



Y2K Experiences in the Nuclear Material Control Area

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1. Introduction

Though Y2K problem was treated by each organization, it became systematic in Japan when Advanced Information and Tele-communication Society Promotion Headquarter, chaired by Prime Minister, was established and issued an action plan last September, recognizing the importance and urgency of the issue.

Here is presented the summary of action plan and some experiences of Y2K issues in the nuclear material control area.

2. Action plan issued by the Japanese government

Recognizing the importance and urgency of the Y2K issues, an action plan for Y2K issue was decided and released.

Following is the summary of the action plan.

(1) Wide and complete offer of the information to the general public

-provides widely the information on on-going Y2K measures and state of the issue in the official gazette and asks mass-media as newspaper, magazines et. for cooperation of publication of the information. It goes further than simple calling attention to the issue but gives the necessary information as structure of the responsibility for this issue, simulation tests to ensure Y2K readiness, preparation of the contingency plans, inclusion of not only computers and software but embedded systems in the Y2K action plan, inclusion of communication networks in the plan to ensure the readiness from outside influence, asking the vendor or supplier of the systems to ensure if they are Y2K ready, and information on the current state of the remedy actions

-each government ministry establishes contact person and open the Home page by September 1998 for Y2K actions being implemented so that general public can access to it and get the information on current state of the issue.

(2) Remedy actions by governments as well as private sectors

-requests central government and local governments for their computer

systems to complete the remedy actions in accordance with the "remedy action guidance" for higher prioritized systems in the programme by the end of June, 1999.

-encourages important private industries as banking, energy, Tele-communication, traffic and medical to establish the over-all inspection plans to make thorough self-inspections and report the results to supervising Ministries and also encourages vendors and suppliers to actively provide necessary information on status of Y2K remedy actions to inside and outside of the country.

-follows up the action plans at Senior Advisory Committee on Y2K problems, Y2K Problem Measure Promotion Committee composed of all Administrative Vice-Ministers and Advanced Information and Tele-communication Society Promotion Headquarter

3. Examples in the Nuclear Material Control Area

Based on the self-initiative as well as Science and technology Agency's request related to the above Initiative to remedy the Y2K problems, nuclear research and development organizations under the supervise of STA are taking necessary actions for Y2K problems.

Here is examples for Y2K remedy actions in the area of Safeguards and Physical Protection.

(1) Examples for Nuclear Material Accounting in the Safeguards

Nuclear Material Control Center (NMCC) is, based on Japanese Law, to gather nuclear material accounting reports as Inventory Change Report (ICR), Material Balance Report (MBR) and others from all nuclear facilities in Japan, and treat and report them through state authority, Science and Technology Agency (STA), to IAEA based on safeguards agreement, and foreign countries as Australia, Canada, France, UK, USA, based on bilateral agreements.

NMCC has a central information treatment and analysis system and nuclear material accounting data received from various facilities are processed to verify and correct the accounting data, and national inspection data as Destructive Assay (DA) and Non-Destructive Assay (NDA) are analyzed. Measurement error and Inventory Difference are also evaluated.

Then accountancy reports and floppy diskette are sent to relevant organizations as IAEA.

This mainframe computer system to treat the information has been upgraded successively to cope with the increase of information and treatment programs in conformity with the expansion of the Japanese nuclear programs

Format used for nuclear material accounting is common between facility operator and NMCC, and between NMCC and IAEA, and it has 6 digits calendar. Existing computer program in the mainframe has 6 digits calendar where year 2000 would be recognized as year 1900 and leads to error. Before the replacement of the program and hardware were started, basic means of modification was decided. In the computer program, date of all control data and computer panel display and output were changed to 8 digits instead of 6. But we decided to minimize the corrections and continue to use the same common format with 6 digits calendar instead of 8.

NMCC recognized Y2K issue, requested the necessary budget for it and made a 3 year-plan for making Y2K ready system of the mainframe computer starting 1997, and has implemented the actions with target completion date of March this year. In the program, we studied the upgrade of data base, picture display, computer languages as NATURAL and PL/1, and output list. We also studied and defined the validation or integration test environment to ensure Y2K readiness before installing the modified system and re-designed display picture and output list. Now it is almost complete and the integration test is under way which is expected to finish by middle of this year. After successful completion of the integration test, the whole system will be transferred to operational condition and checked to ensure Y2K readiness.

Right now each facility operator has it's own program with validation tests to get rid of the Y2K error, and the interface or boundary between operator and NMCC is common format which makes the whole system easy to modify and check. NMCC is to provide Y2K error proof material accounting program to those organizations which utilize small quantity of nuclear material, and normally has very limited resources for this kind of modification.

(2) Physical protection of nuclear material and facility

Japan Nuclear Cycle Development Institute (JNC) has reactors, and fuel cycle facilities which are safeguarded by relevant physical protection systems.

With regards to the Y2K problem it has been recognized since around 1995. When The Institute made and started systematic plans for upgrading important facilities around that time, this issue was also taken into consideration in them and advanced operation systems have been adopted with Y2K proof. They are now almost complete including simulation tests. Those facilities, which were not modified or replaced, are under review to evaluate the influence of the Y2K problem as well as effective measures by the vendor.

During the course of consideration, following sort of issues were recognized.

1. Entry and exit control system

Machine does not recognize the validation date of card, which people use for entry and exit, and make errors after year 2000. Entry and exit data of the people become invalid.

2. Monitor system

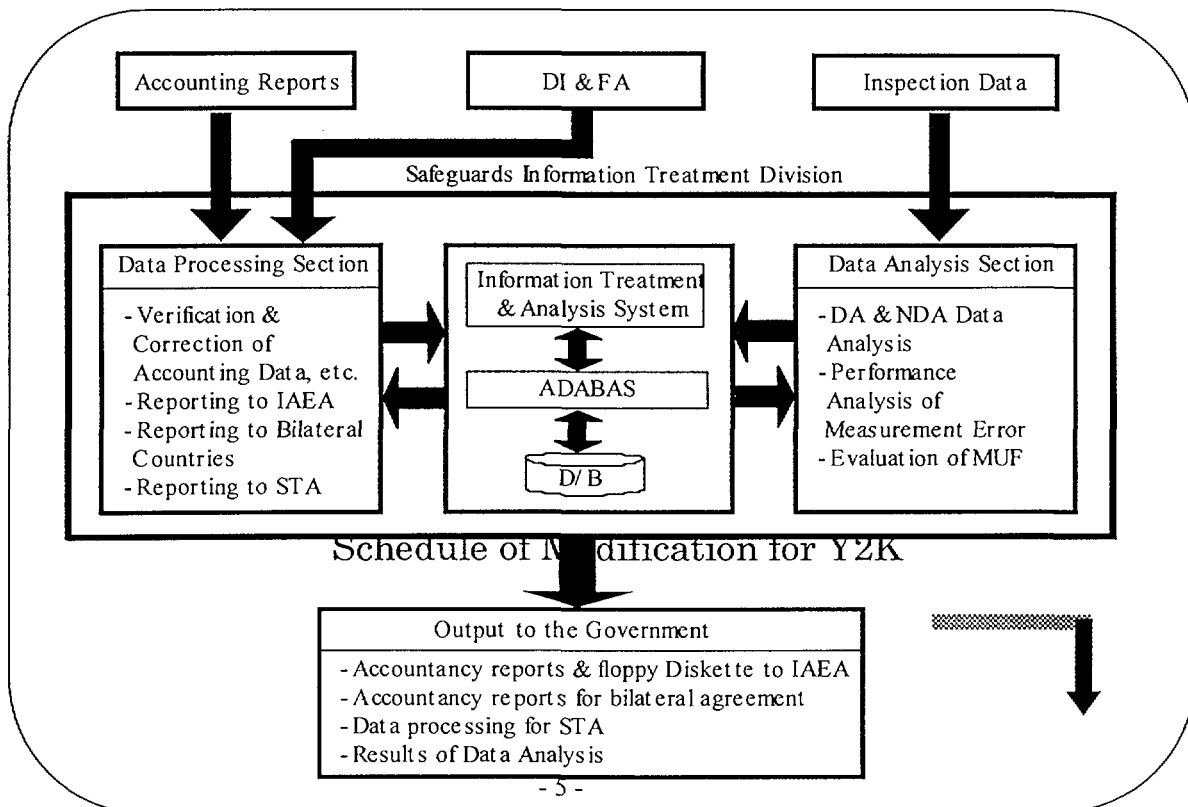
TV camera has an embedded timer and recorded date becomes wrong one. This makes it difficult to review the data. Alarm signal treatment process may stop or make abnormal performances.

3. It cannot respond to leap year in 2000, discards 2000 and after data as old one, makes an error in data review and data accumulation.

" Remedy Action Guidance for Gov. Ministry "

- Establish Organization to Cope with the Issue
- Check Following Items
 - /Computer Hardware /Net-work Related Equipment
 - /Application Program /Embedded system
- Identify , Prioritize Actions
 - A: Close Relationship with Public Life & Economic Activity & Reliability with Foreign Country or International Org.
 - B: influence on Other Ministries
- Implement Over-All Inspection
 - /Action Plan /Measure to Not-Yet Implemented Item
 - /Listing of Inspection Items /Simulation Test
- Establish Contingency Plan
 - / Identify Influence & Extent of Y2K Trouble
 - / Establish Recovery Actions Priority , Alternative Measure
 - / Establish Recovery System, Communica. Network & Method
 - / Establish Chain of Command, Site Authority
 - / Conduct Training Etc.
- Report Over-All Inspection Results

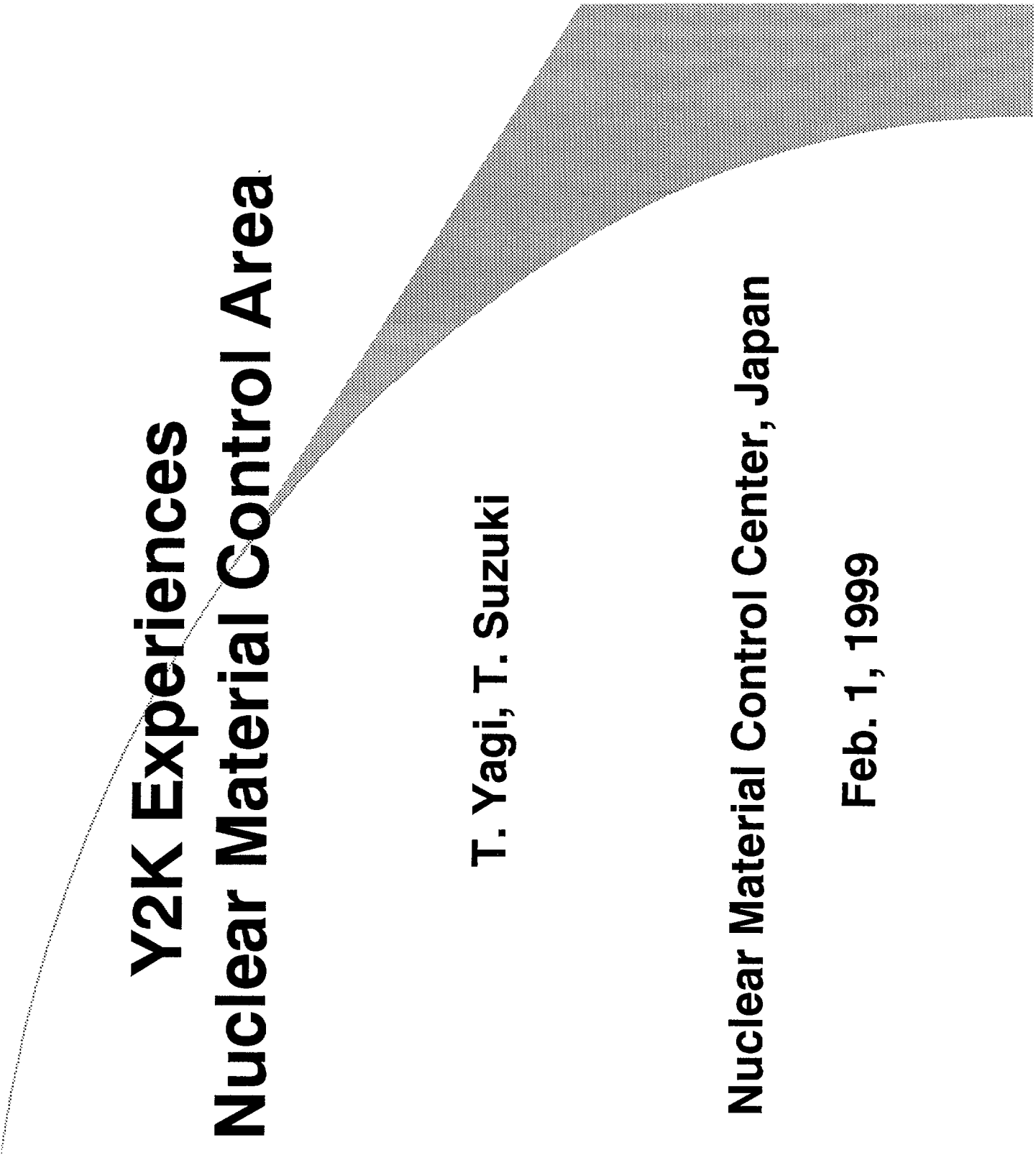
Safeguards Information Treatment in NMCC



Fiscal Year \ Working Process	1997	1998	1999
Analysis of System	→		
Definition of Environment For Development	→		
Design of Display Picture and Output List	→		
Modification of Program		→	→
Integration Test			→
Re-Building of Database			→
Operational Test			→

Some Y2K Problems in Physical Protection System

- Entry & Exit Control
 - / Do Not Recognize Entry & Exit Card
 - or
 - / Entry & Exit Data becomes Invalid
- Monitor System
 - / Difficult to Review TV Recorded Data
 - / Alarm Signal Perform Abnormally
- Others
 - / Do Not Respond Correctly to Leap Year
 - / Make Errors in Data Accumulation



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Action Plan - Wide Information Offer to the Public

- Provide wide and complete information on on-going Y2K Measures and state of the issue in the official gazette

/ Structure of Responsibility

/ Preparation of Contingency Plan

/ Inclusion of computer, software and embedded items

/ Inclusion of Related Communication Network System

/ Vendor and Supplier's information

- Each Government Ministries establish contact person and open Home Page by September 1998 for Y2K actions

- Ask Mass Media for cooperation of publication of the information

Action Plan - Remedy Action

- Request Central and Local Governments to Complete Remedy Actions for Higher Prioritized Systems by June, 1999**
- Encourage Important Private Industries to Establish Over-All Inspection Plans and Make Thorough Self-Inspections**
- Encourage Vendor & Supplier to actively Provide information to Inside & outside of the Country**
- Follow-Up the Actions at**
 - / Senior Advisory Committee on Y2K Problems**
 - / Y2K problem Measure Promotion Committee**
 - / Advanced Information & Tele-Communication Society Promotion Headquarter**

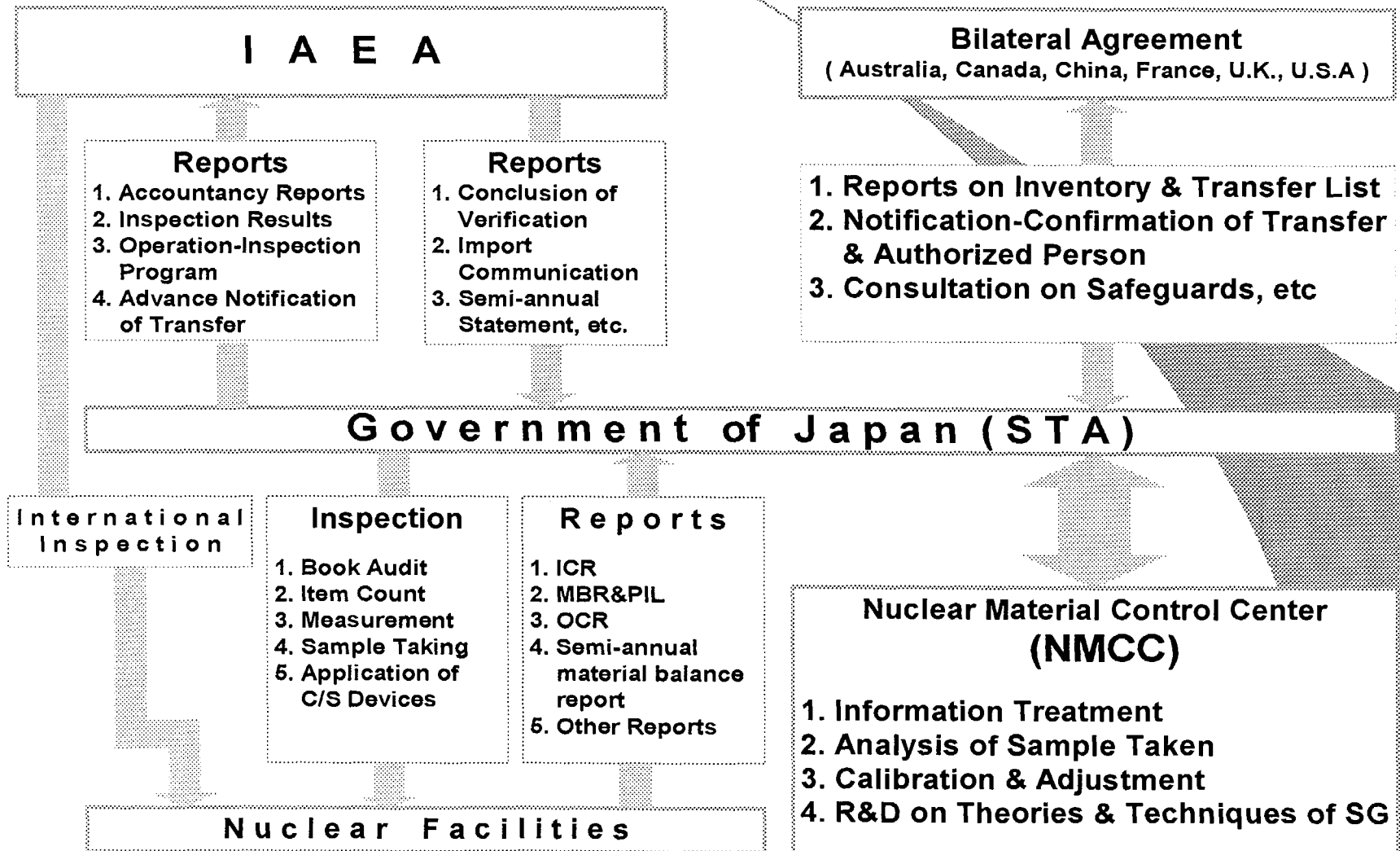
“Remedy Action Guidance for Gov. Ministry”

- Establish Organization to Cope with the Issue**
- Check Following Items**
 - / Computer Hardware / Net-work Related Equipment**
 - / Application Program / Embedded system**
- Identify, Prioritize Actions**
 - A: Close Relationship with Public Life & Economic Activity & Reliability with Foreign Country or International Organization**
 - B: Influence on Other Ministries**
- Implement Over-All Inspection**
 - / Action Plan / Measure to Not-Yet Implemented Item**
 - / Listing of Inspection Items / Simulation Test**

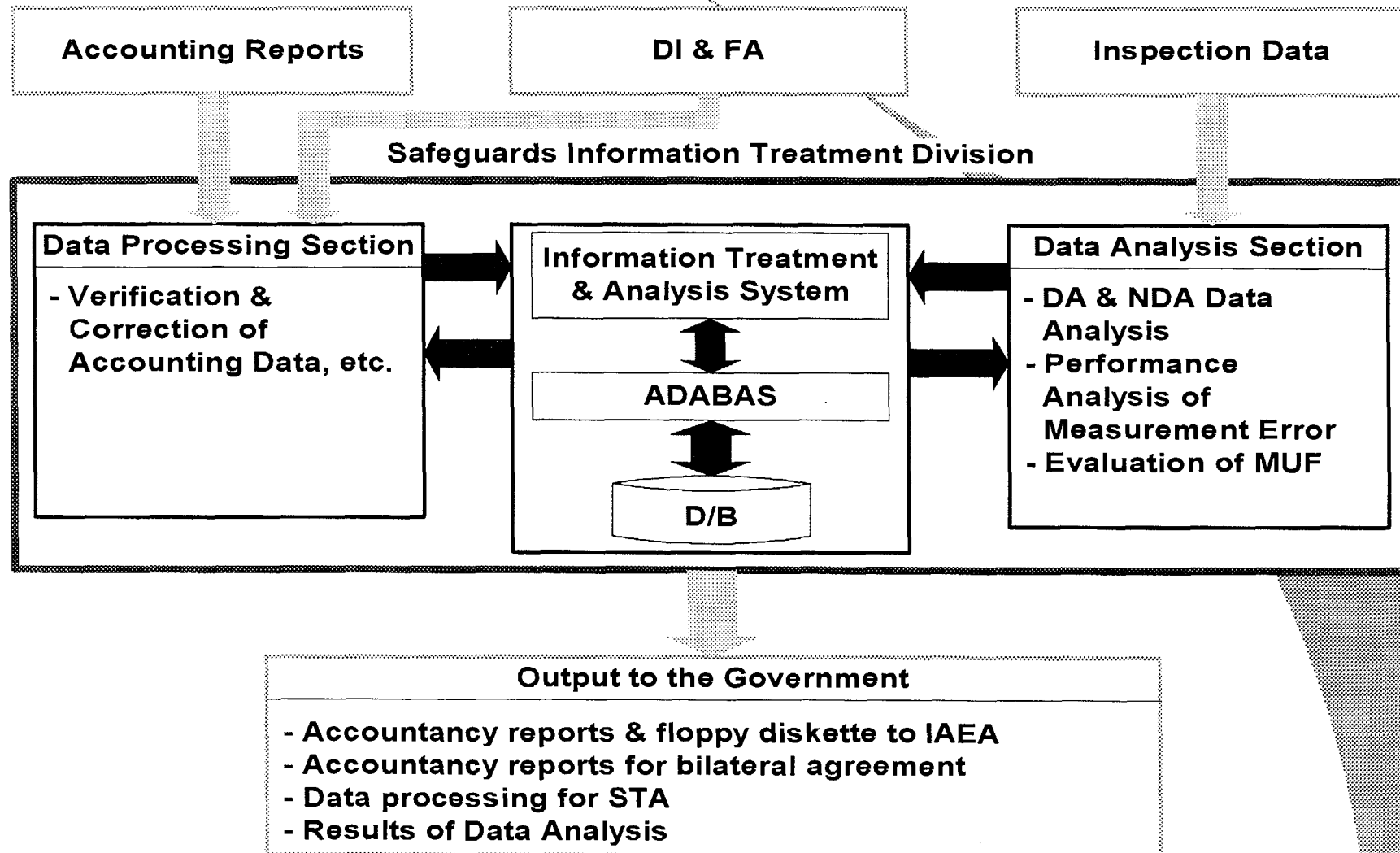
“Remedy Action Guidance for Gov. Ministry” (continued)

- Establish Contingency Plan**
 - / Identify Influence & Extent of Y2K Trouble**
 - / Establish Recovery Actions Priority, Alternative Measure**
 - / Establish Recovery System, Communication Network & Method**
 - / Establish Chain of command, Site Authority**
 - / Conduct Training Etc.**
- Reporting Over-All Inspection Results**

Responsible Organizations for Safeguards Implementation in Japan



Safeguards Information Treatment in NMCC



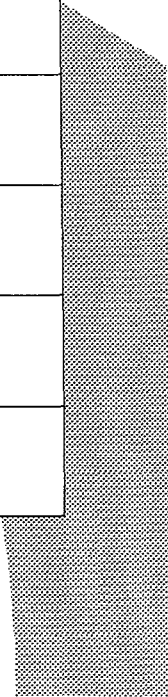
Basic Means of Modification for Y2K

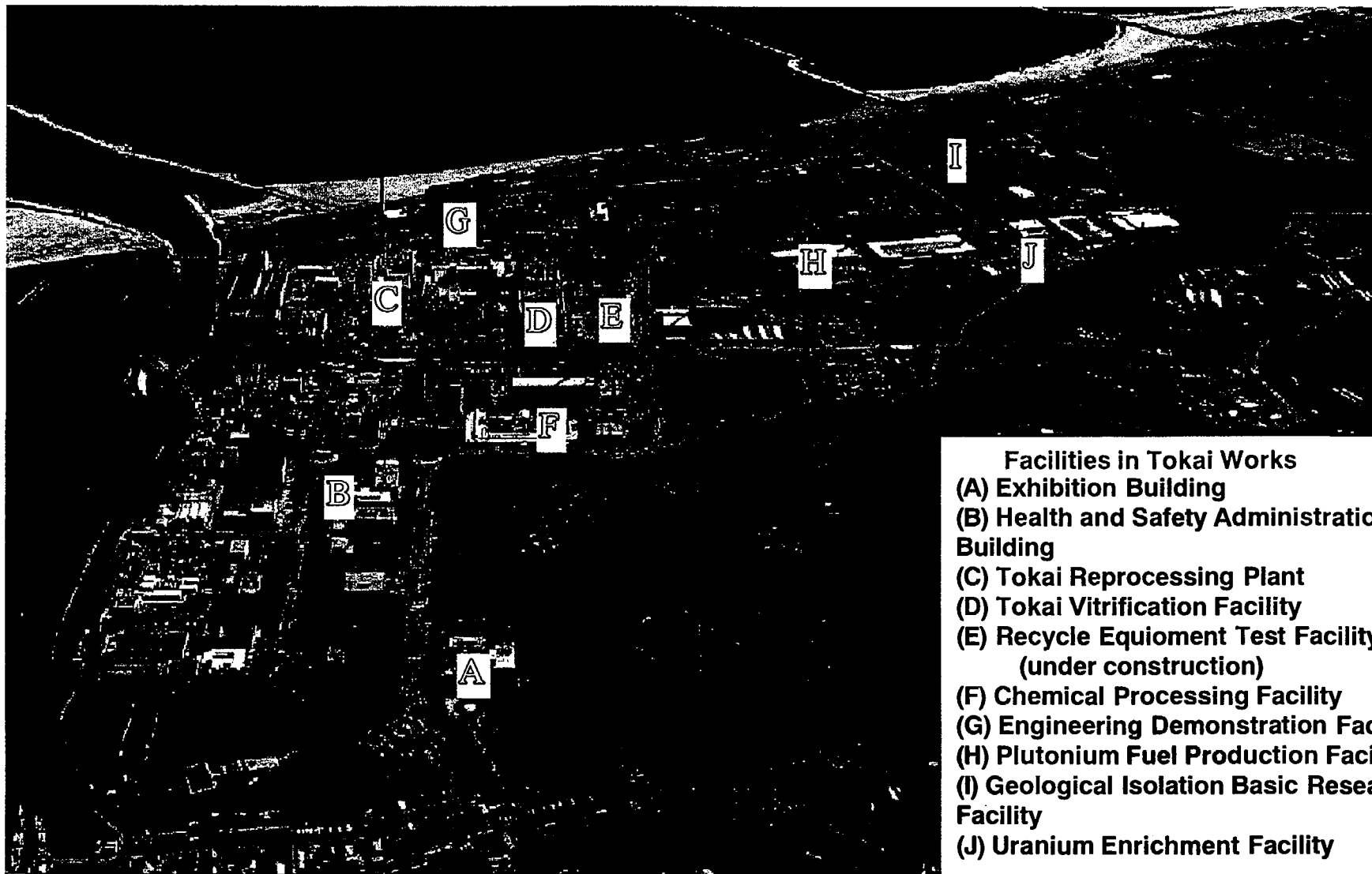
- **Date of all control data be changed to 8 digits from 6 digits**
- **Date displayed on computer panel and output be also changed to 8 digits instead of 6**
- **Do not change program logic**
- **Continue to accept 6 digits date in the report from related organizations**
- **Continue to report to IAEA with 6 digits date, but plan to change to 8 digits**

Schedule of Modification for Y2K

Start of Year 2000

Working Process	Fiscal Year	1997	1998	1999
Analysis of System		→		
Definition of Environment for Development		→		
Design of Display Picture and Output List		→		
Modification of Program		→		
Integration Test			→	
Re-Building of Database				→
Operational Test				→



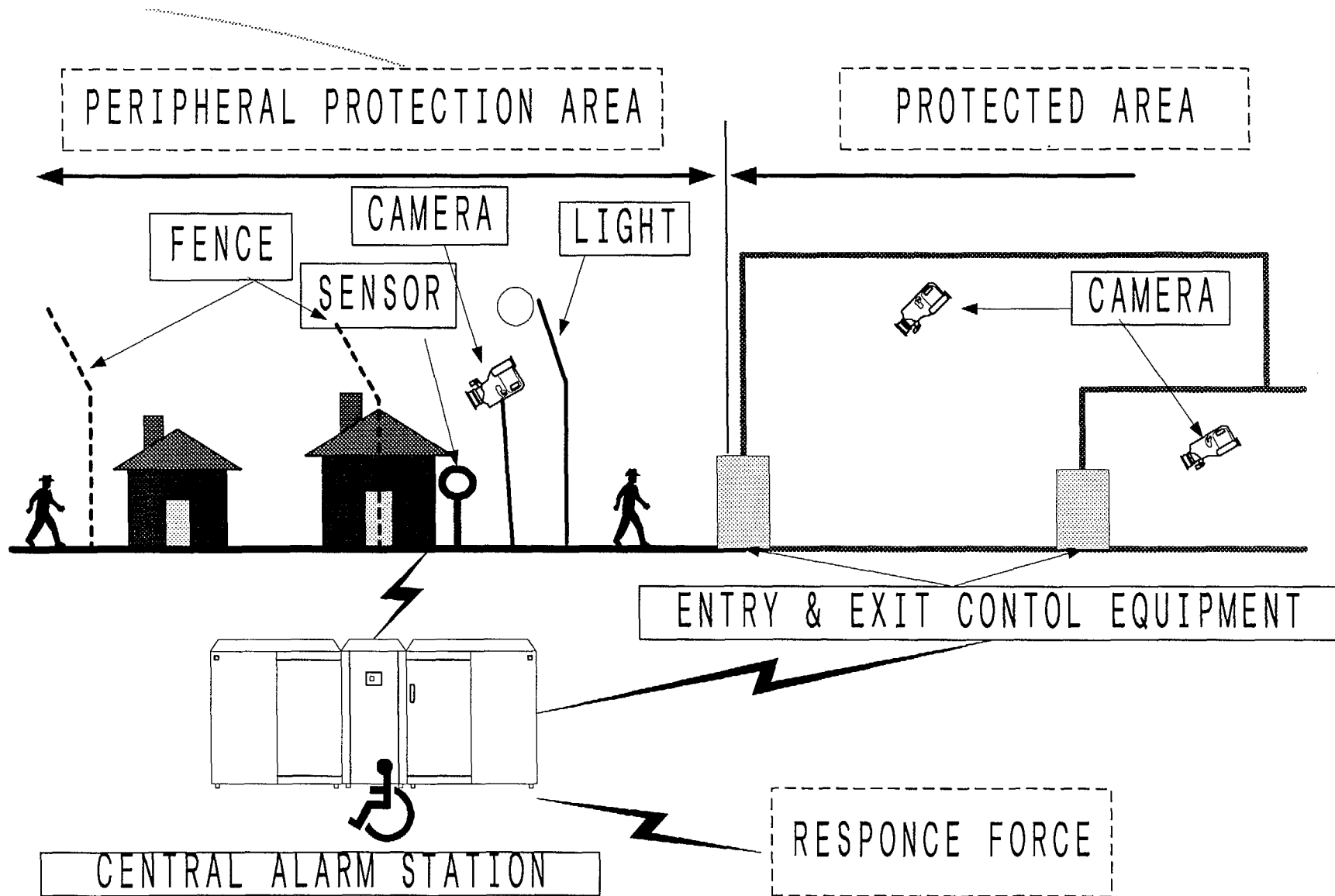


- Facilities in Tokai Works**
- (A) Exhibition Building**
 - (B) Health and Safety Administration Building**
 - (C) Tokai Reprocessing Plant**
 - (D) Tokai Vitrification Facility**
 - (E) Recycle Equipment Test Facility (under construction)**
 - (F) Chemical Processing Facility**
 - (G) Engineering Demonstration Facility**
 - (H) Plutonium Fuel Production Facility**
 - (I) Geological Isolation Basic Research Facility**
 - (J) Uranium Enrichment Facility**

TOKAI WORKS



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CONCEPT OF PHYSICAL PROTECTION

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 - or**
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