

June 24, 1997

FOR: The Commissioners

FROM: L. Joseph Callan /s/
Executive Director for Operations

SUBJECT: COMMERCIAL USE OF NRC-DEVELOPED THERMAL-HYDRAULIC CODES BY NON-U.S. ORGANIZATIONS

PURPOSE:

To inform the Commission of the staff's plan to implement Alternative 3 regarding the current restrictions on commercial use of NRC thermal-hydraulic codes obtained by international organizations under the Code Assessment and Maintenance Program (CAMP) agreements. This action will define and clarify the various uses that international organizations can make of the NRC-supplied codes.

ISSUE:

The current CAMP membership consists of 23 countries. The CAMP agreements are due to expire August 31, 1997. Present NRC policy prohibits non-U.S. organizations from using the NRC developed codes obtained through CAMP agreements for commercial purposes. The intent of the restriction in the current agreement is to prohibit international organizations from utilizing U.S. funded work to compete against U.S. companies. However, the agreement does not explicitly define what constitutes a commercial use. This vagueness may dissuade some members from continuing to participate in CAMP if they interpret the restriction to prohibit the performance of safety calculations. Since there exist a variety of other thermal-hydraulic codes and international user groups that do not restrict code use, current policy may diminish the CAMP membership and reduce the international collaboration provided by CAMP. Alternative actions to manage this issue of commercial use are presented for the Commission's consideration.

BACKGROUND:

Until the early 1980's, the NRC developed thermal-hydraulic computer codes were readily

available to both international and domestic parties. Their distribution was not controlled by an NRC approval process (this policy also applied to all NRC sponsored research). NRC encouraged extensive use of the codes as a means of enhancing worldwide nuclear safety. However, in consideration of the substantial cost associated with code development and supporting experimentation, the policy of unrestricted access was changed when the NRC organized the International Code Assessment Program (ICAP) in 1983.

Through the bilateral ICAP agreements, NRC provided the latest version of its thermal-hydraulic codes and technical assistance with their operation to international governments in exchange for a specified number of code assessment calculations per year as a means of measuring the code's modeling capabilities. The code assessments reduced the level of effort required by the NRC to ensure the validity of the code results. The larger user base exercised the code more thoroughly, since the code was compared with a larger and more diversified database than was possible if use were limited to NRC or domestic applications. The success of a code development program is partially governed by the number of assessment cases performed and their diversity. The more diverse and extensive an assessment database, the more confidence a user community will have in the code's capability to accurately model individual phenomena and system behavior over the required range of conditions. Furthermore, ICAP allowed the U.S. to benefit from international expertise, as members often identified code deficiencies and errors and proposed corrective actions. ICAP was a vehicle by which the NRC codes enhanced the world's Nuclear Power Plant (NPP) analysis capability and by which the NRC received valuable assistance with code development.

Due to the extensive benefits NRC reaped from ICAP, when the codes matured and assessment was no longer the primary concern, ICAP was continued but modified to emphasize maintenance needs rather than assessment. In 1993, the Code Applications and Maintenance Program (CAMP) replaced ICAP. In accordance with the agreements, the individual countries now provide cash contributions to the NRC in exchange for the latest versions of the codes and assistance with their use. NRC funds and the member contributions are invested in code maintenance, error corrections and improvements. Additionally, each member performs two code assessments per year to ensure the codes are continually assessed.

Presently, there is a large number of domestic organizations that use the NRC codes and 23 member nations participate in CAMP. To prevent unauthorized code versions from circulating and perhaps diminishing the quality of NPP safety calculations (a user may mistake a modified unauthorized version for the latest NRC version), NRC prohibits the members from redistributing the code to a third party without prior consent (when a U.S. corporation is purchased by a non-U.S. corporation, the parent organization to the U.S. organization is considered to be a third party and is not permitted to receive the code without NRC permission).

To prevent the situation in which the U.S. government would effectively be subsidizing an international company's competitive status, the agreements also restrict non-U.S. organizations from utilizing the codes for commercial applications. In the past, some exceptions have been granted, such as a three year waiver granted to the Russian Research Center-Kurchatov Institute (RRC-KI) for use in safety studies of Russian designed reactors (SECY-95-014), and the permission for ANPA (Italy) to perform safety analysis of Eastern European reactors under the sponsorship of the European Commission. Additionally, a one-time waiver was granted to Tractebel (Belgium) to assist the Slovenian Safety Authorities with the use of the RELAP5 code to train the KRSKO plant staff.

In October 1993, four companies (Siemens, Tractebel, KEMA, ABB) appealed to the staff to delete the non-commercial use restriction in the CAMP agreements, since they believed the major benefit of their involvement in CAMP would be the ability to use the code for both commercial and non-

commercial purposes. The staff asked Westinghouse and General Electric to comment on the commercial impact of lifting the restrictions on the use of the CAMP released thermal-hydraulic codes. Both companies replied that this action would put them at an economic disadvantage. SECY-94-158 summarized this situation and recommended the continuance of the commercial use restriction. In an SRM on SECY-94-158 dated June 30, 1994, the Commission approved continuing the "current restrictions on commercial use of NRC codes obtained under the CAMP agreements."

DISCUSSION:

The policy of restricting international non-commercial use is stated in the following excerpt from the CAMP agreement:

The USNRC codes and other related analytical techniques covered under this Agreement, any improvements, modifications or updates to such codes or techniques are for the purpose of reactor and plant systems research and shall not be used for commercial purposes, or for other benefits not related to the study of reactor safety without the prior consent of the USNRC.

CAMP members have requested that the NRC clarify the vague definition of commercial use, and some members have declared the prohibition too restrictive. Additionally, these restrictions have been interpreted by some CAMP members as prohibiting the use of the code for safety assessment. As a result, the NRC codes are not being used for all permissible applications, which then diminishes the safety benefit that the codes can provide. There is reason to believe that if the restriction is not modified, participation in CAMP will decline, thus detracting from the program's primary goal of enhancing nuclear safety worldwide.

Alternatives

Three options that may be exercised to manage the issue of commercial use have been identified:

1. Change NRC policy and lift the restrictions on commercial use.
2. Maintain present policy.
3. More explicitly define the permitted commercial uses of the codes to allow wider application, so that strong CAMP participation is ensured without compromising U.S. interests.

Discussion of Alternatives

Alternative 1

By deleting the restrictions on commercial uses of the codes, the NRC would ensure that international participation in CAMP would increase or at least be maintained. This action is consistent with the mission of the NRC to protect the health and safety of the public, since the NRC codes would be more widely used by the international community, enhancing the safety of the world's nuclear program. Furthermore, the in-kind contributions from the participant countries would allow for a more extensive code assessment and maintenance effort, thereby increasing the quality of the codes. The disadvantages include: 1) the appearance that the NRC would effectively be subsidizing international organizations' competitive status, and 2) both Westinghouse and General Electric would have to contend with international competition and they would be at a competitive disadvantage. It should be noted that previous CAMP agreements did not receive full review by the Executive Branch, since they included a clause that restricted the commercial use of the codes by international organizations, which was consistent with Executive Branch policy. The removal of the restriction on commercial use may require that future CAMP agreements undergo full-scale interagency review as well as possible renegotiation with the Executive Branch of the intellectual property provisions NRC had been allowed to use on the basis of the restriction. Both of these results may substantially delay the renewal of the CAMP agreements.

Alternative 2

Under this alternative, the appearance of NRC subsidizing and enhancing international organizations' competitive position would be eliminated and the concerns of Westinghouse and General Electric would be alleviated. However, there are disadvantages to this alternative.

There is reason to believe that if the NRC does not modify the agreement, the CAMP membership will decline. There are other codes and user groups available to the international community that do not restrict the use of the codes. The NRC would lose some benefit from the CAMP technical and financial contributions that have proved valuable. Since the codes have been developed over a period of 15 years of cooperative agreements, and both CAMP and ICAP have provided a great deal of international assistance, the international community can claim some degree of ownership. Furthermore, no legislation prohibits someone from taking a mature version of the code, making minor changes and renaming it with the aim of

providing this code to an alternate user group. However, this user group would neither benefit in a timely fashion from future NRC-supported improvements made to the code nor benefit from NRC user support.

Alternative 3

The agreement can be modified to define more specifically the meaning of commercial use that is consistent with its original intent, i.e., the intent of NRC providing the code to the international community to be used to promote and enhance nuclear safety worldwide and not to defray or eliminate code development cost by international organizations. Under this alternative, international users could perform safety analyses with the codes in the non-U.S. market, but could not use them to compete in the U.S. or as a design tool. If this alternative were adopted, the staff would coordinate the review of this new language with the appropriate Executive Branch agencies. It is suggested that the text of the CAMP agreement be supplemented by the following:

Among the code uses that will be permitted under the CAMP agreements are those related to research in the reactor safety area and analyses performed by CAMP members or their contractors that can assist regulators and plant personnel in assessing the safety of the plant, analyzing operating events,

and training of operators. Specific examples of permitted analyses include: design basis accidents (e.g., loss-of-coolant-accidents), anticipated transients, accident management and emergency operating procedures, mid-loop operation, analysis to support PRA success criteria, power upgrades and reload.

Prohibited uses of the code include: (1) analyses to develop a new reactor design; (2) analyses to support power upgrades and reload in the U.S. unless performed by a U.S. subsidiary.

The disadvantage of this alternative is that it may give some CAMP members the opportunity to compete against U.S. companies in the non-U.S. market for commercial applications. We believe that the previously stated concerns of Westinghouse and General Electric would not be eliminated if the NRC adopts this alternative. However, since strong CAMP participation will be ensured, this option will benefit NRC thermal-hydraulic code development and will enhance worldwide reactor safety assessment. Furthermore, since our international partners have, in effect, partial ownership of the codes through their program contributions, it is reasonable to allow a limited commercial use of the codes in the non-U.S. market.

SUMMARY:

The NRC's thermal-hydraulic codes are used by more countries in the world than any other reactor safety analysis codes. The NRC has made these codes available to the international community to promote and enhance nuclear safety worldwide and benefits from wide distribution of the codes in three ways:

1. The code is exercised by a wider user base and is assessed against more diverse data.
2. Users identify errors, suggest corrections and perform two code assessments per year.
3. NRC receives financial contributions from the participants and invests them in the form of code maintenance, error corrections and improvements.

Presently, uses of the codes obtained under the CAMP agreement are restricted to non-commercial applications. Under Alternative 3, we suggest that these restrictions be clarified and modified to allow international organizations to use the codes for commercial applications in the non-U.S. market. We do recognize, however, that this action may appear to subsidize international organizations' competitive status and U.S. companies would have to contend with the international competition. However, four factors make this Alternative a reasonable policy:

1. Permitting limited commercial use of the codes in the non-U.S. market by international organizations will allow the NRC to maintain the CAMP program, which has proven to be valuable.
2. Wide distribution of the codes enhances the world's reactor safety analysis capability.
3. We believe that ensuring continuation of the U.S. regulatory body's world leadership role enhances the competitive position of U.S. companies more than the possibility of the increased competition in the non-U.S. market hinders it.
4. Even if the CAMP program restricts all commercial use, the codes can be obtained through other means that place no restriction on their use. NRC would receive no benefit from these programs, and the U.S. companies would be forced to contend with international competition in both the non-U.S. and domestic markets.

Alternative 3 maximizes the number of member countries in CAMP but does not unreasonably conflict with the present policy of restricting international organizations' commercial use. Therefore, the staff believes that it is a reasonable policy that accommodates the NRC as well as the U.S. industries. Since the positions of Westinghouse and General Electric have been voiced to the Commission in previous correspondence (Attachment 1), their views were not requested again.

COORDINATION:

The Office of General Counsel and the Office of International Programs have reviewed this paper and have no objections.

RECOMMENDATION:

Unless otherwise instructed within 10 days following the date of this paper, the staff will proceed with two activities:

1. The staff will proceed with implementing Alternative 3.
2. Since Alternative 3 will be a substantive change to the agreement text, Attachment 2 is a letter to Mr. Richard J.K. Stratford, U.S. Department of State, from Mr. Carl Stoiber requesting Executive Branch review of the new supplemental clarification to the non-commercial clause in the CAMP agreements.
3. The staff will proceed with renewing the CAMP agreements that maintain the current restriction but will inform the participants that the NRC is reassessing and clarifying code uses that are permitted under the policy of restricting CAMP members from using these codes for non-commercial purposes. A letter from Dr. Farouk Eltawila to Dr. Nusret Aksan of the Paul Scherrer Institute is also enclosed as an example of this correspondence (Attachment 3).

L. Joseph Callan
Executive Director for Operations

- Attachments:
1. [Correspondence between NRC and Westinghouse Electric Corp. and between NRC and General Electric Proposed Letter from C. Stoiber to R. Stratford](#)
 2. [Letter from F. Eltawila to N. Aksan](#)
 - 3.

ATTACHMENT 1

DRAFT

Mr. Richard J.K. Stratford, Director
 Office of Nuclear Energy Affairs
 Bureau of Political-Military Affairs
 U.S. Department of State
 Washington, D.C. 20520

SUBJECT: COMMERCIAL USE OF NRC-DEVELOPED THERMAL-HYDRAULIC CODES BY NON-U.S. ORGANIZATIONS

Dear Mr. Stratford:

The purpose of this letter is to request expedited Executive Branch consideration of a proposed text change to clarify the meaning of the commercial use restrictions on NRC thermal-hydraulic codes obtained by foreign organizations under the Code Assessment and Maintenance Program (CAMP) agreements. The proposed renewal text for these agreements was sent to you for Executive Branch review and generic clearance on June 6, 1997.

By way of background, the NRC has bilateral agreements with 23 countries to cooperate in the area of thermal-hydraulic research for the exchange of technical information including NRC-developed thermal-hydraulic codes, RELAP5, TRAC-P, and TRAC-B. The CAMP agreements are due to expire August 31, 1997. Article V-I of CAMP agreements (Attachment 1) prohibits non-U.S. organizations from using the NRC developed codes obtained through CAMP agreements for commercial purposes. The intent of the restriction in the current agreement is to prohibit international organizations from utilizing U.S. funded work to compete against U.S. companies. In the past, the NRC has granted some very limited exceptions to CAMP organizations to perform reactor safety analyses that we determined to be necessary to enhance the world's reactor safety assessment capability.

In October 1993, several CAMP members appealed to the NRC to delete the non-commercial use restriction in the CAMP agreements, since they believed the major benefit of their involvement in CAMP would be the ability to use the code for both commercial and non-commercial purposes. The NRC asked Westinghouse and General Electric to comment on the commercial impact of completely withdrawing restrictions on the use of the CAMP released thermal-hydraulic codes. Both companies replied that this action would put them at an economic disadvantage. As a result, the NRC continued the "current restrictions on commercial use of NRC codes obtained under the CAMP agreements."

Now that the current agreements are due to expire August 31, 1997, several CAMP members have indicated that they may not renew the agreements because the non-commercial use prohibitions are too restrictive. Others have requested that the NRC clarify the vague definition of commercial use before they decide to renew the agreement. It is possible that the NRC

codes are not being used for all permissible applications, which then diminishes the safety benefit that the codes can provide. This result is inconsistent with the mission of the NRC, which has been and continues to be to protect the health and safety of the public, by having the NRC codes more widely used by the international community to enhance the world's reactor safety assessment capability.

There is reason to believe that if the NRC does not modify the agreement, the CAMP membership will decline. There are other codes and user groups available to the international community that do not restrict the use of the same or very similar codes. The NRC would lose some benefit from the CAMP technical and financial contributions that have proved valuable. Since the codes have been developed over a period of 15 years of cooperative agreements, and both CAMP and its predecessor, ICAP, have provided a great deal of international assistance, the international community can claim some degree of ownership. Furthermore, no legislation prohibits someone from taking a mature version of the code, making minor changes and renaming it with an aim of providing this code to an alternate user group.

Therefore, we are proposing to modify Article V-I of the CAMP agreements to clarify the meaning of commercial use that is consistent with its original intent, i.e., the intent of NRC providing the code to the international community to be used to promote and enhance nuclear safety worldwide. Under this alternative, international users could perform safety analyses with the codes in the international market, but could not use them to compete in the U.S. or as a design tool. It is suggested that the text of Article V-I be supplemented by the following:

Among the code uses that will be permitted under the CAMP agreements are those related to research in the reactor safety area and analyses performed by CAMP members or their contractors that can assist regulators and plant personnel in assessing the safety of the plant, analyzing operating events, and training of operators. Specific examples of permitted analyses include: design basis accidents (e.g., loss-of-coolant-accidents), anticipated transients, accident management and emergency operating procedures, mid-loop operation, analysis to support PRA success criteria, power upgrades and reload.

Prohibited uses of the code include: (1) analyses to develop a new reactor design and analyses to support plant design modifications unless performed for a regulatory body with the aim to assess the safety significance of these modifications; (2) analyses to support power upgrades

and reload in the U.S. unless performed by a U.S. subsidiary.

It should be noted that although this modified text may give some CAMP members the opportunity to compete against U.S. companies in the non-U.S. market for commercial applications, it does not completely withdraw the restriction on non-commercial use. Moreover,

since strong CAMP participation will be ensured, this option will benefit NRC thermal-hydraulic code development and will enhance worldwide reactor safety assessment. Furthermore, since our international partners have, in effect, partial ownership of the codes through their program contributions, it is reasonable to allow a limited commercial use of the codes in the international market. Finally, we believe, since NRC thermal-hydraulic codes are used by more countries in the world than any other code for reactor safety analysis, they position the U.S. nuclear industry in an excellent competitive position.

We appreciate your prompt attention to this matter.

Sincerely,
Carlton R. Stoiber, Director
Office of International Programs

Attachment: A Sample CAMP Agreement

cc: SECY
OGC
OCA
OPA
EDO

ATTACHMENT 3

DRAFT

Dr. Nusret Aksan
Thermal-Hydraulic Laboratory
Paul Scherrer Institute
5232 Villigen PSI
Switzerland

Dear Dr. Aksan:

Enclosed are two copies of the CAMP agreement which extends the current agreement, due to terminate by the end of August 1997, for five years to August 2002. During the May 21-23, 1997, CAMP meeting, I stated that NRC is fully committed to expending the resources necessary to maintain the RELAP5, TRAC-P and TRAC-B for at least a five-year period. In FY97-FY98, we will couple the three codes to 3D neutronics, reduce the mass error in the RELAP5 code, modernize the RELAP5 code, and continue the modernization of the TRAC-P code. In addition, we will continue the development of the GUI. During the five-year period, the NRC will be undertaking separate tasks that will lead to the consolidation of these codes. Only after the consolidated code is fully completed, tested, assessed, and users are properly trained in its use, will the individual codes be archived.

From the NRC perspective, the CAMP activities have been very useful in providing information on the use of the NRC thermal hydraulic codes. These codes are available worldwide to assess the safety of nuclear plants and they need to be widely tested in order to find and correct errors, and facilitate improvement through experience. CAMP activities provided independent code assessments, identified user effects and machine dependencies which have been valuable in assuring code robustness, usability, and reliability. We also received new models and suggestions for improvement of the codes from member countries, which we factor into our work plans and priorities.

We believe that member countries also benefited from this cooperative agreement. They have had access to the codes and to the support provided by NRC and its contractors on the use of the codes. In addition, CAMP members have access to the updated codes as the errors are corrected and new improved models are added. Participation in the CAMP meetings where all participants present their results has been useful and beneficial to NRC and other users, since participants learn from each others' experience.

Please note that the enclosed agreement extends the current agreement for a five-year period with the same conditions as the current agreement. The NRC is currently reassessing and clarifying code uses that are permitted under the policy of restricting CAMP members from using these codes for commercial purposes. However, until, and only if, a list of such permitted code uses is provided, the current restriction on the use of the code for commercial purposes still applies.

I look forward to receiving a signed copy of the agreement soon, and I look forward to our continued cooperation.

Sincerely,
Farouk Eltawila, Chief
Reactor and Plant Systems Branch
Division of Systems Technology

Enclosures: As stated