

# CERTIFIED

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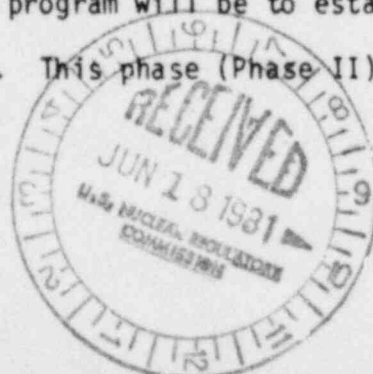
MINUTES OF THE  
ACRS SUBCOMMITTEE MEETING ON ADVANCED REACTORS  
DES PLAINES, IL  
APRIL 21 & 22, 1981

The ACRS Subcommittee on Advanced Reactors met on April 21 & 22, 1981 at the Royal Court Inn in Des Plaines, IL. The purpose of the meeting was to discuss with DOE and some of its contractors the safety design criteria of the Conceptual Design Study (CDS). The CDS is an LMFBR conceptual design that incorporates experience from FFTF, CRBR, AND PLBR and serves as a focus for the U.S. LMFBR base program. The CDS provides a logical next step in the U.S. program.

The Subcommittee did not receive either written statements or request for time to make oral statements from any members of the public. The list of attendees, schedule, notice, and all the handouts received at the meeting are attached to the Office Copy of these minutes.

Dr. M. Carbon opened the meeting at 8:30 a.m. and made a few organizational remarks to the Subcommittee members and consultants. He then briefly commented on the agenda and its contents and called on the first speaker.

F. Gavigan, DOE, stated that the purpose of the meeting was to brief the ACRS regarding the CDS design safety considerations, to assist the ACRS in its plan to develop a "large LMFBR" design criteria and to discuss the criteria for reviewing NRC safety R&D program. Phase I of the CDS program was completed on March 31, 1981. The next phase of the program will be to establish preliminary design parameters for a large plant. This phase (Phase II) is now in progress.



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The contractors of the CDS program under DOE are: Atomics International, Babcock & Wilcox, Combustion Engineering, General Electric Company, and Westinghouse Electric Corporation (reactor manufacturers), Bechtel Corporation, Burns and Roe, and Stone & Taylor (architect-engineers), and Boeing Engineering and Construction (technical integrator). The organizational structure and responsibilities of the participants were discussed. The architect-engineers work through Boeing Engineering and Construction who reports to the Department of Energy Project Office. The architect-engineers are concerned essentially with facility design. The NSS does not report to Boeing but reports to the Department of Energy Project Office directly.

The major plant parameters for the CDS program established in Phase I are:

- Plant size - 1000 MWe
- Reactor configuration - loop
- Number of loops - 4
- First core - mixed oxide fuel/heterogeneous core
- Containment concept - steel containment with concrete confinement (double wall)
- Turbine generator - tandem compound

The basic NSSS consists essentially of the core within the pressure vessel, the primary heat transport system, the intermediate heat transport system, and the steam turbine-generator system. The primary and intermediary transport system contains sodium. There are two decay heat removal systems, diverse and redundant which are located in the primary and intermediate loops. Mr. Gavigan stated that this design is mature enough to support high confidence cost and schedule estimates.

A non-licensed safety review will be performed in accordance with applicable DOE regulations and with requirements and procedures of an independent technical review as agreed upon by DOE and NRC.

The approaches to core disruptive accidents (CDAs) include prevention, mitigation, and risk assessment. In prevention, they will reduce the probability of CDAs sufficiently to justify their exclusion from plant design basis accident (DBAs) spectrum. DOE has issued a report, CDS 300-3, which addresses CDA prevention through reliability of safety features. Mitigation will be provided by design conservatisms beyond those normally included in DBAs to ensure an acceptably low risk to the public from accidents beyond the DBA spectrum. CDS 100-12 addresses CDA mitigation. A probabilistic risk assessment shall be performed to demonstrate that public risk from plant operation on its specified site shall not exceed LWR risks described in WASH-1400.

TMI Lessons Learned have been considered in applicable aspects of the design.

John Graham, Westinghouse, discussed the key safety design considerations of the CDS program concerning areas of the core, safe shutdown, NSSS plant configurations, BOP considerations, and containment.

Mr. Graham stated that there are strong licensing implications of homogeneous versus heterogeneous core configurations. However, it is known that the HCDA energetics associated with sodium voiding and early fuel failure tends to increase and becomes more sensitive to uncertainties

as core sodium void worth increases. With this consideration, a heterogeneous core would have a licensing advantage provided that such a design does not introduce features which unacceptably compromise plant reliability and other operational considerations. A heterogeneous core design was selected.

A secondary shutdown system is required to meet design goals of shutdown reliability with system diversity and redundancy. In addition, the design must be able to accommodate a self-actuated shutdown system (SASS) function which may be combined or independent of the secondary system.

Natural circulation cooling tests were performed on the FFTS in 1980 and 1981 at power levels of 5%, 35%, 75%, and 100%. Results showed good agreement with calculations, though the calculations were generally conservative.

A discussion of NSSS plant configuration, pool versus loop design, was not discussed in depth. The basis for the selection of the loop design was not explored fully by DOE and its contractors at this presentation. This topic will be discussed in detail at a future meeting, although DOE referred to a report CDS 500-1 for further information. This report will be distributed to the Subcommittee when received.

In-service inspection has a strong safety implication, but the best choices with regard to trade-offs between continuous monitoring, periodic testing, and periodic examinations and alternatives (e.g., inherent design features, plant protection features, and back-up and redundant design features) are not yet known.

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BOP considerations such as steam cycle, fuel storage, ventilation, cell liners and catch pans, hardening of steam generator buildings (seismic Category 1) and sodium smoke were discussed.

Cell liners are provided for all cells containing radioactive sodium in order to prevent sodium-concrete reaction and increase the risk of release of radioactivity following a sodium spill. A catch pan will be provided for all cells containing non-radioactive sodium.

Design descriptions and compliance with design requirements for the design basis event (DBE) were discussed for the reactor shutdown system, shutdown heat removal, and containment.

The power coefficient is expected to be negative over the complete power range of operations.

The design basis events were discussed. There are 27 events listed, many of them are similar to the LWR events.

The failure probability of the RSS is predicted to be  $4 \times 10^{-8}$ /yr, primary, and  $5 \times 10^{-6}$ /yr, secondary; the required design failure probability is  $< 10^{-5}$ /yr.

The unavailability of the RSS is predicted to be 22 hrs/yr; the required design unavailability is  $< 25$  hrs/yr.

The shutdown heat removal system (SHRS) of the LMFBR dissipates the residual and decay heat of the operations during reactor shutdown to keep fuel and

reactor systems temperatures below acceptable design limits. A reliable decay heat removal system is essential to protecting the health and safety of the public and the structural integrity of the plant.

This is achieved by: (1) a direct reactor auxiliary cooling system (DRACS) which operates to remove heat directly from the sodium of the reactor vessel, and is independent of the main sodium loops, and (2) an intermediate reactor auxiliary cooling system (IRACS) which removes heat from the sodium in the main intermediate sodium system.

The CDS containment building is a so-called containment/confinement design. The NSSS is confined by an inner hemispherical-cylindrical steel shell of about 1.5 inches thick. Surrounding this steel shell is a concrete confinement of similar shape to the steel shell and has a thickness of 2.5 feet. An air space separates the inner and outer structure. The floor is concrete with a 0.25 inch thick liner.

Radiological dose analyses were performed using source terms from the CRBRP and ANS. Hanford site meteorology (X/Q) was used. Doses were within NRC limit.

The containment/confinement assembly was designed to Region III tornado (240 mph and 1.5 psi), OBE of 0.15g and SSE of 0.30g, internal missiles and large sodium spills.

Large sodium spills are defined as a spill size of 620,000 lbs. caused by a pipe break area of 4 inches square.

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The containment/confinement structure was designed for events beyond DBA or HCDA. The goals for HCDA accommodation are: (1) minimum 24 hr. delay for venting, and (2) passive features inside RCB and active systems outside RCB, if needed.

R. Lancet, Atomics International, discussed safety system reliability. Preliminary conclusions of this analysis are listed below:

- Reliability program instituted to help assure safety.
- Reliability goals established as design targets.
- Reliability evaluation performed to assist in design tradeoffs.
- Accident prevention reliability goals appear achievable.
- Accident mitigation features assessed in risk assessment.

P. Greebler, General Electric, discussed core disruptive accident (CDA) energetics considerations. The initiating accident scenario involves failure to scram following loss of flow (e.g., loss of main pumping power for all primary loops) and transient overpower (e.g., uninterrupted control rod withdrawal). The design approach to this concern is the use of a heterogeneous core (low sodium void worth). This approach renders the calculated CDA energy releases very much lower than SMBDB (700 MJ fuel vapor isentropic expansion to 1 atm).

Two separate phases of CDA have been studied. The initiating phase (core subassembly geometry retained) and transition phase (meltout molten pool, secondary criticality potential). Results of CDS initiating phase energetics assessments indicate that the CDA energetics is expected to be bound by the initiating phase.

J. Graham, Westinghouse, discussed the considerations beyond the design basis for the CDS program. The basis for protection is the so-called line of assurance (LOA) approach of prevention and mitigation. For prevention, there are two diverse and redundant heat removal systems, and self-actuated shutdown SASS and IHRS. For mitigation, there are a heterogeneous low void worth core design, adequate mechanical strengths (low risk margins) and containment thermal margins (low risk margins).

The mechanical strength of the primary system for the beyond the design basis can adequately resist loadings from a core disruptive accident of 700 MJ. This loading value is based on trends from improved understanding of prior history, new methods, and foreign positions.

Provisions may be made to relieve pressure in containment structures, if required, where those pressures may violate structural integrity.

The containment thermal margins for the beyond the design basis is based on little holdup of debris in-vessel. The thermal loadings are calculated using the CACECO code which calculates pressure transients, temperature, and hydrogen concentrations.

Mr. Temme, General Electric, discussed the role of risk analysis in the conceptual design study. He stated that risk analysis can be viewed as an aid to safety decision. At this stage of the project, there are limitations of risk analysis because design details are lacking and definition of operation and maintenance procedures is lacking. Therefore, best estimates and ranges of uncertainty are estimated by judgment.

The meeting was recessed at 6:05 p.m.



The meeting reconvened at 8:30 a.m. on April 22, 1981.

D. Ferguson, Argonne National Lab., discussed a summary of DOE LMFBR safety program activities in support of CDS. The safety program includes reactor system reliability, self-actuated shutdown system development, shutdown heat removal under faulted conditions, CDA accommodation, and risk assessment and allocation.

F. Gavigan, DOE, discussed DOE's LMFBR safety R&D program. The purpose of the program is to provide data base to assess the risk to the public of LMFBRs. He stated that a safety "issue" is when a major area of concern and/or contention between regulators and applicants arises which must be resolved before the regulatory process can proceed.

The major safety issues are reliability of safety features, safety margins under degraded plant conditions, accommodation of core disruptive accidents, and plant siting and accident health effects.

An executive session was held to schedule future meetings and to discuss issues that designers of LMFBRs needed to answer before the program could go forward.

Concerning the next Subcommittee meeting, a tentative date has been set for May 14 and 15, 1981 at the Royal Court Inn in Des Plaines, IL.

F. Gavigan will check the availability of the people doing the presentation and the possible items to be covered.

A preliminary list of the issues that the Subcommittee will address are listed below:

- Overall Safety Philosophy and Goals
- Shutdown Systems
- Shutdown Heat Removal
- Preventing Energetics
- Subassembly Propagation
- Fuel Failure Propagation
- Accommodation Energetics Reaction and Accident Debris Accommodation
- Spent Fuel Cooling
- Siting
- Pool vs. Pot Design
- Global Core Instrumentation
- Containment (venting, integrity)
- Sabotage
- Equipment Qualification (environment)
- Sodium Fires
- Advance Fuel Design
- Automatic vs. Manual Operation
- Seismic (piping, reactor vessel)
- Standardization and Long-Term Perspective to Safety Solution

The meeting adjourned at 4:15 p.m.

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NOTE: For additional details, a complete transcript of the meeting is available in the NRC Public Document Room, 1717 H St., NW, Washington, DC 20555 or from Alderson Reporters, 300 7th St., SW, Washington, DC, (202)554-2345).

Employment and Training  
Administration, 601 D Street NW.,  
Washington, D.C. 20213.

Signed at Washington, D.C., this 31st day  
of March 1981.

**Luis Sepulveda,**

*Acting Director, Office of Program Services.*

Applications Received During the Week  
Ending March 28, 1981

Name of Applicant and Location of  
Enterprise and Principal Product or Activity

Semix Incorporated, Martinsburg, West  
Virginia

Production of cast semi-crystalline silicon  
bricks and wafers for photovoltaic cells  
Berkshire Enterprises, Ltd., Great Barrington,  
Massachusetts

Retail sales of football, baseball, hockey  
products, and related products  
Nentwick Nursing Home, East Liverpool,  
Ohio

Nursing home  
North States Industries, Inc., Siren & Falun,  
Wisconsin, Nevis, Minnesota

Manufacture of wood juvenile furniture,  
plastic lawn and garden furniture and  
bird feeders

Tiger Tail Distillery, Inc., Dyersbury,  
Tennessee

Manufacture of ethanol  
Lawnlite Company, Portland Tennessee  
Manufacture of leisure furniture and  
ladders

Regency Health Care Center, LaFollette,  
Tennessee  
Intermediate care nursing services

[FR Doc. 81-10490 Filed 4-6-81; 8:45 am]

BILLING CODE 4510-30-M

## NATIONAL FOUNDATION FOR THE ARTS AND THE HUMANITIES

### Media Arts Panel (Programming in the Arts Section); Meeting

Pursuant to section 10(a)(2) of the  
Federal Advisory Committee Act (Public  
Law 92-463), as amended, notice is  
hereby given that a meeting of the  
Media Arts Panel (Programming in the  
Arts Section) to the National Council on  
the Arts will be held on April 28-29,  
1981, from 9:00 a.m.-5:30 p.m. in the 12th  
floor screening room of the Columbia  
Plaza Office Complex, 2401 E St., NW.,  
Washington, D.C. 20506.

This meeting for the purpose of Panel  
review, discussion, evaluation, and  
recommendation on applications for  
financial assistance under the National  
Foundation on the Arts and the  
Humanities Act of 1965, as amended,  
including discussion of information  
given in confidence to the agency by  
grant applicants. In accordance with the  
determination of the Chairman  
published in the Federal Register of  
February 13, 1980, these sessions will be  
closed to the public pursuant to  
subsections (c) (4) and (6) and 9(b) of

section 552b of Title 5, United States  
Code.

Further formation with reference to  
this meeting can be obtained from Mr.  
John H. Clark, Advisory Committee  
Management Officer, National  
Endowment for the Arts, Washington,  
D.C. 20506, or call (202) 634-6070.

**John H. Clark,**

*Director, Office of Council and Panel  
Operations, National Endowment for the Arts*  
March 30, 1981.

[FR Doc. 81-10419 Filed 4-6-81; 8:45 am]

BILLING CODE 1437-01-M

## NUCLEAR REGULATORY COMMISSION

### Advisory Committee on Reactor Safeguards, Subcommittee on Advanced Reactors; Meeting

The ACRS Subcommittee on  
Advanced Reactors will hold a meeting  
at 8:30 a.m. on April 21 and 22, 1981,  
Royal Court Inn, 1750 S. Elmhurst Road,  
Des Plaines, IL. The Subcommittee will  
discuss matters relating to the  
development of LMFBR safety design  
criteria. Notice of this meeting was  
published March 27.

In accordance with the procedures  
outlined in the Federal Register on  
October 7, 1980, (45 FR 66535), oral or  
written statements may be presented by  
members of the public, recordings will  
be permitted only during those portions  
of the meeting when a transcript is being  
kept, and questions may be asked only  
by members of the Subcommittee, its  
consultants, and Staff. Persons desiring  
to make oral statements should notify  
the Designated Federal Employee as far  
in advance as practicable so that  
appropriate arrangements can be made  
to allow the necessary time during the  
meeting for such statements.

The entire meeting will be open to  
public attendance except for those  
sessions during which the Subcommittee  
finds it necessary to discuss proprietary  
information. One or more closed  
sessions may be necessary to discuss  
such information (Sunshine Act  
Exemption 4). To the extent practicable,  
these closed sessions will be held so as  
to minimize inconvenience to members  
of the public in attendance.

The agenda for the subject meeting  
shall be as follows: *Tuesday and  
Wednesday, April 21 and 22, 1981, 8:30  
a.m. until the conclusion of business  
each day.*

During the initial portion of the  
meeting, the Subcommittee, along with  
any of its consultants who may be  
present, may exchange preliminary  
views regarding matters to be

considered during the balance of the  
meeting.

The Subcommittee will then hear  
presentations by and hold discussions  
with representatives of the NRC Staff,  
their consultants, and other interested  
persons regarding this review.

Further information regarding topics  
to be discussed, whether the meeting  
has been cancelled or rescheduled, the  
Chairman's ruling on request for the  
opportunity to present oral statements  
and the time allotted therefor can be  
obtained by a prepaid telephone call to  
the cognizant Designated Federal  
Employee, Mr. Eipidio Egne or Dr.  
Richard Savio (telephone 202/634-1414)  
between 8:15 a.m. and 5:00 p.m., EST.

I have determined, in accordance with  
Subsection 10(d) of the Federal  
Advisory Committee Act, that it may be  
necessary to close some portions of this  
meeting to protect proprietary  
information. The authority for such  
closure is Exemption (4) to the Sunshine  
Act, 5 U.S.C. 552b(c)(4).

Dated: April 1, 1981.

**John C. Hoyle,**

*Advisory Committee Management Officer.*

[FR Doc. 81-10395 Filed 4-6-81; 8:45 am]

BILLING CODE 7990-01-M

### Advisory Committee on Reactor Safeguards, Subcommittee on Susquehanna Steam Electric Station, Units 1 and 2; Meeting

The ACRS Subcommittee on  
Susquehanna Steam Electric Station,  
Units 1 and 2 will hold a meeting at 8:30  
a.m. on April 23, 1981 at the Best  
Western Gus Genetti Motor Inn, 77 E.  
Market Street, Wilkes-Barre, PA 18701.  
The Subcommittee will discuss the  
Pennsylvania Power and Light  
Company's request for an Operating  
License. Notice of this meeting was  
published March 27.

In accordance with the procedures  
outlined in the Federal Register on  
October 7, 1980, (45 FR 66535), oral or  
written statements may be presented by  
members of the public, recordings will  
be permitted only during those portions  
of the meeting when a transcript is being  
kept, and questions may be asked only  
by members of the Subcommittee, its  
consultants, and Staff. Persons desiring  
to make oral statements should notify  
the Cognizant Federal Employee as far  
in advance as practicable so that  
appropriate arrangements can be made to  
allow the necessary time during the  
meeting for such statements.

The entire meeting will be open to  
public attendance.

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TENTATIVE SCHEDULE FOR  
THE APRIL 21 & 22, 1981  
ACRS SUBCOMMITTEE MEETING ON ADVANCE REACTORS  
DES PLAINES, IL

APRIL 21, 1981

APPROXIMATE TIME

- |                   |  |
|-------------------|--|
| 8:30 a.m.         | I. Chairman's Opening Statement  |
| 8:45 a - 9:45 a   | II. Presentation by DOE  |
|                   | A. Introduction  |
|                   | - Conceptual Design Study (CDS)<br>documents addressing design safety  |
|                   | - Summary of CDS positions on design<br>safety (philosophical statements,<br>overall plant layout and design)  |
| 9:45 a - 12:00 n  | B. General Design Criteria (GDC) and CDS<br>Positions on Design Choices with Respect<br>to Key Safety Issues ... the back and<br>forth discussion, etc., between the<br>designers and the safety people. |
| 10:30 a - 10:45 a | Break  |
| 12:00 n - 4:00 p  | C. Description of Systems for Key Safety Issues  |
|                   | - Shutdown   |
|                   | - Decay heat Removal   |
|                   | - Containment  |
| 1:00 p - 2:00 p   | LUNCH  |
| 4:00 p - 4:15 p   | BREAK  |
| 4:15 p - 4:45 p   | D. Safety System Reliability Estimates   |
| 4:45 p - 5:45 p   | E. CDA Considerations and Evaluation   |
| 5:45 p - 6:00 p   | BREAK  |
| 6:00 p - 7:00 p   | F. Risk Assessment   |
| 7:00 p - 7:15 p   | III. Chairman's Comments   |
| 7:15 p            | IV. Recess   |

TENTATIVE SCHEDULE FOR  
THE APRIL 21 & 22, 1981  
ACRS SUBCOMMITTEE MEETING ON ADVANCE REACTORS  
DES PLAINES, IL

APRIL 22, 1981

APPROXIMATE TIME

- 8:30 a.m. I. Chairman's Opening Statement
- 8:45 a - 9:45 a II. Presentation by DOE (Cont'd)
  - A. Current R&D Approaches and What is being done for succeeding plants
  - 9:45 a - 10:45 n B. Unresolved Issues and Summary -- What are the Contention Items ?
- 10:45 a - 11:45 a BREAK
- 11:45 a - 12:45 p III. Executive Session
- 12:45 p - 1:45 p LUNCH
- 1:45 p - 5:30 p Continue Executive Session  
(break of 15 mins. as appropriate)
- 5:30 p Adjournment

MEETING DATE:

SUBCOMMITTEE MEETING: ADVANCED REACTORS

LOCATION: DES PLAINES, IL (ROYAL COURT INN)

ATTENDANCE LIST

PLEASE PRINT

NAME	AFFILIATION
1. FX GAVIGAN	USDOE
2. JOHN CRONIN	WESTINGHOUSE
3. STAN DAVIES	CE
4. GEORGE W. MAY	BECHTEL NATIONAL
5. JMTAWB	DOE
6.	
7.	
8.	
9. Lipinski	AEEs cons
10. Weitung	"
11. Holder	"
12. Avery	"
13. Carbon	AEEs
14. marks	"
15. Sheuman	"
16. Lyne	AEEs staff, DOE
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MEETING DATE:

SUBCOMMITTEE MEETING: ADVANCED REACTORS

LOCATION: DES PLAINES, IL (ROYAL COURT INN)

ATTENDANCE LIST

PLEASE  
PRINT

NAME	AFFILIATION
1. S. A. CHANG	FRSTMC/WARD
2. G. H. CLARE	WESTINGHOUSE
3. R. A. JOHNSON	ATOMICS INTERNATIONAL
4. D. W. COY	BURNS & ROE INC.
5. T. W. DI FRANCISCO	WESTINGHOUSE
6. C. A. ANDERSON, JR.	GE - ARSD
7. M. I. TEMME	ATOMICS INTERNATIONAL
8. R. T. LANCE T	GENERAL ELECTRIC-ARSD
9. P. GREEBLER	General Electric - ARSD/FRSTMC
10. A. E. DILLERLEY	Stone & Webster Eng Corp.
11. H. R. MICHAEL	FFTF Project Office
12. J. R. PATTERSON	PMC
13. Henry B. ...	FRSTMC
14. S. S. BORUS	FRSTMC
15. D. FERGUSON	
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MEETING DATE:

SUBCOMMITTEE MEETING: ADVANCED REACTORS

LOCATION: DES PLAINES, IL (ROYAL COURT INN)

ATTENDANCE LIST

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NAME	AFFILIATION
1. Carbon	ACRS
2. Mark	"
3. Koch	" Consultant
4. Avery	"
5. Holden	"
6. Hartung	"
7. Jipuski	"
8. Jones	Acrs Staff, DFE
9. MARK I. TEMME	GE-ARSD
10. PAUL GREEBLER	General Electric-ARSD
11. HORST R MICHAEL	Stone & Webster Eng Co
12. Harry Piper	TMC
13. JH TAUB	DOE
14. Donald Cox	BOEING
15. ROBERT T. LANCET	ATOMICS INTERNATIONAL ROCKWELL
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MEETING DATE:

SUBCOMMITTEE MEETING: ADVANCED REACTORS

LOCATION: DES PLAINES, IL (ROYAL COURT INN)

ATTENDANCE LIST

PLEASE  
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NAME	AFFILIATION
1. DONALD B. FERGUSON	ARGENTINE NATIONAL LABS. RADS
2. Frank Gavigan	DOE
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