bundle of applications) is sent out for actual modification, a copy of this application is "saved" as the Baseline code.

2. The code is "checked out" using the change control process and process code for modification. Ideally, this would be a freeze point for code modifications. An "emergency fix" process will be in place to "get around" the freeze.

3. When the source is returned, the first test executed should be a "no damage" test. This test is to establish that the application still functions as it did before changes were made.

3.4 Compile the Baseline code on the test system (new machine or LPAR).

3.5 Establish data for testing the application.

3.6 Run the application and unload results to a file for comparison.

3.7 Re-establish the same data in step 3.2.

3.8 Compile the modified code on the test system (new machine or LPAR)

3.9 Run the application using the modified code and unload results to a file for comparison.

3.10 Electronically compare the results from step 3.3 and 3.6. Any discrepancies will have to be researched and possibly logged as a problem to be fixed.

4. Year 2000 century tests should be done to ensure that the code handles year 2000 correctly. After this test, you can be reasonably assured that year 2000 changes were correctly applied. Parts of this testing can occur in the "no damage" test—if the scripts include simple date testing. An official acceptance of the code should be done by if all test results are acceptable to this point.

Retrofits should be applied. Any changes to code and moved to production while the code was out for modification will have to be re-applied to the modified code.

Note: This does NOT include changes that were in development at the time baseline was created that have not already moved to production.

PREPARED STATEMENT OF LOUIS J. MARCOCCIA

PART 2

INTRODUCTION

The Utility Industry has not met the criteria for a successful implementation of a Year 2000 project for their mission critical systems. Therefore they have failed in their responsibility to their stockholders, partners, and customers. The Industry regulators have also failed in their responsibility to the American people. I believe their failure will cause major disruptions here in the United States and overseas. I say this based on the following analysis.

Criteria for my Analysis

All mission critical computer and embedded systems must be compliant by 12/31/1998. There are 5 major reason why the Industry needs to be compliant by this date:

1. To allow for a complete year-end process of corrected code and take advantage of factory shutdowns before the Year 2000.

2. To allow for a contingency for unexpected problems not resolved in 1998 or if the project is generally running late.

3. To allow for Integration testing within an organization and between external partners.

4. To allow for replacement or upgrades of computer software, computer hardware and embedded systems that were delayed and not completed in 1998.

5. A one year calculation, which are present in many systems, will fail in 1/1/1999 and not 1/1/2000.

I used the following criteria to establish a successful Year 2000 implementation:

—All mission critical systems that require corrections are fixed, tested, implemented into a Year 2000 production environment.

—Formally document which systems are going to be retired.

—The current software, hardware, and embedded systems that were candidates for replacement have in fact been replaced.

—All major external interfaces have been identified and contacted.

- The strategy for the Year 2000 correction and implementation has been agreed to and documented.

Readiness of Computer Systems

- Currently, many large Utilities have not identified what needs to be corrected.
- The Industry has not yet determined how they will fix or test what they have found.
- The Industry has not yet determined the resources requirements for the entire life cycle. (finding the problem, fixing the problem, testing the problem)
- The Industry has not developed contingency plans for its mission critical systems if failure occurs.
- The Industry is not in a Triage mode in determining what systems must be compliant by 12/31/1998.
- Replacement strategies for non-compliant computer systems with compliant software purchases or converting these systems to another platform have started to late to avoid fixing the existing systems. It is risky for these companies that are not in the implementation phase to begin a replacement project.
- The Industry is finding it extremely difficult to Retire systems. They have not identified all elements of a system in-order make the retirement decision.
- Many Utility companies have found it extreme difficult to identify its entire portfolio of systems and all the elements that make up that system. This type of environment is called a 'dirty shop'. The clean-up process of a dirty shop must be done before the Year 2000 process begins. This activity can take anywhere between on week to six months to complete.

There are several major Utility companies that have not even placed one line of compliant computer code into a Year 2000 production environment or have a complete documented understanding of a process that will allow them to implement a lot of computer code in the shortest period time. Many of these companies have over 25 million lines of code to be made compliant. At this point in time they should have implemented 60 percent of their application into a Year 2000 production environment. If history is a predictor of the future, it will take approximately 10–15 months, for a committed company, to make 10 million lines of mainframe code Year 2000 compliant.

Embedded Systems

Because of the slow start in dealing with the computer systems the embedded systems is the area the Industry has fallen far behind in their understanding on how to find, fix, and test these embedded systems. We currently know that there are embedded systems that will either fail or not work for a period of time. For example, we have known for years that many systems associated with oil tankers will not work beyond the Year 2000. The Industry will probably tell us that they have done an inventory and/or assessment of their embedded systems. The Industry have not answered the following questions:

- They have not identified those individual components that will fail.
- They have not identified unknown or obsolete components.
- They have not developed a fix or test solution for those components that have a problem.
- They have not identified all the resources required to find, repair and test a component, process or system. The IEEE organization have identified approximately 34 different types of tests that can be performed on an embedded system.
- They have not identified the lead time requirements and cost for replacing existing non-compliant components with new purchased components.
- They have not developed a contingency plan in case the replacement strategy is not executed in time.
- They have not associated individual components with their processes. One component that fails in a process, that uses several components, can bring down an entire system.

Interfaces

Since the Industry and the Regulators started late in the Year 2000 process their efforts to effectively communicate with their partners, suppliers and customers have been hampered. Most attempts of communication have been legally sanitized at best. Many Utility companies depend on suppliers for raw material and if there is a delay in the flow of that material disruptions will occur. As late as the United States is in dealing with this problem overseas companies are in worse shape. For example, if an Oil company depends on crude oil shipments from overseas compa-

nies and that company has not corrected it's Year 2000 a ripple effect of delays will occur that will result in effecting the American consumer.

The fallout of the Industry self protection mode has resulted in the following:

- The most mission critical suppliers and customers have not been notified in a meaningful way as to the status of the Year 2000 as it relates to them.
- The integration testing required between supplier and customer has not been fully communicated, understood or documented.
- The two basic interface question that are not yet answered:
 1. When will you be Year 2000 compliant for each interface that exist?
 2. What format will you use for each interface that exist?

Regulators

The NRC, FERC, State Regulators, and others have and continue to be missing-in-action in helping to solve this problem. The Regulators have lagged behind in taking a more proactive role. The Regulators have failed at the following activities:

- Gathered appropriate level information and the right information.
- Determine or understood how the Industry plans to test and implement the their solution.
- They do not have a effective way of analyzing the information they received.
- They cannot determine the accuracy of the information they received.
- Appropriate level of audits are not being done.
- And finally, regulators did not insist that the Industry complete it's Year 2000 solution by 12/31/1998.

Conclusion

There are pockets of successes that exist within the Industry. But, when I take a pragmatic look at the information I have seen, things I have experienced and people I have talked to in this Industry I can only conclude that the readiness of the Utility Industry is not acceptable.

JUNE 16, 1998.

Senator ROBERT F. BENNETT,
Chairman Special Committee on the Year 2000 Technology Problem

DEAR SENATOR BENNETT: I appreciate the opportunity to appear before your committee last Friday concerning the Year 2000 issue as it relates to Utilities. As I testified, many utilities face serious obstacles in reaching an appropriate state of readiness before we reach the millennium date. My comments were based on comprehensive discussions and knowledge with numerous utility companies.

Upon reflection, I want to clarify one potential area for misunderstanding related to the hearing. During the opening remarks, I was associated with several of my utility clients. I want to assure you that my testimony did not reflect my views on the state of Year 2000 readiness of these companies. For example, Duke Energy, where I have served in a technical consulting capacity for the past 19 months, is regarded by me and several other knowledgeable outside expert as an industry leader in terms of Year 2000 readiness. They will have substantially completed their needed Year 2000 readiness efforts by the end of the year.

In addition to Duke Energy, there are many other utilities that are successfully addressing the Year 2000 issue. However, I still remain concerned that the industry as a whole has not yet taken sufficient steps to meet this serious problem.

If you need additional information, please let me know.

Yours very truly,

LOUIS J. MARCOCCIA.

PREPARED STATEMENT OF ELIZABETH A. MOLER

Mr. Chairman and Members of the Committee: It is an honor for me to appear before you today at the Committee's inaugural hearing. You have asked me to focus on the readiness of the utility industry, including electric and gas utilities, to deal with the Year 2000 technology problem.

Before I turn to the specifics of my testimony, let me commend you, Mr. Chairman, as well as Senator Dodd, the Committee's Ranking Democrat and the other Members of this Special Committee for your willingness to invest your time and energy on this important subject matter. Computer technology has become a pervasive part of our society and our Nation's well being. Both techologists and leaders in all sectors of our society must work together to insure that we are investing adequate attention, and resources, in addressing this important potential problem.

President Clinton and Vice President Gore have paid particular attention to the need to address the Year 2000 issue. They personally recruited the former OMB Deputy Director for Management to Chair the President's Council on Year 2000 Conversion. You will hear testimony from Mr. Koskinen later today. The President and the Vice President have spoken repeatedly on the need for both Government and the private sector to address the issue. Back in February, when the President's year 2000 Conversion Council was being formed, the Vice President met personally with the Members of the President's Management Council on the Year 2000 and stressed the importance of the issue. He made it very clear that we, as managers, must pay particular attention to the issue.

We have used the Year 2000 Conversion Council as a vehicle for the Administration to identify the Administration's key participants who will focus on various sectors of our economy. You will hear more about that management structure in Mr. Koskinen's testimony later today. The Energy Working Group of this Council includes all relevant agencies. The Department of Energy has agreed to take the lead on the electricity sector, so my testimony will focus on that sector. The Federal Energy Regulatory Commission (FERC) has agreed to take the lead on the oil and gas subgroup, so you will hear from FERC Chairman Hoecker on that sector.

Electricity is one of those ubiquitous things Americans take for granted. It is also the lifeblood of our modern economy. Simply put, our Nation depends upon a reliable supply of electricity. We cannot afford to have the Year 2000 technology issue disrupt our Nation's supply of electricity.

Our domestic electricity industry has had a long and proud history bringing reliable, affordable supplies of electricity to American consumers. The industry has its own reliability organization, the North American Electric Reliability Council (NERC), which was formed in the aftermath of the 1965 Northeast power outage. When I think about reliability issues, I automatically think of NERC. It is the industry organization that has been responsible for electric reliability for the past 30 years. NERC is a privately chartered, industry run organization. While the Administration's Comprehensive Electricity Competition Plan calls upon Congress to strengthen the government's authority and oversight of NERC, at present there is little in the way of either Federal or State regulatory authority to address reliability issues.

Consequently, when the Department of Energy agreed to take the lead in assessing the electricity sector's Year 2000 readiness, Secretary Peña and I turned to NERC. On May 1, 1998 we wrote to Erle Nye, Chairman of the Board and Chief Executive of Texas Utilities Company, who is also the current Chairman of NERC. We asked NERC to undertake a comprehensive assessment of the industry's Year 2000 readiness. Our letter is attached to my testimony. NERC agreed to our request and has taken on the key task of best assessing the industry's state of readiness, and coordinating the industry efforts. We expect to receive an interim report this fall, and a complete assessment next July. We will closely monitor progress along the way.

Let me emphasize that the Federal government cannot solve this problem. It is up to the industry itself to do so. Every leader, every officer, and every manager in this industry must feel a sense of responsibility for solving this problem. That is the only way we'll get it done. The Government's primary role is to facilitate industry efforts, without getting in the way or creating needless bureaucratic hurdles that distract attention rather than add value.

With these introductory remarks in mind, let me describe the industry and the Year 2000 technology issue in a little greater detail.

THE Y2K TECHNOLOGY PROBLEM

The Year 2000 challenge facing energy utilities is in some respects comparable to that in other sectors. As in other sectors, noncompliant software in a computer can affect a company's back office operations, such as financial control, human resources (payroll, benefits, etc.), purchasing, inventory, plant maintenance, and other administrative operations, and can impact direct operations and exchanges of information. Energy companies use computers to connect plants, refineries, district offices, and major administrative and operational systems that interface with large data centers. Computers are also used to remotely control transmission system breakers, coordinate power generation schedules, compensate for transmission line outages, and provide protection against voltage, current, and frequency fluctuations.

Year 2000 readiness for energy utilities and other sectors also necessitates attention to the performance of embedded microprocessors. Embedded systems are present at plants, pipelines, control and dispatch centers, headquarters, and other energy facilities. Identifying Year 2000 problems in embedded systems can require

significant hands-on effort. Inventory, assessment, and remediation of embedded systems can be difficult, expensive, and time consuming. Many experts believe that embedded hardware systems pose the most significant Y2K readiness challenge to energy utilities.

THE ELECTRICITY INDUSTRY AND Y2K

The electric industry includes entities that generate, transmit, or distribute power, or do all three. Although security and reliability are also very important to natural gas and oil pipeline operations, electricity has some extraordinary features that make it somewhat unique as a commodity. Electricity flows across large regional networks according to physical laws and cannot be routed by switches or stored in large quantities. Supply and demand for electricity must be kept in balance at each instant in time on a continuous basis. Reliability is essential and can be maintained only through constant cooperation among many parties. Grid control is decentralized into approximately 150 power control areas within the contiguous 48 states that are interconnected and must coordinate their activities to maintain reliability. There are three large transmission grids: one in the Eastern part of the United States, one in the Western part of the United States, and one in Texas.

In addition to its unique characteristics as a commodity, electricity also has a unique importance in the economy and the lives of our citizens. The \$212 billion domestic electricity industry is a backbone industry, one on which all other industries and the general population depend.

Business and personal activities across our nation rely on billions of daily applications involving electric devices, that, in turn, depend on a reliable source of electricity. Experience with major interruptions in electricity supplies due to this past winter's ice storms in upstate New York, Maine, and Quebec graphically illustrates the disruption and dislocation that can arise from extended outages.

Y2K READINESS FOR THE ELECTRICITY INDUSTRY

The operators of the electricity system and the vendors who supply it, together with industry-wide organizations such as the North American Electric Reliability Council and the Electric Power Research Institute (EPRI), are the main sources of the skills and resources needed to assure a smooth transition. While many components of the industry are "attending to business" with respect to their individual Y2K preparations, it is important that individual companies' preparations be recognized as contributing to the totality of all such preparations. It is for this reason, that Secretary Peña and I specifically asked that NERC undertake the leadership role within the electric power industry to assure that the Y2K problem is resolved in a comprehensive way so that no serious electrical disruption occurs. We also asked that NERC report to the Department by July 1, 1999, that critical systems needed to maintain the integrity of the interconnected grid have been tested and will be ready for the Year 2000.

The Department and the Y2K Energy Working Group felt strongly that NERC was the natural focal point for this activity for several reasons. First, as I mentioned earlier, NERC was established in the aftermath of the major Northeast power disruption in 1965. It is the industry's organization that has been responsible for electric reliability for the past 30 years. We believe this to be truly a reliability issue and NERC has both an excellent record and a well-deserved reputation for resolving reliability issues. Second, NERC includes all segments of the industry from large to small, from generation to consumer, and from region to region. This initiative must be coordinated so as to embrace the entire community. (A membership list of NERC's Board of Trustees and Observers has been provided to the Committee.) NERC's Board of Directors agreed to undertake the assessment and coordinating role; we appreciate their very positive, enthusiastic response. Of course, it goes without saying that we stand ready to assist NERC in every way possible.

I understand that NERC's President will appear before this panel later today, so I will not address their plan in detail. NERC's Y2K program will focus both on the interconnected grid of major generating stations, substations, and high voltage transmission lines and on distribution networks. Clearly, protecting the bulk power system is a top priority in the electric sector. However, Y2K readiness needs to extend beyond this system, to the distribution networks that serve America's electric consumers. Distribution systems are extremely diverse in nature. While large investor-owned utilities serve the majority of customers, municipal utilities and electricity cooperatives, including both large and small entities also play an important role. These parts of the electricity supply system will also need to address the Y2K issue.

THE Y2K ISSUE AND ELECTRICITY COMPETITION

We do not see Y2K concerns as an impediment to efforts to promote greater competition in electricity markets. Progress on federal legislation will help to provide appropriate institutional structures for protecting reliability that are compatible with the emerging competitive marketplace for electricity. Many of the toughest Y2K issues concern embedded hardware, which involves different resources than software. In any event, I do not believe that the Y2K issue should be viewed as a competitive issue; it should instead be viewed as a reliability issue.

Early updates already being planned to make industry information systems consistent with competition can actually advance our Y2K interests. Some industry sources have commented to me that they think that California's investment in systems compatible with competition, all of which are Y2K compliant, have put them "ahead of the game" in terms of their Y2K response.

BEYOND ELECTRICITY: THE Y2K ISSUE

As I mentioned earlier, the President has established a Council on Year 2000 Conversion, under the Chairmanship of John Koskinen, which is looking at the Y2K issue from an economy-wide perspective. Clearly, the energy utilities cannot assure their Y2K readiness in a vacuum. It is clear, for example, that electric utilities will need access to timely and accurate assessments regarding the likely status of their fuels and transportation infrastructure, as well as the situation in industries that account for a major portion of electricity demand, as they plan for a smooth transition. Like other enterprises where industry-wide information-sharing can play an important role in Y2K planning, energy utilities will also be interested in ways that government might provide assurance that legitimate activities to promote Y2K readiness will not run afoul of antitrust rules or increase liability exposure.

CONCLUSION

The American people have a right to expect the electricity sector to be prepared for a smooth Year 2000 transition. People can dream up doomsday scenarios of what might happen if the industry is not ready. We need the facts, not doomsday scenarios. Once we know what the facts are, we can go from there to solve any problems that emerge. Ultimately, the electricity industry itself bears the primary responsibility for addressing the challenge of assuring a smooth transition through critical dates surrounding the Y2K issue, as well as the skills and knowledge needed to meet that challenge. Government's role is to facilitate their efforts by promoting the sharing of Year 2000 information within the industry, its companies, suppliers, consultants, and state and local regulators. We can help disseminate what is known in other industries about similar products and problems, and we can maintain an awareness about factors external to the industry upon which energy depends. We can also help to keep government speaking with a consistent, calm, voice and cooperate with other levels of government to minimize requirements that do not add value.

We look forward to working with the Special Committee in the months ahead and we welcome both your input and your questions.

THE SECRETARY OF ENERGY,
Washington, DC, May 1, 1998.

Mr. Erle Nye,
*Chairman of the Board,
North American Electric Reliability Council,
1601 Bryan Street, Dallas, TX*

DEAR MR. NYE: We are writing to seek the North American Electric Reliability Council's (NERC's) assistance in assessing whether the Nation's electricity sector is adequately prepared to address the upcoming year 2000 computer problem.

The Administration is undertaking a coordinated effort to assess various sectors' readiness to address the issue. The Department of Energy (DOE) is taking the lead in working with the electricity industry to facilitate actions necessary for a smooth transition through this critical period. To this end, we are requesting that NERC undertake the coordination of an industry process to assure a smooth transition.

The electric system is such a highly interdependent network, and so vital to the security and well-being of the Nation, that there is very little margin for error or miscalculation. The Department realizes that activities designed to address this issue are already underway in many electric utilities, the Electric Power Research

Institute (EPRI), and in other Federal agencies. We are concerned, however, that these activities may not be fully coordinated, or worse, may be incomplete. The Nation needs to know that a systematic process is in place to ensure that the electric supply system will not experience serious disruption.

This is truly a reliability issue, and NERC has demonstrated over the last 30 years that it is capable of coordinating the activities of electric market participants to resolve such issues. NERC is the most appropriate body to organize this process and report periodically on its status. We are confident that NERC will be able to mobilize the necessary cooperation from the Regional Reliability Councils, their members' utilities, and other industry organizations, to develop and implement a process that is both efficient and effective. We are asking that you provide us with written assurances by July 1, 1999, that critical systems within the Nation's electric infrastructure have been tested, and that such systems will be ready to operate into the year 2000. The DOE is prepared to work with NERC to help overcome any obstacles that you might encounter in carrying out this effort. Finally, we wish to work with you to provide a suitable public forum in the late summer or early fall of this year at which NERC and others could report on the industry's assessment of this issue and outline its plans to address this challenge.

Public events on this subject are important and valuable for two reasons. First, they will convey to the public and public officials that the industry is indeed preparing systematically for the transition. Second, they will confirm to the industry that Government agencies and the public are depending on them to ensure that the transition goes smoothly.

We are looking forward to further discussions with you on this important issue.

Sincerely,

FEDERICO PEÑA,
T3Secretary.

ELIZABETH A. MOLER,
Deputy Secretary.

RESPONSES OF DEPUTY SECRETARY ELIZABETH A. MOLER TO QUESTIONS SUBMITTED
BY CHAIRMAN BENNETT

Question 1. Prior to this request, what had been done in the industry and by DOE in the Y2K area?

Answer. Prior to the Department's May 1, 1998 letter to the North American Electric Reliability Council (NERC), most large electric companies appear to have been working on their own on Y2K issues. In terms of collaborative efforts, the Electric Power Research Institute had launched a series of workshops and a shared information database on embedded chips, the Nuclear Energy Institute and the Nuclear Utilities Software Management Group had prepared documentation on year 2000 readiness for nuclear utilities, and the Edison Electric Institute worked with its members on other software issues related to Y2K readiness.

In terms of the Department's own energy sector operations, the Y2K issue has been actively addressed by the Power Marketing Administrations, such as the Bonneville Power Administration and the Western Area Power Administration. The Tennessee Valley Authority, an independent federal agency that generates more electricity than any other company or entity in the United States, has also been actively engaged in Y2K preparations.

Question 2. What leadership or responsibility roles does the Department of Energy see itself taking in order to help NERC guide the power utilities to achieve year 2000 compliance?

Answer. As indicated in our letter to Chairman Nye of the North American Electric Reliability Council (NERC), we believe that the most productive role for the government is to facilitate the efforts of industry to address the Y2K issue. We believe we can contribute best by concentrating our efforts in two areas: (1) a clear vesting of authority in NERC to take responsibility for organizing and coordinating the national campaign to achieve Y2K readiness in the electric power industry; and (2) coordinating with other industry sectors through the President's Council on Year 2000 Conversion (PCY2KC) on crosscutting issues or intersectoral linkages. The latter role focuses on efforts to address issues which industry is not likely to be able to resolve for itself, but which have the potential to significantly slow progress toward Y2K readiness. This is clearly an example of government/industry teamwork in which each partner contributes what it does best.

In this role, we will work especially closely with the PCY2KC so that the energy sector can benefit from the work and accomplishments of other sectors. For example,

two of the earliest "barriers" we discovered (through NERC) to information sharing among industry Y2K technical teams involved their concerns over anti-trust and liability exposure. The PCY2KC had already identified these as very real and significant "barriers" to information sharing in a variety of sectors and was working with the Department of Justice in those areas. Since that time, the Department of Justice has issued a ruling that cooperative efforts to address Y2K issues on an industry-wide basis would not be construed as a violation of antitrust laws.

In terms of intersectoral linkages, it is clear that the electricity industry does not function in isolation from the rest of the economy. In assuring its own Y2K readiness, the electricity sector will need reliable information regarding the state of preparedness among its major customers, fuel transportation systems, and telecommunications systems. The PCY2KC can serve as an important clearing house for information sharing across sectors.

Question 3. The Office of Management and Budget has set a date of March 31, 1999, for all Federal agencies to have fully implemented their year 2000 compliance programs. They also require contingency plans for those critical systems that will not make OMB's March 31, 1999, deadline. Given OMB's requirements for all Federal agencies, why has the Department of Energy "lowered" the requirements on NERC as they have been in the reliability business for more than thirty-three years?

Answer 3. We have asked the North American Electric Reliability Council to undertake and complete a national Y2K leadership and coordination effort and to provide us with written assurances of industry Y2K readiness, all in a period of 14 months. We consider this to be an ambitious undertaking that would not be served by adopting unrealistic deadlines.

Question 4. What actions can the Department of Energy take now to speed up the process of NERC's phases so that this critical national infrastructure does not end up on July 1, 1999, (the currently reported end of NERC's Phase 3) finding out that things don't work as heretofore reported?

Answer 4. We have asked the North American Electric Reliability Council (NERC) to develop and implement a plan which represents industry's best efforts to deal effectively and efficiently with Y2K preparations. Since May 1, 1998, the day the Department asked NERC to take on this responsibility, we have seen a commitment by them and do not think there is a need for us to request a change in their planned schedule.

Given the complexity of the nation's electric system, neither we nor NERC are depending on all aspects of industry Y2K preparations working flawlessly on January 1, 2000. Instead, NERC has included in its Y2K program plan a significant amount of attention to the study and development of contingency plans to be in place during the transition in order to deal with problems that may arise in spite of everyone's best efforts. For our part, we have begun working with the Federal Emergency Management Agency and other federal agencies with various connections to the electric power sector (e.g., the Army Corps of Engineers, the Tennessee Valley Authority, the Power Marketing Administrations, the Rural Utilities Service, and the Bureau of Reclamation) to assure that contingency plans for electric power are in place at the transition.

Question 5. Does the Department of Energy plan to independently verify and validate the year 2000 compliance status of the electrical national infrastructure as they go through their three phases, which concludes with the reported implementation to the Department of Energy of year 2000 compliant systems? If so, when and how?

Answer. We have asked the North American Electric Reliability Council (NERC) for written assurances by July 1, 1999, that critical systems will be ready to operate into the year 2000. From now until then the Department will receive interim reports on their activities. We have defined critical systems to encompass activities within the transmission, generation, and distribution segments of the industry. With NERC's access to virtually all the resources of the industry, it would be impossible for the Department to duplicate their assessment, much less improve upon it. It is important for the Department and the federal government to remain focused on facilitating industry's Y2K readiness efforts in this critical sector, and to avoid duplicative reporting requirements that can only serve to distract attention from the task at hand rather than add value.

Question 6. What mechanisms will be utilized to monitor (NERC's) progress?

Answer. We are in contact with North American Electric Reliability Council (NERC) staff regarding their progress on the Y2K project on a regular basis, typically with one or more contacts each week. In addition, we are meeting with federal agencies participating in the electricity working group on a monthly schedule to see that they, too, are making satisfactory progress.

Question 7. What is DOE doing to team with NERC and others to actually be involved in leading this critical effort?

Answer. We are meeting periodically with the North American Electric Reliability Council, the Electric Power Research Institute, the Edison Electric Institute, the American Public Power Association, the National Rural Electric Cooperatives Association and others to assure that no barriers to progress have been encountered and that all segments of the industry are making satisfactory progress toward Y2K readiness. We are including the Y2K issue in the remarks of senior Administration officials, such as those of former Secretary Peha at the American Public Power Association national convention in San Antonio in the week following the June 12 hearing. The September 1998 National Electricity Forum, co-sponsored by the Department and the National Association of Regulatory Utility Commissioners (NARUC) will include a session at which NERC and others will review the industry status on Y2K preparations and discuss lessons-learned so that others might take advantage of them.

Question 8. Do you have any recommendations regarding this Plan's implementation regarding how it might be used to impact on Y2K issues?

Answer. It is our view that the industry has the resources, expertise and incentives to deal with the Y2K challenge. If the electric power industry needed additional motivation, over and above their own business interests, we believe the Department provided it by formally and publicly asking the North American Electric Reliability Council, the pre-eminent reliability organization in the country, to undertake a leadership role in assuring Y2K readiness. We recognize that it is possible for legal barriers or resource barriers to slow progress and have asked NERC to identify these potential barriers. As noted earlier, the President's Council on Year 2000 Conversion is dealing with legal issues involving anti-trust and liability exposure.

Question 9. When will DOE be in a position to inform this Special Committee on the Year 2000 Technology Problem if any additional funding or legislation is needed to speed up the electrical utilities' year 2000 compliance?

Answer. We have noted above that the electric sector and other industries have raised concerns regarding the potential for information-sharing activities regarding Y2K preparations to increase corporate liability exposure. This issue is not specific to the electric utility sector, and the appropriate response, which may involve narrow legislation, is under consideration within the Administration. The President's Council on Year 2000 Conversion is taking a leading role in this effort. Clearly, it is important to "open up" the sharing of Y2K information and lessons learned so everyone doesn't have to reinvent the same wheel to attain readiness.

In terms of financial resources, there may be an appropriate role for the federal government to play in assuring the widest possible participation in information-sharing consortia, such as the Electric Power Research Institute program on embedded hardware issues. There may also be a role in providing support for some of the information-sharing activities that will take place as part of the response of the North American Electric Reliability Council to the Department's May 1, 1998 request. We are not aware of other legislative needs at the present time. We would plan to identify any additional issues or financial needs at least by the time NERC reports to us in September 1998 on the results of their initial assessment of industry status on Y2K preparations.

Question 10. Has DOE asked the Bonneville and Western Area Power Administrations (that report to DOE) for inputs on year 2000 problems they have encountered with their Supervisory Control and Data Acquisition Systems (SCADA) or other systems that would help other components of the electrical utility industry?

Answer. In the normal course of conducting their business, the Power Marketing Administrations function as integral parts of the electric power industry and, as such, are participating members of the appropriate North American Electric Reliability Council (NERC) regions. They abide by NERC standards, guidelines and reporting requirements and, consequently, will report their experiences with Y2K problems and fixes in the NERC survey of all industry experiences. We are also considering the possibility of having the Tennessee Valley Authority share some of its Y2K experience with the wider industry.

We do, of course, have our own discussions with these federal entities as part of our federal sector electricity activities and are concerned that they have and are applying adequate resources to the problem. We are doing our best to avoid any duplication of work being done by NERC.

Question 11. How can this best be promoted? (Refers to following statement on page 8, paragraph 1 : "I do not believe that the Y2K issue should be viewed as a competitive issue; it should instead be viewed as a reliability issue.")

Answer. Having the North American Electric Reliability Council (NERC), the industry association with responsibility for and expertise in reliability, take a leadership role in the Y2K effort will provide for the widest possible sharing of information among federal and non-federal elements of the electric power industry and assure that reliability considerations dominate.

Question 12. Can you provide specifics on the legislation? (Refers to following statement on page 8, paragraph 1: "Progress on federal legislation will help to provide appropriate institutional structures for protecting reliability that are compatible with the emerging competitive marketplace for electricity.")

Answer. With respect to reliability, the Administration's Comprehensive Electricity Competition Plan Act proposes creation of a self regulating reliability organization with authority to mandate compliance with standards and guidelines. This is important because competitive market participants will not have the same incentives to participate in voluntary activities to protect reliability were sufficient for a regime in which the costs associated with protecting reliability could be passed through to consumers on a virtually automatic basis as a part of the cost of service.

A copy of the legislation can be downloaded from the DOE Home Page at the following address—www.doe.gov/ceca/ceca.htm

Question 13. Which agencies are included, and can you discuss their individual roles if any have been identified? (Refers to the following statement on page 2, paragraph 2: The Energy Working Group includes all relevant agencies.")

Answer. Individual federal agencies included in the electric power portion of the Energy Working Group are, in addition to the Department, the Nuclear Regulatory Commission (NRC), the Federal Energy Regulatory Commission (FERC), the General Services Administration (GSA), the Department of Defense (Army Corps of Engineers) (DOD/ACE), the Department of Interior (Bureau of Reclamation) (DOI/BR), the Department of Agriculture (Rural Utilities Service) (USDA/PUS) and the Tennessee Valley Authority (TVA). Regular meetings provide opportunities for sharing status and progress updates among the participants and to assure that no obstacles have been encountered which could effect readiness. Roles are fairly self-evident. Each agency either participates directly in some aspect of the electricity sector or has oversight responsibilities for some component of the sector: NRC, over nuclear power plant licensees; FERC, over rates for wholesale electric sales of electricity and transmission in interstate commerce for private utilities, power marketers, power pools, power exchanges and independent system operators; GSA, over federal procurement of utility services and vendor lists of Y2K compliant utility equipment; DOD (Corps of Engineers), over dams and hydropower operations; DOI (Bureau of Reclamation), over dams and hydropower operations; USDA (Rural Utilities Service), over nonprofit and cooperative associations, public bodies, and other utilities; and, the TVA, the nation's largest electric-power producer, a regional economic-development agency, and a national center for environmental research. We have added the Federal Emergency Management Agency (FEMA) to cover the contingency planning and response areas of Y2K preparations.

PREPARED STATEMENT OF SENATOR DANIEL PATRICK MOYNIHAN

I am delighted to see that the Special Committee on the Year 2000 Technology Problem is getting off to a brisk and productive start. This is largely due to the hard work and dedication of Senator Bennett on this issue. Let this first hearing mark the beginning of the Special Committee's efforts to bring awareness, debate, and activity to addressing the year 2000 computer problem.

It was almost two years ago that I wrote the President to warn him about the "Year 2000 Time Bomb." The Year 2000 Time Bomb has the potential to ripple through all parts of our society—it could cause everything from the failure of weapons systems, widespread disruption of business operations, the miscalculation of taxes by the Internal Revenue Service, possible misdiagnosis or improper medical treatment due to errors in medical records, to incorrect traffic signals at street corners across the country. And today, Senator Bennett and the Special Committee will address the impact of the year 2000 computer problem on the electric, gas, and nuclear industries.

Our utilities are all deeply dependent on software and embedded microprocessors to operate smoothly. In order for gas and electricity to be delivered to customers, a series of integrated parts—production facilities, transportation networks, and distribution systems—all must function properly. If one of this integral parts is not year 2000 compliant, then gas and electricity will not be delivered to such crucial entities as hospitals, businesses, and homes. We must all work together in an open and honest manner to avoid this dismal and dangerous scenario.

As a Member of the Special Committee, I will continue with my efforts to make the public aware of this problem. Senator Bennett has asked me to focus my attention on the financial sector with regard to the millennium bug. There is little doubt that the year 2000 computer problem could greatly affect the economy—some put the likelihood of recession at 60 percent. I am anxious to start working on this facet of the year 2000 computer problem and will soon hold a field hearing in Manhattan—the Financial Capital of the world—on this aspect of the millennial malady.

PREPARED STATEMENT OF JAMES A. RUBRIGHT

Mr. Chairman: I am Jim Rubright, Executive Vice President of Sonat Inc. Sonat owns interests in 13,852 miles of interstate natural gas pipelines that serve the Southeastern United States and the state of Florida and that transport gas from the offshore continental shelf to the onshore interstate pipeline grid. Sonat also is a large independent producer of oil and natural gas, a wholesale marketer of natural gas and electric power, and owns interests in electric generation capacity in the United States. I am here today representing the Interstate Natural Gas Association of America (INGAA), the trade association that represents substantially all interstate natural gas pipelines in the United States, as well as Canada and Mexico.

I am here today to report that the natural gas interstate pipeline industry has taken the issue of the Year 2000 (Y2K) problem seriously, that we are moving forward on fixing systems prior to the millennial change, and that we have surveyed our industry to help determine progress in this area. As a result of that survey we are pursuing a number of initiatives to foster cooperation in various segments of the energy industry. I also want to point out some areas where I think this Committee and the Congress can help to expedite the effort.

THE NATURAL GAS PIPELINE INDUSTRY

Before getting into some specifics on Year 2000, I thought it would be useful to describe our industry to the Committee. Natural gas is a major energy source for our economy, second only to petroleum in total energy usage (see Appendix A). Natural gas provides 24 percent of the nation's energy, for use in homes, businesses, industrial facilities, and electric power plants. Clean burning natural gas currently fuels about 11 percent of all electric power production in America, but that percentage is expected to grow sharply in the future. Industry experts generally agree that current domestic consumption of 22 Trillion cubic feet (Tcf) will increase to 30 Tcf in the next decade.

The natural gas industry can be thought of as consisting of several segments, each of which is regulated differently (see Appendix B). Natural gas production takes place throughout North America, primarily in the Gulf of Mexico, the Southwest, northern Appalachia and western Canada. Congress removed the economic regulation of natural gas production a decade ago. From production areas, natural gas moves through small gathering pipelines (regulated, if at all, at the state level) to central collection points. Gas is then placed into interstate (or in some cases, intrastate) transmission pipelines for transport to market areas (see Appendix C). The Federal Energy Regulatory Commission (FERC) has economic regulatory authority over interstate transmission pipelines based on their "open access" rules. Pipelines do not own the gas that moves through their systems; rather, customers contract with the pipelines to move gas that they have purchased from producers or marketers. Local gas utilities what we call local distribution companies or LDCs are one of the major customers of pipelines that are regulated by state governments just like other utilities.

The FERC recently completed a major restructuring of our industry intended to increase competition in the markets for natural gas. The principal component of this restructuring involved changing pipelines from merchant sellers of bundled gas and transportation services to open-access transporters of gas owned by others. This change in our business has forced pipelines to accelerate the application of computer and communications technology to our industry, as the demands for flexible and responsive gas transportation service have increased as our markets have indeed become more competitive. This high degree of reliance on computers is one reason why our industry takes the Year 2000 problem so seriously. We want to ensure that our reliable and customer-friendly systems remain so on January 1, 2000.

SURVEYING THE POTENTIAL PROBLEM

Toward that end, in March 1998 INGAA conducted a voluntary high-level survey of the INGAA membership to determine the progress of the membership. Seventy-

five percent of INGAA members responded to the survey, which represent over 80 percent of the U.S. interstate natural gas transmission capacity. Since the survey was directed to members, it did not include upstream or downstream partners or service providers (electricity, telecommunications, etc.). All respondents had a Year 2000 plan in place and were in the process of implementing their plan. The survey questions asked respondents to address the following business functions: accounting, purchasing, administration, gas management, operations, engineering, and general services. An analysis of the survey responses concluded that respondents believed that they would complete their own Year 2000 plans, including analysis, modification, implementation, and testing by October of 1999 (see Appendix D). Although the major pipelines, including Sonat's, that I am familiar with had begun to prepare for the Year 2000 well before this issue began to rise, our trade association undertook in early 1998 to conduct an assessment of pipeline preparedness to determine the need for industry coordination.

Discussions that INGAA has had with individual companies revealed consistent trends in priorities for addressing the problem. In order of importance, these priorities are:

- (1) Protecting People and Ensuring System Safety
- (2) Maintaining the Flow of Natural Gas to Markets
- (3) Accounting for the Flow of Gas
- (4) Maintaining Internal Business Systems

The first priority for our industry is ensuring public safety. Based on survey results, the operations area had the most work to be done. This is largely because the automated equipment that the industry uses to operate and monitor pipeline facilities are replete with embedded chips placed in service over very long periods of time. The diversity and large quantity of such equipment with date sensitive embedded chips makes implementation and testing very time consuming. In many cases, the digital equipment monitors rather than controls the operation of the pipeline. While a tremendous amount of operational and safety systems also contain embedded chips, fortunately, they are, by design, the functional areas that have the most redundancy, including extensive use of non-electronic equipment. Natural gas transmission systems are designed with multiple safeguards to avoid the escape of gas from the pipelines. In addition to sophisticated digital control systems, operating and safety systems use many systems and applications, automatic-analog, pneumatic and mechanical control devices. Also, in the event of an emergency, operating and safety systems are equipped with manual override capabilities. The federal Pipeline Safety Act and the U.S. Department of Transportation define these minimum design, maintenance and operating procedures for our pipelines. Therefore, despite the work ahead, INGAA is confident that pipeline systems will safeguard our people in January of 2000 even in the face of digital device failures.

At Sonat, taking the one example I am most familiar with, our Year 2000 team has worked to identify hardware, software applications, and service providers that are potentially susceptible to a Year 2000 problem. As part of our hardware assessment, we are not only looking exhaustively at our computing infrastructure, but also at our pipeline and monitoring control systems and other hardware components. We have categorized electronic devices in our pipeline systems by business criticality and asset type. If the existing electronic device was supplied by a vendor, we have requested certification that the device is Year 2000 compliant. We require all new devices to be certified as compliant. In addition, we are performing on-site certification testing to the maximum extent feasible. We are also developing contingency plans for our systems based on their business criticality.

INGAA's second priority is continuity of service. Many customers depend heavily on the availability of natural gas. The millennial date change just so happens to occur during the middle of winter always the busiest season of the year for the natural gas industry. Again, the primary functional area within a pipeline system to ensure gas deliverability is operations. As we make upgrades due to safety considerations, we also help to maintain the reliability of the gas delivery system.

As with safety, redundant systems are the key to continuity of service. The supply system is dispersed among tens of thousands of wells geographically spread throughout the U.S. and Canada. These wells are backed-up with numerous storage sites that can increase or decrease natural gas in the system. Many pipelines use on-site natural gas to self-generate electricity and operate extensive private communications systems. All of these systems are designed for major natural and/or man-made disasters. In many cases local distribution companies (LDCs) are supplied by several pipeline systems and have their own storage facilities. This system provides significant flexibility for customers.

The third INGAA priority is maintaining an accurate accounting of gas flows and management. In this area, a significant amount of Year 2000 work has already been completed. Most survey respondents expect to have Year 2000 work in this area, including testing, done by the first quarter of next year. The present natural gas transmission business system relies heavily on electronic transactions for business activities such as nominations, confirmations, and actual flows. The smooth operation of this system is key to the competitive marketplace that has been created over the last decade.

The last priority is maintaining internal company business systems. These applications are, in most cases, the easiest to analyze and repair, since they tend to involve mainframe and PC-based systems, rather than field-based or embedded controller components. These systems are typically back-office applications for such functions as payroll, purchasing, and e-mail. In many cases, these solutions are dependent on software vendors and the diligence of business partners.

At Sonat, we have identified all software applications and defined their business criticality. Since we are heavily dependent on vendors to ensure that their applications are Year 2000 compliant, we have asked for certification from each vendor on their product. In addition, we are performing certification testing based on defined test criteria for all applications.

WHERE DO WE GO FROM HERE?

Now that we have assessed the progress of our Year 2000 efforts, our plan of action is the following. First, we will continue to work on fixing the problems associated with Year 2000 and increasing coordination on the problem areas.

Second, we are reaching out to our customers, service providers and others, to ensure that this is a coordinated effort. As you might expect, many of the potential risks associated with the Year 2000 problem may very well come from parties and systems beyond our control. Our energy delivery system is like a chain, and as the old saying goes, a chain is only as strong as its weakest link. With this in mind, INGAA is recommending a natural gas industry conference in September to discuss our preparedness. We will encourage all segments of the industry to participate, including service providers such as electricity and telecommunications. Sharing information and raising the visibility of the Year 2000 problem, is the best way to ensure that every interested party is taking the steps needed while there is still time.

Finally, INGAA is working to develop Year 2000 contingency plans, similar to the contingency plans currently in place to deal with natural or man-made disasters. We want to work with our partners in the natural gas industry to develop a more extensive Year 2000 contingency plan that ensures the smooth operation of the natural gas delivery system.

WHAT CAN CONGRESS DO?

Congress can play a role in addressing the Year 2000 problem. Perhaps the most important role is the one this Committee is engaging in today raising the visibility of the issue and searching for solutions before Year 2000 becomes a serious national crisis. I want to acknowledge the foresight of the Senate leadership, and of Special Committee Chairman Bennett, in fighting to put this issue on the national agenda. This problem has the potential to do serious harm to our national economy in ways that would affect every American.

I would encourage you to continue reaching out to various sectors of the economy. Our energy system, and indeed our entire national economy, is so interconnected that a problem in one sector may very well have a ripple effect throughout other sectors. For example, interstate pipelines rely heavily on both the electric and telecommunications industries. Natural gas pipelines depend on electric utilities to power many of our compressor stations and other pipeline systems; telecommunication companies help us track and record the gas. Failure by any of these service providers could impact the transmission of natural gas. The Year 2000 effort needs to be coordinated across industries.

As part of developing a government response to the Year 2000 problem, we encourage the Committee to look at ways to streamline the amount of reporting that needs to be made to governmental entities, and minimizing significant electronic commerce mandates until after the millennium. We all know this is a time-sensitive problem. Private industry employees working on this problem need to be spending their critical time working on solutions not responding to multiple government data requests and reporting requirements. A coordinated government effort would be helpful in this regard.

Our industry is also concerned with the litigation risk that we all foresee. It is a huge problem for America. We do not see how our economy can possibly benefit

from devoting the estimated one trillion dollars to allocating blame among the blameless for the consequences of an eventuality that was simply not foreseeable in the infancy of the computer industry. In the finite amount of time left to deal with the Year 2000 problem, we need to concentrate our efforts at the engineering and systems level, instead of worrying about anticipated litigation, and then doing battle with the plaintiff's bar later. INGAA thus respectfully suggests to the Committee that Congress needs to seriously consider limiting liability for Year 2000 events. Few things Congress could do would be more beneficial to expediting the national response to this potential crisis. Needless to say, we believe that new laws creating new statutory liability where none now exists is counterproductive and will lead to further enormous waste.

On a more encouraging note, the Administration has proposed an anti-trust exemption for those industry parties who want to work together on solving the Year 2000 problem. This would be an excellent idea; the more resources that are pooled together to correct this problem, the faster and more effective the overall response will be. INGAA encourages Congress to work with the Administration on an anti-trust exemption.

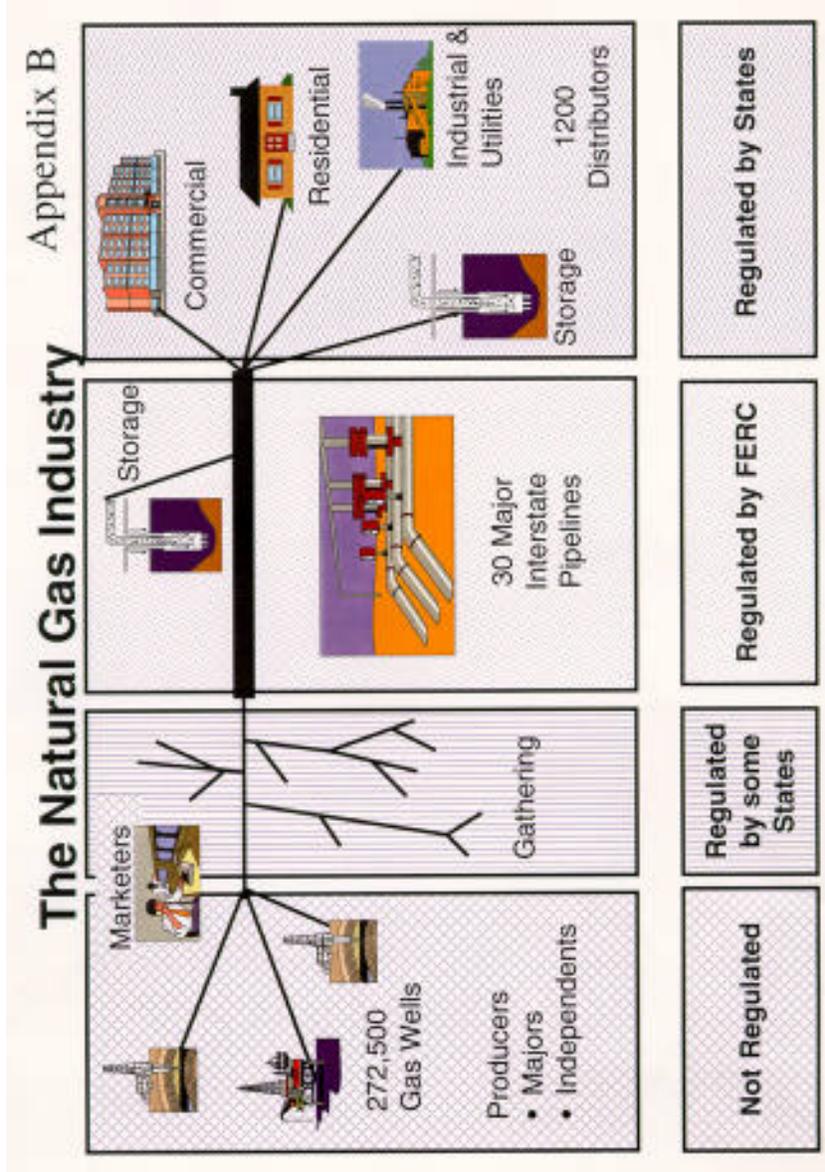
CONCLUSION

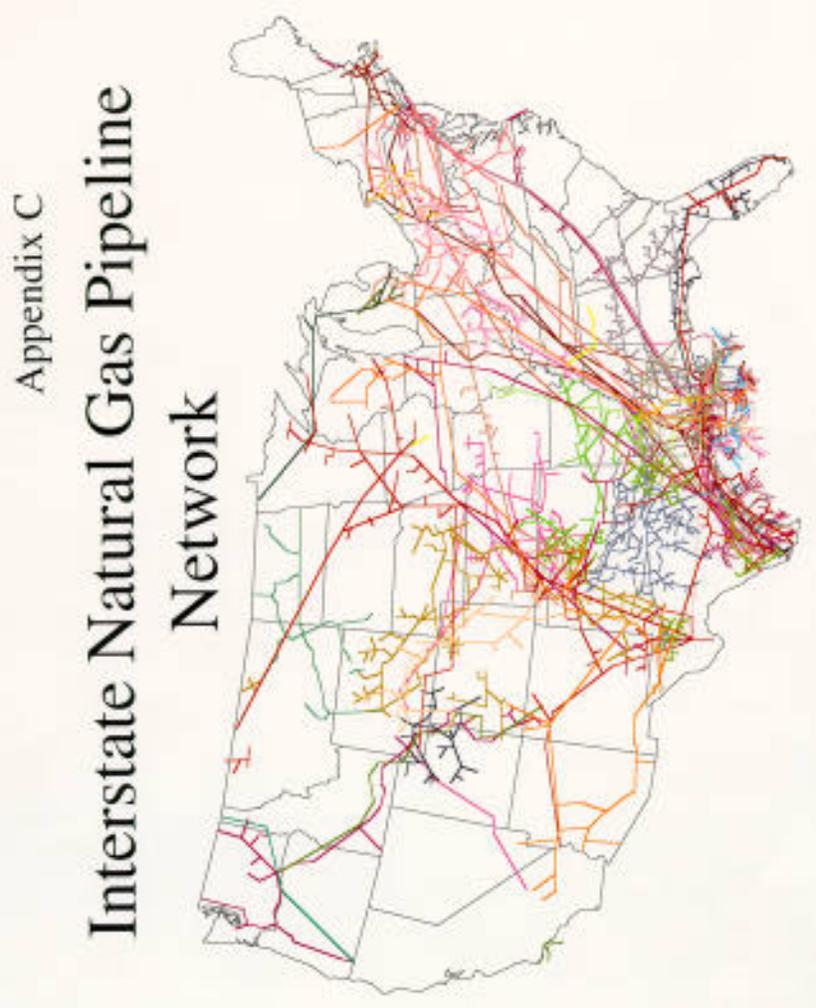
Once again, INGAA congratulates the Special Committee for its leadership on a crucial national economic issue. Our society has grown to depend on instantaneous computing and communications to perform the most important, as well as the most mundane, of tasks. If we all do our jobs right, the general public will wake up on New Years Day 2000 and go about their lives normally, without ever appreciating the amount of effort that has been undertaken to address to Year 2000 problem. The alternative, of course, is what motivates us all to make sure we do a thorough job. I thank the Committee for giving me the opportunity to testify today.

APPENDIX A.—TOTAL U.S. ENERGY CONSUMPTION, BY SOURCE, 1996

Source	Percent
Coal	22
Natural Gas	24
Petroleum	38
Nuclear	8
Hydroelectric	4
Renewable	4

Source: Energy Information Administration, U.S. Department of Energy, 1998.





APPENDIX D.—INGAA YEAR 2000 COMPUTER SURVEY

	Identified problem (yes)	Identified problem (no)	Identified problem (N/A)	Average percent complete	Standard deviation (percent)	Average date complete	Latest date complete	Standard deviation (days)
Accounting								
Accounts Payable	10	4	0	52	27	11/30/98	09/01/99	111
Accounts Receivable	9	4	1	48	36	12/04/98	09/01/99	111
Gas Accounting	9	4	0	49	37	12/22/98	09/01/99	130
Regulatory Accounting	6	5	2	46	36	11/30/98	09/01/99	120
Tax Accounting	9	4	1	39	34	11/23/98	09/01/99	127
Purchasing								
Purchasing	8	5	1	44	33	12/30/98	09/01/99	130
Materials Management	8	5	1	43	37	12/07/98	09/01/99	142
Administration								
Human Resources	10	4	0	34	27	12/21/98	09/30/99	154
Payroll	11	3	0	40	30	11/24/98	09/01/99	129
Training	5	6	3	32	28	12/30/98	09/01/99	160
Gas Management								
Contract Administration	11	2	1	44	36	11/16/98	12/31/99	213
Gas Measurement Systems	11	2	1	35	32	01/15/99	12/31/99	188
Nomination Systems	12	2	0	46	37	12/26/98	12/31/99	188
Bulletin Board Systems	8	4	1	36	32	02/06/99	12/31/99	167
Operations								
Field Communication Systems	9	0	3	26	27	01/30/99	12/31/99	134
Gas Control SCADA Systems	11	1	1	24	21	03/17/99	12/31/99	145
Automated Compressor Systems	11	1	2	30	25	03/02/99	12/31/99	133
Automated Auxiliary Plants	5	1	6	29	28	02/14/99	12/31/99	146
Maintenance Management Systems	6	6	1	27	27	03/15/99	12/31/99	145
Land & Easement Management Systems	7	4	1	40	31	12/25/98	12/31/99	174

APPENDIX D.—INGAA YEAR 2000 COMPUTER SURVEY—Continued

	Identified problem (yes)	Identified problem (no)	Identified problem (N/A)	Average percent complete	Standard deviation (percent)	Average date complete	Latest date complete	Standard deviation (days)
Engineering								
Government Permit Management Systems	4	4	4	23	22	02/14/99	12/31/99	157
Drafting & GIS Systems	4	6	3	27	28	01/27/99	12/31/99	154
Engineering Record Management	6	4	2	31	32	01/09/99	12/31/99	167
Design Software	3	6	3	26	30	12/23/98	09/01/99	110
Construction Project Management Systems	3	5	3	30	32	02/05/99	12/31/99	154
General								
E-Mail Software	6	6	1	25	27	12/10/98	09/01/99	120
Phone Systems	8	2	3	37	33	11/03/98	09/01/99	178
Computer Backup Systems	7	4	2	31	30	12/25/98	09/01/99	113
Office Systems (Word Processing)	6	5	2	49	37	11/23/98	09/01/99	136
Server Operating Systems	9	3	2	36	27	01/07/99	09/01/99	79
PC Operating Systems	9	3	2	41	31	12/23/98	09/01/99	97
Mainframe Operating Systems	8	1	3	60	29	12/16/98	09/01/99	157
Mini-Computer Operating Systems	6	3	4	42	29	01/09/99	09/01/99	87
Other Systems	1	1	2	50	0	12/31/98	12/31/98	0

Number of Miles of Pipe in Survey: 232,435.
 Number of Survey Respondents: 16.
 Year 2000 Compliance Plan: Yes-16—No-0.

RESPONSES OF JIM RUBRIGHT TO QUESTIONS SUBMITTED BY CHAIRMAN BENNETT

Question. Describe in more detail the results of this study. How do you define "a significant amount of work?" What continuing efforts are being made to further monitor industry-wide progress in the Y2K area?

Answer. Further details of the survey results are enclosed. Note that the completion dates include testing. By "significant amount of work" we mean that many companies have been addressing this issue for up to four years. This work includes identification of the problem, analysis of solutions, correction, and testing. INGAA will continue to coordinate the interstate natural gas pipeline Y2K effort. Since our testimony, I have agreed to head up the Natural Gas Council's Y2K Task which will work with FERC and other government agencies as we go forward. This effort will include the gas and oil industries. (See Appendix D of the prepared statement.)

Question. What is the expected time frame for completion of work in this critical area? Does it allow for sufficient time for adequate testing of the systems?

Answer. As shown in the survey results enclosed, pipelines responded that they intend to have solutions in place by March 1999 for operational areas. This timing is designed to allow time to test the solutions during our less busy off-peak months.

Question. Have you experienced any difficulty in attempting to get vendors to certify compliance? If so, describe those difficulties and explain what steps may be taken to overcome them.

Answer. I can respond to this question only as to Sonat's experience in requesting certification. Some vendors responded that systems were not compliant and that no actions would be taken. Also, some vendors were not able to identify precisely which models of a certain product were compliant. As a result, Sonat will not rely solely on vendor certification but will be performing on-site certification to the maximum extent possible. Sonat will focus on those devices critical to our business.

Question. What is the long-term viability of operations if running under such redundant systems? How long could a pipeline operate in a self-sustaining mode?

Answer. Redundant power systems are built into pipeline facilities so if we lose our commercial power, we have standby resources to perform the necessary functions. Our redundant systems are quite robust. For instance, adverse weather conditions sometimes take out essential facilities, yet the gas industry's reliability has remained excellent. Some of the backup systems, such as self-sustaining generators, can perform their function for an extended period of time. While other forms of backup, such as battery power, are generally more limited in time, their duration can be extended in certain circumstances (e.g., by recharging or replacing batteries).

Question. How can the government most effectively monitor industry progress without becoming a source of interference?

Answer. The government can be a constructive force by holding or participating in industry-wide meetings to obtain progress reports. By calling such meetings from time to time, the industry is strongly encouraged to step back from the day-to-day detail of implementing solutions and check the overall path. These checks, if not too frequent, are helpful in keeping us focused. Such meetings allow the industry to allocate resources in a planned manner and will not unduly interfere with industry efforts. Surveys are burdensome, labor-intensive, and generally involve tight deadlines. Industry would prefer to organize its own survey and administer it as needed to provide progress reports.

Question. What limits do you suggest be placed on liability, and in what ways could such limits speed Y2K readiness if adopted?

Answer. First, limit the liability that may be imposed on those providing information about the Y2K problem. Doing so will stimulate the transfer of information among companies. Second, companies that make good faith efforts at solving the Y2K problem should at most be faced with liability based on actual costs incurred, rather than vague liabilities such as business lost.

PREPARED STATEMENT OF CHARLES D. SIEBENTHAL

INTRODUCTION

Mr. Chairman, it's a privilege to address this Special Committee on a subject of vital importance to our country. All economic sectors, including the electric utility industry, are preparing their business operations to be Year 2000-ready. Since this is a complex topic, a number of government and private organizations are briefing you today on the steps being taken by the electric power industry in response to the Year 2000 (Y2K) problem. We all share the goal of having this essential industry well prepared for the Year 2000 transition. The cooperative efforts of everyone involved are necessary to attain the objective.

The specific role of EPRI in the Y2K effort is to serve as a focal point for the electric power industry's sharing of information about embedded systems technical issues.

EPRI

A little background information about EPRI will help you understand why industry leaders chose EPRI for this particular collaborative assignment. EPRI was founded in 1973 as the Electric Power Research Institute. We are a nonprofit collaborative science and technology consortium with headquarters in Palo Alto, California. Members of EPRI represent about 87 percent of the U.S. regulated electric power industry and international participation is growing significantly. EPRI has a twenty-five year record of providing highly respected and objective science and technology to address important energy and environmental questions.

ORIGIN OF THE EPRI Y2K EMBEDDED SYSTEMS PROGRAM

EPRI staff became aware in mid 1997 of growing concern among utility staff about the embedded systems aspects of the Y2K problem. EPRI quickly held a problem assessment workshop in September 1997, which was attended by nearly 200 people, representing 42 U.S. and Canadian utilities, and one middle eastern utility. The oil, pulp and paper, and printing industries were also represented.

Three major concerns emerged from this workshop: (1) the technical nature of the embedded systems problem was poorly understood, (2) the extent to which we could depend on our vendors to help solve this problem was not clear, and (3) there was confusion as to how to design and carry out a cost effective and timely program to achieve Y2K readiness. EPRI was asked to create a program which would address these concerns based upon the assumption that participating companies would agree to share information.

EPRI Y2K EMBEDDED SYSTEMS INFORMATION SHARING PROGRAM

EPRI launched a Y2K Program on October 1, 1997 to act as a forum and shared source of practical technical information for organizations able and willing to share their data about embedded systems. I am pleased to be able to say that even in an electric power industry restructuring for competition, the overriding importance of sharing technical information about Y2K embedded systems was recognized. Today we have 74 companies including 3 major oil companies participating in the program. Additional utilities and organizations in a number of different industries are considering joining. From the beginning, participants have been actively involved in designing the scope, schedule and content of the program as well as the content and functionality of our electronic data base.

U.S. utility participants in the EPRI Y2K program represent more than 70 percent of the electric power generation capacity in the U.S. As a result of deregulation, a significant portion of the nation's electric generation capacity is owned and operated by independent power producers. Some of the largest of these companies are subsidiaries of utilities participating in our program. However, there are still major blocks of independent power outside of the program. They are welcome and encouraged to join this collaborative program and share their data.

Major features of the EPRI program are:

- Facilitation of open communications and technical information sharing between program participants, electronically and in workshops.*—Workshops that provided interactive discussion of problems, processes, testing methods and results were held in January and May of 1998. The next one will be held August 24–28, 1998 in San Diego. We are currently selecting the date and location for a January 1999 workshop. We expect the workshops to continue through 1999.
- Development and operation of an internet-based clearinghouse for participants to share their knowledge on component and system testing.*—EPRI's internet web site for program participants was activated March 15, 1998. Utilities began uploading their data to our electronic knowledge-base in early April 1998. Currently most of this information consists of equipment inventories, program plans, and document templates. During May 1998 utility test data began appearing and we expect growth of the test result information in the knowledge-base to accelerate significantly during the third-quarter of 1998. This is based upon our expectation that by the end of third quarter 1998 most participants in our program will have identified and initiated testing on the mission critical elements of their systems.

Testing results to date have been largely limited to off-line testing of individual components. On-line testing requires that the off-line results be understood in order to minimize the potential for equipment damage and/or shut-downs

which might impact electrical service. Component testing to date has identified primarily nuisance type failures such as erroneous dates on computer screens. To date, instrument and controller functionality appears to be largely unaffected. Some testing of larger integrated systems such as distributed control systems in power plants has been started. These tests have produced some conflicting results which are being resolved through collaborative efforts within our program.

All testing information is being produced and provided by participating companies and the vendor organizations. It is expected that participating companies will use the information which they obtain from the program web site to check their own inventory, assessment, and test results. All program participants must carefully evaluate the test procedures and results they obtain from the EPRI program data base to ascertain the applicability and reliability for their own particular situation. Each company must make its own decisions based on its particular configurations and the results of its own test programs.

During mid-May, those vendor organizations which have agreed to provide information to the program began to up-load their information into the data base. We look forward to the continued growth of the vendor knowledge-base and very much appreciate the willingness of those organizations to provide and maintain information.

—*Facilitation of the utility teams to work collaboratively with key equipment vendors to document programs, methods and results.*—This program is currently underway. Program participants have identified over 45 major vendors in power generation and over 20 major vendors in transmission and distribution. A number of meetings have already been held with vendors. We expect to expand this to include vendors of electronic communications hardware as well. This part of the program is intended to improve industry understanding of vendor statements regarding product Y2K compliance. Groups of utilities have met with individual vendor organizations to discuss exactly what was tested, how it was tested, what result was obtained and how that result was interpreted to mean Y2K compliance. Vendors have also been requested to work with the utilities to develop a test plan for each of their products which can then be used by utilities in field tests.

To date the great majority of vendor organizations which have been asked to participate in such meetings have agreed to do so. We are quite pleased that the vendor organizations recognize the need to work in partnership with us to resolve the many questions which must be addressed.

—*Development of collaborative relationships with Y2K embedded systems programs in other industries to facilitate inter-industry information sharing.*—EPRI and the American Petroleum Institute (API) are discussing possible ways of sharing information between their embedded systems programs. On April 15, 1998, EPRI and API hosted a meeting of industry trade associations to see if other industries have similar collaborative data-sharing efforts. Unfortunately, no similar data bases were discovered. We will continue to monitor this situation and hope that other industries will be able to mobilize as we did and that we will be able to arrange information sharing protocols with them.

The telecommunications industry will be a primary objective of our effort to achieve inter-industry cooperation. While many utilities have their own internal electronic communications systems, all utilities depend to some degree upon telecommunications service providers for inter-utility communications within individual reliability regions. Initial efforts at contingency planning for Y2K induced events have made us very aware of the critical dependence of electric power industry response plans upon electronic communications. We are sure that reliable electric power is a critical feature of the contingency plans of the telecommunications industry. To begin the dialog, we are currently designing a pilot program for utilities and their telecom service providers to sit down and discuss their mutual dependence and identify areas of common concern and possibly joint action.

Contingency planning work has also identified many other dependencies on events and services outside of the direct control of utilities and their subsidiary companies. In addition to telecommunications, Y2K preparedness of local governmental service providers is important. For example, local governments need to be sure that vehicular traffic control measures are in place to enable utility workers to respond to contingency plan requirements and customer service requests. Additionally, Y2K preparedness of coal transport railroad and gas pipeline operations are essential to the electric power industry's ability to provide uninterrupted electric service. As we analyze all facets of the industry's operations, the list of important services outside of the electric power industry's di-

rect control grows. We continue to have concerns about the degree to which many of these other vital services will be able to operate effectively during Y2K transition dates. We are actively seeking electronic linkages to other internet-based information sources and expect this feature of our program web site to be activated before the end of this month.

ADDITIONAL RELATED CONSIDERATIONS

I have given you an overview of the EPRI program. Some additional comments are in order to more fully understand the situation:

—*Legal considerations.*—The importance of sharing information to resolve this technical problem in a timely fashion is difficult to overstate. It is our opinion that there is additional valuable information regarding embedded systems which exists within individual companies (utilities, vendors and other companies in other industries) but is not being shared, often due to fears about future litigation. From our own experience I can state that the legal system and the concerns of those who elect to guard their litigation position have impeded efforts to populate the EPRI Y2K data base. EPRI corporate counsel and counsel for participating companies have worked long and hard to overcome these shared concerns. Those who have weighed these risks and recognized that the overriding public interest and the magnitude of the business problem is so pressing that it should take precedence over the litigation concerns are to be commended.

We believe the government could advance the remediation process by stating a public policy which encourages the noncompetitive resolution of Y2K problems and acting to address legal liability concerns associated with sharing Y2K technical information.

—*Readiness of suppliers to the electricity industry.*—More work needs to be done to understand the state of Y2K readiness of key suppliers for the electric power industry. For example, will the providers of the necessary raw materials for making electricity, such as coal transport railroads and gas pipeline suppliers be Y2K ready and able to provide service at the level necessary to sustain electric power production?

—*Readiness of major users of electric power.*—More work needs to be done on the necessary communications between major users of electricity and their major electricity suppliers to understand the likely power demand at the critical times. Some industries may decide to shut down their business operations during Y2K transition events. Others which co-generate electric power may decide to shut down their electric power generation equipment and take power off the grid during Y2K transition events. Still others may simply decide to try to “ride through” the Y2K transition dates and hope for the best. Utilities trying to plan their Y2K event management programs and develop contingency plans need to understand what major electricity customers are going to do during these potential critical time periods.

—*Regional and National Grid Operations Planning and Management.*—This topic has been discussed in depth in the NERC testimony and is outside of the EPRI program scope.

In conclusion, I would like to make the following points:

- The electric power industry is working hard to ensure that electric service remains reliable through the critical Y2K transition periods.
- Significant additional work remains to be done. The EPRI embedded systems information sharing program is only one of the important components of the industry’s work to prepare for Y2K. Other issues include software remediation, legal constraints, readiness of power industry suppliers, each individual companies’ own actions, readiness of power users and consideration of the operation of the grid.
- The companies themselves are responsible for the actual solutions and implementation.
- The sharing of technical information and collaboration where appropriate should be officially recognized and encouraged.
- EPRI views its role as one of public interest and is pleased to have been invited to brief the committee on our Y2K embedded systems activities.

ATTACHMENTS

- Lists of members of EPRI Y2K Embedded System Information Sharing Program
- Frequently Asked Questions About the EPRI Program
- Milestones of the EPRI Program

EPRI's Y2K MEMBERS LIST

Y2K AGREEMENTS FINALIZED AND/OR IN PROCESS AS OF 6/5/98

Alberta Power (Canada)	Los Angeles Dept. of Water and Power
Allegheny Power System	LG&E Energy Corp.
Ameren Union Electric	Lower Colorado River Authority
American Electric Power	Manitoba Hydro (Canada)
Arizona Public Service	MidAmerican
Baltimore Gas & Electric	Minnesota Power
Boston Edison	Montana Power
Carolina Power & Light	Nebraska Public Power District
Central Hudson Gas & Electric	Nevada Power Company
Central & Southwest	New York Power Authority
Chevron	Niagara Mohawk
Chugach Electric Association	Northeast Utilities
Cinergy	Northern States Power
Commonwealth Edison	Nuclear Electric (England)
Consolidated Edison	Omaha Public Power District
Consumers Energy	Orange & Rockland
Dairyland Power Coop	PacifiCorp
Dayton Power & Light	Pacific Gas & Electric Co.
Detroit Edison	PECO Nuclear
Dominion Resources	Potomac Electric Power Company
Duke Energy	Public Service Co. of New Mexico
Duquesne Light Company	Public Service Electric & Gas
East Kentucky Power Coop	Salt River Project
Edmonton Power (Canada)	SASK Power (Canada)
Entergy	Shell
Eskom (So. Africa)	Southern California Edison
First Energy Corp.	South Carolina Electric & Gas
Florida Power Corp.	Southern Company
Florida Power & Light	Tennessee Valley Authority
GPU Generation, Inc.	Texaco
Houston Industries	Texas Utilities Electric Company
Illinois Power Company	Trans Alta (Canada)
Indianapolis Power & Light	Washington Public Power Supply System
Israel Electric	Western Resources
IVO (Finland)	Wisconsin Electric Power
Kansas City Power & Light	Wisconsin Power & Light
Long Island Lighting Co.	Wisconsin Public Service Corp.

FREQUENTLY ASKED QUESTIONS FROM UTILITIES ABOUT EPRI'S Y2K EMBEDDED SYSTEMS PROGRAM

Question 1. What is the purpose of EPRI's Y2K Embedded System Program?

Answer. EPRI's program is designed to serve as a focal point for systematically collecting, assembling, organizing, sharing and discussing technical information about embedded systems that will help participants inventory, assess and mitigate potential problems. EPRI is also facilitating meetings with vendors leading to coordinated field testing and the sharing of test information and lessons learned. Participants in EPRI's Y2K program will share their own, vendor, and other industry information and take advantage of the lessons learned by participants. This non-competitive approach to solving the problem has also been adopted by other industries such as oil, gas and chemicals. The EPRI program is focused on embedded systems and will not address back-office equipment such as mainframe and PC software.

Question 2. What is an embedded system and what is different about EPRI's Y2K Program versus others?

Answer. For this program, embedded systems are taken to be any system that utilizes a microprocessor.

EPRI's program is unique in several ways:

- It is vendor and solution provider independent. There is growing evidence that generic vendor testing upon which compliance certifications are based often yields results that are different from testing within a specific field environment.
- The focus is on collecting test data rather than a web search of existing data like many existing commercial databases.

- EPRI is facilitating vendor-utility interactions and in some cases getting answers utilities have not been able to obtain themselves. All vendors contacted to date have agreed to share information.
- EPRI is facilitating collaborative field testing.
- The EPRI program is working with many other industry groups (utility and non-utility) to maximize testing information available to participants.
- The EPRI program includes contingency planning to provide extensive information relating to the full range of Y2K efforts.

Question 3. Will EPRI develop generic solutions to industry Y2K problems?

Answer. EPRI will not develop solutions. The nature of each company's problems depends on its specific applications and electronic hardware. Consequently, each company will have to make its own decisions about priorities, risks and remediation. But, the EPRI program will serve as a clearinghouse for Y2K information which will provide value by freeing utility resources from the data gathering steps to focus on problem identification and solution instead.

Question 4. How does the EPRI Program help me?

Answer. EPRI's program can help in a number of ways:

- The overall EPRI program is designed to help participants utilize their resources in the most effective manner. By participating in a collaborative program, duplication of effort can be minimized. Test results from participants, vendors, and service providers will be centralized and conveniently available via a searchable electronic database. EPRI is facilitating the formation of collaborative utility test teams who will obtain vendor specific test information and share it with all participants. Test teams will use this information to perform field testing and these results will also be shared. First hand experiences and lessons learned (both good and bad) will be shared and may be used by others to avoid costly mistakes or to capitalize on successful results. Member interactions at periodic workshops will provide invaluable networking for all participants.
- If your organization is about to begin its Y2K embedded systems project, you will benefit from interacting with and learning from others who have developed successful Y2K programs. The database and lessons learned will help speedup your program and minimize expenditure of scarce resources.
- If your organization has already begun the inventory you will be able to benchmark your inventory results against those of others. Most program participants are learning that initial inventories find on the average only about 70 percent of the potentially Y2K impacted items.
- If your organization is in the assessment or testing phase, you will be able to compare your program and results to those of others as part of your effort to exercise due diligence. The vendor interactions and field testing will provide valuable input. Evaluation of embedded systems testing tools will be of immediate value. Contingency planning will also be of value.

Question 5. What do I get for my money? What are the deliverables? When?

Answer. The \$75,000 participation fee will provide the following:

- A database presenting extensive test results of components and systems (Operational March 17th and continuously updated)
- A web site for rapid dissemination and discussion of results
- System and component testing guidelines (Some available now and others under development)
- Reporting of lessons learned developed by others including those of other industries (Ongoing)
- Workshops for discussion of approaches and results (Jan. 28–29 Atlanta, May 4–8 Dallas, Aug. 24–28 San Diego & Q4–TBA).
- Contingency plans and reactive strategies (To be established in August/San Diego Workshop)
- Facilitation of the formation of collaborative test teams for vendor specific components and systems (Ongoing—Approximately 30 teams formed to date)

Question 6. Who can join? Do you have to be an EPRI member? Are there any exclusions?

Answer. EPRI's database and workshops are focused on the equipment and systems used in the generation and/or transmission and/or distribution of electric power. Therefore, any organization having embedded systems and equipment that are similar to those found in the electric power enterprise would find immediate value in becoming a participant and would be eligible to join. The only other requirement is that the joining organization agree to share its Y2K information with the other participants. It is not necessary to be an EPRI member to join. The only exclusions would be those organizations who are not in the process of addressing

embedded systems Y2K issues and therefore do not have their own technical information to share.

Question 7. How many participants do you have?

Answer. At the present there are approximately 74 participants. We anticipate that the eventual membership will be close to 100.

Question 8. Can I use the EPRI program to help my customers become Y2K ready?

Answer. The database information is designed to address the needs of the electric utility enterprise and is not designed to develop Y2K readiness in utility customers. However, the database, vendor information, and testing methodologies developed by the electric power industry will have information of value to other industries that share common equipment (many of whom are key customers). We recommend that you encourage such customers to join the program.

Question 9. If I join the EPRI program will I still have to test my own equipment and develop my own solutions?

Answer. The nature of each company's problems depends on its specific applications and electronic hardware. Every utility should test its mission critical equipment. Non-mission critical equipment might be tested by groups of utilities; however, utilities must make their own decisions on what and how much testing will be done based on their own risk-based evaluations. Contingency plans for potential failures also should be developed by each organization. To encourage the candid production of valuable data, information provided through the program is not warranted for any particular purpose within another participant's organization. Testing of any equipment by EPRI is not within the scope of this program.

EPRI'S YEAR 2000 (Y2K) EMBEDDED SYSTEMS PROGRAM

PROGRAM MILESTONES

09/97:

—Meeting with 42 utilities held in Scottsdale Arizona. EPRI asked to put together a collaborative program of information sharing to address Y2K embedded systems issues.

10/97:

—EPRI provides \$200,000 "seed money" to initiate program.
 —Program organization formed. Project plan and budget developed.
 —Program announcement sent to all electric utilities and placed on EPRI's public web site. Announcement stated that program was open to any organization having information and willing to share.

12/97:

—First Advisory meeting held in Atlanta, at Southern Company offices. EPRI's project plan and budget approved. Web site and data base schedule accelerated. Quarterly workshops requested.
 —Web site and data base specification developed.
 —Approximately 15 members.

01/98:

—Web site and data base design initiated. Web site activated in late January.
 —First Y2K Workshop and Seminar held in Atlanta, approx. 250 attendees.
 —Second Advisory meeting held. EPRI's workscope expanded to include vendor test teams (teams to visit key equipment suppliers to develop consistent testing methodologies).
 —Vendor Test Teams formed.
 —Marketing brochure published.
 —Approximately 45 members.

02/98:

—Data Acquisition Teams formed to secure utility and vendor information for data base.

03/98:

—Data base fully functional. First data sets populated.
 —Letter from EPRI's CEO Kurt Yeager sent to CEOs of utilities encouraging them to collaboratively share technical information about Y2K.

04/98:

—Over 100 data sources in database.
 —Texaco, Chevron & Shell join Program as first non-utility participants.

- EPRI and the American Petroleum Institute held inter-industry discussions.
- 05/98:
- Second Y2K Workshop held in Dallas. Over 450 attendees.
 - Third Advisory meeting held. EPRI asked to look into natural gas issues, utility related telecommunications issues and to increase emphasis on contingency planning.
- Today:
- Approximately 74 members (see attached listing) representing over 70 percent of the electric sales in the USA and approximately 65 percent in all of North America.
 - Advanced search capabilities fully implemented in data base.
 - Y2K web site drawing over 6500 “hits” per month.
- Future:
- 6/98–8/98—Regional training on web site and data base usage.
 - 6/98—Web site chat rooms and bulletin boards on line.
 - 6/25—Workshop on Y2K legal issues, San Francisco.
 - 8/24—Third Y2K Workshop, San Diego: Over 600 attendees expected.
 - 8/27—Advisory meeting to approve EPRI’s 1999 scope of work and budget.
 - Continuing—Add to and update information in data base.
 - Continuing—Vendor Test Team meetings with key equipment suppliers.

RESPONSES OF CHARLES SIEBENTHAL TO QUESTIONS SUBMITTED BY
CHAIRMAN BENNETT

Question 1. You mentioned that the testing of larger more integrated systems such as distributed control systems have produced conflicting results. Could you explain what you mean by conflicting results?

Answer. We have knowledge of several utilities that have tested their distributed control systems and associated control consoles for Y2K readiness and experienced different results. Some have found no Y2K impacts and others, using similar tests, have found problems. Since these systems are of various software and hardware vintages and are configured differently, software and hardware, more investigation is necessary. Therefore, within the EPRI program, the utilities conducting these tests are working together with the provider to understand the differences in test results and the actions necessary.

Question 2. You noted the mutual dependence of the electric power industry and the telecommunications industry. Do you have any thoughts on how these two industries could work together to facilitate cross-industry sharing?

Answer. All utilities have extensive private communications systems. Utilities either own and operate their own systems, own part and lease the remainder from others, or lease all of their communications systems from other providers. Utilities will be testing and correcting any Y2K problems within their own telecom systems just as the telecom providers are doing. The industries could share test data and vendor response data to insure that remediation processes are based on the same perception of the problem. This collaborative approach would benefit the nation. It is critical that at the interfaces between the telecom service providers and the utilities, the Y2K remediation actions of both sectors are compatible. This requires that these two industry groups share remediation plans and mutually agreed upon standards to minimize interface compatibility problems. Within the EPRI program we are having technical meetings between utilities and their telecom service providers to understand the technical issues and identify potential joint actions.

Question 3. You made reference to the difficulties of sharing Y2K issues within the industry because of fears about future litigation. Do you have any suggestion on how the government might help facilitate this problem?

Answer. The government could help facilitate information sharing with regard to Y2K technical information by taking appropriate steps to assure companies:

a. That sharing of such information in good faith will not be construed as anti-competitive conduct under state and federal antitrust laws. (We note that the Justice Department’s approval of the plan presented by the securities industry has substantially alleviated these concerns with respect to industry-wide programs such as EPRI’s, provided the information exchanged is limited as set forth in the ruling).

b. That technical and factual information about specific products/vendors which is reasonably believed to be correct and exchanged in good faith among

those with a common interest in remediating systems utilizing such vendors products cannot be used as the basis of a trade libel claim by a vendor;

c. That technical and factual information about specific products which is reasonably believed to be correct and exchanged in good faith between vendors and customers with a common interest in remediating systems utilizing such vendors products cannot be used as the basis of a lawsuit against such vendor (or some other action which will encourage greater cooperation by vendors of products with embedded systems);

d. That technical and factual information about specific devices, test plans and results, contingency plans and project management techniques exchanged in good faith among those with a common interest in remediating similar Y2K technical problems cannot be used against the company providing the information to establish lack of due diligence; and

e. That technical and factual information about specific devices, test plans and results, contingency plans and project management techniques exchanged in good faith among those with a common interest in remediating similar Y2K technical problems cannot be introduced into evidence against the company providing the information by another who relied on that information and suffered a negative event allegedly caused by a Y2K failure.

We believe these measures would facilitate the exchange of necessary technical information industry-wide and cross industries without prohibiting the use of otherwise available evidence to prove any of the types of claims mentioned.

Question 4. What types of embedded systems did the EPRI study focus on?

Answer. The EPRI Y2K program is not a study conducted by EPRI, but is a shared compilation of utility experience in finding, testing, and remediating embedded systems problems. This body of information includes all microprocessor based equipment normally found in electric power generation, transmission and distribution systems, and facilities. Generically it includes "smart" sensors, digital controls and data acquisition systems, receivers, actuators, remote meter reading systems, "smart" protective relays, environmental controls, and timing devices of all kinds.

Question 5. Could you explain the legal complications that EPRI encountered in trying to facilitate the sharing of information?

Answer. EPRI has encountered difficulty with the perception of legal risk created by the possibility of each of the types of events described in Question 3 above. We applaud those companies and their legal counsel who determined that the need to share Y2K technical information (subject to appropriate confidentiality agreements) outweighed the legal risks—but it is likely that even these companies would exchange a greater volume of information if they were afforded the protections mentioned above.

Question 6. Concerns have been expressed that some utilities may shutdown prior to the date change in order to protect their equipment from potential Y2K related damage. How probable do you think this might be?

Answer. I have no personal knowledge of any utilities planning to shutdown generating, transmission, and/or distribution systems due to Y2K. At this point it would seem to me that such a decision would be premature. Shutdown of a base-load power plant is a time-consuming, expensive action. Reliability and system implications need to be understood. The North American Reliability Council is tasked by the Department of Energy with looking at system-wide implications of such decisions.

Question 7. Some utilities claim that their generation and delivery systems are purely reactive to sensors and are not date sensitive. However, critics maintain that even some chips which do not have a date function can still experience Y2K related problems due to built-in logic problems. Can you please comment on this?

Answer. It is possible for chips to have a built-in time function which includes a year date, regardless of whether the year date is used in the application. At this point, we believe that there is no reason to assume that lack of explicit use of time in an application is grounds for assuming the application is Y2K ready. We would recommend that any such device considered to be mission critical should be evaluated.

PREPARED STATEMENT OF SENATOR GORDON H. SMITH

Mr. Chairman, I would like to first commend you and Senator Dodd on your leadership on the Year 2000 problem.

The need to provide solutions for all Americans is urgent and I am proud to have the opportunity to serve on this committee with you.

Today's hearing on the year 2000 preparedness of our nation's power grid is extremely important. Everything is powered by our electricity and gas industries—from the heat in our homes to the bright lights in Times Square.

I look forward to the testimonies of our distinguished witnesses about their year 2000 problem contingency plans and am hopeful that these organizations can assure us today that they will be ready on January 1, 2000.

Our witnesses are leaders on this issue and I would be particularly interested in finding out how the energy sector is reaching out to our small and rural power plants who desperately need resources to prepare for this problem.

The large power plants are undoubtedly in the process of evaluating their systems and preparing for renovations, but what about small rural cooperatives? How will small rural towns, like Fossil and Depoe Bay in my state of Oregon, be able to operate without any power? Are there enough resources available? Is there a network of utility sectors sharing information to begin implementing solutions now? Is there a coordinated outreach program to educate and prepare everyone?

Whatever the operating systems are, whether they may be embedded micro-processors in power generators or desktop computers, we need to be sure we are ready for the worst case scenarios and begin testing our systems now. There are just 567 days left. Let's work together and answer these questions before the unthinkable happens.

Thank you Mr. Chairman.

ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

STATEMENT OF THE NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION—
COMPUTERS AND THE ELECTRIC POWER GRID

The National Rural Electric Cooperative Association (NRECA) appreciates the opportunity to provide information on the Year 2000 computer problem as it affects electric utility systems. We appreciate and commend the leadership of Chairman Bennett and the members of the Committee on this critical issue.

NRECA AND ELECTRIC COOPERATIVES

The National Rural Electric Cooperative Association (NRECA) is the national service organization dedicated to representing the national interests of cooperative electric utilities and the consumers they serve. NRECA's 1,000 member cooperatives serve 30 million people in 46 states (about 11 percent of the U.S. population). Most of the more than 900 distribution systems are consumer-owned cooperatives; some are public power districts. NRECA membership includes other organizations formed by these local utilities: generation and transmission cooperatives for power supply, statewide and regional trade and service associations, supply and manufacturing cooperatives, and data processing cooperatives.

Electric cooperatives are:

- private, independent electric utility businesses,
- incorporated under the laws of the states in which they operate,
- established to provide at-cost electric service,
- owned by the consumers they serve,
- governed by a board of directors elected from the membership, which sets policies and procedures that are implemented by the cooperatives' professional staff.

ELECTRIC UTILITY COMPARISONS

	Investor owned	Publicly owned	Cooperatives ¹	Industry
Number of Organizations	243	2,010	960	3,213
Size (median number of customers)	341,300	1,700	9,600	.....
Customers, percent of total	75	14	11	.....
Revenues, percent of total	79	13	8	.....
kWh sales, percent of total	76	14	8	.....
Sales (billions kilowatt hours):				
Residential	751	149	142	1,042
Commercial	713	111	38	862
Industrial	766	148	54	968
Other	62	24	6	92
Total	2,292	432	240	2,964
Density (consumers/mile of line)	34.85	47.76	5.76	.....
Revenue/mile of line (dollars)	\$59,355	\$72,255	\$7,038	.....
Distribution plant investment per consumer (dollars)	\$1,549	\$1,503	\$1,975	.....
Assets (dollars in billions)	\$587	\$158	\$62	\$807

¹ 900 Distribution, 60 Generation & Transmission cooperatives.

kWh = kilowatt hour.

Source: 1996 Dept. of Energy/Energy Information Agency/NRECA Strategic Analysis. March 1998.

HOW ELECTRIC CO-OPS ARE ORGANIZED TO GET POWER TO THE PEOPLE

There are two distinct types of electric cooperatives: generation and transmission cooperatives (G&Ts) and distribution cooperatives.

G&Ts

As their name implies, G&Ts generate and/or transmit electric power on the bulk, or wholesale, level of the market. G&Ts are cooperatives whose members are electric distribution cooperatives. Those members are the owners of the G&Ts. Most G&Ts own transmission lines and substations. Some own or operate electric generating plants. Almost all buy and sell power on the wholesale level to ensure that electric power flows to ultimate customers safely and reliably.

There are 66 G&Ts whose membership comprises all but 250 rural electric distribution cooperatives. Together, they own approximately 60,000 miles of transmission or distribution lines, 4,451 substations and 53 own or have an interest in electric generation facilities.

Distribution Cooperatives

Distribution cooperatives ensure that electric power gets delivered locally. Their members are families, individuals, and businesses of every size and type, from campgrounds to doctors' offices to automobile manufacturers. Distribution cooperatives build and maintain the electric lines that reach to homes and businesses, ensure that rights-of-way stay clear of growth that could affect power distribution, ensure that power flows from a G&T or another source to the distribution system's delivery points and on to consumers, meter and bill for the service.

Distribution lines owned by rural electric cooperatives cover seventy-five percent (75 percent) of the land mass of the continental United States. Some distribution systems own substations or other power delivery points.

More information on how electric cooperatives are organized and operate is provided in Appendix A.

HOW THE ELECTRIC UTILITY INDUSTRY WORKS

We have provided a non-technical attachment (Appendix B) that outlines how electricity is created and provided to homes and businesses nationwide. Briefly, there are three broad components: generation, transmission and distribution.

Generation.—Facilities generate electricity using a variety of fuels—the power of flowing water (hydroelectric facilities), nuclear power, thermal plants that burn some type of fuel (coal, natural gas, diesel, biomass), or renewable resources such as wind. Electricity cannot effectively be stored in large quantities. It must be created in real time, to meet immediate needs. Generation facilities are designed with differing capacities to compensate for variations in electric demand.

Transmission.—Facilities are wires that conduct electricity from generating plants to substations and other delivery points. Their voltages range from about 115 kV to 500kV. They are designed to carry large volumes of electricity, often over long distances. Transmission lines and substations are often referred to as “the grid.” Actually there are four (4) regional grids in North America—the Eastern Interconnection, the Western Interconnection, the Texas Interconnection and the Quebec Interconnection.

Utilities within each grid buy and sell bulk power on both the spot market and through longer-term contracts to ensure a reliable supply of electricity to their customers. Transmission systems within each grid are interconnected to facilitate such transactions. The 4 grids have limited direct current (DC) interties and isolated back-to-back AC-DC-AC interties to help facilitate elasticity between the large regions.

Distribution.—Systems generally operate at voltage below transmission voltages, stepping the voltage down gradually through a series of transformers until it is suitable and safe for end-use. Distribution systems receive electricity at transmission or sub-transmission voltages at substations and pass it along to the distribution wires, either overhead or underground, that deliver the electricity to the customer. Distribution systems often have load management capabilities installed at substations or end-user facilities including Supervisory Control and Data Acquisition (SCADA) systems and peak shaving systems.

THE YEAR 2000 AND ELECTRIC UTILITIES

At this time, the year 2000 (Y2K) problem breaks down into 3 basic areas for electricity utilities: embedded chips, software and the upstream/downstream supply chain.

However, the severity of the problem is not dictated by a utility's corporate structure. Rather, the magnitude of the problem in each utility will be defined by the number of digital controllers in its facilities, the number of computer-controlled processes (billing or power plant control, for instance), and the number and type of interactions it has with customers and suppliers upon which the utility relies for mission-critical materials and services.

All electric utilities are required, by virtue of the business they are in, and in some cases by regulators, to plan for contingencies. Hurricanes, tornadoes, ice storms, wind storms, blizzards, power plant outages (both scheduled and unscheduled) as well as transmission outages (scheduled and unscheduled) all continually test electric utilities' ability to plan for and mitigate situations that affect system reliability. Facilities are generally engineered to have manual overrides or resets and may have redundancy built in to ensure that "the lights stay on." Y2K, although a new challenge for the industry, is not completely insurmountable—utilities can and are testing, mitigating and ensuring that workarounds are in place.

Each electric utility has a different mix of facilities for which it is responsible—some operate generation assets; others own no substations. Each has a different mix of mission-critical software applications, often dependent upon the facilities owned or operated.

Finally, all have some kind of interconnection with other utility systems. Electric utilities are interdependent to ensure reliability in the delivery of electric power. In order to be Y2K "ready," each utility will have to work with those who buy power from it, those from whom it buys power, and the entities that supply the transmission or distribution capacity that ensure that electricity gets where it's supposed to.

NRECA agrees with The North American Electric Reliability Council's (NERC) assessment regarding the reliability of the bulk power system: "* * * distribution systems are generally radial from the bulk supply network and cannot function without a robust bulk supply network or Interconnection."¹ Most NRECA members are electric distribution cooperatives. No matter how prepared they are, if power suppliers selling power to them experience extreme Y2K difficulties, these rural electric distribution systems will be left high and dry and their consumer-owners will be freezing in the dark come January 1, 2000. G&Ts report that their Y2K mitigation efforts, including system and/or controller replacement are well under way as of June 1998. However, it is difficult to discern at this writing how much coordination has occurred in the bulk power market. NRECA also agrees with NERC's assessment that the nature of distributions systems' Y2K challenges will become more apparent as NERC's bulk power project ramps up.²

What follows immediately are brief descriptions of points of vulnerability to Y2K that could be experienced by rural electric cooperatives and other electric utilities. To learn what steps cooperatives are taking to meet the challenge, see "What Rural Electric Cooperatives Are Doing" below.

Embedded Chips.—Date-sensitive chips are found in a variety of electric utility facilities, including but not limited to:

- power plant control systems of various kinds
- electronic transmission/distribution relays
- substation meters
- Supervisory Control and Data Acquisition (SCADA) Remote Terminal Units (RTUs)

Software.—At this writing NRECA's understanding of the software aspect of Y2K is threefold: SCADA; load management systems and automatic generation control; and billing/CIS.

SCADA

A SCADA system, or Supervisory Control and Data Acquisition system, can control an entire distribution substation system. The automation is controlled by a main terminal in the headquarters office, which works with remote terminal units or RTUs. These RTUs communicate information continually exchange information with the main terminal, giving real-time data and immediate control. SCADA systems allow continuous monitoring of the system to look for unusual patterns, receive instantaneous load profiles or note the highs and lows of the day. This allows load rotation as conditions dictate.

¹ Testimony of Michehl Gent, President, North American Electric Reliability Council, before the Senate Special Committee on the Year 2000 Technology Problem, June 12, 1998, page 3.

² *Ibid.*, page 3.

SCADA systems can also be used to open or close breakers or reroute power as well as automate substation transformers, breakers, regulators and switch stations. A SCADA system operator can monitor all of the controls at the substations, check the status of communication channels, and, most importantly, can open switches and back-feed the substation from other sources to get most consumers on immediately when an outage occurs.

Load Management Systems (LMS) and Automatic Generation Control (AGC)

Load management systems are used on a daily basis to plan and schedule generation and transmission resources. Automatic generation control adjusts generation levels across a system to compensate for variations in demand. Both LMS and AGC are used by control areas and the reliability councils to coordinate generation and transmission resources. Many of those systems are not under the direct control of rural electric cooperatives. Therefore, we will be relying heavily on NERC's Y2K program to ensure that they are Y2K ready. Control areas that are maintained by rural electric G&Ts will be participating actively in NERC's program.

Billing/CIS

About 400 rural electric distribution cooperatives employ the services of data processing cooperatives. They provide such services as billing, accounting, payroll, automated meter reading, computer hardware and software. While data processing and information technology entities were the first to broach the Y2K problem, these systems are not mission critical to the delivery of electric power. The lights would stay on if billing or automated meter reading systems failed, but consumers would eventually face billing and accounting difficulties if Y2K problems in these systems were not solved. One data processing cooperative stated that a possible solution to this would be to estimate bills based on usage and billing history.

Upstream/downstream supply chain.—"Upstream" suppliers for the electric utility industry include coal companies, transportation companies and equipment manufacturers. Each of these suppliers will have to be coordinated with to ensure that supplies of fuel and equipment are readily available to generating plants. Again, bulk power reliability is the keystone of electric system reliability. Customers' and suppliers' impacts on a given electric system can vary. A large industrial load's suddenly entering or departing the local distribution system can have severe consequences. Fortunately, utilities and large-load customers plan for such events. Rural electric cooperatives will need to coordinate management of such loads during critical times in the Y2K rollover period.

SPECIFIC Y2K IMPACTS

The "Grid"

As mentioned previously, there are actually 4 grids. NERC, at the request of the U.S. Department of Energy (DOE), has taken on the challenge of Y2K in coordinating the electric utility industry's reliability. We commend NERC for their swift, thorough response in drafting the implementation plan presented to the Special Committee. NRECA expects that its G&T members with generation obligations, transmission responsibilities and control areas will also work closely with NERC. Further, we pledge to work with NERC to ensure that rural electric distribution systems are Y2K ready. However, NRECA cannot fix the problem for individual distribution systems.

Upstream Suppliers of Bulk Power and Transmission

We expect that suppliers of bulk power and transmission also will work cooperatively with NERC, their customers and suppliers to ensure reliability. Y2K is not a competitive issue, nor should it be used as a tool to advance a competitive agenda. As Deputy Secretary Moler stated in her testimony, "I do not believe that the Y2K issue should be viewed as a competitive issue; it should instead be viewed as a reliability issue."³ NRECA agrees.

The Nuclear Regulatory Commission's (NRC) thorough program of communication, testing and inspection of nuclear generating facilities seems well placed to ensure the safety and reliability of that particular type of generating plant during the critical Y2K period.

With regard to power suppliers, NRECA member G&Ts report that contacts are under way and ongoing to ensure that appropriate planning for generation resources. We are encouraging all of our members to contact power and transmission suppliers and engage them in planning for Y2K as well as to seek assurances that

³Testimony of Elizabeth Moler, Deputy Secretary, U.S. Department of Energy, before the Senate Special Committee on the Year 2000 Technology Problem, June 12, 1998, page 8.

power supply and transmission capacity will be maintained. This will also necessitate contacts with the Power Marketing Administrations (DOE), the Tennessee Valley Authority, the Bureau of Land Management (Department of the Interior) and the Corps of Engineers (Department of Defense) to ensure that their respective generation and transmission facilities will be Y2K ready and that appropriate contingency plans are in place.

In addition, NRECA will contact the Federal Energy Regulatory Commission (FERC) and the National Association of Regulatory Utility Commissioners (NARUC) to discuss power supply issues.

WHAT RURAL ELECTRIC COOPERATIVES ARE DOING

NRECA has initially focused on the G&Ts because of their intrinsic role in the nation's bulk power system.

A "snapshot" survey of G&Ts was undertaken by NRECA in May and June 1998, targeted specifically on the embedded-chip question. The overall results show that G&Ts are aware of the Y2K issue, are surveying equipment and facilities and making replacements as needed. Contingency planning efforts also are under way. We consider this an informal survey, and have assured our members that their confidentiality will be protected. In addition, it is reasonable to assume that legal counsel has advised rural electric cooperatives to be circumspect in their responses to surveys and public statements regarding Y2K due to the litigation threat.

SNAPSHOT RESULTS

[Aggregate results covering all 66 G&Ts, including those that own no facilities]

Number of interconnections with power suppliers/wheeling entities	795 at a minimum.
ESTIMATED Y2K budget 1998 ONLY	\$17.7 million.
Number of substations owned by G&Ts	4,451.
Number of substations owned by distribution members of G&Ts	3,373.
Y2K inventories completed for transmission equipment	51 percent.
Necessary replacements made	44 percent.

Completion dates for transmission system Y2K projects range from already completed in two cases throughout 1998 and 1999, with many G&Ts planning for completion early to mid-1999.

48 percent of G&Ts operate power plants. Of those, 33 percent have completed Y2K inventories, with replacements 26 percent complete. Y2K projects at these power plants have completion dates ranging from December 1998 throughout 1999. One power plant project has been completed.

49 percent have contingency planning under way with completion dates ranging from December 1998 throughout 1999.

It is important to keep in mind that not every embedded chip must be replaced in order for a system to be considered "Y2K ready." Different utilities have differing mixes of analog and digital controls. Power plants and transmission systems with analog controls, by definition, do not have "embedded chip Y2K" problems in those systems. Therefore, no replacements are necessary. Further, it may be more reliable and cost-effective for a given plant or transmission owner to implement a manual override on a digital control system or other "analog" workaround than to embark on a wholesale replacement of digital controllers. Replacing chips prior to 1999 is not always the only solution to a Y2K problem. Each G&T is different, and it is reasonable to assume that they each will have a different Y2K mitigation plan and contingency plan.

FERC Chairman Hoecker stated in his testimony before the Special Committee during the hearing on June 12, 1998, that, although some utilities and associations have promoted awareness and have shared information about Y2K industry readiness, "[t]he state of awareness and planning of * * * cooperatives is less certain."⁴

We assume that the Chairman's stated uncertainty resulted merely from being unaware of what rural electric cooperatives are doing, and was not intended to suggest a belief that cooperatives are less aware of the Y2K issue or are unwilling to share information similar to the information shared by other industry segments. NRECA nevertheless intends to contact Chairman Hoecker to assuage his concerns, if any.

⁴ Testimony of James Hoecker, Chairman, Federal Energy Regulatory Commission, before the Senate Special Committee on the Year 2000 Technology Problem, June 12, 1998, page 4.

NRECA and its members will be contacting other federal agencies outlined above and will be recommending to its members that they contact state regulators and lawmakers regarding Y2K readiness. While many co-ops are not subject to state regulation, we feel that is prudent for rural electric cooperatives to share their information with public officials in order to help dispel fear-mongering by ill-informed, possibly unscrupulous parties. Public officials have some tools at hand with which to assist utilities in achieving Y2K readiness, the most important being the "bully pulpit." However, to use that tool effectively public officials need reliable, balanced information. We intend to be such a source of information.

NRECA intends to provide updates to the Special Committee and other Congressional committees as the need arises. We look forward to continuing our work with the Special Committee.

To that end, NRECA is developing a snapshot of distribution cooperative readiness as well as guidelines and checklists that will be provided to all NRECA members. The guidelines and checklists will be targeted at distribution systems. We anticipate having these resources in place later this summer. Coupled with the wealth of information provided by NERC, EPRI and other reputable sources, we hope that these guidelines and checklists will make Y2K readiness a thorough and timely process for our member systems.

In addition, NRECA is featuring reporting on Y2K in its publications, conferences and meetings targeted at members. We are working with allied organizations and insurers. We have posted a page of Y2K resources on our web site (www.nreca.org).

Finally, NRECA is in discussions with EPRI regarding an "aggregation plan" for their embedded chip program. We applaud their efforts in this area and are attempting to find a solution so that even the smallest cooperative with the smallest budget can have access to EPRI's Y2K embedded chip knowledge base.

NRECA cannot solve individual co-ops' Y2K problems. However, we can and will provide them with information, contacts, opportunities to share knowledge and to inform consumers, legislators, regulators and other important groups.

WHAT CONGRESS CAN DO

As Deputy Secretary Moler stated, government cannot solve the Y2K problem for industry.⁵ Only industry can prepare itself to be ready for the millenium. NRECA's members, as a vital part of the nation's infrastructure, intend to meet the Y2K challenge.

Congress can play several instrumental roles in making it easier for utilities and others to meet the Y2K challenge.

The bully pulpit first occupied by Senator Bennett and now, under his leadership, the entire Senate Committee, is a unique and powerful forum. We are encouraged by the balanced approach taken by the Special Committee in its inaugural Y2K hearing on utilities. Congress can help dispel rumor, calm hysteria and disseminate reliable information on Y2K through its everyday activities including hearings, web sites, press conferences, speeches both on the floor and before constituent groups, town meetings and other constituent communications.

We are also encouraged by recent reports out of the Department of Justice indicating antitrust waivers for industries and segments of industries that wish to work together on the Y2K challenge. We will pursue discussions with other electric industry groups and the Department on this subject.

Congress can help smooth the path to Y2K readiness by enacting liability protections specific to Y2K for critical infrastructure industries like all electric utilities. Fear-mongering as well as outlandish reports of some in the legal community yearning for Y2K lawsuits can have only a chilling effect on the all-important cooperation and information-sharing that will be necessary for Y2K readiness. As NERC President Michehl Gent said, "Any restraint in sharing known Y2K problems and solutions will be a direct challenge to the reliability of the electricity supply."⁶ It seems to us that any threat to electric system reliability, especially one embodied in lack of communication on Y2K, should not be tolerated by Congress or regulators. We therefore respectfully request that Congress enact liability protections for the electric utility industry including electric cooperatives.

Further, Congress can, through its oversight powers, act to investigate competitive roadblocks thrown up by companies that directly impinge on any electric utility's ability to be Y2K ready. While regulators have similar oversight responsibilities, there is nothing like the glare of the Congressional spotlight to discourage nefarious activity. It is entirely possible that Congress could enact special penalties

⁵ Moler, page 3.

⁶ Gent, page 6.

for companies and organizations that refuse to supply or drag their feet on supplying vital Y2K information to critical infrastructure industries and for companies within those industries who are reluctant to share information with possible competitors. Again, such reluctance would be a direct threat to system reliability and as such, cannot be tolerated.

While the outlook is unclear that this point, it is entirely possible that Congress might need to enact a special supplemental appropriation to deal with its own Y2K readiness, or that of specific federal agencies. During such legislative consideration, it might be appropriate to ensure that lead agencies under the President's Council also have an Y2K fund that would lapse shortly after the critical Y2K transition period expires.

Finally, Congress can help ensure that additional, onerous, time-consuming regulations or certification requirements regarding Y2K are not put in place by well-meaning regulators. Regulators cannot solve industry's Y2K problems, but they can require paperwork, proceedings, certifications, conferences and other activities that will merely reduce the time, money and energy needed by industry to meet this challenge.

CONCLUSION

Y2K is a serious challenge for all electric utilities based on their usage of software and digital controllers on generation, transmission and distribution systems. The industry as a whole, and rural electric cooperatives in particular, are working hard to ensure that the nation's electric supply is "Y2K ready."

Bulk power system reliability, both generation and transmission is the keystone on which distribution system reliability relies. A great deal of coordination, spearheaded by NERC, will be necessary to ensure that reliability is maintained. Rural electric cooperatives will play a role in that coordination, both through their ownership of generation or transmission assets and their use, as customers, of such assets.

Y2K work at co-ops has been under way, in some cases since 1996 and will continue through the critical period. Rural electric cooperatives are aware of the problem, are doing or have completed inventories, are designing and implementing solutions and are or will be testing solutions, all to do their part to meet the overall Y2K challenge.

While neither Congress nor regulators can solve Y2K problems they can take some helpful actions:

- Continue to spotlight the Y2K issue for the country at large. Congress, and more specifically, the Special Committee has a highly visible forum on this issue. Congress can help dispel rumor, calm hysteria and disseminate reliable information on Y2K.
- Congress can help smooth the path to Y2K readiness by enacting liability protections specific to Y2K for critical infrastructure industries like all electric utilities. It seems to us that any threat to electric system reliability, especially one embodied in lack of communication on Y2K should not be tolerated by Congress or regulators.
- Further, Congress can, through its oversight powers, act to investigate competitive roadblocks thrown up by companies that directly impinge on any electric utility's ability to be Y2K ready.
- It is entirely possible that Congress could enact special penalties for companies and organizations that refuse to, or are reluctant to, supply vital Y2K information to critical infrastructure industries and for companies within those industries who are reluctant to share information with possible competitors.
- It might be appropriate for Congress to ensure that lead agencies under the President's Council also have an Y2K fund that would lapse shortly after the critical Y2K transition period expires.
- Congress can help ensure that additional, onerous, time-consuming regulations or certification requirements regarding Y2K are not put in place by well-meaning regulators.

APPENDIX A—ADDITIONAL INFORMATION ABOUT COOPERATIVES

FACTS AT A GLANCE

- About 900 electric co-ops serve 31 million people in 46 states.
- Electric co-ops serve more than 13 million businesses, homes, schools, churches, farms, irrigation systems, and other establishments in 2,600 of 3,128 counties in the U.S.

- Electric co-ops serve 11 percent of the nation's population, accounting for 7.9 percent of kilowatt-hours sold and 5 percent of electricity generated by the electric utility industry.
- Electric co-ops own and maintain nearly half the electric distribution lines in the U.S., covering three quarters of the nation's land mass.
- Electric co-op assets exceeded \$67 billion in 1996.
- Co-ops serve an average of 5.8 consumers per mile of line and collect annual revenue of approximately \$7,000 per mile of line.
- Investor-owned utilities average 35 customers per mile of line and collect \$59,000 per mile of line.
- Publicly owned utilities, or municipals, average 48 consumers and collect \$72,000 per mile of line.
- There are 900 distribution cooperatives.
- There are 60 G&Ts, owned collectively by their member distribution systems.

NET MARGINS AND CAPITAL CREDITS

Cooperatives are operated to provide at-cost electric service to the consumer-owners. Investor-owned utilities are operated to maximize profit for the shareholders. A co-op's net margin above expenses and reserves does not belong to the utility; it belongs to the individual consumer-owners of the co-op. The margins must either be used to improve or maintain operations, or be distributed to those who use the co-op's products or services.

An individual co-op member's share of each year's net margin is proportional to the amount of electricity that member purchased and is booked to that member in a capital credit account. A member's total capital credit is his or her ownership equity in the cooperative. Capital credits can be returned to members in cash. Total yearly capital credit payments of some larger co-ops may amount to several hundred thousand dollars, a substantial return to the local economy.

RATE REGULATION

In 16 out of the 46 states where there are distribution cooperatives, approximately 250 co-ops are subject to some form of rate regulation and approximately 636 are not rate-regulated. Regulation is offered to protect the consumers' interest. Where co-ops are not regulated, the states accept that electric cooperatives already have effective regulation because the consumer-owners elect or defeat co-op boards of directors, which have rate-setting authority. The Rural Utilities Service also has rate approval authority over those co-ops that are borrowers from RUS-administered loan programs.

COOPERATIVE PRINCIPLES

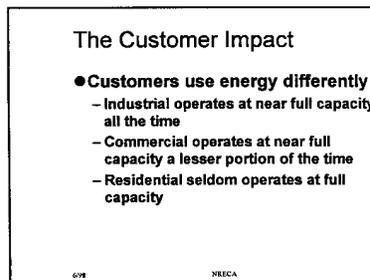
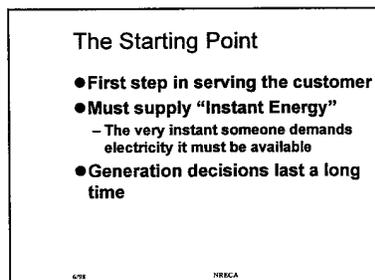
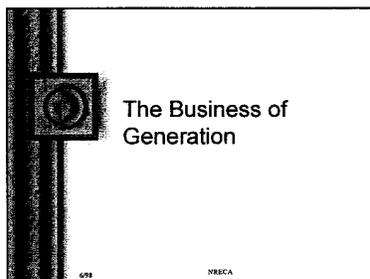
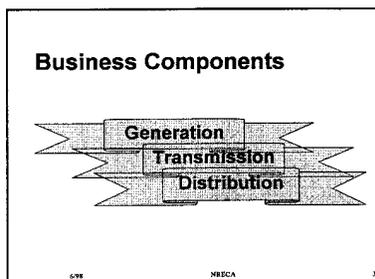
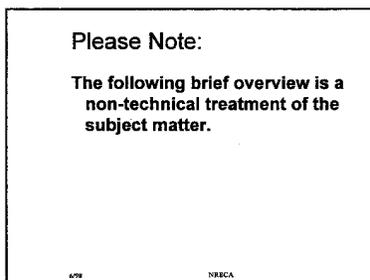
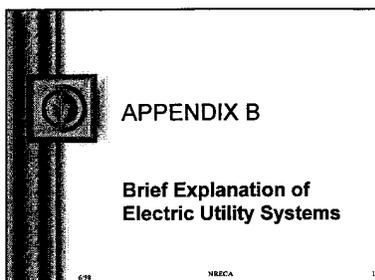
Cooperative businesses adhere to seven guiding principles:

1. Voluntary and Open Membership.—Cooperatives are voluntary organizations, open to all persons able to use their services and willing to accept the responsibilities of membership, without gender, social, racial, political, or religious discrimination.
2. Democratic Member Control.—Cooperatives are democratic organizations controlled by their members, who actively participate in setting policies and making decisions. The elected representatives are accountable to the membership. In primary cooperatives, members have equal voting rights (one member, one vote) and cooperatives at other levels are organized in a democratic manner.
3. Members' Economic Participation.—Members contribute equitably to, and democratically control, the capital of their cooperative. At least part of that capital is usually the common property of the cooperative. Members usually receive limited compensation, if any, on capital subscribed as a condition of membership. Members allocate surpluses for any or all of the following purposes: developing the cooperative, possibly by setting up reserves, part of which at least would be indivisible; benefiting members in proportion to their transactions with the cooperative; and supporting other activities approved by the membership.
4. Autonomy and Independence.—Cooperatives are autonomous, self-help organizations controlled by their members. If they enter into agreements with other organizations, including governments, or raise capital from external sources, they do so on terms that ensure democratic control by their members and maintain their cooperative autonomy.
5. Education, Training, and Information.—Cooperatives provide education and training for their members, elected representatives, managers, and employees

so they can contribute effectively to the development of their cooperatives. They inform the general public, particularly young people and opinion leaders, about the nature and benefits of cooperation.

6. Cooperation Among Cooperatives.—Cooperatives serve their members most effectively and strengthen the cooperative movement by working together through local, national, regional, and international structures.

7. Concern for Community.—While focusing on member needs, cooperatives work for the sustainable development of their communities through policies accepted by their members.



Generation Resources

- **Base Load**
 - Nuclear - Coal - Oil - Gas
- **Intermediate**
 - Combined cycle - Gas - Oil
- **Peaking**
 - Combustion turbine



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The Business of Transmission

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The Need for Transmission

- **Developed based upon issues of reliability**
- **Allows for interconnection of multiple utility systems**
- **Backup and support**
- **Higher voltages mean less losses**
- **National economic interest**
- **Highway for outside suppliers**

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Why Assure Reliability?

- **Customer expectations**
- **Customer confidence and satisfaction**
- **Scheduling and performing electricity transactions**
- **National security**
- **Economic growth and vitality**

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How It Works

- **Conductors carry voltage (Volts) and current (Amps)**
- **Resistance in lines creates losses**
- **AC vs. DC**
 - AC can do everything DC can do for less \$
 - AC allows us to operate parallel systems with like voltages
 - Transformation is easier

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How it Works

- **Technology and price are changing in this market and the future may well include more DC.**

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Substation Components

- Point at which distribution system takes purchase of generation from G&T
- Metering can be done on the high or low side



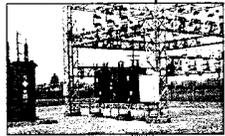
Power Transformers

- Reduce transmission voltage to distribution voltage 69kV to 7.2kV
- Single or three phase units
- Sized to system demand



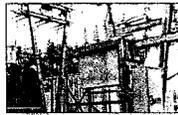
Substation Low Side

- Typically the point of metering and monitoring
- Defines ownership



Reclosers

- Act as circuit breakers to prevent transformers and other equipment from failing

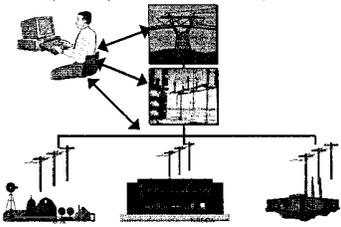


Automation

- SCADA
 - Supervisory Control and Data Acquisition
 - System operations
 - Reliability
- Peak Clipping
- Distribution Automation
 - Automated mapping / facility management (AM/FM) system and GIS
 - Customer data acquisition

What Is SCADA?

Supervisory Control and Data Acquisition



SCADA - System Operations

- Allows remote management of critical system functions
- Typically a substation function
- Should be coordinated with power supplier and neighboring utilities
- Should be transparent to the customer

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SCADA

- Real time - remote control



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SCADA- Remote Terminal Unit

- Receives command from processor
- Converts signal to field action



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SCADA- Man/machine Interface

- Provides user with access to data and control system



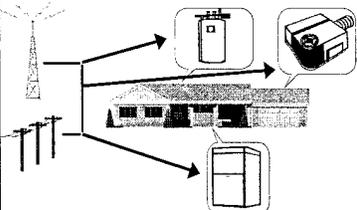
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Peak Clipping

- Direct load control
- Voltage reduction
- Facility energy management
- Dispatchable generation

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Peak Clipping - What Is Direct Load Control



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